BRITISH CHEMICAL ABSTRACTS

A.-PURE CHEMISTRY trong lines 6077 (attributed to 0.1) and consisting of the first positive the forestillar O, basils, and the

MARCH, 1935.

General, Physical, and Inorganic Chemistry.

Spectrum of ordinary hydrogen (H_2) . O. W. RICHARDSON (Nature, 1935, 135, 99-100).-The electronic configurations of new bands in the spectrum of H₂ are discussed. L. S. T.

Fine structure of H_a. F. H. SPEDDING, C. D. SHANE, and N. S. GRACE (Physical Rev., 1935, [ii], 47, 38-44).—Separation of the patterns of H_a^1 and H^2_a was obtained. Analysis of the spectrograms showed three components of the same relative intensities for each line. The divergence between observed and calc. intensities is discussed. The fine structure const. gave $1/\alpha = 137.4 \pm 0.2$. N. M. B.

Excitation potential of the nitrogen second positive bands. N. THOMPSON and S. E. WILLIAMS (Proc. Roy. Soc., 1935, A, 147, 583-593).—The energy of the $C^3\Pi$ level of N₂ is 13.16 ± 0.05 volts. There are indications of a possible fine structure of the excitation function near the excitation potential. L. L. B.

Structure of the second positive nitrogen group and the predissociation of the N_2 molecule. G. BUTTENBENDER and G. HERZBERG (Ann. Physik, 1935, [v], 21, 577-610).-The fine structure of eight bands of the second positive N2 group has been analysed. The discontinuance of the rotation structure in consequence of predissociation is discussed. The dissociation heat of N_2 in the ground state is 169.47±0.11 kg.-cal. per g.-mol. A. J. M.

Excitation of the nebular line 4267 (C) in oxygen. H. NAGAOKA and T. FUTAGAMI (Proc. Imp. Acad. Tokyo, 1934, 10, 554-556).-This line is enhanced in an atm. of O_2 when a minute amount of C is present. H. J. E.

Oxygen afterglow. E. M. STODDART (Proc. Roy. Soc., 1935, A, 147, 454—467).—Pure O₂ excited electrodelessly is glowless in " clean " and " poisoned " vessels, even in presence of N_2 ; it is also glowless in discharge tubes with degassed electrodes, but the glow is restored by addition of N2. From the facts that NO is synthesised when an electrode discharge 18 passed through O₂-N₂ mixtures, but not in electrodeless tubes, and that the addition of NO to an electrodeless discharge through O2 causes the appearance of an afterglow, it is concluded that the \hat{O}_2 afterglow is the same phenomenon as the $NO-O_3$ chemiluminiscence. The afterglow spectrum consists of weak diffuse bands from 4200 to 6700 Å.

L. L. B. Influence of temperature on absorption in excited neon gas. O. MASAKI and T. OKATOME (J. Sci. Hiroshima Univ., 1934, 5, 51-56).-The absorption of the unstable state $2^{3}P_{1}$ of Ne decreases very slightly from 20° to 220°, that of the metastable state $2^{3}P_{2}$ decreases slowly, whereas that of the metastable state $2^{3}P_{0}$ decreases rapidly with rising temp. R. S. B.

Vacuum spark spectra of sodium, magnesium, aluminium, and silicon. J. Söderqvist (Nov. Acta Reg. Soc. Sci. Upsali., 1934, [iv], 9, No. 7, 120 pp.; Chem. Zentr., 1934, ii, 1735). H. J. E.

Absorption series of argon, xenon, and krypton to terms between the ionisation limits ${}^{2}P_{3/2}^{0}$ and ${}^{2}P_{2/1}^{0}$. H. BEUTLER (Z. Physik, 1935, 93, 177-196). A. B. D. C.

Transition probabilities in the potassium series in flames. E. F. M. VAN DER HELD and J. H. HEIERMAN (Physica, 1935, 2, 71-74).—From the intensities of the d-p and s-p lines of K in an C₂H₂-air flame, and the temp. calc. by the reversal method, the transition probabilities of these changes are calc. (cf. this vol., 1). J. W. S.

Persistence of intercombination lines. A. T. WILLIAMS (Compt. rend., 1935, 200, 230-231).-It is shown that as the ratio of the terms decreases, the intensity and persistence of the lines increases; e.g., for the configuration d^2 the term ratios ${}^1D_2 - {}^3F_2/{}^3F_2 - {}^3F_4$ are Sc II 33.4, Y II 9.2, and La II 5.1. R. S. B.

Hyperfine structure of the zinc resonance line 3076 Å. W. BILLETER (Helv. phys. Acta, 1934, 7, 413-426; Chem. Zentr., 1934, ii, 1096).-Measurements by absorption are recorded. H. J. E.

Zeeman effect of the spectra of arsenic. J. B. GREEN and W. M. BARROWS, jun. (Physical Rev., 1935, [ii], 47, 131-135).-Wave-lengths, classifications, and Zeeman patterns are tabulated for 11 lines of As I, 64 lines of As II, and 2 lines of As III; resulting g vals. agree with perturbation theory. 22 unclassified lines of As II are listed. N. M. B.

Zeeman effect in bromine and iodine. P. LACROUTE (Ann. Physique, 1935, [xi], 3, 5-96).-Under improved conditions data are obtained, classified in orders of excitation, for 180 lines of Br and 400 lines of I, in the Schumann region. Zeeman effects are tabulated for 26 lines of Br 1, 182 of Br 11, and 244 of I II. Classifications of the arc spectrum of Br are revised; for Br II 26 lines are classified and g vals. for 20 terms are given; certain observed Paschen-Back effects are analysed. The no. of classified lines of I II is extended from 26 to 209, and the no. of terms from 12 to 54, with g vals. for 39 terms. Fundamental terms are identified; the

ionisation potential of I is 19.4 volts, and nuclear moment is 5/2. N. M. B.

Induced predissociation of the Te₂ molecule. V. KONDRATEEV and A. LAURIS (Z. Physik, 1934, 92, 741–746). $-N_2$ induces dissociation in excited Te₂ mols. A. B. D. C.

Spark spectrum of iodine. P. N. KALIA (Indian J. Physics, 1934, 9, 179–188).—Data are tabulated for 123 new lines in the range 1275— 2376 Å., excited by electrodeless discharge in tubes of I vapour at < 0.05 mm. pressure. N. M. B.

Ultra-violet absorption of iodine vapour. D. T. WARREN (Physical Rev., 1935, [ii], 47, 1-6).— The dependence of absorption on temp. and pressure was investigated. A general survey and explanation of the system 1900—3413 Å. are given. N. M. B.

Magnetic moment of the nucleus of cæsium. D. A. JACKSON (Proc. Roy. Soc., 1935, A, 147, 500-513).—The hyperfine structure of 5 terms in the arc spectrum of Cs has been investigated. Applying the formulæ of Goudsmit (A., 1933, 552) and of Fermi and Segré (*ibid.*, 759), all 5 terms yield the same val. (2.75/1838 Bohr magneton) for the nuclear magnetic moment. L. L. B.

Temperature change of the mercury arc by the addition of cadmium. W. ELENBAAS (Physica, 1935, 2, 45-54; cf. A., 1934, 936).—Addition of Cd increases the potential gradient of a high-pressure Hg discharge, although the ionisation potential of Cd (8.95 volts) is < that of Hg (10.38 volts). The corresponding temp. variation, calc. from the intensity variation of the Hg lines, leads to a calc. val. of the potential gradient in accord with the measured val. J. W. S.

Zeeman effect of mercury and perturbations. P. JACQUINOT (Compt. rend., 1934, 199, 1603— 1604).—Green and Loring's observations were confirmed (cf. Physical Rev., 1934, [ii], 46, 888).

H. J. E. Character of the ³S terms in the mercury spectrum. I. WALERSTEIN (Proc. Indiana Acad. Sci., 1934, 43, 190—191).—Shenstone and Russell's data (A., 1932, 439) have been revised. CH. ABS. (e)

Effect of hydrogen on the self-reversal of the resonance line of mercury. O. MASAKI and K. KOBAYAKAWA (J. Sci. Hiroshima Univ., 1934, 5, 47–50).—In presence of H₂ the resonance line of Hg is more intense at 20°, and less intense at >40°, than the neighbouring line 2537.77 Å. R. S. B.

First spark spectrum of lead: Pb II. L. T. EARLS and R. A. SAWYER (Physical Rev., 1935, [ii], 47, 115—122).—Data with classifications are tabulated for 247 lines in the range 800—10,000 Å., locating 89 levels for which term vals. and quantum nos. are given. N. M. B.

Hyperfine structure of singly ionised lead. J. L. ROSE (Physical Rev., 1935, [ii], 47, 122–128; cf. preceding abstract).—Wave-lengths and classifications of about 130 lines of Pb II and isotope shifts between Pb²⁰⁸ and Pb²⁰⁶, and also hyperfine structure separations of Pb²⁰⁷ are tabulated and discussed.

N. M. B.

Radiation of the night sky between 5000 and 8000 Å. J. CABANNES (J. Phys. Radium, 1934, [vii], 5, 601-613; cf. A., 1934, 824; this vol., 3, 59).—The spectrum consists of a discontinuous region of atm. origin, identical with that of the aurora, with strong lines 5577 (attributed to O I) and 6314 Å., and consisting of the first positive system of N₂, the terrestrial O₂ bands, and the vibration spectrum of H₂O. N. M. B:

Oscillographic test measurements with moving layers of the positive column of rare gases. W. PUPP (Physikal. Z., 1935, **36**, 61-66).

A. J. M. Continuous spectra of flames and arcs. W. FINKELNBURG (Z. Physik, 1935, 93, 201-205).-Part of the continuous emission is electron radiation varying with the pressure and degree of ionisation of the gas. A. B. D. C.

Arcs in air between metallic electrodes. H. DZIEWULSKI (Acta Phys. Polon., 1933, 2, 51– 58).—The force opposed to the e.m.f. for arcs between W, Ta, Mo, Cu, Ni, and Fe electrodes (I) in air is localised in the layer adhering to (I). CH. ABS. (e)

High-frequency discharge in gases and vapours as a source of light. V. I. ROMANOV (J. Tech. Phys. U.S.S.R., 1934, 4, 512—522).—Pure Zn and Cd vapours and their mixtures with Hg were studied. With oxide electrodes an easily regulated discharge is obtained. CH. ABS. (e)

Ultimate lines and excitation potentials. A.T. WILLIAMS (Rev. Soc. cient. Argentina, 1932, 5-6, 261-272).—Complete data are tabulated.

CH. ABS. (e) **X-Ray crystal scale, the absolute scale, and the electronic charge.** E. BĀCKLIN (Nature, 1935, **135**, 32—33).—The val. of e calc. from the difference between wave-lengths of Al $K\alpha_{1,2}$ determined by the grating method and by crystal diffraction is $4\cdot805 \times 10^{-10}$ e.s.u. L. S. T.

Absolute value of the X-unit. M. SÖDERMAN (Nature, 1935, 135, 67).—Vals. obtained are Al $K\alpha_1\alpha_2$ 8·340 \pm 0·001 Å.; 1000X = (1·00225 \pm 0·0001) ×10⁻⁸ cm.; and e (4·806 \pm 0·003)×10⁻¹⁰ e.s.u.

L. S. T.

True and apparent absorption coefficient of inhomogeneous X-rays (intensity and dose absorption coefficients). R. JAEGER (Physikal. Z., 1935, 36, 41-44).—An expression previously derived (this vol., 284) may be used in the calculation of the true absorption coeff. (μ) from the apparent μ . The process is illustrated by the calculation of the true μ for air and Cellophane (I) from the apparent μ of (I). A. J. M.

Atomic scattering power of palladium for copper K-radiation. E. NÄHRING (Z. Physik, 1935, 93, 197–200). A. B. D. C.

Fine structure of *L*-edges in the X-ray absorption spectra of the elements tantalum, tungsten, platinum, and gold. J. VELDKAMP (Physica, 1935, 2, 25-34).—The L_{Π} and L_{Π} absorption edges of Ta and W, which have a body-centred cubic structure, show a strong absorption line near to the edge,

line occurs in the L_{I} absorption edge. Comparison of the fine structures of the L_{III} edge of W and the K edge of Fe indicates that the wave function of the lower state of the electron has an influence on the fine structure near the edges. J. W. S.

X-Ray levels of radioactive elements with applications to β - and γ -ray spectra. A. E. RUARK and F. A. MAXFIELD (Physical Rev., 1935, [ii], 47, 107-114).-Calc. K, L, M, N, O, P series X-ray levels are tabulated for the elements TI 81-U 92. Data are given for the energies of certain γ -rays of Th-B·C, Th-C"·D, Ra-C·C', Ac-B-C, and Ac-C·C", for the energies of Auger lines of Rd-Ac, Ac-X, and Ms-Th₂, for the β -ray spectrum of Rd-Th, and for the β - and γ -ray spectra of U-X, and U-X₂. N. M. B.

New type of Auger effect and its influence on the X-ray spectrum. D. COSTER and R. DE L. KRONIG (Physica, 1935, 2, 13-24).-The radiationless transition $L_{\rm I} - L_{\rm III}$ with ejection of an outer electron is responsible for the abnormal weakening of emission lines with L_{I} as initial level, the great intensity of the Lm satellite lines within certain ranges of at. no. both for cathode-ray and fluorescent excitation, and for the diffuseness of L_{I} emission lines as compared with the $L_{\rm II}$, $L_{\rm III}$ emission lines. J. W. S.

Auger effect in argon. L. H. MARTIN, J. C. BOWER, and T. H. LABY (Proc. Roy. Soc., 1935, A, 148, 40-46).-The K yield of A, measured with a Wilson expansion chamber, the atom being ionised in turn by the K series characteristic radiations of Cu, Mo, and W, is 0.077. The probability of internal conversion is independent of the frequency of the L. L. B. exciting radiation.

New absolute determinations of the energy consumption in the ionisation of argon by X-rays. O. GAERTNER (Ann. Physik, 1935, [v], 21, 564-572).—The new val. for A is 28.4 ± 0.5 volts per ion-pair, which gives for air 35.2 or 37.5 volts according as the results of Gaertner or of Crowther are used for the relative ionisation of air and A. The deviation from the val. accepted at present $(32.2\pm0.5 \text{ volts})$ is discussed from the point of view of heat theory. A. J. M.

Thermionic emission and catalytic activity. II. Thoria-coated surfaces. Theory of Welsbach gas mantle. B. S. SRIKANTAN (J. Indian Chem. Soc., 1934, 11, 805-810; cf. A., 1931, 576).-The thermionic emission from a Pt wire coated with Ce₂0₃-ThO₂ mixtures has been determined. The temp. at which emission is perceptible is a min. for 98.97% ThO₂ + 1.03% Ce₂O₃ (temp.=948°) and this mixture gives max. emission at the same temp. attributed to electron emission. Previous theories of the emissivity of the Welsbach gas mantle are discussed. R. S. B.

Thermionic emission and catalytic activity. III. Mechanism of activation of gases at hot metallic surfaces. B. S. SRIKANTAN (Indian J. Physics, 1934, 9, 161-166; cf. A., 1931, 576).-On analogy between thermionic emission and catalysis

corresponding with a 2p-5d transition. No similar it is suggested that in a hot metallic catalyst activation is mainly due to the collision of the adsorbed mol. with the freely moving electrons, and an expression is derived, connecting velocity coeff. and temp. coeff., which agrees with available data for thermal decomp. of NH_3 by a W filament and of N_2O by Pt. N. M. B.

> Electron emission of tungsten-molybdenum alloys. H. FREITAG and F. KRÜGER (Ann. Physik, 1935, [v], 21, 697-742).-The emission work, b₀, and the const. A of the Richardson-Dushman equation for the emission of electrons from a heated metal, $I_s = AT^2 e^{-t_0/T}$ (I_s is saturation current), have been determined for W, Mo, and alloys of these metals containing 10, 40, 60, and 90% W. The curve between b_0 and composition of alloy decreases from 100% W to 90% W-10% Mo, and then increases almost linearly to 100% Mo. The vals. of A for the alloys, calc. from b_0 , are considerably below theoretical except for 60% W-40% Mo. A. J. M.

> Surface ionisation of potassium on molybdenum. R. C. EVANS (Proc. Camb. Phil. Soc., 1933, 29, 522-527).-Investigations on the efficiency of ionisation of K at a hot Mo surface show that the degree of ionisation (nearly 100%) is consistent with the most recent val. (4.4 volts approx.) for the electron N. M. B. work function of Mo.

> Critical potentials of helium, neon, and argon by the Lenard opposing potential method. H. LÖHNER (Ann. Physik, 1935, [v], 22, 81-91).-Suggested improvements (A., 1930, 1231; 1931, 1107) are incorporated into one apparatus. The following crit. potentials have been determined: He, 19.75, 20.5, 20.8, and 21.1 volts; Ne, 16.6, 17.1, 17.75, 18.5, 19.7 volts; A, 11.55, 11.75, 12.8, 13.2, A. J. M. 14.05, and 14.7 volts.

> Spectral selective photo-electric effect. C. ZENER (Physical Rev., 1935, [ii], 47, 15-16).-Mechanisms in which alkali metal electrons directly absorb light cannot give high efficiencies. If alkali atoms outside a unimol. gas layer absorb light, their excitation energy being transferred to the metal electrons, efficiencies comparable with observed results can be obtained. N. M. B.

> Action of β - and γ -rays on rock-salt crystals. P. W. BURBIDGE (Proc. Camb. Phil. Soc., 1934, 30, 62-69).—The relation between a weak primary activation and the "inner" photo-electric effect, when the crystal was illuminated with blue light, was investigated. The photo-current decreased exponentially with time, and the crystal returned to its original condition after the total photo-electric charge had been collected. This charge increased with the applied field, and varies largely for different specimens. For a given field and activation dosage the charge rose, at a rate increasing with the intensity of illumination, to a const. max. Explanations in terms of quantummechnical crystal theory are discussed. N. M. B.

Direct determination of electron affinities. Electron affinity of iodine. P. P. SUTTON and J. E. MAYER (J. Chem. Physics, 1935, 3, 20-28).-The relative nos. of electrons and negative ions leaving unit area of a hot (2000° abs.) W filament in unit time

when the latter is in I vapour at 10^{-3} mm. pressure have been measured in terms of the ionic and electronic currents flowing when equilibrium is established. The results lead to 72.4 ± 1.5 kg.-cal. as the electron affinity of I atoms. F. L. U.

Emission velocity of electrons in the "spray" discharge. H. FRICKE (Z. Physik, 1934, 92, 728— 740).—The "spray" discharge is the cathode fall free discharge. Velocities of emission of electrons from the cathode, and properties of its oxide layer, have been studied. A. B. D. C.

Scattering of electrons by nitrogen molecules. H. S. W. MASSEY and E. C. BULLARD (Proc. Camb. Phil. Soc., 1933, 29, 511—521).—An approx. theory of scattering is developed for cases when the wave-length of the electron is small compared with the internuclear distance. Calc. and observed angular distribution curves are given for 30, 60, 83, 205, 410, and 780 volt electrons scattered by N_2 . N. M. B.

Effect of exchange on the polarisation of electrons by double scattering. R. A. SMITH (Proc. Camb. Phil. Soc., 1934, 30, 520—523).—The discrepancy between the observed and calc. polarisation of beams of electrons scattered twice is investigated from the exchange between the incident electron and the electrons of an atom with which collision took place. Exchange will take place only in K and Lshells, and its magnitude is derived using Schrödinger's electrons in preference to a relativistic treatment. The val. obtained is too small to influence polarisation appreciably. W. R. A.

Influence of screening on the creation and stopping of electrons. J. A. BETHE (Proc. Camb. Phil. Soc., 1934, 30, 524—539).—Theoretical. Crosssections for the emission of radiation by very fast electrons and for the production of pairs of positive and negative electrons by very hard γ -rays are calc., considering the screening of the at. field in which the processes occur. W. R. A.

Artificially excited positrons. E. RUPP (Z. Physik, 1935, 93, 278).—Previous work is not free from criticism (cf. this vol., 139). A. B. D. C.

Production of electron-positron pairs. E. J. WILLIAMS (Nature, 1935, 135, 66). L. S. T.

Mean lives of excited hydrogen atoms. J. H. E. GRIFFITHS (Proc. Roy. Soc., 1935, A, 147, 547-555). —The average lives of the excited states of H_2 have been measured. The experimental vals. are $1.75\pm$ 0.3×10^{-8} sec. for H_a and $3.1\pm0.5 \times 10^{-8}$ sec. for H_{β} , corresponding theoretical vals. being 1.52 and $3.13 \times$ 10^{-8} sec., respectively. From the decrease of life with increasing pressure, the effective collision radius for quenching collisions between excited H atoms and H_2O mols. is calc. to be 6.57 and 9.5×10^{-8} cm. for H_a and H_{β} , respectively, in agreement with the kinetic theory collision distance. L. B.

Positive and neutral rays. I. Neutralisation of positive rays. II. Liberation of electrons from metallic surfaces. A. ROSTAGNI (Nuovo Cimento, 1934, [ii], 11, 34-47, 99-113; Chem. Zentr., 1934, ii, 1094).—I. The production of positive ions is described. The collision diameter of A, Ne, He, and H_2 for impact with the corresponding ions is independent of the velocity of the latter between 6 and 400 e.v. Ionisation of A and Ne by collision with A⁺ begins between 50 and 100 e.v.

II. The coeff. of electron liberation from a metal surface by A^+ , Ne⁺, He⁺, H₂⁺, A, Ne, and He has been studied. H. J. E.

Molecular rays. M. von Laue (Chem.-Ztg., 1934, 59, 87-88).—A brief review.

Capture of electrons by positive ions from neutral gas atoms. R. A. SMITH (Proc. Camb. Phil. Soc., 1934, 30, 514—519).—An apparatus for the production of an intense narrow beam of the He⁺ ions of uniform velocity is described. Capture crosssections for He⁺ in He and for H⁺ in H₂ and He are recorded and discussed. W. R. A.

Collisions of the second kind between magnesium and neon. J. H. MANLEY and O. S. DUFFENDACK (Physical Rev., 1935, [ii], 47, 56–61).— Data on the cross-section for collision between Ne ions and Mg atoms are obtained from intensity measurements, at various pressures of Ne, of Mg II lines in presence of Ne, and from the cross-section-energy discrepancy curve for the s, d, and f series.

N. M. B.

Energy of agitation of positive ions in argon. F. L. JONES (Proc. Physical Soc., 1935, 47, 74-85).— Investigations were made over an electric force (Z) range 5-50 volts per cm., and pressure (p) range 3-0.24 mm., by measuring the lateral diffusion of a beam of ions moving in a uniform electric field. In pure A, for low vals. of Z/p, the energy was the same as that of the gas atoms, and independent of p; for higher vals. of Z/p the mean energy was increased by the field. N. M. B.

Effect of binding on the effective cross-section with respect to very rapid electrons. A. SIEGERT (Ann. Physik, 1934, [v], **21**, 503-532).—Mathematical. A. J. M.

Interaction of light nuclei. I. H. S. W. MASSEY and C. B. O. MOHR (Proc. Roy. Soc., 1935, A, 148, 206—224).—Theoretical. Assuming the vals. of the binding energies of the nuclei, $_1H^2$, $_1H^3$, and $_2He^3$, respectively, the following vals. have been calc.: (a) cross-sections and angular distributions for elastic scattering of neutrons by H^1 , H^2 , and He^4 nuclei; (b) cross-sections for the radiative combination of neutrons and protons, and for the interaction of γ -rays with diplons; (c) cross-sections for continuous radiation by protons in collision with neutrons; and (d) cross-sections for the disintegration of diplons by α -particles. The data are compared with experimental vals., where available. L. L. B.

Heavy isotope of hydrogen. R. H. FowLER (Proc. Camb. Phil. Soc., 1934, 30, 225-241).-Liversidge lecture. N. M. B.

Chemical elements and natural atomic types from the viewpoint of the investigation of isotopes. O. HAHN (Ber., 1935, 68, [A], 1–15).—A review of work published between the end of 1933 and of 1934. H. W. Nuclear synthesis and isotopic constitution. H. J. WALKE (Phil. Mag., 1935, [vii], **19**, 33–59; cf. this vol., 7).—A discussion of the synthesis of elements as a result of the β -ray activity (or in certain cases the γ -ray activity) of the missing isotope of the previous element in the periodic table. The Pd isotopes in order of decreasing abundance are predicted as 106, 105, 104, 108, 110 (?), 100 (?), 102 (?). The existence of missing radioactive series is discussed. Pb²¹⁰ may be the end product of a shortlived Th-Ra series which has died out. The heavy elements are considered as being synthesised in the same way as the lighter ones, their radioactivity being due to their instability. H. J. E.

Condensation phenomena in mercury vapour. P. C. Ho (Proc. Camb. Phil. Soc., 1934, 30, 216— 224).—Using a cloud chamber connected by a long tube to an expansion chamber, so that Hg could be vaporised by heat while the expansion chamber remained at room temp., data were obtained for crit. expansion ratios required to give a cloud, and for crit. supersaturation, over the temp. range 191— 270° for a definite vol. change expansion. X-Rays did not appreciably increase the cloud density or change the expansion limit, indicating that there is no condensation on ions. Results in the case of definite pressure change expansions differed slightly from the first mentioned. N. M. B.

Theory of ionisation measurements in gases at high pressures. D. E. LEA (Proc. Camb. Phil. Soc., 1934, 30, 80—101).—Jaffé's columnar theory of the recombination of ions in α -particle tracks, extended to β -rays by taking account of the clusters of secondary ionisation, gives fair agreement with experiment. Recombination in proton tracks produced in H₂ by neutrons agrees with the columnar theory, but for N nuclear tracks in N₂ the recombination is only 0.01 of that predicted by theory. It is suggested that recombination is abnormally small for all heavy nuclei of velocities $\geq 5 \times 10^8$ cm. per sec. Data for the coeff. of recombination of ions in N₂ and H, at 20, 40, and 90 atm. are given.

N. M. B.

Simple method for measuring and finding the range of polonium preparations. B. KARLIK and E. RONA (Physikal. Z., 1935, 36, 27–28).—A method involving the luminescence (I) of a ZnS screen produced by bombardment with α -rays is used. It is employed to investigate the range distribution of particles from strong Po preps.; (I) ∞ no. of particles reaching the screen. The curve connecting (I) and range can be explained by assuming that 50% of the particles have normal range, and 50% are decreased by 1.2 mm. The increase in inhomogeneity of the rays with time was also investigated. The possibility of the penetration of the Po into its metallic support is discussed. With Au as the support, there was a marked decrease in range with time, but not with Pd or Ni. A. J. M.

Cloud chamber. P. C. Ho and E. C. HALLIDAY (Proc. Camb. Phil. Soc., 1934, 30, 201–205).—Using Wilson's improved apparatus (cf. A., 1933, 1266) photographs of electron, α - and β -ray tracks can be obtained satisfactorily over the pressure range 1 atm-7 cm. N. M. B.

Heat of the penetrating radiation of radium. A. DORABIALSKA (Rocz. Chem., 1934, 14, 798—805).— The heat of penetrating radiation has been determined after filtration through screens of different opacitics, using a modified adiabatic calorimeter. R. T.

Mesothorium. P. M. Wolf (Chem.-Ztg., 1935, 59, 66-68).—A review.

Radioactivity of potassium. F. H. NEWMAN and H. J. WALKE (Nature, 1935, 135, 98).—This may be due to $_{19}K^{40}$, produced by the action of neutrons on $_{20}Ca^{40}$, and present in amounts too small to be detected by the mass spectrograph. L. S. T.

Most probable ionisation curve of single Po α -particles and the occurrence of large numbers of ions at the end of the range. H. SCHULZE (Physikal. Z., 1935, 36, 68-69).—By dividing the no. of α -particles by the no. of ions produced at different points of the range, an ionisation curve is obtained which gives a max. at 5.4 mm. from the end of the range. The extrapolated val. of the range is 3.87 cm. A. J. M.

Range-velocity relation for α -particles and protons. W. E. DUNCANSON (Proc. Camb. Phil. Soc., 1934, 30, 102—113).—Various calculations and comparisons with available experimental data are given. N. M. B.

Absorption of α -rays and H particles by matter : penetration and retardation. G. MANO (J. Phys. Radium, 1934, [vii], 5, 628-634; cf. A., 1934, 579).—Recalc. vals. of the penetration in air of several groups of α -rays are in good agreement with experiment. The theory of penetration of H particles is examined, and vals. are calc. as a function of initial velocity and kinetic energy. Retardations and equiv. air thicknesses are given for H₂, N₂, O₂, He, Ne, A, H₂O, Al, Cu, Ag, Au, Pb, and mica for velocities $\geq 6 \times 10^9$ cm. per sec. N. M. B.

Diffraction of β -rays. Verification of de Broglie's law for very high velocity electrons. J. V. HUGHES (Phil. Mag., 1935, [vii], **19**, 129—145).— The law was verified for monochromatic β -rays (energy 250—1000 kv.), using sputtered Au on gelatin for the diffracting foils. H. J. E.

Low-energy β -rays of radium-*E*. H. O. W. RICHARDSON (Proc. Roy. Soc., 1935, A, 147, 442– 454).—An energy distribution curve has been obtained, extending from 10 to 65 kv., which fails to fit the accepted energy distribution for Ra-*E*. It is suggested that the available data on branching are inadequate, or that a group of low-energy particles is emitted by Ra-*E*. L. B.

Upper limits of the continuous β -ray spectra of thorium-C and -C". W. J. HENDERSON (Proc. Roy. Soc., 1935, A, 147, 572—582).—Accurate vals. are obtained for the upper limits of Th-C and -C", using the method of magnetic focussing and a coincidence counter. The max. energies liberated in the two branches of Th-C are found to be equal, as predicted by Ellis and Mott (A., 1933, 1100).

L. L. B.

Emission of γ -rays in nuclear reactions. W. D. HARKINS and D. M. GANS (J. Amer. Chem. Soc., 1934, 56, 2786—2787).—The energy changes accompanying artificial disintegration by neutrons are recorded for 71 nuclear reactions. The results are discussed. E. S. H.

Kinetic energy of neutrons emitted by beryllium bombarded by Po α -radiation. L. WINAND (J. Phys. Radium, 1934, [vii], 5, 597—600).—Determinations of the kinetic energy of N and O nuclei bombarded by neutrons from a Po+Be source show that the max. kinetic energy of the emitted neutrons is $< 10^7$ e.v. N. M. B.

Neutrons from deutons and the mass of the neutron. M. S. LIVINGSTON, M. C. HENDERSON, and E. O. LAWRENCE (Physical Rev., 1933, [ii], 44, 781).—Further experiments (cf. this vol., 142) corroborate the view that the deuton disintegrates, liberating approx. 4.8×10^6 volts of energy, and that the neutrons produced in the process have a mass of approx. 1.0006 mass units. L. S. T.

Attempt to detect a neutral particle of small mass. J. CHADWICK and D. E. LEA (Proc. Camb. Phil. Soc., 1934, 30, 59–61).—Unsuccessful attempts to detect a particle of the nature of Pauli's "neutrino," in order to explain the continuous β -ray spectra of Ra-E, indicate that such particle would be of small mass and zero magnetic moment. N. M. B.

Possibility of a positron transformation of radium-C. H. HERSZFINKIEL and J. HERSZAFT (Rocz. Chem., 1934, 14, 957—958).—The isotope of Ra-B which should be obtained were Ra-C to undergo positron degradation was not detected. R. T.

Neutrons and positrons. Artificial radioactivity. F. JOLIOT and (MME.) JOLIOT (Rev. gén. Sci., 1934, 45, 229–235; Chem. Zentr., 1934, ii, 1582–1583).—A summary and review. H. J. E.

Theory of artificial radioactivity. K. SITTE (Compt. rend., 1935, 200, 308–310).—The question of the average life of artificially radioactive elements is discussed on the basis of the theory of β -ray disintegration previously put forward (A., 1933, 1224).

M. S. B.

Natural and artificial radioactivity of potassium. G. von HEVESY (Nature, 1935, 135, 96).— Bombardment of Sc₂O₃ by neutrons from a Be–Rn source produces K⁴² according to scheme $_{21}$ Sc⁴⁵+ $_{0}n^1 \longrightarrow _{19}$ K⁴²+ $_{2}a^4$. K⁴² decays with a period of 16 hr., emitting hard β -rays of approx. 1.2×10^6 e.v. The natural radioactivity of K is thus limited to K⁴⁰ or K⁴¹, but the difficulty of reconciling the computed long life of these isotopes with the 5×10^5 e.v. energy of the electrons emitted by K still remains.

L. S. T.

Radioactivity induced by neutrons. L. SZILARD and T. A. CHALMERS (Nature, 1935, 135, 98). —Irradiation of In by neutrons shows the existence of a third period of approx. 3.5 hr. One of the two isotopes of In thus appears to be activated with two periods. This has been previously observed only in the case of elements lighter than Zn. L. S. T.

New radioactive elements. Chemical proofs of transmutations. F. JOLIOT and (MME.) JOLIOT (J. Chim. phys., 1934, 31, 611–620).—Possible types of transformation which may occur on bombardment of various atoms with α -particles, H atoms, H ions, and neutrons are discussed, and examples so far detected enumerated. On irradiation of BN by α -particles from Po, a radioactive element is formed which passes over with the NH₃ when the BN is treated with NaOH. Al similarly irradiated yields a product which is carried off with the H₂ on treatment with HCl and after oxidation is pptd. with P by a Zr salt. The products, half-life periods 14 and 3¹/₄ min., respectively, are probably N¹³ and P³⁰. J. W. S.

New artificial radioactive elements. I. O. D'AGOSTINO (Gazzetta, 1934, 64, 835—851; cf. A., 1934, 1284).—Details are given of the chemical methods used to identify 20 active elements obtained by neutron bombardment. O. J. W.

Experiments with high-velocity positive ions. IV. Production of induced radioactivity by high-velocity protons and diplons. J. D. Cock-CROFT, C. W. GILBERT, and E. T. S. WALTON (Proc. Roy. Soc., 1935, A, 148, 225-240).—Experiments described show that induced radioactivity can be produced in C by both proton and diplon bombardment, and in B and possibly N compounds by diplon bombardment. A study has been made of the decay period of the radioactive bodies and of the energy distribution of the positive electrons, and some evidence has been obtained bearing on the nature of the radioactive isotopes. L. L. B.

Induced radioactivity produced by neutrons liberated from heavy water by radium γ -rays. T. E. BANKS, T. A. CHALMERS, and F. L. HOPWOOD (Nature, 1935, 135, 99).—Radio-I and -Br are produced when EtI and CHBr₃, respectively, are bombarded by the neutrons liberated from H₂²O by irradiation with γ -rays from Ra. L. S. T.

Artificial radioactivity produced by neutrons. J. C. MCLENNAN, L. G. GRIMMETT, and J. READ (Nature, 1935, 135, 147).—With a Ra-Be source the following half-life periods were obtained : Mo 25 min. and approx. 36 hr., Pd 14 hr., Ta slight activity after 24 hr. exposure, W 23 hr., and Pt 36 min. With intimate mixtures of 100 mg. of Ra and equal quantities of Be, B, and Al the relative activities excited in I were 13.0, 4.5, and 1.0, respectively. L. S. T.

Probability of artificial nuclear transformations and its connexion with the vector model of the nucleus. M. GOLDHABER (Proc. Camb. Phil. Soc., 1934, 30, 561-566).-By introducing into a discussion of artificial nuclear transformations the theorem of quantum mechanics that the spin part of the angular momentum is approx. a const. of the motion, provided that the interaction forces depending on the directions of the spins are small compared with the total forces, "probable" and "not probable" nuclear reactions can be defined. An explanation is offered for the greater probability of $Li^6+H^1 \longrightarrow He^4+He^3$ than of $Li^7+H^1 \longrightarrow 2He^4$. From consideration of the nuclear transformations of Li6 and Li⁷ with H² the nuclear spin of Li⁶ is 1. Similar derivations for the spins of H³, He³, and B¹¹ each give }-W. R. A.

Formulæ and equations in nuclear chemistry. T. M. LOWRY (Nature, 1935, **135**, 36).—It is suggested that the French system, e.g., ³⁵₁₇Cl, be adopted. L. S. T.

Formulæ and equations in nuclear chemistry. J. H. AWBERY (Nature, 1935, 135, 185).—Nomenclature. L. S. T.

Atomic disintegrations with radium-B+C as source of rays. I. Method. G. ORTNER and G. STETTER (Sitzungsber. Akad. Wiss. Wien, IIa, 1933, 142, 493—508; Chem. Zentr., 1934, ii, 1583).— The method used with a Po source is modified by using very pure N₂ in the ionisation chamber.

H. J. E.

Disintegration of beryllium by γ -rays. Absorption of neutrons emitted. Effective crosssection of γ -rays. W. GENTNER (Compt. rend., 200, 310—312).—The fraction of the neutrons, emitted when Be is excited by γ -rays from different sources, which is absorbed by 7 cm. of Pb has been determined. It is thus shown that, in increasing the energy of the quantum supplied to the Be, the kinetic energy of the neutron emitted is also increased. The effective cross-section for the unfiltered γ -radiation of Ra-B+C is 2×10^{-28} sq. cm. M. S. B.

Transformation of beryllium by rapid protons, and the mass of Be⁹. F. KIRCHNER and H. NEUERT (Physikal. Z., 1935, **36**, 54—56).—There is a welldefined homogeneous group of particles of range 7.5 mm.(corresponding with total energy $2 \cdot 2 \times 10^6$ e.v.), which leads to the conclusion that only two types of particles can be present. The process may be represented as $_4\text{Be}^9+_1\text{H}^1 \longrightarrow _3\text{Li}^6+_2\text{He}^4$. Using the val. $6\cdot0145$ for $_3\text{Li}^6$, found by disintegration experiments, the mass of $_4\text{Be}^9$ is $9\cdot0110\pm0\cdot0006$, which is < the sum of the masses of two α -particles and a neutron ($9\cdot0123$). The val. found would make a nucleus of this structure stable, whereas the mass-spectrograph val. of $9\cdot0155$ would make it unstable. A. J. M.

Disintegration of boron by α -particles. H. MILLER, W. E. DUNCANSON, and A. N. MAX (Proc. Camb. Phil. Soc., 1934, **30**, 549—560; cf. A., 1934, 1284).—B was bombarded with α -particles from Ra-C' and Po and protons emitted were examined. All have been ascribed to the disintegration of B¹⁰. Four energy changes of 3·1, 0·4, -0·1, and -1·0 (×10⁶) e.v. are necessary to explain the observed range distribution. W. R. A.

Evidence for a new type of disintegration produced by neutrons. J. CHADWICK, N. FEATHER, and W. T. DAVIES (Proc. Camb. Phil. Soc., 1934, 30, 357-365).—A new type of disintegration, resulting in three heavy particles, has been studied by bombarding C with neutrons. It is not possible, on the available evidence, to decide between the reactions $C^{12} \longrightarrow 3Hc^4$ and $C^{12}+n^1 \longrightarrow 2Hc^4+Hc^5$.

Disintegration by slow neutrons. J. CHAD-WICK and M. GOLDHABER (Nature, 1935, 135, 65).— When Li is bombarded by neutrons from a Rn-Be source slowed down by passage through paraffin wax, singly-charged particles of max. range approx. 5.5 cm. and doubly-charged particles of range < 1.5

cm. are produced. The probable reaction is ${}_{3}\text{Li}^{6}+{}_{0}n^{1} \longrightarrow {}_{2}\text{He}^{4}+{}_{1}\text{H}^{3}$ and the energy released is approx. $5 \times 10^{6} \text{ e.v.}$ With B most of the particles are doublycharged with ranges < 5 mm. and the reaction is ${}_{5}\text{B}^{10}+{}_{0}n^{1} \longrightarrow {}_{2}\text{He}^{4}+{}_{2}\text{He}^{4}+{}_{1}\text{H}^{3}$. A small effect has been observed with N₂ and a doubtful one with Be. These reactions give a convenient and sensitive means for detecting slow neutrons. L. S. T.

Disintegration by slow neutrons. J. TUTIN (Nature, 1935, 135, 153).—An alternative explanation of the ejection of heavy charged particles from light atoms by slow neutrons (see above) is that heavy particles are outside and not in the nucleus.

L. S. T. Disintegration of nitrogen by neutrons. F. N. D. KURIE (Physical Rev., 1935, [ii], 47, 97— 107).—The disintegration of N by neutrons, produced by bombardment of Be with H², was investigated by cloud chamber photographs. The kinetic energy loss agrees with the momentary production of a radioactive N¹⁵ by a radiative capture of the neutron; the N¹⁵ disintegrates with emission of α -particles, the half-life being approx. 10⁻²⁰ sec., and mass 15·0166. In disintegrations by neutrons the proper disintegration energy *E*, as opposed to absorbed energy, is a const. The val. 3·1 mv. found for *E* agrees with that from available data on transmutation of F, O, and Ne. N. M. B.

Disintegration of fluorine nuclei by neutrons and the probable formation of a new isotope of nitrogen (N¹⁶). W. D. HARKINS, D. M. ĜANS, and H. W. NEWSON (Physical Rev., 1933, [ii], 44, 945-946).-3200 pairs of photographs in a Wilson cloud chamber filled with 30% by vol. of CCl_2F_2 and 70% of He show 10 nuclear disintegrations, most probably those of F nuclei. Each disintegrating nucleus breaks into two parts, one of which has a range 2-11 times that of the other. For disintegra tions in which the neutron is captured, the reaction is probably $F_1^{19} + n_1^1 \longrightarrow F_2^{20} \longrightarrow N_2^{16} + H_0^4$, where the subscripts represent isotopic nos. Kinetic energy always disappears when F is disintegrated, part of it probably being converted into γ -rays. The no. of disintegrations obtained with F is approx. the same as with N with equal concns. of atoms and neutrons. The no. decreases in the order N or F, O, Ne, C, and Cl. L. S. T.

Disintegration of the nuclei of light atoms by neutrons. II. Neon, fluorine, and carbon. W. D. HARKINS, D. M. GANS, and H. W. NEWSON (Physical Rev., 1935, [ii], 47, 52—55; cf. A., 1933, 1225).—Measurements of cloud track photographs of disintegration, by capture of a neutron, of Ne and F nuclei indicate the reactions: ${}_{10}Ne^{20}+{}_{0}n^{1} \longrightarrow {}_{8}O^{17}+{}_{2}He^{4}$ and ${}_{9}F^{19}+{}_{0}n^{1} \longrightarrow {}_{7}N^{16}+{}_{2}He^{4}$, the N¹⁶ being a new isotope. Mechanism and energy changes are interpreted. Positive-ray data show that the change ${}_{6}C^{12}+{}_{0}n^{1} \longrightarrow {}_{4}Be^{9}+{}_{2}He^{4}$ requires a min. neutron kinetic energy of $6\cdot9 \times 10^{6}$ e.v. Since only 1 of 6 disintegrations in 6400 photographs satisfied this condition, the neutron disintegration of C is not proved. N. M. B.

Transmutations of sodium by deutons. E. O. LAWRENCE (Physical Rev., 1935, [ii], 47, 17-27).

R. S. B.

Under deuton bombardment Na emits protons, neutrons, and α -particles and yields radio-Na, halflife of 15.5 hr., and emitting electrons with energies up to 1.2 mv., and 5.5 ± 0.5 mv. γ -rays. One microamp. of 1.7 mv. deutons bombarding NaCl produces about 4×10^6 radio-Na atoms per sec., equal approx. to the no. of emitted protons, and indicating the formation of Na²⁴. The max. proton range is 49 ± 2 cm. The nos. of emitted neutrons and protons are approx. equal. The α -particle range is 6.5 ± 0.3 cm., Ne²¹ probably being formed. Balance of energy in the reactions indicates the at. masses : Na²³, 22.992 \pm 0.001; Na²⁴, 24.000 \pm 0.003; Mg²⁴, 23.993 \pm 0.003.

N. M. B.

Artificial transformation of uranium by neutrons. O. HAHN and L. MEITNER (Naturwiss., 1935, 23, 37-38).-Of the four at. species (halflife periods 10 sec., 40 sec., 13 min., and 90 min., respectively) obtained by bombarding U with neutrons, the last two have been further investigated. After bombardment, the U was dissolved, KReO, and $PtCl_4$ added, and then NaOH to ppt. U. Pt was removed by H_2S . The ppt. was found to contain a considerable quantity of the 13-min. body (I), and some of the 90-min. body (II). The Re was pptd. from the filtrate by the addition of conc. HCl and further passage of H₂S, but was inactive. If, on the other hand, $KReO_4$ only was added at the start, and the above separation was carried out, the Re contained both (I) and (II). (I) thus appears to resemble Pt rather than Re, which, whilst excluding the possibility of its being element 90, 91, or 92, is not incompatible with its being 93. When Pt, Re, Zr, and U-Z are added to the U and transformation product, the Pt on separation was found to contain (I) and (II), but the U-Z did not. Hence (I) and (II) are not isotopes of Pa. It is probable that they belong to a radioactive series leading into the Ac series. A. J. M.

Analysis of absorption curves of cosmic rays. B. Gross (Z. Physik, 1934, 92, 755-758).

A. B. D. C.

Ultra-penetrating corpuscles of cosmic radiation. P. AUGER and P. EHRENFEST (Compt. rend., 1934, 199, 1609-1611).—Experiments using two counters, one above the other, separated by 50 cm. thickness of Pb, showed the existence of a highly penetrating type of radiation. H. J. E.

Absorption of cosmic particles in copper and lead. G. Alocco (Nature, 1935, 135, 96—97).—Cu and Pb, although differing in at. no., absorb the more penetrating cosmic particles to the same extent.

L. S. T.

Connexion between atomic and cosmic constants in the expanding universe. H. ERTEL (Naturwiss., 1935, 23, 36–37).—Theoretical.

A. J. M.

Investigation of corpuscular rays with a double [ionisation] chamber and two valve electrometers. G. STETTER and J. SCHINTLMEISTER (Sitzungsber. Akad. Wiss. Wien, IIa, 1933, 142, 427-436; Chem. Zentr., 1934, ii, 1587).—A method of measurement by simultaneous recording of the ionisation in two chambers is described. H. J. E. Determination of the potential of interaction of corpuscles. L. GOLDSTEIN (Compt. rend., 1935, 200, 296—298).—A discussion of the limits of validity of the classical theory and quantum theory with regard to the regions in which the potential of interaction may be considered to exist. M. S. B.

Are the formulæ for the absorption of highenergy radiations valid? J. R. OPPENHEIMER (Physical Rev., 1935, [ii], 47, 44–52).—Discrepancies between observed and calc. absorption of cosmicray electrons and γ -rays are discussed. A limitation of classical electron theory leads to improved agreement. N. M. B.

Nuclear moments. D. R. INGLIS (Physical Rev. 1935, [ii], 47, 84–88).—The magnetic moments of nuclei can be explained on the assumption that nuclei are built of protons of spin 1/2 and gyromagnetic ratio -5, and of neutrons of spin 1/2 and gyromagnetic ratio $-1\cdot1$. N. M. B.

Properties of nuclear constituents. G. C. WICK (Nuovo Cim., 1934, [ii], **11**, 227–234; Chem. Zentr., 1934, ii, 1731–1732).—The interaction between nuclear constituents is discussed. The binding energy of the neutron and proton in H² is $8\cdot3 \times 10^6$ e.v.

H. J. E.

 α -Particles in light nuclei. E. GAPON and D. IVANENKO (Compt. rend. Acad. Sci. U.R.S.S., 1934, 4, 275-277; cf. A., 1934, 827).—The mass defects of atoms of at. wt. 1-36 show maxima at every fourth no., indicating that α -particles or similar groups of 4 are present in the lighter nuclei.

J. W. S.

Stability of the proton and neutron. G. WENTZEL (Naturwiss., 1935, 23, 35-36).—Theoretical. The spontaneous occurrence of the changes $N \longrightarrow P + e^- + n$ (I), and $P \longrightarrow N + e^+ + n$, is considered. N=neutron, P= proton, e= electron, and n= neutrino. Investigation of the breaking down of the H atom into N, n, and a light quant, $P+e^- \longrightarrow$ $N+n+\nu$, furnishes new criteria for the stability of N and P, and leads to the conclusion that the mass of N must be \leq that of $P+e^-$. N is unstable with respect to process (I). A. J. M.

I. Charge and field fluctuations. II. Production of pairs by charged particles. J. R. OPPENHEIMER (Physical Rev., 1935, [ii], 47, 144– 145, 146–147).—I. The field fluctuations arising from the possibility of creating positron-electron pairs in Dirac's theory are cale.

II. The internal conversion by pair-production of the radiation emitted in the impact of charged particles is cale. N. M. B.

Approximation method in the problem of many electrons. H. HELLMANN (J. Chem. Physics, 1935, 3, 61).—A new method is described. F. L. U.

Born-Infeld field theory of the electron. E. FEENBERG (Physical Rev., 1935, [ii], 47, 148-157). N. M. B.

Infinite distribution of electrons in the theory of the positron. P. A. M. DIRAC (Proc. Camb. Phil. Soc., 1934, 30, 150—163).—Mathematical. A precise meaning is found for a distribution in which every state is occupied, and for one in which nearly all the negative-energy states are occupied and nearly all the positive-energy states unoccupied. N. M. B.

Annihilation radiation of the positron. O. KLEMPERER (Proc. Camb. Phil. Soc., 1934, 30, 347— 354).—By means of two Geiger-Müller coincidence counters it has been shown that the radiation produced by the annihilation of a positron by an electron is emitted as a pair of γ -rays in opposite directions. The coincidence method of Becker and Bothe, and absorption measurements using Pb, establish that the radiation is soft and homogeneous, the energy of each ray being 0.5×10^6 e.v. The total energy is then nearly equal to the theoretical val. for the mass equiv. of the positron and electron, viz., 1.02×10^6 e.v. The positron source consisted of C and B (in Na₂B₄O₇) activated by bombardment with diplons and protons.

R. S. B.

Quantum theory of the diplon. H. BETHE and R. PEIERLS (Proc. Roy. Soc., 1935, A, 148, 146—156). —The following vals. have been calc. : cross-section for disintegration of a diplon by absorption of γ -rays, 1.6×10^{-27} sq. cm.; cross-section for capture of neutrons by protons, 2.7×10^{-29} sq. cm.; cross-section for scattering of γ -rays by diplons, 2.0×10^{-31} sq. cm. The disintegration of diplons under electron bombardment is considered. L. L. B.

Wave mechanical treatment of the molecule Li_2^+ . H. M. JAMES (J. Chem. Physics, 1935, 3, 9— 14; cf. this vol., 15).—The dissociation energy of Li_2^+ is $1\cdot30\pm0\cdot05$ c.v. F. L. U.

Electromagnetic fields in the quantum theory. II. L. GOLDSTEIN (J. Phys. Radium, 1934, [vii], 5, 623-627; cf. this vol., 8).—Mathematical.

N. M. B.

Heterogeneous electromagnetic ether capable of producing a quantic atomic field of force. M. BRILLOUIN (Compt. rend., 1935, 200, 275—279).— Theoretical. M. S. B.

Wave mechanical calculation of some atomic properties. G. PLATO (Ann. Physik, 1935, [v], 21, 745—760).—Mathematical. Properties of atoms connected with the three innermost shells are derived. Accurate ψ -functions for Ne and A and ions with this structure (K⁺, Cl⁻) are calc., and the calc. diamagnetic susceptibility agrees with observation. A. J. M.

Spectroscopic determination of e/m. C. D. SHANE and F. H. SPEDDING (Physical Rev., 1935, [ii], 47, 33-37).—The val. $1.7579\pm0.0003\times10^7$ was obtained from accurate measurement of the wave-no. difference between the H_a lines of H and H². The calc. mass ratio H atom/electron is $1835.6\pm0.2_5$.

N. M. B.

Exchange in the Thomas-Fermi atom. H. JENSEN (Z. Physik, 1935, 93, 232-235).—Completion of previous work (A., 1934, 1054). A. B. D. C.

Elementary electric charge. E. SCHOPPER (Z. Physik, 1934, 93, 1—21).—This is given as 4.769 ± 0.004 c.g.s. units. A. B. D. C.

Multipole radiation and quantum selection rules for central field atoms. C. K. JEN (Sci. Rep. Nat. Tsing Hua Univ., 1934, 2, 413-418).—Mathematical. Budde effect in iodine. I. Photo-expansion. II. Influence of temperature on the photoexpansion. T. S. NARAYANA (Indian J. Physics, 1934, 9, 111–115, 117–120).—I. An effect similar to that in Cl_2 and Br_2 (cf. A., 1934, 1295) was found in I_2 . Photo-expansion \propto light intensity and v.p. of I, and was a max. in the violet and orange regions at 70 mm. v.p. of I.

II. Vals. of 0.7 and 0.45 mm. for the photoexpansion at 200° and 350°, respectively, show that the effect diminishes with rise of temp. Results are inter preted with the help of Wood's data for the catalytic effect of dry and moist glass walls. N. M. B.

Relation between scattering and absorption of light in sols of silver, silver chloride, and colophony. G. P. LUTSCHINSKI and E. S. ALTMAN (Kolloid-Z., 1935, 70, 55—61).—The absorption of light by the sols is in accordance with Lambert's rule. The coeff. of total absorption is the sum of the coeffs. of real (I) and apparent absorption (II); in metal sols (I) > (II) and increases with increasing concn.; in colourless non-metal sols (I) increases with concn. to a limit and is independent of concn. thereafter. Beer's rule does not apply. E. S. H.

Formation and dissociation of diatomic molecules. R. RYDBERG (Z. Physik, 1934, 92, 693– 704).—Formation and dissociation of AlH mols. was studied by observing absorption by an Al arc in H_2 at pressures up to 0.5 atm. A. B. D. C.

Ultra-violet transmission changes in glass as a function of the wave-length of the radiation stimulus. W. W. COBLENTZ and R. STAIR (Proc. Nat. Acad. Sci., 1934, 20, 630-635).-Na₂O-CaO-SiO₂ glass exposed to ultra-violet radiation undergoes changes in spectral transmission, differing in magnitude for different wave-lengths, and occurring in a wide band from 405 m μ to the extreme ultra-violet; the glass shows stages in photochemical equilibrium, not found in potash glass, indicating the soda as the photosensitive constituent. Using observed changes in transmission as a measure of changes in concn. of the photo-sensitive substance, the energies involved in the formation and disintegration of the latter are calc.

N. M. B.

Flame spectrum of ethylene. W. M. VAIDYA (Proc. Roy. Soc., 1935, A, 147, 513—521).—When produced with the aid of a Smithells flame separator, the spectrum of the inner cone of the C_2H_4 flame includes, in addition to strong bands of C_2 , CH, and OH, a system of fainter bands extending from 4100 to 2500 Å. degraded towards the red. Conditions for the occurrence of these bands have been investigated, and their wave-lengths are tabulated. It is suggested that they are due to HCO, and supporting evidence is cited. L. L. B.

Modern spectroscopy. H. DINGLE (J. Soc. Arts, 1935, 83, 234–245, 258–272, 283–301).—Lectures.

Absorption spectrum of NaH². E. OLSSON (Z. Physik, 1935, 93, 206-219).—The true quantum numbers for NaH and NaH² are deduced from isotope effects. A. B. D. C.

Spectra of CaH and CaH². W. W. WATSON (Physical Rev., 1935, [ii], 47, 27-32).—Full data of observed lines, quantum assignments, and combination differences are tabulated for the B and C systems of CaH². The spectra of CaH and CaH² are compared. The calc. decrease for the equilibrium internuclear distance in CaH² is 0.059%. N. M. B.

OH²⁺ bands. A. CLARK and W. H. RODEBUSH (J. Amer. Chem. Soc., 1935, 27, 228).—The OH²⁺ bands in the electrodeless discharge in H²O have been photographed. E. S. H.

Absorption spectrum of sulphur monoxide. G. KORNFELD and M. MCCAIG (Nature, 1935, 135, 185–186).—The absorption spectra of SO₂ before and after the production of an electrodeless discharge are identical, but the emission spectrum taken during the discharge shows the presence of SO. Small concns. of SO do not absorb between 3100 and 2500 Å.

L. S. T.

Spectrum of AsO. F. A. JENKINS and L. A. STRAIT (Physical Rev., 1935, [ii], 47, 136-139).-Measurements for the band heads of two systems due to AsO and equations for the vibrational structure are given. Heat of dissociation of AsO is 4.93 volts.

N. M. B.

Spectroscopic investigation of the structure of hydrogen halides. A. K. DUTTA and S. C. DEB (Z. Physik, 1934, 93, 127—140).—Emission spectra of the H halides are continuous with fixed long-wave limits. Electron configurations are given, and the continuous spectra ascribed to two neighbouring levels, the higher being unstable; it cannot be stated whether the linkings are at. or ionic. The electric moment is considered. A. B. D. C.

Ultra-violet absorption spectra of alkali halide crystals. A. von HIPPEL (Z. Physik, 1934, 93, 86—89).—The characteristic ultra-violet absorption spectrum of the alkali halides has two doublet bands corresponding with the different space-groups of cations around an anion. A. B. D. C.

Nature of the red layer formed at the border of the coloured zone in alkali halide crystals. S. ARZIBISCHEV and A. TORPOREC (J. Phys. Radium, 1934, [vii], 5, 619—622).—When a crystal of rock-salt or KCl, containing a piece of Na sealed in a cavity, was heated to 700° a red layer formed in the crystal, the rapidity of formation being increased by the passage of a current. The distance of the layer from the anode varies with the duration of the current. Photometric and ultra-violet absorption suggest that the layer is due to the diffusion of colloidal Cu in the salt, and deposition following the neutralisation of Cu ions (from electrodes) by electrons emanating from the Na cathode. (Cf. this vol., 282.) N. M. B.

Rotation structure of AlCl bands. W. HOLST (Z. Physik, 1934, 93, 55-64).—Six bands have been analysed, and the nuclear separation is given as 2.3 A. A. B. D. C.

Optical dissociation of InBr and InI. J. S. SEDOV and A. N. FILIPPOV (Compt. rend. Acad. Sci. U.R.S.S., 1934, 4, 374—377).—The long-wave limits of absorption causing dissociation have been determined, and the fluorescence spectra examined. Heats of dissociation are $75 \cdot 5 \pm 2 \cdot 5$ kg.-cal. per mol. for InBr and 62 ± 2 for InI. E. S. H. Displacements of the absorption bands of certain rare-earth salts : spectrographic detection of rare earths. Y. UZUMASA (J. Fac. Sci. Hokkaido Imp. Univ., 1934, [iii], 2, 1–11).—Mg and La salts did not affect the appearance and persistence of Nd bands; in EtOH a broadening of band λ 5780 was observed. Addition of HCl to a solution of NdCl₃ +CO(NH₂)₂ progressively eliminated the displacement and broadening, due to the CO(NH₂)₂, of the λ 5780 band. N. M. B.

Vibrational analysis of the absorption spectrum of lead sulphide. G. D. ROCHESTER and H. G. HOWELL (Proc. Roy. Soc., 1935, A, 148, 157— 170).—A new, extensive absorption band spectrum ascribed to PbS has been discovered in the region 3140-7690 Å. The spectrum consists of overlapping progressions of bands degraded to the red. In the region of greatest dispersion, the bands show apparently simple rotational structure. By analogy with PbO, the electronic transition would appear to be $\Sigma \leftarrow -1\Sigma$. Of 230 bands, 221 have been fitted into 6 systems with the same ground state, and the vibrational consts. for the states giving rise to these systems have been derived by a "least-squares" method. Interesting intensity anomalies not explained by the Condon theory have been found in system A.

L. L. B. Absorption spectra of the sulphite and sulphate ions. S. M. KARIM and R. SAMUEL (Proc. Indian Acad. Sci., 1934, 1, A, 398-406).—Curves and data are given of measurements, as crystals or in solution, for NaHSO₃, KHSO₃, Na₂SO₃, Na₂SO₄, NaHSO₄ KHSO₄, NaMeSO₄, Me₂SO₄, Et₂SO₄, and ClSO₃H. Results and structural deductions are discussed.

N. M. B.

General connexion between frequencies of the band spectra of aromatic hydrocarbons and their derivatives. D. RADULESCU and C. DRAGULESCU (Physikal. Z., 1935, 36, 66—68).—For the vapours of aromatic hydrocarbons, and their derivatives, all the luminescence, fluorescence, and absorption bands may be arranged together in series governed by the general formula, $F_x = F_{0}\rho^x$, where F_0 is the frequency of a band, $\rho = 1.01048$, and x is a positive or negative integer. The formula is tested with the absorption max. of pyrene and of phenanthrene (both in EtOH), and the fluorescence bands of solid C_6H_6 . A. J. M.

The azo chromophore.—See this vol., 207.

Continuous bands of glycerol. S. M. MITRA (Z. Physik, 1934, 93, 141—146).—The effect of KI and temp. on fluorescence of glycerol has been studied. A. B. D. C.

Hydrogen sulphide band at 10,100 Å. P. C. CROSS (Physical Rev., 1935, [ii], 47, 7—14).—A detailed rotational analysis is developed. Observed lines and the spectrum calc. from the rotational term vals., and transition vals. explaining 84 of the 91 lines are tabulated; 7 lines are considered spurious. The moments of inertia of the normal vibrational state are 2.667, 3.076, and 5.845×10^{-40} g.-cm.², the axis of least inertia being perpendicular to the symmetry axis of the mol. The linking angle is 92° 20', and the H—S distance 1.345 Å. N. M. B. Absorption bands of HCN in the photographic infra-red. G. HERZBERG and J. W. T. SFINKS (Proc. Roy. Soc., 1935, A, 147, 434–442).—Two strong HCN bands at 1.04 and 1.16 μ have been analysed. The rotational consts. are derived. $I_0=18\cdot703\times10^{-40}$ g.-cm.² The internuclear distances, calc. from I_0 on the assumption that the C—H distance is the same as in C₂H₂, are < those in the free diat. radicals. The broadening of HCN lines by pressure is attributed to a strong intermol. interaction. L. L. B.

Frequency of vibrational and rotational bands and the chemical reactivity of gaseous molecules. W. HELLER (Compt. rend., 1934, **199**, 1611—1613; cf. this vol., 150).—The diminution in the near infra-rcd frequency of OH in a series of compounds of the type R·OH as the complexity of R is increased is parallel to increased reactivity of the corresponding Cl derivative of the radical, as measured by the reaction RCl+ Na \longrightarrow R+NaCl. H. J. E.

Infra-red region of the spectrum. XI. Absorption spectrum and molecular structure of boron trichloride, and the effect of strain on plane groups of the type XY. A. B. D. CASSIE (Proc. Roy. Soc., 1935, A, 148, 87-103).-Nine bands in the infra-red absorption spectrum of BCl3 have been located between 1 and 18 µ, and fundamental frequencies have been assigned from a consideration of the Raman displacements. The true val. of the force const. for the BCl linking is deduced from Morse's potential nuclear separation expression. The electron configuration is discussed. Evaluation of both the true and strain rigidities of the plane configuration shows that this is not due to repulsion of the $\tilde{C}l$ atoms alone. The CO_3'' and NO_3' ions have been similarly investigated with respect to the true force consts. and true rigidity. Both ions would be pyramidal in the absence of the repulsion of the O ions. L. L. B.

Far infra-red absorption of benzene. R. B. BARNES, W. S. BENEDICT, and C. M. LEWIS (Physical Rev., 1935, [ii], 47, 129–130).—Five weak bands, interpreted as difference bands, were found in the region 40–135 μ ; the observations support the plane symmetrical hexagonal mol. model. N. M. B.

Rotational Raman effect in gases: carbon dioxide and nitrous oxide. S. BHAGAVANTAM and A. V. RAO (Nature, 1935, 135, 150).—The distribution of intensity in the rotational Raman wings has been determined for gaseous CO₂ at 6 and 50 atm. and for N₂O at 6 and 40 atm. At the higher pressures these wings become similar to those obtained with liquids. The intensity max. at low pressures give 69×10^{-40} and 62×10^{-40} , respectively, for the moments of inertia of CO₂ and N₂O mols. (cf. A., 1933, 885).

L. S. T.

Raman effect of binary mixtures of sulphuric and nitric acids. L. MEDARD (Compt. rend., 1934, 199, 1615—1617; cf. A., 1933, 1102).—Mixtures of pure conc. HNO₃ and H_2SO_4 gave a new Raman line (1400 cm.⁻¹) attributed to a mol. association product. Other lines, characteristic of the separate acids, were observed. H. J. E.

Relation between the molecular spectrum and the electrons and electron rings of the con-

stituent atoms. H. DESLANDRES (Compt. rend., 1934, 199, 1543—1546; cf. A., 1934, 1054).—Raman spectrum data for H_2O , CH_2O , MeOH, MeCl, and S_2Cl_2 are discussed on the author's theory.

H. J. E.

Raman effect and dipole moment in relation to free rotation. I. S. MIZUSHIMA, Y. MORINO, and K. HIGASI (Sci. Papers Inst. Phys. Chem. Res. Tokyo, 1934, 25, 159-221; cf. this vol., 12).—The dipole moments (I) of (CH2Cl)2, CH2Cl·CH2Br, (CH2Br)2, and $(CH_2I)_2$ in C_6H_{14} , amylenc, C_6H_6 , PhMe, Et_2O , CCl_4 , and CS_2 were determined. (I) of these compounds increases with rise of temp. and with increasing dielectric const. of the solvent, except in C6H6 and PhMe solutions, where (I) are much > would be expected. In the rotation of the CH₂X groups in the ethylene halides, the trans position is most stable. The probability of deviation from this position increases with rise in temp. The mutual potential energy of the two groups increases with the at. wt. of the halogen. Observations of the intensities of the two Raman lines of (CH2Cl)2 and (CH₂Br)₂ lead to the same conclusions. A. J. M.

Relative intensities of the Raman and the Rayleigh lines in light scattering. J. DHAR (Indian J. Physics, 1934, 9, 189–194).—Using the Hg 4358 line for excitation, relative intensities are given in the scattering by C_6H_6 , CCl_4 , $SiCl_4$, $CHCl_3$, and $CHBr_3$. N. M. B.

Raman spectrum of the esters of some derivatives of β -ketobutyric acid. M. MILONE (Gazzetta, 1934, 64, 868—875).—The Raman spectra of the compounds COMe·CHR·CO₂R' (R'=Me or Et, R=alkyl) show that at room temp. there is a considerable amount of the enol form present.

O. J. W. Raman effect of some aliphatic ethyl ketones. M. MILONE (Gazzetta, 1934, 64, 876-882).—The Raman spectra of 9 ketones COEtR all give the characteristic C:O frequency at 1710 cm.⁻¹

C. J. W. Raman spectrum of $\Delta^{1:3}$ -cyclohexadiene. J. W. MURRAY (J. Chem. Physics, 1935, 3, 59— 60).—Raman frequencies are given in comparison with C₆H₆ and C₆H₁₀. F. L. U.

Quasi-crystalline structure of liquids and the Raman effect. E. GROSS and M. VUKS (Nature, 1935, 135, 100–101).—Investigation of the Raman spectrum of Ph₂O shows that the "wings" which accompany the primary line are due, not to a rotation of the mols. as hitherto assumed, but to a vibrational Raman effect. The theory of the quasi-cryst. structure of liquids is supported. L. S. T.

Chemiluminescence of dimethyldiacridylium salts. K. GLEU and W. PETSCH (Angew. Chem., 1935, 48, 57-59).—NN'-Dimethyldiacridylium nitrate fluoresces intense green in neutral or acid solution. On adding alkali the fluorescence disappears immediately and the colour darkens with production of a dark brown ppt. On addition of H_2O_2 to a freshly prepared alkaline solution, however, a green chemiluminescence is obtained, similar in colour to the fluorescence. No light is emitted, however, if OBr', OCl', $KMnO_4$, or $Fe(CN)_6'''$ is used, but a brief strong light emission is observed with reducing agents (HSO₃', S'', VO₂', SnO₂'') in presence of atm. O₂. The behaviour with H₂O₂ is attributed to its alternate oxidation and reduction action, light being emitted during the latter phase. Similar mechanism may account for light emission in biological processes. J. W. S.

Crystallisation fluorescence. H. DÖRING (Naturwiss., 1935, 23, 19; cf. this vol., 147).—The fluorescence previously observed is not now ascribed to a special crystallisation fluorescence. A. J. M.

Fluorescence of fluorite and the bivalent europium ion. K. PRZIBRAM (Nature, 1935, 135, 100).—In ultra-violet light EuCl₂ gives a brilliant purplish-pink fluorescence, showing a broad band in the blue identical with the well-known fluorite band. This confirms the view that the blue fluorescence of fluorspar in ultra-violet light is due to Eu["] (cf. A., 1934, 239). EuCl₂ also gives a line at 690 m μ , and a diffuse band at 630 m μ closely resembling a band shown by some fluorites and by artificial "pure" CaF₂. L. S. T.

Varying β - and γ -ray coloration of Na₂O,2SiO₂ glass and causes of the pure violet colour of manganese-free glass. J. HOFFMANN (Sitzungsber. Akad. Wiss. Wien, IIa, 1933, 142, 437—444; Chem. Zentr., 1934, ii, 1097).—The violet colour produced on irradiation with rays from Ra was attributed to traces of Pt dissolved from the crucible in which the glass melt was prepared. Rapidlycooled Na₂SiO₃ melts gave greyish-black irradiation effects. H. J. E.

Synthetic phosphors. I. External photoelectric effect in the ultra-violet region and the distribution of excitation of various alkalineearth phosphors. S. HAKOMORI and Y. OKA (J. Electrochem. Assoc. Japan, 1934, 2, 182—186).—In ultra-violet excitation in the region of longer λ , direct excitation of the nucleus of phosphorescence occurs. At shorter λ secondary excitation of the electron emitted from CaS occurs. CH. ABS. (e)

Method of working of counter tubes and gasfilled photo-cells. P. GÖRLICH (Physikal. Z., 1935, 36, 36).—A method quoted by Teichmann (*ibid.*, 1934, 35, 637) for the stabilisation of the Townsend discharge in photo-cells is stated to be ineffective. The most important condition for the above stabilisation is the limitation of the c.d. to a val. < a characteristic val. by the use of a high resistance.

A. J. M.

Method of working of counter tubes and gasfilled photo-cells. H. TEICHMANN (Physikal. Z., 1935, 36, 37).—A reply to Görlich (preceding abstract). A. J. M.

Investigations with cuprous oxide photo-cells. II. Fatigue phenomena. W. BULIAN (Physikal. Z., 1935, 36, 33-34; cf. A., 1933, 1229).—Cu₂O photo-cells with cathodic sputtered Ag electrodes show a considerable decrease in the photo-current when illuminated over long periods. The nature of the electrodes plays no part in the effect, which can be prevented by enclosing the cell in a gas-tight vessel. The fatigue is due to optical and chemical changes in the electrodes. For use at wave-lengths > 6000 Å., Cu₂O cells with thin Au electrodes may be used. They show no fatigue. A. J. M.

Spectral distribution of, and the effect of temperature on, the crystal photo-effect with single crystals of pyrargyrite and stephanite. J. BARISCH (Ann. Physik, 1935, [v], 21, 804—811).— The selective max. of the crystal photo-effect with single crystals of pyrargyrite and stephanite increases exponentially with fall in temp. At a certain temp. the exponential function changes, possibly due to the absorption of H_2O . The max. is displaced towards the shorter wave-lengths with fall in temp.; displacement α temp. change. This behaviour is characteristic of semi-conductors. A. J. M.

Loss and restoration of photo-conductivity in red mercuric iodide. F. C. NIX (Physical Rev., 1935, [ii], 47, 72–78).—Single crystals of red HgI lose their photosensitivity on ageing, with accompanying change from mono- to poly-cryst. fibrous state. Sensitivity can be restored by an impressed voltage. The rate of resensitisation and the magnitude of the attained sensitivity increase with increase of applied field and with fall in temp. N. M. B.

Spectral distribution of the photo-current in colloidal coloured alkali halide crystals. L. GROSHEV (Compt. rend. Acad. Sci. U.R.S.S., 1934, 4, 378—382).—Observations on NaCl and KCl containing colloidally dispersed Cu are recorded. The limit of the photo-effect is displaced from 300 to $600 \text{ m}\mu$, indicating a diminution of the work of elimination of electrons in colloidal Cu. (Cf. this vol., 280.) E. S. H.

Crystal photo-effect with coloured rock-salt. S. PELZ (Sitzungsber. Akad. Wiss. Wien, 1933, IIa, 142, 509—522; Chem. Zentr., 1934, ii, 1736).— Results are recorded for NaCl and KCl. The effect is due to diffusion of photo-electrons from the illuminated to the dark part of the crystal. The lag is $\geq 10^{-3}$ sec. H. J. E.

Surface-force theory of crystal rectification. S. R. KHASTGIR (Nature, 1935, 135, 148).

L. S. T.

Energy levels of electrons in amorphous bodies. V. ZDANOV (J. Phys. Radium, 1934, [vii], 5, 614—616).—Mathematical. The case of electrons in an amorphous semi-conductor is examined.

N. M. B.

Molecular rays. V. GUILLEMIN, jun. (J. Franklin Inst., 1935, 219, 73-85).—A survey of recent work on mol. rays in relation to scattering in gases, diffraction at crystal surfaces, magnetic and electric moments of atoms and mols., and other applications. N. M. B.

Space-charge measurements in beeswax during solidification and in the solid state. P. JAEGER (Ann. Physik, 1934, [v], 21, 481-502).-The space-charge distribution in liquid and solid beeswax was investigated by passing the electric discharge (10 and 20 kv.) between parallel electrodes in the wax just about to solidify. The space charge was fixed on solidification, and the solid wax was cut into a no. of parallel layers, the space charge of each section being determined. A. J. M.

Pressure variation of residual ionisation current in different gases. J. A. PRIEBSCH (Z. Physik, 1934, 93, 22—34).—The residual current of a 4-litre chamber was determined for air, A, and CO_2 to 15 atm., and for H_2 to 5 atm. Air and CO_2 gave the largest current. A. B. D. C.

Observation of motions due to electric fields acting on dielectric liquids. R. HOFMANN (Z. Physik, 1934, 92, 759—795).—The "schlieren" method was used to observe the motion of the surface of liquids under electric fields; velocity of wave motion was determined and related to conductivity and dipole character of the liquid. A. B. D. C.

Physical methods in chemistry. I. P. C. HENRIQUEZ and L. J. N. VAN DER HULST (Chem. Weekblad, 1935, 32, 35—39).—A general account of polarisation and absorption and the importance of ϵ and n. S. C.

Chemical applications of recent dielectric constant theory. J. W. WILLIAMS (J. Franklin Inst., 1935, 219, 47-72).—A general survey of the relation of dipole moment data to mol. structure, and the variation of dielectric const. as a function of temp. and concn. relative to mol. association and compound formation in solution. N. M. B.

Dipole moment of iodine. V. VASSILIEV, J. SYRKIN, and I. KENEZ (Nature, 1935, 135, 71).— Measurements of ϵ of 1—6% solutions of I in C₆H₆ and CS₂ between 15° and 70° and 15° and 35°, respectively, show that I has no dipole moment in either solvent. L. S. T.

Dipole moments and molecular structure of amides. W. D. KUMLER and C. W. PORTER (J. Amer. Chem. Soc., 1934, 56, 2549—2554).—The dipole moments of NH_2Ac , NHAcEt, $NAcMe_2$, $NAcEt_2$, $NH:CMe\cdotOEt$, and $p\cdot NO_2 \cdot C_6H_4 \cdot NH_2$ have been determined. The vals. are discussed in terms of resonance. The moment of the C:N linking has been evaluated. E. S. H.

Dipole moments of mono-substituted benzenes in the vapour state. K. B. MCALFINE and C. P. SMYTH (J. Chem. Physics, 1935, 3, 55—57; cf. A., 1934, 1157).—Dielectric consts. of vapours of PhF, PhCl, and PhNO₂ have been determined. The calc. dipole moments are, respectively, 1.57, 1.70, and 4.19 $\times 10^{-18}$. F. L. U.

Dielectric constants of liquids and liquid mixtures. D. S. SUBBARAMAIYA (Proc. Indian Acad. Sci., 1934, **1**, **A**, 355–362).—Mathematical. Narasimhiah's refractivity theory (cf. this vol., 24) is extended to the dielectric const. of binary liquid mixtures, and is satisfactory for C_6H_6 -PhMe mixtures. N. M. B.

Anisotropy of liquids around gaseous bubbles. P. GAUBERT (Compt. rend., 1935, 299, 304—306).— When two bubbles in a liquid touch without coalescing, an optical examination of the area of contact indicates that the film of liquid of which it consists is anisotropic, optically uniaxial, and negative, and that the optical axis lies along the radius of the bubble. M. S. B. Natural and magnetic rotatory power of pinene vapour. P. GABIANO (Compt. rend., 1934, 199, 1607—1609).—The natural rotation of α -pinene vapour at 88° α its pressure (39—64 mm.). The sp. magnetic rotation of the vapour was 1.80×10^{-2} . H. J. E.

Time lags in magneto-optics. H. W. FARWELL and J. B. HAWKES (Physical Rev., 1935, [ii], 47, 78— 84).—Using modified apparatus permitting photometric measurements, an indefinite min. was found for the Faraday effect for CS_2 , but none in the case of HCl. The intensity of the transmitted light is that predicted from Verdet const. of the liquid, and the const. of the electrical circuit. N. M. B.

Valency angles of oxygen and sulphur. N. G. PAI (Indian J. Physics, 1934, 9, 121–130).—From Raman and infra-red frequencies and dipole moments of mols. the following valency angles are calc. for O: H_2O , 115° and 104–106°; Me_2O , 118°; $(CH_2)_2O$, 64°; Et_2O , 125·8°; Pr_2O , 124·8°; Ph_2O , 126·9°, and for S: H_2S , 90°; Me_2S , 100°; Et_2S , 87·8°; Pr_2S , 89·4°; Bu_2S , 87·8°; Ph_2S , 95·2°. N. M. B.

Course of the reaction involved in the recombination of hydrogen atoms to molecules. H. SENTFLEBEN and W. HEIN (Ann. Physik, 1935, [v], 22, 1-27).—A more detailed account of work already reviewed (this vol., 150). A. J. M.

Theory of free radicals and organo-alkali compounds. B. NILSEN (J. Chem. Physics, 1935, 3, 15—19).—The method of Pauling and Wheland (A., 1934, 15) is applied to electron affinities of radicals. F. L. U.

Investigation of the free alkali metals (1930– 1933). H. ALTERTHUM and R. ROMPE (Physikal. Z., 1935, 36, 69).—Two additions are made to the previous review (A., 1934, 1285). A. J. M.

Parachor and chemical constitution. I. Structure of the carbohydrates. S. K. RAY (J. Indian Chem. Soc., 1934, **11**, 843—847).—From rapid measurements of d and surface tension in the fused state, before decomp. begins, the following vals. of the parachor have been determined: fructose 360.7, glucose 358.8, sucrose 672.0, glucose penta-acetate 771.5, glucose octa-acetate 1331, maltose octa-acetate 1339. Measurements have also been made on H₂O and C₅H₅N solutions of fructose, glucose, sucrose, and maltose. Results support Haworth's ring formula. R. S. B.

Interpretation of the parachor. R. F. HUNTER and R. SAMUEL (Rec. trav. chim., 1935, 54, 114-117). —A discussion of the validity of parachor measurements as a test of the existence of co-ordinate covalencies and singlet linkings. E. S. H.

Temperature coefficient of the surface tension of liquids. A. BOUTARIC (J. Chim. phys., 1934, **31**, 621-627).—At temp. < b.p. the temp. coeff. of the surface tension, γ , of liquids is related to the coeff. of expansion by $(1/\gamma)(d\gamma/dt) = -(4/\nu)(d\nu/dt)$, where ν is the sp. vol. of the liquid. This relation, combined with a knowledge of the vals. of the consts. a and b in $v=v_0(1+at+bt^2)$, for any particular liquid, permits calculation of γ at any temp. < b.p. if the val. at any other temp. is known. The approx. validity of the conclusions is confirmed for 15 org. liquids.

J. W. S.

Surface tension and molecular structure of liquids and solid substances in the light of "space energetics." R. VON DALLWITZ-WAEGNER (Kolloid-Z., 1935, 70, 39–48).—Theoretical.

E. S. H.

Surface tension of unassociated organic liquids: simple method of interpolation. A. R. CARR and T. WOLCZYNSKI (J. Amer. Chem. Soc., 1934, 56, 2541-2542).—A method for interpolation of the surface tension of unassociated org. liquids valid over a wide range of temp. E. S. H.

Inactivation of activated molecules. K. WEBER (Arh. Hemiju, 1934, 8, 160-179).-A review. R. T.

Addition of symmetrical diatomic molecules to benzene. A. SHERMAN, C. E. SUN, and H. EYRING (J. Chem. Physics, 1935, 3, 49-55; cf. A., 1934, 242, 736).—Activation energies are calc.

F. L. U.

Linking energies of hydrocarbons : corrections yielding additivity. V. DEITZ (J. Chem. Physics, 1935, 3, 58).—Introduction of three corrections makes the linking energies of nine aliphatic hydrocarbons additive within the accuracy of the experimental data available. The heat of dissociation of C_6H_6 can be calc. accurately without assuming resonance energy. F. L. U.

Normal frequencies of vibration of the plane square molecule AB_4 with reference to the structure of nickel carbonyl. E. B. WILSON, jun. (J. Chem. Physics, 1935, 3, 59).—The model AB_4 is treated analytically and the results are given. The method used by Duncan and Murray (A., 1934, 1289) is criticised. F. L. U.

Spectrum of the frequencies of a polar crystal lattice. M. BORN and J. H. C. THOMPSON (Proc. Roy. Soc., 1934, A, 147, 594—599).—A method for the determination of the frequency spectrum of a crystal lattice is briefly described. L. L. B.

Lithium bromide crystal and polarisation effects. P. GOMBAS (Z. Physik, 1934, 92, 796— 814).—Lattice consts., lattice energy, compressibility, and infra-red characteristic frequency are calc., taking into account polarisation and van der Waals energies. Stability is determined for lattices of NaCl and CsCl type; the former is preferred. A. B. D. C.

Capillary systems. XII (3). Sphere-spiral as a structure element in homogeneous and heterogeneous spherical packing. E. MANEGOLD (Kolloid-Z., 1935, 70, 1—13; A., 1933, 458).—Mathematical. E. S. H.

Experimental proof of the vibrational movements of physical molecules. U. SCHMIESCHEK (Z. tech. Physik, 1934, 15, 178—180; Chem. Zentr., 1934, ii, 1081).—Vibrational movements of very small suspended Ag crystals, produced by the same cause as the Brownian movement, have been observed by photographing the reflected light. H. J. E.

Number of water drops condensing on various solids. G. TAMMANN and W. BOEHME (Ann. Physik, 1935, [v], 22, 77—80).—Condensation centres are on the solid surface and not in the neighbouring air. The no. of drops (I) formed on hard and soft metallic plates is not greatly different. (I) is independent of the orientation of the crystallite planes. The difference in temp. of the condensation plate and the H₂O vapour does not affect (I). The base metals are more effective in the condensation than the noble metals, but are affected by oxide layers and adsorbed gases. A. J. M.

Relative reflexion powers of some X-ray spectrometer crystals. A. FAESSLEE and G. KÜPFERLE (Z. Physik, 1935, 93, 237–244).—Relative reflexion power is given for Zn blende, rock-salt, calcspar, fluorspar, Bi, quartz, gypsum, beryl, mica, and sugar for three wave-lengths, 560, 1932, and 4150 X. A. B. D. C.

Precision methods for the measurement of the parameters of crystal lattices. V. I. IVERO-NOVA (J. Tech. Phys. U.S.S.R., 1934, 4, 459–475).– Vals. are recorded from various crystal faces for Mg, Al, α -Fe, Cu, Zn, Rh, Pd, Ag, Cd, β -Sn, Re, Ir, Pt, Au, and Pb. CH. ABS. (e)

[Laue diagrams and morphology.] V. GOLD-SCHMIDT (Beitr. Kryst. Min., 1934, 3, 143—221; Chem. Zentr., 1934, ii, 1093).—A discussion.

H. J. E. Derivation of a group of X-ray absorption curves from a single curve. R. JAEGER (Physikal. Z., 1935, 36, 3—8).—By considering $\mu_{\infty}l$ instead of the thickness, l, as variable in the exponential function for X-ray absorption by filters, it is possible to derive the group of curves for different tube potentials from a single curve. A. J. M.

Stability of ionic lattices. H. JENSEN (Z. Physik, 1935, 93, 236).—Polemical, against Steensholt (this vol., 19). A. B. D. C.

Laue diagrams of deformed crystals. W. F. BERG (Z. Krist., 1934, 89, 587-593).—The "smearing" of Laue spots, transmitted and reflected, is discussed, viewing the lattice as a series of twodimensional gratings arranged along the path of the X-ray beam. B. W. R.

Kinetics of crystallisation processes. A. HUBER (Z. Physik, 1935, 93, 227-231).—A distribution function is deduced to give direct comparison of Goler and Sachs' theory (A., 1932, 986) with experiment. A. B. D. C.

Orientations of impurity molecules included in crystals. K. S. KRISHNAN and P. K. SESHAN (Z. Krist., 1934, 89, 538-540).—Small traces of naphthacene in anthracene and in chrysene can be detected by their absorption bands. Polarisation measurements can locate the planes of these impurity mols., and it is concluded that these are parallel to the mols. of the mother substance. B. W. R.

Isomorphism of compounds of elements of different valencies. G. BRUNI and A. FERRARI (Z. Krist., 1934, 89, 499—504).—The MgCl₂ lattice can be derived from that of LiCl by maintaining the anion network but filling only half the cation spaces. Isomorphism is discussed from this aspect, the anions in general determining the lattice, in which the cations are by comparison unimportant. B. W. R.

The vitreous state. G. HAGG (J. Chem. Physics, 1935, 3, 42-49).—Formation of glass on cooling is attributed to the presence in the melt of large or irregular groups of atoms the direct addition of which to the lattice is difficult. The structure of silicates and metaborates is discussed in support of the theory.

F. L. U. Structure of liquid substances. P. BOGDAN (J. Chim. phys., 1934, 31, 647—663; cf. A., 1934, 133).—Theoretical. J. W. S.

Growth of magnesium crystals. M. STRAU-MANIS (Z. Krist., 1934, 89, 487–493).—When Mg crystals grow from the vapour phase, besides the faces of regular habit apparently curved surfaces may appear, especially if the growth is fast. The process is discussed. B. W. R.

X-Ray investigations of very finely divided crystals (active charcoal and lamp-black). D. WLM and U. HOFMANN (Kolloid-Z., 1935, 70, 21— 24).—With increasing subdivision of C crystals the distance between the planes of atoms increases from 3.347 to 3.59 Å., whilst in the direction of the *a* axis there is a contraction from 2.456 to 2.40 Å. Recrystallisation begins at > 1300°; the crystals grow particularly in the *c* axis. E. S. H.

Twin formation in graphite. V. S. VESSE-LOVSKI and K. V. VASSILLEV (Z. Krist., 1934, 89, 494-496).—There is definite X-ray evidence for the occurrence of twinning in the basal plane with a rotation of 30°. B. W. R.

X-Ray study of indium and the indium-silver system. L. K. FREVEL and E. OTT (J. Amer. Chem. Soc., 1935, 57, 228).—X-Ray determinations between -25° and 141° reveal only the face-centred tetragonal modification. At 22°, a=4.588, c=4.938 Å.; the linear expansion coeffs. are: $\alpha_a=1/a . (da/dT)_p=$ 5.6×10^{-5} , $\alpha_c=1.3 \times 10^{-5}$. In the In-Ag alloys 5 phases have been detected. E. S. H.

X-Ray determination of the FeAl₃ structure. E. BACHMETEV (Z. Krist., 1934, 89, 575-585). FeAl₃ has a rhombic cell, a_0 47·43, b_0 15·46, c_0 8·08 Å., 100 mols. in the cell, space-group V_{*}^{23} . B. W. R.

Structure of rhombic sulphur. B. E. WARREN and J. T. BURWELL (J. Chem. Physics, 1935, 3, 6–8). —The unit cell contains 16 S₈ mols. and has a 10.48, b 12.92, c 24.55 Å. Space-group V_{Λ}^{*} (*Fddd*). The S₈ mols. are symmetrically puckered rings.

F. L. U.

Fibrous sulphur and its fine structure. K. H. MEYER and Y. Go (Kolloid-Z., 1935, 70, 19—20).—The crystallisation brought about by strongly stretching fibres of plastic S resembles that produced in rubber by stretching. The arrangement of S atoms in the fibre is discussed in the light of X-ray evidence; identity period occurs per 8 atoms. E. S. H.

Physico-chemical properties and X-ray structure of certain ferric oxides and hydroxides. A. NOWAKOWSKI and S. GAWRYCH (Rocz. Chem., 1934, 14, 515-524).—X-Ray studies indicate that ortho-Fe(OH)₃ (I), prepared in various ways, is amorphous, that ferrous acids possess a structure of the type of γ -FeO₂H, and consist of particles $< 10^{-5}$ cm. in diameter, that goethites (II) have the cryst. form of α -FeO₂H, and that Fe₂O₃ obtained from (I) or (II) consists of well-formed crystals of the α -Fe₂O₃ type. R. T.

X-Ray studies on the hydrous oxides. VI. Alumina hydrates. H. B. WEISER and W. O. MILLICAN (J. Physical Chem., 1934, 38, 1175—1182; cf. A., 1933, 214).—The authors overlooked the metastable bayerite, $Al_2O_3, 3H_2O$, reported by Fricke and Severin (A., 1932, 573). The material formerly called δ -Al₂O₃ is identical with böhmite, Al_2O_3, H_2O . D. R. D.

Constitution of the alkaline-earth hydrides. E. ZINTL and A. HARDER (Z. Elektrochem., 1935, 41, 33—52; cf. A., 1932, 326).—Carefully purified specimens of CaH₂, SrH₂, and BaH₂ have been prepared and examined by X-rays. The consts. of the rhombic elementary cells are: CaH₂, a_1 5.936, a_2 6.838, a_3 3.600 Å., d_{calc} . 1.90; SrH₂, a_1 6.364, a_2 7.343, a_3 3.875, d_{calc} . 3.27; BaH₂, a_1 6.788, a_2 7.829, a_3 4.167, d_{calc} . 4.15. Space-group V_h^{16} . Direct measurement gave for SrH₂ d_4 3.26. The arrangement of metal and H atoms in the crystals is discussed. F. L. U

Structure of vitreous BeF_2 . B. E. WARREN and C. F. HILL (Z. Krist., 1934, 89, 481–486)—The diffraction pattern of vitreous BeF_2 in monochromatic radiation agrees with the "random network" hypothesis. This postulates definite interat. distances and co-ordination scheme, but random orientation of neighbouring groups, and consequently no regular repetition of the structure. B. W. R.

Crystal form and space-group of $\mathbb{Z}rF_4$ and $\mathbb{H}fF_4$. G. E. R. SCHULZE (Z. Krist., 1934, 89, 477–480).—These substances have the same monoclinic prismatic structure, space-group C_{2A}^6 , consts. $a_0 9.46, b_0 9.87, c_0 7.64 \text{ Å}., \beta 94^\circ 30'$ for $\mathbb{Z}rF_4$, and $a_0 9.45, b_0 9.48, c_0 7.62 \text{ Å}., \beta 94^\circ 29'$ for $\mathbb{H}fF_4$. B. W. R.

Crystal structure of mercuric chloride. H. BRÆKKEN and W. SCHOLTEN (Z. Krist., 1934, 89, 448—455).—The rhombic bipyramidal cell has a_0 5.963, b_0 12.735, c_0 4.325 Å., space-group Pmnb. At. co-ordinates are located from intensity measurements. The structure differs from that of HgBr₂, the mol. Cl·Hg·Cl being straight. B. W. R.

Space-group of silver nitrate diammoniate, AgNO₃,2NH₃. R. B. COREY and K. PESTRECOV (Z. Krist., 1934, 89, 528).—The cell is orthorhombic, $a_0 8.00, b_0 10.58, c_0 6.29$ Å.; space-group probably C_{2r}^{10} . B. W. R.

Atomic arrangement in potassium trithionate crystals $K_2S_3O_6$ and the structure of the trithionate radical, S_3O_6'' . W. H. ZACHARIASEN (Z. Krist., 1934, 89, 529–537).— $K_2S_3O_6$ is orthorhombic, 4 mols. to the cell, a_0 9.77, b_0 13.63, c_0 5.76 Å., space-group *Pnam.* The parameters are determined.

B. W. R.

Crystal structure of lithium sulphate monohydrate. G. E. ZIEGLER (Z. Krist., 1934, 89, 456– 461).—The cell is monoclinic, a_0 5:43, b_0 4:83, c_0 8:14 Å., β 107° 35', space-group P2₁. The 23 parameters were adjusted by trial, and the detailed at. positions (not H) are given. B. W. R.

Crystal structure of sulphohalite. T. WATA-NABE (Proc. Imp. Acad. Tokyo, 1934, 10, 575—577).— In agreement with predicted vals., the material was cubic (a 10.15 Å.; 4 mols. $2Na_2SO_4$, NaCl, NaF per unit cell; space-group O^3 or O_5^5). H. J. E.

Crystal structure of sulphohalite. A. PABST (Z. Krist., 1934, 89, 514—517).—2Na₂SO₄,NaCl,NaF is cubic face-centred, a_0 10.08±0.01 Å. At. parameters are found. B. W. R.

Crystal structure of dimethylammonium stannichloride. R. B. COREY and R. W. G. WYCKOFF (Z. Krist., 1934, 89, 469–476).— $(NH_2Me_2)_2SnCl_6$ is orthorhombic, 2 mols. in cell, a_0 7·26, b_0 7·38, c_0 14·28 Å., space-group C_{2*}^2 . At. distances are determined; the structure may be regarded as a serious distortion of the CaF₂ grouping. B. W. R.

Crystal structure of cyanuric triazide. E. W. HUGHES (J. Chem. Physics, 1935, 3, 1-5).—The dimensions of the unit cell of $C_3N_3(N_3)_3$ are a 8.70, c 5.98 Å.; it contains 2 mols.; space-group $H6_3/m$. The N₃ groups are bent through 15° at the central N atom. F. L. U.

Directed primary and subsidiary valencies of the oxygen atom deduced from the space-lattice of arsenolite as a geometrical basis for quadrivalent oxygen in oxonium compounds. R. REINICKE (Z. Elektrochem., 1935, 41, 23–28; cf. A., 1934, 476, 941).—The lattice structure of arsenolite and of senarmontite is deducible on the assumption that the O tetrahedron can under certain conditions bring into action two pairs of additional weaker valencies directed from the centre of the faces. Oxonium compounds and the existence of certain elements in both metallic and non-metallic form arc discussed. **F.** L. U.

Crystal structure of manganite. J. GARRIDO (Compt. rend., 1935, 200, 69–71).—The unit cell of manganite has a 8.84, b 5.23, c 5.74 Å., and contains 8 mols. of MnO_2H . The probable at. arrangement in the lattice is discussed. J. W. S.

Crystal structure of calaverite. G. TUNELL and C. J. KSANDA (J. Washington Acad. Sci., 1935, 25, 32—33).—Cell dimensions are a_0 7·18, b_0 4·40, c_0 5·07 Å., all ± 0.03 Å., $\beta 90^{\circ} \pm 30'$. Space-group C2/m; 2 mols. per unit cell. C. W. G.

Space-group of resorcinol. J. M. ROBERTSON (Z. Krist., 1934, 89, 518).—The cell axes given for this compound in the "Strukturbericht" (1931) must be revised; they should be a_0 10.53, b_0 9.53, c_0 5.66 Å., space-group *Pna*. B. W. R.

Spectrometric measurements on hexamethylenetetramine and carbamide. R. W. G. WYCKOFF and R. B. COREY (Z. Krist., 1934, 89, 462–468).— Fourier analyses based on powder and single-crystal measurements agree with the accepted structures for these compounds. The consequent F curves for C, N, and O are discussed. B. W. R.

Reflexion of X-rays from powdered anthracene. B. W. ROBINSON (Proc. Roy. Soc., 1935, A, 147, 467–478).—The discrepancy previously found between the F (001) vals. for single crystals of anthracene obtained with two different X-ray wavelengths (A., 1934, 18) disappears when powder measurements are made, and a higher val. for F (34·3) is obtained. L. L. B.

Structure of some hydrocarbons related to the sterols. J. D. BERNAL and (MISS) D. CROWFOOT (J.C.S., 1935, 93-100).-The crystal structure of some hydrocarbons derived from the sterols and bile acids has been examined by X-ray and optical methods, and compared with that of synthetic hydrocarbons of known constitution. Crystallographically, the hydrocarbons fall into two classes, monoclinic and orthorhombic, which are not essentially different, since a compound may exist in both forms. Diels' $C_{18}H_{16}$ (A., 1928, 169) could not be distinguished from the synthetic y-methylcyclopentenophenanthrenes of Bergmann (A., 1933, 1154) and Kon (A., 1934, 288). It is suggested that $C_{21}H_{16}$ is a methylnaphthafluorene. $C_{25}H_{24}$, $C_{26}H_{26}$, and $C_{27}H_{28}$ are also investigated. The lengths of their mols. are > those given by formulæ previously proposed, and probably part of the sterol chain is still intact. The probable formulæ involve a naphthafluorene skeleton with Bu^g. CHMePr⁸, and CHEtPr⁸ groups, respectively, attached A. J. M. at one end.

X-Ray studies of crystallite orientation in cellulose fibres. Natural fibres. W. A. SISSON (Ind. Eng. Chem., 1935, 27, 51—56).—X-Ray diagrams obtained with the beam parallel to and perpendicular to the fibre axis indicate that in fibres having a spiral arrangement of crystallites (flax, cotton, sisal, and wood), although the direction of the b axis (direction of cellulose chains) is fixed, the other two axes are randomly oriented. This is explained by the assumption of discontinuities in cryst. structure. A. G.

Micellar structure and deformation processes of fibre materials. O. KRATKY (Kolloid-Z., 1935, 70, 14—19).—X-Ray investigation established the cryst. nature of micelles of cellulose esters after swelling. The influence of stretching is discussed. E. S. H.

Structure of cellulose dinitrate. M. MATHIEU (Compt. rend., 1935, 200, 143-145; cf. A., 1933, 216).—Nitrated cotton with 10.5-12.9% N gives the X-ray diagram of cellulose dinitrate, but with 13.3% N that of the trinitrate. The NO₂-groups are arranged at random in the chain, but coplanar with the glucose residues and 13.86 Å. (the dimensions of a NO₂) distant. The monoclinic pattern of a cellulose nitrate with < 13% N has periods 13.86 Å. and 8.0 Å. along a and c axes, and ψ -periods of 5.2 and 3.5 Å. J. L. D.

Preparation of thin single crystals of silver and their investigation with electron beams. H. LASSEN and L. BRUCK (Ann. Physik, 1935, [v], 22, 65—72; cf. A., 1934, 352).—If the temp. of the rock-salt on which the Ag is deposited is > 100°, single crystals are always obtained. Examination of the structure of the Ag layers by transmission of electron beams shows that the rock-salt completely determines the structure and orientation of the Ag crystal, the lattice planes of the latter being parallel to those of the NaCl. Comparison of reflexion with transmission shows that the dissolution of the NaCl support required for the second method causes considerable mechanical strain in the Ag, and consequent distortion. A. J. M.

"Extra" rings and bands in electron diffraction patterns. G. I. FINCH and A. G. QUARRELL (Nature, 1935, 135, 183—184).—Electron diffraction patterns from Pt, Au, Ag, Co, Ni, Cr, Fe, Sn, graphite, and ZnO show up to 14 "extra" rings, and circular bands in addition. The crystals must be oriented and for a given orientation the extra ring and band pattern is characteristic of the crystal lattice. Impurities are not a contributory factor, and secondary scattering appears to play no material rôle in the formation of extra rings. These and the bands appear to owe their origin to the boundary faces through which the electron beam leaves the crystals. L. S. T.

Electron diffraction on oxide-coated filaments. H. GAERTNER (Phil. Mag., 1935, [vii], **19**, 82—103).— Activated block Ni cathodes initially coated with a BaCO₃-SrCO₃ paste showed diffraction rings of SrO. Incomplete activation gave additional rings due to BaO and to the carbonates. H. J. E.

Oxidation of metals. I. G. D. PRESTON and L. L. BIRCUMSHAW (Phil. Mag., 1935, [vii], 19, 160— 176).—From electron diffraction measurements the oxide film on Sn above its m.p. had the tetragonal SnO_2 structure, with the *c* axes of the crystals oriented perpendicular to the surface of the drop. Traces of SnO were indicated. Pb melted in air gave a film with the orthorhombic (yellow) PbO structure, with traces of the tetragonal (red) form (I). The *c* axis was oriented perpendicular to the plane of the film. Oxidation of molten Pb gave a film consisting of (I). H. J. E.

Hall effect of cuprous oxide. O. VON AUWERS (Z. Physik, 1934, 93, 90-91).—The Hall effect is anomalous, *i.e.*, positive. A. B. D. C.

Magnetic Barkhausen effect by irradiation with ultrasonic waves. H. E. HOLLMANN and W. BAUCH (Naturwiss., 1935, 23, 35).—The structural changes occurring in a ferromagnetic body on demagnetisation can be demonstrated by examining the variation of the magnetic Barkhausen effect over the magnetisation curve, while the specimen is irradiated with ultrasonic waves. A. J. M.

Magnetic investigations of separating power of iron-nickel crystals. F. PREISACH (Z. Physik, 1935, 93, 245-268).—The change in magnetic properties on recrystallisation of Fe-Ni alloys, with Be and Cu as separating components, is dependent not only on the extent and distribution of separation, but also on the condition of the crystal lattice.

Discontinuity of magneto-resistance in ferromagnetic materials. G. ALOCCO and A. DRIGO (Nuovo Cimento, 1934, [ii], 11, 224—226; Chem. Zentr., 1934, ii, 1099).—The interpretation of Heaps' results is criticised (cf. A., 1934, 480). H. J. E.

X

Magnetic properties of thin films of nickel. A. ARON (Compt. rend., 1935, 200, 228-230).—The influence of temp. on the magnetic properties of very thin, non-ferromagnetic films of Ni prepared by cathodic sputtering in H_2 and N_2 has been studied. On heating in air an irreversible change first occurs, accompanied by ferromagnetism. Further heating gives a reversible change, which oxidation destroys. In one case the Curic point was 20° > that determined for bulk Ni by the same method (360°). R. S. B.

Thermal expansion and the ferromagnetic change in volume in nickel. C. WILLIAMS (Physical Rev., 1935, [ii], 47, 88; cf. this vol., 153).—A correction. N. M. B.

Diamagnetism of mercury crystals. E. VOGT (Ann. Physik, 1935, [v], 21, 791-803).—The dependence of the diamagnetism on the orientation of the crystals with respect to the field was determined for a single Hg crystal. The anisotropy of the masssusceptibility, χ , is $\chi_1 - \chi_{\parallel} = -8.9 \ (\pm 0.2) \times 10^{-9}$, the abs. vals. being $\chi_1 = -121 \ (\pm 2)$ and $\chi_{\parallel} = -112 \ (\pm 2)$, both $\times 10^{-9}$. A comparison of these results with those for Zn and Cd is made, differences being ascribed to differences in the crystal structure. A. J. M.

Directions of discontinuous changes in magnetisation in monocrystal bars and discs of siliconiron. R. F. CLASH, jun., and F. J. BECK, jun. (Physical Rev., 1935, [ii], 47, 158—165).—Using a cathode-ray oscillograph method, by which the amplified rectangular components of a single discontinuity in magnetisation could be reintegrated into a vector representing the nearly discontinuous increment in magnetisation, a crystallographic dependence of the Barkhausen effect was found.

N. M. B.

Magnetism of tin. K. HONDA and Y. SHIMIZU (Nature, 1935, 135, 108).—The paramagnetic susceptibility of white Sn changes its sign as the internal stress produced by cold-working increases. This is analogous to the change accompanying reduction in particle size (A., 1934, 1061). Both changes are attributed to an increased lattice const. of the surface layer. L. S. T.

Magnetic induction in a superconducting lead crystal. G. N. RJABININ and L. V. SHUBNIKOV (Nature, 1935, 135, 109; cf. A., 1934, 1061). L. S. T.

Penetration of a magnetic field into superconductive alloys. W. J. DE HAAS and J. M. CASIMIR-JONKER (Nature, 1935, 135, 30-31).— Bi₅Tl₄ and a Tl-Pb alloy (approx. 65% Pb), made superconductive by cooling below 4° abs., are penetrated by an electromagnetic field > a certain crit. val. The relation between this val. and temp. is given. L. S. T.

Structure of thin metallic layers produced by cathodic sputtering or vaporisation. G. TAM-MANN (Ann. Physik, 1935, [v], 22, 73—76).—Evidence from density, thermal and electrical conductivity, etc. indicates that pure metals do not exist in the amorphous state (I). Sb containing 5—20% SbCl₃ or Sb₂Se₃ is stable in (I). A. J. M.

A. B. D. C.

Wiedemann-Franz number of β -manganese at -190°. H. REDDEMANN (Ann. Physik, 1935, [v], 22, 28-30).—The thermal and electrical conductivities of β -Mn at -183° and -195° were determined, and the vals. at -190° obtained by extrapolation. At -190° the sp. electrical resistance is 10⁻⁴ ohm per cm. The thermal conductivity no. λ is 0.05 watt per cm. per degree. The Wiedemann-Franz no. L is 6.41×10⁻⁸. The thermal conductivity of β -Mn decreases with temp., supporting the assumption of Brunke (this vol., 19) that β -Mn is a mixed crystal phase of γ -Mn. A. J. M.

Electrical breakdown of X-irradiated rocksalt exposed to light. A. VOROBJEV (Z. Physik, 1935, 93, 269—277).—Exposure to light decreases the electrical breakdown strength of X-irradiated rock-salt. A. B. D. C.

Time of relaxation in crystals of Rochelle salt. R. D. SCHULWAS-SOROKIN and M. V. POSNOV (Physical Rev., 1935, [ii], 47, 166—174).—A theory of the action of mechanical and electrical forces, based on two relaxation times, is given and explains "creep" of polarisation, asymmetrical rates of polarisation and depolarisation, and other experimental results. Data on dielectric const. and power loss and dispersion curves are examined on the theory.

N. M. B.

Rochelle salt. H. MUELLER (Physical Rev., 1935, [ii], 47, 175—191).—Measurements of dielectric, pyroelectric, optical, and electro-optical properties and a theory correlating all observations are given, based on the assumption that all properties depend on the inner field and that the Curie point changes with temp. The theory explains observed variation of susceptibility with temp. and field strength, anomalies of the quadratic electro-optical effect, pyroelectric effect, hysteresis loop, abnormal temp. variation of the birefringence, and change of these properties if piezoelectric deformations are prevented. The electro-optical effect is a Kerr effect, and a longitudinal Kerr effect has been discovered. A small crystal represents a single Weiss region, but large crystals show a Barkhausen effect. N. M. B.

Simple method for demonstrating the piezoelectricity of crystals. L. BERGMANN (Physikal. Z., 1935, 36, 31—32).—A tuning-fork (I) is clamped vertically with its handle in contact with a crystal showing the phenomenon, the crystal resting on a metal plate (II). (I) is connected to the filament, and (II) to the grid, of a valve connected to an amplifier. When (I) is set into vibration, a note is heard in telephones. The piezo axis may be found by moving the crystal until the effect is greatest. A. J. M.

Action of radium and X-rays on piezo quartz. F. SEIDL [with H. FRÖHLICH and E. HOFER] (Sitzungsber. Akad. Wiss. Wien, IIa, 1933, 142, 467—469; Chem. Zentr., 1934, ii, 1738—1739).—Irradiation raised the piezo const., especially in samples for which it was low. H. J. E.

Optical properties of metals. N. F. MOTT and C. ZENER (Proc. Camb. Phil. Soc., 1934, 30, 249— 270).—Mathematical. The quantum theory of the periodic field is developed, and results are compared with available experimental data for a no. of metals. N. M. B.

New interference phenomenon observed with crystalline plates. K. S. SUNDARARAJAN (Indian J. Physics, 1934, 9, 141—151).—A subsidiary set of closely spaced interference fringes, superposed on the interference system due to birefringence, was observed for thin cryst. plates of chrysene mounted between Nicols. Similar results were found for KClO₃ and mica. The theory of the fringes is developed, and they are shown to be due to two sets of closely spaced fringes, the superposition of which gives rise to the birefringence system, complementary to the Haidinger fringes. N. M. B.

Scattering of light by thin metallic films. S. R. SWAMY (Proc. Indian Acad. Sci., 1934, 1, A, 347—353).—The light scattered by thin films of Ag, Al, and Sn evaporated on glass or mica in vac., and of Ag, Cu, and Au sputtered on mica, showed anomalous depolarisation characteristic of metallic surfaces; the thin film has no metallic reflexion and a very large electrical resistance. It is suggested that the film has three possible different states : cryst. with metallic properties, two-dimensional gaseous nonmetallic and non-conducting, and an intermediate state with high resistance. N. M. B.

[Theory of practical strength.] A. SMEKAL (Z. Physik, 1934, 93, 125—126).—A reply to Stepanov (this vol., 19). A. B. D. C.

Mechanical behaviour of single crystals of mercury. E. N. DA C. ANDRADE and P. J. HUTCH-INGS (Proc. Roy. Soc., 1935, A, 148, 120-146).-The rhombohedral faces are glide planes, and the short diagonal is the glide direction. The crystal twins under strain on a plane through the long diagonals of two opposite faces, acting as glide planes. Twinning takes place when the twinning plane makes an angle of 45° with the direction of the applied force. Whereas the packing of the rhombohedral line and that of the hexagonal base are the same, the former contains a much more closelypacked line, which probably confers on this face its prerogative as a glide plane. The distribution of planes of pronounced glide at approx. equal intervals, of the order of 104 times the at. lattice spacing, appears to be a fundamental feature of the metal lattice which does not depend on metallic impurities or dissolved gas. The crit. shear stress is 9.3 g. (wt.) per sq. mm, at -43° . L. L. B.

Directional variation of the translation mechanism of rock-salt crystals at high temperatures. H. WOLFF (Z. Physik, 1935, 93, 147-165).—Directional variation of translation properties of rocksalt crystals was determined at 400°, and shows that the slip planes for homogeneous extension are (100), (110), and (111). A. B. D. C.

Translation conditions. A. SMEKAL (Z. Physik, 1935, 93, 166—172).—Translation conditions for plastic flow of single crystals are summarised; rocksalt shows the further condition that of possible flow systems that of "shortest" direction of slip is preferred. A. B. D. C. Polymorphism of metals. V. N. SVECHNIKOV (J. Tech. Phys. U.S.S.R., 1934, 4, 253-267).—Fe and Sn tend to pass into the form with the lesser sp. lattice vol. at a given temp. The effect of admixtures on the $\alpha = \gamma$ Fe conversion depends on the at. vol. of the mixture. Pure Fe may not have a γ phase. The speed of crystallisation of Sn is lowered by Cd, Sb, and Bi in the order of their at. vols.

Сн. Авз. (е)

Time of melting of thin fuses. J. A. M. VAN LIEMPT and J. A. DE VRIEND (Z. Physik, 1934, 93, 100-110).—Results are given for Cu, Zn, Pt, Ni, Mn-Ni, constantan, monel, "Kruppin," and Ag wire fuses. A. B. D. C.

Refraction of ultrasonic waves. W. BEZ-BARDILI (Physikal. Z., 1935, 36, 20-24).—Photographs show the refraction of ultrasonic waves at an Al prism, their deviation at an Al plate, the action of cylindrical lenses of Al in xylene, the effect at a wire grating, and other examples of reflexion and refraction. A. J. M.

Effect of pressure and addition of foreign gases on the relaxation time of the vibrational heat in carbon dioxide. M. H. WALLMANN (Ann. Physik, 1935, [v], **21**, 671—681).—The velocity of sound (I) in CO₂, H₂, N₂, and CO₂-H₂ and CO₂-N₂ mixtures has been determined, and its variation with frequency investigated. From the dispersion curve, the relaxation time of the vibrational heat (II) in CO₂ at 21° and 600 mm. is $4 \cdot 6 \times 10^{-6}$ sec. (I) in H₂ was const. at frequencies between 359 and 1481 k.-hz., and equal to the val. for audible frequencies. In CO₂-H₂ mixtures, (II) $\propto 1/[H_2]$. (II) \propto (pressure)⁻¹.

A. J. M.

Relaxation time of vibrational energy in oxygen and the effect of foreign gases on it. H. O. KNESER and V. O. KNUDSEN (Ann. Physik, 1935, [v], 21, 682—696).—The absorption of sound in O_2 and binary mixtures of O_2 and other gases (H₂, He, CO, CO_2 , O_3 , H₂S, C_2H_2 , C_6H_6 , EtOH, CHCl₃, CCl₄, CS₂) was determined. The relaxation time of the vibrational heat (I) and the mean life of the vibrational quanta in O_2 is obtained from the absorption curves. The curve between absorption and concn. of foreign gas usually shows a max., but not with CHCl₃, CCl₄, O_3 , CO_2 , CO, and He; N₂ has small effect. The probability of conversion of nuclear vibration of O_2 into translational and rotational energy by collision is cale. A. J. M.

Velocity of sound in liquid oxygen. R. BAR (Nature, 1935, 135, 153).—The scattering of light by ultrasonic waves gives 903 m. per sec. for the velocity of sound in liquid O_2 . The calc. adiabatic and thermal compressibilities are $105 \cdot 6 \times 10^{-6}$ and $172 \cdot 0 \times 10^{-6}$ cm.² per kg., respectively. L. S. T.

Paramagnetism in the palladium series. B. CABRERA and H. FAHLENBRACH (Ann. Physik, 1935, [v], 21, 832—840).—The magnetism (I) of PdCl₂, RhCl₃, and RuCl₃ between -50° and 150° follows a law of the form $(\chi+a)T=C$, where a and C are consts. (I) of an aq. solution of PdCl₂ was also investigated. The paramagnetism of the solution is > that of H₂O. A. J. M. Hydrates and diamagnetism. S. R. RAO and P. S. VARADACHARI (Current Sci., 1934, 3, 249–250). —Investigation of solid Na₂SO₄ and in conc. solution showed no change in magnetic susceptibility at temp. $> 33^{\circ}$. Deviations of 3–4% occurred with aq. H₂SO₄ corresponding with different hydrates. Vals. for diamagnetic susceptibility of cryst. sulphates of Li, Na, K, and Mg did not support the theory of enlargement of ionic radii in solution with rising temp.

P. G. M.

Magnetic susceptibility of organic liquids; applications to the additivity law. C. SALCEANU and D. GHEORGHIU (Compt. rend., 1935, 200, 120— 123).—A modification of the method of Sibaiya and Venkataramiah (A., 1933, 455) is described. The magnetic susceptibilities of $COMe_2$ -PhNO₂ and $COMe_2$ - $1 \cdot C_{10}H_7Me$ follow the additivity law to within 1%. This is contrary to the view of Ranganadham (A., 1932, 216), who attributes deviations from the law to mol. deformations produced by the mutual influence of polar mols. J. W. S.

Susceptibility constants for co-ordinate linking in additive compounds. I. S. S. BHATNAGAR, M. R. VERMA, and P. L. KAPUR (Indian J. Physics, 1934, 9, 131—139).—Magnetic susceptibility data were obtained for compounds containing a co-ordinate linking and formed between $m \cdot C_6 H_4(NO_2)_2$ and benzidine, $C_{10}H_8$, and $\alpha \cdot C_{10}H_7 \cdot NH_2$, and between picric acid and $C_{10}H_8$, anthracene, phenanthrene, and $1 \cdot C_{10}H_7Me$. Results show that the additive compounds become more diamagnetic than expected on the additivity law. The susceptibility increase varies between 77×10^{-7} and 140×10^{-7} per g.-mol. Explanations are discussed. N. M. B.

Ebulliometric and tonometric studies of chemically pure liquids. A. ZMACZYŃSKI (Rocz. Chem., 1934, 14, 691—701).—The b.p. of C_6H_6 and H_2O have been determined at pressures of 289.1— 2347.4 mm. R. T.

Specific heat of some lanthanum and scandium salts, and of monazite. E. TURSKA (Rocz. Chem., 1934, 14, 760—763).—The sp. heats are : $(HCO_2)_3La$ 0.2910, $(HCO_2)_3Sc$ 0.2985, $Sc_2(C_2O_4)_3$ 0.3455, monazite 0.1223. R. T.

Approximate equation for heat capacities at high temperatures. J. CHIPMAN and M. G. FONTANA (J. Amer. Chem. Soc., 1935, 57, 48–51).— The expression $C_p = a + bT + cT^{-\frac{1}{2}}$ holds approx. for solids and gases at high temp. E. S. H.

Specific heat of liquid pure hydrocarbons and petroleum fractions. L. P. GAUCHER (Ind. Eng. Chem., 1935, 27, 57–64).—Each of the purely empirical equations $C_p=0.6230-0.0187T^{0.5}/S^{1.5}+$ $0.000355T/S^3+0.00045(t-32)$ and $C_p=1.323 0.2005T^{1/3}/S+0.0107T^{2/3}/S^2+0.00045(t-32)$ expresses the sp. heat at const. pressure of pure hydrocarbons in terms of the b.p. T, the sp. gr., S, and the temp. t in °F., with a mean error of 1.3%. For petroleum fractions Watson and Nelson's correlation is the best. A. G.

Specific heats of technical gases and vapours at higher temperatures. E. JUSTI (Forsch. Ingenieurw., 1934, A, 5, 130-137; Chem. Zentr., 1934, ii, 1741—1742).—Data are calc. for C_p from 20° to 5000° abs. for H₂, N₂, CO, NO, O₂, Cl₂, H₂O, and H. J. E. CO..

Latent heat of vaporisation and characteristic temperature. R. LAUTIE (Compt. rend., 1935, 200, 58-59) -Theoretical. J. W. S.

Molar heats of fusion of organic compounds and their dependence on the position of the m.p. J. PIRSCH (Ber., 1935, 68, [B], 67-72; cf. A., 1934, 951).—The mol. latent heats of fusion (I) of all ketones and halogenated hydrocarbons of the dicycloheptane-[1:2:2]-ring diminish system linearly with the m.p.; dicyclooctane compounds appear to behave similarly. A like but less exact relationship exists among dicycloheptane hydrocarbons, for which the vals. of (I) are > in the case of ketones of corresponding m.p. Similar relationships are observed with ketones related to a-dicyclopentadiene and the corresponding hydrocarbons. The relationships do not appear to depend on the presence or absence of double linkings in the mol., so that the great change in m.p. frequently produced by hydrogenation is accompanied by corresponding change in (I). The magnitude of (I) is controlled by the form and size of the space demand of the mol. With compounds of approx. the same space demand and m.p., the mol. depression oc mol. wt. H. W.

Further experiments with the magnetic cooling method. N. KURTI and F. SIMON (Nature, 1935, 135, 31; cf. A., 1934, 836).—Zr becomes super-conductive at 0.7° abs. and Hf at 0.3— 0.4° abs. Cu, Au, Ge, Bi, and Mg do not become superconductive at temp. down to 0.05° abs. Using magnetic cooling, 0.04° abs. has been reached with Fe alum.

L. S. T.

New interpretation of the Helmholtz equation and of Nernst's theorem. C. GRABOWSKI (Rocz. Chem., 1934, 14, 806-822).-Theoretical. All three theses of Nernst's theorem are regarded as proved. R. T.

Rapid calculation of fugacities of pure substances. G. VAN LERBERGHE (J. Chim. phys., 1934, 31, 577-582) .- The method described is based on the use of "reduced" temp., pressure, and vol. Examples are given. F. L. U.

Phase equilibria in hydrocarbon systems. VI. Thermodynamic properties of normal pentane. B. H. SAGE, W. N. LACEY, and J. G. SCHAAFSMA (Ind. Eng. Chem., 1935, 27, 48-50).-Data are given for sp. gr., v.p., sp. heat at const. pressure of 1000 lb. per sq. in., fugacity/pressure, and heat content within the limits $21-104^{\circ}$ and 100-3000 lb. per sq. in. A. G.

Density of liquid hydrogen sulphide. J. P. BANTER, L. J. BURBAGE, and C. C. TANNER (J.S.C.I., 1934, 53, 410-4137).—The density of liquid H₂S, prepared synthetically in a system from which all traces of H₂O were excluded, has been determined over the temp. range -81° to 58°, six independent density tubes being used.

Vapour-pressure curves, m.p., and chemical constants of di- and tri-methylamine and isobutylamine. A. SIMON and J. HUTER (Z. Elektrochem., 1935, 41, 28-33).-V.p. have been measured between -78° and 15° for NHMe2, -90° and 12° for NMe₃, and -37° and 74° for NH_2Bu^{β} . The respective m.p. are -93.3°, -123.8°, and -86.7°, Chemical consts. have been calc. from the v.p. F. L. U.

Vapour pressure of ketones. M. G. MAYBERRY and J. G. ASTON (J. Amer. Chem. Soc., 1934, 56, 2682-2683).-The v.p. of the following are measured : COMeEt, COMePra, COMePr^β (I), COMeBu, COMeBu^β, COEtPr^{\$,} COPr^{\$2}, COPr^{\$2}Pr^{\$,} COPr^{\$}Bu^{\$,} COBuPr^{\$.} and cyclohexyl Me and Et ketones. Dühring's rule (cf. White, B., 1930, 443) for predicting v.p. applies; (I) is used as standard. Calculation of Trouton's const. shows that the ketones are slightly associated. H. B.

Viscosity anomalies. M. PICHOT (Physics, 1934, 5, 200–206).—Data for H_2O and for a 0.7% gelatin solution flowing between parallel plates under const. head indicate parabolic velocity distribution for the H₂O and a flat distribution, similar to that in turbulent flow, for the solution. An hypothesis of structural viscosity is derived, supported by other data on aq. Na stearate solutions. Сн. Авз. (с)

Fluidity method for the determination of association. II. E. C. BINGHAM and L. W. SPOONER (Physics, 1933, 4, 387-400; cf. A., 1932, 566) .- Fluidity data for 346 liquids are recorded and discussed. Сн. Авз. (е)

Measurement of the viscosity of the alkali metals in vacuo. F. SAUERWALD [with K. GERING] (Z. Metallk., 1934, 26, 259-260).-Measurements in a capillary in vac. gave the following vals. for η : Na (at 100°) 0.0077; K (at 79°) 0.00520, (at 183°) 0.00346. The extrapolated vals. for η at the m.p. are Na 0.0077, K 0.0056, which are about 30% > those calc. by Andrade's rule. A. R. P.

Viscosity of phosphoric acid. N. D. LIT. VINOV, T. A. KRIUKOV, and E. A. KOROTSCHKINA (J. Appl. Chem. Russ., 1934, 7, 1121-1124).-The η of H_3PO_4 varies approx. exponentially, and the d linearly, with the temp. R. T.

Fluidity of anisole. J. A. GEDDES and E. C. BINGHAM (J. Amer. Chem. Soc., 1934, 56, 2625-2626).-Data for the temp. range 2-100° are recorded. The degree of association is calc. E. S. H.

Viscosity of supercooled liquid glucose. G.S. PARKS, L. E. BARTON, M. E. SPAGHT, and J. W. RICHARDSON (Physics, 1934, 5, 193–199).—Vals. are recorded between 145° and 22°. Considerable association is indicated. CH. Abs. (e)

Glycol-water mixtures. Vapour pressure-b.p.-composition relations. H. M. TRIMBLE and W. POTTS (Ind. Eng. Chem., 1935, 27, 66-68).-Data are recorded for mixtures at 228, 430, 603, and 747 mm. pressure. Raoult's law is approx. obeyed and the results are reproduced by log p=A+B/T, in which the vals. of the consts. depend on the % H₂O. A. G.

Rapid evaporation of liquid mixtures. I. Mixtures of acetic and benzoic acids. Z. BLASZ-KOWSKA (Rocz. Chem., 1934, 14, 919-924). R. T.

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Physico-chemical properties of carbamide nitrate. M. TOKUOKA and H. MOROOKA (Bull. Agr. Chem. Soc. Japan, 1934, 10, 127-129).—The solubility, together with the d and v.p. of aq. solutions, are recorded. CH. ABS. (r)

Viscosity of nitrocotton in various solvents and mixtures. J. W. McBAIN, E. M. GRANT, and L. E. SMITH (J. Physical Chem., 1934, 38, 1217— 1231; cf. B., 1926, 482).—Previous results are confirmed. The η of solutions of cellulose nitrate (I) falls nearly to the val. for the pure solvent in 3 years at 55°. For solutions in benzyl. (II) and ethyl-formanilide (III) and o-C₆H₄(CO₂Et)₂, η passes through a min., and with (II) and (III) a jelly is ultimately formed. Solvent power for (I) may be measured (a) by adding solvent to diluent until gelatinisation occurs; (b) by adding solvent in C₆H₁₄ and comparing swelling; (c) by measuring amount of solvent absorbed from C₆H₁₄, and (d) by measuring the rise of temp. on adding (I) to the liquid. D. R. D.

Viscosity of solutions of cellulose nitrate. (MME.) A. DOBRY (J. Chim. phys., 1934, 31, 568— 576).—The viscosity (η) of solutions of celluose nitrate (I) in 12 org. liquids has been measured at 25°. The ratio $(\eta - \eta_0)/\eta_0 c = R$ ($c = \text{concn.}, \eta_0 =$ viscosity of solvent) is the same for all solvents at c=0, but varies greatly when c increases; e.g., at c=1%, R=630 for cyclohexanone and 2770 for PhNO₂. At great dilutions $\eta = \eta_0(1+R_0c)$. The fact that R_0 is independent of the solvent indicates that the vol. of the particles is the same in all solvents despite large differences in their solvent power. Tho solvation must therefore be negligibly small. Staudinger's "vol. of encumberment" is not the sole cause of the large increase of η caused by (I).

F. L. U. System pyridine-acetic acid. III. L. E. SWEARINGEN and R. F. Ross (J. Physical Chem., 1934, 38, 1141—1144).—Sp. conductance passes through a max. at 83 mol.-% AcOH at all temp. between 0° and 40°. D. R. D.

Copper-gold alloys, especially at high temperatures. L. VEGARD and A. KLOSTER (Z. Krist., 1934, 89, 560-573).—Precision lattice consts. have been determined for 0, 25, 50, 75, and 100 at.-% Cu at 475° and at room temp. The cell size does not increase linearly with at.-%. B. W. R.

Fine structure of X-ray absorption edges of copper and zinc in copper-zinc alloys. D. COSTER and R. SMOLUCHOWSKI (Physica, 1935, 2, 1-12).—The positions of the absorption max. and min. in the X-ray absorption edges due to Cu and Zn in α , β -, and γ -brass are related to those of the pure metals in the same kind of crystal lattice, in agreement with Kronig's theory (A., 1931, 993; 1932, 553). Deviations in the form of the max. or min. are interpreted. J. W. S.

Transformation of the β -phase of copperaluminium alloys. E. KAMINSKY, G. KURD-JUMOW, and W. NEUMARX (Metallwirts., 1934, 13, 373; Chem. Zentr., 1934, ii, 1986).—The transformation $\beta \longrightarrow \alpha + \gamma$ (I) is easily suppressed. Slow cooling in air gives β' , Wassermann's results for the transition $\beta' \longrightarrow \beta_1 \longrightarrow \alpha + \gamma$ being confirmed (cf. this vol., 23). The transitions $\beta = \beta_1$ and $\beta_1 = \beta'$ occur very rapidly and without diffusion. $\alpha + \gamma$ is stable at $< 570^{\circ}$, and is always formed if the diffusion rate is sufficient. When (I) does not occur, β_1 forms β at 520°. H. J. E.

Alloys of aluminium with gallium. E. JENC-KEL (Z. Metallk., 1934, 26, 249–250).—Thermal analysis and X-ray examination of Al-Ga alloys have failed to confirm the existence of any compounds (cf. Pushin *et al.*, A., 1933, 118); the alloys form a simple eutectiferous system with the eutectic at $26\cdot3^{\circ}$ and almost 100% Ga. A. R. P.

Under-cooling of high-melting intermetallic compounds in aluminium alloys. [System aluminium-titanium.] H. BOHNER (Z. Metallk., 1934, 26, 268—271).—When alloys of $99\cdot99\%$ Al with $0\cdot5\%$ Ti are chilled from 900°, needles of Al₃Ti cannot be seen in the microstructure, and the electrical properties are those of a complete solid solution. Prolonged annealing at $550-640^{\circ}$ or casting at <the solidus temp. produces the characteristic needles in the structure and the conductivity rises to that of the saturated solid solution of Ti (0.02%) in Al. On slow cooling from 900° the bottom of the ingot is very rich in Al₃Ti, whereas the top contains only 0.03%. Similar effects have been observed with Mn-Al alloys. A. R. P.

Transformations in eutectoid alloys. G. WASSERMANN (Z. Metallk., 1934, 26, 256–259).— Similarities in the decomp. of cementite, β -Cu-Al, β -Cu-Sn, and β -Cu-Be alloys into the $\alpha + \gamma$ eutectoids are pointed out and explained by means of lattice diagrams. A. R. P.

Properties of alloys of Be, Mg, Zn, Cd, Hg, Al, and Sn. U. DEHLINGER (Z. Elektrochem., 1935, 41, 20-23; cf. A., 1934, 1065, 1158).—The influence of at. radius and polarisability on the formation of compounds and on miscibility in the solid and liquid phases is discussed. F. L. U.

Criticism of the iron-cementite eutectoid diagram and a proposed new diagram. J. SEIGLE (Rev. Met., 1934, 31, 547—548).—The proposed diagram is based on experiments which indicate that the eutectoid transformation does not occur at a fixed temp., and that the α - γ change of pure Fe also occurs over a temp. range. W. P. R.

Magnetic study of the system cobalt-palladium. G. GRUBE and O. WINKLER (Z. Elektrochem., 1935, 41, 52—60).—Magnetisation-temp. curves for Co and its binary alloys containing up to 90 at.-% Pd show that a transformation, setting in at different temp. for heating and for cooling, occurs only with pure Co and with alloys containing 5 and 10 at.-% Pd. The Curie temp. falls steadily with increasing Pd content. The course of the transformation closely resembles that of Fe–Ni alloys. The existence of a continuous series of β mixed crystals extending to 90 at.-% Pd is probable. The construction of a special magnetometer is described. F. L. U.

Disturbance of superconductivity of an alloy by an electric current. W. H. KEESOM (Physica, 1935, 2, 35-36).—Measurements with a eutectic Pb-Bi alloy indicate that the disturbance of the superconductivity by a current does not depend on the val. of the magnetic field due to the current in the manner which Silsbee's hypothesis prescribes for pure metals. J. W. S.

Replaceability of zinc by magnesium and vice versa. I. Miscibility of Mg_3Sb_2 and Zn_3Sb_2 and structure of mixed crystals. K. Löhberg (Z. physikal. Chem., 1934, B, 27, 381–403).—Mg_Sb_2 dissolves up to 46 at.-% Zn_3Sb_2 , the c/a ratio of the hexagonal mixed crystal changing linearly from 1.581 to 1.636. The mixed crystals have the structure of the A modification of the rare-earth sesquioxides. The distribution of the Zn atoms over the Mg sites is such that the Mg atoms of the twofold, but not those of the onefold, point positions are replaceable by Zn. R. C.

Mixed crystals in the vitriol series. IV. A. BENRATH and W. THIEMANN (Z. anorg. Chem., 1935, 221, 423-426).—Solubility curves for CdSO₄ (A., 1932, 229) indicate a transition point at 75° attributed to $(CdSO_4, H_2O)_3 \rightarrow 3CdSO_4, H_2O$. $CdSO_4, H_2O$ should be miscible in all proportions with other kieserites, but the product obtained above 75° is not miscible with MnSO₄, H₂O. The solubility curve at 75° is, therefore, not discontinuous and the observed relations may be due to the gradual dissociation of the associated mol. M. S. B.

Significance of anomalous mixed crystals in the determination of the equilibrium in mixed salt solutions. A. BENRATH and H. SCHACKMANN (Z. anorg. Chem., 1935, 221, 418—422; cf. A., 1934, 725).—The mixed crystals which separate from a solution of FeCl₃ supersaturated with respect to NH₄Cl are not in equilibrium with the mother-liquor. When equilibrium is reached the mixed crystals disappear. A similar phenomenon is observed with MnCl₂ and NH₄Cl. M. S. B.

Heterogeneous binary systems. Physical properties of liquid systems in two layers. (MLLE.) H. SCHLEGEL (J. Chim. phys., 1934, **31**, 668—688; cf. this vol., 25).—Measurements have been made of d, n, viscosity, and surface tension of cyclohexane-NH₂Ph mixtures near the crit. solution temp. and concns. Viscosity measurements have also been made for C₆H₁₄-PhNO₂ mixtures. J. W. S.

Miscibility of sulphides of copper, lead, and iron with lead in the liquid state. W. LEITGEBEL and E. MIKSOH (Metall u. Erz, 1934, **31**, 290–293; Chem. Zentr., 1934, ii, 1985–1986).—Addition of Pb lowers the f.p. of FeS to 1000° (30% Pb) and of Cu₂S to 1060°(7% Pb). Further additions cause two layers to separate. Pb and PbS are completely miscible. The systems Pb-FeS-PbS, Pb-Cu₂S-PbS, and Pb-Cu₂S-FeS are discussed. H. J. E.

Solubility of antimonic acid in water. S. GLIXELLI and A. PRZYSZCZYPKOWSKI (Rocz. Chem., 1934, 14, 474—486).—The proportion of larger particles in the heterodisperse system Sb_2O_5 -H₂O increases with increasing temp. of hydrolysis of the $SbCl_5$ from which the Sb_2O_5 was prepared. The highest solubility of Sb_2O_5 was found when $SbCl_5$ was hydrolysed at 0° (0.186 g. of the product dissolved in 100 c.c. of H₂O at 25°). R. T.

Solubility of chemically-defined hydrates of silicon dioxide. R. SPYCHALSKI (Rocz. Chem., 1934, 14, 915–918).—The stability of the hydrates described by Thiessen *et al.* (A., 1930, 720) increases with time. The solubility of the hydrates increases with diminishing H_2O content. R. T.

Method for experimental investigation of hydrothermal solutions and its application to the solubility of silica. C. S. HITCHEN (Bull. Inst. Min. Met., 1935, No. 364, 26 pp.).—A pressure-vessel of Ni–Cr steel for studying the action of H_2O on solid substances at temp. up to 400° and at a max. pressure of 800 atm. is described. The apparatus has been used to measure the solubility of SiO₂ in H_2O between 128° and 336°. Data for this and for the influence of Na₂SiO₃ on the solubility are given. The results are discussed from the point of view of the formation of quartz veins. Previous work is reviewed. F. L. U.

Solubility of sulphur dioxide in sulphuric acid. E. K. LOPATTO and A. M. SAVINAEV (J. Appl. Chem. Russ., 1934, 7, 881—886).—The v.p. of SO₂ over aq. H_2SO_4 is given by log p=A+B/T, where A and B are consts. depending on the concn. of SO₂ and of H_2SO_4 , respectively. R. T.

Solubility of sodium thiosulphate in ethyl alcohol-water mixtures [at 20°]. R. DOLIQUE (Bull. Soc. chim., 1934, [v], 1, 1745—1752).—The relative concess for which the ternary system affords two co-existing liquid phases have been determined. The solubility of Na₂S₂O₃,5H₂O in EtOH containing small quantities of H₂O is very small. J. G. A. G.

Solubility of cuprous chloride in concentrated hydrogen chloride. K. S. CHANG and Y. T. CHA (J. Chinese Chem. Soc., 1934, 2, 298–306).—The solubility of CuCl in 0.73—12.0N-HCl is determined by two methods. Vals. of $a_{\text{CuCl}_3,\cdot}/a_{\text{Cl}}^2$ and $a_{\text{HCuCl}_3,\cdot}/a_{\text{Cl}}^2$ at 25° are 0.0204 and 0.85, respectively, whence the activity coeff. of CuCl₃" is calc. R. S. C.

Solubility of cuprous chloride in alcoholic hydrogen chloride. K. S. CHANG and Y. M. LIU (J. Chinese Chem. Soc., 1934, 2, 307–310).—CuCl, insol. in abs. EtOH, dissolves in HCl-EtOH, K for the formation of $CuCl_2'$ being about 5.84 at 25°. $CuCl_3''$ is not formed. R. S. C.

Solubility of cellulose nitrate. T. URBANSKI (Rocz. Chem., 1934, 14, 944—956).—The solubility, S, of cellulose nitrate (I) in mixtures of EtOH and various solvents (Me, Et, Pr^a, Pr^β, Bu^a, Bu^β, and *iso*-C₅H₁₁ formate and acetate, EtCO₂Et, PrCO₂Et, Bu^βCO₂Et, CH₂Ac·CO₂Et, COMe₂, and COMeEt) is expressed by S=fr.dc, where r is the % of (I) dissolved by the given mixture, and c the concn. of solvent. For the series R·CO₂R', S increases with increasing mol. wt. of R'; at the same time, the dielectric const. μ of the solvent diminishes, and the dipole moment k increases, so that S varies parallel with μ^2/k . Analogous relationships are not found between the val. of S and the mol. wt. of R.

R. T. Velocity of crystallisation and certain other physico-chemical properties of supersaturated arsenious acid solutions. G. BIRSTEIN and J. KRONMAN (Rocz. Chem., 1934, 14, 975–993).—The mols. of H_3AsO_3 undergo increasing association with increasing concn., to a limiting val. corresponding with As_2O_3 . The *d* and *n* of the solutions increase linearly with concn. The velocity of crystallisation corresponds with $-dc/dt = kc^4$, where *c* is the concn.; the temp. coeff. for the interval $0-25^\circ$ is zero.

R. T. Growth of crystals. VI. Variations of form of crystals grown in the presence of cations which favour their growth. T. YAMAMOTO (Bull. Inst. Phys. Chem. Res. Japan, 1935, 14, 61-65).—The development of star-like crystals (I) of NaCl and KCl in presence of Bi^{***} and (I) of NH₄Cl in presence of Ti^{***}, ZrO^{**}, Cd^{***}, Pb^{***}. Fe^{***}, Cr^{****}, etc. has been studied microscopically. Small cubes are formed which become pyramidal, and the base of the pyramid then extends diagonally to give (I). The structure of the crystal planes is discussed. R. S.

Complex isomerism. Formation of crystal nuclei and crystal lattices of complex isomerides. Thermochemical studies. E. HERTEL and H. FRANK (Z physikal. Chem., 1934, B, 27, 460—466; cf. A., 1931, 1114).—The metastable red form (I) of the compound of $4:1-C_{10}H_6Br\cdot NH_2$ with 2:6-dinitrophenol has a greater power of spontaneous nucleus formation and a larger linear rate of crystallisation than the yellow form (II). In a molten mixture of the components nuclei of (I) and (II) are formed independently. The heat of formation of (I) from its components is negligible, whilst that of (II) \approx 3 kg.-cal. R. C.

Rhythmic precipitates. IV. Distances between rhythmic layers. T. ISEMURA (J. Chem. Soc. Japan, 1934, 55, 809-810).—The formula $d=a+bn+cn^2$ (d being the distance between two successive layers and a, b, and c consts.) holds for ring formation of Cu chromate in SiO₂ gel.

CH. ABS. (e) Partition of tartaric and citric acids between water and *iso*amyl alcohol. N. A. DE KOLOSOVSKI and F. S. KULIKOV (Ukrain. Chem. J., 1934, 9, 143— 147).—The relative concn. of the acids in the aq. layer increases with increasing dilution. R. T.

Diffusion of gases through metals. L. N. KHITRIN (J. Exp. Theor. Phys. U.S.S.R., 1934, 4, 160-170).—The Richardson formula reproduces the experimental data for the diffusion of H_2 , CO, CO₂, C_2H_2 , CH₄, and N₂ through Fe at 300—1000°. H₂ and CO diffuse readily, C_2H_2 and CH₄ more slowly, and CO₂ and N₂ only slightly at 300°. The rate for H₂ is a max. at 550°. CH. ABS. (e)

Sorption of hydrogen by reduced nickel. IV. Velocity of sorption of hydrogen at the early stage. S. IIJIMA (Sci. Papers Inst. Phys. Chem. Res. Tokyo, 1935, 26, 45-69; cf. A., 1934, 358).—The influence of pressure and temp. on the sorption velocity (v) has been studied, and two points of inflexion a and b have been observed in the v curve. The relation between pressure and sorption at a is given by the Langmuir equation. Between a and $b, v=Ap^{Un}$, where n=1.48 at 21°. It is suggested that the initial rapid sorption is of the van der Waals type and beyond a is activated. The v between a and b is governed by the rate of activation, whilst the slower v beyond b is due to diffusion. R.S.

Adsorption of hydrogen on tungsten. J. K. ROBERTS (Proc. Camb. Phil. Soc., 1934, 30, 74— 79).—The change in the accommodation coeff. (I) of Ne on a clean W wire is largely increased when the wire is covered by an adsorbed layer of hydrogen. The vals. of (I) recorded are 0.07 for a clean wire as compared with 0.17 at 295° abs., and 0.32 at 79° abs., for a film-covered wire. The mechanism of the adsorption is discussed. N. M. B.

Heat of adsorption of hydrogen on tungsten. J. K. ROBERTS and B. WHIPP (Proc. Camb. Phil. Soc., 1934, 30, 376–379).—The heat evolved on admitting H₂ at pressures 10^{-6} — 10^{-4} mm. to a clean W wire in a vac. has been determined, and is approx. independent of the pressure and amount adsorbed; the mean val.= $2\cdot8 \times 10^4$ g.-cal. per mol. The max. no. of mols. adsorbed= $2\cdot9 \times 10^{14}$ per 0.54 cm.², and saturation is reached at $< 10^{-4}$ mm. R. S. B.

Desorption of gases from sooted metallic surfaces in a vacuum. R. BEHNE and H. LÖHNER (Ann. Physik, 1935, [v], 22, 92—96).—The desorption has been followed by measuring the pressure in the neighbourhood of a sooted brass plate at definite intervals during the evacuation, and at different distances from the plate. The rate of adsorption of gas after desorption was also studied. A. J. M.

Adsorption on homogeneous surfaces. H. LACHS and Z. SOBIERAJ (Rocz. Chem., 1934, 14, 968— 974).—The amount of methylene-blue adsorbed from aq. solution by glass spheres is 30, and by glass plates 6, times > would correspond with the formation of a unimol. layer on the geometrical surface; the result is ascribed to development of active surface as a result of the existence of minute cracks and fissures. R. T.

Adsorption of cuprous salts from Ilosvay's reagent in precipitating cuprous acetylide. D.F. NOVOTNÝ (Coll. Czech. Chem. Comm., 1934, 6, 514—527).—Absorption of C_2H_2 is complete only when the reagent is conc. Sources of error in the determination are discussed, and modified procedure is recommended. E.S.H.

Relation between the phenomenon of cation exchange with silica-alumina complexes and their crystal structure. J. B. VAN DER MEULEN (Rec. trav. chim., 1935, 54, 107—113).—A survey of published work indicates that eation exchange occurs in silicates containing Al atoms with the co-ordination no. 4. E. S. H.

(A) Adsorption potentials of ions and dipoles. (B) Electrostatic potential and flotation phenomena. (c) Surface tension and electrical potential. B. KAMIENSKI and K. KARCZEWSKI (Rocz. Chem., 1934, 14, 375–382, 383–393, 394–400).--(A) The potential ϵ of so-called irreversible (chemically inert) electrodes (I) is a consequence of the adsorption of ions and dipoles; electrolytes affect chiefly the electrode-solution interface, whilst non-electrolytes are conc. chiefly at the air-solution interface, and have consequently little influence on the ϵ of (I). (B) The ϵ of (I) (Pt, Au, Ag, carborundum, graphite, chalcopyrite, marcasite, galena, and hæmatite) is greatly lowered by aq. K xanthate (II), whilst that of electrodes (CuO, Pb, Zn) which react with (II) rises at first, and then falls to a far smaller extent than in the case of (I). Other collectors, such as o-, m-, and p-tolylhydrazine (III), act similarly to (II), but to a much less marked extent. The ϵ of substances not possessing catalytic properties is scarcely affected by (III) and NH₂-acids, whilst that of hæmatite or Pt is greatly lowered, particularly in presence of O₂. Substances lowering surface tension, such as terpineol, have only an inconsiderable effect on the ϵ of (I).

(c) The fall in ϵ for (I) on adding (II) or other collectors conforms to the adsorption law; this effect is not obtained with other electrodes, or with substances lowering surface tension. R. T.

Adsorption of certain colloids on metallic surfaces and its influence on the structure of electrical deposits. P. JACQUET (Compt. rend., 1935, 200, 226—227; cf. A., 1933, 458).—Gelatin, serumalbumin, and Na caseinogenate, and the peptones are adsorbed by a Cu surface etched by dil. HNO₃ and considerably reduce the crystal size of electrolytic deposits of Cu on the surface. With polished Cu there is no apparent effect, since the grain of the initial electrolytic deposit is very fine. With etched cathodes the continuity of the metallic deposit is hindered by a colloid film except with supports of electrolytic Cu, for which the crystal growth is regular but the crystallites do not grow larger. Gums arabic and tragacanth are not adsorbed and have no influence on the deposit. R. S. B.

Influence of atmospheric carbon dioxide on the surface tension of sodium salts of fatty acids. LOTTERMOSER (Trans. Faraday Soc., 1935, 31, 200-204).—An apparatus for the determination of surface tension, σ , in an atm. containing CO₂ is described. For salts of fatty acids ranging from HCO₂Na to Na stearate, σ remains const. in absence of CO₂, but, in presence of CO₂, it falls to a min. after some hr. or days, and then gradually rises again. The influence of CO₂ increases with increasing mol. wt. of fatty acid up to myristate, due to the diminishing strength of the acid set free by CO_2 . The effect decreases with palmitate and stearate owing to pptn. and con-sequent diminution of concn. The influence of CO_2 also increases with salt concn. for salts of low mol. wt., but diminishes with rising concn. of typical soap solutions. σ diminishes linearly with rising temp., the temp. coeff. becoming smaller as mol. wt. and salt concn. increase. The temp. coeff. for HCO, Na alone rises with increasing concn. σ also diminishes linearly as log concn. increases within certain limits of concn. Na oleate behaves similarly to the salts of the saturated fatty acids if measurements are made in an atm. of N_2 free from O_2 and CO_2 , but its capillary activity is greater. When CO_2 is excluded, the static σ of soap solutions reaches equilibrium within 1 min. Below the laurate the time is too short to be measured, but the time becomes longer the higher is the no. of C atoms in the mol., the more dil. the solution, and the lower the temp. M. S. B.

Influence of capillarity on the m.p. of iodine. W. A. PATRICK and W. E. LAND (J. Physical Chem., 1934, 38, 1201—1210).—The adsorption isotherm of I on SiO₂ gel at 92.5° shows a break which is explained by assuming that the adsorbed I melts in the capillaries to a liquid which wets the walls. D. R. D.

Oxide films on liquid metals studied by means of electron-diffraction. R. O. JENKINS (Proc. Camb. Physical Soc., 1935, 47, 109-124).—Electrondiffraction patterns (I) obtained by reflexion from molten Pb, Zn, Bi, and Sn show that the surfaces are covered with thin oxide films consisting of small flat crystals resting on their (001) faces. The films can be removed by Ni gauze, and give (I) by transmission, which show that, after removal, the chemical composition is unchanged but the orientation is disturbed and distribution is approx. Maxwellian. N. M. B.

Properties of liquid films in fine-pored systems. B. H. WILSDON, D. G. R. BONNELL, and M. E. NOTTAGE (Nature, 1935, 135, 186–187).—The hydrostatic suction necessary to remove H_2O from finely-pored plastic materials is of a different order from that expected from the v.-p. relation. Osmotic pressure and electrical properties are also abnormal. The behaviour of thin films may be due to the formation of oriented chains of mols. L. S. T.

Spreading of pepsin and of trypsin. E. GORTER (J. Gen. Physiol., 1935, 18, 421-426).—Pepsin in aq. buffered solution shows max. spreading [] (approx. 1 sq. m. per mg.) at approx. $p_{\rm H}$ 3 and 1 and a min. at approx. $p_{\rm H}$ 6. At $p_{\rm H}$ 6 addition of cations significantly influences (I). Trypsin gives a (I) curve showing no max. but a definite min. at $p_{\rm H}$ 3 and responds at $p_{\rm H}$ 3 to the valency effect of Cl', SO₄", and CH(SO₂·O')₃ and to the lyotropic series Cl', Br', I', and CNS'. On the acid side of the isoelectric point, glutathione but not glutamic acid influences (I). F. O. H.

Determination of the ebullioscopic constants of ethyl and isobutyl alcohols, benzene, and chloroform. M. ŁaźNIEWSKI (Rocz. Chem., 1934, 14, 560—569).—The ebullioscopic consts. are : EtOH 11.60, Bu^gOH 21.66, C₆H₆ 26.42, and CHCl₃ 38.02. R. T.

Physico-chemical studies on gum arabic solutions. III. Osmotic pressures of arabic acid and sodium arabate. D. R. BRIGGS (J. Physical Chem., 1934, **38**, 1145—1160).—The osmotic pressure of gum arabic in HCl-NaCl solutions has been studied in relation to the $p_{\rm H}$ difference across the (collodion) membrane. The distribution of diffusible ions agrees with Donnan's membrane theory, but the observed osmotic pressure is lower than that predicted by an amount \propto the concn. of salt (other than colloid) inside the membrane, the no. of small ions produced per g. of colloid, and the $p_{\rm H}$ difference across the membrane, but is independent of the presence of EtOH up to 0.5 molar. D. R. D.

Significance of the measurements of dielectric constants in aqueous solution. G. DEVOTO (Ber., 1934, 67, [B], 1985–1987).—Measurements of μ in non-polar solvents (I) and $d\epsilon/dc$ in H₂O for NH₂Ph, PhOH, MeOAc, C₅H₅N, COMe₂, MeNO₂, MeCN, and

CO(NHMe)₂ show proportionality between the vals. Theories developed for (I) are not applicable to aq. solutions. Kuhn's relation, $d\varepsilon/dc \sim l^2$, is not supported by data for $CO(NH_2)_2$ and $SO_2(NH_2)_2$, $NH_2 \cdot CH_2 \cdot CH_2 \cdot CO_2H$ and $NH_2 \cdot CH_2 \cdot CH_2 \cdot SO_3H$, NMe3. C6H4. CO2 and NMe3. C6H4. SO3, or

p.NMe₃·C₆H₄CH:CH·CO₂ and p-NMe₃·C₆H₄·CO₂. The observations exclude the possibility of the existence of spiral forms or pronounced coiling in fatty NH2acids with > 8 C. H. W.

Constitution of water in solutions of electrolytes as studied by the Raman effect. C. S. S. RAO (Indian J. Physics, 1934, 9, 195-230).-The intensity curves of Raman bands for solutions of electrolytes, excited by the Hg λ 4047 line or λ 3650— 3653 group, show that the H_2O band for solutions is sharper than for pure H_2O . With aq. solutions of HNO_3 , H_2SO_4 , and $NaNO_3$ the band becomes sharper with increasing concn., and shifts as a whole towards greater frequency; the opposite is found for aq. HCl. There is a progressive shift towards higher frequencies in the H₂O band in solutions at the same concn., passing from LiCl to NaNO₃ and from HCl to H_2SO_4 and HNO_3 ; with the same H_2O content these differ-ences tend to vanish. Results are attributed to hydration of solute ions, or to change in the H₂O equilibrium due to mol. association of H_2O . The cation exerts little influence on the behaviour of the solvent. The curves for NaNO3 are much sharper than those for HNO₃, even at higher concns. of the latter; this is due partly to formation of complex hydrates, and partly to superposition of the 3420 cm.⁻¹ HNO_3 band on the H_2O band. N. M. B.

Magnetic birefringence of cerous salts in solution. C. HAENNY (Compt. rend., 1935, 200, 56-58).-The magnetic birefringence of CeIII salt solutions varies with the nature of the anion and of the solvent, being very high for aq. solutions of salts of strong acids, less for EtOH solutions, and very small for Ce(OAc)₃. J. W. S.

Diffusion of potassium chloride in aqueous solution. J. W. MCBAIN and C. R. DAWSON (Proc. Roy. Soc., 1935, A, 148, 32-39).-Measurements for 0.1-2.0N solutions have been made at 25° by the porous membrane method, using sintered glass discs. The data include both "integral" vals. for diffusion into H_2O , and "differential" coeffs. for diffusion into a second solution of slightly less concn. The results are the same for alundum as for glass membranes of varying porosity. Comparison with previous results shows that the integral vals. most nearly resemble those of Ohelm up to 0.5N, whilst the differential vals. are most like those of Clack. In conc. solution the ions of KCl are much more mobile than at infinite dilution, the only apparent explanation being that the ions carry less H₂O with them in conc. than in dil. solution. L. L. B.

Viscosity of moderately and highly concentrated solutions of some electrolytes in water and methyl, ethyl, and n-propyl alcohols; relation between conductance and fluidity. H. N. DESAI, D. B. NAIK, and B. N. DESAI (J. Univ. Bombay, 1934, 3, 109-120).—Data for NaI and BaI₂ in H₂O, CaCl₂ in MeOH, MgCl₂ in EtOH, and NaI in Pr^aOH fit the equation $\eta = \eta_0 + D_1 C^2 + D_2 C^3$, where $\eta_0 = \eta$ of solvent, D_1 , D_2 are consts. differing with salt and solvent. Results are correlated with the authors' conductivity data (cf. A., 1934, 967). D. R. D.

Temperature variation of viscosities of aqueous solutions of strong electrolytes. G. R. PARANJPE and E. B. RAJDERKAR (J. Univ. Bombay, 1934, 3, 21-52).--n has been measured for Li, Na, K, Rb, Ca, Sr, Ba, and NH_4 chlorides (0.25-1.0N) at 30-75°. The data fit Raman's equation (Nature, 1923, 111, 600). D. R. D.

Compressibility of solutions of amino-acids. P. W. BRIDGMAN and R. B. Dow (J. Chem. Physics,

1935, 3, 35–41).—Compressibilities of aq. solutions of $NH_2 \cdot CH_2 \cdot CO_2H$, $NH_2 \cdot CHEt \cdot CO_2H$, and $NH_2 \cdot [CH_2]_5 \cdot CO_2H$ at concess. $0.5 - 2 \cdot 5M$ have been measured at 25° and 75° up to 8000 kg. per sq. cm. The substances, selected because they yield zwitterions in solution, differ from all solutes hitherto examined in that at the lower pressures their apparent mol. vol. decreases with increase of pressure. This behaviour is probably related to the action of zwitterions in raising the dielectric const. of H_2O . The abnormality increases with dilution. The curves obtained are too complicated to admit detailed explanation. F. L. U.

Properties of electrolytes as related to their constitution. C. A. KRAUS (Trans. Electrochem. Soc., 1934, 66, 385-409).-The conditions under which ions may associate to form ion-pairs, " triple ions," and more complex charged or neutral aggregates are discussed in relation to the properties of the solvent and sp. characters of the ions (cf. A., 1933, 230, 353, 464, 785; 1934, 25). A general theory of electrolytes is developed on this basis, and its validity tested by comparison with recent experimental data for conductance, f.p., and other properties of electrolyte solutions in solvents of low dielectric const. (cf. A., 1933, 908, 1120; 1934, 1304). H. J. T. E.

Effect of the magnetic field on Brownian movement. A. TURPAIN and R. DE B. DE LAVERGNE (Compt. rend., 1935, 200, 301-303).—Criticism of a paper by Métadier (this vol., 31). M. S. B.

Colloids in the atmosphere. B. N. DESAI (J. Univ. Bombay, 1934, 3, 195-218).-A detailed review is given of present knowledge of ions, solid and liquid particles in the air, their composition, charges, influence on transparency and conductivity of the air, D. R. D. and rates of settling.

Colloidal air, and determination of the size of the particles. A. KRAUZE and K. KAPITANCZYK (Rocz. Chem., 1934, 14, 487-503).-The colloidal air sol obtained by adding 10 c.c. of 18N-NaOH (I) to 1 c.c. of H_2O is diluted with (I); the diameter of the bubbles diminishes with increasing dilution to a limiting val. of 24-27 mµ at 8192-fold dilution. The capillary pressure of such bubbles amounts to 190 atm., and, taking this factor into consideration, the actual diameter of the bubbles is $< 5 \text{ m}\mu$. R. T.

Are not liquid sodium amalgams colloidal? R. M. JOSHI (Indian J. Physics, 1934, 9, 153-159).-Polemical against Bent (cf. A., 1933, 561). The possibility of dil. liquid Na amalgams being colloidal is discussed. N. M. B.

Doubly refracting selenium sol. F. B. GRIBNAU (Chem. Weekblad, 1934, **32**, 53).—A Se sol as prepared by Jannek and Meyer (A., 1913, ii, 948), originally orange-red in colour, changes to greyish-brown on ageing in the dark for three weeks and then shows streaking phenomena in polarised light. The refracting particles are either spheres or flat plates, and so differ from those in an aged V_2O_5 sol, in which they are needle-shaped. S. C.

Electrochemical properties of colloidal silica. V. A. KARGIN and A. J. RABINOVITCH (Trans. Faraday Soc., 1935, 31, 284-297).-Very pure SiO₂ sols, prepared by hydrolysis of SiCl₄ and purified by dialysis and prolonged electrodialysis, give no perceptible con-ductivity to twice-distilled H_2O . "Acid" SiO₂ sols previously obtained (cf. A., 1928, 835) owe their acidity to the presence of HCl. SiO2 gels, due to coagulation on prolonged electrodialysis, are readily peptised by HCl. Very pure SiO₂ sols are prepared by oxidation of SiH₄ by O₃ in H₂O. They have no acid properties, the $p_{\rm fl}$ being approx. 7. The stability of pure SiO₂ sols must be due to their lyophilic properties. Electrometric measurements on acid SiO₂ sols give the ion concn. in the intermicellar liquid only. Cataphoretic measurements show that the potential of acid SiO₂ sols is small or zero. In the coagulation of acid sols by electrolytes there is no appreciable cation adsorption. In the coagulation of alkaline SiO_2 sols by $BaCl_2$, Ba^* is adsorbed, but there is no equiv. displacement of Na^{*} or H^{*}. In the interaction of Na silicates with aq. CaCl₂, solution pressure determinations, X-ray examination, and changes of viscosity with time indicate that adsorption compounds only are formed. M. S. B.

Polymerisation phenomena of silicic acid. W. D. TREADWELL (Trans. Faraday Soc., 1935, **31**, 297-302).—Anomalies in the potentiometric titration curves of Na₂SiO₃ with HCl probably indicate polymerisation of H₂SiO₃. Pure sols were prepared by electrolysing Na₂SiO₃ with a Hg cathode. On keeping in a closed vessel for 5 days, the sol showed a fall in $p_{\rm H}$ from 5.4 to 3.4, indicating that polymerisation precedes the formation of an acid sol. The mol. wt. of H₂SiO₃ in a freshly prepared solution, determined by the f.-p. method, was 149.4. This increased initially at the rate of 22.2 per hr. and then more slowly, reaching 1240 after 86 hr. The viscosity increases with time. The min. time required for gelatination of a 0.5M-sol is at $p_{\rm H}$ 5.8. M. S. B.

New type of tungsten oxide sol and its electrochemical behaviour. F. EIRICH (Trans. Faraday Soc., 1935, 31, 415–421).—WO₃ sols, prepared by d.c. between W wires in 10⁻³N-NaOH, are acid, $p_{\rm H}$ approx. 5, and the acidity is increased by electrodialysis, $p_{\rm H} 3\cdot0$ —3·3. The WO₃ mols. tend to become hydrated and react with bases. The no. of WO₃ mols. corresponding with an active H⁺, *i.e.*, the colloidal equiv., is 100–200 and increases with concn. The electrical conductivity therefore decreases. Conductometric and potentiometric titration curves indicate the presence of two main constituents, probably different types of tungstic acid built up of WO_3 hydrates. As observed in other colloids, the electrometric activity is > corresponds with the conductivity vals. Flocculation takes place with positive ions or colloids, and reversal is observed with Al_2O_3 sols of very small colloidal equiv. It can be followed by conductivity measurements. M. S. B.

Formation of emulsions under the influence of ultrasonic waves. W. DANIEWSKI (Acta Phys. Polon., 1933, 2, 45—49).—The rate of formation of H_2O -kerosene emulsions at const. frequency (150— 9000 kc.) \propto the strength of vibration (I). With increasing frequency, at const. (I), the rate decreases, being a max. at 150 kc. CH. ABS. (e)

Influence of electrolytes on the formation and stability of metallic colloids formed by ultrasonic waves. M. REGGIANI (Compt. rend., 1935, 200, 123-125).—When ultrasonic waves are passed through Hg, above which is a layer of liquid, the velocity of formation of a colloidal solution and the stability and diameter of the colloid particles produced vary with the liquid. Formation of a sol proceeds with difficulty in 0.01-0.1N-HCl, -AcOH, -tartaric acid, -KOH, -NaOH, or -NaCl, the particles being larger than those formed in pure H₂O. If, however, < 0.1% of gelatin or ovalbumin is added to the electrolyte solution, atomisation occurs as readily as, or even more readily than, in pure H₂O. J. W. S.

Physico-chemical properties of solutions of basic ferric sulphate. A. L. ZAIDES and V. N. SVESHNIKOVA (Tzent. Nauch.-Issl. Inst. Koz. Prom., Sborn. Rabot, 1934, No. 2, 92—106).—Increase in basicity of the salt increases the colloidal properties, as shown by increased adsorption by hide powder (I) and C. If aq. $Fe_2(SO_4)_3$ is heated and then cooled and alkali added, a highly basic salt is obtained without pptn. Adsorption by (I) is increased by using an equimol. $Fe_2(SO_4)_3$ -FeCl₃ mixture. CH. ABS. (e)

Potentiometric studies in the formation and stability of colloidal solutions. I. Ferric oxide sols. M. P. V. IYER (Proc. Indian Acad. Sci., 1934, 1, A, 372—382).—Titration curves of acidified and unacidified FeCl₃ solutions against carbonate-free NaOH show that the range of stability of Fe₂O₃ sols extends from p_{π} 3·20 to 4·45; pptn. commences at approx. 4·5, and is complete at 6·0. The composition of the ppt. varies with the neutral salt (KCl, K₂SO₄, KNO₃, BaCl₂) added. The mol. ratio FeCl₃/NaOH varies in the range 1/2·69—1/2·85, against the theoretical val. 1/3. The mol. ratio at the end-point follows the series SO₄'' <Cl' <NO₃' <H₂O. The different stages in the formation of micelles of Fe₂O₃ and their coagulation are elucidated. The development of alkalinity on adding neutral salts is explained, and the liberation of OH' is correlated with the lower mol. ratio obtained in titrating FeCl₃ against alkali. N. M. B.

Action of acids on hydrous alumina. A. W. THOMAS and R. D. VARTANIAN (J. Amer. Chem. Soc., 1935, 57, 4—7).—The dispersing action of different aq. acids on Al_2O_3 has been measured. The order of effectiveness inversely ∞ the tendency of the corresponding neutral salts to raise the $p_{\rm H}$ of Al oxychloride sols. Acids with anions which have a weak tendency to bind co-ordinately to the Al atom have the strongest peptising power. E. S. H.

New type of osmometer for low pressures with some preliminary results for gum arabic. H. B. OAKLEY (Trans. Faraday Soc., 1935, 31, 136-147).-An osmometer capable of measuring pressures of a few mm. of H₂O with an accuracy of 0.1 mm. is described. Osmotic pressures of solutions of gum arabic of concn. 0.5-3.5% have been measured at 25°. The Na gum (I) prepared by neutralising the electrodialysed prep. has an apparent mol. wt. 70% > the undialysed product. The acid electrodialysed gum (II) appears to be an equilibrium mixture with its two products of autohydrolysis. 0.2N-HCl apparently causes two parallel hydrolyses, one of which proceeds to completion more rapidly than the other. The fall of osmotic pressure of (I) with increasing concn. of NaCl is attributed to progressive suppression of the ionic pressure difference. The effect of CaCl₂ and of HCl is still more marked. The following provisional consts. are suggested for (II): equiv. wt. 1200, mol. wt. 290,000, max. valency 240, effective valency in 1% solution 40. M. S. B.

Stability of colloids. Stability of negatively charged colloidal silver iodide. A. BASINSKI (Rocz. Chem., 1934, 14, 1017—1037).—The stabilising action (I) of halides is up to a certain limiting concn. (II) independent of the nature of the cation; at higher concns. (I) diminishes in the order Li' > Na' > $K' > NH_4'$. The val. of (II) for different anions varies in the order Cl' > Br' > I'. A theoretical interpretation is advanced. R. T.

Velocity of coagulation of colloids. J. SZPER and S. UZDAŃSKA (Rocz. Chem., 1934, 14, 579— 589).—Coagulation of SiO₂ sols takes place at $p_{\rm H}$ 3—10 and shows max. velocity (v) at $p_{\rm H}$ 4.8. v rises with rise of temp. The velocity of denaturation of albumin (unspecified) attains a max. at a certain limiting concn. of HCl. The reaction is of the third order, and involves autocatalysis. The results indicate that coagulation and crystallisation are analogous processes. R. T.

Determination of the stability and type of emulsions. B. PUCHKOVSKI and E. STRUKOVA (Masl.-Zhir. Delo, 1933, No. 6, 28—29).—The stability and type of margarine emulsions can be determined by centrifuging a 10-c.c. sample for 60 sec. at 1000 r.p.m. CH. ABS. (e)

Anomalous flow of colloidal systems. A. S. C. LAWRENCE (Proc. Roy. Soc., 1935, A, 148, 59-87).— The velocity distribution for liquids where the distribution is not parabolic (Poiseuille's law not obeyed) has been examined by a new method. Gelating systems and non-gelating but elastic sols can be distinguished by this method. Anomalous flow in all solutions is caused by the greater effective vol. of anisodimensional micelles resulting from rotation and increasing mutual interference. If the effective vol. of the solvent=the vol. of the solution, mutual interference increases rapidly with increasing concn. This should be called anomalous viscosity. Systems not obeying the Poiseuille equation have "apparent

viscosity," and these systems are characterised by "anomalous flow." The effective vol. occupied between collisions ∞ the square of the length of the particle. Whether an elastic gel or sol is formed depends on dispersion and solvation. In mol. colloids degree of dispersion and solvation run parallel. All anomalous systems show "ageing" effects which are due to slow equilibration. Segregating mixtures, emulsions, and nematic liquid crystals are anomalous. L. L. B.

Radiocolloids. H. HERSZFINKIEL and A. WRONC-BERG (Rocz. Chem., 1934, 14, 959–967).—The particles (I) in aq. suspension which act as centres for the adsorption of the products of degradation of Ra appear not to be electrically charged. (I) are absent from EtOH, C_6H_6 , and COMe₂, but solutions in these solvents lose part of their activity on centrifuging, pointing to formation of true colloidal solutions. R. T.

Potassium ethyl sulphate gels. H. HENSTOCK (Trans. Faraday Soc., 1935, 31, 446-451).-KEtSO4 forms a white opaque gel by pptn. from aq. solution by EtOH. At 15° the gel persists for 48 hr., but rapidly crystallises at higher temp. More stable gels are obtained by pptn. with various org. solvents from MeOH solutions. Their permanence varies from 3 weeks when pptd. with CHCl₃ to 10 sec. with o-OH·C₆H₄·CO₂Me. All are readily disintegrated by heating and crystallise at low temp. The gel made with CHCl₃ is slightly alkaline. Electrical conductivity measurements indicate that gel formation is not complete until after approx. 30 min. Syneresis and deterioration set in a little later, and, after a preliminary arrest, proceed slowly to the end. There is a small rotation of polarised light. Refractive indices and radii of capillaries have been determined. The process of deterioration has been followed in the ultramicroscope. Gels in EtOH are best formed by evaporating a boiling solution and cooling. It is also possible to form a gel in PrOH by this method.

M. S. B.

Complex relations in lyophilic colloidal systems. VII. Complex and autocomplex sols. H. G. B. DE JONG, W. A. L. DEKKER, and P. VAN DER LINDE. VIII. Essential and non-essential specific characteristics of the colloidal components of importance for complex relations. H. G. B. DE JONG, P. VAN DER LINDE, and A. DE HAAN (Rec. trav. chim., 1935, 54, 1-16, 17-37; cf. A., 1934, 843).-VII. The separation of complex coacervates in mixtures of positive gelatin and negative gum arabic sols is inhibited when these are in certain proportions, although the particles are shown viscosimetrically to be dehydrated. Such complex sols are distinguished from complex coacervates by their miscibility with the dispersion medium. The influence of neutral salts and p_{π} on the relative viscosity of clupein sulphate sol (I) has been determined. Observations on the coacervation of (I) with $CH(SO_3K)_3$, $K_4Fe(CN)_6$, and K_2SO_4 show that (I) is an autocomplex sol in which the opposition of charge is produced by adsorption of some of the SO_4'' in the inner part of the double layer.

VIII. The density of the centres of capillary

electric charges and their chemical nature determine the conditions for the production of condensed complex or autocomplex systems. E. S. H.

New researches on colloids. [I. The electrical double layer. II. Coacervation.] H. R. KRUYT (Bull. Soc. chim. Belg., 1934, 43, 559—578, 578—596).—Two lectures. A comprehensive survey of the present position and the author's views.

Colloid electrolytes; nature and importance for colloidal science. H. FREUNDLICH (Trans. Faraday Soc., 1935, 31, 4—9).—The development of the conception of ionic micelles is described. These may be classified into three types: (1) sensitive to dilution forming small monomeric dialysable ions, e.g., soaps; (2) sensitive to dilution but forming ions which cannot be dialysed, e.g., Congo-dyes; (3) practically insensitive to dilution, e.g., certain proteins. The particle size of colloidal electrolytes is comparatively small, the mol. wt. not usually exceeding 100,000. There are no exact methods for detecting micelles of small size, and anomalies in the electrical behaviour of conc. solutions of electrolytes may often be due to the presence of ionic micelles. M. S. B.

Relations between electrochemical behaviour and the structure of colloids. W. PAULI (Trans. Faraday Soc., 1935, 31, 11-27) .- The earlier view of the origin of the charge on a colloid particle as due to simple adsorption of an ion has given place to the theory of the formation of a distinct ionogenic complex attached to the surface of the colloid particle. The methods of determining the ionogenic complex for different types of sols are given. The theory has been especially successful in its application to the metallic sols, such as Au, Ag, and Pt, which give the best examples of the connexion between colloidal behaviour and the structure of the complex. Oxide sols, Congo-dyes, and gums are also considered. By electrodialysis or electro-decantation, or by the action of electrolytes, chemical and electrochemical changes take place in the complex, and thus change the character of the sol. M. S. B.

Ionic micelle or electric double layer. H. R. KRUYT (Trans. Faraday Soc., 1935, 31, 28—31).— In attempting to account for the behaviour of colloids it is more convenient, for the quant. interpretation of the facts, to adopt the conception of an electrical double layer at the surface of the particle than to regard the whole particle as a highly multivalent ion with an enormous ionic radius. The inner layer in the electrical double layer is probably often built up by ions of the same material as the particle, but other structures are possible. M. S. B.

Application of the Debye-Hückel theory to colloidal electrolytes. G. S. HARTLEY (Trans. Faraday Soc., 1935, 31, 31-50).—The difficulties encountered in the extension of the Debye-Hückel theory of electrolytes to colloids are discussed. Calculations by Muller's method, relating to the ionic atm. and the magnitude of its effects, indicate that, in pure solutions of colloidal electrolytes, activity coeffs. < those predicted by the extended Debye-Huckel equation, and micellar mobilities < those predicted by a corresponding equation derived by the author, are not likely to be found. It is necessary to postulate some kind of association between micelles and their compensating ions. The effect of this on the properties of the solution may be numerically > the direct effects of the ionic atm. M. S. B.

Are lyophobic colloids colloidal electrolytes? A. J. RABINOVITCH and V. A. KARGIN (Trans. Fara-day Soc., 1935, 31, 50-66).—There are considerable difficulties in the application of the colloidal electrolyte theory to lyophobic colloids. Colloidal acids, such as WO_3 and V_2O_5 , behave like buffer solutions on dilution. This appears to be due to a gradual dissolution of the colloidal particles on dilution, giving a true solution. Where the acidity is caused by the presence of foreign electrolytes, and is not inherent in the colloid, a different behaviour is observed. Potentiometric measurements of ionic concn. give the equilibrium concn. of electrolytes in the intermicellar solution only, and not the concn. of the compensating Considerable amounts of both ions of the ions. stabilising electrolyte may be detected in the intermicellar liquid, and insol. salt formation may occur on the addition of other electrolytes. The equilibrium adsorption on the particles is thus shifted, and may lead to coagulation. Direct experimental data at present available are insufficient for solving the question of the equivalence or non-equivalence of exchange adsorption of compensating ions. Al-though equivalence of exchange adsorption of ions in the double layer may be admitted for typically lyophilic systems, which may be definitely regarded as colloidal electrolytes, it is probably not necessary in the case of lyophobic colloids. The non-equivalence of exchange adsorption leads necessarily to variability of the ϵ - and ζ -potentials. A theory of coagulation should take into account variation of the attractive, as well as repulsive, forces between particles, with varying electrolyte concn. M. S. B.

Molar (micellar) mass, electrovalency of ions, and osmotic pressure of colloidal electrolytes. F. G. DONNAN (Trans. Faraday Soc., 1935, 31, 80– 98).—The thermodynamic theory of membrane equilibria has been applied to the determination of osmotic pressures and mol. masses for the following types of colloidal electrolytes: monodisperse, singly and multiply ionised electrolytes, monodisperse multiply ionised ampholytes, and polydisperse multiply ionised electrolytes. The theory has also been applied to the determination of the electrovalencies of colloidal ions. The conclusions reached are independent of any definitely "chemical " formulation of colloidal electrolytes and are not essentially affected by the consideration or otherwise of mol. or ionic adsorption.

M. S. B.

New determination of the capacity of the electrical double layer. M. PROSKURNIN and A. FRUMRIN (Trans. Faraday Soc., 1935, 31, 110—115).—Measurements of the capacity of the electrical double layer at a Hg surface in N-Na₂SO₄, -KCl, -NaOH, and -H₂SO₄, and in N-Na₂SO₄ saturated with octyl alcohol, have been made and the vals. plotted against cathodic polarisation. The observed vals. are > those of previous investigators, but agree fairly well with those calc. from electro-capillary data. M. S. B.

Cataphoresis of colloidal electrolytes. Τ. KEMP and E. K. RIDEAL (Trans. Faraday Soc., 1935, 31, 116-120) .- The Debye-Henry expression for cataphoretic velocity has been applied to two systems in NaOAc buffers : sols of gliadin and suspensions of quartz particles covered with gliadin. The experimentally determined mobilities are in agreement with theory for a very limited range of ionic strength, $\mu 0.008 - 0.13$. Both above and below this range the experimental vals. are < required by theory. At high rals. of μ appreciable adsorption of anions leads to discrepancies. In very dil. solutions the effective valency of the ion is reduced by a Donnan equilibrium at the ionic envelope. M. S. B.

Significance and determination of mobilities in the study of colloidal electrolytes. J. L. MOILLIET, B. COLLIE, C. ROBINSON, and G. S. HARTLEY (Trans. Faraday Soc., 1935, **31**, 120—129). —The transport no. (T), for colloidal electrolytes, affords evidence of aggregation to form ionic micelles, when conductivity determinations fail to do so owing to the inclusion of compensating ions in the micelles (inclusion effect) and to coulomb forces between the ions (atm. effect). The influence of these two factors on T is discussed. Confirmation of the purity of a colloidal electrolyte may be obtained by plotting mobilities of the simple ion against concn. For very low mobilities the balanced-boundary method must be used. The conditions for the satisfactory application of the moving-boundary method to the measurement of cataphoretic velocity are discussed.

M. S. B. Determination of the electric charge of colloidal ions. G. S. ADAIR and M. E. ADAIR (Trans. Faraday Soc., 1935, 31, 130-135).-Approx. agreement only, between the vals. of the apparent valency of colloidal lons, determined by different methods, can be obtained. This is due to interionic forces and the combination of ions with the colloid. The nearest approximation to the true val. is probably best obtained by the use of membrane potentials. A range of concn. of electrolytes for which the potentials are small should be employed for purposes of extrapolation to the limiting val. for very low concn., and the colloidal solution should be dialysed with repeated changes of standard buffer solutions until osmotic pressures and membrane potentials are const. M. S. B.

Equilibrium between micelles and simple ions, with particular reference to the solubility of longchain salts. R. C. MURRAY and G. S. HARTLEY (Trans. Faraday Soc., 1935, **31**, 183—189).—The anomalous solubility-temp. curves of long-chain salts, which show a very sharp rise in solubility above a certain temp., can be explained by the equilibrium between simple ions and micelles. Since the transition irom a normal temp. coeff. to the extremely high one characteristic of the long-chain salts is less abrupt than the changes in the conductivity- and surface tensionconen. curves, it may be concluded that ionic aggregation predominates in dil. solution. M. S. B.

Soap micelles. A. S. C. LAWRENCE (Trans. Faraday Soc., 1935, 31, 189-195).-The size and structure of the ionic and neutral micelles are discussed. It is suggested that in the micelles undergoing the Krafft transition, the mols. are associated in pairs by their $\cdot CO_2$ Na groups, giving the neutral or secondary micelle. The transition is due to the loosening of the attractive forces between hydrocarbon chains throughout the micelle resulting in a great increase of the degree of dispersion. With the increase of free $\cdot CO_2$ Na groups the no. of ionised micelles will also increase in accordance with the mass law. The formation of curd is due to a phase change. X-Ray examination shows that the structure alters in curding. There are indications that the curd form is lamellar. M. S. B.

Relation of electrokinetic and electrolytic movement, as illustrated by the transport of electricity through soap curds. (MRS.) M. E. L. McBAIN (Trans. Faraday Soc., 1935, 31, 153-164).-Evidence for the interchangeability of electrokinetic and electrochemical quantities is afforded by calculation of electro-osmosis and cataphoresis from transport data for soaps, either alone or mixed with curd fibres, for both mixed with NaCl or KCl, and for curd fibres mixed with simple electrolytes. Insol. curd fibres in NaCl or KCl up to 1N give marked electro-osmosis, with ζ -potentials of 14-65 mv. compared with 39-86 mv. for Cl' under similar conditions. The surface conductance of N-Na palmitate curd fibres (I) is compared with that of 0.07N-NaCl. 7% of the mols. in (I) are ionised, 0.6 of the current being carried by the negatively-charged fibres and the remainder by Na^{\cdot}. The mobility of the latter is little < that of Na^{\cdot} in ordinary solutions. A negative charge on the curd conducts practically as M. S. B. well as on Cl'.

Diffusion of dyes. E. VALKÓ (Trans. Faraday Soc., 1935, 31, 230–245).—Diffusion coeffs. at 25° have been determined by the porous-plate method for Orange II (I), Azogrenadin S (II), Benzopurpurin 4B, Congo-red, and Chicago-blue 6B in pure H₂O and in aq. NaCl. The results indicate that (I) and (II), under the conditions employed, are mol. dispersed, whilst the others are aggregated, the aggregation increasing rapidly with increase in concn. of NaCl. The mechanism of the salt effect on aggregation is discussed. Comparison with mobilities derived from conductance data indicates that the frictional resistance of large colloid ions against osmotic forces is <against electrical forces. M. S. B.

Nature of the aqueous solution of dyes. C. ROBINSON (Trans. Faraday Soc., 1935, 31, 245-253). --Investigation of solutions of some highly purified dyes indicates that they contain micelles consisting of a no. of anions with some included Na^{*}. If > one micellar type exists equilibrium must be established rapidly. The micelle has probably a definite structure, the ions having a definite orientation as in a micro-crystal. From diffusion and osmotic pressure data, Benzopurpurin 4B and meta-Benzopurpurin have probably about 10 particles in the micelle. Congo-red has a somewhat smaller micelle. Bordeaux Extra is much more nearly in true solution. The conductivity curve of methylene-blue shows that it forms micelles to some extent, although formerly supposed to be in true solution. M. S. B.

Thermodynamics of swelling. R. L. STEIN-BERGER (Textile Res., 1934, 4, 451–462).—A discussion. CH. Abs. (e)

Application of Gibbs' fundamental equation to protein systems. G. S. ADAIR (Trans. Faraday Soc., 1935, 31, 98—106).—Gibbs' equations have been applied to protein systems of many components containing protein salts and ions, other salts and ions, and diffusible non-electrolytes. The theory of membrane equilibria has been extended to determine the activities of all the components of such systems. The determination of mol. wts., hydration, reactions which do not obey the law of const. proportions, and the equilibrium distribution of a protein in gravitational and centrifugal fields of force are also considered. M. S. B.

Proteins as colloidal electrolytes. (MISS) D. J. LLOYD (Trans. Faraday Soc., 1935, 31, 317-324).-The electrolytic character of proteins can be explained by their constitution as long polypeptide chains containing approx. 200 NH2-acid residues. They thus form zwitterions, but both charged centres never act together, one or other predominating according as the solution is acid or alkaline. The enormous mol. wts. of proteins indicate their colloidal character, but many proteins are fairly sol. in H₂O at their isoelectric points, probably due to definite hydration centres at which H_2O is held by co-ordinate linkings, and also to the orientation of H₂O mols. around charged centres. The electrolytic properties of proteins are illustrated by the reactions taking place in tanning. Differences in behaviour between colloid and crystalloid electrolytes may be explained by the bulk of the former.

M. S. B.

Electrochemical properties of a simple protein. K. LINDERSTRØM-LANG (Trans. Faraday Soc., 1935, 31, 324—335).—Clupein has been fractionated until it gave nearly pure proteins. One of these fractions has been titrated electrometrically with NaOH and the data employed for the calculation of the acidic and basic ionisation consts. Assuming an average mol. wt. of 4150, each mol. contains one free NH₂• or NH: and one free $\cdot CO_2H$. M. S. B.

Reaction between gelatin and electrolytes in gelatin gels. E. J. BIGWOOD (Trans. Faraday Soc., 1935, 31, 335-348).-Blocks of gelatin gel, placed in aq. NaCl containing (a) some acid, (b) AcOH-NaOAc buffer solution of $p_{\rm H}$ 4.8, (c) NaCl only, were left at const. temp. until the $p_{\rm II}$ was const. and gel and solution were analysed for Na and Cl'. The distribution corresponds with the Donnan membrane equilibrium, as previously observed for CaCl₂ (A., 1931, 306). The reactions are chiefly due to electrolytic dissociation of acid and basic org. radicals at the protein surface. In slightly acid solutions, $p_{\rm H}$ 3-7, surface adsorption is almost negligible. The same behaviour is observed with MgSO4 in solutions of $p_{\rm H} < 4.7$ only. At higher $p_{\rm H}$ there is excess MgSO₄ in the gel. When a swollen block of gelatin is placed in dil. aq. NaOH, diffusion to the interior takes place, but penetration never becomes uniform and a

stationary concen. gradient of diffusible ions is set up and is maintained until the gel disintegrates. The effect is explained by the fact that the concent of gelatin at the centre of the swollen block is > at the exterior, due to uneven swelling. A membrane equilibrium is set up with a concent gradient of the free ions in the gel, due to the concent gradient of the protein. Comparison with the behaviour of an agar gel shows that diffusion of ions in the latter proceeds steadily until distribution is uniform. M. S. B.

Diffusion potentials and mobilities of ionised gelatin. Acid and neutral solutions. E. B. R. PRIDEAUX (Trans. Faraday Soc., 1935, **31**, 350–354).—Measurements of the diffusion potential (D.P.) between gelatin chloride and KCl in HCl solutions of $p_{\rm H}$ 3 seem to indicate that the mobility is ≥ 0 , whilst electrical conductivities give 10—20. Measurements in acetate buffers of $p_{\rm H}$ 3·62 gave a D.P. agreeing with a mobility of the order of 30. Conductivity measurements gave 34·8. Determinations of the D.P. in solutions at or near the neutral point, to eliminate effects due to inequalities of [H⁺], gave 10, whilst two other gelatin solutions of $p_{\rm H}$ 6·2 and 6·45, respectively, gave 30—40 with the flowing junction. M. S. B.

Metaphosphoric acid and proteins. R. K. SCHOFIELD (Trans. Faraday Soc., 1935, 31, 390-394).-When a protein is titrated electrometrically with a strong mineral acid an end-point is usually obtained near $p_{\rm fl}$ 2. It represents the point at which the acid added is sufficient to combine with all the ionisable NH_2 -groups and to prevent the ionisation of the CO_2H . The amount cannot be very accurately determined, partly because of the effect of the anions loosely bound to the protein on the activity of the solution and the difficulty of separating, for backtitration of excess acid, an aliquot portion of the solution free from protein. It is suggested that the difficulties might be overcome by titrating with HPO₃, since, as PO₃' coagulates protein, it should become firmly bound to it and both should be removed together from the solution. Views, which also account for the lack of coagulating power of polymerised HPO3, are put forward to explain the nature of the association of PO_3' with protein. M. S. B.

Influence of electrolytes on the $p_{\rm H}$ of gelatin solutions. W. GIEDROYĆ (Rocz. Chem., 1934, 14, 1409—1417).—At $p_{\rm H} <$ the isoelectric point of gelatin (I) the change in [H^{*}] due to addition of salts varies in the order chlorides <sulphates <acetates and oxalates, both in absence and presence of (I); in the latter case the effect obtained is smaller, owing probably to buffer action of (I). R. T.

Gelatinisation of proteins by acids. W. KOPAC-ZEWSKI (Compt. rend., 1935, 200, 418-421; cf. A., 1934, 547, 792; this vol., 374).—Dispersions in 0.01N-NaOH of casein, fibrin, globulin, myxoprotein, and albumin, but not of fibrinogen, nuclein, or elastin, are gelatinised by 1-2N-lactic acid. As with serum gels, they are liquefied on heating, but set again on cooling, and they also return to the liquid state on dialysis. Gelatinisation always precedes coagulation. The gelatinisation of sera is attributed to the proteins, and especially to the globulins. J. W. S. Effect of variations in ionic strength on the apparent isoelectric point of ovalbumin. E. R. B. SMITH (J. Biol. Chem., 1935, 108, 187— 194).—The apparent isoelectric point of ovalbumin varies with the ionic strength (I) of the buffer used, and with the protein concn. (II). The "true" isoelectric point at zero (I) and (II) is at $p_{\rm fl} 4.86\pm0.01$. A. E. O.

Mordanting and dyeing processes. XXI. Investigation of chemical reactions in gelatin by means of measurements of light absorption. E. ELÖD and T. SCHACHOWSKOY (Trans. Faraday Soc., 1935, 31, 216-230).-In order to determine the composition of the metal compounds which have the actual tanning effect on gelatin, and also the nature of the interaction of these substances with proteins, the change of light absorption of aq. and gelatin solutions of complex compounds of Fe^{111} and Cr^{111} has been studied. It is shown that stable complexes have no tanning effect. The extent of change in a complex, ascertained from the course of the absorption curve, runs parallel with the increase in the time required for the dissolution of the gelatin treated with the same complex. From a similar investigation using CoIII complex compounds it was found that the actual tanning substance in this case is $Co(OH)_3$ produced by decomp. of the complex. Interaction with gelatin produced very little change in the light absorption of $Co(OH)_3$ sols. This does not exclude the possibility that tanning also may be brought about by substances other than metal oxides. M. S. B.

Colloidal ions of starch. M. SAMEO (Trans. Faraday Soc., 1935, **31**, 395–410).—The negative charge of starch is due to H_3PO_4 present in combination as a polysaccharide ester forming amylophos-phoric acid (I). In some starches fatty acids similarly combined are also present. By heating potato starch solution under pressure H_3PO_4 is gradually removed and the starch loses its charge. Osmotic pressure measurements seem to indicate that the amylophosphate ion has a mol. wt. of 200,000. (I) reacts as a dibasic acid, giving salts with bases. The migration velocity of the ion is $6 \cdot 1 \times 10^{-5}$ cm./sec. per volt/cm. The conductivity of (I) is < corresponds with the [H] observed electrometrically. In some starches H. activity and conductivity are < corresponds with the amount of H_3PO_4 present. This seems to be due to the presence of N compounds. It is possible to remove these from wheat starch without affecting the P content; the electrochemical behaviour is then the same as that of potato starch of similar P content. The viscosity changes can be explained on the basis of displacements of the ionisation in presence of electrolytes, as well as by Smoluchowski's theory of the electro-viscous effect. M. S. B.

Very fine wood fibres as colloid electrolytes. A. LOTTERMOSER and T. WILHELMI (Trans. Faraday Soc. 1935, **31**, 411—414).—The electric potential of "cement pulp," and the effect on it of different electrolytes, have been determined by an ultramicroscopic method. The influence of cations in reducing the negative potential increases with their valency, Al" and Th"" giving a positive charge; the opposing influence of anions is small except in the case of K salts, where it overcomes the positive action of K^{*}: NaOH produces a strong negative charge. The flocculating action of different electrolytes on cement pulp, cellulose, and lignin sols has been compared. The flocculating power increases with the valency of the cations, and readiness of flocculation increases in the order lignin<cement pulp<cellulose. With ThCl₄ the results are irregular. The amounts of salt adsorbed are very small.

M. S. B.

Chemical equilibria in homogeneous systems, and the validity of the Le Chatelier principle. B. G. CARBONERI (L'Ind. Chimica, 1934, 9, 1327— 1331).—Theoretical. The conditions under which the principle is valid are defined. H. F. G.

A thermodynamical problem. R. LUTHER (Z. Elektrochem., 1935, 41, 20). F. L. U.

Calculation of free energies, entropies, specific heats, and equilibria from spectroscopic data and the validity of the third law. IV. Homogeneous gas equilibria calculated from spectroscopic data. H. ZEISE (Z. Elektrochem., 1934, 40, 885– 890).—A review.

Families of thermodynamic equations. I. Method of transformations by the characteristic group. F. O. KOENIG (J. Chem. Physics, 1935, 3, 29-35).—Mathematical. F. L. U.

Calculation and graphical representation of elementary displacements in the [reversible] reactions of homogeneous equilibrium. P. MON-TAGNE (Compt. rend., 1935, 200, 234-236; cf. A., 1933, 464).—The influence of temp. and pressure on the equilibrium of the system $\alpha A \implies \beta B + \gamma C$ are discussed in relation to the law of mass action and representation on a ternary diagram. R. S. B.

Influence of thermal diffusion in certain equilibrium measurements. E. D. EASTMAN and S. RUBEN (J. Amer. Chem. Soc., 1935, 57, 97–98).— The conclusions of Emmett and Shultz (cf. A., 1933, 570) are confirmed. E. S. H.

Equilibrium constant for esterification in the gaseous phase. J. SALCEWICZ (Rocz. Chem., 1934, 14, 702-721).—EtOH-AcOH mixtures have been examined. R. T.

Dissociation constant of carbonic acid. J. CARLBERG (Suomen Kem., 1935, 8, B, 4).—MacInnes' vals. (A., 1933, 904) depend on faulty extrapolation. Recalculation of data brings the results more closely into line with the author's. A. G. P.

Thermodynamics of aqueous sulphuric acid solutions from electromotive force measurements. H. S. HARNED and W. J. HAMER (J. Amer. Chem. Soc., 1935, 57, 27–33).—The e.m.f. of the cells $H_2|H_2SO_4(m)|Hg_2SO_4|Hg$ have been determined over the range 0.05—17.5*M* and 0—60°. The activities of H_2O in H_2SO_4 solutions and of H_2SO_4 (0.0005—17.5*M* and 0—60°) have been calc. The normal electrode potential of the $Hg_2SO_4|Hg$ electrode between 0° and 60° is given by $E_0'=0.63495$ — 781.44×10-6t-426.89×10-9t². The relative partial mol. heat content of H_2SO_4 has been calc.

E. S. H.

Dissociation constants of mono- and trichloroacetic acids in ethyl alcohol. F.J. WELCHER and H. T. BRISCOE (Proc. Indiana Acad. Sci., 1934, 43, 142—153).—The dissociation consts., derived from the e.m.f. of cells without liquid junctions, are $CCl_3 \cdot CO_2 H \ 3 \cdot 236 \times 10^{-6}$, and $CH_2 Cl \cdot CO_2 H \ 5 \cdot 224 \times 10^{-7}$ (5 $\cdot 720 \times 10^{-7}$ when Pt electrodes coated with bright Pt are used). CH. ABS. (e)

Dissociation constants of chlorophenols. J. W. MURRAY and N. E. GORDON (J. Amer. Chem. Soc., 1935, 57, 110–111).—The dissociation consts. of PhOH, $C_6H_4Cl\cdotOH$ (I), and $C_6H_3Cl_2\cdotOH$ (II) are determined electrometrically in 50% (vol.) MeOH. The estimated vals. for (I) and (II) in H₂O are given and compared with those of $C_6H_2Cl_3\cdotOH$, $C_6HCl_4\cdotOH$, and $C_6Cl_5\cdotOH$ (Tiessens, A., 1929, 1173). H. B.

Dissociation constants of organic acids. XI. Thermodynamic primary dissociation constants of some normal dibasic acids. G. H. JEFFERY and A. I. VOGEL (J.C.S., 1935, 21-30; cf. A., 1934, 1307).—From conductivity measurements at 25° on the salts Na₂X=CO₂Na·[CH₂]_x·CO₂Na, where x=1-6, the limiting mobilities (l_0) of the ions X" have been calc., using a new combined solvent and hydrolysis correction. Assuming that vals. of l_0 for the amic acid ions NH₂·CO·[CH₂]_x·CO₂' (cf. A., 1934, 963), are equal to those for the acid ions

Electrolytic solutions. XV. Thermodynamic properties of very weak electrolytes. R. M. Fuoss and C. A. KRAUS (J. Amer. Chem. Soc., 1935, 57, 1–4; cf. this vol., 13).—Mainly theoretical. The osmotic properties of a very weak electrolyte, triisoamylammonium picrate in C_6H_6 , are in agreement with the hypothesis that ion pairs may associate into groups containing four ions. E. S. H.

Vapour pressures and activity coefficients of aqueous solutions of calcium and aluminium nitrates at 25°. J. N. PEARCE and L. E. BLACKMAN (J. Amer. Chem. Soc., 1935, 57, 24–27).—V.p. of aq. Ca(NO₃)₂ and Al(NO₃)₃, ranging in concn. from 0.1M to the saturated solutions, have been determined at 25°. The activity of the solvent, the activity coeffs. of the ions, the free energy of dilution of solute and solvent, and the partial mol. vols. of the solvent and solutes have been calc. E. S. H.

Activity coefficients in mixed solutions and the Gibbs-Duhem and Gibbs-Margules formulæ. P. VAN RYSSELBERGHE (J. Physical Chem., 1934, 38, 1161—1168).—Theoretical. D. R. D.

Activity of soap solutions at 90°. J. W. McBAIN and (MISS) M. M. BARKER (Trans. Faraday Soc., 1935, 31, 149-152).—The activity coeffs. for Na and K soaps at 90° have been recalc. (cf. Randall *et al.*, A., 1926, 1208). For the higher soaps in conc. solution the vals. are similar to those for a transition electrolyte of dissociation const. 0.01, but the effect is due to disappearance of soap mols. and fatty ions to form neutral and ionic micelles, respectively. Even in more dil. solution, however, when colloid has disappeared, the soaps, although now behaving as much stronger electrolytes, are definitely not as strong as KCl. M. S. B.

M.-p. and transition curves of the forms of ice from heavy water. G. TAMMANN and G. BANDEL (Z. anorg. Chem., 1935, 221, 391-396).—A mixture (H) containing $58\cdot3\%$ of H_2^2O was employed. The m.-p. curve for ice I for H is about $2^\circ >$ for ordinary H_2O (W). The equilibrium pressure p for ice I and III for W is 2096 ± 8 kg. per sq. cm. at $-30\cdot4^\circ$ and $\Delta V \ 0.2$ c.c. per g. For H p is 2188 ± 13 kg. per sq. cm. at $-30\cdot8^\circ$ and $\Delta V \ 0.16$ c.c. per g. Between ice I and II for H the equilibrium p is approx. 2277 kg. per sq. cm. at -61° and for W 1948 kg. per sq. cm. The transition temp. of ice II to ice III for W is $0.5^\circ <$ for H at the same p. By extrapolation from the vals. for H the p-t curves for H_2° O have been deduced. M. S. B.

Systematic studies in combination. LXIII. System rhenium-phosphorus. H. HARALDSEN (Z. anorg. Chem., 1935, 221, 397—417).—Re and P react when heated above 750—800°, but the products do not melt even at 1200°. Tensimetric and X-ray investigations indicate the existence of the compounds: ReP₃, ReP₂, ReP, and Re₂P. The mol. vols. are additive, the increment for Re being 8·1 c.c. and for P 10·1 c.c. Heats of formation from P₂ and P₄ have been derived for the first three phosphides. These and temp. of decomp. at 1 atm. have been compared with those for other phosphides. M. S. B.

[Solubility] diagram potassium nitrite-water. Hydrate $\text{KNO}_{2,0} \cdot 5\text{H}_2\text{O}$. J. BUREAU (Compt. rend., 1935, 200, 395—397).—Pure KNO_2 is perfectly white, d_0 1.926, m.p. 441°. The eutectic temp. is -40.2° (64.9% KNO_2). The stable solid phase between -40.2° and -8.8° is $\text{KNO}_2.0.5\text{H}_2\text{O}$. J. W. S.

Dissociation pressures of some salt hydrates. D. G. R. BONNELL and L. W. BURRIDGE (Trans. Faraday Soc., 1935, **31**, 473—478).—The dissociation pressures of $ZnSO_4,7H_2O$, $ZnSO_4,6H_2O$, $FeSO_4,7H_2O$, MgSO₄,7H₂O, Na₂HPO₄,7H₂O, and NiSO₄,7H₂O have been determined at 10°, 15°, 20°, and 25° by a dynamic method and compared with the results of other investigations at 25°. Heats of hydration have been calc. A new type of H₂O vapour saturator is described. M. S. B.

Thermal analysis of the system picric aciddinitronaphthalene. T. URBAŃSKI and B. KWIAT-KOWSKI (Rocz. Chem., 1934, 14, 941—943).—Neither 1:5- nor 1:8-C₁₀H₆(NO₂)₂ gives rise to compounds or solid solutions. R. T.

Thermal analysis of binary mixtures containing organic nitrates. T. URBAŃSKI (Rocz. Chem., 1934, 14, 925—940).—The m.-p. diagrams of the systems mannitol hexanitrate (I)-p-NO₂·C₆H₄·OH (II), p-C₆H₄Cl·NO₂, p-C₆H₄(OMe)₂, m- (III) and p-(IV) -NO₂·C₆H₄·CO₂Et, m- (V) and p-NO₂·C₆H₄·CHO, m-NH₂·C₆H₄·NO₂, and 1:2:4-C₆H₃Me(NO₂)₂ (VI); erythritol tetranitrate (VII)-(II) and 2:4:6-trinitrotoluene (VIII); pentaerythritol tetranitrate (IX)-(VI), trinitrophenylmethylnitroamine, NH_2Ph , and camphor (X), indicate the unstable compounds 2(I),(III), 2(I),(IV), (I),2(V), and (VII),4(VIII). Solid solutions are formed in the system (IX)-(X), whilst in the remaining systems only ordinary eutectic mixtures are observed. R. T.

Equilibria in the systems $KCl-H_2O-NH_4Cl$ and $NaCl-H_2O-NH_4Cl$. M. M. JARLIKOV (J. Appl. Chem. Russ., 1934, 7, 902–905).—Solubility and density data are given for 0—80°. R. T.

System $CaSO_4$ -CaO-SO₃. S. ŽEROMSKI and Z. SLUBICKI (Rocz. Chem., 1934, 14, 849-856).—The pressure-% decomp. curves of $CaSO_4$ heated at > 1000° exhibit irregularities and spurious equilibrium points; these effects are ascribed to formation of metastable solid solutions of the products of decomp., and to surface phenomena. The system is univariant. R. T.

System antimony iodide-potassium iodidewater. F. FRANÇOIS (Compt. rend., 1935, 200, 393-395).—Between 16° and 48° $SbI_{3,2}KI,H_2O$ separates in dark red quadratic prisms, isomorphous with $BiI_{3,2}KI,H_2O$ (this vol., 36). J. W. S.

Equilibrium diagrams of salts for salt baths. III. System Na₂CO₃-BaCl₂-KCl. T. SATO (Kinz. no Kenk., 1933, 10, 448—463).—The m.p. and transition temp. of BaCl₂ are 963° and 927°, respectively. Equilibrium data are recorded for binary and ternary mixtures of Na₂CO₃, BaCl₂, and KCl. BaCl₂,Na₂CO₃, which yields two immiscible liquid phases at 730°, and $2KCl,BaCl_2$, m.p. 670°, are formed in the binary systems. In the ternary system there are two ternary eutectic points and one peritecto-cutectic point.

Сн. Авз. (е)

A. R. P.

System iron-iron oxide-calcium orthoferrite. E. MARTIN and R. VOGEL (Arch. Eisenhüttenw., 1934-1935, 8, 249-254).—Thermal and micrographic observations have disclosed two compounds, Ca0,9FeO (I), m.p. 1310°, and 4CaO,3Fe₃O₄, m.p. 1200°. The system may be divided into five 3-phase fields and one 2-phase field, the other solid phases present being Fe, Fe₃O₄, wüstite, CaFe₂O₄, and Ca₂Fe₂O₅. Eutectics are formed at Fe₂O₃ 62·8, CaO 26·9, Fe 10·3%, 1110° [(I) +Ca₂Fe₂O₅]; Fe₂O₃ 65·3, CaO 25·8, Fe 8·9%, 1120°; and Fe₂O₃ 72·0, CaO 24·5, Fe 3·5%, 1240° (Fe₃O₄+Ca₂Fe₂O₅]. Free Fe occurs in the melts when the Fe content is > that corresponding with the sections (I)-Ca₂Fe₂O₅ and (I)-wüstite.

Equilibrium between molten metals and slags. W. KRINGS (Z. Metallk., 1934, 26, 247-249). Deviations from the ideal mass action law in the equilibrium between molten metals and slags are attributed to the formation of stable compounds in one of the liquid phases. In the case of systems involving a metal, P, and O, the more stable is the metal phosphide the looser is the combination between the metal oxide and P_2O_5 in the slag, and hence the greater is the P content of the metal phase; this accounts for the fact that in the Mn-P-O system at 1450° no P_2O_5 can be detected in the slag until the metal contains > 5% P, whereas in the Cu-P-O system no P remains in the metal until the P_2O_5 content of the slag exceeds 40%. A. R. P.

Y

Condensed phase equilibria in the system water-alcohol-ether. A. LALANDE (J. Chim. phys., 1934, 31, 583-610; cf. A., 1934, 137, 845).—The three binary systems and the ternary system have been investigated at temp. from 0° downwards. There is no evidence for the formation of any intermol. compound. All three binary systems form eutectics, and there is a ternary eutectic at -127° . EtOH-Et₂O mixtures remain homogeneous even when supercooled. F. L. U.

System butyric acid-sodium hydroxide-water. C. R. BURY and R. D. J. OWENS (Trans. Faraday Soc., 1935, 31, 480–482).—Four solid phases, NaOH, H_2O , PrCO₂Na, PrCO₂Na, H_2O , and 2PrCO₂Na,PrCO₂H, are formed. Alkali strongly represses the solubility of the neutral salt, whilst excess acid increases it.

M. S. B. Thermal equilibria in ternary systems. Phenacetin-antipyrine-sulphonal. K. HRYNA-ROWSKI and F. ADAMANIS (Rocz. Chem., 1934, 14, 466-473).—Compound formation does not take place; the ternary eutectic mixture, m.p. 69°, contains phenacetin 26, antipyrine 42, and sulphonal 32%. R. T.

Ternary systems of organic compounds and their classification. K. HRYNAKOWSKI (Rocz. Chem., 1934, 14, 451-465).—Three chief types are distinguished, differing in the intermiscibility of the fused components, and in the formation or otherwise of solid solutions and compounds. R. T.

Calorimetry of salt solutions (system sodium sulphate-magnesium sulphate-water). J. PER-REU (Compt. rend., 1935, 200, 237-241).—The sp. heats of mixed solutions of Na₂SO₄,10H₂O and MgSO₄,7H₂O of concns. c_1 and c_2 mol. per mol. of total H₂O, respectively, are given by $\gamma_{c_1c_1} = (a_1c_1 + a_2c_2 + 1)/(b_1c_1 + b_2c_2 + 1)$ at 19-23°, where $a_1 = 17.641$, $b_1 = 27.278$, $a_2 = 11.481$, and $b_2 = 21.043$. Heats of dissolution, dilution, and crystallisation have also been determined. R. S. B.

Hydrazine: heat capacities of aqueous hydrazonium salts at 20° and 25°. A. W. COBB and E. C. GILBERT (J. Amer. Chem. Soc., 1935, 57, 35— 39).—The heat capacities of 0.1—1*M*-hydrazonium dichloride, dibromide, monochloride, monobromide, and monoperchlorate have been determined and the apparent and partial mol. heat capacities of the solute and the partial mol. heat capacity of H₂O calc.

E. S. H.

Hydrazine : heats of dissolution of hydrazonium salts at 25°. E. C. GILBERT and A. W. COBB (J. Amer. Chem. Soc., 1935, 57, 39–41).—Data are recorded for N_2H_4 ,2HCl, N_2H_4 ,HCl, N_2H_4 ,HBr, N_2H_4 ,HClO₄,0·5H₂O, and N_2H_4 ,HClO₄. The partial mol. heats of dissolution of solvent and solute have been calc. E. S. H.

Relation of volume shrinkage to the heat of formation and electrolytic decomposition potential of the alkali and alkaline-earth metal halides. S. BALCE (Univ. Philippines Nat. App. Sci. Bull., 1934, 4, 119—121).—The heats of formation of the alkali and alkaline-earth halides are given by H= $1\cdot33z \times 10^5 \times \sqrt[3]{(\Delta V)}$, where z is the valency of the metal, and ΔV is the shrinkage in vol. per unit vol. on formation of the salt from the elements. The electrolytic decomp. potential $P=5.7\sqrt[3]{(\Delta V)}$.

Сн. Авз. (е)

Determination of free energy and heat of formation of aluminium chloride from the potential of the chlorine-aluminium cell. W. D. TREAD-WELL and L. TEREBESI (Helv. Chim. Acta, 1935, 18, 103-120).—The e.m.f. of the cell Al|Al₂Cl₆+KCl+ NaCl|Cl₂(Pt) has been measured at 90° to 250°. The electrolyte used was the ternary eutectic, the v.p. of Al₂Cl₆ in which, measured over the same temp. range, is given by log p=21.039-5700/T-0.014687T. The free energy of formation of Al₂Cl₆ vapour, calc. from the e.m.f. and from the equilibrium const. of the reaction $Al_2O_3+6HCl=2AlCl_3+3H_2O$, is 1.997- $4.57 \times 10^{-4} (T-500)$ volts up to 930° abs., and 1.766— $4.85 \times 10^{-4}(T-1000)$ volts from 930° to 1500° abs. Heats of formation calc. from ΔF are 307.98 kg.-cal. for Al₂Cl₆ vapour, and 336.85 kg.-cal. for the solid at 20°. Available thermal data lead to 335.3 kg.-cal. for the latter. A method for preparing large quantities of pure AlCl₂ is described. F. L. U.

Approximate value for the heat of formation of an iron phosphide $[Fe_2P]$. W. A. ROTH, A. MEICHSNER, and H. RICHTER (Arch. Eisenhüttenw., 1934—1935, 8, 239—241).—By dissolution of FePO₄ crystals in HCl its heat of formation from Fe₂O₃ and P₂O₅ has been found to be +21.6 kg.-cal., and from Fe, O, and red P+303.9 kg.-cal. The heat of formation of Fe₂P has been determined by oxidation of Fe₂P and of a mixture of $2Fe_a + P_{red}$ in a bomb calorimeter; the most probable val. is +41 kg.-cal. ±10%. Attempts to prepare pure Fe₂P by direct union of the elements in vac. failed. A. R. P.

Theory of concentrated solutions. XII. Application of thermal analysis to the determination of the heats of fusion of organic compounds. J. TIMMERMANS (Bull. Soc. chim. Belg., 1934, 43, 626-638).—The f.-p. data for the binary systems afford the following vals. for the heat of fusion: $n-C_5H_{12}$ 2.0, $n-C_6H_{14}$ 3.0, methylcyclohexane 1.6, PhMo 1.6, CS₂ 1.35, EtBr 1.4, Pr^aBr 1.56, Bu^aBr 1.6, Bu^aBr 0.6, Bu^aCl 0.5, CH₂Cl₂ 1.0, C₂H₄Cl₂ 1.25, PhF 1.95, PhCl 1.8, PhBr 2.0, $o-C_6H_4$ MeCl 2.0, $m-C_6H_4$ Cl₂ 2.5, EtcO 1.8, methylal 1.9, ethylal 3.6, HCO₂Et 2.2, EtCO₂Et 3.0, EtCO₂H 1.8, Pr^aCO₂H 1.2, Bu^aCO₂H 1.85, Bu^aCO₂H 1.75 kg.-cal. per mol. J. G. A. G.

Heats of dissolution, heats of dilution, and specific heats of aqueous solutions of certain amino-acids. C. A. ZITTLE and C. L. A. SCHMIDT (J. Biol. Chem., 1935, 108, 161—185).—The sp. heats of solutions of glycine, dl-alanine, and dl-valine, and the heats of dilution and dissolution of 18 NH₂-acids (I), have been measured at 25°. The relation between free energy change and temp. for certain (I) is also discussed. The heat of hydration of asparagine determined from heats of dissolution of the hydrated and anhyd. form is in agreement with the val. deduced from heats of combustion. A. E. O.

Heats of organic reactions. I. Apparatus and heat of hydrogenation of ethylene. G. B. KISTIA-KOWSKY, H. ROMEYN, jun., J. R. RUHOFF, H. A. SMITH, and W. E. VAUGHAN (J. Amer. Chem. Soc., 1935, 57, 65—75).—The calorimeter described is designed to measure the heats of gaseous reactions at $> 150^{\circ}$ with a precision of about 0.1%. From the measured heat of hydrogenation of C_2H_4 at 82° ($-32,824\pm50$ g.-cal.) the following vals. have been calc.: $\Delta H_{298} - 32,575\pm50$, $\Delta H_{273} - 32,460\pm50$, ΔH_0 $-31,000\pm150$ g.-cal. E. S. H.

Thermal data. II. Heats of combustion of *l*-cysteine, *l*-cystine, β -thiolactic acid, and $\beta\beta'$ -dithiodilactic acid. III. Heat capacities, entropies, and free energies of four organic compounds containing sulphur. H. M. HUFFMAN and E. L. ELLIS (J. Amer. Chem. Soc., 1935, 57, 41–46, 46–48; cf. A., 1933, 27).—II. The mol. heats of combustion at const. pressure at 25° are : β -thiolactic acid 511,500 \pm 800, $\beta\beta'$ -dithiolactic acid 946,800 \pm 900, *l*-cysteine 532,420 \pm 500, *l*-cystine 998,170 \pm 900 g.-cal.

III. The heat capacities, entropies, and free energies between 90° and 298° abs. are calc. for the above compounds. E. S. H.

Apparent molal isochoric heat capacity of electrolytes. F. J. GUCKER, jun., and T. R. RUBIN (J. Amer. Chem. Soc., 1935, 57, 78—82).—Theoretical. E. S. H.

Calculation of heat of reaction from values of the equilibrium constant at two temperatures. T. B. DOUGLAS and H. D. CROCKFORD (J. Amer. Chem. Soc., 1935, 57, 97).—Theoretical. E. S. H.

Diffusion coefficients of electrolytes, and ionic mobilities. S. PLESNIEWICZ (Rocz. Chem., 1934, 14, 764—797).—The diffusion coeffs. have been determined by a new method. The calc. ionic mobilities (I) of the isobaric anions $Fe(CN)_6'''$, $Fe(CN)_6'''$, and Cr_2O_7'' are as $\frac{1}{3}:\frac{1}{2}$, indicating that (I) are inversely ∞ to the charge of the ions. R. T.

Purification of certain solvents for conductivity determinations. E. MICHALSKI (Rocz. Chem., 1934, 14, 1052–1060).—H·CO₂H, AcOH, H₂O, and other solvents are purified by fractional crystallisation in special apparatus ensuring isolation from atm. CO_2 and NH₃. R. T.

Direct determination of the limiting conductivity of strong electrolytes, and the conductivity of very dilute weak electrolytes. M. HŁASKO and A. SALITÓWNA (Rocz. Chem., 1934, 14, 1038–1051).– Specially purified H₂O is used for diluting various salt solutions and the limiting conductivities, λ_{∞} , are measured directly in special SiO₂ vessels. The vals. of λ_{∞} obtained differ by > 0.2% from those calc. from Kohlrausch's equation; λ_{∞} is attained at $2 \times 10^{-6}N$ -TIOH, $10^{-7}N$ -Ba(OH)₂, and $10^{-6}N$ -HCl. R. T.

Influence of the bubbles of gas evolved on the conductivity of solutions during electrolysis. L. E. KRAUZE and P. I. SOKOLOV (J. Appl. Chem. Russ., 1934, 7, 887—901).—The increased resistance of the electrolyte due to formation of bubbles of gas increases directly with the c.d., and inversely with the distance between the electrodes. R. T.

Conductivity of glycerol solutions of calcium, strontium, and barium chlorides. J. SZPER and Z. GAJEWSKI (Rocz. Chem., 1934, 14, 570–578).—At 25—200° the mol. conductivity, λ_m follows Kohlrausch's law; λ_{m} has the same val. in all three cases $(3.67 \times 10^{-4} \text{ at } 25^{\circ})$. The mobility of the cations augments in the order Ca<Sr<Ba. λ_{m} rises with rise of temp., exponentially from 25° to 130°, and linearly from 130° to 200°. R. T.

Potentials of electrodes in non-aqueous solutions. K. DREWSKI (Rocz. Chem., 1934, 14, 865— 898).—The potential of a H electrode in MeOH, EtOH, and PrOH solutions of HCl differs from that in aq. solution, to an extent ∞ to the difference in dielectric const. and in the hydration of H⁺; for solutions in HCO₂H and AcOH the chemical nature of the solvent enters as a further factor. R. T.

Potential of azides. E. H. RIESENFELD and F. Müller (Z. Elektrochem., 1935, 41, 83-86).-The potential (E) of a Pt anode in NaN₃ has been deter-mined. At the anode $N_3' \longrightarrow N_3 + e, N_3 \longrightarrow N_2 + N$, $N+N \longrightarrow N_2$. For $-\log c.d. = 1.5 - 3.5$, Tafel's formula $E=a+b \log i$ holds, where i= current, b= $RT/F \log e$, and a = const. Smooth Pt gives on previous treatment with O_2 and N_2 the same p.d., but with H, a lower val. Platinised Pt gives a p.d. approx. 0.06 volt < for smooth Pt owing to catalysis of the conversion of N_3 into N_2 on the former. The val. of *E* depends on $[N_3']$ according to the Nernst formula, and is independent of $[H^*]$ and [OH'] at const. $[N_3']$. From measurements on the cells Ag|AgN₃|N-NaN₃| 0.1N-KCl $|Hg_2Cl_2|Hg$ at 0°, $Ag|AgN_3|N-NaN_3|0.1$ 0.001N-NaN_3|AgN_3|Ag at 20°, and $Ag|AgN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NaN_3|0.1N-NAN_3|0.1N-NAN_3|0.1N-NAN_3|0.1N-NAN_3|0.1N-NAN_3|0.1N-NAN_3|0.1N-NAN_3|0.1N-NAN_3|0.1N-NAN_3|0.1N-NAN_3|0.1N-NAN_3|0.1N-NAN_3|0.1N-NAN_3|0.1NAN_3|0.1N-NAN_3|0.1N-NAN_3|0.1$ AgNO3 |Ag at 18°, the normal potential of the AgN3 |Ag electrode has been found to be 0.384 volt, with a temp. coeff. 0.0006 volt per 1°. The aq. solubility of AgN₃ is 8.43×10^{-3} g. per litre at 18° . R. S. B.

Systematic $p_{\rm H}$ values of some solutions in the alkaline range. S. J. KIEHL and R. D. LOUCKS (Trans. Electrochem. Soc., 1935, 67, 77-96).—The $p_{\rm H}$ at 30° has been determined for NaOH in admixture with Na₂HPO₄, H₃BO₃, and NaHCO₃; H₃BO₃ mixed with Na₂B₄O₇, Na₃PO₄, Na₂HPO₄, and Na₂CO₃, and Na₂CO₃. The $p_{\rm H}$ of solutions of H₃BO₃, Na₂B₄O₇, Na₂HPO₄, and Na₂CO₃, and Na₂CO₃. The $p_{\rm H}$ of solutions of H₃BO₃, Na₂B₄O₇, Na₂HPO₄, and Na₂CO₃, with and without the addition of NaOH, has also been determined at 60°. In all cases except H₃BO₃, for which the ionisation decreases with fall of temp., $p_{\rm H_{60^{\circ}}} < p_{\rm H_{30^{\circ}}}$. The $p_{\rm H}$ of NaHCO₃ and Na₂HPO₄ solutions increases with decreasing concn. from 0.05M to 0.5M, with a max. at < 0.05M. R. S. B.

Physico-chemical studies of complex formation involving weak acids. XII. Complex anions of cuprous and auric cyanides. H. T. S. BRITTON and E. N. DODD (J.C.S., 1935, 100—104).—The results of adding aq. KCN to $CuSO_4$, to CuCN, and to NaAuCl₄ have been followed by potentiometric titration using the Cu electrode, and by measurements of (a) p_{π} by the glass electrode, (b) conductivity, and (c) v.p. of hydrolysed HCN. It is inferred that in these solutions only the complex ions $Cu(CN)_3''$ and $Au(CN)_4'$ exist. R. S. B.

Potential of the lead dioxide-lead sulphate electrode at various temperatures. W. J. HAMER (J. Amer. Chem. Soc., 1935, 57, 9–15).—The e.m.f. of the cell $H_2|H_2SO_4(m)|PbSO_4|PbO_2|Pt$ has been measured over the range 0.0005—7.0M and 0—60°. Vals. of the mol. electrode potential of the PbSO₄–PbO₂-Pt electrode between 0° and 60° have been calc. E. S. H.

Molal electrode potentials and the reversible electromotive forces of the lead accumulator from 0° to 60°. H. S. HARNED and W. J. HAMER (J. Amer. Chem. Soc., 1935, 57, 33—35).—The e.m.f. of Pb (2-phase amalgam)|PbSO₄|Na₂SO₄|Hg₂SO₄|Hg has been determined between 0° and 60°. The mol. electrode potentials of the electrodes reversible to SO_4'' and those related to the electrodes of the Pb accumulator have been evaluated. Equations for the e.m.f. of Pb|PbSO₄|H₂SO₄(m)|PbSO₄|PbO₂|Pt at 0.05—7*M* and 0—60° have been developed.

E. S. H.

Polarographic studies with the dropping mercury cathode. XLIV. Dependence of limiting currents on the diffusion constant, the rate of dropping, and the size of drops. D. ILKOVIŎ (Coll. Czech. Chem. Comm., 1934, 6, 498—513).— Equations are derived from theoretical principles and confirmed experimentally. E. S. H.

Polarographic studies. Measurement of "limiting currents" in solutions of pure salts by means of the Kučera-Heyrovský dropping mercury electrode. W. KEMULA and B. WENI-GERÓWNA (Rocz. Chem., 1934, 14, 406-413).—Rcproducible results are obtained when the size of the drops of Hg and the rate of flow are strictly const. R. T.

Capacity of the polarised mercury electrode at very low frequencies. N. THON (Compt. rend., 1935, 200, 54-56; cf. A., 1934, 846).—The capacity of the polarised Hg electrode in LiCl, is the same at frequencies of 9 and 31 per sec. The vals. calc. from the cathodic and anodic polarisations are concordant (cf. A., 1932, 24) and are in agreement with the vals. determined from the electro-capillary curve. Since the capacity is independent of frequency over the voltage range investigated, the vals. measured are the true capacities of the Hg-solution double layer. The capacity is a min. at about -0.8 volt. Its decrease with increasing voltage below 0.8 volt is attributed to increase in the proportion of cations in the ionic layer, and its increase with increasing voltage beyond -0.8 volt to decreasing distance between the two layers as a result of dehydration of the cations. J. W. S.

Reduction potentials of organic compounds. XIX. Limiting currents of the current-voltage curves. M. SHIKATA and I. TACHI (J. Electrochem. Assoc. Japan, 1934, 2, 201–206).—Limiting currents found on the polarograms of many org. compounds are compared and discussed. Solubilities of various org. compounds in H_2O at 25° are recorded.

Сн. Авз. (е)

Effect of addition of colloidal substances on the polarisation potential in the electrodeposition of zinc from aqueous solutions of zinc sulphate. T. ISHIHARA, T. ONODA, and K. UMETU (Kinz. no Kenk., 1933, 10, 365—382).—The potential decreases with increasing amount of colloid, whereas the min. overvoltage of O and the decomp. voltage increase. A discontinuity was observed at 0.1 g. of colloid (glue or gelatin) per litre. CH. ABS. (e)

Effect of supersonic waves on chemical phenomena. III. Effect on the concentration polarisation. IV. Effect on overvoltage. N. MORI-GUCHI (J. Chem. Soc. Japan, 1934, 55, 749—750, 751—754).—When supersonic waves (I) are applied in the electrolysis of 0.1N-CuSO₄ the voltage-c.d. curve becomes a straight line. The overvoltage in the electrolysis of N-KOH, -NaOH, or $-H_2SO_4$ is eliminated when (I) are applied. (I) is supposed to eliminate the diffusion layer between electrode and electrolyte. CH. ABS. (e)

Limiting effect of the Debye equation on polarisation concentration curves. W. D. KUM-LER (J. Amer. Chem. Soc., 1935, 57, 100).— Theoretical. E. S. H.

Determination of potential-current curves of electrolytes. J. LIGER (Bull. Soc. chim., 1934, [v]. 1, 1679-1702).-Using a large Pt anode with wire cathodes of Pt, Fe, Cu, and Ag embedded in glass, current-voltage curves have been obtained from successive throws of a ballistic galvanometer produced by applying known p.d. for about 0.1 sec. A fresh electrode surface was made by abrading the exposed end of the wire between each throw. A rocking device permitted the electrode to make and break the circuit. Results were reproducible to within 2-5 mv. NaCl and NaOH solutions afforded four inflexions, corresponding with four discharge potentials (I) which depended on the electrode metal, rose with decreasing diameter of the Pt wire, and varied with dilution more rapidly than the Nernst equation requires. The curves for BaCl₂ and NiSO₄ solutions had four and three inflexions, respectively. The significance of these (I) is discussed. The (I) of Cu[•] at Pt (0.4 mm. diam.) is 0.45-0.5 volt and that of Cu" at Fe (0.5 mm.) is 0.16. J. G. A. G.

Electrochemical potential and corrosion phenomena of iron. N. NEKRASSOV, I. STERN, and Z. GULANSKAJA (Z. Elektrochem., 1935, 41, 2—9).— The change of electrode potential of Fe with time has been measured in aq. solutions of Na₂SO₄, NaHCO₃, Na₂CO₃, Na₂SiO₃, NaH₂PO₄, Na₂HPO₄, Na₃PO₄, NaCl, NaOAc, and Na₂C₂O₄, all containing air. An increased rate of corrosion is associated with displacement of the potential towards more negative vals., and the converse is also true. The val. of $p_{\rm H}$ above which corrosion is greatly diminished is not necessarily 9, but depends on the anions present. F. L. U.

Exact method for the direct measurement of cathodic current distribution. E. MANTZELL (Z. Elektrochem., 1935, 41, 10-20).—The method described consists in measuring the c.d. at each separate part of a symmetrically divided cathode, the subdivisions being insulated from one another and connected by low-resistance leads to a bus bar. The method has been applied to the determination of the current distribution with varying distance between the electrodes and with the interposition of screens and slits of varying dimensions. F. L. U. Acoustic electrochemical phenomena. L. V. NIKITIN (Compt. rend. Acad. Sci. U.R.S.S., 1934, 4, 309—313).—When acoustic waves are passed through an electrolyte during electrolysis, a periodic variation of 0.05—0.1 mv. occurs in the electrode potential, of the same frequency as the wave motion. The character of the variation varies with time, and it disappears after some min. to reappear after a further lapse of time. The phenomenon is associated with the release of the gas films from the electrodes. J. W. S.

Electrolysis of sodium chloride in liquid ammonia. E. I. ACHUMOV and B. B. VASSILIEV (Z. Elektrochem., 1935, 41, 96—101).—For saturated solutions the conductivity (κ) is a max. when the solid phases NaCl and NaCl,5NH₃ are both present. The decomp. p.d. is 3.54 volts. The electrolysis has been studied in an autoclave which acts as cathode, with a C anode, at -10° , 0°, and room temp. The reaction at the anode is $8NH_3+3Cl_2=6NH_4Cl+N_2$, and at the cathode Na+NH₃=NaNH₂+0.5H₂, the NaNH₂ forming a white powder. An asbestos diaphragm separates the anodic and cathodic compartments, preventing the reaction NH₄Cl+NaNH₂= NaCl+2NH₃. R. S. B.

Theory of passivation. XXVI. Limiting current for anodic polarisation of metals in water solution. W. J. MÜLLER (Z. Elektrochem., 1935, 41, 83—86).—Photographs of the anode surface at various points on the i-t curves for Fe in N-H₂SO₄ (alone and saturated with FeSO₄) show that i falls rapidly only when the surface is almost completely covered with crystallites. E. Müller's results are readily interpreted in terms of the author's passivation theory. R. S. B.

Influence of gelatin on the processes taking place in the systems $Zn-ZnSO_4$ and $Zn-CuSO_4$. A. GALECKI [with E. HOJA, J. NETEROWICZ, and F. MODRZEJEWSKI] (Rocz. Chem., 1934, 14, 414–429).— The quantity of Cu deposited on Zn from aq. CuSO₄ containing gelatin (I) is > in its absence. The Zn and (I) contents of the deposit increase with increasing (I) concn., and the deposits become darker and more tenacious. Substantially the same results are obtained in stirred and unstirred systems. The potential of a Zn electrode in aq. ZnSO₄ becomes more negative in presence of (I), whilst that of Zn electrodeposited from aq. ZnSO₄ containing (I) is more positive than that of pure Zn. (I) is deposited on the cathode in amount varying directly with time, and inversely with c.d. R. T.

Entropy and the absolute rate of chemical reactions. I. Steric factor of bimolecular associations. O. RICE and H. GERSHINOWITZ (J. Chem. Physics, 1934, 2, 853-859).—Theoretical.

M. S. B.

Application of wave mechanics to reactions involving hydrogen and diplogen. R. A. SMITH (Proc. Camb. Phil. Soc., 1934, 30, 508—513).—A chemical reaction is treated as a problem of transitions between two stationary states. In a collision between two heavy mols., XH and XH², the initial and final stationary states are taken to have the same energy. Using Fowler and Bernal's method the probability of
exchange of a proton and a diplon in collisions between H_2O and H_2^2O is calc. The effects of temp. and of OH' and OH_3^+ ions on the exchange are discussed. Lower limits to the heights of the potential barriers, through which a proton and diplon have to pass in exchange between H_2^2 and H_2O and OH_3^+ in order that the rates of reaction are as slow as the observed rates, are calc. W. R. A.

Kinetics of the reaction between hydrogen and sulphur. I. Reaction at 265-350° and 290-820 mm. E. E. AYNSLEY, T. G. PEARSON, and P. L. ROBINSON (J.C.S., 1935, 58-68; cf. A., 1933, 469).-The reaction was studied by dynamic and static methods. The velocity of the homogeneous reaction ∞ [S][‡][H₂] and is not affected by N₂, H₂S, or the glass surface, but is markedly catalysed by traces of O₂ at the lower temp. The temp. coeff. is 1.90 corresponding with the heat of activation 43.3 kg.-cal. The velocity of the heterogeneous reaction ∞ the area of the molten S and \propto [H₂], but is not affected by N₂ and is independent of the v.p. of S. The temp. coeff. is 1.95 and the heat of activation is 45.5. Earlier investigations (J.C.S., 1923, 123, 696) are discussed and the following mechanism is proposed : (1) $H_2 + S_2$ \rightarrow H₂S+S, (2) S+S_x \rightarrow yS_{(x+1)/y} and S+H₂+M \rightarrow H₂S+M*. J. G. A. G.

Influence of temperature on the explosion of mixtures of air and hydrocarbons. P. MONDAIN-MONVAL and R. WELLARD (Compt. rend., 1935, 200, 232-234; cf. B., 1931, 705).-The max. pressure produced by exploding mixtures of air and $n-C_6H_{14}$ is independent of the temp. up to 180°, and then begins to increase rapidly with rise of temp. up to the point of spontaneous inflammability, 232°. Commercial oils behave similarly, but with C₆H₆ the max. pressure is independent of temp. from 50° to 350°. Results are interpreted in terms of unstable alcohol peroxides of high latent energy formed in the region of rapid change of max. pressure with temp., and the application of this view to the overheated motor cylinder is discussed. R. S. B.

Oxidation of carbon monoxide by nitrous oxide. C. E. H. BAWN (Trans. Faraday Soc., 1935, 31, 461– 473).—The oxidation of CO by N₂O in quartz vessels near 550° is a surface reaction. The rate ∞ the initial [N₂O] and inversely as [CO], indicating that CO is strongly adsorbed. Inert gases and NO have very little effect, but CO₂, either added or produced by the reaction, accelerates the reaction. Between certain crit. limits of temp. and pressure explosion takes place. The lower explosion limit is depressed by excess of CO and N₂O. The effect of inert gases depends on their physical properties in a way which indicates that the reaction is governed by the temp. of the surface layers. Small amounts of NO inhibit the explosion. A chain mechanism is suggested. M. S. B.

Inert gas effects at the lower explosion limit of phosphine-oxygen mixtures. S. C. GRAY and H. W. MELVILLE (Trans. Faraday Soc., 1935, **31**, 452-461; cf. this vol., 47).—H₂, Ne, A, N₂, CO₂, NO, and SO₂ all depress the lower explosion limit of PH₃-O₂ mixtures by impeding diffusion of the chains to the walls. There is no measurable gas phase inhibition for pressures of the inert gas of the same order as that of PH₃ and O₂. Contrary to their accelerating effect with P_4-O_2 mixtures, C_2H_4 , C_6H_6 , PbMe₄, and CCl₄ all raise the lower limit for PH₃-O₂. This is explained as due to a smaller probability of branching of the chains in the latter case. The inhibition coeff. of C_2H_4 has practically the same val. as in the stable photo-oxidation of PH₃. M. S. B.

Kinetics and activation energy of the thermal decomposition of acetaldehyde vapour. M. LETORT (Compt. rend., 1934, 199, 1617—1619; cf. A., 1934, 1073).—In agreement with Fletcher and Hinshelwood's results (A., 1933, 910), the true order of the reaction was 1.5 (from 0.3 to 1160 mm. pressure). The mean activation energy, 45,700 kg.-cal., was independent of pressure (50—400 mm.) at 447°.

H. J. E.

Kinetics of the thermal decomposition of acetaldehyde vapour in presence of traces of oxygen. M. LETORT (Compt. rend., 1935, 200, 312— 314).—The increased velocity, v'_0 , of the pyrolysis of MeCHO, due to the presence of O_2 , has been determined at different temp. for a practically const. conen. of MeCHO vapour. The temp. coeff. of v'_0 is negative. M. S. B.

Substitution by free atoms and Walden inversion. Decomposition and racemisation of optically active sec.-butyl iodide in the gaseous state. R. A. OGG, jun., and M. POLANYI (Trans. Faraday Soc., 1935, **31**, 482–495).—The homogeneous gas phase decomp. of sec.-BuI (I) at 238–276° consists of a unimol. dissociation into a free radical and I atom and a bimol. reaction of a (I) mol. with an I atom giving 12 and a free sec.-Bu radical. Racemisation of the undecomposed fraction also occurs as a result of a Walden inversion caused by at. exchange through collision between an I atom and a (I) mol. A heterogeneous racemisation of optically active (I) by added I at a soft glass surface, apparently due to I atoms adsorbed at the surface, takes place at temp. as low as 150°. Heats of activation of the different reactions are given. The racemisation observed is evidence for the hypothesis that substitution by free atoms in org. mols. causes optical inversion. M. S. B.

Kinetics of the depolymerisation of bimolecular nitrosoisopropylacetone. K. D. ANDERSON and D. L. HAMMICK (J.C.S., 1935, 30—32).—The rate of depolymerisation of colourless nitrosoisopropylacetone in C_6H_6 solution in the dark has been determined between 8° and 22° by the intensity of the colour of the monomeric form produced. The heat of activation is 26,600 g.-cal., assuming that the necessary energy is derived from binary collisions between solvent and solute. The no. of degrees of freedom involved in the activation of the reactant is 5.

J. G. A. G.

Thermal decomposition of propylamine. D. V. SICKMAN and O. K. RICE (J. Amer. Chem. Soc., 1935, 57, 22-24).—The reaction is of the first order at <4 mm. pressure, but is strongly inhibited by increase of surface; this effect diminishes and finally disappears as the pressure is increased. A chain mechanism is probable. E. S. H. Kinetics of the oxidation of gaseous propaldehyde. E. W. R. STEACIE, W. H. HATCHER, and S. ROSENBERG (J. Physical Chem., 1934, 38, 1189— 1200).—Between 120° and 170° the reaction is a chain process and resembles the oxidation of MeCHO. The heat of activation is 15,400 g.-cal. per mol. No evidence of explosion limits was found. A surface reaction is also present. D. R. D.

Kinetics of the decomposition of nickel carbonyl. C. E. H. BAWN (Trans. Faraday Soc., 1935, **31**, 440—446).—The decomp. of Ni(CO)₄ into Ni and CO, in Ni-coated glass vessels, goes practically to completion at 100—128°. 20% of the reaction is heterogeneous, but this and the homogeneous reaction also are inhibited by CO and give the same velocity relationship $dx/dt = k_{\text{IN}(CO)_4}/(1+k'_{\text{ICO}})$. It is suggested that the dissociation takes place in > one stage. The activation energy is 10,250 g.-cal. The results are in agreement with those of Garratt and others (this vol., 40). M. S. B.

Decomposition of substances at linearly increasing temperatures. P. VALLET (Compt. rend., 1935, 200, 315—317).—An expression is developed for the irreversible unimol. decomp. of a solid when the temp. is increasing linearly with time. Its validity is confirmed by reference to previous experimental results (A., 1934, 859). M. S. B.

Kinetics of decomposition of single crystals of calcite. S. BRETSZNAJDER (Rocz. Chem., 1934, 14, 843-848).—The velocity, v, of decomp.-% decomp. curves of single crystals of calcite (I) present irregularities not observed with numerous crystals. This effect is ascribed to differences in the no. and distribution of active centres (II) originally present, and in the rate of formation of new (II) during the reaction. The initial v of (I) is increased by scratching the crystals, also as a result of increase in the no. of (II). R. T.

Electrostatic factors affecting acidity and chemical reactivity. W. A. WATERS (Helv. Chim. Acta, 1935, 18, 5).—A claim for priority against Schwarzenbach and Egli (A., 1934, 1310).

F. L. U.

[Electrostatic factors affecting acidity and chemical reactivity.] G. SCHWARZENBACH and H. EGLI (Helv. Chim. Acta, 1935, 18, 6).—A reply to Waters (preceding abstract). F. L. U.

Kinetic salt effect in the fourth-order reaction $\operatorname{BrO}_3' + \operatorname{Br}' + 2\operatorname{H}^{\circ} \longrightarrow$. Ionisation quotients for HSO_4' at 25°. W. C. BRAY and H. A. LIEBHAFSKY (J. Amer. Chem. Soc., 1934, 57, 51—56).—The initial rates of the reaction $\operatorname{BrO}_3' + 5\operatorname{Br}' + 6\operatorname{H}^{\circ} = 3\operatorname{Br}_2 + 3\operatorname{H}_2\operatorname{O}$ (1) have been measured at 25°, and compared with published data for the reaction $\operatorname{BrO}_3' + 3\operatorname{H}_2\operatorname{O}_2 = 3\operatorname{O}_2 + \operatorname{Br}' + 3\operatorname{H}_2\operatorname{O}$ (2) and with published kinetic data for (1) and (2) in $\operatorname{H}_2\operatorname{SO}_4$ solutions. At low ionic concns., k_1 increases rapidly with decreasing ionic concn., and the extrapolated val. agrees with k_2 . At ionic concns. > 0.02, $k_1 \ll k_2$ and the difference increases with increasing ionic concn. High vals. of k_1 obtained at high concns. of NaBr indicate the existence of a fifth-order $\operatorname{BrO}_2'-\operatorname{Br}'$ reaction. Ionisation quotients

for HSO_4' have been calc. from the kinetic data for H_2SO_4 solutions. E. S. H.

Kinetics of absorption of oxides of nitrogen by sulphuric acid. I. N. KUZMINICH, E. L. JACHONTOVA, and E. I. SURKOV (J. Chem. Ind. Russ., 1934, **10**, No. 11, 38–45).—The velocity V of absorption of NO₂ by H₂SO₄ (I) is at a min. for 85% (I), corresponding with max. η . V diminishes with rise in temp., owing to increase in the η of the gaseous phase. The gas is absorbed as NO₂, and not N₂O₄. In the case of N₂O₃, V increases with increasing concn. of (I), and falls with rise in temp. R. T.

Theory of semiquinone formation and its application. B. ELEMA (Rec. trav. chim., 1935, 54, 76-78).—The formation const., K, of semiquinones can be determined accurately by the author's electrode equation (A) or by direct titration. Vals. obtained by means of A for hepato- and photohepato-flavin differ from those given in the lit. R. S. C.

Electromotive force measurements of hydrochloric acid solutions with and without sucrose and their relation to the rate of sucrose hydrolysis. V. K. KRIEBLE and F. M. REINHART (J. Amer. Chem. Soc., 1935, 57, 19—22).—The activities have been calc. from e.m.f. measurements of HCl and of HCl+sucrose (1-4M) at 20°. The velocity coeffs. of hydrolysis of sucrose (0.292M) by HCl (1-9M)have been determined. A relation between velocity coeff. and the calc. activity has been noted.

E. S. H.

Activities and the hydrolysis of sucrose with concentrated acids. V. K. KRIEBLE (J. Amer. Chem. Soc., 1935, 57, 15—19).—Velocity coeffs. for the hydrolysis of sucrose by HCl, H_2SO_4 , and HBr are not directly \propto acid conen. or H^{*} activity. The results with HCl suggest that the hydrolysis is catalysed partly by H^{*} and partly by HCl or H^{*}+Cl^{*}. E. S. H.

Mechanism of dissolution of metals. M. CENT-NERSZWER and W. HELLER (Rocz. Chem., 1934, 14, 525—559).—A description of the methods involved in the study of the kinetics of dissolution of metals is given, and the nature of the processes taking place is discussed on the basis of a comprehensive survey of the literature. R. T.

Action of acids on zinc. T. O. POULTER and G. E. FRAZER (J. Physical Chem., 1934, 38, 1131—1140).— The great decrease in the rate of reaction under pressure previously reported was not confirmed and was due to grease on the Zn. The e.m.f. of the cell $Zn|N-H_2SO_4|Pt(platinised)$ is reversed under pressure because of the reduction to H_2S . Reversal does not occur with bright Pt or in HCl. D. R. D.

Velocity of dissolution of sodium in solutions of alcohols in benzene, toluene, and xylene. J. SZPER [with M. JASIŃSKA, K. PRZYBYSZEWSKA, T. BRODZKA, and L. WIZENFELD] (Rocz. Chem., 1934, 14, 590—597).—The velocity of dissolution (v) of Na in solutions of EtOH or MeOH in C₆H₆, PhMe, or xylene falls with time, probably owing to decomp. of traces of H₂O originally present. $v \propto$ [H^{*}]. The temp. coeff. of the reactions, and the accelerating effect of stirring, point to the diffusive nature of the process. R. T.

Relation between rate of dissolution, solvent, and lattice forces in single copper crystals. R. GLAUNER (Ber. Korros.-Tag., 1934, 1933, 36-41; Chem. Zentr., 1934, ii, 2129).-With acid- H_2O_2 mixtures two types of dissolution mechanism operate: (1) the Cu^{**} accelerates dissolution by the process $Cu+Cu^*=2Cu^*(e.g., with HCl)$, and (2) the Cu^{**} has no effect (e.g., with H_2SO_4 , HNO₃, and H_3PO_4). In dil. solution without H_2O_2 the Cu^{**} accelerates dissolution by the above mechanism. The rate of dissolution from different crystal faces in the same solution is const. The nature of the anion is the decisive factor in the mechanism of dissolution.

H. J. E.

Catalytic action of silver ions on the velocity of oxidation of manganous salts by persulphates. E. BEKIER and W. KIJOWSKI (Rocz. Chem., 1934, 14, 1004—1016).—The velocity of the reaction between MnSO₄ in 2·24*M*·H₂SO₄ and K₂S₂O₈ in presence of Ag₂SO₄ is independent of the [MnSO₄], and \propto [K₂S₂O₈] and [Ag₂SO₄]. The process consists of the relatively slow reaction Ag⁺+S₂O₈" \longrightarrow Ag^{**+}+2SO₄", and of the instantaneous reaction 5Ag^{**+}+2Mn^{**+} 8H₂O \longrightarrow 5Ag^{*+}+2MnO₄'+16H^{*}. The velocity of the former reaction varies with the total ionic concn. in accordance with Brönsted's theory. R. T.

Catalytic action of salts on the velocity of ionic reactions. Specific action of ions on the velocity of the reaction $CH_2Cl \cdot CO_2' + S_2O_3'' \longrightarrow$ $S_2O_3 \cdot CH_2 \cdot CO_2'' + Cl'$. E. BEKIER and Z. ŻELAZNA (Rocz. Chem., 1934, 14, 994—1003).—The reaction is accelerated by cations in the order K'>Na'>Li'; Ba''>Sr''>Ca'', and by anions in the order Br'> $Cl'>NO_3'>SO_4''$. The activities of Na', Ca'', and La'' are as 1:1.5:3.25. R. T.

Influence of temperature on catalysis. Hydrolysis of ethyl acetate at $25-60^{\circ}$. W. WYCZAŁ-KOWSKA (Rocz. Chem., 1934, 14, 1118—1122).—The temp. coeff. τ of the reaction EtOAc \Longrightarrow EtOH+ AcOH is independent of the concn. of HCl present; the heat of activation, Q, at $25-60^{\circ}$, and at various HCl concns., is const. at 16,405 g.-cal. The vals. of τ and Q in presence of HCl and NaCl or NaNO₃ are < in presence of HCl alone. R. T.

Catalytic decarboxylation of β -keto-acids. K. BENIYA (J. Biochem. Japan, 1934, 20, 451-463).— The catalysis (I) by 32 N-containing org. substances of the decarboxylation (II) of acetonedicarboxylic acid and CHAc·CO₂H at various [H⁻] was investigated. (II) occurs spontaneously and increases with increasing acidity. With (I), optimum $p_{\rm H}$ vals. occur, e.g., at $p_{\rm H}$ 3.8 and 3.7 for 0.1*M*-NH₂Ph and 0.01*M*-o-C₆H₄(NH₂)₂, respectively, on CH₂Ac·CO₂H.

F. O. H.

Catalytic oxidation of carbohydrates and related compounds by oxygen in presence of iron pyrophosphates. XII. Ethyl alcohol, acetaldehyde, acetic acid, and sodium acetate. E. F. DEGERING (Proc. Indiana Acad. Sci., 1934, 43, 105— 106; cf. A., 1932, 476).—Of the above, only MeCHO is oxidised under the conditions described.

CH. ABS. (r)

Influence of H₂²O and H¹H²O on the mutarotation of glucose. W. H. HAMMILL and V. K. LA MER (J. Chem. Physics, 1934, 2, 891).—Determinations of the velocity of mutarotation of α -d-glucose in heavy H₂O mixtures at 25° and $p_{\rm H}$ 4—6, at which there is mol. catalysis only, and not ionic, give vals. which deviate appreciably from a linear function of the mol. fraction of H₂O. $k_{\rm H^{1}H^{1}O}$ =9.01×10⁻⁵. Experiments in more acid solutions indicate that $k_{\rm mup}$, the acidic catalytic const. in mixtures, is an approx. linear function of the vals. of $k_{\rm H^{-1}}$ and $k_{\rm H^{s}}$. M. S. B.

Poisoning and activation of aluminium. T. PIERZCHALSKI (Rocz. Chem., 1934, 14, 608-613).— The velocity of dissolution (v) of Al in 1.4N-HCl at 25° falls to half the original val. (I) as the conen. of HCNS increases to 0.0005N, thereafter rising to attain (I) at 0.05N-HCNS. CS(NH₂)₂ reduces v to an extent α its conen., whilst CO(NH₂)₂ has no action. H₂S, CS₂, KCl, K₂SO₄, AlCl₃, and FeCl₃ accelerate the reaction. v is gradually decreased by HCN, whilst I, similarly to other oxidising agents, passivates Al. R. T.

Reduction of the rate of dissolution of aluminium in hydrochloric acid by β -naphthoquinoline. E. JENCKEL and E. BRAUCKER (Z. anorg. Chem., 1935, 221, 249-276).-In order to investigate the action of protective agents in the dissolution of metals, the inhibiting effect of β -naphthoquinoline (I) on the dissolution of Al in 3-6N-HCl has been determined at 0°, 25°, and 50°. The rate falls quickly at first with increase in concn. of (I), and then more slowly. For the same concn. of (I), the effect diminishes with rise of temp. and increases with increase in [HCl]. Current-voltage curves for differ-ent concns. of (I) in 1.5N-HCl shows a diminution in current strength with increase in concn. of (I). The results are explained on the assumption that dissolution of the metal is due to local electrolytic action, and the inhibiting effect of (I) is due to formation of a protective layer on the local cathode. The potential of the metal and the surface tension of the solution are so little affected by (I) that it is not possible to ascribe the inhibiting action to these influences. In presence of (I), Cu may be deposited on Al as a smooth adherent film, probably owing to complex formation. In absence of (I) the Cu deposit is spongy.

M. S. B.

Kinetics of the reaction $2SO_2+O_2=2SO_3$ with a vanadium catalyst. N. F. MAKLAKOV and M. S. ARKHIPOV (Khimstroi, 1934, 6, 318—321).—At 450— 500° the kinetics of the reaction with Ba-V and Ca-V catalysts resembles that with a Pt catalyst. At < 450° the velocity falls sharply with a V catalyst. Ba-V is more active than Ca-V at 450—500°.

Сн. Авз. (е)

Catalytic action of Japanese acid earth. IX. Promotion and poisoning of the catalytic action. K. ISHIMURA (Bull. Chem. Soc. Japan., 1934, 9, 521— 530; cf. this vol., 44).—The activity of Japanese acid earth (I), measured in terms of the yield of resinous substance produced from $C_{10}H_8$ under conditions already described (*loc. cit.*), decreases with rise in the temp. of drying from 100° to 800°, but increases with increase of H₂O " retained " after a subsequent adsorption and drying treatment. With other adsorbates, the "degree of promotion" effected per millimol. of "retained" vapour is Et₂O>EtOH> MeOH>COMe₂>H₂O, parallel with the order of increasing heat of adsorption on fuller's earth and decreasing order of solubility of $C_{10}H_8$. The recovery of catalytic activity is accomplished by the adsorbate "retained" forming active centres after the dried (I) has been treated with vapour. "Retained" EtOAc is a weak catalyst and AcOH and HCl are weak poisons, whilst NH₃, NH₂Me, MeCN, and amyl nitrite are strong poisons. C_6H_6 , PhMe, cyclohexane, cyclohexene, methylcyclohexenes, and PhCl have no effect.

J. G. A. G.

Kinetics of the catalytic dehydrogenation of dimethylcyclohexane. A. A. BALANDIN and J. K. JURIEV (J. Phys. Chem. U.S.S.R., 1934, 5, 393-406).-The reaction rate was measured as a function of temp. and concn. on Ni and Al oxide catalysts, using mixtures of dimethylcyclohexane (I) and xylene (II). For mixtures with 20-100% of (I) the energy of activation (200-350°) was 14,700 g.-cal. per mol. It fell to 12,300 g.-cal. per mol. in a 10% mixture. CH₄ formation was slight when (I) was pure. The rate of dehydrogenation of (I) was slightly > that for cyclohexane. The val. of N for mixtures of (I) and (II) \propto the composition. Сн. Авз. (е)

Preparation of anhydrous aluminium chloride by catalytic chlorination of kaolin.—See B., 1935, 99.

Titanomagnetite as a catalyst for ammonia synthesis.—See B., 1935, 99.

Catalytic hydrolysis of chlorobenzene by steam.—See B., 1935, 137.

Sulphuric acid as catalyst for the ethylation of arylamines by alcohol.—See B., 1935, 137.

Anomalous electrolysis of water. M. KATA-LINIÓ (Arh. Hemiju, 1934, 8, 145-149).—The results previously described, in connexion with liquid currents and space charge around wire electrodes (A., 1932, 981), are discussed. R. T.

Reduction of perrhenic acid. B. JEŻOWSKA (Rocz. Chem., 1934, 14, 1061-1087).-KReO₄ (I) in 6N-HCl undergoes electro-reduction to yield Re^v. Pt electrodes readily undergo polarisation, and platinised Pd electrodes are recommended; depolarisation may also be effected by adding HI to the electrolyte. The reduction of cold aq. (I) by HI proceeds in two stages: $\operatorname{Re}^{v_{II}}+2I' \longrightarrow \operatorname{Re}^{v}+2I$; $\operatorname{Re}^{v}+I' \longrightarrow \operatorname{Re}^{iv}+$ I. Rev is characterised, in contrast to ReIV, by the facility with which it is hydrolysed by H_2O , to yield chiefly hydrated ReO_2 , originating as follows: $3\operatorname{Re}^{v} \Longrightarrow 2\operatorname{Re}^{1v} + \operatorname{Re}^{v_{11}}$. A by-product of reduction of (I) is the yellowish-green ion ReOCl₅" (II); the salts $K_2 ReOCl_5$ and $(NH_4)_2 ReOCl_5$, obtained by adding 2 equivs. of HI to cold (I) in conc. HCl, are described. The process of electro-reduction consists of the stages: $\operatorname{ReO}_4' + 4\operatorname{HCl} \longrightarrow \operatorname{ReO}_2\operatorname{Cl}_4'$ (III) + H₂O; (III) $\longrightarrow \operatorname{ReO}_2\operatorname{Cl}_4''$ (IV) $\longrightarrow \operatorname{ReO}_2\operatorname{Cl}_4'''$ (V); (V)+H'+HCl \longrightarrow (II)+H₂O; (IV) \longrightarrow (III)+(V), whilst reduction with HI involves the reactions: $\begin{array}{ccc} (\mathrm{III}) + \mathrm{I}' \longrightarrow (\mathrm{IV}) + \mathrm{I}; & (\mathrm{IV}) + \mathrm{I}' \longrightarrow (\mathrm{V}) + \mathrm{I}; & (\mathrm{V}) + \\ \mathrm{Cl}' + 2\mathrm{H}' \longrightarrow & (\mathrm{II}) + \mathrm{H}_2\mathrm{O}; & (\mathrm{II}) + 3\mathrm{H}' + \mathrm{I}' \longrightarrow \end{array}$ H_2 Re(OH)Cl₅+I. R. T.

Simultaneous discharge [of ions] at the cathode in the electrolysis of zinc [sulphate]. O. Essin and A. BALABAJ (J. Chim. phys., 1934, 31, 559-567; cf. A., 1933, 468).—A general equation giving the current yields of two species of ion when discharged simultaneously agrees well with the results of Roentgen and Hoegel on the electrolysis of aq. of Roentgen and more of H_2SO_4 . ZnSO₄ containing varying amounts of H_2SO_4 . F. L. U.

Electrodeposition of zinc.—See B., 1935, 154.

Effect of germanium in the electrolysis of zinc sulphate solutions.—See B., 1935, 154.

Electrolytic preparation of sodamide.—See B., 1935, 107.

Regulation of the bath solution for the electrolytic oxidation of aluminium.—See B., 1935, 154.

Electrolytic reduction of methyl n-propyl ketone to *n*-pentane. S. SWANN, jun., and J. FELDMAN (Trans. Electrochem. Soc., 1935, 67, 19-FELDMAN (Trans. Electrochem. Soc., 1935, 67, 19– 24; cf. A., 1932, 1005).—In aq.-EtOH H₂SO₄ solutions of COMePr^a the best yields of $n-C_5H_{12}$ are obtained at cathodes of Cd, Zn, Pb, and Hg, the efficiency of electrolytic reduction decreasing in this order. Variation of c.d. between 0.05 and 0.22 amp. per sq. cm. has little effect on the yield, except at Pb cathodes where the lower c.d. is advantageous and at Fe cathodes where the higher c.d. is better. The optimum [H₂SO₄] is 30%, except with Pb cathodes, where a lower concn. is better, and with Hg cathodes, where the concn. should be higher. H. J. T. E.

Cathodic combustion of hydrogen and carbon monoxide. G. I. FINCH (J.C.S., 1935, 32-39).-From a survey of the results obtained by the author and others it is concluded that the cathodic combustion of dry CO-O₂ mixtures in the absence of metal, M, atoms (non-sputtering cathode) involves 2CO= $CO_2 + C$ followed immediately by the oxidation of the C, but direct oxidation of CO to CO₂ is not excluded. In the presence of M atoms (sputtering cathode), an unstable oxide, MO, first formed leads to CO+MO= CO_2+M . With $CO-O_2-H_2$ mixtures in the absence of M atoms, the H_2 burns by way of OH to H_2O , and the CO is then oxidised by the processes $CO+OH=CO_2+H$ and $CO+H_2O=CO_2+H_2$. The initial step in the combustion of rigidly dried H_2-O_2 mixtures in the absence of M atoms is $H_2+O_2=20H$, but with traces of H_2O , $2H_2O=20H+H_2$ and the OH formed promotes the succeeding stages of the combustion. This probably explains the effect of traces of steam on the ignitability by an electric discharge of a $2CO+O_2+(H_2)$ mixture. With atoms of M, MO is first formed and reacts $H_2+MO=H_2O+M$. The relation of these results to flame combustion is considered.

J. G. A. G.

Mechanism of carbon dioxide and hydrogen peroxide formation. W. F. JACKSON (J. Amer. Chem. Soc., 1935, 57, 82-89).-CO is oxidised by the products of an electrical discharge through H₂O vapour at pressures < 1 mm. Large quantities of H₂O₂ are found in the products of discharge. The

effects of added gases, of varying the discharge current, and of interposing dehydrogenation and dehydration catalyst surfaces, on the yields of CO_2 and H_2O_2 have been studied. The yields of H_2O_2 and CO_2 from mixtures of O_2 , CO, H, and H_2 under various conditions have been determined. Mechanisms of reaction are suggested. E. S. H.

Unsaturated silicon hydride. R. SCHWARZ and F. HEINRICH (Z. anorg. Chem., 1935, 221, 277-286).—The decomp. of SiH_4 by the silent electrical discharge in an ozoniser gives highly polymerised solid unsaturated hydrides. The composition varies between SiH_{1.2} and SiH_{1.7} according to conditions. The product consists of brown leaflets with a metallic lustre, easily sol. in aq. NaOH, but stable towards 30% H₂O₂ and aq. KMnO₄. By the decomp. of CaSi with glacial AcOH or HCl in abs. EtOH, polysilene, (SiH₂)_z, is obtained; it is light brown, ignites spontaneously in air, and is decomposed by acids or alkalis forming H₂ and SiO₂, but no SiH₄, thus differing in behaviour from polygermene. By heating $(SiH_2)_x$ in vac. a series of saturated silanes is formed, as also by hydrolysing CaSi with aq. HCl, polysilenes of low mol. wt. being formed as intermediate products. M. S. B.

Mercury-sensitised decomposition of azoimide-A. E. MYERS and A. O. BECKMAN (J. Amer. Chem. Soc., 1935, 57, 89–96).—The final products of decomp., using λ 2537 Å. over the pressure range 03–20 mm., are NH₃ and N₂. NH₄N₃ and H₂ are formed as intermediate products during the earlier stages of decomp. The quantum yield for the initial stage is approx. 2.86 mols. of HN₃ decomposed per quantum absorbed when calc. to the formation of NH₃, or 3.6 when calc. to the formation of NH₄N₃.

E. S. H.

Influence of irradiation on the formation and decomposition of colloidal sodium in rock-salt. S. A. ARZIBISCHEV, L. B. MILKOVSKAJA, and M. V. SAVOSTJANOVA (Compt. rend. Acad. Sci. U.R.S.S., 1934, 4, 382—389).—The absorption max. and max. absorption coeff. have been determined for crystals heat-treated in different ways. E. S. H.

Energytransformations at surfaces. VIII. Importance of metastable conditions for sensitised photo-oxidations. H. KAUTSKY, A. HIRSCH, and W. FLESCH (Ber., 1935, 68, [B], 152-162; cf. A., 1933, 1256).—In the photo-sensitised oxidation of isoamylamine (I) and allylthiocarbamide (II) in presence of hæmatoporphyrin (III), chlorophyll (IV), and other pigments, O_2 is regarded as the substance which withdraws the exciting energy from (III) and (IV), since it is the sole type of mol. which depresses the fluorescence of (III) and (IV). (I) and (II) have no visible effect on the fluorescence of (III) and (IV). Phorescence is not completely destroyed in presence of (11) (cf. Gaffron, A., 1927, 429), and the presence of long-lived metastable conditions of excitation is established by the observation of phosphorescence which may persist for 10-2 sec. in very dil. solutions of many dyes in absence of O2. The influence of concn., temp., and solvent on phosphorescence is described. In all media, very small amounts of O2 extinguish phosphorescence, which is not affected by

acceptors. The primary process in the photo-oxidation of (I) and (II) in solution is activation of the O_2 mols. by the dye. Oxidation of the acceptor by the activated O_2 mols. is a secondary process. The mechanism of the change is the same in solution and in heterogeneous systems. A new interpretation of Gaffron's observations on rubene is given. H. W.

Action of water on the latent photographic image. T. H. JAMES, F. E. E. GERMANN, and J. M. BLAIR (J. Physical Chem., 1934, 38, 1211—1216).— Vapours of H_2O , HCO_2H , AcOH, and $(CH_2 \cdot OH)_2$ cause fading of the undeveloped image. Et₂O, dry EtOH, CCl_4 , CS_2 , C_6H_6 , and PhNO₂ have no effect. The former materials swell gelatin; the latter do not. Exposure to H_2O vapour sensitises an emulsion. Age mottle is due to moisture and does not develop over P_2O_5 . D. R. D.

Water effect in infra-red plates. K. WEBER (Phot. Korr., 1934, 70, 105—106; Chem. Zentr., 1934, ii, 1721).—The H_2O effect (I) (*i.e.*, increased sensitivity on wetting the plates and drying before exposure) is especially marked in the red and infra-red. H_2O has no such effect after exposure. (I) is attributed to a more intense dying of the Ag halide during swelling of the gelatin by dye particles present in it. H. J. E.

Colloidal electrolytes in photography. F. WEIGERT (Trans. Faraday Soc., 1935, 31, 359-365).-On the basis of the photodichroism of dry photographic emulsions, a scheme is suggested for the reaction mechanism between AgBr and the micelles of the photo-sensitive colloidal electrolyte composing the emulsion, when light acts on a photographic plate.

M. S. B.

Blackening of photographic plates by very slow electrons. O. MEIER (Physikal. Z., 1935, 36, 8—14).—Blackening of special photographic plates by electrons of only 5 volts energy has been obtained. This limit is imposed by the apparatus, and is not necessarily the lowest that can be recorded.

A. J. M.

Systematic calculation and technique of the preparation of heavy water. P. GOLDFINGER and L. SCHEEPERS (J. Chim. phys., 1934, 31, 628-646).--After reduction of the initial vol. of the H_2O to 1/20— 1/30 it is economic to recombine the gases evolved and re-electrolyse. The addition of further H₂O during electrolysis to maintain a const. level diminishes the yield. 1 g. of solution containing 90% H₂²O can be obtained by decomp. of 10—15 litres of ordinary H_2O , corresponding with 30,000-45,000 amp.-hr. Electrolytic cells of Fe are described, with electrodes 6 mm. apart and permitting of the passage of 400 amp. at a c.d. of 0.1-0.3 amp. per sq. cm. Working at 2.5-3 volts with 1-8% aq. NaOH as electrolyte 100-150 kw.-hr. are consumed per g. of 90% H₂²O solution prepared. Apparatus is also described for the safe recombination of the gases evolved. The equipment works with a separation factor of about 6.

J. W. S. **Preparation** of heavy water. B. KAMIEŃSKI (Rocz. Chem., 1934, 14, 401-405).-Electrolysis of 30 litres of H_2O yielded a residue of 27 c.c., containing 0.1% of H^2O ; of the H_2O removed, $\frac{1}{3}$ was accounted

for by electrolytic decomp., and § by evaporation. In view of the lower surface tension and dielectric const. of H₂O, the latter might be assumed to undergo concn. at the air-H₂O interface, and to be hence the most exposed to evaporation, and the unsatisfactory concn. of H_2^2O achieved is ascribed to this circumstance. The isotopic identity of Dead Sea H₂O with ordinary H₂O is due to the same factors. R. T.

Cleaning liquid sodium-potassium alloy. J. F. BIRMINGHAM, jun. (Ind. Eng. Chem. [Anal.], 1935, 7, 53).—The globules are cleaned with a dil. solution of EtOH in C₆H₆. E. S. H.

Complex salts of tartar emetic. J. V. DUBSKY and T. BERGER (Z. anorg. Chem., 1935, 221, 367-368). -By replacement of K in tartar emetic (I) by the action of ammines the following compounds have been obtained: $(C_4H_4O_7Sb=E) = E_2[Co(NH_3)_6]Cl_4H_2O$, yellow; $E_4[(NH_3)_4Co:(OH)_2:Co(NH_3)_4], 3H_2O$, violet; $E_4[(H_2O)_2Co\{(OH)_2:Co(en_2)_2], 4H_2O$, rose; $E_3[Co\{(OH)_2:Co(en_2)_3](NO_3)_3, 5\cdot5H_2O$, brown. The

formation of these compounds can be used as a qual. test for (I). M. S. B.

Precipitation of copper under pressure by means of organic reducing agents. V. I. LAINER E. V. NATANSON, and A. A. ORIONOV (Tzvet. Met., 1933, No. 6, 87-102).-By reduction with substances containing cellulose, e.g., sawdust, at $160-170^{\circ}/6-8$ atm., 80-85% pptn. of Cu is possible. The yield is practically independent of [Cu]. Ag and Hg can be recovered similarly. CH. ABS.

Preparation and properties of some cupritetra-chlorides and -bromides. J. AMIEL (Compt. rend., 1935, 200, 138—140).—By interaction in aq. solution of CuCl₂ or CuBr₂ with the amine hydro-chloride, followed by evaporation below 100° at reduced pressure, the following compounds have been

obtained. [CuCl₄](NH₃Me)₂; [CuCl₄](NH₃Et)₂; [CuCl₄](NH₃Pr²)₂; [CuCl₄](NH₃·CH₂Ph)₂; [CuCl₄]([NH₃·CH₂]₂); [CuBr₄](NH₃Me)₂; [CuBr₄](NH₃·CH₂]₂); [CuBr₄](NH₃Me)₂; [CuBr₄](NH₃·CH₂Ph)₂; [CuBr₄](NH₃·CH₂]₂). They have also been prepared by action of Cl₂, HCl, or HBr on the complex chlorates (cf. A., 1934, 978, 1080). The cupritetra-chlorides and -bromides form small yellow and black plates, respectively. They are all very sol. in H₂O, dil. solutions being blue owing to dissociation of the complex. They melt (decomp.) at 125-150° or a little above 200° [(CH₂·NH₂)₂ compounds]. Addition of NH₃ produces a deep blue colour, and conc. KOH ppts. Cu(OH)₂ with liberation of the amine. The Cl compounds are converted into the Br compounds by action of HBr; treatment with Cl₂ effects J. W. S. the reverse change.

Preparation and properties of copper ferrite. F. S. WARTMAN and A. J. THOMPSON (U.S. Bur. Mines, Rept. Invest., 1934, No. 3228, 15-21).-Vals. are recorded for the ferrite formation on heating mixtures of Fe and Cu oxides at a series of temp. from 110° to 1000°. Quenching in H₂O after heating at 900— 1000° gave a magnetic product (cubic; a 8.40 Å.; almost identical with magnetite). Slow cooling, or annealing at 350°, gave a tetragonal structure (a 8.28,

c 8.68 Å.). Cu ferrite was hexagonal (a 6.06, c 2.82 Å.). Solubilities in HCl, H₂SO₄, and HNO₃ are recorded. Сн. Авз. (е)

Chemical reactivity of redistilled magnesium. Action of water and of carbon dioxide on magnesium at room temperature. P. REMY-GENNETÉ (Bull. Soc. chim., 1934, [v], 1, 1674—1678).—Mg redistilled in vac. liberates H₂ from H₂O at room temp. and slowly absorbs dry CO₂ forming Mg carbide at the surface. J. G. A. G.

Action of mercury vapour on calcium at room temperature. P. REMY-GENNETÉ (Bull. Soc. chim., 1934, [v], 1, 1671-1674).-Under the conditions, redistilled Ca absorbs, in vac. during 4 months, approx. J. G. A. G. 5% of its wt. of Hg vapour.

Reactions in systems consisting of three phases (two solid and one gaseous). J. ZAWAD-ZKI (Rocz. Chem., 1934, 14, 823-842).—The mechanism of the reaction $CaCO_3 \implies CaO + CO_2$ is discussed. R. T.

Study of the reaction between calcium oxide and sulphur dioxide by the flow method. M. ILINSKI (Rocz. Chem., 1934, 14, 857-864).-The system is univariant; irregularities in the % decomppressure curves are due to the same causes as in the R. T. case of CaSO₄ (this vol., 303).

The hydrotimetric method. M. LEMARCHANDS and LE VIET KHOA (Ann. Chim. Analyt., 1935, [iii], 17, 5-16).—The formation of a lather is conditioned by: (1) a lowering of the surface tension of the H_2O by the soap, (2) the hydrolysis of the soap which forms, depending on the $p_{\rm H}$, acid salts of the fatty acids of the soap or free fatty acid, and (3) the presence of un-hydrolysed soap. There is an optimum relation between acid mols. and soap, and within limits, the smaller are the particles of the disperse phase, the smaller is the quantity of soap required. Neutral salts of K, Na, and NH4 alone have little effect on lather formation, but hinder the pptn. of Ca salts and in some cases prevent pptn. of Mg salts, thus indicating a source of error in the analysis of saline H₂O. Except with low [Ca"], the quantity of soap required to produce a lather does not increase in direct proportion to J. G. A. G. [Mg] and [Ca].

Monocalcium phosphate as basis of organophosphors. E. TIEDE and H. CHOMSE (Ber., 1935, 68, [B], 146-148; cf. this vol., 234).-Weighed quantities of Ca(H₂PO₄)₂, H₂O and the org. compound are intimately mixed in a porcelain mortar and heated at about 250° on Pt foil or porcelain until the mass has become plastic. (I) is thereby converted into a mixture of $Ca(PO_3)_2$ and $Ca_2P_2O_7$. Luminous preps. are obtained with uranin, $m - C_6H_4(CO_2H)_2$, phenanthraquinone, $C_6H_3(CO_2H)_3$, $C_6H_2(CO_2H)_4$, poor results with 1-hydroxynaphthoic acid, and negative results with o-OH·C6H4·COH and anthracene. Small amounts of metals (Cu, Bi, Mn) do not induce luminescence. Comparison is made with H₃BO₃ phosphors. H. W.

Complex salts of 2 : 2'-dipyridyl with zinc and cadmium. F. M. JAEGER and J. A. VAN DIJK (Proc. K. Akad. Wetensch. Amsterdam, 1934, 37, 753-760). -The prep. and crystallographic characteristics of the following complex salts with dipyridyl (R) are described : $[ZnR_3]SO_4,7H_2O$; $[ZnR(H_2O)_2]SO_4$; [ZnRCl₂]; $[ZnR_3]Cl_2,7H_2O$; $[CdR_2](NO_3)_2,0.5H_2O$; [CdR₃](NO₃)₂,7H₂O; and $[CdR(H_2O)_2](NO_3)_2$. J. W. B.

Reduction of alkaline-earth arsenates by carbon. Tribarium arsenate. H. GUÉRIN (Compt. rend., 1935, 200, 129—131).—A mixture of $Ba_3(AsO_3)_2$ +SC reacts in vac. at 750—800°, successive reduction occurring to $Ba_3(AsO_2)_2$ and then to BaO and As. The letter reaction is slower than the former. Above 850° the products contain BaO, C, $Ba_3(AsO_2)_2$, and Ba_3As_2 . Inefficient removal of the CO formed favours the formation of Ba_3As_2 . J. W. S.

Preparation of phosphorescent substances. VII. Boric anhydride. N. F. SHIROV (J. Appl. Chem. Russ., 1934, 7, 921—925).—The product of heating H_3BO_3 at 800° with 0.1 p.p.m. of sucrose exhibits fairly intense greenish-yellow phosphorescence. The structure of the active centres is discussed. R. T.

Thermal decomposition of metallic borofluoride ammines. G. BALZ and W. ZINSER (Z. anorg. Chem., 1935, 221, 225-248).—Ni(NH₃)₆(BF₄)₂ is irreversibly decomposed by heat giving NiF₂, NH₃, and a sublimate of BF₃,NH₃. An attempt was made to employ this reaction for the prep. of anhyd. NiF₂, but it was not possible to remove the last traces of NH₃. V.-p. determinations of BF₃,NH₃ have been made. The compound Zn(NH₃)₆(BF₄)₂ has been prepared by the action of NH₃ on the tetrammine. Both the Zn and Cd hexammines form the corresponding tetrammines reversibly. The further decomp., giving ZnF₂ or CdF₂, BF₃,NH₃, and NH₃, takes place irreversibly. The heats of formation of the Zn and Cd hexammines from the tetrammines at 0° and 100°, respectively, are 10.9 and 16.7 kg.-cal.

 $Cr(NH_3)_6(BF_4)_3$ behaves similarly to the Ni compound giving CrF_3 . $Co(NH_3)_6(BF_4)_3$ is at the same time partly reduced giving CoF_2 . $Ag(NH_3)_2BF_4$ gives Ag. Determinations of *d* have been made for some borofluoride ammines and hydrates and also for NiF₂ and CoF_2 . M. S. B.

Boron acids and alkali borates. V. Transition of sodium borate pentahydrate into decahydrate. H. MENZEL (Sitzungsber. u. Abh. naturwiss. Ges. Isis. Dresden. Festschr., 1934, 204—207; Chem. Zentr., 1934, ii, 2059; cf. A., 1928, 32).—The transition occurs readily at room temp. on seeding a supercooled solution previously heated at 80°.

H. J. E.

Aluminium subacetate solution. E. V. CHRIS-TENSEN and J. STRØYBERG (Arch. Pharmac. og Chem., 1934, 41, 437—447; Chem. Zentr., 1934, ii, 2100).— Aduition of insufficient AcOH to equiv. quantities of $CaCO_3$ and $Al_2(SO_4)_2$ in solution forms readily gelatinising products. R. N. C.

Pertitanates and pervanadates. (MME.) M. E. P. RUMPF (Compt. rend., 1935, 200, 317-319).—An unstable, yellow to reddish-brown pertitanate is formed in solution by the action of H_2O_2 on TiCl₄ in aq. HCl. Its dissociation const. is 1.12×10^{-4} . Similarly, a red unstable pervanadate, dissociation const. 2.36×10^{-4} , is formed by the action of H_2O_2 on an acid solution of NaVO₃. M. S. B.

Decomposition products of ammonium perchlorate. M. Dobé (Compt. rend., 1935, 200, 63– 66).—NH₄ClO₄, purified by 4 recrystallisations from H₂O and dried in vac. over P₂O₅, decomposes slowly above 150° and deflagrates about 400°. During slow decomp. the principal reaction is $4NH_4ClO_4=2Cl_2+$ $8H_2O+2N_2O+3O_2$; a little Cl oxide (probably ClO₂) and traces of N₂ and NO₂ are also formed, the last two especially above 300°. Some recombination occurs in the cool parts of the vessel, yielding apparent sublimation. The explosive reaction yields H₂O and a complex mixture corresponding with the equilibrium of the system Cl₂-O₂-NO₂-N₂O₃-NOCl. J. W. S.

Oxidation of hydrazine. IX. Mono- and didelectronation of hydrazine by permanganate in hydrochloric acid solution. A. G. HOUPT, K. W. SHERK, and A. W. BROWNE (Ind. Eng. Chem. [Anal.], 1935, 7, 54—57; cf. A., 1928, 380).—Two reactions occur concurrently, viz., (1) $N_2H_4+20 \rightarrow N_2+2H_2O$, (2) $2N_2H_4+O \rightarrow N_2+2NH_3+H_2O$. Since the relative amounts of N_2H_4 oxidised by (1) and (2), respectively, vary with several factors, the reaction is unsatisfactory for the determination of N_2H_4 or the standardisation of KMnO₄. E. S. H.

Reduction of vanadium oxides by carbon monoxide and by carbon. A. MORETTE (Compt. rend., 1935, 200, 134—136).—CO reduces V_2O_5 to V_2O_3 , and the CO₂ produced does not react with the latter. Reaction is slow at 500°, but very rapid at 600°. If insufficient CO is present V_2O_4 may be formed. A mixture of V_2O_5 and C heated in vac. yields V_2O_4 at 400—700°, and V_2O_3 at 1000°, CO₂ being the main gaseous product during the former reaction and CO during the latter. Reduction of V_2O_3 by C commences at 1200°, but is complete only at 1700°. Carbide formation commences considerably below the latter temp. J. W. S.

Compounds of tervalent vanadium. S. BOD-FORSS, K. J. KARLSSON, and H. SJÖDIN (Z. anorg. Chem., 1935, 221, 382—390).—By heating V_2O_3 in excess of CCl₄ vapour VCl₄ is readily formed and can be converted into VCl₃ by Meyer and Backa's method (A., 1924, ii, 558). VCl₃ is not sol. in inert org. solvents, but dissolves in org. bases with a violet-red colour, forming a no. of additive *compounds* with aliphatic amines and C₅H₅N. Facility of formation is in the order primary > sec. > tert.-amines. From aq. solutions of VCl₃,6H₂O complex salts of V^{III} are formed by pptn. with org. acids : V(CO₂·C₆H₄·OH)₃, V(α - and β -CO₂·C₁₀H₆·OH)₃, V[C₆H₅N(NO)·O]₃, V(β -C₁₀H₆O·NO)₃. With K₄Fe(CN)₆ an amorphous reddish-brown *ppt*. or a red sol is formed. The sol is negatively charged, so that flocculation depends on the cation, the concn. of salt required being in the order KCl>K₂SO₄>CaCl₂>AlCl₃. M. S. B.

Preparation of hydrogen selenide by the interaction of selenium and hydrocarbons. C. GREEN and W. E. BRADT (Proc. Indiana Acad. Sci., 1934, 43, 116-118).—A max. yield (96.8% H₂Se based on Se used) was obtained by heating 50 g. of a

paraffin-base motor oil with 1 g. of Se for 1 hr. at 380°. The H,Se yield increases with rise in temp., being negligible at $< 300^{\circ}$ (cf. Scudder and Lyons, A., 1932, 578). Сн. Авз. (е)

Metal carbonyls. XX. Metal hexacarbonyls of the chromium group, their mode of formation and reaction mechanism. XXI. Thermochemical investigations of metal hexacarbonyls. W. HIEBER and E. ROMBERG. XXII. Reactions and derivatives of the hexacarbonyls of chromium and molybdenum. W. HIEBER and F. MUHLBAUER. XXIII. Derivatives of tungsten hexacarbonyl. W. HIEBER and E. ROMBERG (Z. anorg. Chem., 1935, 221, 321-331, 332-336, 337-348, 349-353).-XX. Cr(CO)₆, Mo(CO)₆, and W(CO)₆ have been prepared by the action of CO on the corresponding chlorides in presence of Grignard's reagent (cf. Job et al., A., 1928, 1201). The product is hydrolysed by a mixture of ice and dil. H₂SO₄ and the carbonyl removed together with Et₂O and C₆H₆ by steam-distillation, separated, and purified by vac .sublimation. The yield is not large. The mechanism of the reaction is discussed. There are several concurrent reactions. Carbonyls low in CO, or org. metal carbonyls, are probably first formed, and break up into compounds containing more or less CO. The three carbonyls are isomorphous, all forming colourless, strongly refracting, volatile, orthorhombic crystals readily sol. in inert org. solvents. Compared with other metal carbonyls they are very stable; the vapour decomposes slowly above 120° only; the metal then separates in a very pure form as a mirror. They are stable at room temp. to conc. HCl and H₂SO₄, but decomposed by fuming HNO₃ and by alkalis. $Cr(CO)_6$ is the most stable towards halogens, being attacked by Cl_2 only. They have no appreciable dipole moment.

XXI. Saturation pressures at different temp. have been determined. B.p. (abs.)/1 atm. are : $Cr(CO)_6$ 420.5° , $Mo(CO)_6$ 429.4° , $W(CO)_6$ 448.0° , and heats of sublimation are 17.18, 16.29, and 17.71 kg.-cal., Rg.-cal.,respectively. The anomalous position of $\overline{W}(CO)_6$ in the carbonyl series, as shown by thermal data, is evident also from d determinations.

XXII. The following organo-carbonyls of Mo and Cr have been prepared : (Mo or Cr)(CO)₂(C5H5N)₂₀ (Mo or Cr)(CO)₄(o- $\dot{C}_{12}H_8N_2$), (Mo or Cr)(CO)₃(C_5H_5N)(o- $C_{12}H_8N_2$),

 $\begin{array}{l} \operatorname{Mo}_2(\operatorname{CO})_6[\operatorname{C}_2\operatorname{H}_4(\operatorname{NH}_2)_2]_3, \operatorname{Cr}_2(\operatorname{CO})_7(\operatorname{C}_5\operatorname{H}_5\operatorname{N})_5, \\ \operatorname{Cr}(\operatorname{CO})_4(\operatorname{C}_5\operatorname{H}_5\operatorname{N})_2. \\ \operatorname{XXIII.} \text{ The following organo-carbonyls of W have} \end{array}$ been prepared : $W(CO)_3(C_5H_5N)_3$, $W(CO)_4(C_5H_5N)_2$, $W(CO)_4(o \cdot C_{12}H_8N_2)$, $W(CO)_4(\alpha\alpha' \cdot C_{10}H_8N_2)$, $W(CO)_3(C_5H_5N)(o \cdot C_{12}H_8N_2)$. M. S. B.

Polyacids. E. H. RIESENFELD and M. TOBIANK (Z. anorg. Chem., 1935, 221, 287-317).-Theoretical. The constitutional formulæ of poly- and heteropolyacids of W, Mo, P, As, and Si are discussed.

M. S. B.

Action of heat on some oxides of manganese. S. PAVLOVITCH (Compt. rend., 1935, 200, 71-73; cf. A., 1931, 930).—The network formation observed previously on hausmannite crystals at high temp. is accompanied in air or N2 by absorption of heat at

950° and 1160°, without apparent variation in wt. or crystal structure. The same result is obtained in O2, no oxidation occurring. Thermal analysis of polianite in air or N2 shows two endothermic inflexions at 570° and 950°, respectively, due to transformation into Mn_2O_3 and Mn_3O_4 . Manganite shows similar inflexions at 370° and 940° due to dehydration to Mn₂O₃ and conversion into Mn₃O₄, respectively. In O2 the last two compounds also show inflexions due to O_2 absorption by the Mn₃O₄ on cooling. J. W. S.

Preparation of anhydrous chlorides of certain heavy metals. D. I. RIABTSCHIKOV and V. M. SCHULMAN (J. Appl. Chem. Russ., 1934, 7, 1162-1165).-Anhyd. MnCl₂, NiCl₂, and CoCl₂ are obtained by passing dry HCl over the heated hydrates, FeCl, from Fe and HCl, and CrCl₃ from Cr₂O₃ and CO-Cl₂ mixtures, or from Cr₂O₃-C mixtures and Cl₂. R.T.

Dilatometric study of the dehydration and thermal decomposition of some manganese compounds. P. DUBOIS and E. RENCKER (Compt. rend., 1935, 200, 131–134).—The temp. variation of the length of a pressed pellet of MnCl₂,2H₂O confirms the existence of MnCl₂,H₂O (cf. A., 1934, 617). Similar study of pellets of synthetic Mn₂O₃,H₂O and of cryst. blocks of manganite shows that in absence of air , this Mn₂O₃,H₂O passes into α-Mn₂O₃ at about 250° passing further into β -Mn₂O₃ at about 600° and finally yielding Mn_3O_4 at about 930°. The change from α - Mn_2O_3 into β - Mn_2O_3 is irreversible (cf. the J. W. S. vol., 181).

Keeping properties of ferric chloride solutions for reagent purposes. U. CARISI (Boll. Chim. farm., 1935, 74, 3-4).-Acid solutions keep indefinitely, but neutral solutions must be freshly made.

D. R. D.

Microcrystalline ferric hydroxides and sodium, silver, and barium ferrites. A. KRAUZE and S. KRZYZANSKI (Rocz. Chem., 1934, 14, 504-514).-A highly unstable, colourless, microcryst. Na ferrite (I) is obtained by dissolving ortho-Fe(OH)₃ (II) in conc. NaOH and cooling; when aq. (I) is boiled, a second, stable, brown, microcryst. ferrite, NaFeO2, separates. Unstable colourless Ba ferrites, in which Fe_2O_3 : BaO=1: 3.9-4.5 are obtained by adding Ba(OH)₂ to hot aq. (I), and cooling, whilst when the solution is boiled stable brown ferrites (Fe_2O_3 : BaO = I : 1.37 - 1.48) crystallise on cooling. The sole product of the action of Ag_2O on aq. (I) was $AgFeO_2$ (III) (II) and as KOH do not afford formites but (III). (II) and aq. KOH do not afford ferrites, but only microcryst. Fc₂O₃,H₂O, yielding (III) on treat-R. T. ment with Ag₂O.

Preparation and properties of sodium ferroate. X. THIESSE (Compt. rend., 1935, 200, 136–138).– If a solution of $FeSO_4$, $7H_2O$ (100 g. per litre) be added dropwise to a boiling solution of NaOH (34–57%) in an atm of N the Fe(OH) discussion the NaOH in an atm. of N2, the Fe(OH)2 dissolves in the NaOH yielding an emerald-green solution, which on cooling rapidly to 40° deposits white hexagonal or cubic crystals of sodium ferroate ("hypoferrite") (I). Addition of excess of H_2O to the solution ppts. Fe(OH)₂, but a limited amount of H₂O at a high temp. slowly oxidises (I) to Fe₃O₄, with liberation of H₂. In presence of a large excess of NaOH no oxidation occurs in the atm. in the cold. H_2O immediately hydrolyses solid (I), and the air rapidly oxidises it to Fe_2O_3 , but it can be redissolved in NaOH without decomp. The formula cannot be determined owing to difficulty in removing mother-liquor. J. W. S.

Tartrates of bivalent metals. J. P. MATHIEU (Bull. Soc. chim., 1934, [v], 1, 1713-1744).--Absorption spectra, optical activity, circular dichroism, and conductivity and electrometric determinations with aq. solutions of the tartrates of Co, Ni, Mn, Fe, Cr, and Zn show that at least part of the metal, M, is not ionised. The general formula of the complexes isolated is $[TM(H_2O)_2]$, where $T=C_4H_4O_6$, and these dissociate with increasing dilution. Co, Ni, and Fe form the double salts TM, TNa2. The tendency of the alkaline solutions to oxidise is slight for Co, strong for Mn and Fe, and prevents further investigation in the case of Cr. With $\leq 2NaOH : 1[TM(H_2O)_2]$, sol. metallotartrates, [TM(OH)2]Na2, have been isolated; these, on dilution, afford insol. basic tartrates, [TM(OH)2]M, except Zn, which yields $Zn(OH)_2$, and these are identical with the corresponding ppts. obtained by adding NaOH to $[TM(H_2O)_2]$. The hydrolysis of $[TM(OH)_2]Na_2$ is diminished by NaOH and Na₂T. The facile hydrolysis of [TZn(OH)₂]Na₂ is in keeping with the inability of tartrates to prevent the pptn. of Zn by alkalis. The colloidal nature of some Ni tartrate solutions is emphasised. J. G. A. G.

Potassium cobaltic trioxalate. R. F. RECODER (Chemia, Rev. Centr. Estud. Doct. Chim., 1932, 9, 31-34).—The prep. is described and the stereochemistry of the compound discussed. CH. ABS.

Spectral analysis. F. PAVELKA and H. MOL-TERER (Mikrochem., 1935, 17, 47-102).—A review.

Quantitative spectroscopy and its analytical applications. S. J. LEWIS (Analyst, 1935, 60, 10— 17).—Several examples are given showing the val. of spectrographic analysis in the determination of small quantities of metals in org. materials by the ratio quant. system. A. R. P.

Quantitative emission spectrum analysis. A. WENDT and H. HEUN (Z. Physik, 1934, 93, 92—99).— The electrical conditions of an arc of an alloy can be varied to give a spark line from one metal of the same intensity as an arc line from the other; this is used for quant. analysis, and has given the distribution of Cd in Zn with respect to depth below the electrode surface. A. B. D. C.

Accuracy of log sector method of quantitative spectroscopic analysis. L. C. MARTIN, S. A. EURRE, and E. G. KNOWLES (Trans. Faraday Soc., 1935, 31, 495—502).—The "log sector" method is especially suitable for the determination of metals present as minor constituents of mixtures. The difficulties involved in the photographic photometry associated with the method are discussed. The appartus employed for line length measurement is described. The error in the photometric measurement should be $\geq 5\%$. M. S. B.

Use of logarithmic sector for the quantitative analysis of precipitates. E. G. KNOWLES and L. C. MARTIN (Trans. Faraday Soc., 1935, 31, 502-508).— The determination by the log sector of a foreign element carried down by a ppt. has been applied to the case of Zn pptd. with Cu as sulphide in solutions of varying acidity. A fairly good average accuracy is obtained, but there are large individual variations. The determination, by this method, of K carried down by $BaSO_4$ was not successful. M. S. B.

Application of fluorescence analysis in microchemistry. M. HAITINGER (Mikrochem., 1935, 16, 321-356).—A review.

Drop analysis in practice. J. WINCKELMANN (Mikrochem., 1935, 16, 203—210; cf. A., 1933, 135). J. S. A.

Accurate micro-analysis by Pregl's method. C. TIEDCKE (Mikrochem., 1935, 16, 171–186).—Minor points of technique are discussed. J. S. A.

Rapid method for making standard solutions of specified normality. O. JOHNSON (Ind. Eng. Chem. [Anal.], 1935, 7, 76). E. S. H.

Theory of the error of acid-base titration. P. S. Roller (J. Amer. Chem. Soc., 1935, 57, 98—100).— Theoretical. E. S. H.

Fluorescence acidimetric and adsorption indicators. H. R. FLECK, R. F. G. HOLNESS, and A. M. WARD (Analyst, 1935, 60, 32—33).—In titrating acids with alkalis in ultra-violet light the Mg salt of 8hydroxyquinoline serves as a good indicator, a change from colourless to golden-yellow taking place at $p_{\rm H}$ 7. For the titration of chlorides with AgNO₃ dichlorofluorescein changes from a fluorescent yellow-green to a chocolate-coloured suspension without fluorescence; eosin behaves similarly with bromide and iodide titrations. A. R. P.

Sodium carbonate as a standard in alkaliacidimetry. J. STALONY-DOBRZAŃSKI (Rocz. Chem., 1934, 14, 1106—1117).—Na₂CO₃ suitable for standardisation purposes is obtained by heating NaHCO₃ at $150-280^{\circ}$; at the b.p. of PhNO₂ the decomp. of NaHCO₃ is completed after 100 min. R. T.

Carbonate error in acidimetry. T. MILOBED-ZKI and W. SZCZYPIŃSKI (Rocz. Chem., 1934, 14, 1088—1105).—The presence of carbonate in standard aq. NaOH used for acidimetry is the most serious source of error, the magnitude of which varies according to the conditions of addition of the alkali to the acid, and to the indicator used; the use of carbonatefree solutions, prepared according to Sørensen, is recommended. The indicator properties of redcabbage extracts appear to be due chiefly to the crude anthocyanin rubrobrassicin, elimination of sinapic acid from which yields a product unsuitable for the purpose. R. T.

Standardisation of hydrochloric acid with calcite. J. W. YOUNG (Canad. Chem. Met., 1934, 18, 218).—A method for the standardisation of N-HCl using calcite is described. With 0.1N-acid, deviations are high and several determinations are necessary to obtain an accuracy > 0.1%. H. G. R.

Indicator properties of dinitroaniline azodyes. H. WENKER (Ind. Eng. Chem. [Anal.], 1935, 7,40-41).—Many dinitroanilineazonaphtholsulphonic acids are described. α -Naphthol, 1:6-, 1:7-, and 1:8-OH·C₁₀H₆·SO₃H as azo-components give indicators of strong colour contrast over a narrow $p_{\rm H}$ range. 2:4-Dinitroaniline derivatives give bluer and brighter shades than the 2:6-compounds, which are redder and duller. None of the dyes now described is as good an indicator as nitrazine-yellow (cf. A., 1934, 500), the blue form of which contains 3 Na atoms. J. L. D.

Colorimeter tube for p_{π} determination. K. BUCH (Finska Kem. Medd., 1934, 43, 112—114).— The tube is protected from the atm. A fixed amount of indicator is introduced by a pocketed stopcock and the colour is observed between parallel glass plates. The buffer tube is fitted with similar plates having the same separation. R. S.

β-Methylumbelliferone, a fluorescing indicator. A. G. PUKIREV and M. S. MASLOVA (Zavod. Lab., 1934, **3**, 1038—1039).—Coloured solutions may be titrated by observing the point at which fluorescence due to β-methylumbelliferone appears or disappears ($p_{\rm H}$ 7·2). R. T.

Application of V. Meyer's method to determination of moisture content. W. SWIENTOSŁAWSKI, H. BRZUSTOWSKA, and M. KRAKOWSKI (Rocz. Chem., 1934, 14, 633—639).—The H_2O content of various products can be rapidly and conveniently determined by measuring the vol. of vapour evolved when the sample is heated at the appropriate temp. in a modified V. Meyer apparatus. R. T.

Determination of chloride. Modification of the Volhard method. J. R. CALDWELL and H. V. MOYER (Ind. Eng. Chem. [Anal.], 1935, 7, 38—39).— Addition of PhNO₂ obviates the necessity of removing the pptd. AgCl before titrating back with KCNS.

E. S. H.

Colorimetric determination of small quantities of chlorides in waters. H. B. RIFFENBURG (Ind. Eng. Chem. [Anal.], 1935, 7, 14).—The AgNO₃-K₂CrO₄ method is modified. E. S. H.

Drop method of detection of anions. N. A. TANANAEV and A. M. SCHAPOVALENKO (J. Appl. Chem. Russ., 1934, 7, 1258—1269).—Directions are given for the drop detection of Cl', Br', I', S'', SO₃'', S₂O₃'', SO₄'', CN', CNS', Fe(CN)₆''', Fe(CN)₆''', NO₂', NO₃', AsO₃''', AsO₄''', IO₃', CrO₄'', OCl', BO₃''', and BO₂', alone, or together. R. T.

Determination of free chlorine in water [using o-tolidine].—See B., 1935, 128.

Determination of perchlorates. M. L. NICHOLS (Ind. Eng. Chem. [Anal.], 1935, 7, 39).— ClO_3' is quantitatively reduced in the cold by $TiCl_3$, whilst ClO_4' is quantitatively reduced by conc. aq. $TiCl_3$ containing H_2SO_4 . E. S. H.

Determination of bromine in solutions containing potassium, sodium, and magnesium chlorides. S. K. TSCHIRKOV and A. I. SCHPIKELMAN (J. Appl. Chem. Russ., 1934, 7, 1270—1276).—Br may be determined potentiometrically in solutions containing KCl, NaCl, and MgCl₂; the [Br'] should be 0.007-0.015% for MgCl₂ concns. of $\Rightarrow 10\%$, and 0.011-0.015% for higher MgCl₂ concns. R. T.

Volumetric determination of iodide ions by Fajans' method. E. A. Kocsis (Z. anorg. Chem., 1935, 221, 318—320).—Diamine-fast-bordeaux 6BS (I) and diamine-fast-violet BBN (II) may be used as indicators in the titration of I' by $AgNO_3$ in neutral solution, but not for the titration of Ag by KI. (II) may also be used in acid solution, although the endpoint is not quite so sharp, and in presence of Cl', but not of Br'. M. S. B.

Determination of fluorine in drinking-water. Comparison of several methods and establishment of toxic concentration by these methods. H. V. SMITH (Ind. Eng. Chem. [Anal.], 1935, 7, 23–25).—A comparison of the F' content of 44 waters by 4 different standard methods has been made. H_20 containing > 1.0 p.p.m. F' is associated with the production of mottled enamel in teeth, whilst no H_20 containing < 0.8 p.p.m. is known to cause mottled enamel. E. S. H.

[Detection of traces of fluoride and the volumetric determination of zirconium.] R. CHARON-NAT (Compt. rend., 1934, **199**, 1620—1622; cf. this vol., 190).—The origin of the colour change in de Boer's method (cf. A., 1926, 40) is discussed. The min. ratio of Zr atoms to Na alizarinsulphonate mols. for all the Zr to remain in the (violet-red) solution [I] is 4:1. The min. concns. of acids to produce the yellow colour are HF, 0.001N; H₃PO₄, 0.16N; H₂SO₄, $4\cdot 1N$; HBr, $10\cdot 5N$. (I) is stable only when neutral or alkaline. The action of acids on (I) occurs in 4 stages which depend on the nature and concn. of the acid. H. J. E.

Determination of sulphide-sulphur, especially in effluents.—See B., 1935, 176.

Determination of sulphuric acid in presence of copper salts. J. G. TITOVA (J. Appl. Chem. Russ., 1934, 7, 1277—1281).— H_2SO_4 is determined in presence of CuSO₄ by titrating with standard NaOH to the appearance of a turbidity, due to Cu(OH)₂, of equal intensity to that given by addition of the theoretical amount of NaOH to a H_2SO_4 solution of known concn., also containing CuSO₄. R. T.

Microscopical chemical reactions of some polythionic acids. E. M. CHAMOT and R. W. BRICKEN-KAMP (Mikrochem., 1935, **16**, 121—132).—Benzyl ψ thiocarbamide forms characteristic cryst. ppts. with $S_2O_6'', S_3O_6'', S_4O_6'', S_5O_6''$; nitron sulphate does so with S_2O_6'', S_3O_6'' , and S_5O_6'' only. [Ni en₃](NO₃)₂ is sp. for S_2O_6'' , but S_2O_3'' reacts also [en= $C_2H_4(NH_2)_2$]. [Co en₃]Cl₂ reacts with S_2O_6'' and S_5O_6'' only. [Co(NH₃)₆]Cl₃ gives cryst. ppts. with S_2O_6'', S_3O_6'' , and S_5O_6'' , but not S_4O_6'' . The reactions of other acids with the above reagents are described, and a general group separation of the S oxy-acids is outlined. J. S. A.

New tests [for nitrites, chromates, dichromates, tungstates, and auric salts]. L. R. CATALANO (Rev. Minera, 1931, 1, 16—17).—Aq. $\rm NH_2Ph, H_2SO_4$ containing 2—4% of $\rm H_2SO_4$ (I) gives with aq. nitrites and excess of aq. $\rm NH_3$ a yellow-chestnut colour and ppt., not produced by $\rm NO_3'$, $\rm ClO_3'$, or $\rm ClO_4'$. $\rm CrO_4''$, $\rm Cr_2O_7''$, or vanadates give with (I) a greenish-blue colour, changing to violet with aq. $\rm NH_3$. Au^{***} salts give a permanent orange colour. CH. ABS. (e) Rapid micro-determination of phosphoric acid in water.—See B., 1935, 176.

Determination of active silica in puzzuolana. P. P. BUDNIKOV and L. G. GULINOVA (Kolloid-Z., 1935, 70, 100—105).—SiO₂ is determined by following its reaction with finely-divided $Ca(OH)_2$, calorimetrically or by electrical conductivity in aq. solution. E. S. H.

Analysis of dust samples employing X-ray diffraction. W. F. BALE and W. W. FRAY (J. Ind. Hygiene, 1935, 17, 30—32).—A Debye–Scherrer photograph is made from the dust, using pure SiO₂ or other suspected constituent as a comparison. J. S. A.

Determination of impurities in commercial carbon monoxide.—See B., 1935, 146.

Photronic photo-electric turbidimeter for determining hydrocyanic acid in solutions. E. T. BARTHOLOMEW and E. C. RABY (Ind. Eng. Chem. [Anal.], 1935, 7, 68-69).—With the apparatus described HCN can be determined by titration with AgNO₃ to within 0.00054 mg. Original colour or turbidity of the solutions does not vitiate the results. E. S. H.

Disturbance by cations of tests for anions in alkaline solution. A. HEMMELER and M. ANGELINI (L'Ind. Chimica, 1934, 9, 1343—1353).—Difficulties arising from the presence of heavy metals, either as hydroxide or in anions or complex salts, are considered. A classification of anions is given according to their behaviour when the alkaline solution is neutralised, acidified, oxidised, or reduced, or when they are caused to form stable complex anions, to unite with a second anion (e.g., CN'+S''), to decompose (e.g., S_2O_3''), or to yield salts stable towards Na_2CO_3 .

Volumetric determination of potassium by the cobaltinitrite method. C. S. PIFER (J.S.C.I., 1934, 53, 392-396T).—The method was modified so as to obtain quant. recoveries over the range of 0·1— 50 mg. K₂O. The ppt. has the composition $R_3Co(NO_2)_{e*}aq$. (R=K and Na), but the relative amounts of these elements depend on the amount of K, the amount and nature of pptg. reagent, the amount of Na salts, and the temp. If standard amounts of reagent and NaCl are used at room temp., K_2O in mg.=0.354x+0.00034x², where x is the KMnO₄ val. in ml. of 0.05N solution. The cobaltimitrite ppt. is appreciably sol. in H₂O and in 2.5% aq. Na₂SO₄. The most suitable wash liquids are enter 35% EtOH or a freshly prepared saturated solution of K cobaltinitrite. The titration with KMnO₄ is quant. when the ppt. is added to cold acidified KMnO₄ and then boiled. 11 equivs. of O are required per mol. of R₃Co(NO₂)₆.

Standardisation of potassium dichromate. H. H. WILLARD and P. YOUNG (Ind. Eng. Chem. [Anal.], 1935, 7, 57–58).—K₂Cr₂O₇ is standardised by treatment of H_3AsO_3 in H_2SO_4 solution with <its equiv. of $K_2Cr_2O_7$, and titrating the excess of reducing agent with $Ce(SO_4)_2$ or $KMnO_4$, using OsO_4 as catalyst and *o*-phenanthroline ferrous complex as indicator. The titration may be performed potentiometrically with KBrO₃ in aq. HCl. E. S. H.

Mechanism of precipitation processes. XV. Reactions in the precipitation of Ba", Pb", or SO_4 " ions as barium sulphate or lead sulphate. Z. KARAOGLANOV and B. SAGORTSCHEV (Z. anorg. Chem., 1935, 221, 369-381; cf. A., 1934, 604).-When $Ba(NO_3)_2$ is pptd. with H_2SO_4 the ppt. contains more Ba than corresponds with the amount of H₂SO₄ employed, the excess of Ba being the smaller the more slowly pptn. takes place. The presence of HCl has practically no influence, but excess of HNO_3 causes an increase in the ratio of Ba" to SO4". The results are to be explained, not by adsorption, but by formation of a secondary product, possibly of the form $(BaNO_3)_2SO_4$; > 20% of this product may be formed. A similar reaction takes place in presence of H₃PO₄, probably forming $(BaH_2PO_4)_2SO_4$. Other secondary reactions occur in presence of electrolytes such as KCl or FeCl₃, probably giving products of the form $\operatorname{Ba}(\operatorname{KSO}_4)_2$ or $\operatorname{Ba}_3[\operatorname{Fe}(\operatorname{SO}_4)_3]_2$. BaCl_2 with $\operatorname{H}_2\operatorname{SO}_4$ will result in a secondary product such as (BaCl)₂SO₄. Formulæ other than those suggested are possible. The pptn. of $PbSO_4$ from $Pb(NO_3)_2$ and H_2SO_4 is very little influenced by conditions ; hence it is unlikely that secondary products are formed. M. S. B.

Determination of magnesium, manganese, silicon, and iron in duraluminium by quantitative spectral analysis. P. A. BAZHULIN, A. A. BASKAKOV, and A. P. STRIGANOV (J. Tech. Phys. U.S.S.R., 1934, 4, 578–586).-0.03-0.07% of Mn or Mg, 0.1-0.7% of Fe or Si, and 3.5-5% of Cu may be determined with an error < 10%. Spectral lines used are tabulated. CH. ABS. (e)

Detection of cations without the use of hydrogen sulphide. L. G. BERDITSCHEVSKI and I. G. VASSERBERG (Ukrain. Chem. J., 1934, 9, 161—166).— An analytical procedure is described. R. T.

Effect of salts on the determination of traces of lead by the chromate method. A. W. MIDDLE-TON (J. Ind. Hygiene, 1935, 17, 7—11).—Pb cannot be determined as PbCrO₄ in presence of > very small amounts of other heavy metals. J. S. A.

Simple test for the formation of complex lead alkali halides. H. J. BORN and R. MUMBRAUER (Z. anorg. Chem., 1935, 221, 354-362).—By the radioactive indicator method, using Th-*B*, the formation of complex chlorides of PbCl₃ with KCl and NH₄Cl is confirmed. None, however, is formed with NaCl. M. S. B.

Micro-determination of lead. Electrolyticcolorimetric method. M. RANDALL and M. N. SARQUIS (Ind. Eng. Chem. [Anal.], 1935, 7, 2—3).— 2—15 mg. of Pb can be determined with an accuracy of about 1% by pptg. electrolytically 95-99% as PbO₂ and determining the remainder colorimetrically as PbS. E. S. H. Iodometric determination of copper. J. R. CALDWELL (J. Amer. Chem. Soc., 1935, 57, 96—97).— The absorption of starch iodide by the pptd. CuI is reduced by adding a solution of white shellac in EtOH. E. S. H.

Drop method of detection of copper. L. M. KULBERG (J. Appl. Chem. Russ., 1934, 7, 1079– 1080).—A few ml. of solution are heated for 1–1.5 min. with Sn and conc. HCl, the solution is poured off, the Sn washed and boiled for 1 min. with 1.5 ml. of 65% HNO₃, the solution diluted, and 0.2 ml. of saturated aq. NaF, 0.2 g. of ZnSO₄, and 0.3 ml. of saturated aq. (NH₄)₂Hg(CNS)₄ are added, when a lilac ppt. of ZnHg(CNS)₄,CuHg(CNS)₄ indicates $\leq 10^{-7}$ g. Cu. Co, Pb, Fe, Sn, As, Sb, and Bi do not interfere. R. T.

Colorimetric determination of copper as cupric sulphide. L. DE BROUCKERE and S. SOLOWIEJCZYK (Bull. Soc. chim. Belg., 1934, 43, 597-625).-The conditions for obtaining stable hydrosols of reproducible colour for which Beer's law is valid have been investigated. 25 ml. of solution containing 0-003--0.03 g. of Cu per litre, 0.1-0.5N with respect to HCl, HNO₃, or H₂SO₄, and stabilised with 1 ml. of 1% aq. gelatin (Ostwald) are added to 2.5 ml. of fresh saturated aq. H₂S. The colour is compared, over a period, with that of a simultaneously prepared standard, in a Duboscq colorimeter. In general, the determinations are accurate to within 1% in the presence of 0.05-1.0M-KCl, -NaCl, -KNO₃, -NaNO₃, KSO NaSO MaCl, ChCl, Bacl, MaSO MaCl, ChCl, ChCl -K₂SO₄, -Na₂SO₄, -MgCl₂, -CaCl₂, -BaCl₂, -MnSO₄, -ZnSO₄, and -Al₂(SO₄)₃ even if the concns. are not identical in the solutions compared. The results are not reproducible in presence of Fe. Dextrin and aq. Na₂S are less satisfactory reagents. J. G. A. G.

Quinaldinic acid as a micro-reagent. I. Determination of zinc, and its separation from manganese. P. R. RAY and M. K. Bose. II. Determination of copper, and its separation from cadmium, manganese, nickel, cobalt, etc. P. R. RAY and J. GUPTA (Mikrochem., 1935, 17, 11-13, 14-16; cf. A., 1934, 270).-I. The Zn solution (about 1 mg. in 1–1.5 c.c. of H_2O is acidified with 0.02– 0.04 c.c. of glacial AcOH, and pptd. with slight excess of 1% Na quinaldinate solution. The ppt. is washed 5-6 times with 0.5-1 c.c. of hot H_2O and dried at 125°. In presence of Mn 005-0.1 c.c. of AcOH is used and preliminary washing H₂O contains 2.50 AcOH and 5% Na quinaldinate solution. The AcOH is reduced in presence of Mg and alkaline earths. Pptn. of Fe, Al, Be, Ti, and U can be prevented by addition of alkaline tartrate solution.

II. 0.1-0.9 mg. of Cu in 1-2 c.c. of H_2O is acidified with 0.025 c.c. of 0.7N- H_2SO_4 , and 1% quinaldinic acid solution added dropwise to the hot Cu solution, until 0.1 c.c. in excess is present. The ppt. is washed with hot H_2O and dried at 135°. This method also separates Cu from Cd, Pb, Mn, Ni, Co, PO_4''' , AsO_3''' , and AsO_4''' , if precautions are taken in washing.

J. W. S.

Microchemical detection of mercury. I. M. KORENMAN (Mikrochem., 1935, 16, 223-226).—Hg gives characteristic crystals of $Zn[Hg(CNS)_4]$, advantageously coloured by addition of Fe^{**}, with $ZnSO_4+$

 NH_4CNS . Ag and Cd also give cryst. ppts. with the reagent. J. S. A.

Rapid detection of mercury. P. I. TRISCHIN (J. Appl. Chem. Russ., 1934, 7, 1282—1284).—Br- H_2O , aq. NaOH, and KI are added to the solution, the solution is filtered, excess of aq. Na₂S added, the solution again filtered, and HCl added to the filtrate, when a black ppt. of HgS indicates Hg. Other cations do not interfere. R. T.

Quantitative spectral analysis of slightly volatile substances in the arc. Lanthanum oxide. H. BAUER (Z. anorg. Chem., 1935, 221, 209–224).– Since 0.01% of La₂O₃ mixed with CaO can be readily detected by examination of spectral photographs, whilst below that concn. there is a marked fall in intensity or practical disappearance of some lines, visual comparison of photographs affords an approx. quant. method of determination of small concns. Greater accuracy can be obtained by a photometric method, using ZrO₂ lines as a comparison standard. In the determination of 0.1% of La₂O₃ the error is ± 5 —10%. Using 1.5 mg. of material only, 0.001%La₂O₃ in Al₂O₃ or 0.0025% in CaO can be detected. M. S. B.

Sensitive drop reaction for indium. A. S. KOMAROVSKI and N. S. POLUEKTOV (Mikrochem., 1935, 16, 227–232).—The solution is applied to paper impregnated with alizarin or quinalizarin, and exposed to NH₃ vapour. On neutralising with H₃BO₃, In leaves a red, or a purple, lake, respectively; limit, for both, 0.05×10^{-6} g. Al if present is suppressed by addition of NaF. Zn, Ni, Co, Mn, and Fe (first reduced to Fe^{*} by Na₂S₂O₃) are removed by treating the coloured spot with KCN. J. S. A.

Hexamethylenetetramine and bromate methods of determining manganese in presence of iron. V. F. STEFANOVSKI (J. Appl. Chem. Russ., 1934, 7, 1288—1293).—Ray and Chattopadhya's method (A., 1929, 614) is laborious, and cannot be applied in presence of Ni and other metals. Kolthoff and Sandell's method (A., 1929, 1414) gives trustworthy results, with the following modifications : the acidity of the medium during oxidation should correspond with $1 \cdot 2N$, and the filtrate from MnO₂ should be treated a second time with KBrO₃. Fe, Ni, Zn, and other metals present in Fe alloys do not interfere. R. T.

Determination of titre of permanganate solutions by means of calcium carbonate. A. V. FILOSOFOV (J. Appl. Chem. Russ., 1934, 7, 1085– 1086).—0.5 g. of CaCO₃ is dissolved in 50 ml. of 20% HCl, 250 ml. of 0.1N-H₂C₂O₄ are added, the solution is made alkaline with 20% aq. NH₃ at 95°, diluted to 500 ml., filtered after 3 hr., and excess of H₂C₂O₄ is determined by KMnO₄ titration; the titre of the latter is hence calc. R. T.

Arsenic test for reduced iron. M. OAKLEY and J. C. KRANTZ, jun. (J. Amer. Pharm. Assoc., 1934, 23, 1196—1197).—The Fe is dissolved in aq. Br, heated on a H₂O-bath for 15 min., and the normal U.S.P. Gutzeit method applied, the order of addition of acid SnCl₂ and of KI being reversed. F. O. H.

Separation of iron from indium with cupferron. F. C. MATHERS and C. E. PRICHARD (Proc. Indiana Acad. Sci., 1934, 43, 125-127).-Cupferron will ppt. Fe completely in presence of In. Most of the Fe should be removed previously by some other method. InCl₃ is sol. in a mixture of Et₂O and conc. HCl saturated with HCl; consequently the method of Gooch and Havens (A., 1897, ii, 232) for separating Al and Fe cannot be applied to In and Fe. CH. ABS. (e)

Determination of ferrous iron in materials containing metallic iron and ferric iron. T. TAZAWA (Seitetsu Kenkyu, 1933, No. 134).—Free Fe is re-moved by treatment with aq. $HgCl_2$, pptd. Hg being removed with a solution of I in EtOH. Fe^{II} and Fe^{III} are determined in the mixed oxide residue.

Сн. Авз. (е)

Potentiometric and conductometric titration of ferric salts. A. L. ZAIDES (Tzent. Nauch. Issl. Inst. Koz. Prom. Sborn. Rabot, 1934, No. 2, 107-111).-In the conductometric determination of $Fe_2(SO_4)_3$ min. were observed at [NaOH] approx. 0.5 and 3.0 equiv. per atom of Fe. Similar breaks were found in the potentiometric curve. Their origin is discussed.

CH. ABS. (e) Quantitative micro-analytical determination of certain metals in complex salts. J. MEYER and K. HOEHNE (Mikrochem., 1935, 16, 187-192).-Co and Ni in complex salts are weighed as the metal by igniting first in O_2 and subsequently in H_2 , without addition of H_2SO_4 . Compounds of Fe, Cr, and V are converted into Fe_2O_3 , Cr_2O_3 , and V_2O_5 by ignition in O_2 . Preliminary heating in air is advantageous in some cases J. S. A.

Micro-colour reaction of chromium. S. Augusti (Mikrochem., 1935, 17, 17–21).— CrO_4'' and Cr_2O_7'' (or Cr^{\cdots} oxidised with H_2O_2) yield a violet colour, passing into red, when treated with a 1%solution of strychnine in conc. H₂SO₄. The limit of sensitivity as a drop reaction is 0.98×10^{-6} g. CrO_4 $(0.348 \times 10^{-6} \text{ g. Cr})$. Mn[°] and Co[°], which interfere with the test, can be removed with BaCO₃ and 1: 2-NO·C₁₀H₆·OH, respectively. Fe(CN)₆[°] and Fe(CN)₆[°] Fe(CN) also interfere, but can be decomposed with conc. H_2SO_4 before the test. J. W. S.

Critical study of cacotheline for the determination of tin. I. L. NEWELL, J. B. FICKLEN, and L. S. MAXFIELD (Ind. Eng. Chem. [Anal.], 1935, 7, 26-27).-2 p.p.m. of Sn[°] can be detected when present alone, but the presence of Sb", Cr", Cr", Co", Cu", Cu', Fe", Hg", Hg₂", Ni", Ag', Ti", HSO₃', CO₄", MoO₄", NO₂', SeO₃", SO₃", or VO₄" interferes with the test. The sensitivity of the test is increased In presence of HCl in presence of HCl. E. S. H.

n-Propylarsinic acid as a reagent for the determination of zirconium. F. W. ARNOLD, jun., and ^{U.}C. CHANDLEE (J. Amer. Chem. Soc., 1935, 57, 8).-The procedure is applicable in presence of a large no. of other metals, including Sn. The error is about 0-1%. Allylarsinic acid can be substituted when Zr 18 alone or accompanied by Th, Ti, or Sn.

E. S. H. Detection and determination of germanium in organic matter.—See this vol., 369.

7.

Gravimetric determination of vanadium with ammonium benzoate, and of titanium with tannin. F. M. SCHEMJAKIN (Zavod. Lab., 1934, 3, 986-987).-25 c.c. of solution, containing 0.1-0.15 g. of V₂O₅, are boiled with 10 c.c. of 2N-HCl; $(NH_4)_2SO_4$ is added to reduction of V^v to V^{1v}. A hot saturated solution of 1 g. of NH₄OBz is then added, the solution boiled for 2 min., the ppt. of VO(OBz), collected after 4 hr., washed with saturated aq. BzOH, ignited, and weighed as V_2O_5 . Fe and Cr should be absent; Mg, Al, Cu, Mo, W, and Ti do not interfere. Das-Gupta's method for determination of Ti (A., 1930, 566) is not as accurate as the 8-hydroxyquinoline method. R. T.

Microchemical mineral analysis. V. A. MAR-TINI (Mikrochem., 1935, 16, 233-235).-Rh gives a yellow cryst. ppt. with (NH4)2[Hg(CNS)4]. Pyramidone + aq. NH₄CNS gives characteristic cryst. ppts. with Fe, Zn, Cd, Sn, Cu (amorphous), and Co, but not with Ni; 1% of Co in Ni may be so detected.

J. S. A. Recent advances in calorimetry and thermometry. W. A. ROTH (Z. Elektrochem., 1935, 41, 112-122).—A review.

Isothermal calorimeter. H. B. SREERANGACHAR and M. SREENIVASAYA (Biochem. J., 1935, 29, 295-299).—A simple isothermal calorimeter using CH₂Ph₂ and its calibration are described. The heat liberated in the peroxidase-quinol system is 68.2 g.-cal. per g. of quinol. P. W. C.

Construction of a tubular oven for the thermostatic conduction of reactions in sealed tubes. E. SUCHARDA, T. MAZONSKI, and J. MOKRZYCKI (Rocz. Chem., 1934, 14, 1166—1171).—Apparatus is described. R. T.

Induction furnace without molten metal movement suitable for melting of light metals. E. F. Russ (Z. Physik, 1935, 93, 220-226). A. B. D. C.

Temperature regulator for high temperatures. J. FÖRSTER and E. GRUNER (Z. Elektrochem., 1935, 41, 9-10).—The winding of the electric furnace, the temp. of which is to be regulated, is placed in series with a second heating element having a resistance about 0.1 of that of the former. This second element is wound on the bulb of a Hg regulator which operates a relay cutting out one of two parallel resistances, thus decreasing the current through both main and subsidiary windings. Temp. between 300° and 1000° can be maintained with an accuracy of $1-2^{\circ}$.

F. L. U. Thermostatic relay. K. V. TSCHMUTOV (J. Appl. Chem. Russ., 1934, 7, 1103).-A simple relay for currents of 6-7 amp. is described. R. T.

Thermo-regulator for heating and cooling baths. A. E. BRADFIELD (J.S.C.I., 1935, 54, 6T).-The temp. is altered at a steady rate by moving the position of the upper contact by means of a clockwork drive. J. S. A.

Accurate thermostat of small capacity. I. G. NAGATKIN (Zavod. Lab., 1934, 3, 1036).-The thermostat, of 1 litre capacity, and of simple construction, can be maintained at $20-150^{\circ}\pm0.1^{\circ}$. R. T.

Micro-thermal conductivity apparatus for gas analysis. P. GROSS and H. STEINER (Mikrochem., 1935, 17, 43-46).—A modification of the Schleiermacher apparatus is described for measurement of the thermal conductivity of vols. of gas down to 0.2 c.c. The measurements can be applied to the analysis of gas mixtures and indicate the concn. of H_2^2 in H_2 to 0.5%. J. W. S.

Hydrogen discharge tube for spectrographic work. H. J. J. BRADDICK (Proc. Camb. Phil. Soc., 1934, 30, 355—356).—The tube is made of Pyrex, with a cryst. SiO₂ window, and runs at 3000 volts and 0.5—1.0 amp. It is claimed that it is easy to construct and aline with other apparatus, is robust, and permits a rather higher power input than is usual.

R. S. B.

High-power hydrogen lamp. L. HENRY (J. Chim. phys., 1934, 31, 665—667).—A form of H_2 lamp is described, constructed in Pyrex glass and with 50 sq. cm. Al electrodes, which can operate up to 4000 watts. J. W. S.

Light filters for the mercury lamp. E. J. BOWEN (J.C.S., 1935, 76).—A list of filters for isolating lines and groups of lines between 2480 and 5790 Å. is given (cf. A., 1932, 1013). J. G. A. G.

Possibility of approximate spectro-photometry without analysis of the spectrum. N. NIUBERG (Compt. rend. Acad. Sci. U.R.S.S., 1934, 4, 278— 285).—Theoretical. J. W. S.

Instruments used for spectrum analysis and absorption spectrophotometry. F. TWYMAN (Analyst, 1935, 60, 4—9).—A brief description is given of the Hilger const.-deviation wave-length spectrometer, the quartz spectrograph, the logarithmic sector, and the "Spekker" spectrophotometer, and their uses. A. R. P.

Sources of error in absorption spectroscopy. C. P. SNOW and E. EASTWOOD (Nature, 1935, 135, 186).—Sources of error in determining the absorption spectrum of vapours are the possible presence of small amounts of impurities and the effect of interference bands from the quartz plates of the apparatus.

L. S. T.

Microphotometric methods in divided-beam spectrophotometry. D. H. FOLLETT (Proc. Physical Soc., 1935, 47, 125—135).—A microphotometer is described in which two photocells, connected differentially, are used to indicate the difference in transmission of the individual spectra in the pairs produced in divided-beam methods of spectrophotometry.

N. M. B.

Roulette comparator for colorimetric analysis. J. H. YOE and T. B. CRUMPLER (Ind. Eng. Chem. [Anal.], 1935, 7, 78).—Apparatus and procedure are described. E. S. H.

New precision colorimeter. J.J. MANLEY (Proc. Physical Soc., 1935, 47, 69—73).—The length of the standard solution column is controlled by a plunger working in a vertical connected tube; the two beams of light are juxtaposed by a simple optical system.

N. M. B.

Sonic interferometer for the study of absorption in liquids. A. L. QUIRK and G. D. KOCK (Rev. Sci. Instr., 1935, [ii], 6, 6-7).—The oscillations of a quartz crystal, protected from direct contact with the liquid by a thin metal diaphragm, are amplified. C. W. G.

Apparatus for converting photograms into intensity curves. K. HABERL (Physikal. Z., 1935, 36, 59-61).—The apparatus is a type of planimeter. A. J. M.

Simple registering micro-photometer. H. KULENKAMPFF (Physikal. Z., 1935, 36, 56–59). A. J. M.

Direct photography of dust in air. L. H. OTT and J. B. FICKLEN (Rev. Sci. Instr., 1935, [ii], 6, 4-5).—A dust chamber attached to the camera is illuminated from the side by a photo-flash lamp. C. W. G.

Micro-refractometer and its use in chemical microscopy. E. E. JELLEY (J. Roy. Microsc. Soc., 1934, [iii], 54, 234—245).—Using only 0.0001 ml. of liquid, n can be determined to ± 0.001 between 1.330 and 2.000. C. W. G.

Technique of Kerr cells. H. J. WHITE (Rev. Sci. Instr., 1935, [ii], 6, 22–26).—The purification of PhNO₂ by fractional distillation and freezing is described. Kerr cells are made of plate glass cemented with ceresin wax. C. W. G.

Sensitivity of the γ -ray method of radiography. J. T. NORTON and A. ZIEGLER (Trans. Amer. Soc. Met., 1934, 22, 271—279).—The sensitivity is arbitrarily defined as the change in thickness of a steel block which produces a 2% change in density of the exposed film. Capsules containing 100 millicuries of Rn were used as the source of the γ -rays. The sensitivity is lower for a small thickness of steel, but improves up to a thickness of 2.5 in., after which it is practically const. at 1.3%. W. P. R.

Valve potentiometer. D. N. MEHTA and S. K. K. JATKAR (Proc. Indian Acad. Sci., 1934, 1, A, 390– 397). N. M. B.

Lamp potentiometer and its application to the glass electrode. S. I. SOKOLOV and V. A. PTSCHFLIN (J. Appl. Chem. Russ., 1934, 7, 1316—1322). R. T.

Calomel electrodes. M. CHANOZ, G. FLORENCE, and (MLLE.) PERROTTET (Compt. rend. Soc. Biol., 1935, 118, 245-247).—Theoretical. R. N. C.

Cataphoretic measurements by the aid of resistance lamps, using a direct current. R. SPYCHALSKI and J. NETEROWICZ (Rocz. Chem., 1934, 14, 909—914).—Apparatus for cataphoresis experiments is described, in which accumulators are replaced by direct lighting current. R. T.

Haber glass electrode. B. P. NIKOLSKI and K. S. EVSTROPIEV (Proc. Leningrad Lab. [N.S.], 1930, No. 12, 5-24).—The glass electrode (I) gives accurate readings up to $p_{\rm H}$ 11.5, departures beyond this $p_{\rm H}$ depending on the cation. Ca and Ba do not affect the accuracy. (I) is especially valuable in heterogeneous solutions. CH. ABS. (e)

Improvements in the technique of counting small ions. N. WEGER (Physikal. Z., 1935, **36**, 15– 20).—Apparatus for counting and determining the velocitics of small ions is described. A. J. M. Water-cooled resistors. E. M. THORNDIKE (Science, 1934, 80, 619-620).—Two types of resistor, consisting essentially of nichrome wire cooled by a flow of H_2O , and capable of carrying 40 amp., are described. L. S. T.

Device for holding electrodes during electrometric titrations. M. L. HERZOG (Ind. Eng. Chem. [Anal.], 1935, 7, 47). E. S. H.

Radio-frequency high-voltage generator. D. H. SLOAN (Physical Rev., 1935, [ii], 47, 62—71).—The resonance transformer, generating 800,000 volts, is contained in an evacuated, H_2O -cooled, Cu-lined steel tank, and is wound of H_2O -cooled concentric Cu pipes, without insulation. N. M. B.

Apparatus for measuring the magnetic susceptibility of solids and liquids at high temperatures. R. B. SOSMAN and J. B. AUSTIN (J. Washington Acad. Sci., 1935, 25, 15—32).—The pull on a sample suspended inside a vertical solenoid is measured directly by means of a sensitive balance. The shape of the hysteresis loop of a ferromagnetic powder is estimated by combining a uniform field with a nonuniform one. C. W. G.

Accuracy of the Curie-Cheneveau magnetic balance. F. W. GRAY and J. H. CRUICKSHANK (Nature, 1935, 135, 152).—The accuracy of the balance is defended. The unexplained variations sometimes obtained with H_2O are not due to its untrustworthiness (cf. this vol., 149). L. S. T.

Apparatus for measuring Curie points at low temperatures. R. FORRER and V. MARIAN (J. Phys. Radium, 1934, [vii], 5, 617—618).—A simple instrument, consisting of a small three-pole magnet in contact with a thermometer and acting on a magnetometer, can be used at temp. $> 400^{\circ}$. The substance under investigation is placed between two of the poles. N. M. B.

Wash-bottle for quantitative work. E. J. DE BEER (Ind. Eng. Chem. [Anal.], 1935, 7, 67).—The apparatus permits the use of a measured amount of washing liquid. E. S. H.

Viscosity determinations at high temperatures by means of freely falling spheres. W. M. COHN (Ann. Physik, 1935, [v], 21, 761-782).—Pt-Rh spheres were dropped through silicate melts (900-1400°), the time taken to fall a measured distance being determined electrically. The viscosity is calc. from Stokes' equation. Comparison with the rotating-cylinder method shows good agreement.

A. J. M.

Determination of the degree of purity of liquid substances and azeotropic mixtures. W. SWIEN-TOSLAWSKI (J. Physical Chem., 1934, **38**, 1169-1174).—A standard apparatus is described (cf. A., 1932, 1226). D. R. D.

Apparatus for control of pressure in distillation. G. W. JACOBS (Ind. Eng. Chem. [Anal.], 1935, 7, 70-71). E. S. H.

Fractional distillation under reduced pressure. A. E. BRADFIELD (J.S.C.I., 1935, 54, 6T).—A vacuumjacketed fractionating column is described.

J. S. A.

Distillation apparatus. W. SWIENTOSŁAWSKI (Rocz. Chem., 1934, 14, 614—620).—Apparatus for fractional distillation of small vols. of liquids is described. R. T.

Milling of small quantities of material for analysis. J. HUDIG (Chem. Weekblad, 1935, 32, 54).—The laboratory disintegrator described mills and sieves 50-g. samples of plant materials quantitatively in 3 min. S. C.

Preparation of very thin tungsten wires by sputtering a thicker wire in a gas discharge. J. F. H. CUSTERS (Nederl. Tijds. Natuurk., 1934, 1, 8—15; Chem. Zentr., 1934, ii, 1738).—A W wire of 2×10^{-4} cm. diam. was made by sputtering one of 10^{-3} cm. diam. in an A atm. H. J. E.

Preparation of graded collodion membranes and their use in study of filterable viruses.—See this vol., 257.

Vacuum regulator. C. W. McCONNELL (Ind. Eng. Chem. [Anal.], 1935, 7, 4). E. S. H.

Compact rotatable vacuum gauge with three ranges for pressures of 700-0.0001 mm. H. MOSER (Physikal. Z., 1935, 36, 1-2).—An instrument based on the MacLeod principle is described.

A. J. M. Magnesium perchlorate ("anhydrone") as a drying agent. J. G. F. DRUCE (Chem. and Ind., 1935, 54-55).—A review. $Mg(ClO_4)_2$ is as effective as P_2O_5 as a drying agent, is readily regenerated, and is not subject to the chemical limitations imposed on the use of P_2O_5 . $Mg(ClO_4)_2, 3H_2O$ is almost as effective as P_2O_5 . R. S. B.

Magnesium perchlorate as a drying agent. J. G. F. DRUCE (Chem. and Ind., 1935, 133; cf. preceding abstract).—Mg(ClO_4)₂ can be heated with NH_2Ac at 220° without any sign of violent action, but caution must be used in heating with some org. compounds, or explosions may occur. P. G. M.

Glass-blowers' holder for large flasks. A. F. Scott (Science, 1934, 80, 620). L. S. T.

Apparatus for extraction of solids by upward flow of solvent. F. E. HOLMES (Ind. Eng. Chem. [Anal.], 1935, 7, 75-76). E. S. H.

Hot-water funnel. J. R. CALDWELL (Ind. Eng. Chem. [Anal.], 1935, 7, 76). E. S. H.

Filling of instruments with liquids through capillary tubes. V. G. SHIVOV (Zavod. Lab., 1934, 3, 1037).—Electrical heating is recommended for filling thermoregulator bulbs with PhMe. R. T.

Determination of solubility, density, viscosity, and conductivity of solutions of salts. S. K. TSCHIRKOV (J. Appl. Chem. Russ., 1934, 7, 1323-1328).—Apparatus is described. R. T.

Nomogram for centrifugal force. H. SHAPIRO (Ind. Eng. Chem. [Anal.], 1935, 7, 25).—The nomogram may be used for machines having a radius up to 27 cm. and speed up to 2000 r.p.s. E. S. H.

Geochemistry.

Atmospheres of the planets. H. N. RUSSELL (Science, 1935, 81, 1-9).-A lecture. L. S. T.

Origin of the helium in natural gases. Helium and ekacæsium (element no. 87). A. LEPAPE (Compt. rend., 1935, 200, 336—338).—A small portion only of the He found in natural gases can be accounted for by known radioactive elements. Owing to the frequent association of the rarer alkalis, Li, Rb, and Cs, with the sources of these gases, it is suggested that the origin of the He was eka-Cs which has probably now practically disappeared. M. S. B.

Origin of the helium in natural gas; relation between helium and lithium contents in certain sodium chloride mineral springs. A. LEPAPE (Compt. rend., 1935, 200, 163—165).—Of 14 French mineral spring-waters examined, those yielding gases richest in He are the NaCl springs richest in Li, and originating in triassic strata. No relationship exists between the He in the gas and the radioactivity of the H₂O. NaCl springs originating from tertiary formations are poor in He, whatever their [Li] or radioactivity. In all springs very rich in He the Li is accompanied by Rb and Cs. J. W. S.

Abnormal temperature stratification in lakes Maru-numa and Ooziri-numa, Gunma Prefecture, Japan, and the chemistry of their waters. S. YOSHIMURA (Japan. J. Geol., 1934, 11, 259—271).— Data are recorded. CH. ABS. (e)

Radium content of some connate waters. H. G. BOTSET (Physics, 1934, 5, 276-280).-H₂O from oil wells gave vals. from 208 to 1956×10^{-12} g. Ra per litre. There was a fairly definite correlation between the heavy mineral content of a sample and its Ra content. CH. ABS. (e)

Colloid lake at Witzenhausen a.d. Werra. E. WEDEKIND (Kolloid-Z., 1935, 70, 39).—The H_2O contains $Fe(OH)_3$, $Al(OH)_3$, and SiO_2 as a reversible sol. E. S. H.

Acid-base equilibrium in sea-water. L. IRVING (Science, 1934, 80, 587-588).—A discussion. L. S. T.

Microbiology and the marine limestone. R. M. FIELD (Trans. Amer. Geophys. Union, 1932, 230– 233).—Ca(HCO₃)₂ in solution, and pptn. of CaCO₃ in the waters of the Bahamas, may be due to bacterial action. CH. ABS. (e)

Metallic sulphides in the Shotover River district. C. O. HUTTON (New Zealand J. Sci. Tech., 1934, 16, 154—155).—Analytical data are recorded for a chalcopyrite outcrop and for a pyrrhotite ore containing an abnormally high proportion of S relative to Fe. A. G. P.

Halloysite and allophane. C. S. Ross and P. F. KERR (U.S. Geol. Survey, 1934, Prof. Paper 185-G, 135-148).—12 analyses of halloysite show $SiO_2: Al_2O_3$ ratios 206:100 to 165:100 with only approx. agreement with the usually accepted formula $H_2Al_2Si_2O_8$. The material may be white and friable or grey and porcellaneous. Most is optically isotropic, but sometimes feebly birefringent (< 0.001), n 1.543—1.648.

X-Ray patterns with somewhat diffused bands show that the material is minutely cryst., with some relation to, but distinct from, kaolinite. The dehydration curve shows a gradual loss of H_2O to $400-430^\circ$ and a rapid loss to 500°. Halloysite is a product of weathering, especially in association with sulphide ores, and it is often associated with alunite. Allophane is truly amorphous and shows a wider range in composition, often containing evansite and other minerals in solid solution. X-Ray patterns show traces of diffused bands. n 1.472-1.512. The dehydration curve shows a gradual loss of H_2O throughout. L. J. S.

Alkalinity of silicate minerals. R. E. STEVENS (U.S. Geol. Survey, 1934, Prof. Paper 185-A, 1—13).— Various minerals were ground with a few drops of H_2O free from CO₂ in an agate mortar for 2 min., and the $p_{\rm fr}$ of the solution was determined colorimetrically and electrometrically. Vals. include : beryl 7·2, muscovite 7·8—9·0, calcite 9·0, orthoclase 8·8—9·2, albite 9·4—9·8, olivine 10·2, wollastonite 10·8, glass 11·2— 11·4. This is the order of stability of the minerals with respect to their resistance to weathering. The effects of silicate minerals on underground waters and geochemical changes is discussed. L. J. S.

Constancy of the uranium-actinium ratio in minerals. F. H. BRUNER and H. SCHLUNDT (J. Physical Chem., 1934, 38, 1183—1188).—U was determined gravimetrically and Ac by Meyer and Hess' method (A., 1920, ii, 658). The ratio was const. within the limits of experimental error (5%) in soddite, thorianite, and pitchblende from Bohemia and two Canadian sources. D. R. D.

Spring Hill gold deposit near Helena, Montana. V. JONES (Econ. Geol., 1934, 29, 544–559).—The sulphides are pyrrhotite, arsenopyrite, and pyrite (I), Au occurring mainly with (I). CH. ABS. (e)

Characteristics of organic content of rocks. W. L. RUSSELL (Bull. Amer. Assoc. Petroleum Geol., 1934, 18, 1103—1125).—The org. substances and NH_3 evolved on distilling > 700 samples of shale, limestone, and dolomite in a closed tube have been studied. CH. ABS. (e)

Rôle of volatiles in the formation of Virginia titanium deposits. C. S. Ross (Trans. Amer. Geophys. Union, 1934, 245).—The development of the minerals is discussed. CH. ABS. (e)

Rare elements in Oklahoma sphalerite. E. L. HASSLER and H. C. Roys (Proc. Oklahoma Acad. Sci., 1934, 14, 67–68).—Ga, Ge, Fe, Zn, Cd, Pb, and Sn were detected, indicating the magmatic origin of this Zn ore. CH. ABS. (e)

Eclogites from the eastern Alps. H. WIESENE-DER (Tsch. Min. Mitt., 1934, 46, 174—210).—Descriptions with chemical analyses are given of eclogites from several localities. L. J. S.

Magmatic rocks. E. TRÖGER (Tsch. Min. Mitt., 1934, 46, 153—173).—Detailed chemical analyses are given of ten rarer types of igneous rocks—greisen, carbonate-beresite, weiselbergite, sanukite, ornöite, bojite, corsite, lakarpite, alnöite, and olivine-melilitite. L. J. S.

Pyromorphism of inclusions in volcanic rocks. K. SCHOTLITSCH (Tsch. Min. Mitt., 1934, 46, 127— 152).—Inclusions of various plutonic rocks and cryst. schists in volcanic rocks on the borders of the eastern Alps are described and the mineral changes in them noted. L. J. S.

Plagioclase from Linosa : the anemousite question. E. ERNST and H. NIELAND (Tsch. Min. Mitt., 1934, 46, 93—126).—Crystals of felspar from the same spot on the island of Linosa, Mediterranean, as those described as anemousite by Washington and Wright (1910) were examined in detail. They show a variation in their optical data, d, and composition; four analyses range from Ab 61·38, An 34·02, Or 4·60 to Ab 44·62, An 51·55, Or 3·83 mol.-%, d 2·660— 2·693. The optical data are found to agree with the normal plagioclase series, and there is no need to assume a carnegeite mol. The assumed anemousite and pacificite from Hawaii (Barth, A., 1930, 448; 1931, 708) are not accepted. L. J. S.

Boehmite and diaspore in Ayrshire fireclays (Scotland). J. DE LAPPARENT (Compt. rend., 1934, 199, 1629—1631).—Well-developed boehmite crystals and diaspore were observed. The Ayrshire fireclays are analogous to bauxites in the Pyrenees (Ariege).

H. J. E.

Separation of argillaceous fraction of sedimentary rocks. M. DREYFUSS (Compt. rend., 1934, 199, 1631-1633).—Argillaceous constituents (I) are separated by using suspending agents (K soaps, gum arabic, or gelatin). (I) is recovered from the suspension by pptg. and washing. H. J. E.

Thermal decomposition of carbonate minerals. R. C. WELLS ('Trans. Amer. Geophys. Union, 1934, 237-240).—Data for the rate of thermal decomp. of magnesite (I), brucite, and hydromagnesite are given. Decomp. of (I) begins at $> 560^{\circ}$, increasing rapidly for the first third of the decomp. and then remains approx. const. CH. ABS. (e)

Stilpnomelane and related minerals as constituents of schists from Western Otago, New Zealand. F. J. TURNER and C. O. HUTTON (Geol. Mag., 1935, 72, 1-8).—Minerals of the stilpnomelane group are common constituents of the schists and semi-schists of various parts of W. Otago. The genesis of stilpnomelane is discussed. L. S. T.

Analysis of Egyptian igneous and metamorphicrocks. W. F. HUME, H. F. HARWOOD, and L. S. THEOBALD [with A. I. AWAD] (Geol. Mag., 1935, 72, 8-32; cf. A., 1929, 56).—Analyses and petrographic descriptions of a gneiss, four schists, a diorite, a feiste, four Baramia serpentines, a dolomite, and a typical Aswan monumental granite are discussed.

Dehydration of fibrous parasepiolite. (MLLE.) 8. CAILLERE (Compt. rend., 1934, 199, 1626—1628).— Dehydration in vac. occurs in two stages (190—290° and 465—675°), and is complete at 720°. From X-ray measurements, the material is non-cryst. at 6.6°, but becomes cryst. at 1000°. The decomp. of sepiolite on heating is $H_4Mg_2Si_3O_{10}=2H_2O+2MgSiO_3$ +SiO₂. Changes in optical properties on heating, and analytical data are recorded. H. J. E.

Hessian bauxite deposits. M. MOLDENHAUER (Chem.-Ztg., 1935, 59, 125—127).—The location of the deposits is given, and the composition of samples discussed. A. J. M.

Origin of the crystalline slates of Kabylie de Collo (Department of Constantine, Algeria). M. ROUBAULT (Compt. rend., 1935, 200, 145—147).— These rocks include complete slate formations (satin and mica slates), gneissic formations (biotite, granulitic and amphibolic gneiss), more basic amphibolites, and some strata of cipolins. The origin of these formations is discussed. J. W. S.

Schroeckingerite from Bedford, New York. E. J. ARMSTRONG (Amer. Min., 1935, 20, 62–63).— The mineral which occurs in pegmatite specimens from Kinkel's quarry has $n_a 1.658$, $n_{\beta} 1.682$, $n_s 1.685 \pm$ 0.003. L. S. T.

Soda-alunite from Molokai, Hawaiian islands. J. D. LAUDERMILK (Amer. Min., 1935, 20, 57-58). A white, chalky mineral from the desert strip of Molokai has been identified as soda-alunite; SiO_2 0.04, Al_2O_3 34.64, Fe_2O_3 2.16, MgO trace, CaO 0.28, K_2O 6.08, Na_2O 4.62, H_2O 15.38, TiO_2 0.60, SO_3 37.02, total 100.82%. L. S. T.

Burkeite, a new mineral species from Searles Lake, California. W. F. FOSHAG (Amer. Min., 1935, 20, 50–56).—The analysis Na₂O 47·89, K₂O none, SO₃ 39·96, CO₂ 11·72, H₂O 0·04, Cl 0·09, insol. 0·04, total 99·74%, agrees with the formula $2Na_2SO_4, Na_2CO_3$. The mineral is biaxial, negative with n_a 1·448—1·449, n_β 1·488—1·489, n_γ 1·491— 1·493; d 2·57, hardness 3·5. L. S. T.

Unit cell and space-group of realgar. M. J. BUERGER (Amer. Min., 1935, 20, 36–43).—Weissenberg photographs for realgar from Allchar, Macedonia, give a 9.27, b 13.50, c 6.56 Å., β 73° 227' with 16 formula wts. per unit cell, space-group C_{2h}^{s} , $P2_1/n$, referred to a new orientation chosen by taking the *a*-axis in Goldschmidt's [101] direction. X-Ray methods confirm the monoclinic holohedral nature of realgar. L. S. T.

Formula and crystal system of alleghanyite. A. F. ROGERS (Amer. Min., 1935, 20, 25–35).— Alleghanyite from Bald Knob, Alleghany County, N.C., has the formula $2Mn_2SiO_4$, $Mn(OH,F)_2$ and not $5MnO_2SiO_2$ (A., 1932, 1228). It is monoclinic, and isomorphous with chondrodite; n_a 1.756, n_β 1.780, n_γ 1.792; d 4.020. SiO_2 22.75, Al_2O_3 0.75, Fe_2O_2 0.73, MgO 0.71, CaO 1.34, H_2O 2.56, CO_2 1.92, TiO_2 0.15, MnO 67.85, F 0.30, S 0.11, total 98.82%. L. S. T.

Pegmatites of Fitchburg, Massachusetts. C. S. HITCHEN (Amer. Min., 1935, 20, 1-24).—The pegmatites described are classified into the following types: biotite, tourmaline, beryl, titanite, and allanite. Their origin is discussed. L. S. T.

Stibnite in quartz. N. H. STEARN (Amer. Min., 1935, 20, 59-62).—Inclusions of stibnite and prob-

L. S. T.

ably cinnabar occurring in small quartz crystals from the Parnell Hill and Gap Ridge mines, Pike County, Arkansas, are described. The order of crystallisation appears to be stibnite, cinnabar, quartz. L. S. T.

X-Ray study of opals. F. P. DWYER and D. P. MELLOR (J. Proc. Roy. Soc. New South Wales, 1934, 68, 47-50).—The presence of β -cristobalite and α -quartz in opals is correlated with their thermal history. F. N. W.

Mineral occurring in Germany containing rare-earths as main constituent. F. HENRICH (J. pr. Chem., 1935, [ii], 142, 1-5).—Weinschenkite (A., 1922, ii, 860) is a rare-earth phosphate dihydrate ($X^{III}PO_4, 2H_2O$) and contains Y (main constituent), Gd, Dy, Er, Ho, Tb (trace), Yb (trace), and small amounts of Ce-earths. H. B. Origin of natural oil. E. BERL (Science, 1935, 81, 18).—A reply to criticism (cf. this vol., 191). L. S. T.

Soil profiles developed on carboniferous limestone in Somerset and Derbyshire. A. J. Low (J.S. East. Agric. Coll. Wye, 1934, No. 34, 155–165). CH. Abs. (p)

Soil profile in view of field studies in Somerset, Derbyshire, and Cheshire. A. J. Low (J.S. East. Agric. Coll. Wye, 1934, No. 34, 166–196). CH. ABS. (p)

Meteorite from Lanton, Howell County, Missouri. J. S. CULLISON and G. A. MULLENBURG (J. Geol., 1934, 42, 305—308; Chem. Zentr., 1934, ii, 1755). —The outer crust consisted of reddish-brown oxides. The composition was Fe 90.40, Ni 8.33, Co 0.61, P 0.18, SiO₂ 0.005% (no Mn or Cu). The chief minerals were kamazite, taenite, schreibersite, and plessite.

H. J. E.

Organic Chemistry.

Electronic theory of organic chemical reactions. F. ARNDT and B. EISTERT (Ber., 1935, 68, [B], 193-199).—Theoretical. H. W.

Isomerism. II. F. P. A. TELLEGEN (Chem. Weekblad, 1935, 32, 40-45; cf. this vol., 191).—An account of stereo- and geometrical isomerism.

S. C.

Bruto-isomerism. J. VAN ALPHEN (Chem. Weekblad, 1935, 32, 39–40). F. P. A. TELLEGEN (*ibid.*, 53–54).—A discussion. S. C.

Occurrence of optical asymmetry. F. Rost (Angew. Chem., 1935, 48, 73-75).—A review.

E. S. H.

Electrolytic syntheses in organic chemistry. F. FICHTER (Bull. Soc. chim., 1934, [v], 1, 1585— 1609).—A lecture.

Improvements in the Sabatier-Senderens process for the preparation of paraffins. P. K. SAKMIN (Ber., 1935, 68, [B], 164—166).—The olefine is mixed with an excess (instead of a deficiency) of H₂ and passed over a Ni catalyst at 150°. The product contains 1% of C_nH_{2n} , 9% of N₂, 30% of H₂, and 60% of C_nH_{2n+2} . It is strongly cooled (apparatus described), whereby all paraffins are condensed but H₂ and N₂ escape. The advantage of the process lies in its avoidance of olefine and use of Br; the paraffins are free from olefine dibromides and are 92-94% (instead of 80%) pure. H. W.

Oxidation of ethane. E. W. R. STEACIE (Chem. and Ind., 1935, 62-63).—A reply to Bone (this vol., 40). R. S. B.

Oxidation of ethane. W. A. BONE (Chem. and Ind., 1934, 63—64; cf. preceding abstract).—A reply to Steacie with further criticism. R. S. B.

Catalytic isomerisation of *n*-heptane, *n*-octane, and Δ^{α} -hexene. A. D. PETROV, A. P. MESCHT-SCHERJAKOV, and D. N. ANDREEV (Ber., 1935, 68, [B], 1-5).—With olefines, the temp. ranges of isomerisation, cracking, and, particularly, of polymerisation lie very close to one another. In presence of ZnCl₂, n-heptane (I) undergoes 20-25% isomerisation in 6 hr. at 300-400° under pressure of H_2 or N_2 . In presence of MoS₃ at 420° (I) is appreciably isomerised at 420° to an extent which increases markedly with time over 3-14 hr. *n*-Octane in presence of MoS_2 is isomerised at 410° and at 440° suffers profound transformation accompanied by marked cracking. MoS₃ is more powerful than ZnCl₂ but weaker than AlCl₃ as isomerising agent. Δª-Hexene remains unchanged in presence of MoS₃ at 300°, but commences to polymerise at 350°; the process is more marked at 400°. It differs from the paraffins in that it scarcely yields fractions of b.p. < that of the initial material. After 1 hr. at 400°/140 atm., the product contained Δ^{β} - and Δ^{γ} -hexene, but isohexenes could not H. W. be detected.

Hydrocarbon in basking shark.—See this vol., 233.

Determination of unsaturation in aliphatic hydrocarbons by bromide-bromate titration. S. P. MULLIKEN and R. L. WAKEMAN (Ind. Eng. Chem. [Anal.], 1935, 7, 59).—The procedure is applicable to alkenes, cycloalkenes, and alkadienes; its application under ordinary conditions to alkines and cycloalkdienes, such as terpenes, is doubtful.

E. S. H.

Addition of hydrogen bromide to olefines. J. C. SMITH and P. L. HARRIS (Nature, 1935, 135, 187).—isoUndecenoic acid adds HBr relatively slowly and yields the same proportions of 0- and t-bromoundecoic acid whether oxidants or anti-oxidants arc present. Since undecenoic acid shows the peroxide effect, this is now evidence that only terminal double linkings are susceptible. L. S. T.

Preparation of butadiene from ψ -butylene (butene). B. P. FEDOROV, A. I. SMIRNOVA, and P. A. SEMENOV (J. Appl. Chem. Russ., 1934, 7, 1166– 1180).—Butadiene (I) is obtained in 21% yield by passing 7:1 N₂-CHMe:CHMe (II) mixtures through

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porcelain tubes at 700°; at the same time, 18-24%of the (II) is decomposed, and the remainder may be recovered. Lower yields of (I) are obtained in presence of ZnO, Cr_2O_3 , SiO_2 gel, Pt, Fe, Cu, and C, whilst in presence of MgO 25-29% yields of (I), with 27-29% decomp. of (II) to other products, are obtained. R. T.

Addition of sulphur dichloride to butadienes. H. J. BACKER and J. STRATING (Rec. trav. chim., 1935, 54, 52—56).— $\beta\gamma$ -Dimethylbutadiene and isoprene with SCl₂ in ligroin give 1% yields of 3 : 4-dichloro-3 : 4-dimethyl-, m.p. 174° (HgCl₂ compound, decomp. 130—131°), and -3-methyl-thiacyclopentane, b.p. 68—70°/3 mm. (HgCl₂ compound, decomp. 158°), oxidised to 3 : 4-dichloro-3 : 4-dimethyl-, m.p. 265° (decomp.), and -3-methyl-thiacyclopentane 1 : 1-dioxide, m.p. 144-5—145.5°, respectively. Butadiene, however, gives the tetrachloride, m.p. 73—74°, as sole product. R. S. C.

Polymerisation of pentenes. H. I. WATERMAN, J. J. LEENDERTSE, and W. MOKLAZINGAL (Rec. trav. chim., 1935, 54, 79—84).— $n \cdot C_5 H_{12}$ (I) and AlCl₃ at 0° give 80% of "partly cyclised" polymerisation product (II). At 400° alone or with Al₂O₃ (I) gives a larger yield of (II). A mixture of branched-chain pentenes, mainly CH₂:CHPr^{\$\vert\$} (III), at 400° or in C₆H₆ at 85° or 200° undergoes much isomerisation (to a product giving CMe₂EtCl with HCl) and polymerisation to "partly cyclised" products. R. S. C.

Low-temperature hydrogenation and polymerisation of acetylene in presence of nickel catalysts. A. D. PETROV and L. I. ANTZUS (Compt. rend. Acad. Sci. U.R.S.S., 1934, 4, 295-303).— C_2H_2 and H_2 at 300°/1 atm. (a), or at 40°/20—25 atm. (b), give alkenes principally, but *iso*alkenes, alkadienes, more highly unsaturated hydrocarbons, and aromatic hydrocarbons (I) have been found. Conditions (b) favour the formation of (I). Reactions involved are discussed. F. N. W.

Oxygen additive compounds of acetylenes. C. A. YOUNG, R. R. VOGT, and J. A. NIEUWLAND (J.C.S., 1935, 115; cf. A., 1934, 1089).—Acetylenes which are normally liquids or are in fused condition form peroxides, but C_2H_2 does not. F. R. G.

Reaction between acetylene and sulphur. C. T. BHATT, K. S. NARGUND, D. D. KANGA, and M. S. SHAH (J. Univ. Bombay, 1934, 3, No. 2, 159— 160).—Passage of C_2H_2 through S heated at 290—390° (reaction becomes rapid at 320°) in a glass flask gives C, H₂S, CS₂, thiophen, and PhSH. H. W.

Reactions between ethylene chloride and chlorine. S. HAMAI (Bull. Chem. Soc. Japan, 1934, 9,542-548).—No measurable reaction occurs between liquid (CH₂Cl)₂ (I) and Cl₂ at 25°, 30°, or 50°, but in presence of HCl as catalyst CHCl₂·CH₂Cl is formed. Gaseous (I) and Cl₂ at room temp. give a trace of C₂Cl₆. Both reactions are preceded by an induction period. F. N. W.

Preparation and solubilities of aluminium alkoxides. E. V. ZAPPI and E. RESTELLI (Anal. Asoc. Quim. Argentina, 1934, 22, 87—90).—Al amalgams do not react satisfactorily with all alcohols. In presence of HgCl₂ clean Al filings begin to react with anhyd. alcohols at room temp.; Al powder is less

satisfactory, owing probably to greater surface oxidation. The solubilities of Al(OR)₃, where R=Me, Et, Pr^a, Pr^{β}, Bu^a, Bu^{β}, CH₂Ph, and CH₂:CH·CH₂, in the corresponding alcohol, are recorded. All, except the first and last-named, are sol. (12-47%). H. F. G.

Preparation of propylene glycol from propylene chloride. A. L. KLEBANSKI and I. M. DOLGO-POLSKI (J. Appl. Chem. Russ., 1934, 7, 1181–1191).— CHMeCl·CH₂Cl and saturated aq. NaHCO₃ at 210°/ 182 atm. yield 60–65% of OH·CHMe·CH₂·OH (I) and 7–8% of unsaturated compounds (chiefly CH₂Cl·CH:CH₂); when Na₂CO₃ is substituted for NaHCO₃ the yields of (I) are $\geq 48\%$. R. T.

Oxonium compounds. Complex acidic oxonium compounds of organic oxygen compounds. V.V.TSCHELINTZEV (Compt. rend. Acad. Sci. U.R.S.S., 1934, 4, 304—309).—Saturated solutions of many org. O compounds (I) (R·OH, R·CHO, etc.) in varying concess. of HCl are found to contain (I) and HCl in equimol. proportions. Formation of acid oxonium compounds is assumed. F. N. W.

Reactions of cobalt sulphate in glycerol. M. CHATELET (Compt. rend., 1935, 200, 62-63).—The red solution (I) of $CoSO_4,7H_2O$ (II) in glycerol on addition of EtOH deposits a viscous mass which after prolonged washing with C_6H_6 is approx. $(CoSO_4)_3, C_3H_8O_3$. Addition of aq. NH₃ to (I) gives no ppt., but yields a yellow solution which on addition of an equal vol. of EtOH deposits crystals of the *compound* (CoSO₄,4NH₃)₃(C₃H₈O₃), stable in dry air but decomposed by traces of H₂O with pptn. of $Co(OH)_2$. If dry HCl is passed through saturated (I) heat is generated and further amounts of (I) can be dissolved until the HCl yields a ppt., probably $CoCl_2, C_3H_8O_3, nHCl$, which on washing with C_6H_6 and Et_2O yields the violet compound $CoCl_2, C_3H_8O_3$. J. W. S.

Constitution of benzylidene-d-sorbitol. Synthesis of *l*-xylose. L. VON VARGHA (Ber., 1935, 68, [B], 18-24).—Sorbitol is converted by PhCHO in H₂O-HCl at room temp. into $\alpha\gamma$ -benzylidene-d-sorbitol (I), m.p. 172-173°, $[\alpha]_{10}^{20} + 5.6°$ in H₂O, trans-formed by COMe₂-CuSO₄ into $\alpha\gamma$ -benzylidene- $\epsilon\zeta$ -isopropylidene-d-sorbitol, m.p. 179°, [a]²⁰ +19.0° in CHCl₃, $\alpha\gamma$ -benzylidene- $\beta\delta\epsilon\zeta$ -diisopropylidene-d-sorbitol, and m.p. 131–132°, $[\alpha]_{D}^{20} + 26.7^{\circ}$ in CHCl₃. (I) is oxidised by Pb(OAc)₄ in AcOH to 3 : 5-benzylidene-1-xylofuranose (II), m.p. (indef.) 184° (decomp.), $[\alpha]_{D}^{20} + 36.5°$ in EtOH (phenylhydrazone, m.p. 185°, $[\alpha]_{D}^{20} + 28.0°$ in MeOH). (II), Ac₂O, and C₅H₅N at 15-20° afford 3: 5-benzylidene-l-xylofuranose 1: 2-diacetate, m.p. (indef.) 90°, $[\alpha]_{D}^{20} + 20.6^{\circ}$ in CHCl₃, which does not react with NHPh·NH₂ or redden fuchsin-H₂SO₃. Hydrolysis of (II) with boiling 10% AcOH leads to β -*l*-xylose (III), m.p. 144°, $[\alpha]_{p0}^{20} - 79\cdot3°$ (initial), $-18\cdot6°$ (equil.), in H₂O (*tetra-acetate*, m.p. 126°, $[\alpha]_{p0}^{20} + 25\cdot7°$ in CHCl₃). Treatment of (III) according to Schmidt *et al.* (A., 1934, 173) gives l-xyloketose identical with that obtained by Levene et al. (A., 1914, i, 1027) from H. W. urine.

Detection of trichlorotribenzylidenesorbitol with acetone. G. REIF (Z. Unters. Lebensm., 1934, 8, 468-473).—The [H₂SO₄] required to liberate o-C₆H₄Cl·CHO from trichlorotribenzylidenesorbitol (I) (equal vols. of H₂O and H₂SO₄ of d 1·84) is > that required to liberate PhCHO from benzylidenesorbitol (9 vols. of H₂O to 5 vols. of H₂SO₄), and the more conc. acid is also necessary to produce a coloration with COMe₂. With the more conc. acid benzylidenemannitol may also give a coloration with COMe₂, but instructions are given for differentiating the two. The purification of the pptd. (I) and the method of carrying out the test are described. E. C. S.

Synthesis of glycerides. I. P. E. VERKADE and J. VAN DER LEE (Proc. K. Akad. Wetensch. Amsterdam, 1934, **37**, 812—818).—On the basis of lit. data concerning the wandering of acyl groups in the hydrolysis of CPh₃ from OR·CH₂·CH(OR')·CH₂·O·CPh₃ (R, R' or R''=acyl), the following general method for the synthesis of glyceryl esters (of known structure) containing three different acid radicals is outlined : the α -monoglyceride OR·CH₂·CH(OH)·CH₂OH (from *iso*propylideneglycerol and RCl) with 1 mol. of CPh₃Cl and C₅H₅N (or triphenylmethylglycerol and RCl) affords OR·CH₂·CH(OH)·CH₂·O·CPh₃, converted by R'Cl-C₅H₅N in CHCl₃ into

OR·CH₂·CH(OR')·CH₂·O·CPh₃, hydrolysis of which gives either the $\alpha\gamma$ -, OR·CH₂·CH(OH)·CH₂·OR' (I) or $\alpha\beta$ -, OR·CH₂·CH(OR')·CH₂·OH (II), -diglyceride, the constitution of which is readily determined by known methods. Further action of R''Cl on (I) and (II) gives, respectively, the triglycerides OR·CH₂·CH(OR'')·CH₂·OR' and OR·CH₂·CH(OR')·CH₂·OR''. J. W. B.

Production of an optically active phosphoglyceric acid by glycolysis in muscle.—See this vol., 250.

Reaction of alkyl sulphates and p-toluenesulphonates with the Grignard reagent and preparation of magnesium dialkyls. C. M. SUTER and H. L. GERHART (J. Amer. Chem. Soc., 1935, 57, 107—109; cf. Cope, A., 1934, 991).—Contrary to the previous statement (A., 1933, 1033), MgBu°Br and Bu°₂SO₄ do not give Bu°(MgBu°)SO₄ (1); if (I) is produced to any appreciable extent it undergoes disproportionation to MgBu°₂ and Mg(Bu°SO₄)₂. The reactions of various Alk₂SO₄ and p-C₆H₄Me·SO₃Alk with MgBu°Br and MgPhBr are investigated; the decreases in the % of basic Mg (Gilman *et al.*, A., 1929, 800) and Br' are determined. A solution of nearly pure MgBu°₂ is obtained from MgBu°Br and Et₂SO₄ (slightly > 1 mol. per equiv. of Br). Reaction between Mg and Bu°₂SO₄ occurs only in presence of a little Mg halide; MgBu°₂ and Mg(Bu°SO₄)₂ are produced (cf. *loc. cit.*). The catalytic effect of, *e.g.*, MgI₂ is explained thus : $2Bu°_2SO_4 + MgI_2 \longrightarrow 2Bu°I$ +Mg(Bu°SO₄)₂; $2Bu°I + Mg \longrightarrow MgBu°₂, MgI_2 \Longrightarrow$ MgBu°₂+MgI₂. Me₂SO₄, Mg, and MgI₂ similarly afford a low yield of MgMe₂ owing to the production of C₂H₆ (evolved rapidly towards the end of the reaction): $2Me_2SO_4 + MgMe_2 \longrightarrow 2C_2H_6 + Mg(MeSO_4)_2$. H. B.

Esters of thiosulphurous acid, $H_2S_2O_2$. A. MEUNSEN [with G. DEGEL] (Ber., 1935, 68, [B], 121— 127).—Addition of NaOMe or NaOEt (prep. described) to a well-cooled solution of S_2Cl_2 in light petroleum leads to Me_2 (I), b.p. $44\cdot 2-44\cdot 4^{\circ}/28-29$ mm., and

Et2 (II), b.p. 62.0-62.7°/15-16 mm., thiosulphite as greenish-yellow liquids which dissolve S, mix with org. media, are decomposed by acids, and are stable to air. Addition of S₂Cl₂ in light petroleum to NaOAlk in the same medium gives the isomeric Me_2 (III), b.p. 33-33.5°/15 mm., and Et₂ (IV), b.p. 67-68°/16 mm., esters. (III) and (IV) dissolve S very sparingly and are distinguished from (I) and (II) in that they are scarcely affected by Hg, by which (I) and (II) are rapidly decolorised with production of HgS. Small amounts of KOH-MeOH rapidly cause copious separation of S from (I) and (II), whereas from (III) and (IV) a slight pptn. occurs only after considerable time. (I) and (II) colour KI-MeOH brown, whilst (III) and (IV) give only a pale yellow colour. Treatment with NaOMe, prolonged boiling under reduced pressure, or long keeping at $15-20^{\circ}$ isomerises (I) to (III). The structure S:SCl₂ being assigned to S_2Cl_2 , (I) and (II) are therefore considered to be $S:S(OAlk)_2$, whereas (III) and (IV) are OAlk·S·S·OAlk. The alternative structure SR·SO·OR is improbable, since (III) and (IV) have no mercaptan odour and do not yield mercaptan when hydrolysed by acid or alkali. Attempts to obtain a compound of this structure from Et chlorosulphinate, b.p. 45.1- $45\cdot3^{\circ}/38-39$ mm., $171^{\circ}/760$ mm. (from SOCl₂ and EtOH), were unsuccessful. The discrepancy in b.p. excludes the possible formulation SR.SO2R, but the alternative structure OR·S·SR:O is not excluded. H. W.

Isomerism of cyclic isoprene sulphones. J. BÖESEKEN and E. DE R. VAN ZUYDEWIJN (Proc. K. Akad. Wetensch. Amsterdam, 1934, **37**, 760—762).— The conversion of cyclic isoprene sulphone (R=Me), in 0.5N-KOH, into an isomeride occurs in the dark and is due, not to *cis-trans* isomerisation (Eigenberger, A., 1931, 600, 1268), but to a three-carbon prototropic change (Ingold *et al.*, A., 1929, 300), $SO_2 < CH_2 CH$ $CH_2 CH$ (I) $\implies SO_2 < CH_2 CH_2$ (II), since O_3 in aq. CHCl₃ affords, after removal of HCO₂H and addition of BaCO₃, a *Ba* salt (CH₂Ac·CH₂·SO₃)₂Ba or (CHO·CHMe·CH₂·SO₃)₂Ba (slight reducing properties and gives CHBr₃ with NaOBr). Similar equilibration of butadiene sulphone (R=H), m.p. 63°, affords an isomeride, m.p. 45—50°, the equilibrium being at approx. 66.6% of (I). J. W. B.

Steric hindrance. tert.-Butyl chlorotrithioortho-silico- and -germano-formate. H. J. BACKER and F. STIENSTRA (Rec. trav. chim., 1935, 54, 38—46).—Bu^{γ}₃ chlorotrithio-orthosilicoformate (I), SiCl(SBu^{γ})₃, m.p. 71°, b.p. 161—163°/3—4 mm. [from NaSBu^{γ} (3·3 mols.) and SiCl₄; 60% yield], with the appropriate alkyl mercaptide gives Me (II), m.p. 43—44°, b.p. 159—160°/4 mm. (66%), Et (III). m.p. 26—27°, b.p. 163—164°/4 mm. (75%), and Pr⁴, m.p. 105°, b.p. 161—163°/3—4 mm. (25%), Bu^{γ}₂ tetrathio-orthosilicate (IV), Si(SBu^{γ})₃·SR, and Bu₄ tetrathio-orthosilicate, m.p. 160—161°, sublimes at 4 mm. (46%). Presence of a little NaOH during the prep. of (IV) leads to formation of tritert.-butylthiolsilicon oxide, [Si(SBu^{γ})₃]₂O, m.p. 248—249° (decomp.), but the formation of (II) and (III) is more rapid than that of (IV), and thus NaOH does not in these cases lead to oxides. (I) is unchanged by H_2O (1 mol.) in EtOH, but with KOH-EtOH affords tritert.-butylthiolsilicon hydroxide (46%), m.p. 90—91°. GeCl₄ and NaSBu^{γ} (3 mols.) in hot C₆H₆ give Bu^{γ}₃ chlorotrithioorthogermanoformate, m.p. 66—67°, b.p. 156—157°/ 3—4 mm., also formed, together with half its wt. of Ge(SBu^{γ})₄, m.p. 173—174°, when 4·4 mols. of NaSBu^{γ} are used. Crystallographic data are given.

R. S. C.

Electrolysis of crotonic acid and thermal decomposition of dicrotonyl peroxide. F. FICHTER and J. ROSENZWEIG (Helv. Chim. Acta, 1935, 18, 238-242).-In the electrolysis of crotonic acid (I) between a Pt anode and Sn cathode about 25% of the current yield is consumed by oxidative decomp., about 75% by decomp. of H_2O , and only about 1.3% by the production of propinene. Thermal decomp. of dicrotonyl peroxide (II) affords CO_2 and $\Delta^{\beta\delta}$ -hexadiene with some $CHMe:CH_2$. The behaviour of (I) and (II) is thus similar to that of BzOH and Bz₂O₂ under analogous conditions, thus supporting the hypothesis that the inability of BzOH to undergo Kolbe's synthesis is due to its unsaturated nature (double linking $\alpha\beta$ to CO₂H). The prep. of percrotonic acid is hindered by its great instability; the products give the same substances as does (II) when thermally decomposed and probably contain (II). H. W.

Determination of lactic acid. F. GIRAULT (Bull. Sci. pharmacol., 1934, 41, 331—338; Chem. Zentr., 1934, ii, 1815).—An improved method for the determination of the purity of lactic acid is described.

H. N. R.

Catalytic decarboxylation of β -keto-acids.— See this vol., 309.

Glycol esters of dibasic acids. Di- β -hydroxyethyl esters. F. B. SHORLAND (J. Amer. Chem. Soc., 1935, 57, 115—116).—(CH₂)_n(CO₂H)₂ (n > 1) (005 g.-mol.) and (·CH₂·OH)₂ (0·5 g.-mol.) at 100° give good yields of (CH₂)_n(CO₂·CH₂·CH₂·OH)₂ (I), which polymerise slowly at 160° to

H[0·CH₂·CH₂·CO₂·(CH₂)_n·CO·]_xO·CH₂·CH₂·OH, and when heated to 260° afford the corresponding polyesters (Carothers and Arvin, A., 1929, 1165). Di-βhydroxyethyl sebacate has m.p. 46°. β-Hydroxyethyl formate and acetate are similarly obtained from H₂C₂O₄ and CH₂(CO₂H)₂, respectively. Acetylation of the appropriate (I) gives di-β-acetoxyethyl succinate, b.p. 196°/5 mm., glutarate, b.p. 198°/5 mm., adipate, b.p. 210°/5 mm., and sebacate, b.p. 242°/5 mm., m.p. 25·5°. H. B.

Biochemistry of micro-organisms. XLI. Metabolic products of Penicillium Charlesii. G. Metabolic products of Penicillium Charlesii. G. MITH. II. Molecular constitution of carolic and carolinic acids. P. W. CLUTTERBUCK, H. RAISTRICK, and F. REUTER (Biochem. J., 1935, 29, 30–321).—Carolic acid (I) (A., 1934, 452), $C_9H_{10}O_4$, m.p. 132°, $[\alpha]_{5461}$ +84° in H₂O, monobasic and acid to Congo-red, containing no active H in anisole and l acuve H in C_5H_5N , gives on bromination (a) in gacial AcOH d-bromocarolic acid, $C_9H_9O_4Br$, m.p. I_{45}^{∞} $[\alpha]_{5461}$ +39° in H₂O, monobasic, containing its Br in the side-chain, (b) in 50% AcOH and in H₂O 4x-bromo- γ -methyltetronic acid, $C_5H_5O_3Br$, m.p. 172°, $[a]_{44}$ +9.5° in H₂O, monobasic, with d- $x\gamma$ -dibromo-

y-methyltetronic acid, C5H4O3Br2, m.p. 88°, monobasic (monohydrate, m.p. 135°, [a] 5461 + 36.2° in H2O, monobasic). These C₅ mono- and di-bromotetronic acids with Pd-C-H₂ give 1- γ -methyltetronic acid, C₅H₆O₃, m.p. 115°, [α]₅₄₆₁ -21°, monobasic (dinitrophenyl-hydrazone, m.p. 235°), red FeCl₃ and violet NaNO₂ colours, hydrolysis products 1 mol. each of CO2 and acetoin. (I) on hydrolysis gives 1 mol. each of CO_2 , acetoin, and butyrolactone (phenylhydrazide, m.p. 94°). (I) on reduction with Pd-C-H₂ gives an acid, C₉H₁₄O₄, monobasic (which on distillation in vac. gives a substance, C₉H₁₂O₃, m.p. 45°, neutral), which on hydrolysis gives a ketol, $C_8H_{16}O_3$ (bisdinitrophenyl-hydrazone, m.p. 225°). (I) in H_2O becomes $C_9H_{12}O_5$ which gives mono- and bis-dinitrophenylhydrazones, m.p. 176° and 225°, respectively. (I) with CH₂N₂ gives a Me1 ether readily hydrolysable with NaOH. Carolinic acid (II), $C_9H_{10}O_6$, m.p. 129°, $[\alpha]_{5461}$ +60° in H_2O (monohydrate, m.p. 123°; dinitrophenylhydrazone, m.p. 228°), dibasic, containing 2 active H in anisole, gives on hydrolysis 1 mol. each of CO₂, acetoin, and (•CH2•CO2H)2, on reduction the dibasic acid, $C_9H_{12}O_5$, m.p. 143° [hydrolysis product a ketol-monobasic acid, $C_8H_{14}O_4$ (bisdinitrophenylhydrazone, m.p. 248°)], and with CH_2N_2 a Me_1 ether Me_1 ester. The structures assigned are :

$$\begin{array}{c} O \begin{pmatrix} CHMe \cdot C & -O - CH_2 \\ CO & --C \cdot CO \cdot CH_2 \end{pmatrix} \\ CH_2 & O \begin{pmatrix} CHMe \cdot C \cdot OH \\ CO & --C \cdot CO \cdot [CH_2]_2 \cdot CO_2 H \\ (I.) & (II.) \end{pmatrix}$$

A complete analogy is obtained between all the reactions of these acids and of synthetic α -acetyltetronic acid (III). (III) hydrolyses at the same speed as (I) and (II), giving 1 mol. each of CO₂, acetol, and AcOH, on bromination loses its α -side-chain giving α -bromotetronic acid, and on reduction gives α -ethyltetronic acid, gives a readily hydrolysable Me_1 ether and a dinitrophenylhydrazone, m.p. 226°. Attention is directed to the relationship in structure of these acids and ascorbic acid (vitamin-C). P. W. C.

Reducing substance obtained by hydrolysis of alginic acid. II. H. UGAMI (J. Agric. Chem. Soc. Japan, 1934, 10, 727–730).—Hydrolysis of alginic acid yields a substance, $C_5H_6O_3$, m.p. 207–207.5° (*phenylosazone*, m.p. 246°; Ac_1 derivative, m.p. 195°), which yields (·CH₂·CO₂H)₂ on oxidation and is considered to be reductic acid (A., 1934, 511).

CH. ABS. (r)

Tartrates of bivalent metals.—See this vol., 315. Complex salts of tartar emetic.—See this vol., 312.

Preparation of trihydroxyglutaric acid from xylose. E. Z. PLIUSCHKIN (J. Appl. Chem. Russ., 1934, 7, 1004—1007).—Trihydroxyglutaric acid is obtained in 50% yield from xylose by oxidation with HNO_3 according to Acree (B., 1930, 1084) and 97% of the HNO_3 can be regenerated. R. T.

Action of barium hydroxide on monobasic sugar acids. W. D. ALBERT and F. W. UPSON (J. Amer. Chem. Soc., 1935, 57, 132—134).—The amounts of CO₂, HCO₂H, other volatile acids (mainly AcOH), $H_2C_2O_4$, and lactic acid (I) formed (as Ba salts) when the Ba salts of *d*-gluconic (II), *l*-arabonic, and *dl*glyceric acids are treated with 3N-Ba(OH)₂ at 140° for 24 hr. are determined. (I) is the main product and is obtained in yields of 65.2, 59.9, and 65.2% (of recovered C), respectively. Possible mechanisms (involving enedial formation) for the production of (I) are discussed. A little meso- $\alpha\alpha'$ -dihydroxyadipic acid [Ca salt; phenylhydrazide, m.p. 215° (corr.)] is also produced from (II). dl-Lactic acid is largely unaffected by the above treatment. Much less (I) but more HCO₂H and AcOH are obtained from glucose [as compared with (II)]. H. B.

Determination of glycuronic and galacturonic acids by Bertrand's method. Z. I. KERTESZ (J. Biol. Chem., 1935, 108, 127–129).—Cu equivs. for the determination of these acids by Bertrand's method are given. A. E. O.

Configuration of fucohexonic and rhodeo-hexonic acids. E. VOTOČEK (Coll. Czech. Chem. Comm., 1934, 6, 528-548).-Fractional crystallisation of the Ba α - and β -fucohexonates (I) obtained by the HCN synthesis from fucose affords the pure α -salt, $[\alpha]_{\mathbf{D}} = -6.6^{\circ}$, from which α -fucohexonolactone, +H₂O and anhyd. (II), sinters 110°, m.p. 126° (decomp.), $[\alpha]_{D} + 43.6^{\circ}$ to $+48.0^{\circ}$ (12 days), is obtained, together with a substance, m.p. 187-188°, [a] 0° to $+35.7^{\circ}$ (16 days), which is possibly the compound erroneously described by Mayer et al. (A., 1907, i, 588) as (II). From the lactones obtained from the mother-liquor of (I), after deposition of more (II), is isolated Ba β -fucohexonate, $[\alpha]_{\rm D}$ +4.3°, whence pure β -fucohexonolactone (III), sinters 125°, m.p. 130°, $[\alpha]_{\rm D}$ +69.2° to +28.9° (11 days), is obtained. With NH₂R-MeOH, (II) gives the α -acid amide, m.p. 218°, and methylamide (IV), m.p. 213° (decomp.), $[\alpha]_{\rm p}$ -15.4°, diethylamide, m.p. 173—174°, and di-n-amyl-amide, m.p. 170°; (III) similarly gives the β -acid amide, m.p. 199—200° (decomp.), and methylamide (V), m.p. 207–208° (decomp.), $[\alpha]_{D}$ +44.5°. Reduction of (II) with 2% Na-Hg-H₂O gives α -fucohexose, isolated as its benzylphenylhydrazone (VI), m.p. 176-177°, $\alpha_{\mathbf{p}}$ +0.18° to +0.22° in 2.5 hr. [p-bromophenyl-CO₂H hydrazone, m.p. 211—212° (decomp.); p-

CO₂H hydrazone, m.p. 211—212° (decomp.); pbromophenylosazone, m.p. 225° (decomp.)]. HO-C-H Rhodeose is similarly converted into α -HO-C-H H-C-OH H-C-OH $-47\cdot3^{\circ}$ (122 hr.), and the acid methylamide, m.p. 212—213°, $[\alpha]_{\rm D}$ +15·4°. The signs of $[\alpha]_{\rm D}$ (all vals. in H₂O) of (1), (II), (III), (IV) (V) prevention of (1), (III), (III),

(IV), (V), and (VI) prove that α -fucohexonic acid has the annexed configuration, the β -acid being the epimeride. J. W. B.

Symmetrical esters of methanetetra-acetic acid. H. J. BACKER (Rec. trav. chim., 1935, 54, 62-67).—C(CH₂·CO₂H)₄ (modified prep.; 4% yield from citric acid) gives the *tetrachloride*, m.p. about 45°, whence good yields of the following esters are obtained : Me_4 , b.p. 192—195°/12 mm., m.p. 23°; Et_4 , b.p. 211°/20 mm.; Pr_4 , b.p. 212—213°/5 mm.; *tetracyclohexyl*, m.p. 73·5°; *tetramenthyl*, m.p. 82— 83°; Ph_4 , m.p. 116·5° [(p- NO_2)₄-derivative, m.p. about 100°]; (p- $C_6H_4Me_4$, m.p. 127°; (p- $C_6H_4Bu^{\gamma}_4$, m.p. 166·5° {[2:6- $(NO_2)_2$]₄-, m.p. about 250° (decomp.) after sintering from about 130°, and (2:6- Br_2)₄derivative, m.p. 222—224°}; (p- $C_6H_4\cdot CMe_2Et$)₄, m.p. 122—122·5°; (o- $C_8H_4\cdot OMe_4$, m.p. 121°; (α - $C_{10}H_7$)₄, m.p. 148°; and $(\beta - C_{10}H_7)_4$, m.p. 171.5°. The esters are not volatile and show the ready crystallising power and high m.p. of symmetrical compounds. R. S. C.

Action of phosphorus pentachloride on ethylenetetracarboxylic acid. R. MALACHOWSKI and R. J. SIENKIEWICZOWA (Ber., 1935, 68, [B], 29-37).-CHBr(CO2Et)2 is converted by K2CO3 in boiling C6H6 saturated with H₂O into C₂(CO₂Et)₄, m.p. 55.5-57° (vield 80%), transformed by hydrolysis and treatment of the product with AcOH into (CO₂H)₂C₂(CO₂K)₂ (I). (I) cannot be converted into C₂(CO₂H)₄ (II), m.p. 184° (corr.), by the usual method, but transformation is effected by passing HCl through its suspension in C₆H₆ saturated with H₂O. Treatment of (II) with PCl₅ and POCl₃ under varied conditions leads to evolution of CO2 and production of a mixture of chlorides (III) which cannot be separated by fractional distillation. (III) is converted by NH₂Ph in Et₂O into ethylenetetracarboxytetra-anilide, m.p. 224° (corr.) [transformed when melted or treated with boiling AcOH into ethylenetetracarboxydianilideanil,

NPh CO·C·CO·NHPh, m.p. 195°], anilinoethylenetricarboxytrianilide, m.p. 188° (corr., decomp.) [whence anilinoethylenetricarboxyanilideanil (IV), m.p. 232°], and (IV). Successive treatment of $C_2(CO_2H)_4$ with PCl₅ and EtOH yields $C_2(CO_2Et)_4$ and Et_3 chloro-ethylenetricarboxylate, b.p. 163–164.5°/10 mm., converted by condensation with CHNa(CO2Et)2 and subsequent hydrolysis with boiling 20% HCl into aconitic acid. Treatment of C2(CO2H)4 with PCl5 and POCl3 under defined conditions followed by distillation of the product in vac. leads to anhydroethylenetetracarboxyl dichloride (V), $O < CO \cdot C \cdot CO CI \\ CO \cdot C \cdot CO CI$, b.p. 115.5—116°/8 mm., which with PCl₅ at 50° affords a mixture of $C_2(COCl)_4$ and $C_2Cl(COCl)_3$. (V) and hot EtOH yield Et_3 H ethylenetetracarboxylate, which passes when distilled in vac. into Et2 anhydroethylenetetracarboxylate, m.p. 33—35°, b.p. 162—163°/9 mm. (whence $El_2 H_3$ ethylenetetracarboxylate, m.p. 103—104°). Ph_2 anhydroethylenetetracarboxylate has m.p. 103-104° H. W.

Reduction of aldehyde- or ketone-nitrite mixtures. III. A. OGATA, T. HOSOI, H. NISHDUTSU, and S. TOMIOKA (J. Pharm. Soc. Japan, 1934, 54, 280-291).—In the above the most important factor is the absorption of the CO_2 produced; other necessary precautions are discussed. CH. ABS. (r)

Chloralides of α -hydroxycarboxylic acids. A. N. MELDRUM and D. M. BHATT (J. Univ. Bombay, 1934, 3, No. 2, 149—152).—Chloralides are obtained by treatment of CCl₃·CH(OH)₂ with the requisite acid and H₂SO₄ at room temp. (method 1; yield > 80% with aliphatic acids, smaller yields with aromatic acids, and failure with OH·CH₂·CO₂H) or from CCl₃·CHO and the acid at 150° (method 2). Chloralides of the following acids are described : *l*-lactic acid, m.p. 45° (by 1 and 2); malic acid, m.p. 139—140° (by 1 and 2), and the Et ester C₈H₉O₅Cl₃, m.p. 44°; *d*-tartaric acid (III), m.p. 160° (by I); r-tartaric acid, m.p. 128—130° (by 2) or from (III) and H₂SO₄ at 115—120°, converted by KOH into *r*-tartaric acid; citric acid (also +0.5PhNO₂), m.p. 161° (by I) (converted by PCl₅ into the chloride, $C_8H_5O_5Cl_5$, m.p. 78—79°; Me_2 ester, $C_{10}H_{11}O_7Cl_3$, m.p. 68—69°; Et_2 ester, b.p. 215— 225°/33 mm.); mucic acid, $C_{12}H_7O_8Cl_9$, m.p. 200—201°; r-mandelic acid, m.p. 82—83°. H. W.

Action of metallic sodium on aliphatic ketones. III. Reaction between sodium and isobutyrone. I. N. NAZAROV (Compt. rend. Acad. Sci. U.R.S.S., 1934, 4, 288–294).—Na with $CO(CHMe_2)_2$ (I) produces the pinacol alcoholate [(ONa)C(CHMe_2)·]₂ (II), which on hydrolysis gives (I) and Bu^yOH together with the pinacol [OH·C(CHMe_2)·]₂ (III), m.p. 90–91°. The dibenzoate, b.p. 150–153°/19 mm., is formed from (II) and BzCl, whilst (II) and MeI give an ether (?) and a trace of (III). F. N. W.

Electrolytic reduction of methyl *n*-propyl ketone to *n*-pentane.—See this vol., 310.

Action of Grignard salts on hydroxymethyleneketones. R. E. MEYER (Helv. Chim. Acta, 1935, 18, 101—103).—In the hope of preparing $\alpha\beta$ -unsaturated aldehydes, the OH·CH: compound of methylheptenone (I) has been treated with MgMeI; the nonhomogeneous product does not yield H₂O with NHPh·NH₂ or NH₂Ph, reddens fuchsin-H₂SO₃, reduces AgOH-NH₃, and decomposes when heated into MeCHO and (I). H. W.

Internal energy relationships of organic compounds. III. Experimental foundations of the double linking rule. Fission of sugars. O. SCHMIDT (Ber., 1935, 68, [B], 60-67; cf. this vol., 73).--Numerous examples are cited in favour of the view that in a C chain or ring the single linking proximate to a double linking is strengthened and the following linking is weakened, and that this alternating process extends with diminishing intensity throughout the mol. The fission of sugars at C3 during fermentation or under the action of alkali is explained by assuming that the cyclic form passes initially into the ring-free aldose, which affords an $\alpha\beta$ -dienol, thus weakening the linking from C3. Evidence of a less pronounced fission at C5 is found in the presence of n-amyl alcohol in fusel oil. Examples are quoted of similar fissions at C5, particularly at higher temp. Scission of hexitols when hydrogenated under pressure similarly involves the production of $\alpha\beta$ -dienols and, to a smaller extent, of β_{γ} -dienols. Like relationships exist among pentitols and pentoses. The cracking of paraffins is considered from a similar viewpoint. The distance of the double from the single linking is considered to be so great that at. forces are not involved, and the phenomena are attributed to the action of the B electrons. The phenomena of alternating polarity are therefore not due to alternating charge, but to H. W. alternating spin.

Determination of sugars by Bertrand's method in presence of phosphates. VI. Oxidation of sugars by cupric oxide in alkaline solutions. A. MALKOV (J. Appl. Chem. Russ., 1934, 7, 1254– 1257).—Reduction of Cu^{II} to Cu^I by invert-sugar, but not by-glucose, is retarded by Na₂HPO₄ and Na₄P₂O₇ to an extent increasing with the duration of the reaction. R. T. **Transformations of isomeric sugars.** J. W. H. OLDHAM and G. J. ROBERTSON (Nature, 1935, 135, 103; cf. A., 1934, 871).—d-Glucose has been converted into d-galactose and l-gulose. By a series of consecutive reactions α -methylglucoside is converted into 3:4-anhydro-6-triphenylmethyl- α -methylhexoside 2-acetate, which gave two isopropylidenemethylhexoside acetates, (I) m.p. 101—102°, $[\alpha]_{\rm B}$ +127·3° in CHCl₃, and (II) m.p. 176—178°, $[\alpha]_{\rm B}$ +76·8° in CHCl₃. Deacetylation of (I) gives an isopropylidenemethylhexoside, m.p. 109—110°, $[\alpha]_{\rm D}$ +147·2°, which on partial hydrolysis yields α -methylgalactoside. From this d-galactose is isolated. Similarly, (II) gives an isopropylidenemethylhexoside, m.p. 132—133°, $[\alpha]_{\rm D}$ +88·5°, and complete hydrolysis yields *l*-gulose, $[\alpha]_{\rm D}$ -17·9°. L. S. T.

Precipitation of sugars with methyl-alcoholic barium hydroxide. T. BABA (Biochem. Z., 1935, 275, 253—260).—The sugars are pptd. with MeOH– Ba(OH)₂, recovered from the ppt. by treatment with CO_2 , and determined in the filtrate by polarimetric and reduction methods. The recovery of sugar for glucose, mannose, maltose, lactose, sucrose, and cellobiose is in each case 100%, for fructose 67%, galactose 89%, arabinose 80%, and xylose 87%. The pptn. in the latter cases can be rendered quant. by adding Et₂O. Rhamnose is not pptd. by the reagent and only 57% pptd. on adding Et₂O. P. W. C.

Action of 132-volume aqueous hydrogen peroxide on carbonaceous substances obtained by action of concentrated sulphuric acid on sucrose, glucose, etc. G. SOLLAZZO (Boll. Chim. farm., 1934, 73, 917—922).—The C-like substances (I) obtained by action of H_2SO_4 on sugars and starches are oxidised very slowly by cold 132-vol. H_2O_2 to a colourless liquid and a white infusible solid; at 60—80°, oxidation is rapid, and there is no residue, the products being CO_2 , HCO_2H , and $H_2C_2O_4$. The residue after interrupted oxidation explodes when heated. It is suggested that (I) are not impure C, but dehydration products containing H and O. E. W. W.

d-Adonose (d-erythro-2-ketopentose). C. GLATTHAAR and T. REICHSTEIN (Helv. Chim. Acta, 1935, 18, 80—81; cf. A., 1934, 1205).—Boiling C_5H_5N transforms d-arabinose (I) into a mixture of isomerides from which unchanged (I) is mainly removed by crystallisation. Treatment of the non-cryst. residue with o-NO₂·C₆H₄·NH·NH₂ in boiling abs. EtOH affords d-adonose-o-nitrophenylhydrazone, m.p. 168—169.5° (corr., decomp.), $[\alpha]_D^{20} - 48.3^\circ (\pm 3^\circ)$ in MeOH. H. W.

Modification of the Hagedorn-Jensen method for semi-macro-quantities of glucose. G. A. SCHRADER (Ala. Agric. Exp. Sta., 42nd Ann. Rept., 1931,39–42).—10 c.c. of the glucose solution are added to 5 c.c. of 0.04N-K₃Fe(CN)₆ and heated for 15 min. on a water bath. After cooling, 5 c.c. of KI (25 g. of KI, 50 g. ZnSO₄,7H₂O, and 250 g. NaCl in 1 litre of H₂O) are added. Liberated I [from unchanged K₃Fe(CN)₈] is titrated with 0.02N-Na₂S₂O₃.

Сн. Авз. (е)

Effect of asparagine on the reducing power of fructose. I. WEBER, E. J. POSEN, and N. G. CEBOOLSKY (Ind. Eng. Chem. [Anal.], 1935, 7, 77).-- Asparagine does not affect the determination of fructose by Jackson's method. J. L. D.

Determination of sucrose in very small amounts of liquid by measurement of specific gravity and specific rotation. R. BEUTLER (Mikrochem., 1935, 16, 133-140).-The sugar content of 5-30 mg. of solution may be determined within 2% by measurement of the sp. gr. by direct weighing in a calibrated glass capillary, or from the $[\alpha]$ as measured for a 2-mm. column contained in a glass J. S. A. ring held between plane cover glasses.

Physico-chemical properties of lactose. V. Influence of other substances on the equilibrium rotation of lactose. B. L. HERRINGTON (J. Dairy Sci., 1934, 17, 701-707; cf. this vol., 200).-In glycerol the equilibrium mixture of the high- and low-rotating forms of lactose (I) contains more of the former than is the case in aq. solutions. $[\alpha]$ of (I)is altered by the presence of neutral salts (II). Changes in concn. of (I) or (II) alter the equilibrium rotation. A. G. P.

Effect of liquid ammonia on sugar derivatives. L. ZECHMEISTER and G. TOTH (Naturwiss., 1935, 23, 35).—Cellobiose octa-acetate is de-acetylated by heating to 50° with liquid NH₃ in a sealed tube. Reacetylation in C5H5N leads to N-containing peracetates, the principal product being formed by linking of cellobiose residues through N (3.3% N; m.p. 192—193°). A. J. M.

Acetyl derivative of a new anhydride of gentiobiose. L. KAMIEŃSKI (Rocz. Chem., 1934, 14, 1342-1347).-l-Dimethylaminogentiobiose hepta-acetate, m.p. 169°, $[\alpha]_{D}^{19}$ -10.84° in CHCl₃, is obtained from α -bromogentiobiose hepta-acetate (I) and NHMe₂ in C_6H_6 . (I) and NMe_3 in C_6H_6 yield gentiobiosetrimethylammonium bromide hepta-acetate, m.p. 140-144° (decomp.), and isooxygentiobial hepta-acetate, m.p. $140-141^{\circ}$, $[\alpha]_{p}^{*}$ -30.81° in CHCl₃, from which the parent anhydride was not obtained by hydrolysis.

R. T.

Derivatives of phenol- β -d-glucoside. B. Hel-FERICH and F. STRAUSS (J. pr. Chem., 1935, [ii], 142, 13-22).-Successive treatment of phenol-β-d-glucoside (I) (A., 1933, 379) [tetrabenzoate, m.p. 177° (corr.), $[\alpha]_{D}^{10} + 27.5^{\circ}$ in CHCl₃] with CPh₃Cl and Ac₂O in C_5H_5N at 100° (bath) and room temp., respectively, gives 6-triphenylmethylphenol-B-d-glucoside 2:3:4-triacetate (II) $(+C_6H_6)$, m.p. 110–116° (corr.), $[\alpha]_{D}^{23}$ (C_6H_6 -free) +16.93° in CHCl₃, converted by cold AcOH-HBr into phenol-β-d-glucoside 2:3:4-triacetate (III), m.p. 114° (corr.), [a]²⁰ -28.3° in CHCl₃. (III) and p-C₆H₄Me·SO₂Cl in C₅H₅N at room temp. afford the 6-p-toluenesulphonate, m.p. 161–162° (corr.), $[\alpha]_{1}^{19}$ -25.96° in CHCl₃, hydrolysed (method : Zemplen, A., 1926, 822) to phenol-3-d-glucoside 6-p-toluenesulphonate (IV), m.p. 127-128° (corr.), [a]²⁵ -66.6° in EtOH. Short treatment of crude (III) with a little 0.1N-KOH in EtOH at room temp. gives phenolβ-d-glucoside 2:3:6(?)-triacetate, m.p. 130° (corr.), $[\alpha]_{\rm p}^{\rm o} -52\cdot 2^{\circ}$ in CHCl₃, the 4(?)-p-toluenesulphonate, m.p. 160° (corr.), $[\alpha]_{\rm 20}^{\rm 20} -20\cdot 62^{\circ}$ in CHCl₃, of which is hydrolysed (Zemplen) to anhydrophenol- β -d-glucoside (?) (V), m.p. 149— 150° (corr.), $[\alpha]_{D}^{18}$ -161° in H₂O (*di*- acetate, m.p. 120-123°, $[\alpha]_{19}^{19}$ -104.5° in CHCl₃), and a little phenol-B-d-glucoside 4(?)-p-toluenesulphonate

OO HOOH _CH --CH·OPh

CH₂·OH (VI), m.p. $142-144^{\circ}$ (corr.), $|\alpha|_{D}^{24}$ -49·95° in EtOH. 6-Triphenyl-CH (V.) methylphenol-β-d-glucoside 2:3:4-tri benzoate, m.p. 110-120°, [a]20+27.37° in CHCl₃ [from (I), CPh₃Cl, and BzCl (as above)], and AcOH-HBr give phenol-B-d-glucoside 2:3:4-tribenzo-

ate (VII), amorphous, $[\alpha]_D^{21} + 15 \cdot 16^\circ$ in CHCl₃, hydrolysed (0·1*N*-KOH in EtOH) to the 2 : 3-dibenzoate (?), m.p. 174—176°, $[\alpha]_{D}^{20}$ +63.4° in CHCl₃. The 6-OH in (III) and (VII) could not be methylated (quant.), showing that the glucosidic substituent can influence the properties of C6 (cf. A., 1925, i, 9). (IV) and (VI) are practically unaffected by emulsin. H. B.

Cardiac glucosides. VIII. Transformation products of scillaren A. A. STOLL and A. HOF-MANN (Helv. Chim. Acta, 1935, 18, 82-95; cf. A., 1934, 1206).-Lactone fission, formation of carboxylic ester (I) and Ph ether, ester hydrolysis, and production of the iso-ring occur in the same manner with scillaren A (II) as with scillaridin A (III) (loc. cit.). Quant. hydrolysis of (I) gives the theoretical yield of aglucone and sugar, proving that the glucosidic linking remains intact until this stage is reached. The aglucone of (II) contains a fourth O to which the scillabiose residue is attached; in harmony, all the glucosides contain $1 H_2 O >$ calc. from the corresponding scillaridin derivative and sugar. (II) is changed in a complex manner by 20% aq. KOH, but is transformed by KOH-MeOH into the K derivative (IV)

(II.) (IV.) (VI.) (R'=K), m.p. 220–230° (decomp.), $[\alpha]_{D}^{20} - 66\cdot4°$ in H₂O, which when slightly acidified and immediately treated with an excess of CH₂N₂ gives *Me scillarenate* A *Me ether* (V) (cf. IV; R=Me), m.p. 223–226° (corr.), $[\alpha]_{D}^{2n} - 42\cdot8°$ in dioxan. Cautious hydrolysis of (V) leads to *methylscillarenic acid* A, m.p. 214° (corr. decomp.) $|\alpha|^{20} - 46\cdot4°$ in dioxan. (corr., decomp.), $\lfloor \alpha \rfloor_{p}^{20} - 46 \cdot 4^{\circ}$ in dioxan, re-converted by CH_2N_2 into (V). (IV) passes very readily when acidified into Me isoscillarenate A (VI), m.p. (indet.) 180—190° (corr.) after softening at 135°, $\left[\alpha\right]_{p}^{20}$ -104 in dioxan. Quant. hydrolysis of (VI) yields (III), m.p. 175° (corr.), glucose, and rhamnose. Cautious alkaline hydrolysis of (V) gives isoscillarenic acid A, m.p. 218-222° (corr., decomp.), [a]²⁰ -109° in dioxan. It is recommended that the Liebermann reaction should be standardised and made quant., 1 mg. of aglucone or the equiv. quantity of glucoside being dissolved in 1-2 drops of AcOH and treated with the fresh reagent prepared with 10 c.c. of Ac₂O and 0.2 c.c. of conc. H₂SO₄. H. W.

Cardiac glucosides. IX. True glucosides of Digitalis purpurea; purpureaglucoside-A and -B. A. STOLL and W. KREIS (Helv. Chim. Acta 1935, 18, 120-141; cf. A., 1933, 877, 1146).—The fresh leaves of Digitalis purpurea are extracted under conditions which exclude enzymic action and the extracts are purified and freed from tannin-like impurities as described for *D. lanata* (I) (*loc. cit.*). The product is non-cryst. and contains much more ballast than is the case with (I). It is purified by distribution between $CHCl_3$, MeOH, and H_2O . Thus isolated, purpureaglucoside-*A* and -*B* are shown by analysis, $[\alpha]_D$, lactone titration, colour reactions, decomp. temp., solubility, and enzymic or acid hydrolysis to be identical with deacetyldigilanid-*A* and -*B*, respectively. H. W.

Heteroside of Primula acaulis, Jacq.—See this vol., 268.

Xylan esters. N. J. SOLETSCHNIK (J. Appl. Chem. Russ., 1934, 7, 1029—1036).—Xylan diacetate, from xylan and 100: 1 Ac₂O-H₂SO₄ at 28—30°, gives solutions in 9: 1 CHCl₃-EtOH from which films may be prepared. Xylan heated for 15 min. with stearyl chloride in quinoline at 145° gives the stearate, $C_{10}H_{12}O_4(OH)(CO_2 \cdot C_{17}H_{35})_3$, m.p. 48°, sol. in C_6H_6 , xylene, and CHCl₃. The oleate, $C_5H_6O_2(OH) \cdot CO_2 \cdot C_{17}H_{33}$, decomp. 250°, prepared by heating xylan with oleyl chloride in C_5H_5N at 135°

 $C_5H_6O_2(OH)$ ·CO₂·C₁₇H₃₃, decomp. 250°, prepared by heating xylan with oleyl chloride in C_5H_5N at 135° for 2 hr., is insol. in org. solvents. *Benzylxylan*, OH·C₁₅H₁₈O₆(O·CH₂Ph)₅, m.p. 158—159°, prepared by heating xylan at 100° for 4 hr. with CH₂PhCl and aq. NaOH, adding an equal amount of NaOH, and heating for a further 3 hr., has similar properties to the corresponding benzylcellulose. R. T.

Benzyl ethers of polysaccharides. I. Benzyl ethers of starches of various origins. T. ASAHINA and G. NARA (Bull. Chem. Soc. Japan, 1934, 9, 530— 534).—With $CH_2PhCl-aq$. NaOH, six varieties of starch give (CH_2Ph)₂ ethers; the m.p. varies between 165° and 175° and $[\alpha]_D$ is +117·1° to +120·8° in $CH_2Cl·CH_2·OH$. F. N. W.

Hemicellulose-A from English oak wood.— See this vol., 421.

Osmometric investigations of dilute solutions of polymeric carbohydrates. VII. Molecular size of technical cellulose acetates [cellite]. M. ULMANN (Ber., 1935, 68, [B], 134-145; cf. this vol., 201).-Technical cellulose acetate is fractionated by step-wise addition of H₂O to a solution in COMe, and intermediate highly-viscous (I) and less viscous (II) fractions are used for determining osmotic pressure in AcOH. (I) and (II) can be dispersed to mols. of the size of a biose anhydride, the process occurring more readily with (II) and the difference being probably most marked at the higher concn. (I), (II), limit dextrin acctate I (III) and II (IV) are dispersed according to concn. to particles which are even multiples of $2C_6$. The stages vary between $32C_6$ and $2C_6$. All preps. are similar in the final stage of dispersion, but show characteristic differences in the concn. at which the different stages of dispersion appear. In this respect close relationships exist between (I) and (IV) and between (II) and (III). The stage $(C_6)_4$ missing in (I) and (IV) is observed in (II) and (III). ^rurther, a complication in the state of solution occurs with (II) and (III), since at very great dilution the observed osmotic pressures are > those expected and change continuously. Comparison of the properties of (I) with those of (IV) shows that viscosity and

ability to form films are not directly related to the mol. wt. of a substance. H. W.

Structure of cellulose dinitrate.—See this vol., 286.

Significance of measurements of dielectric constants in aqueous solution.—See this vol., 294.

Preparation and properties of some cupritetra-chlorides and -bromides.—See this vol., 312.

Betaines. I. Racemisation of ethyl propiobetainate chloride [ethyl α -trimethylammoniopropionate chloride]. II. Preparation of N-alkylalanine esters and betaine esters. E. BIILMANN and N. BERG. III. Ethyl α -ethylpropiobetainate iodide [ethyl α -trimethylammonio- α -methyl-*n*-butyrate iodide] and similar compounds. E. BIILMANN, K. A. JENSEN, and H. B. JENSEN (Bull. Soc. chim., 1934, [v], 1, 1645—1653, 1653—1661, 1661—1670).—I. l-CO₂Et·CHMe·NMe₃Cl (I), $[\alpha]_{20}^{20}$ —25° in dry EtOH, is racemised by NMe₃, NEt₃, NPr₃, NBu^a₃, and NEt₂·CH₂Ph in dry EtOH without replacement of the NMe₃ and k is that of a unimol. reaction. It follows that racemisation (A) is not due to exchange of alkylamino-groups (cf. A., 1912, i, 420). (A) probably occurs by way of the ion of the enolic form, +NMe₃·C:C(OEt)·O⁻, formed under the influence of the base, or, less probably, by feeble ionisation to +NMe -CMe₂CO Et and recombination of this ion

the base, or, less probably, by feeble ionisation to $^{+}NMe_{3} \cdot -CMe \cdot CO_{2}Et$ and recombination of this ion with H' derived from $^{+}NHR_{3}$. (1) is very rapidly racemised by NaOEt. A nomenclature is proposed, based on the names Et betainate bromide or Et trimethylbetainate bromide for CO_2Et $\cdot CH_{2} \cdot NMe_{3}Br$, Et propiobetainate ion for CO_2Et $\cdot CHMe \cdot NMe_{3}^{+}$, Et $\alpha \cdot ethylpropiotriethylbetainate$ bromide for CO_2Et $\cdot CMeEt \cdot NEt_{3}Br$, etc.

II. Compounds of the type,

CO₂Et·CHMe·NRR'R"X, in which the alkyls are Me or Et, are readily prepared, except that in which R=R'=R"=Et, which could not be obtained. Alanine, aq. N-NaOH, MeOH, and McI give at room temp. a solution, from which 1-propiobetaine, *NMe₃·CHMe·CO₂⁻, hygroscopic, $[\alpha]_D^{20} - 18\cdot3^{\circ}$ in EtOH, is obtained; this with HCI-EtOH gives Et 1-propiobetainate chloride (I), hygroscopic, $[\alpha]_D^{20} - 25\cdot2^{\circ}$ in EtOH (corresponding bromide, a syrup). CHMeBr·CO₂Et and dry NHEt₂ at 50-60° give Et N-diethylaminopropionate, b.p. 74-75°/13 mm., which with MeI at room temp. gives the methiodide, cryst., hygroscopic, but does not react with cold EtI and with hot EtI gives NEt₄I. NEt₂·CHMe·CN (modified prep.) does not react with MeI or EtI (cf. lit.). However, NMe₃·CHMe·CO₂Et with EtI at 100° gives the ethiodide, m.p. 79·5-80·5°, hygroscopic, and NEt₂·CH₂·CO₂Et at 100° gives the ethiodide, m.p. 125-126° (lit. 123-125°).

III. Formylation of α -NH₂-acids is best effected by HCO₂Ac. *l*-NH₂·CMeEt·CO₂H (prepared by way of the formyl derivative and brucine salt) affords α -ethyl-propiobetaine, +NMe₃·CMeEt·CO₂⁻, m.p. 133—134° (decomp.), deliquescent (hydrochloride), which is not affected by HCl-EtOH or CH₂N₂, but with EtI-EtOH at 100° gives Et α -ethylpropiobetainate (α -tri-methylammonio- α -methyl-n-butyrate) iodide (II), m.p. 144—145°. This method also gives a good yield of

the *iodide*, m.p. 97—98°, corresponding with (I), and of nearly pure NMe₃I·CH₂·CO₂Et, m.p. 173— 175°; similarly EtBr affords *Et betainate bromide*, NMe₃Br·CH₂·CO₂Et, m.p. 152—153°, but MeCl reacts only very slowly. (II) is not racemised by *tert*.amines, nor is the corresponding chloride (III) (not isolated); since (II) contains no H attached to the α -C, the explanation given above for the racemisation of (II) is supported. (II), (III), and solutions of the hydroxide have the same [α], indicating complete ionisation of these substances in solution. (II) is slowly hydrolysed by amines and more rapidly by NaOEt. *d-p*-C₆H₄Me·CHPh·CO₂Et is rapidly racemised by NaOEt. R. S. C.

Reactions between sugars and amino-acids. IV. Crystalline dipeptide-glucosides and the influence of hydrogen-ion concentration on their fission. K. MAURER and B. SCHIEDT (Z. physiol. Chem., 1935, 231, 1-9; cf. A., 1933, 263).-Glycylglycine ester (I) and acetobromoglucose in CHCl₃ afford glycylglycine ester glucoside tetra-acetate (II), m.p. 140°, $[\alpha]_{p}$ -2.0° in CHCl₃. With NH₃ in MeOH, (II) gives glycylglycinamide glucoside (III), m.p. 118° (decomp.), $[\alpha]_{b}^{\mu\nu}$ -6.06° in H₂O. With acetobromocellobiose, (I) yields glycylglycine ester cellobioside hepta-acetate, m.p. 105°. With C₅H₅N-Ac₂O, (III) gives glycylglycinamideglucoside penta-acetate, m.p. 146°, $[\alpha]_{D}^{20}$ +7.56° in CHCl₃. Hydrolysis of sarcosine ester glucoside tetra-acetate with NaOEt in EtOH gives in non-cryst. but pure form the sarcosineglucoside Na salt, m.p. $110-120^{\circ}$, $[\alpha]_{\rm B}$ +19·32° in H₂O, +17·42° in MeOH. Methylation of sarcosineglucoside with CH_2N_2 and treatment of the ester with NH_3 in MeOH yields sarcosinamide-glucoside (IV). Na salts of l-phenyl-, sinters 125°, m.p. 133° (decomp.), [α]_p -31·25° in MeOH, -33·0° in H₂O, sarcosyl-, sinters 145°, decomp. 160°, [α]_p +17.5° in MeOH, +15.32° in H2O, and glycyl-glycineglucoside, decomp. 110–115°, $[\alpha]_{D}$ +7.14° in MeOH, +7.32° in H₂O, were similarly obtained. Phenylglycine (V) [r- or l-form] and CH₂Cl·COCl in 2Nglycine (V) [r- or l-form] and CH₂Cl-COCI in 2N-NaOH afford r-chloroacetylphenylglycine (VI), m.p. 128° (or 1-chloroacetylphenylglycine, m.p. 127—128°, $[\alpha]_{\rm D}$ —178·60° in EtOH). With aq. NH₃, (VI) gives glycylphenylglycine, m.p. 248° (*Et ester hydrochloride*, m.p. 189°, hydrobromide, m.p. 170°), l-(VI) gives glycyl-l-phenylglycine, m.p. 248°, $[\alpha]_{\rm D}$ —187·27° in 0·1N-HCl [*Et ester* (VII), $[\alpha]_{\rm D}$ —120·3° in EtOH (hydrochloride, m.p. 201°, $[\alpha]_{\rm D}$ —113·54° in H₂O; hydrobromide, m.p. 180°, $[\alpha]_{\rm D}$ —113·86° in H₂O)]. On keeping, the esters give the dl-, m.p. 235°, and On keeping, the esters give the dl-, m.p. 235°, and l-anhydride, m.p. 228°, $[\alpha]_{\mathbf{D}} - 84 \cdot 03^{\circ}$ in AcOH, respectively. With acetobromoglucose, (VII) gives glycyl-1-phenylglycine Et ester glucoside tetra-acetate, m.p. 141°, $[\alpha]_{D} = -65.85^{\circ}$ in CHCl₃, which with NH₃ in MeOH yields glycyl-l-phenylglycinamideglucoside, m.p. from 115°, decomp. 135°, $[\alpha]_{\rm p} - 46.06^{\circ}$ in H₂O. (IV) is immediately decomposed by 0.1N-HCl, (III) in 3 hr. at $p_{\rm H}$ 4.5; both are slowly hydrolysed. In 0.1N-NaOH, (III) is stable but (IV) is slowly hydrolysed. (III) is hydrolysed by emulsin but not by aminodior aminopoly-peptidase. J. H. B.

Determination of cystine and cysteine in butyl alcohol extracts. W. C. HESS and M. X. SULLIVAN (J. Biol. Chem., 1935, 108, 195—199).—Data are given for the partition of cystine (I) and cysteine (II) between N-HCl and BuOH. (II) is much more readily extracted from N-HCl solution by BuOH than (I). The Sullivan, Okuda, and Folin-Marenzi methods for the determination of (I) and (II) can be successfully applied to both aq. and solvent layers if purified BuOH has been used (cf. A., 1933, 1179). Both (I) and (II) can be extracted quantitatively from BuOH by 0·1N-NaOH. A. E. O.

Calcium cyanamide. III. Preparation of nitroguanidine nitrate. Y. KATO, K. SUGINO, and K. KOIDZUMI (J. Electrochem. Assoc. Japan, 1934, 2, 187—191; cf. B., 1933, 748).—Cyanoguanidine NH₄ nitrate (I), m.p. 116°, on heating affords, according to the conditions, guanidine, its nitrate (II), or biguanidine. (II) can be dehydrated to nitroguanidine nitrate (III) with fuming HNO₃ (IV); (III) is also produced directly from (I) and (IV). CH. ABS. (r)

Addition of hydrogen sulphite to thiocarbimides. H. J. BACKER, H. MULDER, and W. FROENT-JES (Rec. trav. chim., 1935, 54, 57—61).—The following thiocarbimides are prepared in 60—70% yield by Kaluza's method : Et (I), Me, m.p. 35°, b.p. 118°, Pr^a, b.p. 153°, Pr^β, b.p. 137°, Bu^a, b.p. 168°, Bu^g, b.p. 162°, Bu^v (II), b.p. 142°, and CH₂Ph, b.p. 143°/20 mm. (9% yield). These [except (II)] add KHSO₃ in 50% aq. EtOH at 100° to form cryst. K alkylaminothiomethanesulphonates (III), NHR-CS-SO₃K. (II) is decomposed by KHSO₃, and PhCNS gives CS(NHPh)₂. The structure of (III) is proved by their failure to give reactions for S₂O₃" and SH' and by the non-reactivity of CS(NMe₂)₂ with KHSO₃. (I) is unaffected by cold H₂SO₄, but gives SO₂ when heated with this acid. It can be crystallised from Ac₂O, but is decomposed therein by a drop of H₂SO₄. Seven nitriles and two carbylamines failed to react with KHSO₃. R. S. C.

Ruthenium- and osmium-specific group in organic sulphur compounds. B. STEIGER (Mikrochem., 1935, 16, 193—202).—Ru compounds give sensitive colorations (blue to red) with N-alkylor -aryl-thiocarbamides, but not isothiocarbamides. The colour is changed by addition of NH₃; that from ditolylthiocarbamide only is sol. in Et₂O. Os reacts with CS(NH₂)₂ only. NH₂·CS·NH·NH₂ gives with Ru a red coloration, destroyed by NH₃, and turning green in air (limit 1.4×10^{-7} g.). Os gives a blue colour in NH₃, fading in air. Phenyl-, 1 : 4-diphenyl-(limit 0.025×10^{-6} g. per c.c.), 2 : 4-diphenyl- (limit 0.017×10^{-6} g. per c.c.), and α -diphenyl-thiosemicarbazides in HCl or AcOH give violet colorations with Ru, sol. in Et₂O. Os gives a deep red colour, unaffected by NH₃, with Ru in acid solution (limit 0.6×10^{-6} g. per c.c.), whilst Os gives a pink colour in NH₃, decolorised by HCl. Dithiourazole gives an intense red with Ru in NH₂ (limit 0.8×10^{-6} g. per c.c.). J. S. A.

Formation and decomposition of diazoketones and of the so-called diazo-anhydrides from the viewpoint of the electronic theory. ORGANIC CHEMISTRY.

B. EISTERT (Ber., 1935, 68, [B], 208-216).—Theoretical. H. W.

Halogenoalkylarsinic acids. H. J. BAOKEB and C. C. BOLT (Rec. trav. chim., 1935, 54, 68–72).— The following are prepared in poor yield by King's method (A., 1928, 1231): β -chloropropane-, b.p. 80–84°/14 mm., and γ -chlorobutane-, b.p. 120–125°/ 14 mm., - α -dichloroarsine; β -chloropropane-, m.p. 164·5—165°, γ -chlorobutane- (I), m.p. 167–167·5°, γ -chloro-n-pentane- (II), m.p. 159–159·5°, and γ -chloron-hexane- α -arsinic acid (III), m.p. 144·5—145°. By means of quinine (IV) are obtained the 1-forms of (I), (II), and (III), $[M]_D$ –28°, -12·4°, and -6·8°, respectively [(IV) salts, +2H₂O; Ba salts, $[M]_D$ –21·4°, -5·7°, and -4·3°, respectively]. The acids are monobasic to Me-red. R. S. C.

Aliphatic diarsinic acids. H. J. BACKER and C. C. BOLT (Rec. trav. chim., 1935, 54, 47—51).— (CH₂Br)₂ and alkaline Na₃AsO₃ give, according to the conditions, C₂H₄ (75%) and impure $Ba_2 \alpha\beta$ -ethanediarsinate, or C₂H₃Br. Other appropriate dibromoparaffins give $\alpha\gamma$ -propane- (36.8%), +2H₂O, m.p. 178—180° [reduced by Na₂PO₃ to ? arsenobistrimethylenearsinic acid, [AsO₃H₂·(CH₂)₃·As.]₂, amorphous, $\alpha\delta$ -butane- (37%), +2H₂O, m.p. about 220—225° (decomp.) (reduced probably to the unstable arsenocompound), and $\alpha\epsilon$ -pentane-diarsinic acid, +2H₂O, decomp. about 230° (not reduced to the arseno-compound). The Ca₂ and Ba₂ salts are less sol. in hot than in cold H₂O. The acids are dibasic to Me-red and tribasic to thymolphthalein, but the salts are those of tetrabasic acids. (·CH₂·CH₂·OH)₂, from (°CH₂·CO₂Et)₂ and Na-EtOH (55% yield), has b.p. ill-112°/4 mm. R. S. C.

Fission of hexachlorodisiloxan by acetylacetone. H. RHEINBOLDT and W. WISFELD (J. pr. Chem., 1935, [ii], 142, 23-25).--(SiCl₃)₂O and CH₂Ac₂ in CHCl₃ give triacetonylsilicon chloride hydrochloride (isolable as the ferrichloride) (Dilthey, A, 1903, i, 405) and a gel-like "silicone." Reaction occurs thus: $(SiCl_3)_2O+5CH_2Ac_2 \longrightarrow 4HCl+$ $[(R=)_2Si < O_{R} > Si(=R)_2]^+[Cl, HCl]^- \longrightarrow$ $[Si(=R)_3]^+[Cl, HCl]^- + 1/n[O:Si(=R)_2]_n; R=$ ·O-CMe;CH·CMe;O----. H. B.

Secondary reactions in the preparation of zinc ethyl. R. F. McCLEARY and E. F. DEGERING (Proc. Indiana Acad. Sci., 1934, 43, 127—131).— Animproved apparatus for the prep. and manipulation of ZnEt₂ is described. Secondary reactions lead to C_4H_{10} , C_2H_6 , and C_2H_4 ; there is no indication of the formation of H₂ or of CHEt:CH₂. CH. ABS. (7)

Physical properties of alkyl compounds of mercury, tin, and lead. W. J. JONES, D. P. EVANS, T. GULWELL, and D. C. GRIFFITHS (J.C.S., 1935, 39–47; cf. A., 1930, 1019; 1931, 609, 1404; 1932, 1119; 1933, 663).—By the interaction of the appropriate Grignard reagent with HgBr₂, SnCl₄, PbCl₄, CiCl, SnR₃Br, or PbR₂Cl₂ the following are prepared : Ig di-n-amyl, b.p. 106°/0.5 mm., 133°/10 mm.; Ig n-amyl iodide and thiocyanate, m.p. 108°; Hg di-dl-amyl, b.p. 93°/1 mm.; Hg dl-amyl bromide, mp. 119°, iodide, m.p. 128°, and sulphate, m.p. 180° (decomp.); Hg di-n-hexyl, b.p. 110°/0.5 mm., 158°/10 mm.; Hg n-hexyl bromide; SnBu^a4, b.p. 145°/10 mm.; Sn Buas bromide, b.p. 163°/12 mm., and iodide, b.p. 172°/10 mm.; Sn tetra-n-amyl, b.p. 181°/10 mm.; Sn tri-n-amyl bromide, b.p. 189°/13 mm., and iodide, b.p. 198°/15 mm.; Sn tetra-dl-amyl, b.p. 174°/10 mm.; Sn tetra-n-hexyl, b.p. 209°/10 mm.; Sn tetra-nheptyl, b.p. 239°/10 mm.; Sn tetra-n-octyl, b.p. $268^{\circ}/10 \text{ mm.}$; Sn tetra- β -phenylethyl, b.p. $288^{\circ}/12$ mm.; SnPra2Br2, m.p. 53°; SnMePra3, b.p. 93°/10 mm.; SnPra3Bua, b.p. 121°/10 mm.; SnMeBua3, b.p. 121°/10 mm.; SnEtBu^a₃, b.p. 129°/10 mm.; Sn Pr^a tri-n-amyl, b.p. 163°/10 mm.; PbBu^a₂Cl₂, decomp. 108°; $PbMe_2Bu^a{}_2$, b.p. 96.5°/5 mm., 108°/10 mm.; $PbEt_2Bu^a{}_2$, b.p. 90°/1 mm.; $PbPr^a{}_2Bu^a{}_2$, b.p. 120°/1 mm.; $PbBu^a{}_2Bu^\beta{}_2$, b.p. 135°/1 mm.; Pb $Bu^a{}_2 diisoamyl$, b.p. 135°/0.5 mm.; $PbBu^a{}_2 di$ -dl-amyl, b.p. 135°/0.5 mm.; Pb di-n-amyl dichloride, decomp. 123-125°, dibromide, sinters 89°, and sulphate, sinters 177°; Pb Me, di-n-amyl, b.p. 113°/4 mm., 121°/5 mm., 135°/10 mm.; Pb Me di-n-amyl chloride, decomp. 121-122°; Pb Et₂ di-n-amyl, b.p. 116-118°/0.5 mm., 157—158°/10 mm. (decomp.); $Pb Pr^{a}_{2} di-n-amyl$, b.p. 150°/1 mm.; $Pb Bu^{a}_{2} di-n-amyl$, b.p. 170°/1 mm.; $Pb Bu^{\beta}_{2} di-n-amyl$, b.p. 140°/0.5 mm.; Pb tetra-namyl, b.p. 170°/1 mm.; Pb di-n-amyl dinitrate and dinitrate dihydrate, sinters 96-98°; Pb di-n-amyl diisoamyl, b.p. 160°/1 mm.; Pb di-n-amyl di-dl-amyl, b.p. 160°/1 mm.; Pb di-n-amyl di-n-hexyl, b.p. 180°/0.5 mm.; Pb di-dl-amyl dichloride, m.p. 67° (decomp.); Pb tetra-dl-amyl, b.p. 150°/0.5 mm.; Cd di-n-amyl, b.p. 105°/2 mm.; Cd di-dl-amyl, b.p. 94°/2 mm. PbR4 with conc. HNO3 gives PbR₂(NO₃)₂,2H₂O and HR in agreement with Polis (A., 1887, 572; 1888, 283) and contrary to Calingaert (Chem. Reviews, 1926, 2, 50). Pb Bu^a₂ dinitrate dihydrate, sinters 116–117°, and Pb Pr^a₂ dinitrate dihydrate, m.p. 87–89° were obtained. PbMe₂R₂ with conc. HNO₃ gives PbR₂(NO₃)₂,2H₂O; Me is removed in preference to Bu^a or n-amyl. The vals. of b.p. d ,mol. vol., $[R_L]$, and heats of formation and combustion are given for the above and other HgR2, SnR₄, PbR₄ compounds, SnEt₂Bu^βBr, SnEt₂Br₂, and SnBr₄. Equations are given for the gradation of b.p. with composition and pressure and of mol. vol. with composition. All b.p. and m.p. are corr. $[r_L]$ for Hg, Sn, and Pb are calc. Methods are given for determining Hg, Pb, and Cd in their alkyl com-F. R. G. pounds.

Spatial configuration of cyclohexane and its derivatives. R. D. DESAI (J. Univ. Bombay, 1934, 3, No. 2, 219-225).—A review of the lit. leads to the conclusion that, despite the hypothetical existence of two multiplanar forms of cyclohexane and its derivatives, the overwhelming chemical evidence is in favour of the uniplanar configuration although it is admitted that evidence is gradually accumulating to support the other view. H. W.

Preparation of gem-dimethylcyclohexane and its behaviour towards noble metal catalysts. N. D. ZELINSKI, K. PACKENDORFF, and E. G. CHOCH-LOVA (Ber., 1935, 68, [B], 98—101).—Dimethyldihydroresorcinol in EtOH or H_2O absorbs H_2 very slowly in presence of Pt-C, but rapidly after addition of H₂SO₄ and with production of 3: 3-dimethylcyclohexanol (I), b.p. 183°/742 mm. (I) is also obtained by catalytic reduction of 3-chloro-5-keto-1:1-dimethyl- Δ^3 -cyclohexene in HCl provided that the concn. of acid is $\geq 12\%$. (I) is transformed by KHSO₄ into 1:1-dimethylcyclohexene, b.p. 118.5— 120°/752 mm., hydrogenated (Pt-C) to 1:1-dimethylcyclohexane (II), b.p. 119.2-119.7°/752.8 mm. (II), alone or mixed with CO2, is unchanged by passage over Pt–C at 300° or 330° or by passage over Pt–C or Pd–clay in presence of H_2 at 305–330°. H. W.

Reaction of sulphur with benzene in presence of aluminium chloride. G. DOUGHERTY P. D. HAMMOND (J. Amer. Chem. Soc., 1935, and 57, 117-118).-In agreement with Böeseken (A., 1905, i, 583), thianthrene (I), Ph.S (II), and H.S are formed from C_6H_6 , S, and AlCl₃. With C_6H_6 (250 c.c.) and S (32 g.), a max. yield (0.183 mol.) of (I) is obtained with 0.25 mol. of AlCl₃ at 80°. Addition of the S to $C_6H_6+0.5-1$ mol. of AlCl₃ gives (II) only. (I) is best prepared by heating a mixture of $C_{g}H_{g}$ (40 g.), CS_2 (200 c.c.), S (32 g.), and $AlCl_3$ (33.5 g.) for 12 hr. (II) or Ph₂S₂ heated with S and AlCl₃ in light petroleum affords 95-100% of (I). H. B.

Catalytic hydrogenation of toluene by combined hydrogen. N. I. SCHUIKIN and E. A. FEDER (J. Appl. Chem. Russ., 1934, 7, 1192-1196).-Methylcyclohexane is obtained in 26% yield by passing 9:1 EtOH-PhMe mixtures over Ni-Al₂O₃ or Pd-asbestos at 180-190°; the reaction is 3EtOH+ $PhMe \implies 3MeCHO + C_6H_{11}Me.$ R. T.

Preparation of mesitylene. E. SUCHARDA and H. KUCZYŃSKI (Rocz. Chem., 1934, 14, 1182-1187).-Ipatiev's synthesis of mesitylene (I) (A., 1931, 207) can be effected at lower pressures than those recom-mended by him. At $195^{\circ} 47\%$ of the COMe₂ present in mixtures containing 8% of HCl is converted into (I) after 48 hr.; the reaction velocity with HBr is >with HCl, the yield of (I) is the same, but that of higher polymerides (II) is increased. When the oxide of (I) is heated with HCl, the product consists chiefly of (II), indicating that the oxide is not an intermediate product. R. T.

Relations between acidity and tautomerism. III. The nitro-group and the nitronic esters. F. ARNDT and J. D. ROSE (J.C.S., 1935, 1-10; cf. A., 1933, 146; 1934, 770).-CH₂R·NO₂ (R=Ph, p-C₆H₄Br) and CH₂N₂ (I) in Ét₂O react slowly, whilst the *aci*-forms CHR:NO₂H react vigorously to give the Me ether of aciphenylnitromethane (II) (cf. v. Auwers and Ottens, A., 1924, i, 516), and the Me ether of aci-p-bromophenylnitromethane (III), m.p. 65°. (II) at 85° gives CH₂O and PhCHO. (II) with boiling dil. HCl gives 3 : 5-diphenvl-1 : 2 : 4-oxadiazole. (III) at 80° yields CH₂O and p-C₆H₄Br CH:NOH and with boiling dil. HCl is converted into 3:5-di-p-bromophenyl-1: 2: 4-oxadiazole, m.p. 181°. Prolonged heat-ing of (III) with HCl gives $p - C_6 H_4 Br \cdot CO_2 H$. NO₂·CH₂·CO₂Et (IV) and Et furoxandicarboxylate (V) [not Et bisanhydronitroacetate, as stated by Bouveault and Wahl (A., 1904, i, 796)] are formed from CH₂Ac CO₂Et and fuming HNO₃ in Ac₂O. (∇) and conc. aq. NH₃ give a substance, m.p. 233°,

probably furoxandicarboxylamide (cf. Wieland and Gmelin, A., 1909, i, 610). (IV) and (I) in Et_2O give the nitronic Me ester of Et nitroacetate,

CO₂Et·CH:NO·OMe (VI), which explodes at 90° to give CH₂O, and decomposes at 65°/0.01 mm. giving Et oximinoacetate. (VI) and conc. HCl give Et chloro. oximinoacetate, which with H₂O yields (V), not H₂C₂O₄ and NH₂OH, HCl (cf. Propper, A., 1883, 573). Successive treatment of (VI) with 2N-NaOH, HCl, and conc. aq. NH₃ yields a substance, m.p. 120-121° (decomp.), regarded as the bisanhydronitroacetamide of Scholl and Schöffer (A., 1901, i, 359). $NO_2 CH(CO_2Me)_2$ (improved prep.) and (I) in Et₂0 give the *nitronic Me ester* of *Me nitromalonate*, (CO₂Me)₂C:NO·OMe, m.p. 68°, which decomposes at 80° to CH₂O, and with 2N-NaOH gives fulminic acid. The product from *p*-thiotolylacetone or ω -(*p*-thiotolylacetophenone (VII) and Et nitrate (VIII) in EtOH-NaOEt is oxidised (H₂O₂, AcOH) to *p*-toluenesulphonylnitromethane (IX), m.p. 116°. More gentle treatment of (VIII) and (VII) in EtOH-NaOEt yields ω-nitro-ω-(p-thiotolyl)acetophenone, m.p. 78°. (IX) and (I) in Et₂O gives the nitronic Me ester of (IX), p-C6H4Me·SO2·CH:NO·OMe, which decomposes 95° giving CO_2 and p-tolylthiocarbimide. at COPh·CH₂·NO₂ and (I) in Et₂O yield 65% of nitronic Me ester and 35% of enolic Me ether. Contrary to Kuhn and Albrecht (A., 1927, 749) the nitronic acids are formulated CHR:N(OH) \rightarrow O, the acidity associated with the NO₂ being attributed to the enolising tendencies of its doubly bound O as in CO and differtendencies of its doubly bound 0 so the SO₂. ing from the acidifying properties of the SO₂. F. R. G.

1:2-Dimethylnaphthalene of coal tar. 0. KRUBER and W. SCHADE (Ber., 1935, 68, [B], 11-16).—A neutral, heavy oil fraction, b.p. about 266-270°, is freed by repeated cooling and centrifuging as far as possible from solid components and cautiously treated with 90% and 96% H₂SO₄ to remove acenaphthene and resinifying materials. Treatment of the product with picric acid in EtOH leads to the isolation of $1:2-C_{10}H_6Me_2$ (I), b.p. $266-267^{\circ}/760$ mm. Oxidation of (I) with CrO_3 in AcOH affords 1:2-dimethyl- α -naphthaquinone, m.p. 125°, oxidised by KMnO₄ to 1:2:3:4-C₆H₂(CO₂H)₄. Oxidation of (I) to C₁₀H₆(CO₂H)₂ could not be effected by K EcC N in all of the second K₃FeC₆N₆ in alkaline solution; the transformation is effected by converting (I) into C₁₀H₆Me·CO₂H by dil. HNO₃ and completion of the change by K_3 Fe(CN)₆-KOH. (I) is converted by 98-100% H₂SO₄ at > 0 into mixtures of non-cryst. sulphonic acids. (I) and 90% H2SO4 at 50° afford cryst. 1: 2-dimethylnaphthalene-4-sulphonic acid (II) (corresponding amide, m.p. The 183°), converted by Na-Hg into 1 : 2-C₁₀H₆Me₂. Na salt of (II) is transformed by molten KOH into 1:2-dimethyl-4-naphthol, b.p. 205-210°/15 mm., m.p. 114—115°, which affords the compound $C_{18}H_{16}ON_2$, m.p. 112°, with PhN₂Cl. H. W.

Homologues of naphthacene. II. 2-Methyland 2:7-dimethyl-naphthacene: synthetic applications of 2:6- and 2:7-dimethyl-1:2:3:4tetrahydronaphthalene. E. A. Coulson (J.C.S., 1935, 77-83; cf. A., 1934, 1211).-3:6:2-C₁₀H₅Me₂·OH (I) with (NH₄)₂SO₃ and conc. aq. NH₃

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gives 3:6-dimethyl-β-naphthylamine, m.p. 139° [hydrochloride, m.p. 283° (decomp.); Ac derivative, m.p. 207°], whence (Sandmeyer) 3:6-dimethyl-2naphthonitrile, m.p. 145°, hydrolysed (EtOH, KOH) to 3:6-dimethyl-2-naphthoic acid (II), m.p. 224° (anilide, m.p. 207-208°). The chloride, b.p. 160°/ 3 mm., m.p. 70°, of (II) yields with PhMe and FeCl₃ at 90° 2-p-toluoyl-3 : 6-dimethylnaphthalene, m.p. 112° which at 400° gives 2:7-dimethylnaphthacene (III), m.p. 362° (9:10-quinone, m.p. 233°), which does not depress the m.p. of 2:6-dimethylnaphthacene (IV). Diphenylcarbamyl chloride (V), tetrahydronaphthalene (VI), and AlCl₃ in CS₂ give 1:2:3:4-tetrahydro-6-naphthodiphenylamide, m.p. 87-88°, hydrolysed (75% H₂SO₄) to the acid (anilide, m.p. 147°), the chloride of which with m-xylene and AlCl₃ in CS₂ yields 6-2': 4' - dimethylbenzoyl - 1:2:3:4 - tetraprepared from 2:4hydronaphthalene [also $C_6H_3Me_2$ ·COCl, (VI), and AlCl₃], which when heated to $400-420^\circ$ gives 7-methyl-1 : 2-benzanthracene, 7-methyl-1: $2: \overline{3}: 4$ -tetrahydronaphthacene, and 2methylnaphthacene (VII), m.p. 350°. (VII) is oxidised (K₂Cr₂O₇, AcOH) to a resinous substance. 2:6-C₁₀H₆Me₂ is reduced (H₂, C-MoO₃-S, 400°/100 atm.) to 2:6-dimethyl-1:2:3:4-tetrahydronaphthalene (VIII), b.p. 237–239°, m.p. 14–17°, and -decahydronaphthal-ene, b.p. 216–217°. 2:7- $C_{10}H_6Me_2$ similarly gives 2:7-dimethyl-1:2:3:4-tetrahydronaphthalene (IX), b.p. 237-238°, and -decahydronaphthalene, b.p. 216-218°. (V), (VIII), and AlCl₃ in CS_2 give a diphenyl-amide, hydrolysed (75% H_2SO_4) to 2:6-dimethyl-1:2:3:4-tetrahydro-7-naphthoic acid, m.p. 183°, dehydrogenated (Se at $250-300^{\circ}$) to $2:6:3-C_{10}H_5Me_2\cdot CO_2H$. Similarly (V), (IX), and AlCl₃ in CS₂ give 2:7-dimethyl-1:2:3:4-tetrahydro-6-naphthoic acid, m.p. 187°, dehydrogenated to (II). (VIII) and H_2SO_4 give a sulphonic acid, the Na salt (X) of which with PCl₅ yields the sulphonyl chloride, which with conc. aq. NH3 gives 2:6-dimethyl-1:2:3:4-tetrahydronaphthalene-7-sulphonamide, m.p. 166-167°. (X) with fused KOH gives 2:6-dimethyl-1:2:3:4-tetrahydro-7-naphthol, m.p. 116°, having good "wetting power" (cf. Morgan " al., B., 1933, 504). This with Se at 240° gives 2:6:7-C₁₀H₅Me₂·OH. Similarly (IX) gives a Na sulphonate (XI) and 2:7-dimethyl-1:2:3:4-tetrahydonaphthene-6-sulphonamide, m.p. 145.5°. (XI)with fused KOH gives 2:7-dimethyl-1:2:3:4-tetra-hydro-6-naphthol, m.p. 87°, and (I). (VIII) or (IX) with the appropriate RCOCl (R=Ph, p-C₆H₄Me) and AlCl₃ in CS₂ give 6-benzoyl-2:7- (XII), b.p. 199°/3 mm., 202°/4 mm., 6-p-toluoyl-2 : 7- (XIII), b.p. 199°/ ² mm., or 7-p-toluoyl-2: 6-dimethyl-1:2:3:4-tetrahydronaphthalene (XIV), m.p. 95°. (XII), (XIII), and (XIV) boil with loss of H_2O and some H_2 to give, respectively, (VII) and 2-methyl- (XV), m.p. 203° ; (III) and 2:7-dimethyl- (XVI), m.p. 210° ; (IV) and 2:6-dimethyl-1: 2: 3: 4-tetrahydronaphthacene (XVII), m.p. 214°. (XV), (XVI), and (XVII) with Se at ²⁴⁰ give (VII), (III), and (IV), respectively. 3:6:2-C10H3Me2 COCI and C6H6 or PhMe (Friedel-Crafts) give resinous products which are avoided by the above use of tetrahydronaphthalene derivatives. F. R. G.

Structure of hydrocarbons related to the sterols.—See this vol., 286.

Identity of 3'-methyl-1: 2-cyclopentenophenanthrene with Diels' hydrocarbon, C18H16. H. HILLEMANN (Ber., 1935, 68, [B], 102-105; cf. A., 1933, 1154),-Improved methods are given for the conversion of 2-acetylphenanthrene into Me β -2phenanthrylcrotonate, m.p. $147-148^{\circ}$ (corresponding *Et* ester, m.p. $116-117^{\circ}$), for hydrogenation of the latter to Me β -2-phenanthrylbutyrate, and for reduction of the ketone obtained after ring-closure. Identity of the 3'-methyl-1: 2-cyclopentenophenanthrene (I), m.p. 125-126°, with Diels' hydrocarbon is established by the identity of the product, C₁₈H₁₃O₂N, m.p. 232-233°, obtained from each by the action of N₂O₃. The constitution of (I) follows from its oxidation to mellophanic acid. β-2-Phenanthrylcrotonic acid has m.p. 227-228°. H. W.

[Diradical formula of rubene.] A. SCHON-BERG (Ber., 1935, 68, [B], 162; cf. A., 1934, 643).—A reply to Dufraisse (A., 1934, 882; this vol., 205). H. W.

Action of sodium and potassium on compounds containing the NH group. S. V. SHAH and D. G. PISHAVIKAR (J. Univ. Bombay, 1934, 3, No. 2, 106—108).—By use of methods described previously (A., 1933, 153), the K and Na derivatives of $m \cdot C_6 H_4 Me \cdot NHAc$, NHMeAc, NHAc₂, CO(NHPh)₂, and (CO·NHPh)₂ have been obtained as micro-cryst. powders quantitatively decomposed by boiling H₂O into KOH (NaOH) and the initial material. $m \cdot C_6 H_4 Me \cdot NKAc$ has m.p. 146°. Compounds could not be obtained similarly from NHPh₂, NHPhMe, NHPhEt, NH₂·CH₂Ph, carbazole, or indole. H. W.

Benzylation of amines. IV. Rate of reaction of benzyl bromide with nitrobenzylaniline and some derivatives. D. H. PEACOCK (J.C.S., 1935, 16-18; cf. A., 1926, 691).—The vals. of $10^{3}k$ for the interaction of CH₂PhBr with various bases at 45° in COMe₂ are given in parentheses: m- (7.45, 3.7 at 35° ; E=13,750 g.-cal.) and p-C₆H₄(NO₂)·NH₂ (0.73, 0.36 at 35° ; E=13,600 g.-cal.), m-nitrobenzylaniline (17.2, 9.9 at 35°), -p- (1.7) and -m-toluidine (1.17), -p-, (0.18) and -m-chloroaniline (0.14); p-nitrobenzyl-aniline (14.0, 7.0 at 35°), -p-toluidine (1-2), and -p-chloroaniline, m.p. 99.5° (0.28). 3-Chloro-4'nitrobenzylaniline has m.p. 66°. The results are briefly discussed and it is concluded that the factor most influencing reactivity is the electron availability at the N. J. W. B.

Arylamides of β -arylaminocrotonic acids. II. J. K. THOMSON and F. J. WILSON (J.C.S., 1935, 111— 114; cf. A., 1933, 1157).—True β -arylaminocrotonoarylamides are prepared in good yields by two methods : (1) CH₂Ac·CO·NHR+NH₂R \longrightarrow

NHR•CMe:CH•CO•NHR (I) $+H_2O$, in presence of a little 2*N*-HCl in an inert solvent (PhMe, PhCl, etc.) immiscible with H_2O , and giving a homogeneous solution at its (relatively low) b.p., or (2)

NH₂•CMe:CH•CO•NHR+NH₂R \longrightarrow (1)+NH₃, in a similar solvent; (2) gives a better product in all cases except with C₆H₄(NO₂)•NH₂. Thus are prepared β -m-nitroanilinocrotono-m-nitroanilide, m.p. 152—153°, β -p-nitroanilinocrotono-p-nitroanilide, m.p. 220—221° (monohydrate, shrinks at 200°), β -p-anisidino-

A A

crotono-p-anisidide, m.p. 116-117°; β-p-aminocrotonop-phenetidide, m.p. 123-124° (from acetoacet-p-phenetidide, m.p. 104-105°), -m-4-xylidide, m.p. 124-125°, -p-xylidide, m.p. 136-137° (from acetoacet-p-xylidide, m.p. 98-99°), and -m-chloroanilide, m.p. 81-82°; β-p-phenetidinocrotono-p-phenetidide, m.p. 105-106° chloroanilinocrotono-o-chloroanilide, m.p. 99-100°, βm-chloroanilinocrotono-m-chloroanilide, m.p. 86-87° [only by (2)], and β-p-chloroanilinocrotono-p-chloroanilide, m.p. 123-124°. J. W. B.

Reaction of aromatic carbimides with organic acids. II. Isolation of carbamic-carboxylic anhydrides. C. NAEGELI and A. TYABJI (Helv. Chim. Acta, 1935, 18, 142-160).-3:5-Dinitrophenylcarbimide and AcOH in well-cooled PhMe afford acetic 3: 5-dinitrophenylcarbamic anhydride, decomp. 78°, which passes at 130° into CO₂, Ac₂O, and tetranitrocarbanilide; it decomposes slowly at room temp. Lauric 3:5-dinitrophenylcarbamic anhydride at 70-80° and finally at 130° behaves similarly; in presence of NH₂Ph it gives CO₂, (NO₂)₂C₆H₃·NH₂, lauranilide, m.p. 78°, lauric acid, and 3: 5-dinitrocarbanilide, m.p. 216° (laur-3 : 5-dinitroanilide, m.p. 86-87°). Phenylpropionic 3-nitrophenylcarbamic anhydride (I) at 75-90° affords CO2, 3: 3'-dinitrocarbanilide (II), and (CH₂Ph·CH₂·CO)₂O, whereas at 160-170°, phenylpropion-m-nitroanilide, m.p. 111°, is produced. In absence of solvent (I) and NH, Ph yield CO2, CH2Ph·CH2·CO·NHPh, CH2Ph·CH2·CO2H, *m*-nitrocarbanilide, and m-NO₂·C₆H₄·NH₂; the similar decomp. in warm C₆H₆ is described. In EtOH (I) appears to be transformed mainly into urethane and acid; with CH₂Ph·OH, benzyl m-nitrophenylcarbamate, m.p. 116-117⁸, is formed. Cinnamic m-nitrophenylcarbamic anhydride (?) decomposes when heated into CO_2 , (CHPh:CH·CO)₂O and (II). The anhydride nature of the product from BzOH and $m \cdot NO_2 \cdot C_6 H_4 \cdot NCO$ could not be demonstrated at room product temp. Lauric m-nitrophenylcarbamic anhydride very readily suffers disproportionation into anhydride and carbamide derivative; phenylpropionic p-nitrophenyl-carbamic anhydride behaves similarly. A definite anhydride could not be obtained from PhNCO and AcOH and the compound from PhNCO and CHPh:CH·CO₂H is not characterised as a mixed anhydride at room temp. Phenylacetic phenylcarbamic anhydride slowly passes at room temp. into CO_2 and $CH_2Ph\cdot CH_2\cdot CO\cdot NHPh$. Phenylpropionic phenylcarbamic anhydride is described. Benzoic phenylcarbamic anhydride appears to decompose when heated either into CO₂ and NHBzPh or into CO₂ and CO(NHPh)₂; the direction of decomp. could not be controlled. *Phenylpropionic o-nitrophenylcarbamic*

CH₂Ph·CH₂·CO·NHPh, and o-NO₂·C₆H₄·NH₂. H. W. Aminobenzenesulphonates of bivalent elements. V. ČUPR and J. ŠIRŮČEK (J. pr. Chem., 1935, [ii], 142, 6–10).—The following are described: Mg (+6H₂O), Zn (+4H₂O), Cd (+4H₂O), Ca, Sr $(+H_2O)$, Ba (lit. $+2H_2O$), Cu, Mn, Ni ($+4H_2O$), and

anhydride could not be obtained solid; with NH2Ph

it affords CO2, CH2Ph·CH3·CO3H, o-nitrocarbanilide,

 $(+4H_{2}O)$ o-aminobenzenesulphonates; Co Ma $(+6H_2O)$, Zn (+4H₂O), Cd, Ca (anhyd. and +6H₂O), Sr (+6H₂O), Ba (+5H₂O) (lit. +5 and 6H₂O), Mn $(+6H_2O)$, Ni $(+4H_2O)$, and Co $(+6H_2O)$ m-amino. benzenesulphonates; Cu $(+4H_2O)$, Mn $(+2H_2O)$, Ni $(+4H_2O)$, and Co $(+6H_2O)$ p-aminobenzenesulphonates. A relationship between Be and Mg and the sub-group Zn and Cd is not demonstrable from the co-ordination no. of the hydrates (cf. A., 1934, 398). H. B.

Preparation of N-substituted imines of aliphatic ketones. J. HOCH (Compt. rend., 1934, 199, 1428-1430).-CPr₂(OEt)₂ and the appropriate base at 180-200° afford the imines, CPr2:NR, in which $R = CH_2Ph$, b.p. 150°/17 mm., $CH_2Ph \cdot CH_2$, b.p. 155°/16 mm., and CH2Ph·CH2·CH2, b.p. 168-170°/ 17 mm., in 29, 10, and 26% yield, respectively. These imines are all unstable and are hydrolysed by cold H₂O. Other acetals did not react similarly with aliphatic bases. By heating CR'R"(OEt)₂ with the appropriate base, first at 120° and then at 200°, 65-98% yields (very low at 100°) of imines, CR'R":NR", are obtained, in which (a) R''=Ph, and R'=R''=Et, b.p. 117-118°/25 mm., Pr, b.p. 130-131°/17 mm., R'=Me, R"=nonyl, b.p. 195-197°/24 mm., and R'=Me, R"=Ph, b.p. 175-177°/ 17 mm., m.p. 41°, (b) R'=R''=Pr, and R'''=0. b.p. 139-140°/18 mm., m-, b.p. 143-145°/20 mm., and p-C6H4Me, b.p. 143-144°/17 mm., and o-, b.p. 150-151°/15 mm., and p-C₆H₄·OMe, b.p. 164-165°/ 17 mm., (c) $\mathbf{R}' = Me$, $\mathbf{R}'' = nonyl$, $\mathbf{R}''' = \mathbf{p} \cdot C_6 H_4 Me$, b.p. 205–207°/24 mm., (d) $\mathbf{R'} = Me$, $\mathbf{R''} = Ph$, and $\mathbf{R'''} = p - C_6 H_4 \cdot OMe$, b.p. 209–211°/15 mm., m.p. 86°, and cyclohexanone-, b.p. 157°/30 mm., and methyl-cyclohexanone-anil, b.p. 149-150°/18 mm. Secondary products, usually yellow solids, are also formed R. S. C. in small amounts.

1-Benzoyl-β-naphthylamine. K. DZIEWOŃSKI, L. KWIECIŃSKI, and L. STERNBACH (Bull. Acad. Polonaise, 1934, A, 329-337; cf. A., 1934, 419).β-C10H7·NH2 and BzCl at 185° with anhyd. ZnCl. yield 1-benzoyl-2-benzamidonaphthalene, m.p. 155.5-156.5°, which on hydrolysis gives 1-benzoyl-β-naphthylamine (I), m.p. 167.5-168.5° [picrate, m.p. 156-157°; Ac derivative, m.p. 136-137°; N-benzyl derivative, m.p. 129-130°; 2'-hydroxy-3'-naphthoyl derivative (II), m.p. 257-258°]; this, on diazotising and coupling (a) with β-C₁₀H₇·OH, yields 1-benzoyl-2-naphthaleneazo-B-naphthol, m.p. 184-185°, and (b) with 2-hydroxy-3-naphthoic acid, yields 1-(1'-benzoyl-2'-naphthaleneazo)-2-hydroxy-3-naphthoic acid, m.p. 270° (decomp.). (II) on coupling with the requisite diazocompound gives 1-benzeneazo-2-hydroxy-3-naphth-1'benzoyl-2'-naphthylamide, m.p. 247-249°, and the 1-p-nitrobenzeneazo-derivative, m.p. 295-298°. (1) with Ac₂O and NaOAc for 8 hr. at 180° affords 2-hydroxy-4-phenyl-5:6-benzoquinoline, m.p. 306-307° (picrate, m.p. 226°). (I) heated in EtOH with S and CS₂ on a water-bath for 10 hr. affords bis-(1benzoyl-2-naphthyl)thiocarbamide, m.p. 184-193° (according to rate of heating). (I) with EtOH, KOH, and CS2 at the b.p. during 8 hr. gives tris-(1-benzoyl-2-naphthyl)guanidine, m.p. 285°. (I) in CHCl3, with COCl₂ in PhMe at 60° during 2 days, gives bis-(1benzoyl-2-naphthyl)carbamide, m.p. 230°, and with COPhMe and ZnCl₂ at 210° gives 2 : 4-diphenyl-5 : 6benzoquinoline, m.p. 146° (picrate, m.p. 233°; hydrochloride, softens at 147°, resolidifies and melts at 260°, forms a double salt, m.p. 224°, with HgCl₂).

H. G. M.

β-Phenylethylamines. IV. Preparation of β-aminophenylethylamines. K. H. SLOTTA and G. SZYSZKA [with, in part, H. HELLER] (Ber., 1935, 68, [B], 184-192; cf. A., 1933, 819).-β-o-Benzamidophenylpropionic acid is converted by successive treatment with SOCl₂ and conc. NH₃ into the corresponding amide, m.p. 176°, degraded (Hofmann) exclusively to dihydrocarbostyryl, m.p. 165°. m-Nitrocinnamic acid, m.p. 207°, is reduced (Na₂S and NaOH) to m-aminocinnamic acid, m.p. 180-181° (hydrochloride, decomp. 281°), reduced at a Hg cathode to β -m-aminophenylpropionic acid (I) (hydrochloride, m.p. 199°). (I) is transformed into the corresponding chloride, which when treated with NaN₃ and then heated evolves about 65% of the calc. amount of N_2 , leaving a product hydrolysed by conc. HCl to brown resins; similar results are obtained from m- $NHAc \cdot C_6H_4 \cdot CH_2 \cdot CH_2 \cdot COCl.$ Treatment of (I) in conc. H_2SO_4 with HN_3 in CHCl₃ and of the product with NaOH leads to β -m-aminophenylethylamine (II) in 44% yield. Alternatively m-NO2 ·C6H4 ·CHO is condensed with MeNO, in KOH-MeOH or in presence of Na_2CO_3 and NH_3MeCl to $m\omega$ -dinitrostyrene, m.p. 125°, electrolytically reduced to (II), b.p. 180°/14 mm. [dihydrochloride, m.p. 310°; picrate, m.p. 204°; compound with 1:2:4-C6H3Cl(NO2)2, m.p. 197°]. 3-Amino-4-methoxycinnamic acid is reduced electrolytically (yield 78%) or by Na-Hg (yield 56%) to 3-3-amino-4-methoxyphenylpropionic acid hydrochloride, m.p. 223°. β-3-Benzamido-4-methoxyphenylpropionic acid, m.p. 140°, is converted (SOCl₂ in CHCl₃ and conc. NH_3) into the corresponding amide, m.p. 161°, which gives unidentified products when degraded (Hofmann). 3-ω-Dinitro-4-methoxystyrene is electrolytically reduced (yield 47.2%) to β -3-amino-4-methoxyphenylethylamine, b.p. 192°/15 mm. [hygro-scopic hydrochloride, m.p. 254°; picrate, m.p. 208°; compound with $1:2:4-C_6H_3Cl(NO_2)_2$, m.p. 190°]. 5-Nitro-3: 4-dimethoxybenzaldehyde (III) and $CH_2(CO_2H)_2$ in C_5H_5N containing piperidine yield 5-nitro-3: 4-dimethoxycinnamic acid, m.p. 164°, reduced (Na₂S) to ill-defined substances. $5: \omega$ -Dinitro-3:4-dimethoxystyrene, m.p. 186° [from (III) and MeNO2 In presence of KOH-H2O-MeOH or of Na2CO3 and NH₃MeCl in abs. EtOH at 15-20°], is electrolytically reduced (yield 49.2%) to β -5-amino-3: 4-dimethoxy-phenylethylamine, b.p. 202°/14 mm. [dihydrochloride, n p. 249°; picrate, m.p. 184°; compound with 1:2:4-

Alkylethylenediamine derivatives. I. NN'-Dihenzylethylenediamine. J. VAN ALPHEN (Rec. tav. chim., 1935, 54, 93-96).—PhCHO (2 mols.) and (CH₂·NH₂)₂ at 120° give (CHPh:N·CH₂·)₂, solid, which with 8% Na-Hg and dry EtOH gives NN'-disylethylenediamine, m.p. 25-26°, b.p. 222°/18 mm. (cf. lit.) [hydrochloride, cryst.; (NO)₂-, anhyd., m.p. 3°, and ? + H₂O (hydrolysed by hot HCl), Ac_2 , m.p. 139°, Bz_2 , m.p. 183°, and di(phenylcarbamido)-deriv-

H. W.

C₆H₃Cl(NO₂)₂, m.p. 122°].

ative, m.p. 182°], which with PhCHO affords 2-phenyl-1: 3-dibenzyltetrahydroglyoxaline, m.p. 100°.

R. S. C. **Preparation of benzidine bases.** V. O. LUKA-SCHEVITSCH (Anilinokras. Prom., 1934, 4, 605—609). o-C₆H₄Cl·NO₂ is converted into 2 : 2'-dichloroazoxybenzene (I) by reduction with Zn in 50% aq. NaOH at 80°, and (I) is further reduced in more dil. solution at 65—70° to 2 : 2'-dichlorohydrazobenzene, which is washed with 30—40% H₂SO₄, and converted by 50% H₂SO₄ at 10—40° into 2 : 2'-dichlorobenzidine (74% yield). o-NO₂·C₆H₄·OEt is similarly reduced (in xylene) to the hydrazo-compound, and this is converted into o-diphenetidine by 25% H₂SO₄ at 5—20°. R. T.

Action of nitrous acid on tertiary amines: influence of acidity. C. DONALD and T. H. READE (J.C.S., 1935, 53-58).—The relative amounts (mol. fractions of products in parentheses) of 3:3'-dinitro-4:4'-di(dimethylamino)- (I) (nuclear nitration) and 4:4'-di(nitrosomethylamino)-(II) (nitrosoamine formation by loss of alkyl groups) -diphenylmethane and p-NO2 ·C6H4 ·NMe2 (III) (fission accompanied by nitration) produced from $CH_2(C_6H_4 \cdot NMe_2 \cdot p)_2$ (IV) by the action of NaNO₂ in presence of varying [HCl] (0.663-9.035N) at 0°, have been determined, in general, by isolation of the products. With 4 mols. of NaNO₂ to 1 mol. of (IV) the yields of (I) and (III) remain const. (0.5) up to 2N-HCl, then that of (I) increases up to 3.8N-HCl (0.7) and then slowly falls to 9N-HCl (with an 8/1 ratio the increase continues more slowly until at 9N-HCl it is almost the sole product), whereas that of (III) diminishes rapidly to 0 at $3\cdot 8N$ -HCl. The yield of (II) increases (from 0) to a true max. (0.2) at $3\cdot 8N$ -HCl and thereafter decreases to 0 at 9N-HCl. No action occurs if NaNO₂ completely replaces NaNO₂ at 0°, but with NaNO₃-NaNO₂ full yields of (I) and diminished yields of (II) (∞ the mol. fraction of NaNO₂) are obtained. With NaNO₂ the amount of NO evolved at 19.3°, with varying [HCl] approx. ∞ the sum of the yields of (I) and (II) at 0°, and in 3.0—6.0N-HCl the velocity of evolution of total gases $(NO+N_2)$ is approx. const., but diminishes slightly at lower [HCl]. The Et₂ analogue of (IV) behaves similarly, but $CO(C_6H_4 \cdot NMe_2)_2$ gives only the mono- (0.8 at 0.6N-HCl, decreasing to 0 at 7N-HCl) and di-nitrosoamines (max. 0.56 at approx. 3N-HCl). These results are discussed and are explained by the scheme: $[NHRMe_2]Cl+HNO_2 \longrightarrow [NO\cdot NRMe]Cl (IV) =$ $OMe \cdot NCl \cdot NRMe + HNO_2 \longrightarrow OMe \cdot NO(NO) \cdot NRMe$ \rightarrow (+2HNO₂) 2NO+H₂O+OMe·NO(NO₂)·NRMe \rightarrow NO·NRMe+MeO·NO₂: (IV)+2HNO₂ \longrightarrow 2NO $+H_2O+[NO_2 \cdot NRMe_2]Cl (high acidity) \longrightarrow$

 $[(NO_2)R'\cdot NHMe_2]Cl$, analogous to that for the diazonium-diazo system. 4:4'-Di(nitrosoethylamino)diphenylmethane, m.p. 83° [(?) 3:3'-(NO_2)_2-derivative, m.p. 39-40°], is new. J. W. B.

The two *p*-aminoazoxybenzoic acids. D. BIGIAVI and C. ALBANESE (Gazzetta, 1934, 64, 897– 909).—AcO₂H oxidises *p*-aminoazobenzene to a mixture which after hydrolysis contains α - and β -*p*-aminoazoxybenzenes, Ph·NO.N·C₆H₄·NH₂ (I), m.p. 134– 136°, and NPh.NO·C₆H₄·NH₂ (II), m.p. 133° (mixed m.p. 113—120°), also the α - and β -p-NO₂-compounds. (I) and (II) yield the following derivatives. By diazotisation : α - and β -p-hydroxyazoxybenzenes, and, coupling with PhOH, p-phenolazoazoxybenzenes, Ph·N₂O·C₆H₄·N:N·C₆H₄·OH, α -, m.p. 203° (known), and β -, m.p. 176° (new?); with PhCHO, p-benzylideneaminoazoxybenzenes, α -, m.p. 104—105°, and β -, m.p. 132°: with PhNO, p-(benzeneazo)azoxybenzenes, α -, m.p. 135—141°, β -, m.p. 135—136·5°; with Ac₂O, the Ac derivatives of (I) and (II), m.p. 151° and 171— 172°: with KCNO, p-carbamidoazoxybenzenes, α -, m.p. 206°, β -, m.p. 204—206°; with PhNCO, p-phenyl-carbamidoazoxybenzenes, α -, m.p. 213—214·5°, β -, m.p. 200—210° (decomp.). Oxidation (KMnO₄) of (I) and (II) gives compounds, m.p. 229—231°, and 133—134° [(II) unaltered?].

Relation between absorption spectra and chemical constitution of dyes. VII. Separation of chromophores in symmetrical bisazo-dyes. J. D. PIPER and W. R. BRODE (J. Amer. Chem. Soc., 1935, 57, 135-138; cf. A., 1934, 1344).-The absorption spectra of 6 mono- and 9 bis-azo-dyes, p-NAr:N·R·N:NAr-p (I) $[R=:C_6H_4:, C_6H_4:C_6H_4: C_6H_4: C_6H_$ NaOH, and dil. and conc. HCl as previously described (cf. A., 1928, 1171). With sufficient separation [as (A) and (B)] the 2 chromophores in (I) are independent. Conjugated or closely linked (I) show marked deviations from the theoretical additive absorption of the two components. The deviation is probably influenced by solvent, by bulky substituents (which in NAr:NAr' cause a shift of the bands to lower frequencies), and by the conjugated coupling of the N:N groups to form a single chromophore. H. B.

Nitro-compounds as oxidising agents. W. A. FLETCHER and R. E. LYONS (Proc. Indiana Acad. Sci., 1934, 43, 107–113; cf. A., 1933, 817).—The reaction of CH₂Ph·ONa (I) with a no. of aromatic NO₂-compounds is described. 3:3'-Dinitrohydrazobenzene, m.p.239–241°, is obtained from (I) and m-C₆H₄(NO₂)₂; reduction yields 3:3'-diaminohydrazobenzene.

CH. ABS. (r)

Metal salts of diazoaminobenzene. G. W. WATT and W. C. FERNELIUS (Z. anorg. Chem., 1934, 221, 187—192).—Methods of prep., analysis, and some physical properties of the Ag, Cu^I, Cu^{II}, and Hg^{II} salts are given. F. L. U.

Products of the reaction of diazomesitylenesulphonic acid with glycerol. (Synthesis of new foam-promoting compounds.) W. JAROSZEWICZ and E. SUCHARDA (Rocz. Chem., 1934, 14, 1188— 1194).—Diazomesitylenesulphonic acid and glycerol heated at 100° yield a variety of products, of which the compounds $OR \cdot CH_2 \cdot CH(OH) \cdot CH_2 \cdot OR'$ and the anhydride, m.p. 114° (decomp.), of

 $OR' \cdot CH_2 \cdot CH(OR) \cdot CH \cdot OR' (R = SO_2 \cdot C_6 HMe_3 \cdot OH; R' = C_6 HMe_3 \cdot SO_3 H)$ have been identified. These compounds are readily hydrolysed by aq. NaOH, with liberation of mesitylenesulphonic acid. R. T.

Character of the diazonium group. Preparation of benzaldehyde-*p*-diazonium sulphate and its condensation with benzene to form triphenylmethane derivatives. H. A. J. SOHOUTISSEN (Rec. trav. chim., 1935, 54, 97–100).—p-NH₂·C₆H₄·CHO (I) is diazotised by NO·HSO₄ in H₂SO₄–AcOH or H₂SO₄–89% H₃PO₄ and converted into p-C₆H₄I·CHO and p-OH·C₆H₄·CHO. By diazotisation of (I) and treatment with C₆H₆–H₂SO₄ in AcOH or H₃PO₄ at 10–15° a triphenylmethane-p-diazonium salt is obtained, which yields p-hydroxy- and p-iodo-triphenylmethane, m.p. 82°. This ready condensation is in accord with the strong "negative" character of the diazonium group. R. S. C.

Aliphatic diazo-compounds. Preparation and rearrangement of diazo- $\beta\beta\beta$ -triphenylethane. L. HELLERMAN and R. L. GARNER (J. Amer. Chem. Soc., 1935, 57, 139-143; cf. A., 1928, 878).-Et βββ-triphenylethylcarbamate, m.p. 94° [from CPh₃·CH₂·NH₂ (I) and ClCO₂Et in aq. Na₂CO₃], and N₂O₃ in Et₂O+anhyd. Na₂SO₄ give the N-NO-derivative, decomp. 114° (corr.), converted by NaOEt in Et Q at 15° into discuss 200 trick with the in Et_2O at -15° into diazo- $\beta\beta\beta$ -triphenylethane (II), decomp. 78-80° (corr.). (II) is decomposed by a little Cu-bronze or I in Et₂O or by 25% H₂SO₄ to CPh2:CHPh (III); decomp. with H2O at 70-100° gives (III) and a little triphenylacetaldazine, m.p. > 300°. Decomp. of (II) with AcOH also affords (III); with AcOH in Et₂O or light petroleum, (III) and $\alpha\alpha\beta$ triphenylethyl acetate, m.p. 175.5° (corr.) [corresponding benzoate, m.p. 179.5° (corr.), similarly formed using BzOH], are produced. An electronic mechanism explaining the formation of these products is discussed. (I) and (II) with N_2O_3 in $Et_2O + Na_2SO_4$ give a complex product from which a little CPh. CPh NO2 is isolable. H. B.

Conditions of formation of phenol by fusion of sodium benzenesulphonate with sodium hydroxide.—See B., 1935, 91, 137.

Electrochemical reduction of phenols. T. BAHR (Ges. Abh. Kenntn. Kohle, 1934, 11, 246–249; Chem. Zentr., 1934, ii, 876).—By reduction of PhOH with a Pb cathode in acid solution pyrocatechol, quinol, and probably quinone are formed. With a Pt cathode (optimum temp. 70–80°) cyclohexanol (I) is formed. Reduction of (I) under the same conditions gave no cyclohexane or C_6H_6 . Reduction of o-4-xylenol yielded dimethylcyclohexanol. H. J. E.

[Attempted] synthesis of phenyl sulphates. 1. Oxidation of mixtures of phenols with mineral compounds of sulphur in alkaline media. (MLLE.) Y. GARREAU (Bull. Soc. chim., 1934, [v], 1, 1563-1570).-The action of air on solutions of phenols in a mixture (I) of $(NH_4)_2SO_3$ and aq. NH_3 and in a mixture (II) of (I) with Cu(OH)₂ is slow. PhOH and (II) afford a phenolsulphonate and possibly PhO·SO₃H. $o \cdot C_6 H_4(OH)_2$ yields a monosulphonate with (I) and a disulphonate with (II). Guaiacol (III) and (II) give the monosulphonate. The products from m- $C_{c}H_{4}(OH)_{2}$ were not identified. Quinol with (I) affords NH_{4} quinoldisulphonate and with (II) NH_{4} 2:5-diaminobenzoquinonedisulphonate is obtained. Phenyl sulphates were not obtained either by treating PhOH in (I) with oxidising agents or by using mixtures J. G. A. G. of phenols and Na₂S.

Action of bromine on *p*-methoxysulphonic acids. M. S. SHAH, C. T. BHATT, and D. D. KANGA (J. Univ. Bombay, 1934, **3**, No. 2, 153—154). Passage of Br through 3:1:6-OMe·C₆H₃Me·SO₃H in H₂O affords 6-bromo-3-methoxytoluene, b.p. 236—237°, also obtained from Br and m-C₆H₄Me·OMe in AcOH. Similarly, 6:3:1-

 $SO_3H \cdot C_6H_3(OMe) \cdot CO_2H$ yields 6-bromo-3-methoxybenzoic acid, m.p. 162°, also prepared from m-OMe \cdot C_6H_4 \cdot CO_2H and Br in AcOH or by oxidation of 6:1:3- C_6H_3 BrMe·OMe with alkaline KMnO₄. Replacement of SO₃H by Br occurs only when it is para to OMe. H. W.

Methylation of sulpho- and nitro-derivatives of cresols and hydroxybenzoic acids. M. S. SHAH, C. T. BHATT, and D. D. KANGA (J. Univ. Bombay, 1934, **3**, No. 2, 155—158).—The customary method is applicable to the methylation of o-cresol-4and p-cresol-2-sulphonic acid, 4- and 5-sulphosalicylic acid, and 4- and 5-sulpho-m-hydroxybenzoic acid, but fails in the cases of 3- (I) and 5- (II) -nitro-o-cresol, 2- (III), 4- (IV), and 5- (V) -nitro-m-cresol, 2-nitro-pcresol (VI), 3- (VII) and 5- (VIII) -nitrosalicylic acid, and 2-sulphosalicylicacid (IX). Treatment with Me₂SO₄ and anhyd. K_2CO_3 in xylene (Haworth et al, J.C.S., 1923, 123, 2982) yields satisfactory results with (I)—(VII), but fails entirely in the cases of (VIII) and IX). H. W.

Condensation of *p*-bromophenol and bromocresols with benzoyl chloride and *m*- and *p*-nitrobenzoyl chlorides. G. V. JADHAV and Y. I. RANGWALA (J. Univ. Bombay, 1934, **3**, No. 2, 161-162).—Mol. proportions of the acid chloride and bromophenol are heated until evolution of HCl ceases. The following compounds are new: 4-bromo-o-tolyl, mp. 63-64°, 2: 6-dibromo-p-tolyl, m.p. 94-95°, and 2:3: 6-tribromo-p-tolyl, m.p. 120°, benzoates; pbromophenyl m-nitrobenzoate, m.p. 121-122°; 4bromophenyl, m.p. 180-181°, 4-bromo-o-tolyl, m.p. 184°, 4-bromo-m-tolyl, m.p. 144-145°, 4: 6-dibromo-otolyl, m.p. 136-137°, 2: 4-dibromo-p-tolyl, m.p. 141-142°, and 2: 3: 6-tribromo-p-tolyl, m.p. 159-160° after softening at 156°, p-nitrobenzoates. H. W.

Derivatives of p-phenetidine. M. PASSERINI and G. RAGNI [in part with W. MARESCO and L. PICIACCI] (Gazzetta, 1934, 64, 909-918).-p-Phenetidine (I) and CHCl₃ give p-phenetylcarbylamine (II), m.p. 49-50°, and di-p-phenetylformamidine, m.p. 111-112°. (II) with COMe₂+AcOH forms the acceloxyisobutyryl, m.p. 133-134° (hydrolysed to the a-hydroxyisobutyryl, m.p. 149-150°), with p-nitrobenzaldehyde (III) and BzOH the O-benzoyl-p-nuromandelyl, m.p. 174-176°, and with (III) and salicylic acid the O-salicyl-p-nitromandelyl, m.p. $114-176^{\circ}$, derivatives of (I). With chloretone, (I) a.p.phenetylaminoisobutyrylphenetidine, m.p. 122-133° (hydrochloride, m.p. 240°), and β-p-phenetylaminoisobutyric acid, m.p. 192-194° (NO-derivative, ^m p. 90–95°); with $AcCO_2Na$ (I) forms α -*p*-phenetyliminopropionic acid, which in boiling EtOH condenses to 6-ethoxy-2-methylquinoline-4-carboxylic acid, m p. 242-244°. E. W. W.

Action of nitric acid on *p*-hydroxyphenyltrimethylammonium iodide. K. C. ROBERTS (J.C.S., 1935, 116).—Boiling 2N-HNO₃ converts

p-OH·C₆H₄·NMe₃I into 5(?)-iodo-3-nitro-4-hydroxyphenyltrimethylammonium nitrate, decomp. > 210°, converted by aq. KI into the corresponding iodide, decomp. > 225°. J. W. B.

Purification of α -[2:4-]dinitrophenol. J. C. BIRD, Z. PANCIERA, and E. G. E. ŜHAFER (Amer. J. Pharm., 1934, 106, 462-466).—A method of purification of 2:4-dinitrophenol and its Na salt (H₂O of crystallisation completely lost only at 170°), qual. tests for purity, and details of analysis are described. R. S. C.

Cyclic ethers of pyrocatechol with ketones. J. BÖESEKEN and G. SLOOFF (Proc. K. Akad. Wetensch. Amsterdam, 1934, 37, 584—590).—The equilibrium (K=0.001) of the pyrocatechol (I)-COMe₂ condensation (A., 1932, 860) is situated largely in favour of the free components, although the H_3BO_3 complex of (I) shows a large conductivity increase. The conclusion that COMe₂ equilibrium and H₃BO₃ conductivity increase do not run parallel with aromatic diols is explained sterically; conditions are less favourable to ring closure with COMe₂ than with H₃BO₃. The two K salts obtained from Et 4-nitroisopropylidenedioxybenzene-ω-carboxylate (A., 1933, 511) and EtOH-KOH are cis-trans isomerides of the enol NO2. C6H3(OK). O. CMe. CH. CO2Et (Ac derivatives, m.p. 59° and m.p. 67°, respectively) and with CH₂N₂ give two corresponding *Me ethers*, m.p. 120° and m.p. 106°, respectively, both of which are converted by H₂SO₄ into 4-nitropyrocatechol 1-Me ether. Similar cis-trans isomerism occurs in the spiran formed by condensation of (I) with 4-methylcyclohexanone, nitration affording two isomeric 5-NO2derivatives. No experimental data are given.

J. W. B. Nitration of 4: 4'-dimethoxydiphenylmethane. K. MATSUMURA (J. Amer. Chem. Soc., 1935, 57, 128-129).—4:4'-Dimethoxydiphenylmethane, m.p. 51— 52° (modified prep.), and fuming HNO₃ in AcOH at $> 30^{\circ}$ give the 5:5'-(NO₂)₂-derivative (I), m.p. 164.5—165.5°, oxidised (CrO₃, AcOH) to 5:5'-dinitro-4: 4'-dimethoxybenzophenone, m.p. 193°. The dinitro-4: 4'-dihydroxydiphenylmethane (11)of Staedel (A., 1895, i, 232) is methylated (Na, salt with Me₂SO₄ in PhMe) to (I). Reduction (SnCl₂, AcOHconc. HCl) of (II) affords 5:5'-diamino-4:4'-dihydroxydiphenylmethane, m.p. $220 - 222^{\circ}$ (decomp.) (previous darkening) (dihydrochloride, m.p. > 305°). Distillation of 5:5'-tetra-acetyldiamino-4:4'-diacet oxydiphenylmethane, m.p. 142-143°, gives di-(2methyl-5-benzoxazolyl)methane, m.p. 103-105°.

H. B. Reactions of organic disulphides and oxidation of organic compounds in presence of disulphides. A. SCHÖNBERG (Ber., 1935, 68, [B], 163—164).—Bz₂S₂ and tetramethylthiuram disulphide are transformed by PPh₃ in boiling C₆H₆ into Bz₂S and tetramethylthiuram sulphide, respectively, PPh₃S being also formed. Many disulphides such as $(CH_2Ph)_2S_2$ are very stable towards PPh₃, whereas the dissociable (α -C₁₀H₇·CS)₂S₂ reacts readily. Ph₂S₂ and PPh₃ in presence of H₂O give PPh₃O and PhSH; if O₂ is also present, PhSH passes back into Ph₂S₂, which therefore does not appear to participate in the change. H. W.

Properties of some optically active sulphonylthiolethanes. F. B. KIPPING (J.C.S., 1935, 18-21).— α -p-Carbethoxybenzenesulphonylethyl Me ketone (A., 1934, 71) and Ph₂ disulphoxide (I) afford dl- α -p-carboxybenzenesulphonyl- α -phenylthiolethane (II), m.p. 167—168° (Me ester, m.p. 72°), resolved by quinine into d- (III), m.p. 164—165°, $[\alpha]_{5461}$ +134° in CHCl₃ (quinine salt, m.p. 136—138°, $[\alpha]_{5461}$ +97° in CHCl₃; Me ester, m.p. 73—74°, $[\alpha]_{5461}$ +145° in CHCl₃), and (through the *l*-menthylamine salt of the mother-liquor) 1-acid, $[\alpha]_{5461} - 134^{\circ}$ (Me ester, m.p. 73-74°, $[\alpha]_{5461} - 145^{\circ}$). Oxidation of (II) with AcOH-H₂O₂ on a water-bath gives α -p-carboxybenzenesulphonyl-a-benzenesulphonylethane, m.p. 244° (Me ester, m.p. 128-129°). α-p-Carbethoxybenzenesulphonyl- α -p-toluenesulphonylethane (IV) (loc. cit.), NaOEt-EtOH, and (I) give the Et ester, m.p. 173°, of α -p-carboxybenzenesulphonyl- α -p-toluenesulphonyl- α -phenylthiolethane (V), +AcOH, m.p. 145—147°, and solvent-free, m.p. 186—190° (decomp.), the acid being obtained by hydrolysis with the theoretical amount of alkali [excess of alkali regenerates the acid of (IV)]. (V) is resolved through its brucine salt into the 1-, (v) is resolved through its brache sait into the rate of heating), $[\alpha]_{5461} - 16 \cdot 1^{\circ}$ in COMe₂ (brucine salt +H₂O, m.p. 171-172°, $[\alpha]_{5461} + 14 \cdot 1^{\circ}$ in CHCl₃; Et ester, m.p. 148° $[\alpha]_{5461} - 3 \cdot 2^{\circ}$ in CHCl₃), and d-acid, $[\alpha]_{5461} + 15 \cdot 5^{\circ}$ in COMe₂ (l-menthylamine salt, m.p. 220°; Et ester, $[\alpha]_{5461} + 4 \cdot 24^{\circ}$ in CHCl₃). No racemisation of (III) accurs in N2OH-26. EtOH up to Lequip of of (III) occurs in NaOH-aq. EtOH up to 1 equiv. of alkali, but further increase causes a rapid increase in the velocity of racemisation. The d- and l-Me esters undergo rapid racemisation in presence of NaOMe-MeOH. Since the active forms of (V) are not racemised by alkali it is suggested that racemisation occurs by formation of a salt ·S·CMe:SO(ONa)·, the optical stability of (V) being due to the absence of H on the J. W. B. a-ethane C.

Preparation of the pure diastereoisomeric forms of αβ-diphenyl-n-propyl and -butyl alcohols. F. KAYSER (Compt. rend., 1934, 199, 1424—1426).—Stilbene oxide (I) and MgMeBr give the α-form (liquid) of CHPhMe·CHPh·OH; the β-form (obtained from CHPhMe·COPh) has now been obtained cryst., m.p. 48°. CHPhEt·CHO and MgPhBr give the α-form (II) of αβ-diphenylbutan-α-ol, b.p. 182—184°/18 mm. (phenylurethane, m.p. 118°), the β-form (III), m.p. 82° (phenylurethane, m.p. 124°), of which is obtained by hydrogenation of CHPhEt·COPh (IV) or, remarkably, from (I) and MgEtBr. Both (II) and (III) are oxidised to (IV) by CrO₃-AcOH. R. S. C.

Plant pigments. LXIII. Products of the oxidation of carotenes. Carotenoid of Thiocystis bacteria. P. KARRER and U. SOLMSSEN (Helv. Chim. Acta, 1935, 18, 25–27).— α -Semicarotenone affords an oxime $C_{40}H_{57}O_2N$, m.p. 132°. Oxidation of β -carotene in C_6H_6 -AcOH with 0·1N-CrO₃ (=10) gives (irregularly) neo- β -hydroxycarotene, $C_{40}H_{56}O_2$, m.p. 143°. Lycopene appears to be the sole carotenoid present in the carotenoid fraction from Thiocystis bacteria. H. W.

Configuration of alicyclic alcohols. I. Configuration of 2-ethylcyclopentanols. W. HÜCKEL and W. GELMROTH (Annalen, 1934, 514, 233-251) .--2-Ketocyclopentylacetic acid (I), m.p. 54° (lit. 50-51°), is reduced (1% Na-Hg, dil. Na₂CO₃ or H₂, PtO₂, Et₂O) to (mainly) trans-2-hydroxycyclopentylacetic acid (II), m.p. 52.5-53.5°, and a little cis-2-liydroxycyclopentylacetic acid lactone (III), b.p. 123°/16 mm., m.p. -17.5° (lit. -70°). Reduction (H₂, PtO₂, Et₂O) of the Me ester of (I) and subsequent hydrolysis (10% KOH) gives (II) (63%) and (III) (35%) (best method of prep.). Reduction (Na, EtOH) of the Me ester, b.p. 125°/14 mm., of (II) affords trans-2-β-hydroxyethylcyclopentanol (IV), b.p. 100-105°/ 0.3-0.4 mm. [di(phenylcarbamate), m.p. 97.5-98.5° and $107.5-108^{\circ}$ (stable); $(CPh_3)_2$ ether, m.p. 57-69°], converted by HI at 100° into the cyclic ether, b.p. 144-145°/760 mm. (III) is similarly reduced to cis-2-\beta-hydroxyethylcyclopentanol (V), b.p. 110-115°/0.5 mm., m.p. 36° [di(phenylcarbamate), m.p. 129°], whilst valerolactone gives 30% of pentane-addiol (VI) [di-(a-naphthylcarbamate), m.p. 128-5-129.5°], and 45% of high-boiling condensation product. (VI) is reduced [HI (d 1.96) at 100° followed by Zn and AcOH] to γ -amylene oxide and pentan- β -ol (H phthalate, m.p. 63-64°; a-naphthylcarbamate, m.p. 72°). Successive treatment of (V) with CPh₃Cl and BzCl in C_5H_5N affords cis-2- β -triphenylmethoxyethylcyclopentyl benzoate, m.p. 120.5°, converted by PBr₅ into the β -bromoethyl ester, which is reduced (Zn dust, 80% AcOH, little H₂PtCl₆) to cis-2-ethylcyclopentanol (VII), b.p. 163—165° (phenylcarbamate, m.p. 87°; H phthalate, m.p. 90—91°); (IV) could not be similarly converted into (IX) (below) (a substance, b.p. 177-178°, is produced). (VII) is obtained as the main product by reduction (H2, Pt-black, AcOH-HCl) of 2-ethylcyclopentanone (VIII) [semicarbazone, m.p. 182° (decomp.)], which is reduced (Na, EtOH) to trans-2-ethylcyclopentanol (IX), b.p. 165–166° (p-nitrobenzoate, m.p. $48\cdot5-49^\circ$; phenylcarbamate, m.p. 76.5°). Mixtures of varying amounts of (VII) and (IX) are produced by catalytic reduction (variance) and (IX) are produced by catalytic reduction (various conditions) of (VIII). H. B.

Vinyl and hydrobenzoin dehydration of cyclic a-glycols. Extension of the hydrobenzoin type of migration to the cyclic series. M. TIFFENEAU and (MLLE.) B. TCHOUBAR (Compt. rend., 1934, 199, 1624—1626).—Dehydration of cis-cyclohexane-1:2diol by passing its vapour over Al₂O₃ at 250-300° gives cyclohexanone almost exclusively, only traces of cyclopentylformaldehyde (I) being detected, but the trans-compound affords only (I). Similarly cis-1-methylcyclohexane-1: 2-diol gives (90% yield) 2-methylcyclohexanone (II) and only a trace of 1-methylcyclopentylformaldehyde (III), but the transcompound gives a 45% yield of a mixture of 70% of (II) and 30% of (III). Thus the cis-forms undergo vinyl dehydration, whereas in the trans-forms a hydrobenzoin type of change (C migration) occurs. J. W. B.

Condensation of aromatic ketones with formaldehyde. J. MANTA (J. pr. Chem., 1935, [ii], 142, 11-12).—COPhEt and 40% CH₂O (4 mols.) in boiling EtOH-KOH give α -phenyl-35-di(hydroxymethyl) propyl alcohol, m.p. 96–97°, COPhPr^{β} similarly affords a 2:1 compound, m.p. 81–82°, of α phenyl- β -hydroxymethylisobutyl alcohol and α phenyl- β -methyl- β -hydroxymethylbutane- $\alpha\delta$ -diol. H. B.

Pinacolin and retropinacolin rearrangements in the phenanthrene group. J. SUSZKO and R. SCHILLAK (Rocz. Chem., 1934, 14, 1216-1225).-Bisdiphenylenepinacolin (I) is converted into the β isomeride (II) [hydrazone (III), m.p. 189°; phenylhydrazone, m.p. 222° (decomp.)] by boiling with a mixture of AcOH and 70% H2SO4. 9:9-Diphenylene-9: 10-dihydrophenanthrene (IV), m.p. 195°, is obtained from (II) or (III) by heating with N_2H_4 at 200° for 8 hr. (IV) affords tetrabenzocyclodecane-1: 6-dione (V), m.p. 267°, when boiled for 33 hr. with Na₂Cr₂O₇ in AcOH. Tetrabenzonaphthalene (VI), obtained by boiling (II) for 16 hr. with Zn-Hg and HCl in EtOH, affords (V) on oxidation with $Na_2Cr_2O_7$. 9-Hydroxy-10:10-di-phenyleno-9:10-dihydrophenanthrene, m.p. 174-175°, prepared by reducing (II) with Zn and boiling EtOH-NH₃, yields (VI) when boiled with EtOH-HCl, and (V) when oxidised. (V) is reduced to (VI) by heating at 170° for 5 hr. with N_2H_4, H_2O ; with MgMeI it affords tetrabenzo-1: 6-dihydroxy-1: 6-dimethylcyclodecane, m.p. 204°. Tetrabenzo-9: 10-dihydroxy-9: 10-dihydronaphthalene, m.p. 232°, obtained by boiling (V) with Na and MgI₂ in xylene, is converted into (II) by boiling with $1:1 \text{ AcOH}-70\% \text{ H}_2\text{SO}_4$ for 40 min. The above results confirm the views that (II) is 10:10-diphenylenophenanthrone, that (I) is bisdiphenylenoethylene oxide, and that a retropinacolin rearrangement takes place during reduction of (II). **R**. **T**.

alloPregnandiol, a new alcohol from the urine of pregnancy. M. HARTMANN and F. LOCHER (Helv. Chim. Acta, 1935, 18, 160-165).-The extracts of the urine are freed from solvent and treated with aq. alkaline-earth hydroxides; the hormone and its hydrate are converted into metallic salts sol. in H₂O, whilst the insol. portion (I) consists of neutral substances (II) and insol. salts of acidic impurities. (II) are removed from (I) by boiling C_6H_6 and the portion remaining after removal of solvent is treated successively with cold COMe2 and norit in EtOH, thus giving ^{a mixture} consisting of about 5/6 pregnandiol (III) and 1/6 allopregnandiol (IV). Separation of (III) and (IV) is best effected through the acetates. alloPregnandiol diacetate, m.p. $141.5-142.5^{\circ}$ (corr.), $[\alpha]_{D}^{24} + 18.8^{\circ}$, is hydrolysed to (IV), m.p. $248-248.5^{\circ}$ (corr.). Oxidation of (IV) by CrO3 in cold 90% AcOH leads to the diketone C21H32O2, m.p. 204-204.5°, identical with hat obtained by analogous treatment of the OHsetone from the corpus luteum. In (III) the rings A and B are united in the cis-position, in (IV) in the trans-position (dihydrocholesterol series). H. W.

Steric course of addition and substitution reactions. II. Stereochemistry of diene synthesis. II. K. ALDER and G. STEIN [with M. LEBMANN and E. ROLLAND] (Annalen, 1934, 514, 197-211; cf. this vol., 211).-2: 5-endoMethylene-⁴-tetrahydrobenzoic acid (endo) (1), m.p. 39° [from cyclopentadiene (II) and $CH_2:CH \cdot CO_2H$ at $> 40^\circ$] (cf. A, 1928, 1018), is reduced (H₂, colloidal Pd, aq. $N_{2}O_{3}$) to 2 : 5-endomethylenehexahydrobenzoic acid

(endo) (III), b.p. 141-142°/23 mm., m.p. 65-66° (cf. loc. cit.) (chloride, b.p. 84°/12 mm.; anilide, m.p. 151-152°), and is converted by cold 50% H₂SO₄ into the lactone, m.p. 155-156°, of 3-hydroxy-2: 5-endomethylenehexahydrobenzoic acid. Crude 2:5-endomethylenc- Δ^3 -tetrahydrobenzaldehyde (IV) [from (II) and CH2:CH·CHO] (cf. loc. cit.) is reduced (H2, colloidal Pd, MeOH) to the hexahydro-derivative, which is oxidised (method : von Braun and Keller, A., 1933, 259) to (III). (I) and (IV) are, therefore, endoderivatives [cf. (VI) (below)]; they are the main products in the above additive reactions. Hydrolysis (aq. Na₂CO₃) of the product from (II) and fumaryl chloride (V) in Et₂O at -10° gives trans-3: 6-endomethylene- Δ^4 -tetrahydrophthalic acid; direct addition of (V) to (II) occurs. (II) and trans-crotonyl



Me (exo) methyl(exo)-2 : 5-endomethylene- Δ^3 tetrahydrobenzoic acid (endo) (VI), m.p. 95—96°, reduced (H_2 , Pd, aq. Na₂CO₃) to the hexahydro-acid (VII), m.p. 69° (A., 1929, 819), and converted by 50% H₂SO₄ into the lactone, m.p. 70-71°, of 3-hydroxy-

6 - methyl(exo) - 2 : 5 - endomethylenehexahydrobenzoic acid (endo). (VI) and (VII) are regenerated when their Me esters are heated with conc. MeOH-NaOMe. trans-6-methyl-2: 5-endomethylene- Δ^3 -tetra-The hydrobenzaldehyde previously described (loc. cit.) is (VI) with $CO_2H=CHO$, since successive reduction and oxidation gives (VII); it is formed (cf. loc. cit.) by direct addition of trans-crotonaldehyde to (II). H. B.

Preparation of acid chlorides by thionyl chloride. P. CARRÉ and D. LIBERMANN (Compt. rend., 1934, 199, 1422-1423).-p-NO2.C6H4.CO2H, $p - C_6 H_4 Br \cdot CO_2 H$, $p - C_6 H_4 (CO_2 H)_2$, and $Bu^{\gamma} CO_2 H$ with SOCl₂ at or slightly above room temp. give excellent yields of the acid chlorides in the presence of C5H5N, but not in its absence. R. S. C.

4-Bromo-o-toluic acid. K. J. KEUNING and N. EVENHUIS (Rec. trav. chim., 1935, 54, 73-75).o-C₆H₄Me·CO₂H and Br give 4-bromo-o-toluic acid. m.p. 170° (lit. 167°) (Me ester, m.p. 45°, b.p. 264.5°). 4-Bromo-o-xylene and HNO₃ ($d \ 1.08$) give 5-bromo-o-toluic acid, m.p. 181—182° (Me ester, b.p. 265°) (cf. lit.). R. S. C.

2-Chloro-3: 5-dinitro-4-chloromethyland 2:4:6-tribromo-3-bromomethyl-benzoic acids and attempts to resolve them. A. WEISSBERGER, H. BACH, and E. STRASSER (J.C.S., 1935, 68-71).-2-Chloro-4-chloromethylbenzonitrile (I) [prep. from 3-chloro-p-toluidine \longrightarrow 3-chloro-p-toluonitrile (II)+ $PCl_5 \longrightarrow (I)$ is converted by conc. H_2SO_4 -HNO₃ (d 1.52) at 100° into 2-chloro-3: 5-dinitro-4-chloromethylbenzoic acid (III), m.p. 198-200°. 2:4:6-Tribromom-toluidine is converted (Sandmeyer) into 2:4:6tribromo-m-toluonitrile, m.p. 123-124°, hydrolysed by 66% aq. HBr at 160-180° to the amide, m.p. 202by 60 7_0 aq. 11D1 at 100 100 100 to the antac, in.p. 202-203°, converted by HNO₂ into the acid (IV) (poly-morphous), sinters at 160°, m.p. 190.5—191.5°. With Br-CHCl₃-NaHCO₃ (IV) affords 2:4:6-tribromo-3-bromomethylbenzoic acid (V) (polymorphous), sinters at 160°, m.p. 183.5—184.5°. In (III) and (V) the

(Compt. rend., 1934, 199, 1426-1428).-p-tert.-Butylbenzyl chloride (prepared in 70% yield), b.p. 115°/16 mm., m.p. -18°, with Et₂ allylsodiomalonate in PhMe gives Et₂ p-tert.-butylbenzylallylmalonate (75% yield), b.p. 180-181°/3 mm., converted by KOH-EtOH and subsequent heating into a mixture of α -p-tert.-butylbenzyl- Δ^{γ} -butenoic acid (I), m.p. 68°, and the γ -lactone (II), p-C₆H₄Bu^{γ}-CH₂-CH $\xrightarrow{-CO}$ CO CH₂-CHMe>0, b.p. 152°/2 mm. With H₂SO₄,H₂O (I) gives slowly 20% of (II) and 80% of 4-methyl-6-tert.-butyl-1:2:3:4tetrahydro-2-naphthoic acid, which with S affords 4-methyl-6-tert.-butyl-2-naphthoic acid, converted by distillation with CaO in vac. into 1-methyl-7-tert. butylnaphthalene, b.p. 151-152°/14 mm. [picrate, m.p. 95.5°; styphnate, m.p. 129°; (NO)2-derivative, m.p.

131°]. Vegetable heart poisons. V. Ætioallocholanic acid and its identification with the acid obtained by degradation of azarigenin. R. TSCHESCHE (Ber., 1935, 68, [B], 7-9; cf. A., 1934, 1354).—The identity of the acid $C_{20}H_{32}O_2$ (I) obtained from uzarigenin (loc. cit.) with ætioallocholanic acid is established by comparison of the acids and their Me esters. The genins (II) of the heart poisons have therefore the same C skeleton as the sterols and bile acids. The acid $C_{19}H_{30}O_4$ derived from (I) is ætioallobilianic acid. It is not certain that (II) belong H. W. to the allo-series.

R. S. C.

Ethyl cyclopentanone-2-carboxylate and cisand trans-2-ethylcyclopentanols. G. VAVON and A. HOREAU (Bull. Soc. chim., 1934, [v], 1, 1703-1713).—Et sodiocyclopentanone-2-carboxylate reacts 3-4 times as fast with alkyl iodides as with the bromides and 60-70 times as fast with the latter as with the chlorides. For this alkylation aq. NaOH can advantageously replace the NaOEt usually used. The relative rates of reaction of CH₂PhCl, o- and p-C₆H₄Me·CH₂Cl, and CH₂:CH·CH₂Cl are 1:5:10:5, whilst $2:4:6-C_6H_2Me_3\cdot CH_2Br$ reacts 100 times as fast as CH_2PhBr . The following *Et 2-alkylcyclopent*. anone-2-carboxylates are described : Et (I), b.p. 114 12 mm.; Pr, b.p. 117-119°/9 mm.; Bu, b.p. 125- $127^{\circ}/8$ mm. (I) with about 20% HCl gives an 80%yield of 2-ethylcyclopentanone (II) and with 20% NaOEt-EtOH an 86% yield of a-ethyladipic acid, m.p. 51° (lit. 49°), also obtained without isolation of (I) by use of a deficiency of EtI in the prep. of (I). This acid with Ba(OH)₂ at 160-180° gives an 85% yield of (II), b.p. 157-158° [semicarbazone, m.p. 187° (decomp.)]; this is reduced by Na-EtOH to a mixture containing mostly trans-2-ethylcyclohexanol (III) (H phthalate, m.p. 54.5-55°; phenylurethane, m.p. 73-74°), whereas hydrogenation (Pt-black) in AcOH-HCl gives mainly the cis-alcohol (IV) (H phthalate, m.p. 54.5—55°; phenylurethane, m.p. 86—86.5°). (IV) has a higher d than (III), is less readily obtained from the H phthalate, and is more readily dehydrated by 3% H₂SO₄-Bu₂O. Both forms have about the R. S. C. same n.

Derivatives of salicylic acid. VI. Reaction of thionyl chloride on esters of hydroxybenzoic acids in presence of finely-divided copper. I. Synthesis and constitution of 4:4'-dihydroxy-

possibility of enantiomorphism arising from restricted rotation of the CH2 Hal by the two bulky o-substituents was anticipated, but attempts to resolve these acids with brucine, strychnine, quinine, or quinaldine failed, even the alkaloid salts exhibiting no difference in rotation from those of 3-chloro-2:6-dinitro-p-toluic acid [from (II) by hot H₂SO₄-HNO₃]. All m.p. are corr. J. W. B.

Conversion of carboxylic acids into higher homologues or their derivatives. F. ARNDT and B. EISTERT (Ber., 1935, 68, [B], 200-208).—The acid is converted into its chloride, which is transformed by excess of CH₂N₂ into the diazo-ketone (I) accompanied by a little Cl-ketone : $R \cdot COCl + 2CH_2N_2 = R \cdot CO \cdot CHN_2 + MeCl + N_2$. Treatment of (I) with H_2O , alcohols, NH₃, primary or sec.-amines in presence of finelydivided Ag, Pt, or Cu as catalyst, if necessary at raised temp. and under pressure, leads to elimination of N2, wandering of R, and addition to the residue of H₂O, alcohol, amine, etc., thus: $\mathbb{R} \cdot \mathbb{CO} \cdot \mathbb{CHN}_2 + \mathbb{H} \cdot \mathbb{OH} \longrightarrow \mathbb{R} \cdot \mathbb{CH}_2 \cdot \mathbb{CO}_2 \mathbb{H} + \mathbb{N}_2$. The following examples are cited : $o - \mathbb{NO}_2 \cdot \mathbb{C}_6 \mathbb{H}_4 \cdot \mathbb{COCl}$ to $o - \mathbb{NO}_2 \cdot \mathbb{C}_6 \mathbb{H}_4 \cdot \mathbb{CH}_2 \cdot \mathbb{CO} \cdot \mathbb{NH}_2$, m.p. $160 - 161^\circ$; $1 - \mathbb{C}_{10} \mathbb{H}_7 \cdot \mathbb{CO}_2 \mathbb{H}$ to α -naphthoyldiazomethane, m.p. 54—55°, and thence to $1-C_{10}H_7 \cdot CH_2 \cdot CO_2Et$, b.p. 175—178°/11 mm., $1-C_{10}H_7 \cdot CH_2 \cdot CO_2H$, m.p. 131°,

1-C₁₀H₇·CH₂·CO·NH₂, m.p. 180°, and 1-C₁₀H₇·CH₂·CO·NHPh, m.p. 156°: veratric acid to veratroyldiazomethane, m.p. 75°, and thence to homoveratroylamide, m.p. 146°; BzOH to

CH, Ph·CO·NH, and CH, Ph·CO·NHPh; anthraquinone-2-carboxylic acid to anthraquinonyl-2-acetanilide, m.p. 267-268°; 1-chloroanthraquinone-2-carboxylic acid to 1-chloro-2-w-diazoacetoanthraquinone, m.p.148-150° (decomp.), and thence to 1-chloroanthraquinonyl-2-acetanilide, m.p. 285-286°; 1-nitroanthraquinone-2carboxylic acid to 1-nitro-2-w-diazoacetoanthraquinone, m.p. 200° (decomp.), and thence to 1-nitroanthraquinonyl-2-acetanilide, decomp. 256°. H. W.

Syntheses in the aromatic-aliphatic series. Phenylacetic acids with the tert.-butyl radical in the ring. R. BERG (Rocz. Chem., 1934, 14, 1249-1261).-p-C6H4Bur CH2Cl and aq. EtOH-NaCN afford p-tert.-butylphenylacetonitrile, b.p. 141-142°, yielding the corresponding acid, m.p. 78-79°, on hydrolysis with aq. H₂SO₄-AcOH. 1-Methyl-4-tert.butyl-2(?)-benzyl chloride, b.p. 146-147°/26 mm., prepared from p-C₆H₄MeBu^y, (CH₂O)_x, and HCl in presence of ZnCl₂, yields similarly the corresponding nitrile, b.p. 145-147°/11 mm., and acid, m.p. 72-1-Ethyl-4-tert.-butyl-2(?)-benzyl chloride, b.p. 73.5°. 146—147°/18 mm., prepared analogously from p-C₈H₄EtBu⁷, b.p. 207—208°/751 mm. [2:6-(NO₂)₂derivative, m.p. 94-95°], affords the corresponding nitrile, b.p. 158-159°/12 mm., and acid, m.p. 70.5-R. T. 72°.

Esters of thionaphthoic acid. L. SZPERL and J. HERSZAFT (Rocz. Chem., 1934, 14, 1238-1242).-Me, b.p. 168.5-170°/10 mm., Ph, m.p. 61.6-62.1°, and α -C₁₀H₇, m.p. 125—126·2°, α -thionaphthoates have been prepared by Taboury's method (Ann. Chim., 1908, **15**, 5). The above esters have similar pro-R. T. perties to those of other known thio-acids.

Synthesis of a methyltert.-butyl-naphthalene and -naphthoic acid. G. DARZENS and A. LEVY
3:3'-dicarboxydiphenyl sulphide and related compounds. N. W. HIRWE, G. V. JADHAV, and Y. M. CHAKRADEO (J. Amer. Chem. Soc., 1935, 57, 101-103).-o-OH·C₆H₄·CO₂Me (I), SOCl₂, and Cu dust give 4:4'-dihydroxy-3:3'-dicarbomethoxydiphenyl sulphide (II), m.p. $147-148^{\circ}$ (diacetale, m.p. 94° ; dibenzoate, m.p. 117° ; $5:5'-Br_2$ -derivative, m.p. 133°); reaction does not occur in absence of Cu. (II) is also obtained from (I), SCl₂, and a little Cu; S₂Cl₂ similarly gives (II) and S (also formed in the above reaction; cf. below). Evidence is given to show that the following reactions are intermediary: $4SOCl_2+3Cu \longrightarrow 3CuCl_2+2SO_2+S_2Cl_2; 2CuCl_2+$ 4:4'-dihydroxy-3:3'-dicarboxydiphenyl sulphide (III), m.p. $269-270^{\circ}$ [Na_2 (+H₂O), K_2 (+2H₂O), Ca (+4H₂O), and Ba (+4H₂O), salts; diamide, m.p. 272-273° (decomp.), from (II) and conc. aq. NH₃; diacetate, m.p. 164°; dibenzoate, m.p. 129°; Me2 ether, m.p. 157°; 5:5'-Br2-derivative (IV), m.p. 274-275° (decomp.)], converted by warm 6.5% and conc. HNO3 into 5-nitrosalicylic and pieric acid (V), respectively. (III) and Br at 100° give 3: 5-dibromosalicylic acid, whilst (IV) is converted by warm 13%, 32.5%, and conc. HNO3 into 3-bromo-5-nitrosalicylic acid, 2bromo-4: 6-dinitrophenol, and (V), respectively. $o-OH \cdot C_6H_4 \cdot CO_2Et$, SOCl₂, and Cu afford 4: 4'-dihydroxy-3: 3'-dicarbethoxydiphenyl sulphide, m.p. 110° (diacetate, m.p. 92°), also prepared by esterification of (III); o-OH·C₆H₄·CO₂Ph similarly gives 4:4'-dihydroxy-3: 3'-dicarbophenoxydiphenyl sulphide, m.p. 158° Ĥ. B. (diacetate, m.p. 144°).

Spontaneous hydrolysis of salolphosphoric and phenylphosphosalicylic acids. J. ARAI (J. Biochem. Japan, 1934, 20, 465-480).-Me salicylate with 0Ph.POCl₂ at 220° followed by treatment with NaOH yields phenylphosphosalicylic acid (I), $0 \cdot CO_2H \cdot C_6H_4 \cdot O \cdot PO(OH) \cdot OPh$ (Ba salt). Max. hydrolysis of 0.002M-phosphosalicylic and -salolphosphoric (salol-O-phosphinic; A., 1899, 53) acid (II) and (I) occurs at $p_{\rm H}$ 5.5, H_3PO_4 and salicylic acid (III) being liberated in approx. equiv. amounts with each acid. With (II) at $p_{\rm H}$ 5.5 for 3 hr., approx. 14% of H₃PO₄ and of (III) are liberated, whilst the liberation of PhOH is complete; at such a stage the hydrolysate yields the Na salt of salicylic anhydride phosphoric ester, $[NaO \cdot PO(OH) \cdot O \cdot C_6H_4 \cdot CO \cdot]_2O$, which dephosphorylates in H_2O with a p_H optimum of 5.5 (20%) after 3 hr.). F. O. H.

Compounds of tervalent vanadium.—See this vol., 313.

Inversion of α -substituted hydroxyhydrindeneacetic acids. D. H. PEACOCK and B. K. MENON (J.C.S., 1935, 15—16).—Condensation of

CH₂Ph-CH₂·CHAc·CO₂Et with 2-bromo-1-hydroxyhydrindene and EtOH-NaOEt, and hydrolysis (KOH-EtOH) of the product, affords trans-y-phenyl- α -1hydroxyhydrindene-2-butyric acid, m.p. 131°, converted by boiling HBr-AcOH into the a-form, m.p. 94°, of the cis-lactone, converted (by inversion about C_a) by boiling N-NaOH-EtOH into the b-form, m.p. 88°, more slowly and less completely than in case of the corresponding CH₂Ph derivative (A., 1934, 1217).

Similarly is obtained trans- β -p-bromophenyl- α -1-hydroxyhydrindene-2-propionic acid, m.p. 175° (Ac derivative, m.p. 171°), converted into the a-form, m.p. 134°, and the b-form, m.p. 110°, of the cis-lactone. J. W. B.

Preparation of tetraiodophthalic anhydride. G. W. PERKINS and G. P. QUIMBA (Amer. J. Pharm., 1934, 106, 467–473).—Prep. of this compound in 80-99.9% yield by I and fuming H_2SO_4 (50% SO₃) and determination of I therein by fusion with Na₂CO₃– Na₂O₂ are described. R. S. C.

Preparation of methyl caffeate [3:4-dihydroxycinnamate]. F. MAUTHNER (J. pr. Chem., 1935, [ii], 142, 33—34).—Successive treatment of the dicarbomethoxy-derivative of 3:4-dihydroxycinnamic acid (I) [from 3:4-(OH)₂C₆H₃·CHO and CH₂(CO₂H)₂ in AcOH at 100° (bath)] with MeOH-Et₂O-CH₂N₂ and cold aq. EtOH-NaOH (in H₂) gives the *Me* ester, m.p. 152—153°, of (I).

Condensation of acetonedicarboxylic acid with phenols and phenolic ethers. II. Formation of 3-keto-7-methoxy-4-methylhydrindenylideneacetic acid. D. B. LIMAYE and G. R. GOGATE (J. Univ. Bombay, 1934, 3 No. 2, 135-140; cf. A., 1931, 1055).—Condensation of $CO(CH_2 \cdot CO_2H)_2$ with p-C₆H₄Me·OMe in H₂SO₄ at 25-28° affords 3-keto-7-methoxy-4-methylhydrindenylideneacetic acid (I), m.p. 218° (decomp.), and 6-methylcoumarin-4-acetic acid (II), m.p. 180° (decomp.), whereas at $0-5^{\circ}$ β -2methoxy-5-methylphenylglutaconic acid (III), m.p. 169° (decomp.), (II), and an acid, $C_{21}H_{22}O_5$, m.p. 252° [*Et* ester, m.p. 122°; semicarbazone, m. p. 272° (decomp.); phenylhydrazone, m.p. 205° (decomp.)], which is converted by conc. H_2SO_4 at 70–80° into (I) result. (III) is transformed into (I) by H_2SO_4 . Oxidation of (I) with HNO₃ (d 1.2) gives 3-methoxy-6-methyl-o-phthalic anhydride, m.p. 186° (Ag and Ba salts and Et H ester, m.p. 94° , of the corresponding acid). From (III) are obtained the anhydride, m.p. 117°, Et2 ester, b.p. 207°/5 mm., Et H ester, m.p. 82°, semianilide, m.p. 148°, anil, m.p. 225°, 2-methoxy-5methylisopropenylbenzene, b.p. 205°, 2:6-dihydroxy-3-2'-methoxy-5'-methylphenylpyridine, m.p. 200°, and its Bz₂ derivative, m.p. 134°. (I) yields an Et ester, m.p. 158° [semicarbazone, m.p. 234° (decomp.); oximino-, m.p. 216° (decomp.), and benzylidene, m.p. 143°, derivatives], a semicarbazone, m.p. 252° (decomp.), and a phenylhydrazone, m.p. 213° (decomp.); it is decarboxylated to a product C₁₂H₁₂O₂, m.p. 83°. H. W.

Synthesis of homosyringic [4-hydroxy-3:5dimethoxyphenylacetic] acid. F. MAUTHNER (J. pr. Chem., 1935, [ii], 142, 26—32).—Syringic acid [from 3:4:5-(OMe)₃C₆H₂·CO₂H and conc. H₂SO₄ at 50°] is converted (method: Lepsius, A., 1914, i, 1072) into the O-CO₂Me derivative and thence by PCl₅ in CHCl₃ into the acid chloride. This is reduced (method: Rosenmund, A., 1918, i, 300) to 4-carbomethoxyoxy-3: 5-dimethoxybenzaldchyde, m.p. 98—99°, hydrolysed (aq. EtOH-NaOH in H₂) to syringaldehyde (the cyanohydrin of which could not be converted into the mandelic acid). Oxidation (O₃ in EtOAc) of the benzoate, m.p. 77°, of 4-hydroxy-3: 5dimethoxyallylbenzene (A., 1921, i, 726) gives 4benzoyloxy-3: 5-dimethoxyphenyl-acetaldehyde [oxime (I), m.p. 118—119°] and -acetic acid (II), m.p. 149—150° [nitrile (III), m.p. 127—128°, from (I) and Ac₂O]. Hydrolysis of (II) with 10% NaOH and (III) with aq. EtOH-KOH gives homosyringic acid, m.p. 130—131°. H. B.

Perkin synthesis. II. E. MÜLLER, H. GAWLICK, and W. KREUTZMANN (Annalen, 1935, 515, 97—112; cf. A., 1932, 56).—The Na enolate (I) of homophthalic anhydride (*loc. cit.*) reacts with ArCHO (yield of product dependent on reactivity of CO) other than PhCHO. Thus, o-NO₂·C₆H₄·CHO and

PhCHO. Thus, o-NO₂·C₆H₄·CHO and o-OMe·C₆H₄·CHO give 83 and 55% of β -hydroxy- β o-nitrophenyl- and - β -o-anisyl- α -o-carboxyphenylpropionolactones, o-C₆H₄<CH(CO₂H)>CH·C₆H₄R, m.p.

178° and 186.5° (decomp.), respectively (Me esters, m.p. 163.5° and 104.5°, respectively). Prolonged interaction of (I) and p-NMe₂·C₆H₄·CHO and subsequent acidification (dil. H₂SO₄) gives 17% of a resinous product, converted by CH₂N₂ into the substance, ? C₆H₄<CO $\xrightarrow{CH(CO_2Me)}$ CH·C₆H₄·NMe₂·SO₄Me, m.p.

228° (becoming red). Succinic anhydride and NaCPh₃ in C₆H₆ afford a *Na enolate*, which with PhCHO at room temp. for 3 weeks gives dibenzylidenesuccinic acid (*Me* ester, m.p. 116°). The enolates from EtOAc and CH₂Ph·CO₂Me react with PhCHO in Et₂O to give (after hydrolysis) CHPh:CH·CO₂H and

CHPh:CPh·CO₂H (*Me* ester, m.p. 76—77°), respectively. NaCPh₃ and CH₂Ph·CN (II) in Et₂O afford the "enolate" [CHPh:C:N]-Na⁺, which is hydrolysed (dil. AcOH) to (II) and reacts with AcCl and PhCHO giving CHAcPh·CN and CHPh:CPh·CN, respectively. Reaction products could not be obtained from PhCHO and the enolates from CHPh₂·CO₂Et, CHPh₂·CHO, CHPh₂·CN, Pr^βCO₂Et (III), Pr^βCHO, and (Pr^βCO)₂O (IV) (*Na*₂ dienolate). The production of OH·CHPh·CMe₂·CO₂H(Et) from (IV), Pr^βCO₂Na, and PhCHO (Fittig et al., A., 1883, 471; 1885, 663) or from (III), PhCHO, and EtOH-NaOEt (Scheibler and Friese, A., 1925, i, 1417) could not be confirmed. The Na enolate of CH₂(CO₂Et)₂ does not condense with PhCHO in C₆H₆ or in Et₂O containing small amounts of piperidine, NEt₃, or NaOAc.

The first stage in the Perkin reaction is the formation of an enol or enolate which subsequently condenses with a reactive CO (of the second component). H. B.

Action of aromatic aldehydes on benzene and toluene in presence of aluminium chloride. D. H. HEY (J.C.S., 1935, 72-75).—Contrary to Gattermann (A., 1906, i, 589) PhCHO and anthracene (I) are formed when dry CO+HCl is passed into C_6H_6+ AlCl₃ at 45°. C_6H_6 reacts with *m*- or *p*- C_6H_4 Me·CHO, or with *o*- C_6H_4 Cl·CHO to give, in each case, (I), CHPh₃, and, respectively, PhMe and *m*-xylene or PhCl. The last-named products indicate the reversibility of the reaction PhCHO $\Longrightarrow C_6H_6+$ CO. In agreement with this view PhCHO and AlCl₃ afford CO, and CO+HCl with boiling PhMe-AlCl₃ give a mixture (II) of 2:6- and 2:7-dimethylanthracene (identified by oxidation to the quinones), and a mixture of tritolylmethanes. The same (II) is obtained by the action of either PhCHO or furfuraldehyde on PhMe-AlCl₃ at 60°. It is therefore concluded that the hydrocarbon nuclei alone go to form the two end rings in (I) and the three rings in $CHAr_3$, the aldehyde supplying only the *meso*-C in the former, and the methane-C in the latter. J. W. B.

Action of halogens on the arylhydrazones of unsaturated aldehydes. F. D. CHATTAWAY and H. IRVING (J.C.S., 1935, 90–92).—The action of excess of Br in AcOH on the appropriate phenylhydrazone of CHPh:CH·CHO is probably NHPh·N:CH·CH:CHPh \longrightarrow

2:4-C₆H₃Br₂·NH·NBr·CHBr·CHBr·CHBrPh 2:4-C₆H₃Br₂·NH·N:CBr·CHBr·CHBrPh, although a NO₂ in the N:NHPh residue prevents further nuclear substitution. By such methods are obtained waß-tribromo-\beta-phenylpropaldehyde-2: 4-di-, m.p. 180°, and -2:4:6-tri-bromo-, m.p. 173°, -p-nitro-, m.p. 193°, and -2-bromo-4-nitro-, m.p. 199°, -phenylhydrazone, and ab-dibromo-b-phenylpropaldehyde-2-bromo-4-nitrophenylhydrazone. Similar action of Cl₂ gives waß. trichloro-β-phenylpropaldehyde-2: 4-di-, m.p. 158°, and 2:4:6-tri-chloro-, m.p. 111°, and -2-chloro-4-nitro-, m.p. 190°, -phenylhydrazone. Reduction (SO2-aq. NH₃) of the diazonium compound from 2-bromo-4nitroaniline affords 2-bromo-4-nitrophenylhydrazine, m.p. 142°, the corresponding 2-Cl-derivative, m.p. 142°, being similarly obtained. The following are also new: cinnamaldehyde-2:4-di-, labile and stable form, m.p. 164°, and -2 : 4 : 6-tri-bromo-, m.p. 125°, -2-bromo-4-nitro-, m.p. 148°, and -2-chloro-4-nitro-, m.p. 157°, -phenylhydrazone. J. W. B.

Oxidation of 2- and 4-nitro-4'-methyldiphenyl with chromyl chloride. W. S. H. GRIEVE and D. H. HEY (J.C.S., 1935, 114—115).—2- and 4-Nitro-4'-methyldiphenyl are, respectively, converted by $CrOCl_2-CCl_4$ and subsequent treatment with SO₂ into 2-, m.p. 101°, and 4-nitrodiphenyl-4'-aldehyde, m.p. 127° (together with the corresponding acid), identical, respectively, with the corresponding products obtained by nitration of diphenyl-4-aldehyde (A., 1933, 1051). J. W. B.

Determination of lignin at low temperatures and the complete hydrolysis of straw. R. S. HILPERT and E. LITTMANN (Ber., 1935, 68, [B], 16-18).—The production of ppts. by the action of H_2SO_4 on carbohydrates (A., 1934, 1205) diminishes greatly with fall of temp. and is generally very slight at 6°. At 0°, straw gives 16% of its wt. of ppt. At $> -10^{\circ}$, straw dissolves in 72% H₂SO₄ to a clear solution except for a slight residue of ash. Dilution causes pptn. of varying amounts of material, 2C₆H₁₀O₅-H₂O, which is doubtless a carbohydrate and either represents an intermediate product or a component particularly stable to acid. Apart therefrom (8-20%), the solutions are transparent and when neutralised and conc. leave a pale yellow product which reduces Fehling's solution. Straw cannot therefore contain appreciable amounts of substances with the properties of lignin. The unusual sensitiveness of straw to H_2SO_4 indicates the presence of an unknown carbohydrate unless a peculiar linking of the polyose enhances the reactivity of the sugar. H. W.

Cyclic ketones. IV. R. POGGI [in part with (MISS) M. GOTTLIEB] (Gazzetta, 1934, 64, 852-857).--Anisaldehyde (I) and 4-methylcyclohexanone condense (KOH) to form 2-anisylidene- (II), m.p. 91.5-93° [semicarbazone, m.p. 205-208° (decomp.); oxime, m.p. 122-124°], and 2:6-dianisylidene-4methylcyclohexanone (III), new m.p. 144-145°. (II) and (I) yield (III); (II) and PhCHO, the 6-benzylidene-2-anisylidene compound, m.p. 108-112.5°. Br converts (III) into the compound, $C_{23}H_{23}O_3Br_5$ (?), decomp. 179°. All the above are photo-sensitive. E. W. W.

Structure of metal ketyls. IV. Nature of intermediate product in reaction with alkyl halides. C. B. WOOSTER and J. G. DEAN (J. Amer. Chem. Soc., 1935, 57, 112-114; cf. this vol., 84).-The red solution of Na (I) or K (II) ethoxydiphenylmethyl obtained from CPh₂(OEt)₂ and Na or K (2 equivs.) in liquid NH₃ is decolorised by dry O₂; benzpinacol Et_2 ether, m.p. 162.5° (converted by HI into COPh·CPh₃ and EtI), and ethoxydiphenylmethyl peroxide, m.p. 138° (converted by HI into COPh2 and EtI), are produced. (I) is accompanied by some $CNa_2Ph_2: CPh_2(OEt)_2 + 4Na \longrightarrow CNa_2Ph_2 + 2NaOEt.$ (II) is also prepared from CHPh2 OEt and KNH2 in liquid NH_3 . Determinations of OEt show that (I) and (II) do not undergo any appreciable rearrange-ment during several hr. The ketyl (A) from COPh₂ and Na (or K) in liquid NH3 with EtBr gives products containing 2-3.8% OEt only; (I) [or (II)] is not, therefore, an intermediate. The radical $C_{15}H_{15}O$ (loc. cit.), formed during the reaction between (A) and EtBr, is considered to be $CPh_2Et \cdot O \cdot$; (A) thus reacts as CPh₂Na·O·. The Na can be removed from (A) by CPh_3 ; $COPh_2$ (about 39%) and $NaCPh_3$ are produced. The reactions and electrolytic properties of metal ketyls are consistent with the equilibrium $CR_2Na \cdot O = \cdot CR_2 \cdot ONa.$ H. B.

Reactions of *p*-dimethylaminobenzophenone and the Beckmann transformation of *p*-dimethylaminobenzophenoneoxime. R. C. SHAH and M. B. ICHAPORIA (J. Univ. Bombay, 1934, **3**, No. 2, 172—175).—*p*-NMe₂·C₆H₄·COPh (I) is converted by an excess of MeI in boiling MeOH into the methiodide, m.p. 188—190° (decomp.), from which (I) is regenerated at 190°/3 mm. (I) and Br in CHCl₃ afford 3-bromo-4-dimethylaminobenzophenone, m.p. 78—80°. 3:3:5'-Trinitro-4-dimethylaminobenzophenone, m.p. 130°, is obtained from (I) and conc. HNO₃ in AcOH at room temp. or from (I) and HNO₃ (conc. or 1:1). *p*-Dimethylaminobenzophenoneoxime (II), m.p. 154—155°, is transformed by PCl₅ in Et₂O into *p*-benzamidodimethylaniline, m.p. 226—228°, thus establishing the anti-configuration of (II). H. W.

General method of preparing α -amino-ketones. 1. P. W. NEBER and G. HUH (Annalen, 1935, 515, 283-296; cf. A., 1932, 404).—The formation of the ethyleneimine from ketoxime esters is dependent on the attachment of the SO₂Ar residue to O of the NOH group and does not occur when its place is taken by Ac, Bz, or CHPh:CH-CO. Reaction appears independent of the configuration of the oxime and is

generally applicable except in the cases of certain ketonic acids or their esters and ether-ketones such as $NO_2 \cdot C_6H_4 \cdot O \cdot CH_2 \cdot CMe \cdot N \cdot OH$.

2:4-Dinitrodcoxybenzoinoxime (I) is transformed by PhSO₂Cl or p-C₆H₄Me·SO₂Cl in C₅H₅N at 0° into the "ethyleneimine" base, $(NO_2)_2C_6H_3$ ·CH $<_N^{CPh}$, m.p. 100°, converted by 50% H₂SO₄-EtOH at room temp. into α -amino- β -keto- β -phenyl- α -2: 4-dinitrophenylethane sulphate, decomp. 156°. Acid hydrolysis of the acetate, m.p. 92°, benzoate, m.p. 136°, and cinnamate, m.p. 117°, of (I) leads to 2: 4-dinitrodeoxybenzoin. Transformation of (I) by PCl₅ in Et₂Odioxan affords 2:4-dinitrophenylacetanilide, m.p. 183°. β-o-Nitrobenzyl Me ketoxime and $p-C_6H_4Me\cdot SO_2Cl$ in C_5H_5N at 0° give the corresponding p-toluenesulphonate, m.p. 124°, hydrolysed with accompanying transformation by 20% H_2SO_4 to $o-NO_2 \cdot C_6H_4 \cdot CH_2 \cdot CO \cdot NHMe$, m.p. 145°, and converted by KOEt-EtOH at 0° through a-amino-βketo-α-o-nitrophenylpropane into 3:6-di-o-nitrophenyl-2: 5-dimethyl-3: 6-dihydro-1: 4-diazine, m.p. 186°. Deoxybenzoinoxime affords an unstable p-toluenesulphonate, m.p. 81°, converted by KOEt-EtOH into desylamine. Propiophenoneoxime p-toluenesulphonate, m.p. 65°, cannot readily be obtained in C_5H_5N by reason of the ease with which it suffers the Beckmann transformation by C5H5N,HCl. It is obtained in 2N-NaOH and converted by KOEt-EtOH at room temp. into ω-aminopropiophenone, 3: 6-diphenyl-2: 5-dimethyl-1: 4-diazine, whence m.p. 125°. Acetophenoneoxime p-toluenesulphonate, m.p. 79° (decomp.), is converted by EtOH at room temp. into NH3Ph p-toluenesulphonate, decomp. 233°, and by KOEt into CH₂Bz·NH₂ (Bz derivative, m.p. 126°). Acetoxime p-toluenesulphonale, m.p. 88° (decomp.), yields aminopropanone. o-Nitro-

by $p-C_6H_4$ Me·SO₂Cl and C_5H_5 N at 0° into $o-NO_2$ ·C₆H₄·CH₂·CN, m.p. 87°. The prep. of *Et* o-nitrophenylpyruvate oxime, m.p. 124°, and its p-toluenesulphonate, m.p. 120°, is described. o-Nitrophenoxyacetoxime, m.p. 134° (lit. m.p. 102°), yields a p-toluenesulphonate, m.p. 104°, remarkably stable towards EtOH. 2:4-Dinitrophenoxyacetone, m.p. 94°, from 2:4-(NO₂)₂C₆H₅·OAg and CH₂AcI in boiling C₆H₆, affords an oxime, m.p. 154°, and its p-toluenesulphonate, m.p. 123°. H. W.

phenylpyruvic acid oxime, m.p. 172°, is transformed

Condensation of styryl methyl ketone with nitrobenzaldehydes. W. KRASZEWSKI (Rocz. Chem., 1934, 14, 1354—1357). Styryl Me ketone and o-, m-, and p-NO₂·C₆H₄·CHO in EtOH-NaOH afford styryl o- (I), m.p. 104° (tetrabromide, m.p. 170—171°; semicarbazone, m.p. 195°), m-, m.p. 140° (tetrabromide, m.p. 174—175°; phenylhydrazone, m.p. 176°), and p-nitrostyryl ketone, m.p. 176° (dibromide, m.p. 166— 167°; tetrabromide, m.p. 195—196°; phenylhydrazone, m.p. 180—181°). In presence of H₂O, styryl β -hydroxy- β -o-nitrophenylethyl ketone, m.p. 74° (benzoate, m.p. 130°; dibromide, m.p. 104°; semicarbazone, m.p. 179—180°), is obtained in place of (I). R. T.

Dioximes. CIV. G. PONZIO and F. BIGLIETTI (Gazzetta, 1934, 64, 861-868).—Action of N₂O₄ on

αζ-dioximino-αζ-diphenylhexane (I) [new m.p. 227-228° (cf. A., 1913, i, 171); Ac₂ derivative, m.p. 89°] gives, not the expected peroxide with 10-membered ring, but a mixture of aaζζ-tetranitro- (II) with aζ-dinitro-aζ-diphenylhexane (III), m.p. 83°. (II) is obtained in an α -form, blue, becoming white at 120°, m.p. 137-138°, with isomerisation into the β-form, white, m.p. 141-142°, also obtained by action of HNO₃ on (I). (II) is reduced (SnCl₂) to (I) and the ak-Dioximino-ak-diphenyldecane diketone. Inew m.p. 125-126° (cf. A., 1912, i, 23); Ac2 derivative, m.p. 92°] yields with $N_2O_4 \alpha \alpha \kappa \kappa$ -tetranitro- $\alpha \kappa$ -diphenyl-decane, α -form, blue, becoming white at 100°, and isomerising at m.p. 130° to the β-form, m.p. 137-E. W. W. 138°.

Sexual hormones. III. Elucidation of the constitution of androsterone. L. RUZICKA, M. W. GOLDBERG, and H. WIRZ. IV. Derivatives of synthetic androsterone and one of its isomerides. L. RUZICKA, M. W. GOLDBERG, and J. MEYER (Helv. Chim. Acta, 1935, 18, 61–68, 210–218).— III (cf. A., 1934, 1221). Mainly a reply to criticisms. Examination of a variety of compounds shows that the occurrence of colour and its variations in the Liebermann reaction throw little light on the nature of the C skeleton. Oxidation of cholestane with CrO₃ in AcOH at 85–90° gives *ætio*allo*cholan*-17-one, $C_{19}H_{30}O$, m.p. 121–122° (corr.) [semicarbazone, m.p. about 270° (corr., decomp.) after softening], and *allocholanic acid*, m.p. 169–170°.

IV. The only marked difference between the physiological action of synthetic androsterone (I) (A., 1934, 1221) and its acetate (II) lies in the rather longer period required for development of max. action with (II). Dihydrocholesterol benzoate, m.p. 135° to a cryst. liquid phase which becomes transparent at 155°, is oxidised by CrO_3 (=100) in AcOH at 90-95° to 3-hydroxyætioallocholanone benzoate, m.p. 210-212° (corr.) [semicarbazone, m.p. 251-253° (decomp.)]. (I) is transformed by (·CH₂·CO)₂O in C₅H₅N at 80-90° into the H succinate, m.p. 184–185° (corr.), and by BzCl in C_5H_5N at 80–90° into the benzoate, m.p. 178—178.5°. Catalytic reduction (PtO_2) of (I) in acid solution $(AcOH-H_2SO_4)$ yields a *diol* (III) C19H32O2, m.p. 223° (corr.) [diacetate (IV), m.p. 162-163°], whereas in neutral or alkaline medium (III) is accompanied by relatively large amounts of the other stereoisomeride (the isolation of a probably nonhomogeneous product, m.p. about 205° after softening, is described). Reduction of (II) (PtO₂-EtOH-H₂SO₄) affords 3-epiacetoxyætioallocholan-17-ol (V), m.p. 183°. (III), (IV), and (V) are about 3 times as active as (I) and (II) physiologically. The oxidation of (I) to 3:17-diketoætioallocholane, m.p. 132°, is described. H. W.

Artificial preparation of male sexual hormone. L. RUZICKA (Naturwiss., 1935, 23, 44–49).—CrO₃ oxidation of dihydro- and epidihydro-cholesterol (I), coprosterol, and epicoprosterol acetates followed by neutralisation, pptn. of the semicarbazones, and hydrolysis yields the hydroxyketones, $C_{19}H_{30}O_2$, that from (I) being identical chemically and biologically with Butenandt's "androsterone" (A., 1932, 96, 971), which probably has the space formula:



 Δ^4 -Pregnen-20 ol-3-one. Specificity of corpus luteum activity. A. BUTENANDT and J. SCHMIDT (Ber., 1934, 67, [B], 2092—2094).—Pregnanol-3-one



is transformed by Br-AcOH into the substance (I), which loses HBr in boiling C_5H_5N yielding Δ^4 -pregnen-20-ol-3-one (II), m.p. 159°, $[\alpha]_D^{20} + 89.7°$ in abs. EtOH [acetate (III), m.p. 138.5°, also obtained by loss of HBr from bromopregnan-20-ol-3-one acetate, m.p. 167.5°]. (II) and (III) appear physiologically inactive. H. W.

Constitution of astacin. P. KARRER, L. LOEWE, and H. HUBNER (Helv. Chim. Acta, 1935, 18, 96– 100; cf. A., 1934, 896).—The isolation of $\alpha\alpha$ -dimethylsuccinic acid from the products of the oxidation of the diphenazine derivative of astacin (I) shows the latter substance to be 5:6:5':6'-tetraketo- β -carotene. Treatment of the protein-free ligroin extract of lobster shell with I gives a ppt. of the *iodide* of astacin palmitate, which gives non-cryst. astacin palmitate (astacein), readily hydrolysed by KOH to (I) and palmitic acid. H. W.

Catalytic hydrogenation of diphenyl triketone. I. L. A. BIGELOW, H. G. RULE, and W. A. P. BLACK (J.C.S., 1935, 83-85).—The course of the catalytic reduction of COBz₂ (I) is affected by the proportion and character of the catalyst. With 1 mol. of H₂-Pt-PtO₂ at 15°/2—5 atm. in C₆H₆, (I) affords dibenzoylcarbinol (II) ($\alpha\gamma$ -diketo- $\alpha\gamma$ -diphenylpropan- α ol), m.p. 110—111.5° (kept at 106—107°, it undergoes a series of changes to a mixture of isomerides, m.p. 96—98°), further reduced (2H₂) to $\alpha\gamma$ -diphenylglycerol (III), m.p. 84.5—85°, +H₂O, m.p. 97—99° (Ac_3 derivative, m.p. 84—85°). With less catalyst and 1H₂ (II) affords (III) and $\alpha\beta$ -dihydroxy- γ -keto- $\alpha\gamma$ diphenylpropane, m.p. 87—89° (or an isomeride), also obtained by direct reduction of (I), and further reduced to (III). J. W. B.

Oxidation of 2:7-diacetylfluorene. K. DZIEwoński, S. KUZDRZAŁ, and J. MAYER (Bull. Acad. Polonaise, 1934, A, 348—353).—2:7-Diacetylfluorene (A., 1931, 622) [the formation of an isomeride, m.p. 188—190° (A., 1932, 1251), has not been confirmed] is oxidised by Na₂Cr₂O₇ in AcOH at the b.p. to 2:7-diacetylfluorenone, m.p. 252—253°, and 2-acetylfluorenone-7-carboxylic acid, m.p. 307° (decomp.) [Me ester, m.p. 225°; diphenylhydrazone, m.p. 265°; amide, m.p. 298° (decomp.); sparingly sol. Na salt]. More prolonged oxidation affords fluorenone-2: 7-dicarboxylic acid, m.p. 407° (decomp.) (Me_2 ester, m.p. 218°; phenylhydrazone, m.p. 332°; diamide, m.p. 337-338°). H. G. M.

Dyeing properties of dicinnamoylmethane derivatives. W. LAMPE and J. TACZANOWSKA (Rocz. Chem., 1934, 14, 1226—1230; cf. A., 1929, 1069).—p-C₆H₄(CO·CH:CHR)₂ [R=·C₆H₃:O₂CH₂ and o-C₆H₃(OH)·OMe] are obtained by heating piperonal or vanillin with p-C₆H₄(CO·CH₂·CO₂Et)₂ with alcoholic HCl at 100° for 2 hr. The dyeing properties of these substances are compared with those of the dicinnamoylmethane series. Only those substances having a OH group or able to develop one by enolisation are substantive dyes for cotton. R. T.

Quinones from homologues of orcinol and their bromo-substituted products. F. FUZI-RAWA (Ber., 1935, 68, [B], 72-76).-Oxidation of divarin Me₂ ether by Na₂Cr₂O₇ in AcOH at 100° affords 6-methoxy-2-propyl-p-benzoquinone, m.p. 78°. Similarly, olivetol Me2 ether, b.p. 130°/3 mm., gives 6-methoxy-2-n-amyl-p-benzoquinone, m.p. 63°, and spharophorol Me₂ ether, b.p. 175-180°/22 mm., yields 6-methoxy-2-n-heptyl-p-benzoquinone, m.p. 67°. Deoxyhyposalazinol Me3 ether is converted into 6-methoxy-2: 5-dimethyl-p-benzoquinone, m.p. 64°, also obtained from β -orcinol Me ether. Me *p*-orsellinate Me2 ether and Br in AcOH give Me bromo-p-orsellinate Me, ether, m.p. 80°; the corresponding acid, m.p. 180°, is decarboxylated by Cu chromite in quinoline at 185-190° to 2-bromo-3 : 5-dimethoxytoluene (I), m.p. 57°. Me dibromo-p-orsellinate Me2 ether, m.p. 84° yields successively the corresponding acid, m.p. 126° and 2:6-dibromo-3:5-dimethoxytoluene, m.p. 168°. Oxidation of (I) by Na₂Cr₂O₇ in AcOH leads to 3-bromo-6-methoxy-2-methyl-p-benzoquinone, m.p. 149°, also obtained by the oxidation of tribromoalectol Me₃ ether. Divarin is methylated (Me₂SO₄, NaOH) and the crude ether is oxidised to 3-bromo-6-methoxy-2-n-propyl-p-benzoquinone, m.p. 110°. Similar treat-ment of olivetol leads to 3-bromo-6-methoxy-2-namyl-p-benzoquinone, m.p. 114°. H. W.

Absorption spectra of hydroxynaphthaquinones and of the colouring matter of *Drosera Whittakeri*. A. B. BECK, A. K. MACBETH, and F. L. WINZOR (Austral. J. Exp. Biol., 1934, 12, 203-211).— α - and β -Naphthaquinones differ in absorption spectra only in the absence of free OH. Hydroxydroserone triacetate is of the α -quinone type. P. G. M.

Oxidation of acenaphthene to acenaphthenequinone. A. I. KIPRIANOV and M. M. DASCHEVSKI [J. Appl. Chem. Russ., 1934, 7, 944—949).—The products of oxidation of acenaphthene by $K_2Cr_2O_7$ in AcOH are acenaphthenequinone (I) and naphthalic anhydride (II), sol. in aq. Na₂CO₃, and an insol. residue (III), consisting of mixed crystals of (I) and (II); the relative yield of (III) increases with duration of oxidation. (I) can be extracted from (III) by prolonged heating with NaHSO₃ or Na₂CO₃ dissolved in H₂O or suspended in PhNO₂. R. T.

Colouring matters of fungi. XI. Boletol, the colouring matter of the blue-coated Boletus.

XII. Synthesis of boletol and isoboletol. F. Kögl and W. B. DEIJS (Annalen, 1934, 515, 10-23, 23-33).-XI. Boletol (I), C₁₅H₈O₇, red, chars 275-280° [purified through its Ac_3 derivative (II), m.p. > 300° (becoming red)], is extracted [method essentially that of Bertrand (A., 1902, i, 220; ii, 166)] from Boletus satanas, Lenz., B. luridus, Schäff., and B. badius, Fr. (II), Ac2O-NaOAc, and Zn dust give pentaacetyl-leucoboletol, m.p. 246°, whilst methylation (Et₂O-CH₂N₂) of (I) and subsequent reductive acetylation affords diacetyltrimethyl-leucoboletol (III), m.p. 213°. Distillation of (II) with "electrolytic" Zn dust (prep. described) gives anthracene. (I), which contains a CO.H group, is decarboxylated (soda-lime) to 1:2:4-trihydroxyanthraquinone and oxidised $(30\% H_2O_2, 0.1N-NaOH)$ to $1:2:3-C_6H_3(CO_2H)_3$. (I) is, therefore, 1:2:4- or 1:3:4-trihydroxyanthra-quinone-8-carboxylic acid. Oxidation [Pb(OAe)₄, AcOH] of (I) gives 2- or 3-hydroxyanthra-1:4:9:10diquinone-8-carboxylic acid, m.p. > 300°, which dissolves in conc. Na_2CO_3 to a bright blue solution [(I) similarly gives a red solution], and is spectroscopically identical with the blue pigment in the expressed juice of fresh Boletus.

XII. Successive treatment of the product from hemimellitic anhydride (IV), $1:2:4-C_6H_3(OMe)_3$, and AlCl₃ in CS₂ with 20% oleum at 100° (bath), CH₂N₂, 1% MeOH-NaOH at room temp., and Zn dust+Ac₂O gives a *mixture*, m.p. 193—196°, of 9:10diacetoxy-1:2:4-trimethoxyanthracene-5- and -8carboxylic acids; one acid (V), m.p. 210-211° (Me ester, m.p. 170°), is separated by alternate crystallisation from AcOH and MeOH. (V) is identical with (III) (above). Attempted demethylation of (V) causes deep-seated decomp. Quinol, (IV), and AlCl₃-NaCl at 180-190° give I: 4-dihydroxyanthraquinone-5-carboxylic acid, decomp. about 250°. Oxidation of this with Pb(OAc)₄ in AcOH, treatment of the resulting diquinone (freed from AcOH but not from Pb) with Ac_2O -conc. H_2SO_4 , and subsequent hydrolysis (5% EtOH-KOH) affords a mixture of 1:2:4- and 1:3:4 - trihydroxyanthraquinone-8-carboxylic acids [one of which is (I) and the other isoboletol (VI)], separated by adsorption (from EtOH solution) on Al₂O₃. Reductive acetylation of (VI) gives pentaacetyl-leucoisoboletol, m.p. 235°. Spectroscopic data for (I) (natural and synthetic) and (VI) are given. Attempted condensation of triacetylnaphthopur-

Attempted condensation of triacetylnaphthopurpurin and β -vinylacrylic acid (VII) in EtOH at 100° or C₆H₆ results in the polymerisation of (VII). 3-Chlorophthalic anhydride, 1:2:4-C₆H₃(OMe)₃, and AlCl₃-NaCl at 200—220° give a mixture, m.p. 185— 194°, of 5- and 8-chlorotrimethylpurpurin; Cl could not be replaced by CN (method : G.P. 484,633). H. B.

Condensation of diketo-compounds with nitromethane. I. Condensation of α -diketones. A. J. JAKUBOVITSCH (J. pr. Chem., 1935, [ii], 142, 37-48).—Phenanthraquinone (I) and MeNO₂ (II) in MeOH or MeOH-KOH (varying amounts) give 10-hydroxy-9-keto-10-nitromethyl-9:10-dihydrophenanthrene, m.p. 148-148.5° (sinters at 145-148°) (K salt), which when heated above the m.p. decomposes to (I). Benzil and (II) (2 mols.) in MeOH-KOH (2 mols.) at room temp. afford COPh·CH₂·NO₂ (III), PhCHO, MeOBz, CH₂Ph·OH, BzOH, and $\alpha\delta$ -dinitro- $\beta\gamma$ -diphenylbutane, m.p. 238·5—239·5° (decomp.); the following reactions probably occur: Bz₂+ MeNO₂ \longrightarrow COPh·CPh(OH)·CH₂·NO₂ \longrightarrow

COPh·CH₂·NO₂+PhCHO; Bz_2 +KOMe \longrightarrow COPh·CPh(OMe)·OK \longrightarrow PhCHO+MeOBz. (III) is hydrolysed slowly by boiling 4% H₂SO₄ to BzOH; with aq. EtOH-HCl, COPh·CCI:N·OH (Claisen and Manasse, A., 1893, i, 464) results. Ac₂ heated with an excess of (II) and a little K₂CO₃ gives α -nitro- β hydroxy- β -methylbutan- γ -one, b.p. 125°/11 mm. [semicarbazone, m.p. 214—215° (partial decomp.)]; with an excess of Ac₂, some δ -nitro- γ e-dihydroxy- γ e-dimethylheptane- $\beta\zeta$ -dione, b.p. 127—128°/11 mm., is obtained. H. B.

9:10-Dihydroxy-9:10-di-n-butyl-9:10-dihydrophenanthrene and 2:2'-di-n-valeryldiphenyl. T. W. JEZIERSKI and M. SPOTOWSKA (Rocz. Chem., 1934, 14, 1243—1248).—Phenanthraquinone and MgBu^oI afford 9:10-dihydroxy-9:10-di-n-butyl-9:10-dihydrophenanthrene (I), m.p. 135—135.5°, together with the corresponding 9:10-dibutylenoderivative, b.p. 239—240.5°/7 mm. (I) is converted by boiling with CrO₃ in AcOH into 2:2'-di-n-valeryldiphenyl, b.p. 197.5—199.5°/6 mm. R. T.

Oxidative degradation of violanthrone and 2:2'-dibenzanthronyl to 2:2'-dianthraquinonyl-1:1'-dicarboxylic acid. Synthesis of this acid from 2-bromo-1-cyanoanthraquinone and its conversion into 1:2:7:8-diphthaloylphenan-thridone. R. SCHOLL, E. J. MÜLLER, and O. BOTTGER (Ber., 1935, 68, [B], 45-49).-2-Bromo-1-cyanoanthraquinone is transformed by Cu powder in boiling PhNO2 into 1: 1'-dicyano-2: 2'-dianthraquinonyl, which darkens without melting at 500° and is hydrolysed by H_2SO_4 to 2:2'-dianthra-quinonyl-1:1'-dicarboxylic acid (I) (corresponding chloride), converted by BzCl in boiling PhNO2 into 2: 2'-dianthraquinonyl-1: 1'-dicarboxylic anhydride (II), decomp. about 375-380°. Oxidation of violanthrone in dil. H2SO4 by CrO3 affords (I), also obtained from 2:2'-dibenzanthronyl. Successive treatment of (II) in conc. NH_3 with $Na_2S_2O_4$ and air leads to the *semiamide* of (I) $[NH_4]$ and Na salts], converted by Br-NaOH into 1'-amino-2:2'-di-anthracuin mid learning in mit and the semianity of the semianit anthraquinonyl-1-carboxylic acid (Na salt), which in boiling AcOH passes into 1:2:7:8-diphthaloylphenanthridone, m.p. about 480° (decomp.) after darkening at 400° and softening at about 450°. H. W.

Saponins. I. Cyclamin and cyclamiretin. II. Spinatsaponin and [spinat]sapogenin. O. DAFERT [with F. BAUER, M. BAUER, V. CAPESIUS, and S. GREIFINGER] (Sci. Pharm., 1934, 5, 49–56, 61-65; Chem. Zentr., 1934, ii, 1785–1786).—I. The formulæ $C_{63}H_{110}O_{32}$ for cyclamin (I) and $C_{35}H_{56}O_5$ for cyclamiretin (II) previously advanced (A., 1926, 1146) must be replaced by $C_{56}H_{96}O_{29}$ and $C_{28}H_{46}O_4$, respectively. The isolation of (I) from cyclamen tubers is described, the content being highest in autumn. (I) is not stable to heating in aq. solution, the hæmolytic index falling rapidly. An ash-free sample of (I) has m.p. 250°, hæmolytic index 1:650,000; other biological characteristics are described. (II) has m.p. 204° (diacetate, m.p. 207°; monobenzoate, m.p. 209°; semicarbazone, m.p. 277°). Reduction of (I) (Na-EtOH) yields tetrahydrocyclamiretin (?), $C_{28}H_{50}O_4$, m.p. 215° (triacetate, m.p. 135°). (II) with NaOEt affords a compound, $C_{30}H_{52}O_5$, m.p. 280°; with Br-EtOH, a compound, $C_{28}H_{45}O_4$ Br, m.p. 220-223°; and with Br-CCl₄, an impure compound, $C_{28}H_{42}O_4$ Br₆ (?).

an impure compound, $C_{28}H_{42}O_4Br_6$ (?). II. Spinatsaponin, $C_{59}H_{90}O_{27}$, is isolated from spinach roots; it has a hæmolytic index of 1 : 40,000 and many other biological characteristics are recorded. Acid hydrolysis yields spinatsapogenin (III), $C_{32}H_{50}O_5$, m.p. 300°, which gives the Liebermann cholesterol reaction, is acidic (equiv. $-\frac{1}{2}$ mol. wt.), and appears to contain 2 OH; no CO or double linking could be detected. The following derivatives of (III) are described : monoacetate, m.p. 256°; Et ester (?), m.p. 295°; and a compound, $C_{30}H_{48}O_4$, m.p. 219°, formed during esterification. The partial formula $C_{29}H_{45}(CO_2H)(OH)$ ·OAc is advanced for (III). H. N. R.

Crystalline principles from Indian species of *Artemisia*.—See this vol., 268.

Preparation of ketonic terpenes. R. DULOU (Bull. Inst. Pin, 1934, 173—177).—Prep. of the following is described: pinocamphone, b.p. $95^{\circ}/22$ mm. (semicarbazone, m.p. 227—228°), from hyssop essence; nopinone and Na nopinate from nopinene and KMnO₄; fenchone from fenchyl alcohol; pulegone, b.p. 105°/18 mm., from peppermint essence; tetrahydrocarvone, dihydrocarveol (and thence dihydrocarvone), and carvotanacetone from carvone.

R. S. C.

Action of hydrogen sulphide on ketonic terpenes. R. DULOU (Bull. Inst. Pin, 1934, 205– 209).—The H₂S compound, m.p. 210—211°, of carvone is unaffected by semicarbazide and shows 1.8 OH by MgEtBr. Harries' formula is, therefore, considered correct. Piperitone and verbenone give oily H₂S compounds. 3 - Methyl - 5 - *iso*propenyl - Δ^2 - *cyclo*hexenone gives crystals, stable at --10°, but decomp. at 0°. Benzylidene- and hydroxymethylenecamphor do not react with H₂S. Reaction is considered to be due to hydration of the CO group.

R. S. C.

Configuration of derivatives of camphane, isocamphane, etc. J. BOESEKEN (Rec. trav. chim., 1935, 54, 101-106).—The spatial proximity of CI, C2, and C6 in Bredt's formula for camphor (I) accounts (for details see original) for the optical stability of (I), the properties of the OH of borneol and isoborneol, the transformation of camphene (II) into bornyl and isobornyl acetate, of bornyl chloride (III)into (II) and tricyclene, and of 2: 2-dichlorocamphane (IV), the oxidation of camphorhydrazone by HgO, and the instability of diazocamphane. The bornyl radical [formed by ionisation of (III)] after rupture of the C1-C6 linking and formation of the C2-C6 linking is said to be in the "proto(iso)camphanic" state. Transformation of d-(I) by way of (IV) into derivatives of l-(I) is due to re-formation of the skeleton by a different path, and not to a true inversion of the mol. Transformations in the fenchene series are similarly explained. R. S. C.

Functional exchange between Grignard compounds and α -bromocamphor. H. WUYTS (Compt. rend., 1934, **199**, 1317—1319; cf. A., 1934, 640).—Excess of MgMeI with bromocamphor (I) gives an approx. equimol. mixture of CH₄ and C₂H₆, camphor (II), and some camphorpinacol. Similarly, with CH₂Ph·MgCl, (I) gives PhMe and (·CH₂Ph)₂. (I) with the Mg derivatives of PhBr and 1-C₁₀H₇Br gives mainly (II), and with MgPhI or MgPhCl, a considerable amount of PhBr, which indicates that MgI is exchanged for Br. J. L. D.

Rupture of the four-carbon ring of pinene glycol. K. SŁAWIŃSKI and W. ZACHAREWICZ (Rocz. Chem., 1934, 14, 1320—1329).—HBr and pinene glycol in AcOH yield a mixture of products, of which the following have been isolated : a saturated glycol, $C_{10}H_{18}O_2$, m.p. 193—194°; an unsaturated glycol, $OH \cdot CMe < CH(OH) \cdot CH_2 > CH \cdot CMe \cdot CH_2$, m.p. 179—180° (diacetate, b.p. 147—148°/4 mm.); an unsaturated alcohol, $CMe < CH(OH) \cdot CH_2 > CH \cdot CMe \cdot CH_2$, b.p. 68—69°/1 mm., 217°/747 mm.; disobrerol; dipinol. R. T.

Stereoisomerism in the pinocampheol and menthol series. H. SCHMIDT and L. SCHULZ (Ber. Schimmel, 1934, 97-100; Chem. Zentr., 1934, ii, 2077; cf. A., 1930, 217, 921).-There are 8 possible optically active pinocampheols. Hydrogenation of l-pinocarveol yields a l-pinocampheol (I), m.p. 57°; exidation affords a d-pinocamphone, reduced (Na-EtOH) to a d-pinocampheol (II), m.p. 67° [the optical antipode of that described by Gildemeister and Köhler (A., 1910, i, 180)]. (I) and (II) are cis and trans, respectively, with regard to the Me and the cyclobutane ring. cis-d-Pinocampheol is obtained by hydrogenation of d-pinocarveol (from autoxidised ⁸-pinene). (I) and (II) can be interconverted by heating with alkali metals. Oxidation yields the corresponding pinocamphones. The following are described : cis-1-pinocampheol (I), m.p. 57°, b.p. 219°, [a] -36° (naphthylurethane, m.p. 88°; phthalate, m.p. 126°); cis-d-pinocampheol, m.p. 57°, b.p. 219°, $[\alpha]_D$ +37° (phthalate, m.p. 126°); cis-dl-pinocampheol, m.p. 42°, b.p. 219°; trans-l-pinocampheol, m.p. 67°, b.p. 217°, $[\alpha]_D$ —55° (phenylurethane, m.p. 77°; naphthylurethane, m.p. 91°; phthalate, m.p. 107°); trans-d-pinocampheol (II), m.p. 67°, b.p. 217°, $[\alpha]_D$ +55° (phenylurethane, m.p. 77°); trans-dl-pinocampheol, m.p. 36°, b.p. 217° (phenylwrethane, m.p. 99°; *phthalate*, m.p. 113°); cis-l-pinocamphone, b.p. 212°, $[\alpha]_{\rm D} - 17°$; cis-d-pino-camphone, m.p. about -35°; b.p. 212°, $[\alpha]_{\rm D} + 17.9°$ (semicarbazone, m.p. 219°); cis-dl-pinocamphone (arime, m.p. 88°); trans-1-pinocamphone, m.p. about -20° ; b.p. 211°, $[\alpha]_{\rm D} -22 \cdot 8^{\circ}$ (semicarbazone, m.p. 277); trans-d-pinocamphone, b.p. 211°, [a]D +225°; trans-dl-pinocamphone (oxime, m.p. 89°). d. Neoisomenthol, b.p. 214—215°, $\alpha_{\rm p}$ -0° 20' maphthylurethane, m.p. 105—106°; phthalate, m.p.

50-86°; acetate, b.p. 228°, $\alpha_D - 19°$ 20'), is obtained by catalytic hydrogenation of *d*-isomenthone (III), or (with some inversion) by means of Al(OEt)₃. Oridation with CrO₃ yields (III). H. N. R. Action of acetylene and its dimagnesium derivatives on ketonic terpenes. R. DULOU (Bull. Inst. Pin, 1934, 164—165, 178—182, 197— 204).— C_2H_2 with the Na derivative of camphor (I) gives a 20% yield of the *alcohol* (II), m.p. 85° (Ag



salt). Nopinene gives similarly the *alcohol* (III), b.p. $109-112^{\circ}/20$ mm. (Ag salt), and pinocamphone



the alcohol (IV), b.p. $122^{\circ}/20$ mm. (Ag salt). These alcohols show an exaltation of R_L of 0.3—0.6. (I) and (MgBr·C:)₂ give slowly the glycol (V), m.p.



203°, the yield being poor partly owing to enolisation; fenchone gives first the *alcohol* (VI), m.p. 16—18°, and when heated the *glycol* (VII), m.p. 106° (a second form was obtained impure); camphenilone (VIII) affords the *glycol* (IX),

 α -, m.p. 127—128°, and β -form, m.p. 113—114°, giving only (VIII) with KMnO₄. R. S. C.

Application of the Friedel-Crafts method to the preparation of bornyltoluene. L. KAMIEŃSKI and P. LEWIÓWNA (Rocz. Chem., 1934, 14, 1348-1353).—Bornyl chloride, PhMe, and AlCl₃ are kept at 10°/15 mm. for 4 hr., and then at 40°/15 mm. for 3 hr., when m- and p-, b.p. 163—164°/11 mm., -bornyltoluene are obtained in good yield. The products of nitration of the mixture, and of the reduction of the NO₂-products, are described.

R. T.

dl-Fenchyl alcohol. G. KOMPPA and S. BECK-MANN (Ber., 1935, 68, [B], 10-11).—The alcohol obtained by Zeitschel *et al.* (A., 1932, 619) from American pine oil is identified as *dl*-fenchol (I). The *p*-nitrobenzoate and *naphthylurethane* of (I) have m.p. 94-95° and 148.5—149.5°, respectively. The noncryst. *cinnamate*, b.p. 204°/8 mm. of (I) does not add Br. H. W.

Steric course of addition and substitution reactions. IV. Phenyl azide reaction in fenchene series. K. ALDER and G. STEIN [with W. FRIEDRICHSEN and K. A. HORNUNG]. V. Steric course of the phenyl azide reaction. K. ALDER and G. STEIN [with S. SCHNEIDER] (Annalen, 1935, 515, 165—184, 185—200).—IV. Of the various ring systems now and previously (A., 1931, 489; 1933, 384) investigated, only 1:2:2-dicycloheptene adds PhN₃ readily; 2:2:3-dicyclononenes react slowly at 100°. Thus, 3:6-endopropylene- Δ^4 -tetrahydrophthalic anhydride gives an adduct, $C_{17}H_{17}O_3N_3$, decomp. 219°. Similarly, the adduct (I), m.p. 165166° (from eucarvone and maleic anhydride at 150°), with PhN_3 in EtOAc at 100° (sealed tube) for 6 days



gives a hydrotriazole, $C_{20}H_{21}O_4N_3$, m.p. 227° (decomp.). (+)-Pinene also reacts slowly with PhN₃ at 70° (8 days) to give an *adduct*, $C_{16}H_{21}N_3$, m.p. 77°. When the mixture of fenchenes obtained (cf. Komppa and Roschier, A., 1929, 821) by dehydration of dlfenchyl alcohol, is treated with PhN₂, the adduct, $C_{16}H_{21}N_3$ (II), m.p. 148–149° [from the γ -fenchene (III) present], separates; steam-distillation of the residue removes the non-reacting α -, β - (IV), and cyclo-fenchenes and leaves some (II) and an adduct (V), m.p. 128-129° [from &fenchene (VI)]. The (II) obtained from an active mixture has m.p. 177°; this is also formed when a mixture of active (III)+ (IV) [prepared from methyl-β-fenchocamphorol by · Komppa and Roschier's method (A., 1918, i, 445)] is treated with PhN₃ [the presence of unaltered (IV) is shown by oxidation]. (V) and an isomeride (VII), m.p. 122°, are obtained from PhN3 and (VI) [prepared from dl-isofenchyl alcohol by Nametkin's method (A., 1924, i, 754)]; (V) and (VII) differ in the arrangement of the triazole ring, since thermal decomp. gives the same phenylimine. The results with (VI) differ

from those of Komppa and Beckmann (A., 1933, S30). isoFenchoneanil and PhN₃ at 100° for 3 weeks afford the anilinotriazole (VIII), m.p. 232—233°, converted by $H_2C_2O_4$ in EtOAc into a compound, $C_{16}H_{19}ON$, m.p. 134°. β -Fenchocamphoroneanil similarly gives an anilinotriazole, m.p. 230° convertible ($H_2C_2O_4$) into 2-anilino-5:5-dimethyl-3:6endomethylenecyclohexanone, m.p. 125—126°. Fenchoneanil (which cannot rearrange to the enamine form) and α -fenchocamphoroneanil (which contains the endo-CMe₂ group) do not react with PhN₃.

endo-CMe₂ group) do not react with PhN₃. V. Addition of PhN₃ to endo-cis-, trans-, and exocis-3: 6-endomethylene- Δ^4 -tetrahydrophthalic acid (using ester or anhydride) (details in A., 1933, 384, 942) occurs in the same manner and is independent of the configuration of the CO₂H groups. This is established as follows. Me trans-4: 5-phenylimino-3: 6-endomethylenehexahydrophthalate (obtained by thermal decomp. of the original adduct) is hydrolysed (acid) to the Me ester, m.p. 122–123°, of the anilinolactonic acid (I), m.p. 210°; (I) is also obtained by the



action of EtOH-NaOEt on the endo-cis- and exo-cis-phenylimino-esters (rearrangement occurs in both cases). Addition (I.) of PhN₃ to dicycloheptene derivatives containing the endo-CMe₂ group is probably inhibited owing to interference (with exo-addition)

by one of the Me. The different behaviour (this vol., 211) of dimeric Me cyclopentadiene-1-carboxylate and Me cyclopentadiene-1-carboxylate-maleic anhydride (which does not add PhN₃) is probably due to the different configuration of the endo-C·CO₂Me in the two adducts. A small amount of an adduct has been ob-

tained from bornylene and PhN_3 after 5 years at room temp. The heat of activation for the non-retarded (and retarded) reaction is small. H. B.

Identity of darwinol with *d*-myrtenol. A. R. PENFOLD, G. R. RAMAGE, and J. L. SIMONSEN (J. Proc. Roy. Soc. New South Wales, 1934, **68**, 36–38).– "Darwinol" (A., 1924, i, 1328) is identical with *d*-myrtenol (*phenylurethane*, m.p. 58–59°; α -naphthylurethane, m.p. 92–93°). It is oxidised (CrO₃) to *d*-myrtenal [semicarbazone, m.p. 220–221°; phenylsemicarbazone, m.p. 180° (decomp.)]. F. N. W.

Teresantalic acid and isoteresantalic acid. Y. ASAHINA, M. ISHIDATE, and T. MOMOSE (Ber., 1935, 68, [B], 83—91).—isoKetopinic acid (I) is transformed by successive treatment with HCO_2NH_4 at 220—230° and KOH-EtOH into trans- π -2-aminoapocamphane-7-carboxylic acid hydrochloride (II), decomp. about 318° (formyl derivative, m.p. 244°). Treatment of (II) with amyl nitrite in AcOH at 50—60° yields an acid, C₁₀H₁₄O₂, b.p. 160°/24 mm., m.p. 144°, which is stable towards KMnO₄ in COMe₂, but decolorises it slowly in H₂O. isoKetopinohydrazone, decomp. > 350° (from the acid and N₂H₄,H₂O at 100°), is oxidised by HgO to teresantalic acid, m.p. 158°, [α]^{III}_D —74·2° in C₆H₆, oxidised by Na₂Cr₂O₇ and H₂SO₄ to santenone, m.p. 46—47°, $\alpha_D \pm 0°$ in EtOH (semicarbazone, m.p. 224°). (I) is converted by Na



and EtOH into trans- π -apoborneol.7carboxylic acid (III), m.p. 273°, [a], +4·2° in abs. EtOH [Me ester (IV), b.p. 140—141°/14 mm., m.p. 54°, H·OH [α], +3·6° in EtOH]. (IV) and PBr₅ in light petroleum afford Me 2-bromo-trans- π -apocamphane-7-carboxylate, a non-distillable oil, which

passes when heated with NH2Ph into Me apocamphenecarboxylate, b.p. 86—87°/8 mm., hydrolysed to apo-camphenecarboxylic acid (V), m.p. 142°, $[\alpha]_{3}^{23}$ -708 in C₆H₆, which does not depress the m.p. of isoteresantalic acid. Oxidation of (V) with KMnO4 yields small amounts of an acid not identical with teresantalic acid, whereas Na2Cr2O7 and H2SO4 convert it into santenone. (V) with AcOH-50% H₂SO₄ at 50-60° gives the lactone (VI), $C_{10}H_{14}O_2$, m.p. 191-192°, of Semmler and Bartelt, oxidised by KMnO₄ in alkaline solution to *l-cis-π-apo*camphor-7-carboxylic acid, m.p. 269-270°, [a]¹⁶ -60.2° in EtOH (semicarbazone, m.p. 205°), and trans-π-apoisoacetylborneol-7-carboxylic acid, m.p. 122°, whence trans-π-apoisoborneol-7-carboxylic acid (VII), m.p. 288°, [a]_D¹⁸ -47.3° in abs. EtOH. Oxidation of (VII) with Na2Cr207 and AcOH gives an acid, m.p. 250°, which does not depress the m.p. of (I) and is transformed through its semicarbazone into π -apocamphane-7-carboxylic acid, m.p. 230°, [a]¹⁶ -19.0° in abs. EtOH. Saturation of Me teresantalate, b.p. 92-94°/18 mm. (from the synthetic acid and CH₂N₂), with HBr gives Me hydrobromoteresantalate, which is converted by NH₂Ph at 200° followed by hydrolysis into an acid very closely similar to isoteresantalic acid in m.p., solubility, and $[\alpha]_{D}$; since teresantalic acid in small amount is obtained when its aqueous solution is oxidised with KMnO4, the product is not homogeneous (cf. Rupe et al., A., 1917, i, 138). Hydration of it affords (VI), m.p. 190–191°, and (VII), m.p. 288°, [a]b⁶ -47.5° in abs. EtOH. H. W.

Diterpene oxides of the resin of Dacrydium Colensoi. II. Manoyl oxide. J. R. HOSKING and C. W. BRANDT (Ber., 1935, 68, [B], 37-45; cf. A., 1934, 897).—Dehydrogenation of manoyl oxide (I) by Se at 240-340° affords 1:2:5-(1:5:6-) $C_{10}H_5Me_3$ (II) (picrato, m.p. 138—139°; styphnate, m.p. 139°) and 1:2:8-(1:7:8-)trimethylphenanthrene (III), m.p. 144° [picrate, m.p. (indef.), 160°; corresponding quinone, m.p. 194-195°, and its quinoxaline derivative, m.p. 131-132°]. (I) is converted by 98% HCO2H at 120-125° into isomanoene, b.p. 139-140°/0.2 mm., hydrogenated (PtO₂) in AcOH at 40° to dihydroisomanoene, which gives an intense colour with C(NO2)4, does not further absorb H₂, and is dehydrogenated by Se to (II) and (III). Dihydromanoyl oxide (IV) and 98% HCO₂H afford β -dihydromanoene, C₂₀H₃₄, b.p. 123—124°/Ő·2 mm., which absorbs 1H₂ (PtO₂ in EtOAc) yielding a substance, b.p. 145°/0·1 mm. (I) in Et₂O at 0° is transformed by HCl into manoene trihydrochloride, m.p. 118-120°, which does not give a Cl-free product when heated with NH₂Ph at 100° and then distilled repeatedly over Na or boiled with KOH-McOH. Similar treatment of (IV) results in dihydromanoene dihydrochloride, m.p. 120—122°, converted by NH₂Ph into α -dihydromanoene (V), C₂₀H₃₄, b.p. 149— 150°/0·3 mm., which absorbs 2H₂ (PtO₂-AcOH). Agitation of (V) with boiling 99% HCO₂H leads to tricyclic dihydroisomanoene, b.p. 124°/0.2 mm. Dihydromanoene dihydrobromide, m.p. 97° ; is converted by repeated treatment with Ag₂O or with boiling H_20 into (V). Ozonisation of (I) in CCl₄ and decomp. of the ozonide by boiling H₂O yields CH₂O in considerable amount. Oxidation of (I) with KMnO4

Me2 MeO MeO MeO

a amount. Oxidation of (1) with KMINO₄ in COMe₂ at $\Rightarrow 12^{\circ}$ gives a monocarboxylic acid, $C_{19}H_{32}O_3$, m.p. 74—75°, converted by HCl in anhyd. Et₂O into the *dihydro*l=CH₂ chloride $C_{19}H_{32}O_2Cl_2$, m.p. 133— 134°. Treatment of sclareol (VI) and its H₂-derivative with HCl affords compounds identical with

those described above. The C skeleton of (I) is therefore identical with that of (VI) (cf. Ruzicka *et al.*, A., 1931, 737) and of agathicdicarboxylic acid (A., 1931, 31). (I) is probably A. H. W.

Biogenesis of some terpenes. J. WALKER (hem. and Ind., 1935, 55-56).—An intramol. Polymerisation of the type involved in the conversion of linalool into α -terpineol would explain the formation of α and β -eudesmol from nerolidol, and of α -pinene iron limonene (I). The bioconversion of (I) into errone (II) possibly then occurs by direct oxidation of the CH₂ in position 6 to CO, thus giving a (II) of the same rotational sign as (I), as actually occurs in nature, whereas in the conversion of (I) into (II) through the nitrosochloride the CO is formed in position 2 giving a (II) of opposite sign. J. W. B.

Polyterpenes and polyterpenoids. XCII. Caryophyllenic acid and norcaryophyllenic acid. Additive product of maleic anhydride and Caryphyllene. L. RUZICKA and W. ZIMMERMANN RB

(Helv. Chim. Acta, 1935, 18, 219-230; cf. A., 1934, 1215).-The acidic products of the fission of caryophyllene ozonide (cf. A., 1931, 735) are oxidised with HNO_3 , thereby giving $H_2C_2O_4$ ($\cdot CH_2 \cdot CO_2H$)₂, as-dimethylsuccinic acids (I), and a mixture of acids insol. in H₂O which is separated into its components by fractional distillation of the Me esters. Thus are obtained norcaryophyllenic acid (II), C8H12O4, m.p. 123.5—124.5°, $[\alpha]_{\rm D}$ +118° in CHCl₃, and caryophyllenic acid (III), m.p. 81—82°, $[\alpha]_{\rm D}$ +28.2° in C_6H_6 . (II) gives a Me_2 ester (III), b.p. 107°/12 mm.; it is converted by Ac_2O at 220° (AcCl gives nonuniform products) into the anhydride, m.p. 38-39°, transformed by H₂O into an acid, m.p. 149-150°. (II) is transformed by SOCl₂ at room temp. into the corresponding chloride, b.p. 99-100°/12 mm., converted by Br at 100° into dibromonorcaryophyllenic acid (V), C₈H₁₀O₄Br₂, m.p. 202°; the residues from the prep. of (V) give dehydronorcaryophyllenic acid, $C_8H_{10}O_4$, m.p. 194° [which absorbs Br and is oxidised to (I) by CrO_3 in AcOH], when boiled with aq. NaOH. (IV) and MgPhBr afford the corresponding Ph_4 glycol, $C_{32}H_{32}O_2$, m.p. about 194°, oxidised to $COPh_2$ and (I). (III) yields a Me_2 ester, b.p. 119—119.5°/12 mm., $[\alpha]_D + 47.9^\circ$. Caryophyllenyl chloride, b.p. 86—88°/0.2 mm., from (III) and SOCl₂ at room temp., and Br at 100° yield dibromocaryophyllenic acid, C₉H₁₂O₄Br₂, m.p. 198°, transformed by treatment with KOH and subsequent oxidation into (I) in small amount; with less halogen bromocaryophyllenic acid, m.p. 167°, results, converted by the successive action of aq. Ba(OH)2 and CH2N2 into non-homogeneous Me, hydroxycaryophyllenate. Caryophyllene (VI) is converted by maleic anhydride (VII) in boiling C_6H_6 to the extent of > 70% into an adduct of which an amount equiv. to 50% of the hydrocarbon is cryst. and the remainder amorphous. 30% of (VI) docs not react after repeated treatment with (VII). The adduct (VIII), $C_{19}H_{26}O_3$, m.p. 98°, is hydrolysed to a dicarboxylic acid (IX), $C_{19}H_{28}O_4$, m.p. 208° $[Me_2$ (X), m.p. 156°, and Et_2 (XI), m.p. 113°, esters]. The mol. refractions of (X) and (XI) indicate the absence of a double linking, and the indifference of (VIII) and (IX) towards O_3 , BzO_2H , and alkaline KMnO₄ establishes complete saturation, thus leading to the following structures for (VI) and (IX)



Synthesis and reactions of $\alpha\delta$ -hydroxyketones. Derivatives of ϵ -hydroxyhexan- β -one and 2:5dimethyl-4:5-dihydrofuran. G. POJARLIEFF (J. Amer. Chem. Soc., 1934, 56, 2685—2687).— δ -Chloro- α -acetyl- γ -valerolactone (Traube and Lehmann, A., 1901, i, 501) and MeOH-HCl (0.5%) at room temp. give (after removal of HCl with Ag₂CO₃) Me 2methoxy - 2 - methyl - 5 - chloromethyltetrahydrofuran - 3carboxylate (I), b.p. 97°/1 mm., which when heated with HCl at 120—130° and then distilled affords Me 2-methyl-5-chloromethyl-4: 5-dihydrofuran-3-carboxyl-

ate (II), b.p. 127°/14 mm. [free acid (III), m.p. 110° (corr.)]. (II) heated with MeOH gives (I). (III) and boiling 0.2N-H₂SO₄ afford impure α -chloro- β hydroxyhexan- ϵ -one, b.p. 95°/3 mm. {acetate, b.p. 117°/5 mm. [semicarbazone, m.p. 131° (corr.)]}, converted by MeOH-HCl into 2-methoxy-2-methyl-5chloromethyltetrahydrofuran, b.p. 73.5°/13 mm. (II) and s-C₆H₃(OH)₃ in boiling 0.2N-HCl give a compound, C₁₃H₁₃O₅Cl, m.p. 250° (corr.), which is either a coumarin or a chromone. δ -Methoxy- α -acetyl- γ valerolactone, b.p. $134^{\circ}/4$ mm. [from γ -methoxy- $\alpha\beta$ -oxidopropane (modified prep.; cf. Blanchard, A., 1927, 853) and CH2Ac CO2Et in EtOH-NaOEt], is converted (as above) into Me 2-methoxy-5-methoxymethyl-4: 5-dihydrofuran-3-carboxylate, b.p. 126°/15 mm. [free acid (IV), m.p. 82°]. β -Hydroxy- α -meth-oxyhexan- ϵ -one (V) [from (IV) and dil. H₂SO₄] loses H₂O when heated at atm. pressure and passes into 2-methyl-5-methoxymethyl-4: 5-dihydrofuran, b.p. 47-48°/11 mm. Oxidation $(K_2Cr_2O_7, \text{ dil. } H_2SO_4)$ of (V), prepared by Levene and Walti's method (A., 1931, 68), gives α -methoxyhexane- $\beta\epsilon$ -dione (VI), b.p. 68-70°/0.6 mm. [di-p-nitrophenylhydrazone, m.p. 175° (corr.)], and lævulic acid. (VI) is obtained similarly from 2-methoxy-2-methyl-5-methoxymethyl-tetrahydrofuran, b.p. 72°/14 mm. [from (V) and MeOH-HCl]. ab-Dihydroxyhexan-e-one and MeOH-HCl afford (mainly) 5-methoxy-5-methyltetrahydrofurfuryl alcohol (cf. Levene and Walti, loc. cit.).

H. B.

F. N. W.

New synthesis of hydrocarbons of C_nH_{2n+2} series. N. A. ORLOV (Compt. rend. Acad. Sci. U.R.S.S., 1934, 286—288).—Hydrogenation (MoS₃) of furfuraldehyde at 220—320°/150 atm. gives $n \cdot C_5H_{12}$ and traces of 2-methylfuran and $n \cdot C_5H_{11} \cdot OH$. Furfurylideneacraldehyde (?) similarly gives $n \cdot C_7H_{16}$, whilst furylethylcarbinol with MoS₃-NiO catalyst at 300—315°/100 atm. gives (1) in larger yield.

Creatinine derivatives. I. W. R. CORN-THWAITE and E. JORDAN (J. Amer. Chem. Soc., 1934, 56, 2733—2734).—Creatinine (I) and furfuraldehyde (II) (excess) at 140° give 63% of 5-furfurylidenecreatinine (III), m.p. 273° (decomp.) [hydrochloride, m.p. 257° (decomp.); picrate, m.p. 244° (decomp.)], and some difurfurylidenecreatinine, m.p. 243° [picrate, m.p. 205° (decomp.)], which is hydrolysed (conc. HCl) to (II) and (III). A solution of (III) in 10% NaOH deposits furfurylidenecreatine, m.p. 254° (decomp.). Methylcreatinine sulphate, (II), and Na₂CO₃ at 120° afford 30% of 5-furfurylidene-, m.p. 134° [picrate, m.p. 235° (decomp.)], and a little difurfurylidenemethylcreatinine, m.p. 137° [picrate, m.p. 207° (decomp.)]. Furfurylidenearaldehyde (slight excess) and (I) at 140° give 41% of di(furfurylideneacrylidene)-

and (I) at 140° give 41% of di(furfurylideneacrylidene)creatinine, m.p. 268° (picrate, decomp. about 200°). 5-Salieylidene- (83%), m.p. 232° (decomp.) [picrate, m.p. 269° (decomp.)], and 5-cinnamylidene- (17%), m.p. 280° (decomp.) [picrate, m.p. 261° (decomp.)], and dicinnamylidene-creatinine (19%), m.p. 220° (decomp.) [picrate, m.p. 193° (decomp.)], are similarly prepared. H. B.

Di-p-bromophenylfurans and αδ-diketones. R. E. LUTZ and W. M. EISNER (J. Amer. Chem. Soc.,

1934, 56, 2698-2701).-2: 5-Di-p-bromophenylfuran (I) and HNO₃-AcOH at 70° give trans-αβ-di-pbromobenzoylethylene (II), converted by exposure to sunlight (in C₆H₆) into the cis-form (III), m.p. 124.5-125° (corr.); (III) is converted into (II) by HNO3-AcOH at 70° or by exposure of a solution in $CHCl_3+I$ to sunlight. $\alpha\beta$ -Di-p-bromobenzoylethane (IV) [which with Ac₂O-conc. H₂SO₄ gives (I)], (I), and (:CHBz), with PBr, afford 3: 4-dibromo-2: 5-di-p-bromophenylfuran (V); (II) similarly gives $meso-\alpha\beta$ -dibromo- $\alpha\beta$ -dip-bromobenzoylethane, which is unaffected by Ac₂Oconc. H_2SO_4 . cis- $\alpha\beta$ -*Dibromo*- $\alpha\beta$ -*di*-*p*-*bromobenzoyl*-ethylene (VI), m.p. 112.5° [from (V) and HNO_3 -AcOH at 70°], is converted (solution in CHCl₃+I in sunlight) into the trans-form (VII), m.p. 235.5°, also prepared from dibromofumaryl chloride, PhBr, and AlCl₂ in CS_2 ; (VI) and (VII) are both reduced (Zn dust, AcOH) to (IV). dl- $\alpha\beta$ -Dichloro- $\alpha\beta$ -di-p-bromobenzoylethane and Ac_2O -conc. H_2SO_4 give 3:4-dichloro-2:5-di-p-bromophenylfuran, m.p. 166° [also prepared from the following compounds and PCl₅ at 100-150°: (I), (II), (IV), $p - C_6 H_4 Br \cdot CO \cdot CH \cdot C(OR) \cdot CO \cdot C_6 H_4 Br - p$ (R=H and Me), 3-methoxy- and 3-chloro-2:5-di-p-bromo-phenylfuran, m.p. 120° (from αβ-di-p-bromobenzoylethylene and AcCl-conc. H2SO4)], which with HNO3-AcOH at 70° affords cis-ab-dichloro-ab-di-p-bromobenzoylethylene, m.p. 111° [reduced (Zn dust, AcOH) to (IV)], convertible [as for (VI)] into the trans-form, m.p. 206° (corr.). The chloride, b.p. 107-108°/12 mm., of Me H dibromofumarate, m.p. 75° [obtained by partial hydrolysis (MeOH-KOH) of the Me₂ ester], with PhBr and AlCl3 in CS2 gives Me trans-ab-dibromoβ-p-bromobenzoylacrylate, m.p. 102°, attempted hydrolysis (NaOH in 80% EtOH at room temp.) of which affords $p \cdot C_6 H_4 Br \cdot CO_2 H$; Me trans- $\alpha\beta$ -dibromo- β benzoylacrylate (hydrolysed to BzOH) is similarly prepared using C₆H₆. H. B.

2:3:5-Triphenylfurans and related saturated and unsaturated $\alpha\delta$ -diketones. R. E. LUTZ, W. R. TYSON, A. G. SANDERS, and C. K. FINK (J. Amer. Chem. Soc., 1934, 56, 2679–2682; cf. A., 1934, 1361). -4-Chloro-2:3:5-triphenylfuran (I) is obtained from 2:3:5-triphenylfuran (II) or its 4-Ac derivative, and a3-dibenzoyl-a-phenyl-ethylene (III) or -ethane (IV) and PCl_5 at 100°; (I) is also prepared from (III) and EtOH-HCl or AcCl-conc. H_2SO_4 . The above compounds [except (IV)] and PBr_5 at 60° give 4-bromo-3-phenyl-2: 5-di-p-bromophenylfuran (\mathbf{V}) (+H₂O), m.p. 203 5° (corr.) [oxidised (HNO₃ followed by $KMnO_4$) to $p-C_6H_4Br\cdot CO_2H$ (1.89 equivs.)], whilst (II) and PBr_5 at 25° afford 4-bromo-2 : 3 : 5-triphenylfuran (VI), convertible into (V). The furan ring in (II) is thus more reactive than any of the Ph groups. (II) and HNO₃ (d 1.42) in AcOH at 50° give cis-(111); use of more HNO_3 at 100° gives β -nitro- $\alpha\beta$ -dibenzoyl- α -phenylethylene (VII) (cf. Japp and Klingemann, J.C.S., 1890, 57, 674), which is reduced (Zn dust, AcOH) to (IV). (IV) and HNO₃-AcOH similarly afford (VII) [probably by way of (II)], whilst (VI) gives 63 $cis-\beta$ -bromo- $\alpha\beta$ -dibenzoyl- α -phenylethylene, m.p. [reduced (Zn dust, AcOH) to (II) and a little (IV); Br must be eliminated before ring-closure, since (VI) is stable under these conditions]. 3-Phenyl-2: 5-di-pbromophenylfuran (VIII), m.p. 114° (corr.) [from αβ-dip-bromobenzoyl- α -phenylethane (IX) and Ac₂O-conc. H₂SO₄ at 60°], with HNO₃-AcOH affords cis- β -bromo- $\alpha\beta$ -di-p-bromobenzoyl- α -phenylethylene (X), m.p. 142° (corr.). Reduction (Zn dust, AcOH) of $\alpha\beta$ -di-pbromobenzoyl- α -phenylethylene involves 1:6-addition of H₂ (cf. A., 1929, 1459) and gives (VIII) and (IX) (stable under the same conditions); (X) similarly affords (VIII) as the sole product (this is ascribed to the catalytic effect of the ZnBr₂ formed during reduction). (VIII) and PBr₅ give (V). H. B.

Condensation of aldehydes with malonic acid in presence of organic bases. I. In presence of pyridine alone. P. N. KURIEN, K. C. PANDYA, and V. R. SURANGE (J. Indian Chem. Soc., 1934, 11, 823—826).—The yields of condensation products obtained from $CH_2(CO_2H)_2$ (I) and a large no. of aromatic aldehydes in presence of C_5H_5N are recorded. o-OH·C₆H₄·CHO condenses with (I) only when a trace of C_5H_5N is used, a 51% yield of coumarinearboxylic acid (not o-coumaric acid as in lit.) being obtained. J. W. B.

[Attempted] synthesis of 2: 2'-dihydroxydicinnamoylmethane. W. LAMPE and M. TRENK-NERÓWNA (Rocz. Chem., 1934, 14, 1231—1237).— The Cu salt (I), m.p. 241—242°, of Et β -3-coumarinyl β ketopropionate when boiled in CHCl₃ with the chloride, m.p. 136—137°, of coumarin-3-carboxylic acid (II) yields Et di(coumarinyl-3-carbonyl)acetate (III), m.p. 210—212°, which on autoclaving affords di(coumarinoa-carbonyl)methane (IV), m.p. 276—278°. Attempts to prepare 2: 2'-dihydroxydicinnamoylmethane by hydrolysis of (IV) with 5% aq. or alcoholic NaOH, or with POCl₃ in PCl₅, were unsuccessful, the products with NaOH being (II) and acetyl- α -coumarin, whilst POCl₃ had no action. Et (coumarin- α -carbonyl)cinnamoylacetate, m.p. 220—222° (decomp.), is obtained analogously to (III) from (I) and cinnamoyl chloride. R. T.

Condensation of phenols and phenolic ethers with acetonedicarboxylic acid. (A) Syntheses of ββ-substituted glutaric acids. (B) Anhydrides of β-2-hydroxyphenylglutaconic acids. V. M. DIXIT and G. N. GOKHALE (J. Univ. Bombay, 1934, 3, No. 2, 80-94, 95-105).-(A) Condensation of CO(CH₂·CO₂H)₂ with PhOH in 75% H₂SO₄ gives ββ-2: 2'-dihydroxydiphenylglutaric acid (I), m.p. 234° (decomp.) [Pb and Cu (+2H₂O) salts], also obtained starting from citric acid. The constitution of (I) follows from the following observations. It is converted by conc. H_2SO_4 at 50-60° into PhOH and coumarin-4-acetic acid. When oxidised with alkaline KMnO₄ or CrO₃ it affords PhOH and 4-methylcoumarin. With cold, conc. HNO3-H2SO4 it yields ββ-5: 5'-dinitro-2: 2'-dihydroxydiphenylglutaric acid, m.p. 204° (decomp.), which passes when heated with uning HNO₃ into a little picric acid and much ββ'-dinitroxanthone, m.p. 261°, also obtained directly from (I). Moist KOH at 180° transforms it into $\frac{1}{2}$: 2'-dihydroxybenzophenone. The acid or its esters do not condense with o-OH·C₆H₄·CHO. The Me_2 ester, m.p. 189° [Ac2, m.p. 107°; Bz2, m.p. 152°; Me2, m.p. 85°, and 3:3':5:5'-Br4-, m.p. 180° (decomp.), -derivatives], condenses with $Me_2C_2O_4$ in presence of NaOMe to Me, 4:5-diketo-2:2-di-o-

hydroxyphenylcyclopentane-1: 3-dicarboxylate (diphenylhydrazone, m.p. 128°) and with o-C6H4(CO2Me)2 to Me, 4:7-diketo-3:3-di-o-hydroxyphenyl-5:6-benzocycloheptane-1: 3-dicarboxylate, m.p. 148° (diphenylhydrazone, m.p. 199°). The following compounds are incidentally described : $\beta\beta - 2: 2'$ -dihydroxydiphenylglutaric anhydride (II), m.p. 80°, from the acid at 239° (Ac₂, m.p. 203°, and Bz₂, m.p. 167°, derivatives), converted by NH3 at 150° into the corresponding imide (III), b.p. 135°/40 mm. (Bz₂ derivative, m.p. 61°); $\beta\beta-2: 2'$ -dibenzoyloxydiphenylglutaric acid, m.p. 223° (decomp.); ββ-2: 2'-dimethoxydiphenyl-glutaric acid, m.p. 154° (decomp.) (Ag salt), from (I), MeI, and NaOMe, and its anhydride, m.p. 160°; Et2 ββ-2: 2'-dihydroxydiphenylglutarate, m.p. 145°; ββ-5:5'-dibromo-, m.p. 180° (decomp.), and $\beta\beta$ -3:3':5:5'-tetrabromo-, m.p. 210° (decomp.), -2:2'-dihydrodiphenylglutaric acid, from (I) and Br in AcOH and H_2O , respectively; the semianilide (IV), m.p. 120° (decomp.) (Ag salt), from (I) and NH₂Ph at 110°, anil, m.p. 220°, from (I) and NH₂Ph at 130-140°, from (II) and NH₂Ph in boiling EtOH, or from (IV) by heating at its m.p., and the dianilide, m.p. 298°, from (IV) and NH_2Ph at 160–180°, of (I); the NH_4 H salt of (I), converted by distillation/20 mm. into (III). CO(CH2•CO2H)2 and o-cresol in 75% H2SO4 afford ββ-2: 2'-dihydroxy-3: 3'-dimethyldiphenylglutaric acid, m.p. 203° (decomp.) [Cu (+2H₂O) salt], transformed by conc. H₂SO₄ into 8-methylcoumarin-4-acetic acid, m.p. 184° (decomp.), and o-cresol. Similarly, $p - C_6H_4Me$ ·OMe gives $\beta\beta$ -2: 2'-dimethoxy-5: 5'-dimethyldiphenylglutaric acid, m.p. 164° [Cu (+2H₂O) salt], transformed by conc. H₂SO₄ into 6-methylcoumarin-4-acetic acid, m.p. 183° (decomp.), and 2-methoxy-5-methylphenyl-glutaconic acid, m.p. 82°. p-C₆H₄(OH)₂ gives $\beta\beta$ -2:2':5:5'-tetrahydroxydiphenylglutaric acid, m.p. 242—243° (decomp.) [\check{Cu} (+2 \check{H}_2 O) salt], converted by conc. H₂SO₄ into 6-hydroxycoumarin-4-acetic acid, m.p. 165°.

(B) Citric acid is heated with conc. H₂SO₄ at 60-70° until evolution of CO ceases, and the solution is treated with PhOH, thus giving coumarin-4-acetic acid (I), m.p. 168° (decomp.), which does not react with Ac₂O, AcCl, or BzCl, passes at its m.p. into 4-methylcoumarin (II), affords an Et ester, m.p. 116°, which condenses with o-OH·C₆H₄·CHO to give the corresponding dicoumaryl, m.p. 246° (Dey et al., A., 1924, i, 538). In addition, β -2-hydroxyphenylglutaconic anhydride (III), m.p. 188° (decomp.), is produced. (I) is transformed into (III) by contact with 100% H_2SO_4 and (III) into (I) by hydrolysis with boiling 20% NaOH. (III) is oxidised to o-OH·C₆H₄·CO₂H by CrO₃ in AcOH containing a little H2SO4, loses CO2 at 188°/20 mm., with formation of a phenolic substance, m.p. 82°, which depresses the m.p. of (II), gives a Bz₂ derivative, m.p. 252°, and a cryst. compound with Ac₂O-NaOAc. The following compounds are obtained similarly. 7-Methylcoumarin-4-acetic acid (IV), m.p. 168° (decomp.), from *m*-cresol (whence 4:7-dimethylcoumarin, m.p. 132°, and Et 7-methylcoumarin-4-acetate, m.p. 131, converted by o-OH·C₆H₄·CHO into 7-methyl-4:5-dicoumaryl, m.p. 247°) and β-2-hydroxy-4-methylphenylglutaconic anhydride (V), m.p. 212° (decomp.),

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which loses CO, when heated with formation of a substance, m.p. 110°, and is converted by NaOH into (IV); it is formed in 90% yield from (IV) and anhyd. H_2SO_4 . (V) is oxidised to 2-hydroxy-*p*-toluic acid, m.p. 173°, and yields a Bz_2 derivative, m.p. 275°, hydrolysed by boiling alkali to (IV). 6-Methylcoumarin-4-acetic acid (VI), m.p. 173° (decomp.), from p-cresol (whence 4:6-dimethylcoumarin, m.p. 148°) and \$-2-hydroxy-5-methylphenylglutaconic anhydride (VII), m.p. 192° (decomp.), which loses CO₂ with formation of a phenolic substance, m.p. 155°, and is oxidised to 5-methylsalicylic acid, m.p. 148°; the Bz_2 derivative, m.p. 310°, is hydrolysed by boiling alkali to (VI). The interconversion of (VI) and (VII) is described. 8-Methylcoumarin-4-acetic acid (VIII), m.p. 182° (decomp.), from o-cresol, which passes at its m.p. into 4:8-dimethylcoumarin, m.p. 118°, and β-2-hydroxy-3-methylphenylglutaconic anhydride (IX), m.p. 188° (decomp.), which loses CO₂ under reduced pressure yielding a phenolic sublimate, m.p. 120°, and is oxidised to 3-methylsalicylic acid, m.p. 158°; the Bz, derivative, m.p. 288°, is hydrolysed by boiling alkali to (VIII). (VIII) and (IX) are interconvertible. H. W.

Reactions of o-hydroxybenzylidenediacetophenones. II. Conversion into pyrylium and benzopyrylium salts. D. W. HILL. III. Formation of a 4-phenacylideneflavene during the preparation of 4'-methoxyflavylium chloride. D. W. HILL and R. R. MELHUISH (J.C.S., 1935, 85-88, 88-89).-II. o-Hydroxybenzylidenediacetophenone (I) under different conditions condenses to give flavylium ferrichloride, m.p. 140°, also obtained from 4-phenacylflavene. Elimination of 4-phenacyl group on condensation (HCl-TeCl₃) does not take place in the phenacylidene series : 4-phenacylflavylium, m.p. 156—157°, 7-methoxy-4-phenacylflavylium, m.p. 168°, 2:6-diphenyl-4-(2':4'-dimethoxyphenyl)pyrylium, m.p. 190—191°, 2:6-diphenyl-4-(o-acetoxyphenyl)-pyrylium, m.p. 181°, 2:6-diphenyl-4-(2'-acetoxy-4'methoxyphenyl)pyrylium, m.p. 162°, and 2:6-diphenyl-4-(2'-acetoxy-5'-methoxyphenyl)pyrylium ferri-chloride, m.p. 225-226°. The significance of the results in the structure given to benzopyrylium salts is considered.

III. (I) and HCl in Et₂O condense to a flavylium ferrichloride, m.p. 159—161°, which contains some 4-phenacylflavylium ferrichloride. Condensation of p-methoxyacetophenone and salicylaldehyde in Et₂O affords 4'-methoxy-4-(p-methoxyphenacylidene)flavene (II), m.p. 167—168°, and in EtOH-NaOH gives o-hydroxybenzylidenedi-(p-methoxyacetophenone) (III), m.p. 167°, which with AcOH forms 4'-methoxy-4-(pmethoxyphenacyl)flavene, m.p. 122°. (III) and boiling AcOH yield (II), converted by HCl into 4'-methoxy-4-(p-methoxyphenyl)flavylium chloride, m.p. 120° (decomp.), from which the ferrichloride may be obtained. F. R. S.

3-Amino- and 3-hydroxy- β -naphthapyrones. B. B. DEV and A. K. LAKSHMINARAYANAN (J. Indian Chem. Soc., 1934, 11, 827—833).—When heated together with NaOAc-Ac₂O at 100°, 2-hydroxy-1naphthaldehyde (I) and NHBz·CH₂·CO₂H afford the Ac derivative of (I), $\beta\alpha$ - δ : 6-naphthapyrone, and the Bz derivative (II), m.p. 230°, of 3-amino-βα-5:6naphthapyrone (III), m.p. 169° (hydrochloride, m.p. 201°; sulphate), which is obtained by debenzoylation with AcOH-HBr. The Ac derivative, m.p. 245°, of (III) is obtained by similar condensation of (I) and NH₂·CH₂·CO₂H with NaOAc-Ac₂O at 140°. Hydrolysis of (II) with 2N-KOH affords (?) trans-α-benzamido-β-2-hydroxy-1-naphthylacrylic acid, m.p. 206° (decomp.), whereas with N-KOH (III) gives cis-αhydroxy-β-2-hydroxy-1-naphthylacrylic acid, sinters 120°, m.p. 136° (decomp. and resolidification to a solid, m.p. 215—220°), converted by heating at 160° into 3-hydroxy-βα-5: 6-naphthapyrone (IV), m.p. 230° (Ac derivative, m.p. 162°), also obtained by the action of HNO₂ on (III). (IV) is not converted by alkali into 2-hydroxynaphthyl-1-acetaldehyde (cf. A., 1934, 1008). J. W. B.

A simple γ -pyran, 2:4:4:6-tetraphenyl- γ pyran. A. P. DE CARVALHO (Compt. rend., 1934, 199, 1430—1432).—CPh₂(CH₂Bz)₂ is dehydrated to 2:4:4:6-tetraphenyl- γ -pyran (I), m.p. 157—158°, very readily hydrolysed by H₂O. The 3:5-Br₂derivative, obtained from Br and (I), but not by dehydration of CPh₂(CHBrBz)₂, resists hydrolysis. R. S. C.

Manufacture of bases derived from benzdioxan.—See B., 1935, 124.

Thiophen series. XXVIII. Bromo-derivatives of 3-thiotolene [3-methylthiophen]. W. STEINKOPF and H. JACOB (Annalen, 1935, 515, 273-283; cf. A., 1934, 1365).---3-Methylthiophen (I) is converted by Br-H₂O into 2-bromo-3-methylthiophen (II), b.p. 173-176°, the constitution of which follows from the production of a single 5-HgCl compound, m.p. 251°, and its conversion into 2-bromo-3-methylthiophen-5-sulphonic acid (corresponding amide, m.p. 142°). (II) is converted by successive action of Mg-Et₂O and CO₂ into 3-methylthiophen-2-carboxylic acid, m.p. 148°, whilst 3-bromo-2-methylthiophen, Mg+ MgMeBr, and Et₂O followed by CO₂ afford 2-methylthiophen-3-carboxylic acid, m.p. 115-117°. (II), AcCl, and AlCl₃ in light petroleum yield 2-bromo-5acetyl-3-methylthiophen, m.p. 67-68°. 2-Bromo-5iodo-3-methylthiophen, b.p. 131-135°/14 mm., m.p. -3° to -2° , is obtained from (II), I, and yellow HgO in C6H6, and 2-iodo-3-methylthiophen, b.p. 86-88°/ 13 mm., is obtained similarly from (I). More intense bromination of (I) with Br-H₂O affords (I) and 2:5dibromo-3-methylthiophen (III), b.p. 226-230°. Grignard degradation of (III) in presence of MeBr gives mainly (II) accompanied by a small amount of 5-bromo-3-methylthiophen (mercurichloride, m.p. 2:4:5-Tribromo-3-methylthiophen 217-220°). (IV), m.p. 33°, is debrominated to bromomethylthiophens and (mainly) 4:5-dibromo-3-methylthiophen (V), b.p. 232-233° (2-mercurichloride, m.p. 240-241°). Successive treatment of (V) with Mg-MgMeBr and CO2 in Et2O leads to 4-bromo-3-methylthiophen-5carboxylic acid, m.p. 195°, reduced by Na-Hg to 3-methylthiophen-5-carboxylic acid, m.p. 88-90°. 4-Bromo-3-methylthiophen, b.p. 180-182°, gives a di-, blackens at $310-315^\circ$, and a mono-, unchanged > 330°, -mercurichloride. (IV) is converted by an excess of Br in sunlight into 2:4:5-tribromo-3-bromomethylthiophen, m.p. $63-67^{\circ}$, and by AcCl and AlCl₃ in light petroleum into 4:5-dibromo-2-acetyl-3-methylthiophen, m.p. $126-127^{\circ}$. (I), BzCl, and AlCl₃ in light petroleum afford 5-benzoyl-3-methylthiophen, m.p. $91-93^{\circ}$, and 2-benzoyl-3-methylthiophen, transformed by Br into 4:5-dibromo-2-benzoyl-3-methylthiophen, m.p. $77-79^{\circ}$, also obtained from (V). 2:5-Dimethylthiophen, I, and yellow HgO give 3:4-di-iodo-2:5-dimethylthiophen, m.p. 83° . 2:5-Dibromo-3-acetylthiophen, m.p. 55° , is described.

H. W.

Constitution of pyrrolines. A. SONN [with R. PODSCHUS, K. SCHÜTZLER, and G. STEPHANI] (Ber., 1935, 68, [B], 148-151).-Ph vinyl ketone condenses with MeNO₂ in presence of NaOMe-MeOH to Ph y-nitro-n-propyl ketone, m.p. 102° (decomp.), reduced by Zn and AcOH at 100° to 2-phenyl- Δ^2 -pyrroline [picrate, m.p. 198° (decomp.)], which gives y-benzamidopropiophenone, m.p. 126°, with BzCl and excess of NaOH. γ -Nitro- β -phenyl-*n*-propyl Me ketone similarly affords 4-phenyl-2-methyl- Δ^2 -pyrroline (I), b.p. 135°/15 mm. [picrate (II), m.p. 149-150°], whence γ -benzamido- β -phenyl-n-propyl Me ketone (III), m.p. 124°. Reduction of 4-phenyl-2-methylpyrrole with Zn and conc. HCl in Et₂O affords a base shown to be identical with (I) by means of (II) and (III); addition of H₂ occurs therefore in the 4:5 position instead of in the expected 2:5 position. Phy-nitroβ-phenyl-n-propyl ketone yields 2:4-diphenyl- Δ^2 -pyrroline, m.p. 48-49° (picrate, m.p. 155-156°), whence $Ph \gamma$ -benzamido- β -phenyl-n-propyl ketone, m.p. 180—181°. H. W.

Reaction between aβ-dibenzoyl-a-phenylethylene and hydroxylamine hydrochloride. A cyclic hydroxynitrone. A. H. BLATT (J. Amer. Chem. Soc., 1934, 56, 2774-2779).-cis-αβ-Dibenzoyl-αphenylethylene (I) in EtOH and aq. NH₂OH,HCl give 2-hydroxy-2:3:5-triphenylpyrrolenine oxide (11),CPh CPhOH, m.p. 179° [Me ether (III), m.p. 172°, obtained using MeOH-HCl], and not an isooxazoline (cf. Oliveri-Mandalà and Calderaro, A., 1914, i, 1077). trans- $\alpha\beta$ -Dibenzoylethylene similarly affords the dioxime, m.p. 210-211° (decomp.) [diacetate, m.p. about 140° (opaque; clear at 156°)]. (II) and PCl₅ in EtO₂ give benz-β-benzoylstyrylamide (IV), CBzPh:CH·NHBz, m.p. 162°, hydrolysed (aq. EtOH-KOH) to BzOH, HCO₂H, NH₃, and deoxybenzoin. Reduction of (III) with Zn dust and AcOH containing small amounts of CuSO4 and conc. HCl affords 2:3:5triphenylpyrrole (V); with liquid Na-K alloy in Et_2O , 1-hydroxy-2:3:5-triphenylpyrrole (VI), m.p. 196° (Me ether, m.p. 122-123°; anisoyl derivative, m.p. 139-140°), results. (VI) is also obtained from (III) and MgEtBr, MgPhBr, or (best) MgMeI. (VI) is reduced [as for (III)] to (V). Dissolution of (II) in aq. 5% NaOH and cautious acidification (dil. HCl) in the cold gives the impure oxime (VII), CBzPh:CH·CPh:N·OH lacetate, m.p. 99°; benzoate, m.p. 141° (opaque; clear at 148°)], of (I); (VII) is readily converted (acid; solvents) into (II). (VII) and $PhSO_2Cl$ in C_5H_5N afford (IV), thus showing that (II) is not a stereo-¹⁸⁰meride of (VII). The stereochemical factors involved in the production of (II) from (I) are discussed

briefly. (II) and MeOH–NaOMe give a Na salt, $C_{22}H_{16}O_2NNa$, H. B.

Reaction of amides with magnesylpyrroles. A. SANNA (Gazzetta, 1934, 64, 857–860).—The Mg-EtBr derivatives of pyrrole and NH₂Ac interact to form α -amino- α -2-pyrrylethanol, b. p. 76°.

E. W. W.

An autopyrrole black. G. GIULIANI (Gazzetta, 1934, 64, 894—896).—AuCl₃ oxidises pyrrole to an *auropyrrole-black*, probably C_4H_4N ·AuH· C_4H_3N ·AuCl· C_4H_4N . E. W. W.

Bases obtained from acetophenone, formaldehyde, and ammonium chloride. C. MANNICH and S. M. ABDULLAH (Ber., 1935, 68, [B], 113-120; cf. Schäfer *et al.*, A., 1906, i, 574).—The interaction of COPhMe, 33% CH2O, and NH4Cl at 100° gives triβ-benzoylethylamine hydrochloride (I), m.p. 145°, whence tri-β-benzoylethylamine (II), m.p. 67° [picrate, m.p. 140—142°; platinichloride; aurichloride, m.p. 168°; methiodide (III), m.p. 147—148°]. In boiling EtOH (II) passes into Schäfer's base (IV), now regarded as 4-hydroxy-5-benzoyl-4-phenyl-1-\beta-benzoylethylpiperidine, m.p. 150° [hydrochloride (V), m.p. 199—200°; platinichloride, m.p. 207—208°; picrate, m.p. 154°; methiodide, identical with (III)]. (I) with excess of BzCl at $75-80^{\circ}$ leads to (V). (V) is unchanged by BzCl in C5H5N at 100°, but is converted by BzCl at 155-160° into NBz₃. Treatment of (II) with Ac₂O at 100° yields acetdi-β-benzoylethylamide (VI), m.p. 110°, and an oil smelling of Ph vinyl ketone (VII) which deposits crystals, m.p. 55-57°, (?) β -benzoylethyl acetate (VIII). (VI) gives a dioxime (IX), m.p. 210°, disemicarbazone, m.p. 210-212°, and di-p-nitrophenylhydrazone, m.p. $207-208^{\circ}$. (IV) is transformed by short treatment with Ac₂O at 100° into 4-hydroxy-5-benzoyl-1-acetyl-4-phenylpiperidine (X) [which does not give derivatives with $NH_2 \cdot CO \cdot NH \cdot NH_2$ or $p \cdot NO_2 \cdot C_6H_4 \cdot NH \cdot NH_2$ and with NH_2OH yields (IX)], accompanied by (VII) and (VIII), and on more protracted heating gives (VI). 4-Chloro-5-benzoyl-1-acetyl-4-phenylpiperidine, m.p. 165°, from (X) and SOCl₂ at $> 15-20^{\circ}$, is converted by NaOH into 5-benzoyl-1-acetyl-4-phenyltetrahydropyridine, m.p. 143°, hydrogenated (Pt-C-EtOH) to 5-benzoyl-1-acetyl-4-phenylpiperidine, m.p. 168°. Distillation of (I) or (V) with steam gives (VII) and di-B-benzoylethylamine hydrochloride (XI), m.p. 175° (corresponding platinichloride, m.p. 194-195°, and aurichloride, m.p. 120°). The corresponding base readily becomes disproportionated into NH₃ and the tert.-base, but its sec. character is established by its conversion into (VI), its Bz derivative, m.p. 105-106°, NO-derivative, m.p. 114-115° (decomp.), and carbamide compound, m.p. 187° (decomp.). (XI) with superheated steam slowly gives (VII) and β-benzoylethylamine hydrochloride, m.p. 125° [corresponding platinichloride, m.p. 227-228° (decomp.), and *picrate*, m.p. 160°]. When preserved, the free base yields NH_3 and (II). H. W.

Additive products of halogenyl amides with pyridine. J. A. SPRAGGE (Trans. Roy. Soc. Canada, 1934, [iii], 28, III, 103—106).—The m.-p. curves of N-bromobenzamide, N-bromo- and N-chloro-phthalimide in C_5H_5N afford evidence of compound formBRITISH CHEMICAL ABSTRACTS .--- A.

ation. The m.p. is a max. at 45—50 mol.-% halogen compound. Solutions more conc. than 55 mol.-% are unstable at room temp. J. L. D.

Optical investigation of the antineuritic vitamin($-B_1$).—See this vol., 261.

Optical activity in the indole group. A. MCKENZIE and P. A. STEWART (J.C.S., 1935, 104-111).-Reduction of r-o-nitromandelic acid (I) with FeSO₄-Ba(OH)₂ gives r-o-aminomandelic acid, m.p. 144° (decomp.), which with HCl yields r-dioxindole [r-o-benzamido-, m.p. 140°, and r-o-B-naphtholazomandelic acid, m.p. 205-206° (decomp.)]. r-o-Nitroacetylmandelic acid, m.p. 102-103°, could not be reduced. r-o-Nitrophenylmethoxyacetic acid, m.p. 81-82°, and Et r-o-nitrobenzoylmandelate, m.p. 76-77°, are described. (I) is resolved with brucine into (-)0- and (+)0-nitromandelic acids, m.p. 100-101°, $[\alpha]_{5461}^{20} \mp 594^{\circ}$ in COMe₂. (+)0-Nitroacetylmandelic acid has m.p. 95-96°, $[\alpha]_{5461}^{20} + 367^{\circ}$ in COMe₂, and Et (+)0-nitromandelate has b.p. 165-166°/4 mm., and Et (+)0-nitromatalettate has 0.p. 100 (100 (100)) [α]^{β_{461}} +384° in COMe₂. Reduction of the active NO₂-acids leads to (-)0- and (+)0-aminomandelic acids, m.p. 159° (decomp.), [α]²⁰₄₄₆₁ =195° in N-NaOH [(-)0-acetamido-, m.p. 160°, [α]⁵⁴⁶¹ -227° in COMe₂, and (-)0- β -naphtholazo-mandelic acid, m.p. 190–191° (decomp.)]. (-)o-Aminomandelic acid is converted with H_2SO_4 into (+)-dioxindole, m.p. 167—168°, $[\alpha]_{3461}^{so}$ +40° in COMe₂, giving with NHPh·NH₂ an inactive isatin-\beta-phenylhydrazone and with KOH-EtOH isatide. Other reagents also yield inactive products. (+)o-Nitromandelic acid, aq. NH₃, NH₄Cl, and Zn give (-)N-hydroxydioxindole [(-)-trioxindole], m.p. 159° (decomp.), $[\alpha]_{161}^{20}$ -59° in COMe₂, and (+)N-hydroxydioxindole is similarly obtained. Na (-)o-aminomandelate and HNO2 afford (-)o-hydroxymandelic acid, an oil, $[\alpha]_{5401}^{20} - 76.6^{\circ}$ in COMe₂. F. R. S.

Ferrohalides of pyridine and quinoline. F. S. TAYLOR (J.C.S., 1935, 115—116).—The following salts are described : pyridinium ferrochloride, $(C_5H_5NH)_2FeCl_4$, yellow, m.p. 127—128°; quinolinium ferrochloride dihydrate, $(C_9H_7NH)_2FeCl_4,2H_2O$, yellow, m.p. 97°; pyridinium ferrobromide, $(C_5H_5NH)_2FeBr_4$, green; quinolinium ferrobromide dihydrate, $(C_9H_7NH)_2FeBr_4,2H_2O$, yellow, m.p. 89°. F. R. G.

Action of cyanogen iodide on quinolines. 0. MUMM and C. BRUHN (Ber., 1935, 68, [B], 176-183). -Addition of CNI to the requisite quinoline in Et₂O in presence or absence of HCN leads to pptn. of the following iodocyanides: quinoline, m.p. 104°; p-, m.p. 107-108°, and o-, m.p. 98°, -toluquinoline; 2-methylquinoline, m.p. 98°; β-naphthaquinoline (I), m.p. 116-117°. The compounds are treated with so much cold, conc. HCl as is necessary for complete dissolution; from the vellow solutions the following dichloroiodides (II) RH[ICl₂] separate in about 80% yield, their formulation resting on the complete analogy of their properties with those of the compounds derived by addition of ICl to alkali halides: quinolinium, m.p. 118-120°; o-toluquinolinium, m.p. 146-148°; 2-methylquinolinium, m.p. 112-113°. (II) pass at 100° into the trichloroiodides (RH)2[ICl3], re-converted into the original materials by recrystallisation

from dil. HCl, the following being described : quinolinium, m.p. 123°; 2-methylquinolinium, m.p. 148— 149°; α -naphthaquinolinium, m.p. 194—195°, transformed by EtOH-H₂O into the corresponding dichloroiodide, m.p. 166°. Treatment of (II) with H₂O-BaCO₃, saturated NaHCO₃, or H₂O leads to products identical with those obtained by addition of ICl to quinolines. At 130°, (I) suddenly evolves I and acid vapours and passes into a compound, m.p. 118—120°, transformed by successive treatment with boiling 2N-NaOH and 50% AcOH into. β-naphthaquinolinea-carboxylic acid, m.p. 188—190° [hydrochloride, m.p. 220—221° (decomp.)]. The action of CNI therefore differs essentially from that of CNBr (this vol., 92). H. W.

Synthesis of substituted cinchonic acids with use of weak bases as condensing agents. K. M. PANDALAI (Annalen, 1935, 515, 302-306).-The cis-forms of 3-acylideneoxindoles are converted by weak bases into substituted cinchonic acids, although this reaction does not occur with the corresponding trans-derivatives (cf. Braude, A., 1933, 282; Lindwall et al., ebenda, 164). The mechanism of the reaction differs from that of the Pfitzinger synthesis (A., 1898, i, 207). 3-Acetonylideneoxindole (I) is isomerised by irradiation in abs. EtOH with ultra-violet light and then transformed by 33% K2CO3 into 2-methylquinoline-4-carboxylic acid, m.p. 242°, also obtained by protracted ebullition of 3-hydroxy-3-acetonyloxindole with KOH. (I) is transformed by boiling KOH into dark, resinous material and by irradiation with sunlight in alkaline or EtOH solution into a dark mass from which a definite product could not be isolated. cis-3-Phenacylideneoxindole, m.p. 193°, is similarly converted into 2-phenylquinoline-4carboxylic acid, m.p. 210°. The behaviour of phenacyloxindoles towards conc. alkali and sunlight resembles that of the corresponding Me compounds. H. W.

of 1:4-dihydrocincophens Synthesis [2phenyl - 1 : 4 - dihydroquinoline - 4 - carboxylic acids | from 3-phenacyloxindoles. R. N. DuPuis and H. G. LINDWALL (J. Amer. Chem. Soc., 1934, 56, 2716-2719).-3-Phenacyloxindole (+a little AcOH) and boiling aq. HCl give the hydrochloride, m.p. 213-217° (decomp.), of 2-phenyl-1: 4-dihydro-quinoline-4-carboxylic acid (I), m.p. 165° [Ag salt; sulphate, m.p. 198—200° (decomp.)], oxidised (boiling PhNO₂) to 2-phenylquinoline-4-carboxylic acid (II); with aq. EtOH-HCl, (I) and (II) result. The 4'-Cl-, m.p. 145°, 4'-Br-, m.p. 153-155°, and 4'-Me, m.p. 150° (Ag salt), derivatives of (I) are similarly prepared and oxidised to the 4'-substituted (II). (I) contains 2 active H, could not be reduced (Na+amyl alcohol or metal+acid), and could not be acylated or alkylated. Isatin and benzphenacylamide in EtOHpiperidine or -NHEt, at room temp. give 3-hydroxy-3a-benzamidophenacyloxindole (III), m.p. 144-147°; in the hot, 3-a-benzamidophenacylideneoxindole (IV), m.p. 252-253° [also formed from (III) and EtOH-HCl], results. (IV) is reduced (Zn dust, AcOH) to 3-a-benzamidophenacyloxindole, m.p. 209-211°, converted by aq. EtOH-HCl at 110--120° (bath) into (II); deamination thus occurs at some stage in the reaction. H. B.

Preparation of quinoline derivatives. VI. K. DZIEWOŃSKI and J. MAYER [with L. MARCZEWSKI, K. PIOTROWSKA, and A. SMORAWINSKA] (Bull. Acad. Polonaise, 1934, A, 338-347, and Rocz. Chem., 1934, 14, 1157-1165; cf. this vol., 222).-p-C₆H₄Cl·COMe (I) heated with CS(NHPh)₂ at 180-260° for 4 hr. yields 4-anilino-2-p-chlorophenylquinoline (II), m.p. 159° [hydrochloride, m.p. 170° (decomp.); picrate, m.p. 275° (decomp.); 4-N-NO-, m.p. 200° (decomp.), 4-N-Ac derivatives, m.p. 171°]. Similarly COPhMe and (p-C₆H₄Cl·NH)₂CS afford 6-chloro-4-pchloroanilino-2-phenylquinoline (III), m.p. 221° [hydrochloride, m.p. 335° (decomp.); picrate, m.p. 245° (decomp.): 4-N-NO-, m.p. 201° (decomp.), 4-N-Ac, m.p. 170°, and (?-)NO2-derivatives, m.p. 191° (decomp.)], and (I) and (p-C₆H₄Me·NH)₂CS afford 4-p-tolylamino-2-p-chlorophenyl-6-methylquinoline (IV), m.p. 278° [hydrochloride, m.p. 305° (decomp.); nitrate, m.p. 145° (decomp.); acetate, m.p. 305°; picrate, m.p. 243° (decomp.); 4-N-NO-, m.p. 157° (decomp.), and 4-N-Ac derivatives, m.p. 306-307°]. (II) with KOH and EtOH at 200° under pressure 4-hydroxy-2-p-hydroxyphenylquinoline, m.p. yields 216°. Similarly, 4:6-dihydroxy-2-phenylquinoline, m.p. 251—252° (Me_2 ether, m.p. 118°), is obtained from (III), and 4-hydroxy-2-p-hydroxyphenyl-6-methylquinoline, m.p. 274°, from (IV). H. G. M.

Syntheses and transformations of new compounds derived from 2-phenylquinoline. K. DZIEWOŃSKI and J. MOSZEW [with W. JASTRZEBSKA, R. KOCHAŃSKI, J. MAKSYMOWICZ, P. STACHOWICZ, I. STRASIKÓWNA, and P. TRZĘSIŃSKI] (Rocz. Chem., 1934, 14, 1123—1135).—COPhMe and di-m-tolyl-thiocarbamide heated at 180—205° for 10 hr. yield 4-m-toluidino-2-phenyl-5-methylquinoline, m.p. 134-135° [hydrochloride, m.p. 173—175° (decomp.); picrate, m.p. 245—246°; N-Ac, m.p. 149—150°, and N-NO-derivative, m.p. 144°], which affords 4-hydroxy-2-phenyl-5-methylquinoline, m.p. 281°, on hydrolysis with EtOH-KOH at 200° for 6 hr. CH2BzPh (I) and CS(NHPh)₂ heated at 190-210° for 6 hr. afford 4-anilino-2: 3-diphenylquinoline (II), m.p. 196-197° [hydrochloride, m.p. 279°; nitrate, m.p. 185° (decomp.); picrate, m.p. 259-260°; N-NO-derivative, m.p. 153-154° (decomp.)], which yields on hydrolysis 4-hydroxy-2: 3-diphenylquinoline, converted by POCl₃ into 4-chloro-2: 3-diphenylquinoline, m.p. 121°. (I) and di-p-tolylthiocarbamide when heated at 190° for 3 hr., and then at 210-220° for 3 hr., yield 4-p-toluidino-2: 3-diphenyl-6-methylquinoline, m.p. 176° (picrate, m.p. 236°). 2- $C_{10}H_7$ ·N:CPhMe, m.p. 65–67°, b.p. 215–220°/13 mm. (from β - $C_{10}H_7$ ·NH₂ and COPhMe with ZnCl₂ at 170–220°), with PhNCS at 200° (1 hr.) and then at 280° (30 min.) yields 4-anilino-2-phenyl-5: 6-benzoquinoline (III), m.p. 193-194° [picrate, m.p. 238-239° (decomp.); hydro-chloride, m.p. 328°], hydrolysed to 4-hydroxy-2phenyl-5: 6-benzoquinoline, m.p. 280-281° (picrate, n.p. 234-235°). The methiodide, m.p. 236-238°, and ethiodide, m.p. 269° (decomp.), of 4-anilino-2phenylquinoline $(2:1 compound with CH_2Br_2, m.p.)$ 268-270°; 1:1 compound with BzCl, m.p. 258-260°) yield 4-phenylmethyl-, m.p. 153-154°, and 4-phenylethyl-, m.p. 164-165°, -amino-2-phenylquinoline, when hydrolyscd with EtOH-KOH. The methiodide, m.p. 240° (decomp.), and ethiodide, m.p. 256° (decomp.), of 4-p-toluidino-2-phenyl-6-methylquinoline yield similarly 4-p-tolylmethyl-, m.p. 205— 206°, and 4-p-tolylethyl-, m.p. 136°, -amino-2-phenyl-6-methylquinoline. The methiodide, m.p. 246°, and ethiodide, m.p. 253° (decomp.), of (II) afford 4-phenylmethyl-, m.p. 207°, and 4-phenylethyl-, m.p. 174°, -amino-2: 3-diphenylquinoline, and 4-phenylmethylamino-2: 6-benzoquinoline, m.p. 190—191°, similarly prepared from the methiodide, m.p. 284— 285°, of (III). R. T.

Sulphonation of aminoquinolines. K. CYBUL-SKI, E. SUCHARDA, C. TROSZKIEWICZÓWNA, and W. TURSKA (Rocz. Chem., 1934, 14, 1172-1181).-5-Aminoquinoline-6-, +0.5H2O, m.p. 280-305° (decomp.), and -8-sulphonic acid $(\overline{1})$, $+H_2O$, m.p. 290–310° (decomp.), and -6:8-disulphonic acid, $+1.5H_2O$, m.p. > 230° (decomp.), are obtained by heating 5-aminoquinoline hydrochloride for different periods with 25-40% oleum; (I) is also obtained from 5-hydroxyquinoline-8-sulphonic acid and aq. NH₃ at 140°. The following acids are prepared analogously : 6-aminoquinoline-5- (II), decomp. at > 230°, 7-aminoquinoline-8-; 8-aminoquinoline-5-sulphonic acid (III), m.p. $> 260^{\circ}$ (decomp.); -5 : 7-disulphonic acid, +H₂O. The products of diazotation of (I), (II), and (III) are R. T. described.

β-Hydroxyphenylethylamines and their transformations. III. Synthesis of benzylisoquinolines under physiological conditions. G. HAHN and O. SCHALES (Ber., 1935, 68, [B], 24-29; cf. A., 1934, 647, 1220).-Study of the action of (1) homopiperonylamine (I) and homopiperonal (II), (2) 3:4methylenedioxyphenylpyruvic acid (III) and (I), (3) 3:4-methylenedioxyphenylalanine (IV) and (II), (4) (III) and (IV) shows that all β -hydroxyphenylethylamines (V) with substituted OH are suitable for the synthesis of tetrahydroisoquinolines, although con-densation is less rapid than with (V) with free OH. The preliminary stage of the ring closure (formation of N-substituted aldehyde-ammonia or of Schiff's base) depends greatly on the $p_{\rm H}$ of the solution, the rate being maximal at $p_{\rm II}$ 5. (II) (prep. from safrole described) condenses with the hydrochloride of (I) in H₂O at 25° and $p_{\rm H}$ 5 to give 6 : 7 : 3' : 4'-dimethylenedioxybenzyl-1:2:3:4-tetrahydroisoquinoline, m.p. 98° (hydrochloride, m.p. 235°). H. W.

Nitrogen compounds in petroleum distillates. VIII. Degradation of the naphthenic base, $C_{16}H_{25}N$, to the lower homologue, $C_{14}H_{21}N$. R. W. LACKEY and J. R. BAILEY (J. Amer. Chem. Soc., 1934, 56, 2741—2743).—The base $C_{16}H_{25}N$ (I), m.p. 23—24·3° (cf. A., 1933, 1305), and Br give (cf. A., 1931, 631) a Br_1 -derivative (II), m.p. 55·7° [picrate, m.p. 194·2° (softens slightly at 192°)], which could not be oxidised (HNO₃ or KMnO₄), is reduced (Zn dust, AcOH; not Adams) to (I), and does not react with Na at 250°, aq. or EtOH–KOH, AgOAc, or Mg. (II) probably contains CH₂Br attached to a neo-C atom. The additive compound, m.p. 80—100°, from (I) and CNBr decomposes at 260°/4 mm. The product from (I) and 37% CH₂O at 190° is oxidised (HNO₃) to a dicarboxylic acid, $C_{14}H_{19}N(CO_2H)_2$, m.p. about 100° (softens at 85°), decarboxylated at 235—240°/30 mm. to an acid, $C_{14}H_{20}N\cdot CO_2H$, m.p. 218—220°. Distillation of this with soda-lime gives a base, $C_{14}H_{21}N$, b.p. 266·4°/746 mm. (picrate, m.p. 146·2°), which could not be brominated or reduced (Adams).

(I) thus resembles 2:4-dimethylquinoline in its reaction with CH_2O . Structure (A) is now assigned to (I). H. B.

Chemiluminescence of dimethyldiacridylium salts.—See this vol., 281.

Manufacture of compounds of acridinium series.—See B., 1935, 124.

Oxidation of uracil in vitro. C. R. SCHWOB and L. R. CERECEDO (J. Amer. Chem. Soc., 1934, 56, 2771—2772).—Uracil (I) is oxidised [aq. H_2O_2 in presence of C (Nuchar W) at 95—98°] to small amounts of *iso*barbituric (II) and *iso*dialuric (III) acid, $H_2C_2O_4$ (IV), and CO(NH₂)₂ (V); in absence of C, a trace of (V) only is isolable. (II) is similarly oxidised [much more readily than (I)] to (III), (IV), and (V). (III) is actually isolated as K dialurate; treatment of (III) with aq. KOH causes isomerisation. Oxaluric acid (a probable intermediate) could not be isolated [probably owing to its ready hydrolysis to (IV) and (V)]. H. B.

Derivatives of N-phenylpiperazine. V. PRELOG and Z. BLAZEK (Coll. Czech. Chem. Comm., 1934, 6, 549-560).-N-Phenylpiperazine (I) (A., 1934, 196, improved prep.) and (·CH₂)₂O in boiling MeOH give its N'-B-hydroxyethyl derivative (II), m.p. 91° [mono-, m.p. 162°, and di-hydrobromide, m.p. 226°; dipicrate, m.p. 169° (decomp.); hydrochloride of O-Ac deriv-ative, m.p. 206—207°; O-Bz, m.p. 87° (hydrochloride, m.p. 214°), and O-p-nitrobenzoyl, m.p. 105°, reduced (Sn-HCl) to the O-p-aminobenzoyl, m.p. 144.5°, derivatives]. With 66.5% HBr at 170° (II) affords the dihydrobromide, m.p. 256°, of N'- β -bromoethyl-, converted by NH₂Ph in boiling BuºOH into the trihydrobromide, decomp. 228-229°, of N'-β-anilinoethyl-, converted by BzCl in C₆H₆ into the monohydrochloride, m.p. 195°, of N'- β -benzanilidoethyl-N-phenylpiper-azine. With 40% CH₂O (I) gives N-bis-(N'-phenyl $piperazyl) methane, \operatorname{CH}_2\operatorname{R}_2(\operatorname{R}=\cdot\operatorname{N}{<}_{\operatorname{C_2H}}^{\operatorname{C_2H}}{>}\operatorname{NPh}), \operatorname{m.p.}$ 133° (tetrahydrobromide, m.p. 239-241°), and (I) with COCl2 in PhMe affords carbo-N'-phenylpiperazide COR2, m.p. 183°. Similarly (I) with CH2Br·CO2Et-PhMe gives Et N'-phenylpiperazine-N-acetate, isolated as its mono-, m.p. 166°, and di-hydrobromide, m.p. 210° (decomp.) (hydrobromide, decomp. 257°, of free acid); with CH₂PhCl and 2:4-C₆H₃Cl(NO₂)₂ are obtained,

respectively, N-phenyl-N'-benzyl-, m.p. 59° (monohydrochloride, m.p. 228°), and -N'-2: 4-dinitrophenyl-, m.p. 156°, -piperazine. The compound $C_{12}H_{20}ON_2Br_2$, previously obtained from NH₂Ph and

 $OH \cdot CH_2 \cdot CH_2 \cdot N(CH_2 \cdot CH_2Br)_2$ (this vol., 71), is probably the dimeride

 $\begin{bmatrix} \mathring{HBr}, NHPh \cdot C_2H_4 \\ HO \cdot C_2H_4 \end{bmatrix} N \langle \overset{C_2H_4}{C_2H_4} \rangle N \langle \overset{C_2H_4}{C_2H_4} \cdot NHPh, HBr \\ & HO \cdot C_2H_4 \end{bmatrix} Br_2$

(dihydrochloride, m.p. 183°), converted by boiling $Ac_{2}0$ into the compound [NPh($C_{2}H_{4})_{2}N(CH_{2}\cdot)_{2}$]Br₂.

J. W. B. Condensation of o-phenylenediamine with benzaldehyde. S. WEIL and H. MARCINKOWSKA (Rocz. Chem., 1934, 14, 1312—1319).—o-C₆H₄(NH₂)₂ (I) (1 mol.) and PhCHO (3 mols.) yield phenylbenzylbenziminazole and a compound, m.p. 159°, probably $C_6H_4 < \frac{\text{N:CPh}}{\text{N:CPh}}$ CHPh. CHPhBz₂ or CPhBz₃ and (I) yield phenylbenziminazole (hydrochloride, decomp. at 200°) when heated at 170—180°. 1 : 2 Compounds of the benziminazole type are obtained from (I) and piperonal, m.p. 175°, and from (I) and vanillin, m.p. 224°; o-OH·C₆H₄·CHO and (I) yield $C_6H_4(\text{N:CH·C}_6H_4\cdot\text{OH})_2$. R. T.

Pyrimidines. CXLIII. Preparation of derivatives of uracil. L. R. BUERGER and T. B. JOHN-SON (J. Amer. Chem. Soc., 1934, 56, 2754—2755; cf. A., 1933, 1307).—OEt·CH:CAc·CO₂Et and NH₂·CO·NHMe at 140° give *Et methylcarbamidomethyleneacetoacetate*, m.p. 133—134°, converted by aq. 5% KOH at 75° followed by acidification (AcOH) into 5-acetyl-1-methyluracil, m.p. 197°. 5-Acetyl-1-phenyluracil, m.p. 228°, and 1-phenyluracil-5-carboxylic acid (I), m.p. 239° (decomp.), are similarly prepared from *Et phenylcarbamidomethylene-acetoacetate*, m.p. 141°, and *-malonate*, m.p. 170—171°, respectively [from PhNCO and NH₂·CH:CAc·CO₂Et and NH₂·CH:C(CO₂Et)₂, respectively, in xylene-C₅H₅N].

1-Phenyluracil, m.p. 247°, is obtained when (I) is boiled with conc. HCl and the solution then evaporated to dryness. H. B.

Pyrimidines. Molecular rearrangement of 2ethylmercapto-6-thiocyano-5-ethylpyrimidine. Y. F. CHI and Y. L. T'IEN (J. Amer. Chem. Soc., 1935, 57, 215-217).-Pr^aCO₂Et, HCO₂Et, and Na in Et₂0 give the Na derivative of Et formyl-n-butyrate, which with ψ -ethylthiocarbamide hydrobromide and aq. KOH at 0° gives 2-ethylthiol-5-ethyluracil, m.p. 119-120°, converted by hot POCl₃ into 6-chloro-2-ethylthiol-5-ethylpyrimidine, b.p. 160-162°/22 mm., which with KCNS in hot EtOH, C₆H₆, or COMe, affords a little 2-ethylthiol-6-thioethylurethano-5-ethylpyrimidine, m.p. 77—78°, and much 2-ethylthiol-6-thiocyano-5-ethylpyrimidine (I), m.p. 46—47°. The structure of (I) is proved by its stability to conc. aq. NH₂ and hot EtOH, and its reaction with hot SH·CH₂·CO₂H to form 2 - ethylthiol - 6 - acetyldithiourethano - 5 - ethylpyrimidine, m.p. 116-117°. Although (I) is stable to heat alone and can be distilled unchanged at 158-160°/5 mm., it is rearranged by boiling PhMe (6 hr.) or EtOH (2 hr.) to the 6-thiocarbimido-compound, b.p. 146-149°/8 mm., which with the appropriate reagents affords 2-ethylthiol-6-thiocarbamido-, m.p. 143-144°, -6-phenylthiocarbamido-, m.p. 108-109°, and -6-thioethylurethano-5-ethyl-pyrimidine, m.p. 77-78°. **R**. S. C.

6: **7**-Dimethyl-9-*l*-araboflavin. R. KUHN and F. WEYGAND (Ber., 1935, 68, [B], 166—169).— $[\alpha]$ of synthetic 6: 7-dimethyl-*l*-araboflavin (I) (measured with the Ac₄ derivative) is identical with that of natural lactoflavin within the limits of experimental

error. Definite conclusions cannot be based thereon until the effect of individual OH on the $[\alpha]$ and growthpromoting action of the corresponding flavins is ascertained. Assuming the sign of $[\alpha]$ to be governed by OH proximate to the chromophore, *l*-arabinose, *d*-xylose, *l*-lyxose, and, particularly, *d*-ribose must be considered, whereas *d*-arabinose is excluded. (I) shows little ability to couple with the colloid carrier of the yellow ferment of Warburg and Christian. The slight effect produced is not sp. and the expected catalytic actions do not occur. The possibility is considered that the "active group" of the ferment is a lactoflavinphosphoric acid. Theorell's view that the active group is a "nucleotide" containing 6:7-dimethylalloxazine is regarded as erroneous, since spectroscopic evidence leaves no doubt that the coloured parent material is 6:7-dimethyl*iso*alloxazine. H. W.

Optical activity of lactoflavin. R. KUHN and H. RUDY (Ber., 1935, 68, [B], 169—170).—The following vals. of $[\alpha]_{20}^{20}$ are recorded for lactoflavin (I): $\pm 3^{\circ}$ in 2N-H₂SO₄; $\pm 5^{\circ}$ in H₂O or 0.01N-NaCl; -114° in N/75-NaOH; -115° in 0.1N-NaOH, -110.5° in 0.2N-NaOH; -78° in 1.4N-NaOH; -123.5° in 0.04N-NaOH-H₄Mo₂O₅; +350° in 0.04N-NaOH-Na₂B₄O₇; -59° in AcOH. These vals. are approx. twice as great as those for the red Cd line. There appears to be a relationship between the optical activity and sensitiveness to light of alkaline solutions of (I). H. W.

Natural and synthetic lumilactoflavin. R. KUHN, H. RUDY, and K. REINEMUND (Ber., 1935, 68, [B], 170–172).—The differences observed between synthetic 6:7:9-trimethylflavin (I) and preps. of the pigment $C_{13}H_{12}O_2N_4$ from natural sources are due to impurities in the latter which are removed only with difficulty by purification through the Ag salt and repeated crystallisation from AcOH. (II) as used in degradation experiments contains 6:7-dimethylallox-azine (formerly α -lumilactoflavin) and β -lumilactoflavin (I). H. W.

[Flavins.] P. KARRER (Ber., 1934, 67, [B], 2061-2063).-Mainly a question of priority against Kuhn et al. H. W.

[Flavins.] R. KUHN (Ber., 1935, 68, [B], 172-176).—A reply to Karrer *et al.* H. W.

Syntheses of flavins. P. KARRER, K. SCHOPP, F. BENZ, and K. PFAEHLER (Ber., 1935, 68, [B], 216-219).—Reductive condensation of N-monoacyl-ophenylenediamines with sugars affords excellent yields of o-acetamidophenylamino-pentitols and -hexitols which with alloxan give the corresponding isoalloxazine compounds. The following -isoalloxazines are thus obtained : 6 : 7-dimethyl-9-1-1'-arabo- (I), m.p. 298°, [a]_D -78° (±10°) in 0.05N-NaOH; 7-methyl-9.11'-arabo-, m.p. 284—285°; 9-1-1'-arabo-, m.p. 292°, [1]₀ - 108° (±10°) in 0.05N-NaOH; 7-methyl-9-d-1'ylo-, m.p. about 268-269°; non-cryst. 7-methyl-9.d-1'-sorbo-. The compounds resemble lactoflavin (II) in behaviour towards light. (I) differs in m.p. from (II). Change in m.p. above 286° could not be effected by crystallisation of (II), whereas the operation causes divisions into fractions of differing $[\alpha]_{D}$. (I) may be identical with the least sol. fraction obtained from (II). H. W.

Syntheses of flavins. III. P. KARRER, K. SCHÖPP, F. BENZ, and K. PFAEHLER (Helv. Chim. Acta, 1935, 18, 69-77; cf. preceding abstract). --A detailed account of work already reported. The following intermediate compounds are described. Et 2-aminophenylcarbamate, m.p. 86°, obtained by reduction (H2-Pt-EtOH) of Et 2-nitrophenylcarbamate, m.p. 58° (from $o \cdot NO_2 \cdot C_6 H_4 \cdot NH_2$ and $ClCO_2Et$ in boiling $CHCl_3$). Et 2-amino-4:5-dimethylphenylcarbamate, m.p. 111°. 2-Acetamido-5-methylphenyl-d-glucosamine, m.p. $184-185^{\circ}$, $[\alpha]_{\rm D}^{\circ}$ $-3^{\circ}0^{\circ}$ ($\pm 3^{\circ}0^{\circ}$) in H₂O, by hydrogenation at 120-135°/15-20 atm. of 2-acetamido-5-methylaniline and glucose in 90% MeOH in presence of Ni [whence 2:6-dimethyl-1-d-sorbitylbenziminazole, m.p. 226°, [a]20 2: 6-atmentyl-1-d-soloriguenzinnacol, II. p. 20, [a]b $-46\cdot4^{\circ}$ ($\pm5^{\circ}$) in H₂O]. 2-Acetamido-5-methylphenyl-d-xylosamine, m.p. 156–157°, $[a]_{D}^{\circ}$ $-31\cdot5^{\circ}$ ($\pm3^{\circ}$) in H₂O; 2-acetamido-5-methylphenyl-1-arabinosamine, m.p. 159°, $[a]_{D}^{\circ}$ +29.4° ($\pm3\cdot0^{\circ}$) in H₂O; 2: 6-dimethyl-1-l-arabitylbenziminazole, m.p. 235–236°, $[a]_{D}^{\circ}$ +56.3° $(\pm 2^{\circ})$; 2-carbethoxyaminophenyl-l-arabinosamine, m.p. 161°, apparently feebly dextrorotatory in H₂O; 2 - carbethoxyamino - 4 : 5 - dimethylphenyl - 1 - arabinosamine, m.p. 175°, probably very feebly lævorotatory in H₂O. H. W.

Synthesis of "ancient purple." W. ROTTIG (J. pr. Chem., 1935, [ii], 142, 35-36).—6:6'-Dibromoindigotin (ancient purple) is prepared by Sachs and Sichel's method (A., 1904, i, 593) from 4-bromo-2-nitrobenzaldehyde [obtained by hydrolysis (conc. HCl) of its oxime, which is prepared from 4-bromo-2-nitrotoluene and EtO·NO in EtOH-NaOEt].

H. B.

Complex salts of 2: 2'-dipyridyl with zinc and cadmium.—See this vol., 312.

Triazolium salts. III. Triazolium salts from azimides and ψ -azimides. F. KROLL-PFEIFFER, A. ROSENBERG, and C. MÜHLHAUSEN (Annalen, 1935, 515, 113–130; cf. A., 1934, 182, 785).—Methylation (Me₂SO₄, 2N-NaOH) of $\alpha\beta$ naphtha-1:2:3-triazole (I) gives a mixture of the 1-Me (II), m.p. 86–87° (picrate, m.p. 163–164°), 2-Me (III), m.p. 74.5° (picrate, m.p. 131–132°), and 3-Me (IV), m.p. 109–110°, derivatives; the Na derivative of (I) is, therefore, best represented as

 $[C_{10}H_6 < \stackrel{N}{\underset{N}{>}} N]^-Na.^+ \qquad 3\text{-Ethyl-}\alpha\beta\text{-naphtha-}1:2:3\text{-}$

triazole, m.p. 74—75° [prepared by the method of Morgan et al. (A., 1922, i, 181, 380)], and EtI at 100° (sealed tube) afford 1-methyl-3-ethyl- $\alpha\beta$ -naphtha-1:2:3-triazolium iodide, decomp. 197—198° (picrate, m.p. 166—167°; periodide, m.p. 125—126°), also obtained from (II) and EtI. 3-Methyl-1-ethyl-, decomp. 205° (picrate, m.p. 185—186°; periodide, m.p. 130—131°), and 1:3-dimethyl- (V), decomp. 208— 209° (picrate, m.p. 185—186°), - $\alpha\beta$ -naphtha-1:2:3triazolium iodides are similarly prepared from (IV) and EtI and MeI, respectively. (III) and Me₂SO₄ at 100° give 2:3-dimethyl- $\alpha\beta$ -naphtha-1:2:3triazolium methosulphate, decomp. 198—199° (previous sintering), converted by conc. aq. KI into the iodide (VI), decomp. 168°, which is also formed (very slowly)

from (III) and an excess of MeI at room temp. Prolonged interaction of (III) and MeI at 100⁵ affords (V); (VI) and MeI at 100° give (V) and a little (111). 2-Phenyl- $\alpha\beta$ -naphtha-1:2:3-triazole (VII) (which does not react with MeI) and Me₂SO₄ similarly afford 2-phenyl-3-methyl- $\alpha\beta$ -naphtha-1:2:3-triazolium metho-sulphate, decomp. 206–207° (previous sintering), which is reduced (alkaline $Na_2S_2O_4$) to 1-benzeneazo-N-methyl-β-naphthylamine. Oxidation (amyl nitrite, AcOH) of 1-benzeneazo-N-ethyl-β-naphthylamine and subsequent treatment with picric acid 2-phenyl-3-ethyl- $\alpha\beta$ -naphtha-1:2:3-triazolium gives picrate, m.p. $181-182^{\circ}$ [the corresponding ethosulph-ate is obtained from (VII) and Et_2SO_4]; the corresponding chloride, decomp. 100°, is reduced [(NH₄)₂S] to (VII) and undergoes thermal decomp. to (VII) and EtCl. Thermal decomp. of (V) and (VI) affords (I), (II), and (III).

Methylation (Me_2SO_4 , 2N-NaOH, or MeOH-MeI) of 1:2:3-benztriazole (VIII) gives 55% of the 1-Me (IX), m.p. 65°, and 33% of the 2-Me (X), b.p. 103.5-104°/15 mm.; ethylation (EtBr, EtOH-NaOEt) affords a mixture of the 1-Et, b.p. 149.5°/12 mm., and 2-Et (XI), b.p. $108 \cdot 5^{\circ}/14$ mm., derivatives. (VIII) and $CH_2Cl \cdot CO_2H$ in 2N-Na₂CO₃ give (cf. Reissert, A., 1914, i, 432) 1- and 2-benztriazolylacetic acids, m.p. 212-213° and 223-224°, respectively, which when distilled afford (IX) and (X), respectively. (IX) and MeI at room temp. or 100° give 1:3-dimethyl-1:2:3benztriazolium iodide, decomp. 185° (picrate, m.p. 167-168°), also formed by prolonged interaction of (X) and MeI at 100°, which undergoes thermal decomp. to (mainly) (IX) and (X). 1:2-Dimethyl-1:2:3benztriazolium methosulphate (XII), m.p. 156-157° [from (X) and Me₂SO₄], is converted into the corresponding picrate, m.p. 121-122°, and iodide (XIII), decomp. 160° [a trace of which is obtained by prolonged interaction of (X) and MeI at room temp.]. Thermal decomp. of (XIII) also gives (mainly) (IX) and (X). Reduction (Na₂S₂O₄, 2N-NaOH) of (XII) in absence of air affords o-methylazomethylaniline, b.p. 99-102°/3 mm. 1-Methyl-2-ethyl-, m.p. 116-117°, and 2-methyl-1-ethyl-, m.p. 124-125°, -1:2:3benztriazolium picrates are prepared by the action of Me_2SO_4 etc. on (XI) and Et_2SO_4 etc. on (X), respectively. H. B.

Synthesis of 1:3:5-tripyridylbenzene. W. JAROSZEWICZ and E. SUCHARDA (Rocz. Chem., 1934, 14, 1195—1197).—3-Pyridyl Me ketone and HCl at 180—185° (9 hr.) yield s-*tripyridylbenzene*, m.p. 226°, not undergoing sulphonation or nitration even with the most conc. acids at high temp. R. T.

Colorimetric micro-determination of caffeine. G. DENIGÈS (Compt. rend., 1934, 199, 1622—1623).— Caffeine (I) (0.001—0.02 g.) may be determined by evaporation of its CHCl₃ solution, addition of 6 drops of Br-H₂O (saturated in the cold) and N-HCl to the residue, gentle evaporation to dryness and heating until a red colour is produced, addition of 10 c.c. of H₂O and 1 drop of 5% aq. Hg(OAc)₂-AcOH, and colorimetric comparison with a standard similarly prepared from pure (I). J. W. B.

Mechanism of autoxidation of uric acid. M. Frèrejacque (Compt. rend., 1934, 199, 1432-1434). —Autoxidation $(MnO_2 \text{ is a catalyst})$ of alkaline solutions of "isoallantoylaniline" (I) or oxidation by alkaline $KMnO_4$ (not I) gives the compound (II),

$$CO < NH \cdot CH - NH > CO (I)$$

$$CO < NH \cdot C(NHPh) \cdot NH > CO (I)$$

$$CO < NH \cdot C - NH - CO (II)$$

decomp. about 145°, only slowly affected by dil. alkali, but with cold, dil. mineral acids giving rapidly and quantitatively H₂C₂O₄, carbamide, and NH₂Ph. Autoxidation of uric acid (III) in presence of MnO2 and NH₂Ph affords no (I), the formation of which, in absence of MnO₂, takes place to a greater extent the faster the oxidation proceeds. Addition of NH,Ph to solutions of (III), freshly autoxidised in presence of MnO_2 , does not afford (I). It is concluded that (I) is not formed from (III) and NH₂Ph without oxidation (cf. A., 1933, 427) and that the primary product of autoxidation of (III) is a dioxide, which is decomposed by certain catalysts to a ureide. This ureide can unite with amines, but the products are stable only in strongly alkaline solution, and in neutral or slightly alkaline solution lose CO₂ to give isoallantoin derivatives; the ureide rapidly isomerises to a second ureide, which undergoes the classical degradation. R. S. C.

Attempts to synthesise uric acid from ninemembered cycloids. P. C. GUHA and M. N. RAMASWAMI (J. Indian Chem. Soc., 1934, 11, 811-822).—Hydrolysis of (·CO·NH·CO₂Et)₂ (I) (improved prep.) with boiling dil. HCl gives carbethoxyoxamic acid CO₂H·CO·NH·CO₂Et $+3H_2O$, m.p. $133-134^\circ$. Condensation of (I) with 1 mol. of CO(NH₂)₂ (II) at 120-125° affords Et allophanate (III), carbethoxyoxamide, m.p. 155-156°, carboxalyldicarbamide, $CO < MH \cdot CO \cdot MH \cdot CO, m.p. > 300^{\circ}, dicarbamyloxalyl$ diurethane, [·CO·N(CO2Et)·CO·NH2], m.p. 230°, and a substance, not melting at 330° . With > 2 mols. of (II) at $135-140^{\circ}$ is obtained oxalyldibiuret (·CO·NH·CO·NH·CO·NH₂)₂, m.p. 185-186°. With aq. NH₃ (I) gives oxalylbiuret, m.p. 235°, and oxalyldicarbamide, m.p. > 350°; and CO2Et.NH.CH2.CO2Et affords an *amide*, m.p. $> 350^{\circ}$, and $CO_2ETMIPCH_2CO_2ETMIPCH_2CO_2ETMIPCH_2CO_2ETMIPCH_2CO_2ETMIPCH_2CO_2ETMIPCH_2CO_3 at 170—180°, NH₂·CO·NH·CH₂·COR (IV, R=NH₂) affords$ *glycollylbiuret*(V), m.p. 220—221°, similar condensation of the ester (R=OEt) with (II) giving(V) and glycollyldicarbamide, m.p. 236°, also obtained from either (IV) or hydantoin and (II). Condensation of $CO(NH \cdot CO_2Et)_2$ with $C_2H_4(NH_2)_2$ affords (III) and carbethylenedicarbamide, $CO < NH \cdot CO \cdot NH \cdot CH_2$ m.p. 275-276°, converted by hot conc. HCl into (?) deoxyuric acid, CO< at 340°. J. W. B.

Action of chlorine on methylated and acetylated uric acids. H. BILTZ and H. PARDON (Annalen, 1935, 515, 201–252; cf. A., 1932, 1044).— The reactions have been studied with particular reference to the role of the solvent. Uric acid (I) is unaffected by Cl_2 in CHCl₃ or anhyd. AcOH; in aq. AcOH [H₂O:(I)=1:1], 5-chloro- ψ -uric acid results, whereas fission to alloxan and CO(NH)2 occurs when $(I): H_2O = 1:5$. Chlorination in Ac₂O leads to 4-chloro-5-acetoxy-9-acetyldihydrouric acid, also obtained from 9-acetyluric acid, whereas the 7-Ac-acid gives 5-chloro-7-acetylisouric acid. 1-Methyluric acid (II) and Cl₂ in CHCl₃ afford 5-chloro-1-methyl-4-uric acid (+AcOH), converted by MeOH and EtOH, respectively, into the 5-alkoxy-acid, m.p. 192° and 216° (decomp.). In Ac₂O containing anhyd. AcOH (II) is transformed into 4-chloro-5acetoxy-9-acetyl-1-methyldihydrouric acid (III), decomp. $>290^{\circ}$ [reduced by KI to (II)], which reacts violently with boiling H₂O giving methylalloxan, whereas at room temp. a substance, $C_{10}H_{12}O_7N_4$, m.p. 205–208° (slight decomp.) [reduced to (II)], is produced. With cold or boiling MeOH or EtOH (III) yields 9-acetyl-4methoxy-, m.p. 212° (slight decomp.), and 9-acetyl-4-ethoxy-, m.p. 228° (decomp.), -5-acetoxy-1-methyl-dihydrouric acid. Treatment of (III) with KI-H₂O gives 9-acetyl-1-methyluric acid, darkening $> 320^{\circ}$, converted by uncontrolled action of CH_2N_2 into 8-methoxycaffeine and by CH₂N₂ in cooled Et₂O into 9-acetyl-6:8-dihydroxy-2-methoxy-1:7-dimethylpurine, m.p. 162° (decomp.). 7-Acetyl-8-acetory-1-methylxanthine and Cl₂ in Ac₂O, CHCl₃, or AcOH afford 5-chloro-7-acetyl-1-methyl- $\Delta^{4:9}$ -isouric acid (IV), m.p. 201° (decomp.), transformed by short treatment with warm MeOH into 7-acetyl-1-methyluric acid glycol Me₂ ether, m.p. 176° (slightly decomp.) (which yields the corresponding Me_1 other, m.p. 196°, with 50% AcOH), and by boiling EtOH in 5-ethoxy-1-methyl- ψ -uric acid, m.p. 216° (decomp.). (IV) and hot H₂O yield 1-acetyl-7-methylcaffolide (V), m.p. 192°, transformed by pure CH_2N_2 into 1-acetyliso-apocaffeine, m.p. 113°, and by CH_2N_2 -MeOH into 1:3:7-trimethylcaffolide (VI), m.p. 204°. Hydro-lysis of (V) with EtOH-HCl leads to 7-methylcaffolide, m.p. 193—194°, which yields (VI) with CH_2N_2 . 3 Methyluric acid and Cl_2 in AcOH-Ac₂O, CHCl₃, or Ac₂O afford 5-chloro-3-methylisouric acid, m.p. 175-180° (decomp.) after becoming discoloured at 150°. 5-Chloro-7-acetyl-3-methyl- $\Delta^{4:9}$ -isouric acid, m.p. (indef.) 195° (decomp.), from Cl₂ and 7-acetyl-3-methyluric acid in Ac₂O, AcOH, or CHCl₃, gives 3methyluric acid glycol Et, ether, m.p. 203° (decomp.), with EtOH and methylalloxan and $CO(NH_2)_2$ with $H_20.$ 5-Chloro-7-methyl- $\Delta^{4:9}$ -isouric acid, decomp. $>300^{\circ}$ after darkening $> 200^{\circ}$ [transformed by MeOH into 7-methyluric acid glycol Me₂ ether, m.p. 211° [decomp.)], is the sole product of the chlorination of 7-methyluric acid or its Ac derivative. 9-Methyluric acid and Cl₂ in anhyd. AcOH give 5-chloro-9-methyluric acid, decomp. 210°, whereas (?) 9-methyluric acid 4:5-dichloride (VII), gradual decomp. > 300°, is formed in CHCl3 and 4(5)-chloro-5(4)-acetoxy-9-methyldihydrouric acid (VIII) is produced in Ac₂O. On exposure to moist air (VIII) becomes transformed nto 9-methyluric acid glycol, m.p. 208° (decomp.), whilst with EtOH it gives 5-ethoxy-9-methyl-4-uric acid, m.p. 222° (decomp.); when its solution in Ac₂O is exposed to air it gives 5-chloro-9-methyl-4uic acid, m.p. 208° (decomp.). 7-Acetyl-9-methyl-Inc acid in CHCl₃ appears to give a mixture of (VII) and its Ac derivative; in Ac2O or, preferably, AcOH+ ⁴, 4-chloro-7-acetyl-5-hydroxy-9-methyldihydrouric

acid, m.p. 198° (decomp.), is produced, converted by boiling EtOH into 4-chloro-5-hydroxy-9-methyldihydrouric acid, m.p. 212° (decomp.).

1:3-Dimethyluric acid in AcOH-H₂O gives 5chloro-1: 3-dimethyl- ψ -uric acid, whereas in CHCl₃, Ac₂O, or anhyd. AcOH 5-chloro-1: 3-dimethyl- $\Delta^{4:9}$ isouric acid (IX), m.p. 225° (decomp.), converted by H_2O or alcohols into 1:3-dimethyluric acid glycol or its ethers, results. 7-Acetyl-1: 3-dimethyluric acid in Ac₂O or anhyd. AcOH yields 5-chloro-7-acetyl-1: 3-dimethyl- $\Delta^{4:9}$ -isouric acid, m.p. 162° (decomp.), whereas (IX) results in $CHCl_3$. 1:7-Dimethyluric acid (X) in AcOH, Ac₂O, or AcOH-Ac₂O gives 5-chloro-1: 7-dimethyl- $\Delta^{4:9}$ -isouric acid, m.p. 161° (decomp.) after softening at about 130°, transformed by HCl in AcOH into 4:5-dichloro-1:7-dimethyl-4:5-dihydrouric acid, m.p. 163° (decomp.), converted by H₂O into apocaffeine and by MeOH into 1:7-dimethyluric acid glycol Me₂ ether, m.p. 171°. (X) and Cl₂ in AcOH containing 3% of H₂O give 5-chloro-4-hydroxy-1:7-dimethyl-4:5-dihydrouric acid, m.p. 130° (slight decomp.). 8-Acetoxy-1:7-dimethylxanthine in Ac₂O, AcOH, or CHCl₃ affords 5-chloro-1: 7-dimethyl- $\Delta^{3:4}$ -isouric acid, m.p. 175° (decomp.). 1:9-Dimethyluric acid (improved prep.) yields 4-chloro-1: 9-dimethyl- $\Delta^{5:7}$ -isouric acid (XI), m.p. 198° (decomp.), in Ac₂O, AcOH, or (+1CHCl₃) in CHCl₃. 7-Acetyl-1:9-dimethyluric acid and Cl₂ in CHCl₃ give (XI), whereas in Ac₂O or AcOH 5-chloro-7-acetyl-1: 9-dimethyl- $\Delta^{3:4}$ -isouric acid, m.p. 168° (slight decomp.), results, which does not react with boiling EtOH. 5-Chloro-3:7-dimethylisouric acid, m.p. 168° (decomp.), arises from 3:7-dimethyluric acid in Ac₂O as in CHCl₃. 4(5)-Chloro-5(4)-acetoxy-7: 9-dimethyldihydrouric acid, m.p. 132° (decomp.), is obtained in Ac₂O; similarly, 5-chloro-1:3:7-trimethylisouric acid, m.p. 158° (decomp.), is obtained from 1:3:7-trimethyluric acid. In AcOH 1:3:9-trimethyluric acid gives 4-chloro-1:3:9-trimethylisouric acid, whilst in CHCl₃ 4:5dichloro-1:3:9-trimethyldihydrouric acid, m.p. about 171° (decomp.), results (converted by alcohols into 5-alkoxy-1:3:9-trimethyl- ψ -uric acids) and in AcOH 4(5)-chloro-5(4) - acetoxy -1:3:9 - trimethyldihydrouric acid, m.p. 126° (decomp.), is formed (converted by alcohols into 1:3:9-trimethyluric acid glycol alkyl, ethers). 7-Acetyl-1:3:9-trimethyluric acid (XII) in CHCl₃ gives 4:5-dichloro-7-acetyl-1:3:9-trimethyldihydrouric acid, m.p. 168° (slight decomp.), converted by cold MeOH or EtOH into 4-hydroxy-5-methoxy- (XIII), m.p. 215°, and 4-hydroxy-5-ethoxy- (XIV), m.p. 205° -7-acetyl-1:3:9-trimethyldihydrouric acid. In Ac₂O or anhyd. AcOH (XII) yields 4-chloro-5-acetoxy-7acetyl-1:3:9-trimethyldihydrouric acid, m.p. 185° (decomp.), transformed by warm H₂O into 1-acetylisoapocaffeine, by the requisite boiling alcohol into (XIII) and (XIV), respectively, and by NH₃- or NH2Me-EtOH into 4-amino-, m.p. 165°, and 4methylamino-, m.p. 201° (slight decomp.), -5-hydroxy-7acetyl-1:3:9-trimethyl-4:5-dihydrouric acid, respectively, which do not form salts with HClO₄, H₂PtCl₆, HAuCl₄, or pieric acid. Solid products could not be obtained from Cl_2 and 1:7:9-trimethyluric acid in CHCl₃ or Ac₂O, whereas in AcOH allocaffeine (XV) is formed. When very small amounts of solvent are used, 3:7:9-trimethyluric acid in CHCl₃ gives 4:5-dichloro-3:7:9-trimethyl-4:5-dihydrouric acid, m.p. 138° (decomp.) [yielding 3:7:9-trimethyluric acid glycol and (XV) with H₂O], in Ac₂O 4-chloro- 5-acetoxy-3:7:9-trimethyldihydrouric acid, m.p. 125— 130° (decomp.), and in 90% AcOH 4(5)-chloro-5(4)hydroxy-3:7:9-trimethyldihydrouric acid, m.p. 132° (decomp.). Similarly, by use of regulated amounts of solvent 1:3:7:9-tetramethyluric acid affords in CHCl₃ 4:5-dichloro-1:3:7:9-tetramethyldihydrouric acid, m.p. 132° (decomp.), in Ac₂O 4-chloro-5acetoxy-1:3:7:9-tetramethyldihydrouric acid, m.p. 134° (decomp.), and in AcOH a substance which may be a Cl-OH- or a Cl₃-compound (+AcOH). H. W.

Fractionation and purification of organic substances by chromatographic adsorption. III. Is there a chlorophyll c? A. WINTERSTEIN and K. SCHÖN (Z. physiol. Chem., 1934, 230, 139—145).— Contrary to Zscheile (A., 1934, 1115), a third chlorophyll does not exist; the use of talcum as an adsorbent (cf. *loc. cit.*) causes the formation of decomp. products. Previous work (*ibid.*, 91) on chlorophyll, using sucrose as adsorbent, is confirmed. Improved apparatus for separation of relatively large amounts of substances is described. H. B.

Chlorophyll. LI. Partial synthesis of ethylchlorophyllide b; 10-ethoxymethylphæophorbide b. H. FISCHER and G. SPIELBERGER. LII. Constitution of colouring matter of purple bacteria; 9-hydroxydeoxophæoporphyrin a5. H. FISCHER and J. HASENRAMP (Annalen, 1935, 515, 130-148, 148-164).-LI. Ethylphæophorbide b is converted into ethylchlorophyllide b by the method previously described (A., 1934, 785) for the a compound. Methylchlorophyllide a+b and benzoquinone (I) in EtOH and N₂ give 10-ethoxymethylphœophorbide a, $C_{38}H_{42}O_6N_4$, m.p. > 320°, and 10-ethoxy-methylphæophorbide b (II), $C_{38}H_{40}O_7N_4$, m.p. > 320°, separable by fractionation from Et₂O with HCl. (II) is converted by HI-AcOH at 65° into a little 10-ethoxyphæoporphyrin $b_6 Me_2$ ester, $C_{38}H_{40}O_7N_4$, m.p. 275°, also obtained (details to be published) from phæoporphyrin b_6 and EtOH-I. Reduction (H₂, Pd-black, AcOH) of ethylchlorophyllide a (III) (modified prep.; cf. loc. cit.) results in the absorption of about 6 H; reoxidation affords phæoporphyrin a_5 Et ester, m.p. 269°. Allomerisation of (III) with (I) in EtOH, subsequent reduction, and re-oxidation gives mainly 10-ethoxyphæoporphyrin a5 Et ester, m.p. 288°. Reduction (H2, Pd, dioxan or COMe2) of (III) results in the uptake of approx. 2 H only; the resulting non-cryst. dihydro-derivative gives a positive phase test, is decomposed by HCl to dihydrophæophorbide a (IV), and with (I) in EtOH affords 10-hydroxydihydroethylphæophorbide a, $C_{37}H_{42}O_6N_4$, m.p. about 260°. Reduction (H₂, Pd, COMe₂) of methylphæophorbide a (V) (oxime) and re-oxidation of the leuco-compound in neutral solution gives (IV); re-oxidation occurs more slowly in AcOH-HCl and affords (IV) and pheoporphyrin a_5 . The leuco-compound formed during neutral reduction of (V) or the Et analogue probably undergoes partial rearrangement into the leuco-porphyrin. Phæophorbide a (oxime) and Et₂O-CH₂N₂ in COMe₂ give (V);

(IV) (in C_5H_5N) affords dihydromethylphæophorbide a, m.p. 219° (sinters at 215°) (oxime, m.p. 215°) (cf. A., 1933, 1308).

LII. Bacteriochlorophyll (I), obtained by extraction (80% COMe₂) of *Thiocystis* or *Rhodovibrio*, is converted by 10% HCl into bacteriophæophytin a (II), which with MeOH-HCl gives bacteriomethylphæophorbide a (III), $C_{36}H_{36(38)}O_6N_4$, m.p. 260°. The Et₂O mother-liquors from (II) and (III) contain a small amount of a phorbide-like compound (? b series). (III) gives an oxime, is converted by Et₂O-CH₂N₂ in MeOH-C₅H₅N into bacteriochlorin Me₃ ester, $C_{37}H_{40(42)}O_7N_4$, m.p. 205° (which can be oximated), and with HI (d 1.96) in AcOH at 65° affords oxophæoporphyrin a_5 and an unidentified porphyrin. A structure is suggested for (III). The bacteriochlorophyll of Noack and Schneider (A., 1934, 112, 1265) is considered to be identical with (I) and not to be related to the b series.

Oxochloroporphyrin e_5 and $Et_2O-CH_2N_2$ in $COMe_2-C_5H_5N$ give a Me_2 ester, m.p. 279°, which differs from that (m.p. 288°) obtained using MeOH-HCl; structures analogous to those for the Me₂ esters of chloroporphyrin e_5 (A., 1933, 402) are assigned. Reduction (H₂, Pd, HCO₂H) of phæoporphyrin a_5 (IV) affords 9-hydroxydeoxophæoporphyrin a_5 , $C_{36}H_{40}O_5N_4$, m.p. 281°, which is oxidised (CrO₃-AcOH) to (IV); short treatment with S in oleum gives (IV) and some phæoporphyrin a_7 . H. B.

Porphyrins. XXXI. Synthesis of tetramethyltetrapropylbilirubinoids, tetramethyltetrabutylporphyrin I, II, and IV, tetramethyltetraisobutylporphyrin I, and di-(β-carboxyethyl)tetramethyldipropylporphin. XIII. H. FISCHER and M. BERTL. XXXII. Amino- and vinyl-porphyrin and some derivatives. H. FISCHER and E. HAARER. XXXIII. Synthesis of 2:3:6:7-tetra-($\alpha\beta$ -dicarboxyethyl)-1:4:5:8tetramethylporphin. isoUroporphyrin I. H. FISCHER and E. VON HOLT (Z. physiol. Chem., 1934, **229**, 37–54, 55–70, 93–102; cf. A., 1934, 1371).– XXXI. With AgOAc or NaOMe, 5-bromo-4:3':5'trimethyl-3: 4'-dipropylpyrromethene hydrobromide gives 5-hydroxy-4:3':5'-trimethyl-3:4'-dipropylpyrromethene (I), m.p. 202°. Bromination of (I) affords a mixture of a dihydrobromide (Gmelin negative) of a base, C35H46O3N4, m.p. 280-282° (decomp.), and a trihydrobromide (Gmelin positive) of a 1:10-dihydroxy-2:4:7:9-tetramethyl-3:5:6:8tetrapropyltetrapyrro-11:14:18-triene. 5-Carbethoxv-2:4-dimethylpyrrole (II) with PrCOCI and AlCl₃ gives 5-carbethoxy-3-butyryl-2: 4-dimethylpyrrole, m.p. 117°, yielding the carboxylic acid (III), m.p. 182°, on hydrolysis. Decarboxylation of (III) by heating affords 3-butyryl-2: 4-dimethylpyrrole (IV), m.p. 76°. With HCO₂H-HBr, (IV) gives cryst. 4:4'-dibutyryl-3:5:3':5'-tetramethylpyrromethene hydrobromide, with MeOH-CH₂O the corresponding methane, m.p. 184°. With HČN, (IV) yields 5-formyl-3-butyryl-2:4-dimethylpyrrole, m.p. 161°. Wolff-Kishner reduction of (IV) affords 2:4-dimethyl-3-butylpyrrole (V), b.p. 100-120°/12 mm. (picrate, m.p. 141°). With HCN, (V) gives 5-formyl-2: 4-dimethyl-3-butylpyrrole, m.p. 85°. Bromination of (V) in AcOH- CCl₄ gives a cryst. mixture (VI) of 5-bromo-3': 4:5'trimethyl- and 5-bromo-3': 4-dimethyl-5'-bromomethyl-3: 4'-dibutylpyrromethene hydrobromides, which on fusion with succinic acid at 170-180° 1:3:5:7-tetramethyl-2:4:6:8-tetrabutylaffords porphyrin, m.p. 229° [Fe (hæmin), m.p. 289°, Cu, m.p. 277°, complex salts]. By Grignard reaction and CICO₂Et, (V) gives 5-carbethoxy-2: 4-dimethyl-3-butylpyrrole, m.p. 99°, brominated to 5-carbethoxy-4methyl-2-bromomethyl-3-butylpyrrole (VII), m.p. 131°. When heated with MeOH, (VII) gives 5:5'dicarbethoxy-4:4'-dimethyl-3:3'-dibutylpyrromethane, m.p. 107°, yielding the dicarboxylic acid (VIII), which with Br-AcOH affords 5:5'-dibromo-4:4'-dimethyl-3: 3'-dibutylpyrromethene hydrobromide (IX) (free base, m.p. 113°). With HCO₂H-HBr, (V) gives 3:3':5:5'ktramethyl-4: 4'-dibutylpyrromethene hydrobromide (X) [free base, m.p. 210° (decomp.)]. Fusion of (IX) and (X) at 180° in methylsuccinic acid gives 1:4:6:7teiramethyl-2:3:5:8-tetrabutylporphyrin (XI), m.p. 217-218° (hæmin, m.p. 243°; Cu complex salt, m.p. 230°), in poor yield. Bromination of (X) in AcOH at 100° gives 3: 3'-dimethyl-5: 5'-dibromomethyl-4: 4'dibutylpyrromethene hydrobromide, which on fusion with (\hat{IX}) gives (XI) in good yield. (VIII), mixed with HCO₂H and aërated at 30-35°, or better, in boiling AcOH affords 1:4:5:8-tetramethyl-2:3:6:7-Wrabutylporphyrin, m.p. 284° [hæmin, m.p. 259°, Cu complex salt, m.p. 313-315° (decomp.)]. By similar methods (II) yields successively 5-carbethoxy-3-isobutyryl-2: 4-dimethylpyrrole, m.p. 108°, 2: 4-dimethyl-3-isobutylpyrrole, b.p. 98—108°/12 mm. (picrate, m.p. 131°), pyrromethene mixture, 1:3:5:7-tetramethyl-2:4:6:8 tetraisobutylporphyrin, m.p. 209-210°. Fusion of 3:3'-dimethyl-5:5'-dibromomethyl-4:4'dipropylpyrromethene hydrobromide with 5:5'-dibromo - 4:4' - dimethyl - 3:3' - di - (β - carboxyethyl) prromethene in succinic acid at 200-210° yields 2:3:5:8-tetramethyl-6:7-di-(β-carboxyethyl)-1:4-dipropylporphyin, m.p. \$ 300°, HCl no. 3 [Cu salt, m.p. 312°; hæmin, m.p. $\leq 420^{\circ}$; Me₂ ester, m.p. 216° (Cu alt, m.p. 260°; hæmin, m.p. 228°)].

XXXII. 1:3:5:8-Tetramethyl-2:4-diethyl-7-βcarboxyethylporphin (pyrroporphyrin XV Me ester) with N₂H₄,H₂O in MeOH at 135° yields the hydruide (I), m.p. 273° (Cu salt, m.p. < 360°), which with HNO_2 gives the azide (II). In boiling C_6H_6 , (II) affords the β -isocyanic acid, m.p. 252°, in MeOH the methylurethane (III), m.p. 231°, and with NH2Ph the \$-phenylcarbamide. With 10% HCl at 130-140°, (III) gives the hydrochloride, m.p. < 360°, of -aminoethyl - 1:3:5:8-tetramethyl - 2:4-diethylpor phin (IV), m.p. 194° [NH2 substitution derivatives : B2, m.p. 301° (Cu salt, m.p. 304°); Ac2, m.p. 276° (Cu salt, m.p. 251°); Me₃-MeSO₄ (V), m.p. ≯ 320°]. Heated with KOH-MeOH, (V) yields 1:3:5:8ktramethyl-2: 4-diethyl-7-vinylporphin (VI), m.p. 269° Cu salt, m.p. 229-230°), reduced (HI-AcOH) to proætioporphyrin. (VI) adds Et diazoacetate at he double linking. With Br-AcOH in CHCl₃, (VI) gres 6:7-dibromo-1:3:5:8-tetramethyl-2:4-diethylwithin, m.p. $\leq 360^{\circ}$, and a substance, decomp. 193°. [1] adds HBr, but the product is hydrolysed to 1:3:5:8-tetramethyl $\cdot 2:4$ - diethyl $\cdot 7 \cdot \alpha$ -hydroxyethylprimphin, m.p. 246, from which H_2SO_4 or heating at 120°

in vac. removes H_2O , regenerating (VI). KMnO₄ (1 mol.) eliminates N from (I) and closes the γ -methine bridge yielding pyrrorhodin.

XXIII. Treatment of 5-bromo-4:3':5'-trimethyl-3:4'-di-(ββ-dicarbethoxyethyl)pyrromethene hydrobromide with HBr and esterification of the product gives 1:3:5:7-tetramethylwith MeOH-HCl 2:4:6:8-tetra-($\beta\beta$ -dicarbomethoxyethyl)porphin (I) (isouroporphyrin Me₈ ester), m.p. 284° [Cu, m.p. 289°, Ni, m.p. 272°, Ag, m.p. 290°, Fe (hæmin), m.p. 256°, salts]. (I) on hydrolysis yields the free octacarboxylic acid [Fe salt (halogen-free internal anhydride)]. With Br in Et_2O , 5-carbethoxy-2: 4-dimethyl-3- $\alpha\beta$ -dicarboxyethylpyrrole (II) (A., 1932, 626) affords the 2-bromomethyl derivative, m.p. 157-158° (decomp.), which in H₂O at 100° gives bis-(5-carbethoxy-4methyl-3-a-dicarboxyethylpyrryl)-2-methane, m.p. 138° (decomp.) [Nas salt (III) of hexa-acid]. In a current of air, (III) in HCO₂H at 40-45° gives 1:4:5:8tetramethyl-2:3:6:7- $tetra-(\alpha\beta$ -dicarboxyethyl)porphin [Me₈ ester (IV), m.p. $317-318^{\circ}$ (Cu, m.p. $\neq 290^{\circ}$, Fe salts)]. With 1% HCl at 180-188°, (IV) yields an Et₂O-sol. porphyrin identical with coproporphyrin II ester. Hydrolysis of (II) with 5% aq. NaOH affords 5-carboxy-2: 4-dimethyl-3-αβ-dicarboxyethylpyrrole (V), m.p. 198° (decomp.), which is unstable and is readily decarboxylated to 2:4-dimethyl-3-ab-dicarboxyethylpyrrole (VI), m.p. 173-174°. The main product of the action of HI-AcOH on (V) is (probably) tri-iodo-2:4-dimethyl-3-ab-dicarboxyethylpyrrole, m.p. 188-189° (decomp.). With p-NMe₂·C₆H₄·CHO and HClO₄, (VI) affords 2: 4-dimethyl-3-αβ-dicarboxyethylpyrro-pdimethylaminophenylmethene perchlorate, m.p. 199-200°. Oxidation of (II) with CrO_3 in aq. H_2SO_4 gives a product CoHoOn, m.p. 184-185°, probably a carb-J. H. B. oxylated hæmatic acid.

Bile pigments. XIV. Synthesis of methoxypyrromethenes and bilirubinoid pigments. H. FISCHER and J. ASCHENBRENNER (Z. physiol. Chem., 1934, 229, 71—92; cf. A., 1934, 1234).—Hydrolysis of 5:5'-dicarbethoxy-4:4'-dimethyl-3:3'-di-(β-carboxyethyl)pyrromethane with 10% aq. NaOH for 15 min. yields a mixture (I), m.p. 186-187°, of tri- and tetra-carboxylic acids, consisting mainly of the 5'-CO₂H product. With Br-AcOH, (I) gives the hydrobromides (II) of 5:5'-dibromo- (III) and 5bromo - 5' - carbethoxy - pyrromethenes. Crystallis ation from HCO₂H eliminates Et₂O and gives a mixture, m.p. 210° (decomp.). With MeOH-HCl, (II) affords as the hydrochloride, m.p. 200° (decomp.), 5:5'-dibromo-4:4'-dimethyl-3:3'-di (β-carbomethoxyethyl)pyrromethene, m.p. 136°, and 5-hydroxy-5'-carboxy-4: 4'-dimethyl-3: 3'-di-(β-carbomethoxyethyl)pyrromethene (IV), m.p. 231° [Me ether Me ester (V), m.p. 94°). With KOH-MeOH, (III) yields 5'-bromo-5 -methoxy - 4 : 4' - dimethyl-3 : 3' - di - (β - carboxyethyl) pyrromethene (VI) [Me₂ ester, m.p. 93° [hydrochloride, m.p. 130° (darkens), decomp. 174°)]. With KOH in MeOH, (II) gives a mixture of the K salt of (VI), 5-bromo-5'-carboxy- (VII) (Me3 ester, m.p. 130°) 5'-carboxy-5-methoxy-4:4'-dimethyl-3:3'-di-(Band carboxyethyl)pyrromethene (VIII) (decomp. 210-218°). (VI) and (VIII) are separated in the form of the Me₂ esters. With NH₂Ph in MeOH or EtOH,

(II) gives 5-anilino-5'-carboxy-4:4'-dimethyl-3:3'-di-(βcarboxyethyl)pyrromethene, m.p. 213° (decomp.) (Me3 ester, m.p. 130°). (VIII) yields Me_2 (dicarbomethoxy-ethyl), m.p. 167°, and Me₃ [identical with (V)] esters. With CH₂O-HCl, (VIII) gives di-[5-methoxy-4:4'dimethyl - 3 : 3-di- (\beta-carboxyethyl)pyrromethene]methane (IX) (dimethoxycoprobilirubin), m.p. 253° (decomp.) $[Me_4 \text{ ester (with CH}_2N_2), \text{ m.p. 152}-153^\circ].$ (IX) with MeOH-HCl gives a mixture of (OH)2- and (OMe)2esters, which with FeCl₃ affords a *ferrobilin*, m.p. 160°. Decarboxylation of (IV) at 230-240°/vac. gives 5-hydroxy-4:4'-dimethyl-3:3'-di-(B-carbomethoxyethyl)pyrromethene, m.p. 172°, yielding the methane, m.p. 190° (decomp.) (ferrobilin, m.p. 160°). Pro-longed hydrolysis of the dicarbethoxy-compound with NaOH in aq. EtOH gives 5:5'-dicarboxy-4:4'dimethyl-3: 3'-diethylpyrromethane (X) (A., 1927, 1206). Shorter hydrolysis gives a mixture of (X) and the 5'-carbethoxy-5-carboxylic acid, which with Br-AcOH gives 5-bromo-5'-carbethoxy- (XI) and 5:5'-dibromo-4:4'-dimethyl-3:3'-diethylpyrro-methene (XII) hydrobromides. With KOH-MeOH, (XII) yields the 5'-bromo-5-methoxy-derivative, m.p. 107°; the pyrromethene mixture also gives the 5-carboxy-5'-methoxy-product (XIII), m.p. 191° (decomp.), isolated as Me ester, m.p. 93°. With NH₂Ph, (XII) affords 5:5'-dianilino-4:4'-dimethyl-3:3'-diethylpyrromethene (XIV), m.p. 165°, isolated as the hydrobromide, decomp. 260-265°. The (XI) and (XII) mixture also gives 5-anilino-5'-carboxy-4:4'dimethyl-3: 3'-diethylpyrromethene, m.p. 226° (decomp.) (Me ester, m.p. 147°). With 40% CH₂O and conc. HCl, (XIII) gives, as hydrochloride, darkens 160°, m.p. 247° [di-(5-methoxy-4:4'-dimethyl-3:3'dicthyl)pyrromethene]methane (XV) (Me₂ ether of isoætiobilirubin), m.p. 181° (decomp.) (ferrobilin, m.p. 265°). With NaOMe at 180-185°, (XIII) gives the 5-OH-compound, m.p. $< 230^{\circ}$ (decomp.) (ferrobilin, m.p. 265°), corresponding with (XV); with KOH-PrOH, (XIII) yields 5-hydroxy-4:4'-dimethyl-3:3'-diethylpyrromethene (XVI), m.p. 200°, which with CH_3O-HCl affords the bilirubinoid, m.p. 265° (decomp.). With MeOH-HCl, (XIII) gives 5-hydroxy-5'-carboxy-4: 4'-dimethyl-3: 3'-diethylpyrro-methene, m.p. 234° (decomp.). Fusion of (XIII) in resorcinol yields a product, m.p. 197°. Esterification of 5:5'-dibromo-3:3'-dimethyl-4:4'-di-(\beta-carboxyethyl)pyrromethene (XVII) with MeOH-HCl, but not with CH₂N₂, gives as the hydrochloride, m.p. 202° (decomp.), the Me2 ester, m.p. 158°. With KOH-MeOH, (XVII) affords 5'-bromo-5-methoxy-3:3'-dimethyl-4: 4'-di-(β -carboxyethyl)pyrromethene [Me₂ ester, m.p. 131° (hydrochloride, m.p. 175°)]. J. H. B.

Compounds with condensed pyrrole nuclei, having behaviour analogous to urobilin. G. ILLARI (Gazzetta, 1934, 64, 883–893).—Pyrrole treated with SO₂ in H₂O polymerises slowly to two dark substances, $(C_{18}H_{35}O_{12}N_5S_3)_n$ (I), sol. in MeOH, and $(C_8H_{14}O_4N_2S)_m$ (II), insol. (I) and (II) do not melt; the action of diazotised anthranilic acid on either in aq. solution yields the substance, $C_{78}H_{67}O_{20}N_{15}S_2$, no m.p. Both resemble urobilin in giving the Ehrlich reaction, and in absorption bands with mean at 496 mµ. Structures are suggested. E. W. W. Preparation of 1-thiolbenzthiazole. R. F. DUNBROOK and M. H. ZIMMERMANN (J. Amer. Chem. Soc., 1934, 56, 2734—2736).—1-Thiolbenzthiazole is obtained in about 90% yield from $o -C_6H_4Cl\cdot NO_2$ (1 mol.), aq. Na₂S₃ (3 mols.), and CS₂ at 85—90° for 3 hr. The following changes probably occur : 2o-C₆H₄Cl·NO₂ \rightarrow (o-NO₂·C₆H₄)₂S₂ \rightarrow (o-NH₂·C₆H₄)₂S₂ or 2o-NO₂·C₆H₄·SH \rightarrow 2o-NH₂·C₆H₄·SH \rightarrow

$2C_6H_4 < N > C \cdot SH.$

H.B.

Directive effect of cyano- and iodo-substituents on the thiazole cyclisation of pp-disubstituted thiocarbanilides by bromine. M. O. FAROOQ and R. F. HUNTER (Rec. trav. chim., 1935, 54, 122-128).—The following condensations are in agreement with anticipations from the m-directing effect of CN and the relative dipole moments of PhI, PhBr, and PhCl. p-CN·C₆H₄·NH₂ (I), m.p. 88°, and CSCl₂ in H₂O give p-CN·C₆H₄·NCS, m.p. 122° (cf. lit.), which with p-C6H4Me·NH2 gives s-p-cyanophenyl-p-tolylthiocarbamide (p-cyano-p-methylthiocarbanilide), m.p. 170° [hydroperbromide, m.p. 156° (decomp.)]. This with Br in CHCl₃ gives 1-p-cyanoanilino-5-methylbenzthiazole, m.p. 222-223°, also obtained from 1-chloro-5methylbenzthiazole and (I). Similarly are obtained s-p-cyanophenyl-p-bromo-, m.p. 180°, -chloro-, m.p. 174-175° [hydroperbromide, m.p. 165° (decomp.)], and iodo-phenylthiocarbamide, m.p. 182° [hydroperbromide, m.p. 173° (decomp.)], s-p-iodophenyl-p-tolyl-thiocarbamide, m.p. 186° (hydroperbromide), and s-pnitro-, m.p. 189-190° [hydroperbromide, m.p. 156° (decomp.)], -chloro-, m.p. 190° (hydroperbromide), and -bromo-phenyl-p-iodophenylthiocarbamide, m.p. 190°, and 5-bromo-, m.p. 271-272°, -chloro-, m.p. 273-274°, and -iodo-1-p-cyanoanilinobenzthiazole, m.p. 275°, 1-p-iodoanilino-5-methylbenzthiazole, m.p. 202°, 5-iodo-1-nitro-, m.p. 271-272°, -p-chloro-, m.p. 194°, and -p-bromo-anilinobenzthiazole, m.p. 202°. 5-Chloro-, m.p. 182°, and -bromo-1-p-iodoanilinobenzthiazole, m.p. 198°, are obtained from 1:5-dichlorobenzthiazole and p-C₆H₄I·NH₂, and 1-chloro-5-iodobenzthiazole (II) and $p-C_6H_4Br\cdot NH_2$, respectively; they do not depress the m.p. of their position isomerides described above. p-C6H4I.NCS and Br in CHCl give 5-iodo-1-aminobenzthiazole, m.p. 222° (lit. 210°), which (diazo-reaction) affords (II), m.p. 136°.

R. S. C.

Condensation of thiocarbamides with chloroacetic acid and the conversion of arylformamidinethiolacetic acids into ψ -thiohydantoin derivatives. R. D. DESAI, R. F. HUNTER, and L. G. KOPPAR (Rec. trav. chim., 1935, 54, 118—121).-CS(NH₂)₂ and CH₂Cl·CO₂H in H₂O at room temp give formamidinethiolacetic acid, m.p. 234° (decomp.), whilst in COMe₂ at room temp. the hydrochloride m.p. 222° (decomp.) (hydrolysed by cold H₂O), is obtained. The acid in hot AcOH yields 2-imino-4ketotetrahydrothiazole, m.p. 200°. Substituted thiocarbamides in COMe₂ lead similarly to arylformamid inethiolacetic acids, NH₂·C(:NR)·S·CH₂·CO₂H, ir which R=Ph, m.p. 184° (decomp.) [m.p. 211° (de comp.)], o-, m.p. 168° (decomp.) [m.p. 222° (de comp.)], and p-C₆H₄Me, m.p. 189° (decomp.) [m.p. 214° (decomp.)], α -, m.p. 190° (decomp.) [m.p. 223° (decomp.)], and β - $C_{10}H_7$, m.p. 214° (decomp.) [m.p. 214° (decomp.)], the m.p. in brackets being those of the hydrochlorides, and thence to 2-arylimino-4-keto-tetrahydrothiazoles, in which the substituent is Ph, m.p. 178°, o-, m.p. 144—145°, m-, m.p. 165°, and p- C_6H_4Me , m.p. 183°, α -, m.p. 213—214° (decomp.), and β - $C_{10}H_7$, m.p. 220—221°. NPhMe·CS·NH₂ gives phenylmethylformamidinethiolacetic acid, m.p. 188° (decomp.) [hydrochloride, m.p. 199° (decomp.)]. CS(NHPh)₂ does not react in cold COMe₂, but in hot EtOH gives 2-phenylimino-3-phenyl-4-ketotetra-hydrothiazole. R. S. C.

Constitution of vasicine. W. E. HANFORD, P. LIANG, and R. ADAMS (J. Amer. Chem. Soc., 1934, 56, 2780-2783).-o-Aminobenzylallylamine [by reduction (Fe, H₂O) of the o-NO₂-derivative hydrochloride] (as hydrochloride, m.p. 119-120°), HCO₂Na, and anhyd. HCO₂H give 3-allyl-3: 4-dihydroquinazoline (I) [picrate, m.p. 180-181° (lit. 172-173°); H oxalate, m.p. 173-174.5° (lit. 172°)], also prepared by Paal and Stollberg's method (A., 1894, i, 210), reduced (H2, PtO2, EtOH) to a dihydro-derivative, an oil (picrate, m.p. 180.5-182°). Anthranilallylamide, m.p. 94° [from isatoic anhydride (II) and allylamine in 95% EtOH], evaporated with 85% HCO₂H gives formylanthranilallylamide, m.p. 82-82.5°; when the crude reaction product is heated at 190-210°, 4-keto-3-allyl-3: 4-dihydroquinazoline (III), b.p. 156—157°/4 mm., m.p. 66-67°, results. Reduction (Na, amyl alcohol) of (III) or (I) affords 3-allyl-1:2:3:4-tetrahydroquinazoline (IV), b.p. 105-110°/3 mm. Reduction (H₂, PtO₂, EtOH) of (III) gives 4-keto-3-npropyl-3: 4-dihydroquinazoline, m.p. 96-98° (lit. 82°), also prepared by the successive action of EtOH-NH₂Pr and boiling HCO₂H on (II). 2(? 3)-Allylquinazolinium bromide, m.p. 130-131.5° (from quinazoline and allyl bromide), is hydrolysed (alkali) to, and also prepared by the action of MeOH-conc. HBr on, the corresponding hydroxide (Reynolds and Robinson, A., 1934, 1014). The non-identity of (I) with deoxyvasicine (V) (Ghose, A., 1927, 785) [oxalate, m.p. 235-236° (Maquenne block); picrate, m.p. 205-206° (Maquenne)] and of (IV) with dihydrodeoxyvasicine (VI), m.p. 69-70° [picrate, m.p. 185° (Maquenne)], shows that vasicine (VII) cannot be 4-hydroxy-3allyl-3: 4-dihydroquinazoline (Spath and Nikawitz, A., 1934, 310) or 4-hydroxy-2-allyl-1: 2- or -3: 4-dihydroquinazoline (Ghose *et al.*, A., 1933, 77; Narang and Rây, A., 1934, 1014). (VI) is prepared CH. by Spāth and Nikawitz's

CH₂ N—CH₂ CH•OH N—CH₂ (A.) by Spath and Nikawitz's method (*loc. cit.*) of obtaining dihydrodeoxypeganine (VIII) (the deoxytetrahydropeganine of these authors). (VI) and (VIII) have the same m.p.; the view (Spath and

(A.) m.p.; the view (Spāth and Kuffner, A., 1934, 787) that (VII) and peganine are identical is thus supported. (V) and (VII) (as hydrochloride) could not be reduced (various catalytic methods). Structure (A) is preferred for (VII). H. B.

Alkaloids of Senecio. I. Retrorsine. G. BARGER, T. R. SESHADRI, H. E. WATT, and T. TABUTA (J.C.S., 1935, 11-15).—Retrorsine (I),

obtained from S. retrorsus, D.C., has m.p. 212°, [a]18 -17.6° in EtOH, and gives a monophenylcarbamate, m.p. 200-202°, and a nitrate (+0.5EtOH), m.p. 145°. It is hydrolysed (NaOH) to retronecine (II) and retronecic acid, $C_{10}H_{16}O_6$, m.p. 177°, $[\alpha]_D - 11.36°$ in EtOH, and the work of Manske (A., 1932, 286) is confirmed. (II) forms a Ac₂ derivative (picrate, m.p. 146°; methiodide, m.p. 118-120°) and is reduced (PtO_2-H_2) to retronecanol (III) (picrate, m.p. 208°), also obtained by reduction (4H) and subsequent hydrolysis of (I). Diacetylretronecine is reduced to acetylretronecanol (picrate, m.p. 176°; methiodide, m.p. 207-208°). (III) is oxidised (K₂CrO₄) to an amphoteric substance, which gives an Et ester, forming a methiodide, C₉H₁₂O₂NI, m.p. 292-295°. The constitution of the compounds is discussed; retronecane is probably identical with piperolidine, F. R. S. C₈H₁₅N.

Alkaloids of Ulex europœus. I. G. R. CLEMO and R. RAPER (J.C.S., 1935, 10—11).—Young shoots of U. europœus contain anagyrine, isolated as the picrate, m.p. 242° (picronolate, decomp. 254°), and a small quantity of a base, $C_{15}H_{20}O_5N$, m.p. 170°. The occurrence is seasonal. F. R. S.

Alkaloids of Holarrhena antidysenterica. III. Action of cyanogen bromide on conessine and its N-demethylation to isoconessimine and conimine. S. SIDDIQUI and R. H. SIDDIQUI (J. Indian Chem. Soc., 1934, 11, 787—795).—Conessine R(:NH)·NMe₂ (I) (R=C₂₁H₃₁) [monohydrobromide, m.p. 310—311° (decomp.)] with 1 mol. of BrCN in Et₂O affords its dimethobromide, m.p. 321—322° (decomp.), and cyanoisoconessimine

R(:NMe)·NMe·CN (II), m.p. 182-183° [hydrochloride, m.p. 289-290° (decomp.); platinichloride, m.p. 210-211° (decomp.); picrate, m.p. 139-140°; methobromide (III), m.p. 255°]. The second tert.-NH₂ group in (I) is more resistant to BrCN, but with 2 mols. of this reagent (I) gives, in addition, some dicyanoconimine R[NMe(CN)]:N·CN (IV), m.p. 159-160°, obtained, with (III), by the action of 2 mols. of BrCN in EtOAc on (II). (II) with 20% KOH-EtOH affords isoconessimine, R(:NMe)·NHMe {Bz, m.p. 159—160° [hydrochloride, m.p. 325—326° (decomp.); platini-chloride, m.p. 264—265° (decomp.)], Ac, m.p. 127— 128° [hydrochloride, m.p. 325—326° (decomp.); platinichloride, shrinks at 246°, m.p. 265—266° (decomp.)], and NO-, m.p. 163—164° [hydrochloride, m.p. 248-251° (decomp.); picrate, m.p. 190-194° derivatives}, identical with a specimen from H. antidysenterica. Similar hydrolysis of (IV) affords conimine, R(:NH) NHMe $(Bz_2, \text{ m.p. } 250^\circ, Ac_2, \text{ m.p. } 139-140^\circ, \text{ and } (NO)_2^-, \text{ m.p. } 206-207^\circ, \text{ deriv-}$ atives). On the basis of these results the above partial J. W. B. formulæ are suggested.

Formation of an isomeride of corynanthine by esterification of its product of alkaline hydrolysis. RAYMOND-HAMET (Compt. rend., 1934, 199, 1658—1659).—With KOH-EtOH at 70° corynanthine (I), $[\alpha] -73^{\circ}$, gives a substance $C_{20}H_{24}O_3N_2$ corresponding with the anhydride of corynanthic acid. This with MeOH-gaseous HCl gives a *d*-hydrochloride (II) of a Me ester (III), $[\alpha] +107\cdot2^{\circ}$, liberated from (II) by NaHCO₃. Similarly an Et ester, $[\alpha] +95\cdot9^{\circ}$, is obtained. (III) is thus a ψ -corynanthine. Similarly treated yohimbine gives a Me ester identical with the original alcohol. Rotations are in C₅H₅N. J. W. B.

Alkaloids of Mitragyna stipulosa, O. Kuntze. RAYMOND-HAMET and L. MILLAT (J. Pharm. Chim., 1934, [viii], 20, 577—584).—The alkaloid (I), m.p. 215—216° (m.p. depends on mode of heating), isolated from M. stipulosa (II) is identical with mitrinermine (III) isolated from M. inermis, O. Kuntze. (I) and (III) have the same m.p. (and mixed m.p.), empirical formula $C_{22}H_{18}O_4N_2$, and [α]. Both have 2 OMe and give the same reactions with Fröhde's and Mandelin's reagents. Mitraphylline, isolated from (II) by Larrieu (Diss., Paris, 1930), can be further purified by crystallisation and is then identical with (I) and (III). H. G. M.

Simple separation of the Cinchona alkaloids from their dihydro-bases. H. THRON and W. DIESCHERL (Annalen, 1935, 515, 252—260).—The mixture, dissolved in 10% H₂SO₄, is warmed at 40—50° with a 10% solution of Hg(OAc)₂ in 5% AcOH, whereby the vinyl bases (I) are transformed into compounds (III) R·CH(HgOH)·CH₂·OH and the Et bases (II) remain unchanged. After cooling and addition of NH₃ which dissolves (III), (II) are collected or extracted with Et₂O. The residual aq. solution is acidified with H₂SO₄ and boiled with H₃PO₃, whereby Hg is pptd. and (II) are liberated. The separation is nearly quant. A similar separation (cf. Buttle et al., A., 1934, 681). Quinidine, m.p. 172°, is converted by boiling 60% H₂SO₄ into apoquinidine (IV), m.p. 165—175°, $[\alpha]_{15}^{13}$ +100° in EtOH, whereas the technical alkaloid, containing about 30% of hydroquinidine, gives (IV) and hydrocupreidine when similarly treated (cf. Ludwiczakwóna et al., A., 1933, 1312). H. W.

Preparation and properties of aurothiosulphates of quinine, ammonium, and calcium. M. PICON (J. Pharm. Chim., 1935, [viii], 21, 101—118).— The prep. of quinine aurothiosulphate, the corresponding NH_4 compound, and Ca salt are described. The properties and the structure of the compounds are discussed. H. T.

Anomalous properties chloroformyl of derivatives of quinine alkaloids. J. SUSZKO and F. SZELAG (Rocz. Chem., 1934, 14, 1202-1215).-The Cl atoms of O-chloroformyl-cinchonidine (I) [methiodide, m.p. 181° (decomp.)] and -quinine (II) [methiodide, m.p. 208° (decomp.)] are extremely inactive, not being replaced by prolonged boiling with KOAc in EtOH or with NH₂Ph in C_5H_5N . O-Carbethoxycinchonidine (III), m.p. 85° , $[\alpha]_{b}^{19}$ -17.87°, is obtained readily from ClCO₂Et and einchonidine (IV), but not from (I) and EtOH. (I) is 10 times as resistant as (III) to hydrolysis with alcoholic NaOH. Dicinchonidine carbonate is obtained readily from (III) and COCl₂, but not from (I) and (IV). isoPropylideneglyceryl quininecarboxylate [methiodide, m.p. 216-218° (decomp.); dimethiodide, m.p. 138° (decomp.)] cannot be obtained from (II) and isopropylideneglycerol, as stated in G.P. 346,889 (Bayer u. Co.). The methiodide, m.p. 226°,

+1.5H₂O, m.p. 102—103°, $[\alpha]_{10}^{10}$ —119°, and dimethiodide, m.p. 90°, of O-carbethoxyquinine are described. α -Dibromocinchonidine and COCl₂ in PhMe yield α -dibromo-O-chloroformylcinchonidine, m.p. 180—181°, $[\alpha]_{10}^{10}$ —134·4°; the corresponding β -dibromo-compound (V), m.p. 173—174°, $[\alpha]_{10}^{20}$ —162·9°, is obtained analogously. (I) and Br in AcOH yield (V), whence it follows that the inactivity of the Cl of (I) is not due to internal rearrangement, with entrance of the Cl into the vinyl group of quinine. (I) and (II) do not afford dimethiodides even with great excess of MeI: the methiodides formed are readily hydrolysed by cold alcoholic NaOH. R. T.

Photo-oxidation of 2-benzylpyridine and papaverine. A. MULLER and M. DORFMAN (J. Amer. Chem. Soc., 1934, 56, 2787-2788).—Exposure of 2-benzylpyridine (I) (in glass) to light from a quartz-Hg lamp gives a brown product from which a little 2-benzoylpyridine (II) is isolable. Exposure of a C₆H₆ solution of papaverine (III) in quartz to sunlight for 3 days affords approx. 10% of papaveraldine (IV). (I), (II), and (IV) (in C₆H₆) in dry O₂ show no absorption at 115° in the dark (pronounced absorption occurs in Hg light at lower temp.); (III) (in C₆H₆) similarly absorbs O₂ (but is unchanged in air at 60°). (I) and (III) are unaffected by Hg light in a vac.; (II) and (IV) undergo some change. (I)-(IV) are not affected by light of wave-length > 405 mµ. H. B.

Cotarnine series. I. Action of phenyl-carbimide and -thiocarbimide on cotarnine. B. B. DEY and (MISS) P. L. KANTAM (J. Indian Chem. Soc., 1934, 11, 835-842).-Cotarnine (I) reacts with PhNCO (II) in C_6H_6 to give a carbamide derivative (III), m.p. 137°, which must possess the structure $\dot{C}HO\cdot R\cdot [\dot{C}H_2]_2 \cdot NMe \cdot CO \cdot NHPh [\dot{R} = CH_2O_2 \cdot C_8 H(OMe)],$ since it gives an oxime, m.p. 152° (decomp.) (O-Ac, m.p. 139°, and O-Bz, m.p. 142°, derivatives), converted by further action of (II) into its phenylurethane, NHPh·CO·O·N:CH·R·[CH₂]₂·NMe·CO·NHPh, m.p. 151° , also obtained from (II) and the oxime of (1). Similar action of PhNCS on (I) gives the corresponding thiocarbamide derivative, m.p. 132° [oxime, m.p. 142° (Ac, m.p. 147°, and Bz, m.p. 153°, derivatives), and anil, m.p. 146°]. (III) condenses with o-, m-, and *p*-toluidine to give, respectively, its o-, m.p. 196°, m-, m.p. 168°, and p-toluidil, m.p. 168°, but with NH₂Ph only CO(NHPh)₂ is obtained. These results favour the structure CHO·R·[CH₂]₂·NHMe for (I).

J. W. B.

Preparation of morphenol (3-hydroxy-4:5oxidophenanthrene) from morphine. E. MOSET-TIG and E. MEITZNER (J. Amer. Chem. Soc., 1934, 56, 2738—2740).—Morphine and Me₂SO₄ in MeOH-NaOMe give codeine methosulphate ($+2H_2O$), degraded (aq. NaOH) (cf. Knorr, A., 1894, i, 430) to α -methylmorphimethine [methosulphate (I) ($+COMe_2$)], which is rearranged (method : Knorr and Smiles, A., 1902, i, 817) to β -methylmorphimethine [methosulphate (II)]. (II) is hydrolysed (20% H₂SO₄, subsequently removed as BaSO₄) to the methohydroxide, which when dried at 100—105°/15 mm. and then treated with H₂O gives methylmorphenol (III) (65% yield). (III) is also obtained in 60—70% yield from (I) or (II) and Na cyclohexyloxide in cyclohexanol at 120-140°; with Na amyloxide in boiling amyl alcohol the yield is only 20%. (III) is demethylated (48% HBr in AcOH) to morphenol (yield nearly quant.). H. B.

Amide of norcodeine-N-carboxylic acid. S. WEIL and S. ROZENBLUMÓWNA (Rocz. Chem., 1934, 14, 1309-1311).-The amides of norcodeine-, m.p. 195-197°, and of normorphine-N-carboxylic acid are less toxic and less therapeutically active than are R. T. the parent alkaloids.

Strychnos alkaloids. LXXXIII. Perhydrogenation of strychnidine and tetrahydrostrychnine to isomeric bases. H. LEUCHS and H. GRUNOW. LXXXIV. Isomerism of the strychninolines. H. LEUCHS, W. DIELS, and A. DORNOW (Ber., 1935, 68, [B], 91-97, 106-113; cf. A., 1933, 170, 841).-LXXXIII. Hydrogenation of tetrahydrostrychnine (PtO₂-N-HCl) leads to a mixture of dodecahydrostrychnines, C21H34O2N2, m.p. 248-250° (vac.), $[\alpha]_{D}^{20} - 6.3^{\circ}/d$ in abs. EtOH, and m.p. 153°, $\left[\alpha\right]_{p}^{\infty}$ -14.3°/d in abs. EtOH. The last-named base is transformed by POCl₃ at 100° into the substance C21H32ON2,HCl, m.p. 286°; it resinifies under the influence of Ac₂O and NaOAc. Strychnidine affords the H_8 -bases $C_{21}H_{32}ON_2$, m.p. 109—110°, $[\alpha]_D^{20} + 5\cdot4^\circ/d$ in abs. EtOH {diperchlorate, $[\alpha]_D^{20} + 16\cdot2^\circ/d$; dimeth-iodide (I), $[\alpha]_D + 11\cdot5^\circ$ to $+12^\circ$ }, and m.p. 110—112° (vac.), $[\alpha]_{D}^{20} 0^{\circ}$ to $+2^{\circ}$ in abs. EtOH (diperchlorate, $[\alpha]_{D}^{20}$ $+6.4^{\circ}/d$). Decahydrostrychnidine I (II) yields the salt $C_{21}H_{34}ON_2$, ZnCl₂, 2HCl, $[\alpha]_D^{20} + 23 \cdot 6^\circ/d$ in H_2O , and an analogous compound, $[\alpha]_D + 22 \cdot 6^\circ$, with ZnBr₂. *O*-Acetyldecahydrostrychnidine I is readily isolated from the crude mixture of bases and affords (II) when hydrolysed; the corresponding base II does not appear to react with Ac₂O. The salts $C_{21}H_{32}N_{21}ZnCl_2,2HCl, [\alpha]_D^{20} -10.6^{\circ}/d$, and

 $C_{21}H_{34}N_{21}ZnCl_2,2HCl, \ [\alpha]_{D}^{20} 0^{\circ} to -2.7^{\circ} in H_2O, are$ derived from anhydrodecahydrostrychnidine I and octahydrostrychnoline, respectively. (I) is transtormed in the first stage of the Hofmann degradation into a mixture of doubly and singly unsaturated bases from which a perchlorate $C_{23}H_{27}ON_2$.ClO₄,HClO₄, $[\alpha]_{11}^{20}$ -25.7° , is isolated; it appears to contain 1 C.C linking.

LXXXIV. Reduction of strychninonic acid (Na-Hg=4H) affords 10-15% of neutral material from which a substance $C_{19}H_{20}O_{3}N_{2}$, m.p. > 295°, $[\alpha]_{D}^{20}$ -155° in AcOH (apparently a H₂-derivative of ¹⁸⁰ strychninolone), is obtained. Hydrogenation (PtO₂-AcOH) of strychninolone a (I) yields the compound $C_{19}H_{20}O_{3}N_{2}$, m.p. 263—268°, $[\alpha]_{10}^{20}$ -12·2° in AcOH; analogous treatment of acetylstrychninolone a (II) leads to the substance $C_{21}H_{22}O_4N_2$, m.p. 256—258° (slight decomp.), $[\alpha]_{20}^{20}$ -57.2° in AcOH, identical with the by-product which remains when crude (II) is oxidised with KMnO₄. Strychninolone b (+H₂O) is hydrogenated to the compound C₁₉H₂₀O₃N₂, m.p. 205–208°, $[\alpha]_{15}^{15}$ –62·1°, and (?) dihydrostrychninolone c. Acetylstrychninolone b yields acetyldihydrostrychninolone α and a substance $C_{21}H_{20}O_4N_2$ or $C_{21}H_{22}O_4N_2$, m.p. 233–235°, $[\alpha]_D^{30}$ –35° to –36° in AcOH. Strychninolone c and its Ac derivative yield the compounds $C_{19}H_{20}O_3N_2$, m.p. 227—229°, $[\alpha]_{p}^{20}$ -S8° in AcOH, and $C_{21}H_{22}O_4N_2$, m.p. 265°

(slight decomp.), $[\alpha]_{\rm D}^{20}$ -124°. Treatment of (I) with 12N-HCl at 100° and esterification of the product with MeOH-HCl gives the ester hydrochloride (III) $C_{20}H_{22}O_4N_2$, HCl, m.p. 305—310° (decomp.), $[\alpha]_D^{20} + 12^\circ$ (corresponding perchlorate, m.p. > 300° , $[\alpha]_{D} + 10^{\circ}$), hydrolysed to the substance, $C_{19}H_{20}O_{4}N_{2}$, m.p. 240° (decomp.), $[\alpha]_{D}^{20} - 7^{\circ}$ in 0·1N-HCl (perchlorate, decomp. 260–265° after softening and becoming discoloured at 230°, $[\alpha]_{D}^{20}$ -9°). Perhydrogenation (PtO₂ and N-HCl at 50-60°) of (III) yields the salt,

C19H26O4N2, HClO4, decomp. 285-290° after softening at 195°, $[\alpha]_{D}^{\alpha}$ +6.7°. a-Strychninolone hydrate I is hydrogenated to the H₆ derivative. Dihydrostrychninolone a hydrate perchlorate, C₁₉H₂₂O₄N₂,HClO₄, m.p. 180°, $[\alpha]_{D}^{15} + 46.6^{\circ}$ in H₂O, is described. Strychninolone b hydrate (+4 H_2O), m.p. 240° (Na salt; perchlorate, C₁₉H₂₀O₄N₂,HClO₄, m.p. about 245° (decomp.), [α]²⁰_D $+24^{\circ}$ in H₂O), is obtained from the b form and 12N-HCl or from the resin remaining after hydrolysis of the a-variety. It gives a Me ester perchlorate, $C_{10}H_{22}O_4N_2$, HClO₄, m.p. about 255° (decomp.), $[\alpha]_0^{20}$ $+26.7^{\circ}$ in H₂O, and is hydrogenated (=2H) to a substance $C_{19}H_{22}O_4N_2$ [perchlorate (IV), m.p. about 200° after softening and frothing at 150°, $[\alpha]_m^{15} + 17 \cdot 5^\circ$]; the perhydrogenated product could not be caused to crystallise and did not give cryst. salts. (IV) is hydrogenated (=8H) to the compound, $C_{10}H_{30}O_4N_2$, HClO₄, $[\alpha]_D^{20} + 29^\circ$. H. W.

Strychnine and brucine. Catalytic decomposition of quaternary brucine salts. O. ACHMA-TOWICZ and B. BOCHWIC (Rocz. Chem., 1934, 14, 1330-1341).-Benzylbrucinium chloride yields dihydrobrucine and PhMe on hydrogenation (Pd-C); similarly benzylstrychninium chloride yields dihydrostrychnine and PhMe. Methylbrucinium chloride gives methyldihydrobrucinium chloride and N_{b} methylchanodihydrobrucine, C24H30O4N2, m.p. 147-148° (methiodide, m.p. 263-265°; methochloride, m.p. •214-216°; picrate, m.p. 147-150°), from which the H₆-derivative, m.p. 143-144° (methiodide, m.p. 218-222°; Ac_2 derivative, m.p. 108—110°), is obtained by electro-reduction. The above results support the view that brucine and strychnine contain the allyl-R. T. amine group.

Yohimbine. III. J. P. WIBAUT and (FRL.) A. J. P. VAN GASTEL (Rec. trav. chim., 1935, 54, 85-92; cf. A., 1931, 369).-The yohimbine (I) used previously (loc. cit.) for dehydrogenation contained much isoyohimbine (II), which constituted the major portion of other commercial samples. Pure (I) gives, however, the same dehydrogenation products, but less ketoyobyrine. The formula C₁₉H₁₆N₂ for yobyrine (III), m.p. 217-218°, is confirmed (cf. A., 1934, 89). The substance C₁₉H₂₀N₂, previously called dihydroyobyrine, is thus tetrahydroyobyrine (IV). Pure (II) cannot be hydrogenated (PtO2). Hydrogenation of (III) gives decahydroyobyrine, $C_{19}H_{26}N_2$, m.p. 228–229° (picrate, m.p. 195–196°), that of (IV) gives slowly octahydroyobyrine, $C_{19}H_{24}N_2$, m.p. 177–178° (picrate, m.p. 220-221°). iso Yohimboaic acid (Et ester, +H2O, m.p. 202-204°) retains 1H2O tenaciously and is racemised by C5H5N. The 7-ring of (I) is not strained in models. R. S. C.

Sinomenine. XL. (-)- and (+)-Bis-1:1'thebenone. H. GOTO, H. MICHINAKA, and H. SHISHIDO (Annalen, 1935, 515, 297-302).—Bis-1:1'demethoxysinomenine methiodide is converted by boil-



ing 25% KOH into bis-1: 1'-demethoxyde-N-methyldihydrosinomenine (I), m.p. 252°, $[\alpha]_{1}^{19} + 45 \cdot 10^{\circ}$ in CHCl₃. Bis-1: 1'-de-N-methyldihydrothebainone, m.p. $252^\circ, [\alpha]_{10}^{20} - 45.15^\circ$ in CHCl₃, is obtained similarly. The corresponding r-compound, m.p. 240-243°, is pre-pared from equal wts. of the d- and l-forms. The amorphous methiodide of (I) is converted by 25% KOH into (-)-bis-1:1'-dehydrothebenone (III), m.p. 208—212° after softening at 185°, $[\alpha]_{10}^{20}$ —201.93° in CHCl₃; (+)-, m.p. 205—212° after softening at 195°, [a]²⁰ +201.54° in CHCl₃, and dl-, m.p. 202-205°, -bis-1: 1'-dehydrothebenone are described. Hydrogenation (Pd-C) of (I) leads to bis-1: 1'-demethoxyde-Nmethyldihydrosinomenine (II), decomp. 248-249°, $[\alpha]_{p}^{\circ}$ +33.16° in CHCl₃; bis-1:1'-de-N-methyltetrahydrothebainone, decomp. 249-250°, [a] -32.52° in CHCl₃, and the corresponding dl-compound, m.p. 245-248° (decomp.), are described. (-)-Bis-1:1'thebenone (IV), m.p. 230-233° after softening at 225°, $[\alpha]_{D}^{0}$ -163.27° in CHCl₃-MeOH, is obtained by catalytic hydrogenation of (III) or by degradation of the amorphous methiodide of (II). (+)- and dl-Bis-1: 1'-thebenone have m.p. 233° after softening at 190°, $[\alpha]_{D}^{\circ}$ +163.09° in CHCl₃-MeOH, and m.p. 250-254° after softening at 245°, respectively. H. W.

Tetracovalent compounds of platinum with tertiary arsines. G. J. BURROWS and R. H. PARKER (J. Proc. Roy. Soc. New South Wales, 1934, 68, 39-46).—(AsPh₂Me)₂PtCl₂ (I), m.p. 214°, is obtained from AsPh₂Me (II) and H₂PtCl₆ (III); (AsPh₂Me)₂PtBr₂ (IV), m.p. 167°, from (II) and H₂PtBr₆; and (AsPhMe₂)PtCl₂ (V), m.p. 193°, from AsPhMe₂ and (III). When freshly prepared, (I), (IV), and (V) are sol. in PhMe, but on heating to their m.p. or keeping at room temp. for 11 months, isomerides insol. in PhMe result, with m.p. 218° (I), 165° (IV), and 196° (V). (I) [or (IV)] with moist Ag₂O affords a base reconverted into (I) [or (IV)] by HCl. F. N. W.

α-Naphthylmethylarsine derivatives. A. SPOR-ZYNSKI (Rocz. Chem., 1934, 14, 1293-1308).--AsRMe₂ (R=α-C₁₀H₇) and Cl₂ in CCl₄ yield $AsRMe_2Cl_2$, m.p. 127·5-130° (decomp.), which on dry distillation gives AsRMeCl (I), b.p. 165-166°/6 mm., m.p. 62·2-62·7° (HgCl₂ salt, m.p. 105-107°). (I) affords ($AsRMe_2O$ (II), m.p. 57·5-59°, when boiled with KOH in 50% aq. MeOH. The following compounds are prepared from (II) and the appropriate halogen acid in the cold, or by the action of the appropriate halide on (I): AsRMeF, b.p. 139·5-140°/6 mm., $d_1^{19.5}$ 1·4402, $n_2^{19.5}$ 1·6500; AsRMeBr, m.p. 74—74.6° [dibromide, m.p. 105—106° (decomp.)]; AsRMeI, m.p. 101.8—102.6°; AsRMe·CN, m.p. 84— 85°, b.p. 190—191°/6 mm.; AsRMe·CNS, m.p. 49.5— 50.5°. (II) is oxidised by H_2O_2 to RMeAsO·OH, m.p. 187—188°. The above-described compounds react with HCl or HBr at 100° to yield AsMeCl₂ or AsMeBr₂ and C₁₀H₈. R. T.

Mercury compounds of nitro-o-cresols.—See B., 1935, 175.

Mercury derivatives of substitution products of diphenylphenolphthalein.—See B., 1934, 175.

Phosphoro-pyridine compounds. E. PŁAŻEK and Z. SASYK (Rocz. Chem., 1934, 14, 1198—1201).— 2-Dimethylaminopyridine (I) and PCl₃ are heated at 100° for 8 hr., excess of PCl₃ is distilled off, aq. NaOH added to an alkaline reaction, excess of (I) removed by Et₂O extraction, the aq. solution evaporated, the residue dissolved in EtOH, and 2-dimethylaminopyridine-5(?)-phosphinous acid (II), m.p. 250—252° (decomp.), prepared from the Na salt crystallising from the EtOH solution. The analogous phosphinic acid, decomp. at > 300°, is obtained by oxidising (II) with EtOH-HgCl₂. R. T.

New class of betaines. P. PFEIFFER and K. SCHNEIDER (Ber., 1935, 68, [B], 50-60).—The prep. of betaines containing the group $SbCl_5 o$ - and p- to NMe_3^+ affords further evidence that betaines are not cyclic compounds but dipole-like substances of the type, $^+NMe_3 \cdot R \cdot CO_2^-$, $^+NMe_3 \cdot R \cdot O^-$, $^+NMe_3 \cdot R \cdot SO_3^-$. The action of $SbCl_3$ on C_5H_5N in anhyd. Et₂O leads

The action of SbCl₃ on C_5H_5N in anhyd. Et₂O leads to the compound, $2SbCl_3, 3C_5H_5N$, m.p. (indef.) 185°, which passes in vac. over P_2O_5 at 90° into the substance (I) $SbCl_3, C_5H_5N$. Treatment of (I) with fuming HCl gives the substance $[SbCl_4]H, C_5H_5N$, m.p. 175°, also obtained from Sb_2O_3 and C_5H_5N in fuming HCl. The compound $[SbCl_4]H, R$ (R=quinoline), m.p. 190° (decomp.), is similarly obtained.

 $[SbPhCl_3]\dot{H}, C_5H_5N$ and $[SbPhCl_3]H, R$, m.p. 111°, are prepared from SbPhO. Sb *p*-tolyl dichloride and the appropriate base in AcOH-fuming HCl afford the salts $[p-C_6H_4Me\cdotSbCl_3]H, C_5H_5N$, m.p. 132°, and $[p-C_6H_4Me\cdotSbCl_3]H, R$, m.p. 129°. The compounds $[p-OMe\cdotC_6H_4\cdotSbCl_5]H, C_5H_5N$, decomp. 230°, and $[p-OMe\cdotC_6H_4\cdotSbCl_5]H, R$, m.p. 125° after softening at 110°, are derived from *p*-methoxyphenylstibinic acid. Sb m-aminophenyl dichloride hydrochloride, m.p. 218°, in MeOH-fuming HCl is converted by the requisite base into the compounds

 $[m-\text{HCl},\text{NH}_2 \cdot \text{C}_6\text{H}_4 \cdot \text{SbCl}_3]\text{H}, \text{C}_5\text{H}_5\text{N}, \text{m.p. 216}^\circ, \text{and} \\ [m-\text{HCl} \cdot \text{NH}_2 \cdot \text{C}_6\text{H}_4 \cdot \text{SbCl}_3]\text{H}, \text{R}, \text{m.p. 211}^\circ.$ The sall, $m-\text{NH}_2 \cdot \text{C}_6\text{H} \cdot \text{NMe}_3\text{Cl}, \text{HCl}, \text{ decomp. 190} -200^\circ, \text{ is diazotised and transformed by Sb}_2O_3 \text{ in fuming HCl} \\ \text{into the diazonium compound}$

m-SbCl₄·N₂·C₆H₄·NMe₃Ĉl,1·5H₂O, decomp. 124°, which is converted by protracted heating with fuming HCl at 100° into the *betaine* +NMe₃·C₆H₄·SbCl₅⁻, decomp. 224° after blackening at 210°, which yields NMe₃ when warmed with NaOH and gives a yellow turbidity when treated with H₂S in COMe₂-conc. HCl; hydrolysis of it in COMe₂-H₂O and treatment with 70% HClO₄ leads to the *perchlorate*

m-ClO₄·NMe₃·C₆H₄·SbO₃H₂, which darkens at 250°. p-Chlorophenyltrimethylammonium chloride, shrinks at 245°, and SbCl₃ yield the double salt $m \cdot C_6H_4Cl \cdot NMe_3 \cdot SbCl_4$, m.p. 134°, isomeric with the betaine, from which it is distinguished by giving an immediate ppt. of Sb_2S_3 with H_2S in $COMe_2$ -HCl and vigorously evolving HCl when treated with conc. H_2SO_4 . p-Aminophenyltrimethylammonium chloride, m.p. 219°, is diazotised and converted into the compound, p-NMe_2Cl·C_6H_4·N_2·SbCl_4, transformed by hot, fuming HCl into the p-chlorobetaine

*NMe₃·C₆H₄·SbCl₅⁻, m.p. $\Rightarrow 250^{\circ}$ after darkening at 200°, from which the *perchlorate*,

 $SbO_3H_2 \cdot C_6H_4 \cdot NMc_3[ClO_4]$ is derived. H. W.

Rapid method for dialysing large quantities of protein solution. G. C. H. STONE (Ind. Eng. Chem. [Anal.], 1935, 7, 8).—Protein solutions (10 litres) containing 10% of $(NH_4)_2SO_4$ are freed from the salt in 24 hr. by dialysis against tap-H₂O and then distilled H₂O which circulate through collodion sacs arranged in series. J. L. D.

Occurrence of hydroxyvaline as a constituent of proteins. E. ABDERHALDEN and K. HEYNS (Z. physiol. Chem., 1934, 229, 236—240).—No hydroxyvaline could be detected in the hydrolysis products of zein. Dipeptides containing tyrosine and proline (I), leucine (II) and (I), and (II) and glutamic acid were present. J. H. B.

Specific rotation of crystalline edestin. M. FREEMAN (Austral. J. Exp. Biol., 1934, **12**, 187— 191).—Cryst. edestin rapidly prepared has $[\alpha]_{5461}$ -50° to -53° . Edestin prepared by EtOH-pptn. or dialysis has $[\alpha]_{5461}$ —56° to -58° , due to the presence of some denaturation product. Treatment with alkali, acid, or heat also yields a product with higher rotation. P. G. M.

Action of ultra-violet rays on solutions of peptone and protein. F. LIEBEN and H. JESSERER (Biochem. Z., 1935, 275, 367-372; cf. A., 1933, 1063).—The irradiation (I) produces a skin (II) on the surface of aq. Witte's peptone (with 2.5-3.0%solutions optimum yield at $p_{\rm H}$ 5.5), but not on aq. peptone from caseinogen or silk. Sunlight, diffuse daylight, or sensitisers have no effect. (II) does not give the biuret reaction and contains no tryptophan, whilst the tyrosine content is reduced and the histidme content probably greatly diminished. Since the NH₂ content of (II) is reduced, production of plasteins possibly occurs. The NH3 or new NH2R liberated during (I) of proteins (III) probably comes not from the breaking of heterocyclic rings, but from that of peptide linkings which, in (III), are less resistant than In peptones and peptides. In addition to arginine other NH2-acids give more new NH2R when irradiated in a distinctly alkaline than when irradiated in a neutral or acid medium. W. M. C.

Clupein. II. Electrometric titration. K. E. RASMUSSEN and K. LINDERSTRØM-LANG (Compt. rend. Lab. Carlsberg, 1935, 20, No. 10, 36 pp.).— Iitration curves obtained resemble those for aliphatic NH₂-acids and their peptides. Logarithmic quantities corresponding with the dissociation consts. are calc., and evidence is given that a clupein prep. is a mixture. Ine basic structure seems to be a polypeptide with one terminal CO_2H and N. Calc. mol. wts. give the no. of arginine and NH_2 -acid residues in the protein. H. T.

Organic micro-analysis. K. LINDENFELD (Mikrochem., 1935, 16, 153—170).—By the use of Flaschenträger absorption tubes, with low resistance to the gas stream, the pressure-regulating Mariotte bottle may be dispensed with in Pregl C-H determinations. Evaporation of liquids over a gas flame can cause high results in S determinations. J. S. A.

Rapid determination of carbon in organic compounds. C. B. POLLARD and W. T. FORSEE (Ind. Eng. Chem. [Anal.], 1935, 7, 77).—A wet oxidation method which can be completed in 1—2 hr. is described. J. L. D.

Quantitative micro-analysis of organic compounds. K. LINDENFELD (Rocz. Chem., 1934, 14, 1425—1435).—A no. of modifications of Pregl's methods are proposed. CO_2 is best absorbed by ascarit-soda-lime mixtures. Air-free CO_2 for N determination is obtained by adding 20% H₂SO₄ to Na₂CO₃ in a special apparatus. In S determinations, the solutions should not be evaporated on gasheated H₂O-baths, owing to absorption of SO₂ from the combustion gases; the error due to this source may attain +1-2%. R. T.

Technique of the Kuttner-Lichtenstein method for the determination of organic phosphorus. D. GLICK (J. Lab. Clin. Med., 1934, 19, 1012—1013; Chem. Zentr., 1934, ii, 1814).—A more rapid method (A., 1932, 531) is described. H. N. R.

Detection and determination of germanium in organic matter. W. GEILMANN and K. BRUNGER (Biochem. Z., 1935, 275, 375–386).—Org. matter is destroyed with hot conc. H_2SO_4 and HNO_3 , and the Ge is separated, after addition of HCl, by distillation as GeCl₄ and pptn. with H_2S . Amounts of Ge ≥ 0.05 mg. are then determined spectroscopically. When the amount is 0.05-0.5 mg., a colorimetric method similar to that used for H_3PO_4 determination (cf. Bell *et al.*, A., 1920, ii, 769), and when it is >0.5 mg. a gravimetric method (Grosscup, A., 1931, 322) is employed. W. McC.

Rapid determination of hydroxyl by acetyl chloride and pyridine. D. M. SMITH and W. M. D. BRYANT (J. Amer. Chem. Soc., 1935, 57, 61–65).— Modified procedure, applicable to monohydric primary and sec. aliphatic and aromatic alcohols, phenols, and those polyhydroxy-compounds that are appreciably sol. in the reagent, is recommended. The mean accuracy is about $\pm 0.5\%$. The effects of certain interfering substances are discussed.

E. S. H.

Physico-chemical methods of analysis of esterification mixtures. J. SALCEWICZ (Rocz. Chem., 1934, 14, 722—738).—The H₂O, EtOH, and EtOAc contents of mixtures containing 6% of AcOH are determined by adding 6% aq. AcOH until the solutions become turbid, and applying the result to the phase diagram of the given system. The error is $\Rightarrow 0.15\%$. R. T.

Reactions and reagents for the detection of organic compounds. III. E. E. EEGRIWE (Z. anal. Chem., 1935, 100, 31-36; cf. A., 1934, 171).--

Colour and fluorescence reactions are described for the detection of glycerol, allyl alcohol, glyoxylic acid, and $H_2C_2O_4$. The behaviour of numerous related substances is recorded. R. S.

Hydroxylamine method for the determination of aldehydes and ketones. Displacement of oxime equilibria by means of pyridine. W. M. D. BRYANT and D. M. SMITH (J. Amer. Chem. Soc., 1935, 57, 57—61).—Modified procedure, using NH_2OH ,HCl and C_5H_5N as reagents, is recommended. Determinations of the relative reaction velocities of certain ketones suggest that steric hindrance of CO is responsible for wide variations in the rate. Addition of C_5H_5N displaces the oxime synthesis equilibrium in the direction of completion. E. S. H.

Action of Nessler's reagent on ketonic alcohols and acids. G. SCHUSTER (J. Pharm. Chim., 1935, [viii], 21, 32-43).— α -Hydroxyketones of the form R·CO·CHR'·OH are oxidised by Nessler's reagent (I) and may be determined under the following conditions: if R=R'=Me or Ph, 2I is rapidly taken up at room temp. to yield the corresponding diketone (Ac₂ being only slowly oxidised at room temp., but rapidly at 100°); if R=R'=Et, Pr^a, Pr^{\beta}, or Bu^a, the oxidation is slow at room temp. but rapid at 100°, 4I being absorbed to yield 2 mols. of R·CO₂H; if R=Me or Ph, and R'=H, 8I is absorbed at room temp. β - and γ -Hydroxyketones and α -ketonic acids are not oxidised by (I). A. E. O.

Colour reactions of amino-acids with phenols and hypochlorites; new tests for tryptophan and phenylalanine. F. M. MILLER and R. E. LYONS (Proc. Indiana Acad. Sci., 1934, 43, 132—135).— A blue colour develops on treating 2 c.c. of 0.02 molar NH₂-acid with 8 drops of 5% PhOH and 2 c.c. of 2% aq. NaOCI. The test is not given by tyrosine, tryptophan (I), phenylalanine (II), histidine, and aspartic acid. (I) gives a rose or pink colour with 0.5—0.01% aq. NaOCI and 0.5—0.002% NaOH. Indole and skatole do not interfere. (II) with 0.9—0.2% aq. NaOCI and 0.25—0.003% NaOH gives a white turbidity, which is sp. CH. ABS. (e)

Determination of furfuraldehyde by means of diphenylthiobarbituric acid. V. E. TISCHT-SCHENKO and N. V. KOSCHKIN (J. Appl. Chem. Russ., 1934, 7, 1307–1315).—Diphenylthiobarbituric acid (I) is prepared in 80–85% yield by boiling a mixture of $CH_2(CO_2H)_2$, $CS(NHPh)_2$, and AcCl in $CHCl_3$ for 8 hr. Furfuraldehyde (II) is determined by adding excess of 1% (I) solution [prepared by dissolving (I) in feebly acid 4% aq. $\rm NH_4OAc$] to (II) (9—70 mg.) in 12% HCl, and, after 15—20 hr., collecting, washing, drying, and weighing the ppt. of $\rm C_5H_4O\cdot C_{16}H_{10}O_2N_2S_5H_2O$. The compounds of (I) with other aldehydes are sol. in acids, whilst ketones do not condense with (I).

R. T.

New colour reaction for quinine, quinidine, and cupreine and its application to the determination of quinine. J. A. SANCHEZ (J. Pharm. Chim., 1935, [viii], 21, 24—32).—Quinine (I) is demethylated by boiling H_2SO_4 to cupreine (II), which with diazotised p-NO₂·C₆H₄·NH₂ gives a stable orange-red colour or ppt. Quinidine, but not cinchonine, cinchonidine, or cinchonamine, behaves similarly. The reaction is applied to the determination of (I) in cinchona bark, tincture, and fluid extract. (II) may be detected directly, before demethylation, by the same method. A. E. O.

Electrodialysis as method of separation and determination of bases in biological fluids. I. Electrodialysis of aqueous solutions of carnosine, creatine, and creatinine. S. E. SEVERIN (Z. physiol. Chem., 1934, 230, 109—113).—Electrodialysis [using a modified Pauli apparatus with (usually) collodion membranes (Bjerrum and Manegold, A., 1927, 727)] of acidic solutions of carnosine (I), creatinine (II), and creatine (III) causes migration (the velocity decreases in the order quoted) to the cathode (IV); (I)—(III) are thus readily separated from colloidal substances. With solutions of $p_{\rm H}$ 10—12, little or no (I) passes to (IV); (II) and (III) migrate with a somewhat smaller velocity. Electrodialysis of (II) and (III) occurs very slowly in H₂O alone; (I) migrates to (IV) much more rapidly. H. B.

Diazo-reaction of histidine. G. BARAC (Compt. rend. Soc. Biol., 1935, 118, 198—200).—Histidine can be determined in pure aq. solution (I), and in blood or urine to which (I) has been added, by the diazo-reactions with p-NO₂·C₆H₄·NH₂ in alkaline solution, under the same conditions as the determination of PhOH, the colour produced being weaker than with PhOH. R. N. C.

Determination of glycine in proteins. A. R. PATTON (J. Biol. Chem., 1934, 108, 267—272).—The prep. of a protein for the colorimetric determination of glycine is discussed; the colorimetric test is standardised and simplified. H. T.

Biochemistry.

Rare gases not essential to life. A. L. BARACH (Science, 1934, 80, 593-594; cf. A., 1930, 941; 1933, 409).-Mice kept in an atm. of 21% O₂ and 79% N₂ provided no evidence for the view that the inert gases are necessary for normal biological activity. The cause of death in O₂ poisoning is probably not related to any dilution by rare gases which might occur. L. S. T.

Oxygen consumption of immature rats. J. E. DAVIS and A. B. HASTINGS (Amer. J. Physiol., 1934,

109, 683-687).—The mean O_2 consumption of normal rats decreased with age up to the 4th month, and over this period showed no variation between the sexes. Direct measurement of O_2 consumption made possible a distinction between the quiet states of dozing and sleeping. R. N. C.

Prolonged residence in high-oxygen atmospheres. Effects on normal individuals and on patients with chronic cardiac and pulmonary insufficiency. D. W. RICHARDS, jun., and A. L. BARACH (Quart. J. Med. [N.S.], 1934, 3, 437–466).— Arterial O_2 saturation was raised to or exceeded normal in 24 hr. Blood-CO₂ increased progressively for several days. Urinary Cl' frequently increased. CH. ABS. (p)

Influence of an oxygen atmosphere on the blood of *Helix pomatia*. A. RAFFY and P. H. FISCHER (Compt. rend. Soc. Biol., 1935, **118**, 15—17). —The $p_{\rm H}$ and the alkaline reserve of the blood of snails placed in O₂ increases; Cl', however, remains unchanged. A. L.

Respiration of certain tropical fresh-water fishes. E. N. WILLMER (J. Exp. Biol., 1934, 11, 283-306).—Fish blood has $p_{\rm H}$ 6.7. The CO₂-combining power is < that of other animals. Carbonic anhydrase occurred in all species. CH. ABS. (p)

Biology of Calanus finmarchicus. VI. Oxygen consumption in relation to environmental conditions. S. M. MARSHALL, A. G. NICHOLLS, and A. P. ORR (J. Marine Biol. Assoc., 1935, 20, 1–27).— The respiratory rate increases from 0° to 20° for both males and females at $p_{\rm H}$ 7.4—8.5. Variations of 100% may occur with light variation. Increase in O₂ content (I) of the H₂O has little effect on respiration, but it is reduced where (I) is < 3 ml. per litre. P. G. M.

Respiratory gas exchange in Termopsis nevadensis. S. F. COOK (Biol. Bull., 1932, 63, 246– 257).—There is no decline in O_2 consumption with falling O_2 tension until a concn. of approx. 2% is reached. At lower vals. all gas is consumed. The organism respires anaërobically for 2 days without injury, and can also exist and respire normally in

20% CO₂. The R.Q. is approx. 1. CH. ABS. (p)Oxygen and carbon dioxide content of the blood of insects with the open-trachea system. M. FLORKIN (Compt. rend. Soc. Biol., 1934, 117, 1224-1226).—The O₂ content and partial pressure of the blood of open-trachea insects are practically zero. The CO₂ content varies from 9 to 89 vol.-%.

R. N. C.

Oxygen content of the blood of the brain veins. P. BAMBERGER and H. E. NEVER (Pflüger's Archiv, 1934, 234, 675—679).—The blood of human brain veins contains less O_2 and more CO_2 than that of other veins. R. N. C.

Continuous measurement of oxygen content of blood flowing through intact vessels. K. KRAMER (Z. Biol., 1935, 96, 61-75).—The artery or vein is inserted in a bakelite holder between a H₂O-cooled micro-lamp and a red-sensitive Se photo-cell and the absorption of a definite wave-length band is determined from the galvanometric response which is calibrated from vals. given by the Van Slyke method. F. O. H.

Arterialisation of blood. I. Oxygen saturation of blood and respiration during narcosis. II. Equilibrium of oxygen tension between alveoli and blood. III. Gaseous exchange in the lungs during the respiratory pauses. K. KRAMER and H. SARRE (Z. Biol., 1935, 96, 76-88, 89-100, 101-114).-I. Continuous determinations (cf. preceding abstract) of the O₂ saturation (I) (common carotid and femoral arteries) and respiratory vol. in narcotised dogs (II) indicate a fall in (I) together with variations due to disturbances in the transfer of O_2 from alveoli to blood ("pneumonosis") and in the mechanism of respiration (III). Each pause in the retarded (III) is accompanied by a fall in the alveolar O_2 tension (IV) and in arterial (I) due to the inflow of venous blood. The resulting influence on (III) and the effect of disease are discussed.

II. With (II), the difference between (I) and (IV) is normal (approx. 20 mm. Hg), varies according to Krogh's diffusion theory, and is diminished by increase in respiratory vol. That between (IV) and the O_2 tension of the inflowing venous blood influences depth of (III), O_2 content of the venous blood, changes in the alveolar capillaries, etc.

III. With decreasing O_2 tension, that of alveolar air is always > that of arterial blood. The bearing of the data on oxygenation of the blood, especially during the pauses in (III), is discussed. F. O. H.

Respiratory adaptation to anoxæmia. A. HURTADO, N. KALTREIDER, and W. S. MCCANN (Amer. J. Physiol., 1934, 109, 626—637).—Exposure to low pressure causes, in arterial blood, increases in red cell count, hæmoglobin, and viscosity, a moderate decrease in CO_2 , and a marked decrease in O_2 content and saturation. In the alveolar air both CO_2 and O_2 tensions are reduced. The respiratory response to anoxæmia includes structural changes in the lungs that favour a more efficient exchange of CO_2 and O_2 . R. N. C.

Respiratory effect of prolonged anoxæmia in normal dogs before and after denervation of the carotid sinuses. C. L. GEMMILL, E. M. K. GEILING, and D. L. REEVES (Amer. J. Physiol., 1934, 109, 709—713).—The respiratory response to pure N_2 is abolished by denervation, and rate of breathing in O₂-poor mixtures is increased without an increase in depth of breathing. R. N. C.

Cardiac output in man. Adaptation of the katharometer for the rapid determination of ethyl iodide in estimations of cardiac output by the ethyl iodide method. Effect of posture on cardiac output and other circulatory and respiratory measurements. J. S. DONAL, jun., C. J. GAMBLE, and R. SHAW (Amer. J. Physiol., 1934, 109, 666-682). R. N. C.

Factors affecting the oxygen capacity of hæmoglobin. I. Influence of $p_{\rm H}$ on the oxygencombining ability of red blood-corpuscles. II. Critical temperature causing heat-injury to gascarrying ability of hæmoglobin. III. Velocity of heat-injury sustained by hæmoglobin on its oxygen capacity. T. IWATA (Acta Schol. Med. Univ. Tokyo, 1934, 17, 56—62, 63—80, 81—87).— I. The O₂ capacity (I) of red corpuscles in isotonic buffer solutions varies with $p_{\rm H}$ and reaches max. at 7.0 (25°). The % decrease in (I) for a given change in $p_{\rm H}$ is independent of the O₂ tension at all vals. > 35 mm. Hg.

II. Hæmoglobin of mammalian blood heated beyond physiological temp. (40-47°) undergoes irreversible denaturation causing a decrease in (I). The CO_2 carrying ability of the blood is unchanged.

III. Heat-injury to hæmoglobin affecting (I) is in accord with a unimol. reaction, except in the last stages which correspond with a bimol. reaction.

Сп. Авз. (р)

Combination of coagulated protein particles with anions. M. MAIZELS (Biochem. J., 1934, 28, 2133-2140) .--- Coagulated hæmoglobin particles (I) adsorb more anion at $p_{\rm H}$ 5.2 than at $p_{\rm H}$ 7.2. If (I) are suspended in a solution containing both a hydrophobic (II) and a hydrophilic (III) ion, the former is preferentially bound, and at $p_{\rm H}$ 5.2 the latter is practically excluded from combination. Assuming that the bulk of the H_2O in a (I) sediment is free, it follows that practically no (III) ion, and but little (II) ion, is bound at $p_{\rm fr}$ 7.2. The ions strongly adsorbed by (I) are all readily sol. in org. solvents. The anion ratio in (I) exposed to a solution containing Cl' and another ion at $p_{\rm H}$ 5.2 depends on the relative adsorption of the ions by the protein, but with erythrocytes the controlling factor is the solubility of the anions in the lipin of the membrane (cf. A., 1934, 429). A. E. O.

Reactions of hæmoglobiniferous cells to acid and basic dyes under varying conditions of hydrogen-ion activity. J. E. KINDRED (Stain Tech., 1935, 10, 7-20).—The substances in Russel bodies and in the cytoplasm of the plasma-cells are probably not hæmoglobiniferous (I) because they do not react as do substances in known (I) cells in respect to the isoelectric point of hæmoglobin. H. W. D.

Exchange of hydrogen carbonate and chloride ions between blood-serum and red corpuscles at different carbon dioxide tensions. T. IWATA (Acta Schol. Med. Univ. Kyoto, 1934, 17, 88— 92).—Serum under high CO_2 tension (I) contains more CO_2 and less Cl than that under low tension. If the two sera are brought into equilibrium under the same (1) the difference of CO_2 contents diminishes somewhat. This difference remains const. and independent of (I). Ch. Abs. (p)

Composition of the hæmocyanin and hæmoerythrin of Sipunculus nudus. J. ROCHE (Skand. Arch. Physiol., 1934, 69, 87—96; Chem. Zentr., 1934, ii, 1940).—Hæmocyanins from blood or lymph of various molluses and Crustaceæ yielded cryst. substances, the N, S, and (notably) Cu contents of which were characteristic of the class of organism. Analysis of hæmoerythrin from S. nudus is recorded. A. G. P.

Spectroscopic studies of hæmoglobin derivatives. L. WACHHOLZ, W. BARANOWSKI, and H. KACZY (Deut. Z. ges. gerichtl. Med., 1934, 23, 83— 88; Chem. Zentr., 1934, ii, 1135).—Neutral methæmoglobin has only one absorption band in the red portion of the spectrum. H. N. R.

Combination between methæmoglobin and peroxides : hydrogen peroxide and ethyl hydroperoxide. D. KEILIN and E. F. HARTREE (Proc. Roy. Soc., 1935, B, 117, 1–15).—Methæmoglobin (I) in solution free from catalase (III) at $p_{\rm H}$ 5.8—6.5 is converted by the addition of $\rm H_2O_2$ into methæmoglobin- H_2O_2 (II) compound with diffuse absorption bands at 589 and 545 mµ. The min. amount of H_2O_2 required to transform (I) into (II) corresponds with I mol. of H_2O_2 per Fe atom. (II) is unstable and rapidly decomposes to yield up to 87% of (I). The H_2O_2 disappears without formation of mol. O_2 so that it seems to be used up in oxidising the 13% of (I) which does not reappear. The decomp. of (II) is not accelerated by (III), but is accelerated by certain easily oxidisable compounds such as $p-C_6H_4(NH_2)_2$ or $p-(-C_6H_4\cdot NH_2)_2$ with reappearance of (I). EtO₂H reacts with (I) to give a compound very similar to (II) both in absorption bands and other properties. EtO₂H and [in the absence of (III)] H_2O_2 oxidise hæmoglobin to yield (I). W. O. K.

Blood and its components. I. Physico-chemical investigation of their magnetic properties. H. KUDO (Acta Med. Scand., 1934, 81, 511–520; Chem. Zentr., 1934, ii, 1152).—Human and animal bloods are diamagnetic; κ is slightly > for H₂O, and in fever, starvation, and menstruation falls to $6.30 \times$ 10⁻⁷. X-Ray irradiation of rabbits' bodies raises blood- κ . Vals. are given for κ of 14% aq. hæmoglobin, and for 2% and 1.5% serum-albumin, solutions. R. N. C.

Determination of sodium in human red blood-cells. F. W. OBERST (J. Biol. Chem., 1935, 108, 153—160).—The cells should first be washed with Na-free, dialysed serum made isotonic with KCl and KHCO₃, and equilibrated with approx. 40 mm. of CO_2 . A. E. O.

Suspension stability of erythrocytes in solutions of gum acacia. S. P. LUCIA and J. W. BROWN (Proc. Soc. Exp. Biol. Med., 1934, 32, 189– 192).—The factors responsible for changes in the suspension stability (I) of erythrocytes (II) are independent of (II). (I) is reduced by solutions of gum acacia, max. instability being produced by a 3-4% solution. Rapidity of formation and size of agglutinated (II) masses increase with (II) conen. The sedimentation curve for rapidly sedimenting bloods is not linear. R. N. C.

Comparison of the centrifugation with the electrical conductivity method for the determination of the volume of blood-corpuscles. A. SLAWINSKI (Bull. Soc. Chim. biol., 1934, 16, 1575— 1577).—The determination by electrical conductivity measurement is more accurate than the method of centrifuging. A. L.

Changes in the blood of animals according to age. I. Changes in the blood of rodents (Mus musculus, L., and Citellus pygmæus, Pall) and birds (Passer montanus, L., and Larus nidibundus, L.) during the period of growth. N. KALABUKHOV and V. RODIONOV (Folia Hæmatol., 1934, 52, 145—157).—Changes in H₂O content, acidity, glucose content, and size of erythrocytes (I) are recorded. In birds the increase in hæmoglobin (II) results from an increase in (I). In mammals the increase in (II) is preceded by a period of decrease associated with the intake of Fe in the mother's milk. CH. ABS. (p)

Conditions of determination of lactacidæmia and its variations. F. KAYSER and N. MASIUS

Sources of error in the Hagedorn-Jensen method for blood-sugar. G. FREY (Klin. Woch., 1934, 13, 1400).—No glycolysis occurs within 4 hr. when blood is added to aq. $ZnSO_4$ +NaOH before heating to coagulate. NUTE. ABS. (m)

Determination of blood-sugar. Bound sugar of blood. H. BRAUN (Biochem. Z., 1935, 275, 433— 447).—The reducing material liberated in bloodserum (I) by acidic or alkaline hydrolysis is "bound sugar" (II). Most of (II) is united to protein (chiefly globulin). Glucose (III) in concess similar to those found in blood can be accurately determined spectroscopically and the degradation of (III) by alkali may be observed thus. The method should be applicable to the determination of (II) in deproteinised (I) if suitable deproteinising agents are used and the selective absorption of the filtrate does not interfere. (II) but not free sugar is increased in carcinoma.

W. McC.

Diurnal variation in blood-sugar level of the rat. M. C. HRUBETZ (Proc. Soc. Exp. Biol. Med., 1934, 32, 217).—Very small variations occur.

R. N. C.

Blood-sugar of the snail (Helix pomatia, L.). K. SCHWARZ (Biochem. Z., 1935, 275, 262–269).— The blood-sugar of H. pomatia is 10–30 mg. per 100 c.c. and remains fairly const. throughout the year both with and without food. The vals. are unchanged on injecting either insulin (I) or adrenaline (II). (I) is not, but (II) is, toxic. P. W. C.

Effect of halogenated acids on the glycolysis of blood *in vitro*. J. LABARRE and P. RIOPEL (Canad. Chem. Met., 1934, **18**, 219).—The anti-glycolytic powers of $CH_2Cl \cdot CO_2H$, $CH_2Br \cdot CO_2H$, and $CH_2I \cdot CO_2H$ at a concu. of 1: 250 are equiv.

H. G. R.

Disappearance of fatty acids in presence of serum-protein. Z. GRUZEWSKA and M. G. ROUSSEL (Ann. Physiol. Physicochim. biol., 8, 806—838; Chem Zentr., 1934, ii, 1480).—Ovalbumin in 0.9%NaCl adsorbs $PrCO_2H$ only in traces and AcOH not at all. Adsorption of fatty acids (I) by serum-proteins (II) depends on the concn. of (I). With 0.0025— 0.005N-(I) the limit of adsorption is reached in approx. 1 hr. Adsorption is most efficient with the glyceryl esters of (I). The adsorption val. is the same for all (I) at the same mol. concn. R. N. C.

Role of serum-lipins. I. Physico-chemical study. S. WENT and A. VON KUTHY (Z. Immunität., 1934, 82, 392—398).—Serum-proteins are freed from lipins by coagulation of the serum (I) with EtOH and extraction with Et_2O , and the euglobulin (II) and pseudoglobulins I and II separated by fractional pptn. from aq. solution with Na_2SO_4 . The ppt. corresponding with (II) is > the corresponding ppt. from the native (I). Addition of aq. lecithin or lecithin-cholesterol emulsion does not affect the pptn.; hence the splitting of the protein-lipin linking in the (I) complex by EtOH is irreversible. The lipin-free (II) fraction dissociates less readily than (II) in (I). R. N. C.

Cholesterol and phosphatide content of the blood of dairy cows. A. DOULKIN and S. HELMAN (Le Lait, 1934, 14, 797-808).—There is a negative correlation $(r=-0.87\pm0.087)$ between serum-cholesterol (I) and milk yield and a positive correlation $(r=0.85\pm0.124)$ between serum-lipin-P (II) and the % of fat in the milk. The level of (I) is in winter > in summer, and is lowered by feeding seawced to the cows, turning them out to pasture, or ionisation of the air in the byres. There is apparently no direct correlation between (I) and (II), although there is a positive correlation (r=0.84) between the ratio (I): (II) and (I). NUTR. ABS. (b)

Adenine-nucleotide content of human blood. I. Determination and content. M. V. BUELL (J. Biol. Chem., 1934, 108, 273—283).—The method for the determination of purine nucleotides in blood has been revised, and data of their content in normalhuman blood collected. The nucleotide content of whole blood in males is > that of females, but in the red corpuscles the val. is the same. Menstruation seems to have no effect on the vals. A normal person appears to have a characteristic val. for the corpuscular purine-nucleotide content. H. T.

Distribution of the precursors of ammonia in sheeps' blood. J. HELLER and A. J. KLISIECKI (Biochem. Z., 1935, 275, 362-366; cf. A., 1932, 1272).—Sheep's blood (I) contains two substances which decompose spontaneously in vitro giving NH₃. One is equally distributed between serum and corpuscles (II) and is removed from (II) by washing with physiological aq. NaCl (III). Alkaline aq. borate does not inhibit the decomp. of this substance. The other (IV) is present in (II) only, is stable in intact (II) undergoing decomp. only after hæmolysis, and is not removed from (II) by washing with (III). The enzyme which accelerates the decomp. of (IV) is also not removed by washing with (III). 100 c.c. of (I) contain the equiv. of 0.4-0.6 mg. of NH₃-N of the first and of 0.5-0.85 mg. of NH₃-N of the second substance. (IV) is probably adenylic acid.

W. McC.

"True creatinine" of blood. G. FERRO-LUZZI (Biochem. Z., 1935, 275, 422—429; cf. Behre *et al.*, A., 1922, i, 789).—Since treatment of blood-filtrate (I) with hot aq. NaOH produces degradation products which give the reaction (II) of Jaffé, and since treatment of (I) with kaolin after deproteinisation by the method of Somogyi inhibits (II), whilst hot aq. CH_2O inhibits (II) in (I) exactly as in creatinine (III) solutions, it is concluded that normal blood contains (III) in amount which ∞ the intensity of (II). The term "true creatine" should not be used. W. McC.

Origin of blood-indoxyl. B. A. HOUSSAY, P. MAZZOCCO, and D. POTICK (Compt. rend. Soc. Biol., 1934, 117, 1235—1237).—Indoxyl originates in the intestine, and is stored in the blood and excreted by the kidneys. Blood-indoxyl (I) is not affected by extirpation of the thyroid or pituitary. It is modified slightly and irregularly by extirpation of the intestine; urinary indoxyl falls, but rises again later. Nephrectomy produces a rapid and intense increase of (I), which is reduced to a small val. by extirpation of the intestine. R. N. C.

Role of organs in the elimination of bloodindoxyl. B. A. HOUSSAY, P. MAZZOCCO, and D. POTICK (Compt. rend. Soc. Biol., 1934, 117, 1237-1238).—Injection of urinary indican in dogs produces an increase in blood-indoxyl, which falls rapidly, except after extirpation of the kidneys, by which it is normally excreted. Extirpation of the liver or gastro-intestinal tract does not affect the excretion. R. N. C.

Determination of the tyrosine index of serumpolypeptides. R. GOIFFON and J. SPACY (Bull. Soc. Chim. biol., 1934, 16, 1675—1685).—The serum is freed from protein by phosphotungstic acid on the one hand and CCl₃·CO₂H on the other. The Folin-Denis phenol reagent is added to the filtrates, the difference in depth of colour being measured and expressed as polypeptide-tyrosine. A. L.

Photometric study of the effect of natural waters on human serum in vitro. P. PONTHUS (Arch. Phys. biol. Chim.-Phys. Corps org., 1933, 10, 318—326; Chem. Zentr., 1934, ii, 1152).—The turbidity produced on adding the H_2O (I) to the serum, due to pptd. globulins, is governed by the salts present in (I), and hence is a direct indication of its characteristics. R. N. C.

Osmotic pressure and molecular weight of serum-globulins. A. ROCHE and J. BRACCO (Bull. Soc. Chim. biol., 1934, 16, 1479—1497).—Fresh serumglobulin (I) of the horse, (I) aged for several weeks at 0° , (I) heated for a similar period at 37°, and old antidiphtheritic serum had at $p_{\rm H}$ 7.4 mol. wt. 150,000, 136,000, 225,000, and 225,000, respectively, as determined by osmotic pressure measurements. Horseserum euglobulin and pseudoglobulin had mol. wt. 152,000 and 110,000, respectively. A. L.

Gelification of human serum by acids. W. KOPACZEWSKI (Compt. rend., 1935, 200, 266—268).— The concn. of acids necessary to produce gelatinisation of blood-serum (A., 1934, 547) is always slightly < that required to cause coagulation. The gelatinising power (I) of various org. acids is most marked in monobasic acids. (I) is not completely dependent on [H'], is decreased by the introduction of OH or by increase in the basicity of the acid, but is increased by increasing the no. of CH₂ groups. No differentiation between the *dl*- and active forms of an acid is observed. (Cf. this vol., 300.) J. W. B.

Determination of blood-protein. L. SERVANTIE and G. DEMENIER (Bull. Soc. Pharm. Bordeaux, 1934, 72, 96-105; Chem. Zentr., 1934, ii, 2109).— The proteins are pptd. and separated and their N content is determined by a modified Kjeldahl process, the NH₄ being determined with Nessler's solution. H. N. R.

Determination of serum-protein by measurement of volume of precipitate. F. W. HAYNES (J. Lab. Clin. Med., 1934, 19, 1320-1323).—The vol. of the ppt. obtained by adding phosphotungstic acid to the dil. (1:50) serum is measured in Shevky-Stafford tubes and compared with standard preps. of caseinogen. CH. ABS. (p)

Blood-protein of hens and egg-laying. M. ROCHLINA (Bull. Soc. Chim. biol., 1934, 16, 1645– 1651).—The protein content (I) of the blood of fowls varies according to age, sex, the time of egg-laying, and the breed. The average (I) in chickens, cocks, and hens (II) is $3\cdot5-4\cdot0$, $5\cdot5$, and $5\cdot6\%$, respectively; in (II), the min. (I) coincides with the time of laying. A. L.

Composition of hens' blood in relation to egglaying. M. ROCHLINA (Bull. Soc. Chim. biol., 1934, 16, 1652—1662).—The composition of cocks' blood varies < that of hens' blood, although the differences between individual animals are considerable. Whilst there is a marked change in the Ca and protein content of the blood connected with egg-laying, the Cl' and the dry extract content remain unchanged.

A. L.

Phosphorus partition in blood-serum of laying hens. R. R. ROEPKE and J. S. HUGHES (J. Biol. Chem., 1935, **108**, 79–83).—The total P (I) of the serum of cocks and non-laying hens is accounted for by the lipoid (II) and acid-sol. (III) fractions, whilst in laying hens (I) is > (II)+(III). The P remaining in the CCl₃·CO₂H ppt. after extraction with 10% CCl₃·CO₂H and hot Et₂O-EtOH accounts for the difference; this fraction has the properties of vitellin. H. D.

Phosphorus compounds in the blood-plasma of the laying hen. M. LASKOWSKI (Biochem. Z., 1935, 275, 293-300).—A phosphoprotein is detected in the plasma of the laying but not in that of the nonlaying hen. P. W. C.

Calcium distribution in chicken blood. H. PAUL (Proc. Oklahoma Acad. Sci., 1934, 14, 32– 34).—Serum-Ca occurs as ionic 20%, protein-bound (I) 30%, and adsorbable Ca (II) 50% of the total. The egg-laying period is marked by an increase, notably of (I) and total (II), and a decline in filterable (II). Non-filterable (II) is associated with shell formation. Ch. Abs. (p)

State of calcium in fluids of the body. I. Conditions affecting ionisation of calcium. F. C. McLEAN and A. B. HASTINGS (J. Biol. Chem., 1934, 108, 285—322).—With total Ca and total protein known, Ca^{**} may be cale. Certain variables influence ionisation of Ca in body-fluids, but the individual and combined effects are of slight practical importance compared with the Ca-protein relationship except in the rabbit and possibly other herbivora where citrate has a significant effect. H. T.

Phosphorus of blood. II. Partition of phosphorus in blood in relation to the corpuscle volume. E. WARWEG and G. STEARNS (J. Clin. Invest., 1934, 13, 411-418).—Changes in corpuscle vol. affected the lipin- and ester-P (I). (I) is not const. in human corpuscles. CH. ABS. (p)

Distribution of chloride between plasma and blood-corpuscles in normal and laked blood. S. RASZEJA and A. SLAWINSKI (Bull. Soc. Chim. biol., 1934, 16, 1692-1707).—In normal human and equine blood (I) the [Cl'] in the serum and in the cytoplasm is the same; in (I) treated with citrate or small quantities of Cl', however, the Cl' does not pass freely from the corpuscles, although in (I) treated with oxalate and F' or with considerable quantities of Cl', the Cl' passes freely. Variations in the thickness of the corpuscular membranes have a great influence on the amount of free H_2O as determined by the ratio Cl' in corpuscles/serum-Cl'. A. L.

Determination of bromine in blood. R. INDO-VINA (Biochem. Z., 1935, 275, 286—292).—A method is described depending on the reaction of Br liberated from ashed blood with fuchsin–SO₂ reagent, the colour developed being compared with standards. The method gives good results down to 6×10^{-6} g.

. W. C.

Inhibition of blood-clotting by metals in vitro. H. HAUSLER and H. SCHNETZ (Biochem. Z., 1935, 275, 187–203).—Cu, Zn, Fe, Cd, Co, Ni, and Pb salts inhibit blood-coagulation in vitro in equiv. concn. to about the same extent, the inhibition being complete with concns. > 0.003M. Inhibition occurs with both inorg. and org. salts, the anions having only a slight modifying effect. Salts of Ba, Sr, and Ca accelerate clotting, whilst those of Mg and Mn occupy a mean position. As buffer solutions in these experiments, $PO_4^{""}$ mixture is avoided and acetate-veronal buffer preferred. P. W. C.

Clotting of plasma in absence of lipin. H. WU (Proc. Soc. Exp. Biol. Med., 1934, 32, 97–98).— Fat-free plasma coagulates on addition of fat-free serum, or of Ca and lipin, but not with Ca or lipin alone. It is concluded that lipin is necessary for the activation of thrombin, but not for the actual coagulation. R. N. C.

Coagulating action of the juice of embryonic guinea-pig tissues. P. MENDELÉEFF (Compt. rend. Soc. Biol., 1934, 117, 1219—1222).—The coagulating action on plasma of the juice of the embryonic thymus is > that of any other tissue or of the entire embryo. Coagulation is more rapid for the plasma of a pregnant animal. R. N. C.

Specificity of the coagulating power of embryonic guinea-pig tissues. P. MENDELÉEFF (Compt. rend. Soc. Biol., 1934, 117, 1222—1224).— The tissue-juice has little or no coagulant action on the plasma of species other than the guinea-pig. For mixtures there is a min. concn. of guinea-pig plasma to produce coagulation. R. N. C.

Antigenic properties of lipins. K. KIMIZUKA (J. Biochem. Japan, 1935, 21, 141-152).-Impure lipin preps. (I) from egg-yolk show only slight antigenic activity (II) when injected with pig's serum into rabbits; phospholipin purified by $CdCl_2$ in EtOH is without (II), whilst hydrogenation or partial oxidation of (I), but not of pure lipin, increases (II). A H_2O -sol. fraction showing (II) can be separated from hydrogenated (I). F. O. H.

Effect of X-rays on the formation of complement-binding substances in blood. I. P. MISCHT-SCHENKO and M. M. FOMENKO (Strahlenther., 1934, 50, 167—178; Chem. Zentr., 1934, ii, 1637—1638).— X-Irradiation of blood decomposes antibody-albumins, producing substances resembling antigens in appearance. R. N. C.

Studies on cell structure by the freezing-drying method. V. Chemical basis of the organisation of the cell. VI. Preparation and properties of mitochondria. R. R. BENSLEY and N. L. HOERR (Anat. Rec., 1934, 60, 251-266, 449-455).-V. The globulins, glycogen, and mitochondria (I) of frozen-dried sections (II) of liver of Amblystoma remain sol. for 1-2 weeks at room temp., and for 4 months in the cold. Their removal with 0.9% NaCl does not affect the integrity or structure of the cells. In guinea-pig or rabbit liver, (I) are insol., whether the extraction is made from (II) or an emulsion of the tissue (III); the extraction removes large quantities of dissolved proteins, but the cells still retain their integrity. (I) are sol. in 0.005N-NH2, which dissolves also the nuclear chromatin and causes the cells to swell and cohere to a gel, further quantities of protein being removed; the characteristic cell structure is still recognisable in stained sections of the gel. The gel is sol. in 0.1N-NH₃ or N-NaOH; from solution, after centrifuging from insol. debris, the NaCl-insol. cell-material is pptd. with AcOH, purified by repeated pptn., washed, and dried over P_2O_5 . Successive extraction with EtOH, Et₂O, and CHCl₃ removes fatty material (IV) equiv. to 30% of the dried wt., of which 3.84% is insol. in COMe₂. The residual protein, termed ellipsin, is the structural protein and the basis of org. continuity of the cell body.

VI. (I) are extracted from (III) by repeatedly centrifuging at low speeds to remove cell debris, followed by high speed to separate (I), washing with 0.9% NaCl and dil. AcOH, and drying over P_2O_s . (I) contain about 43.6% of (IV) sol. in EtOH, Et₂O, and CHCl₃, none of which is lecithin or kephalin. (IV) is partly or wholly unsaturated, and reduces OsO_4 . Fresh (I) are sol. in 0.0005N-NH₃, and two proteins are pptd. isoelectrically from the solution at $p_{\rm H}$ 6.6 and an undetermined point further on the acid side. R. N. C.

Interaction of proteins and nucleic acid. T. CASPERSSON, E. HAMMARSTEN, and H. HAMMARSTEN (Trans. Faraday Soc., 1935, 31, 367–389).—Experiments have been made with a view of devising suitable methods for demonstrating the existence or otherwise of a protein structure in cell nuclei, especially chromosomes. The reaction between La-malonic acid reagent, nucleic acid, and protein has been studied, and also the action of proteolytic enzymes on mixtures of Na nucleinate and proteins. When mitotic cells are digested with a suitable mixture of activated trypsin and La acetate the chromosomes are rendered visible under the microscope in ordinary light. M. S. B.

Kinochromatins. G. VAN CAMP (Protoplasma, 1934, 22, 128–136).—A review. A. G. P.

Polarisation studies in tissue models. M. SPIEGEL-ADOLF and E. A. SPIEGEL (Proc. Soc. Exp. Biol. Med., 1934, 32, 139-141).-The conductance difference (I) between the max. and min. frequencies of an alternating current, produced by a membrane of parchment, collodion, hardened gelatin, or gelatin containing pseudoglobulin, placed between the electrodes in KCl solution, is >0.4%. Membranes of gelatin containing lipins (II) give similar vals., but collodion-lipin membranes (III) have a (I) of 2-5%; hence lipins can imitate the polarisation phenomena observed in animal tissues. In (III) the lipins are homogeneously distributed, whilst in (II) they appear in doubly-refracting lumps, irregularly distributed. Polarisation is increased in (III) by 0.05N-HCl, and decreased by 0.05N-NaOH; it is destroyed irreversibly by 95% EtOH, which extracts the lipins. (I) in brain tissue is decreased by hypotonic solutions, alkali, and other agents that R. N. C. produce swelling of the tissue.

Origin of uric acid in the hibernating eggs of the silkworm. C. MANUNTA (Atti R. Accad. Lincei, 1934, [vi], 20, 283—286).—This acid is derived largely, not from embryonal metabolism, but from the maternal blood. T. H. P.

Nucleic acid of the eggs of Arbacia punctulata. K. C. BLANCHARD (J. Biol. Chem., 1934, 108, 251— 256).—From the unfertilised eggs of the sea-urchin have been isolated in equal amounts a nucleic acid of the $C_{39}H_{51}O_{25}N_{15}P_4$ type and a pentose derivative which may also be of nucleic acid type. H. T.

Effect of variations in ionic strength on the apparent isoelectric point of ovalbumin.—See this vol., 301.

Kephalin from human brain. V. Oxygen uptake of phosphatides and their acids in presence of catalysts. I. H. PAGE and M. BULOW (Z. physiol. Chem., 1935, 231, 10—18; cf. A., 1932, 533). —Of the salts of Fe, Cu, Co, and Mn, only Fe shows strong activity as catalyst of the oxidation of lecithin (I) and kephalin (II) and the acid mixture resulting from their hydrolysis. (II) is more affected than (I). Cu is slightly active, also Co, for (II) acids. NH₂-acids are inactive as catalysts. (II) always shows greater uptake than (I) even using phosphatide of the same I val. The phosphatides and acids of the same I val. show no difference. J. H. B.

Acetylcholine content of nerves, brain, and spinal cord. H. KWIATKOWSKI (Arch. exp. Path. Pharm., 1935, 177, 154—158).—The vagus and ischiadie nerves, brain, and spinal cord of dogs, cats, oxen, guinea-pigs, and men contain acetylcholine $(0.2-5\times10^{-6} \text{ g. per g.})$. F. O. H.

Urea content of the frog's kidney. R. HOBER (Pflüger's Archiv, 1934, 234, 716-721).—The urea content of a frog's kidney dried by heat is < that of a fresh triturated kidney from the same frog. Perfusion of the isolated kidney through the aorta and portal vein (I), or through (I) only, with NaCl solution containing urea, produces a deposition of urea in the kidney. R. N. C.

Lipins in the renal tubule of the cat. W. MODELL (Anat. Rec., 1933, 57, 13—28).—Location of lipins in adult and young cats and in the fœtus is recorded. CH. ABS. (p)

Cystine content of sheep's wool as affected by the protein content of the diet. J. E. LONG, V. G. HELLER, and A. E. DARLOW (Proc. Okla. Acad. Sci., 1933, 13, 12—16).—Variations in diet, within normal limits, do not affect the cystine (I) content of wool. Analytical methods for (I) are compared. CH. ABS. (p)

Origin of sulphur in wool. II. Cuprous mercaptide method for the determination of cystine or cysteine. S. D. Rossouw and T. J. WILKEN-JORDEN (Biochem. J., 1935, 29, 219—224).—After hydrolysis of dried material by 40% H₂SO₄, and pptn. of colouring matter (I) by adjustment to $p_{\rm H}$ 4.5, cystine and cysteine are pptd. as cysteine Cu^I mercaptide by addition of Cu₂Cl₂ Excess of Cu and further (I) are removed from the ppt. by treatment with KCNS and C₅H₅N, and cystine is then determined by the modified Sullivan method (A., 1934, 1021). Cysteine can be regenerated as such only if a large excess of Zn dust is added to the mercaptide in dil. HCl. Twice the normal colour intensity is then obtained in the modified Sullivan method.

A. E. O.

Polarographic studies with the dropping mercury cathode. XLIII. Specific effects of aminoacids. J. SLADEK and M. LIPSCHUTZ (Coll. Czech. Chem. Comm., 1934, 6, 487–497).—Remedies for pernicious anæmia, containing proteolytic products from liver, inhibit the polarographic cysteine test. Among NH₂-compounds examined to trace the origin of this inhibition, tryptophan, arginine, histidine, β -phenyl- α - and - β -alanine suppressed the cysteine effect. E. S. H.

Proteins of liver. C. ACHARD and M. PIETTRE (Compt. rend., 1935, 200, 363—366).—New apparatus, the histoclast, disintegrates tissue by projecting pulp at high pressure through screens and jets, on to a polished surface at -30° . The cells and even their nuclei are thus broken down. Ox-liver tissue so treated yields an extract containing much NH_2 -acid, and a phosphoprotein of globulin type, but no serumprotein. E. W. W.

Non-protein-carbon and -nitrogen of muscle and post-mortem changes. II. T. INOUE (Tohoku J. Exp. Med., 1934, 23, 241-254).--Postmortem increases in non-protein-C and -N in leg muscles of rabbits were parallel. CH. ABS. (p)

 $\alpha-\beta$ Intramolecular transformation of myosin. W. T. ASTBURY and S. DICKINSON (Natare, 1935, 135, 95).—In air-dried myosin (I) films the mol. chains lie approx. parallel to the surface. On moistening and stretching these chains are pulled approx. parallel to the direction of stretching, and give rise to an X-ray pattern resembling that of muscle or α -keratin. Further stretching gives a pattern resembling that of β -keratin. Exposure to steam fixes the β pattern at the expense of the α , as in the case of stretched hair. (I) films can usually be stretched in cold H₂O to approx. three times their original length, and like keratin fibres, show well-marked long-range reversible elasticity, the β pattern disappearing on contraction when the film has not been kept stretched in the dry state. Unstretched (I) film like keratin in the labile state contracts by about 20% when exposed to steam. L. S. T.

Sex differences from viewpoint of biochemistry. III. T. TADOKORO (J. Fac. Sci. Hokkaido Imp. Univ., 1934, 2, 13—58).—Myosin (I) and myogen (II) were obtained from muscle by extraction with aq. NaCl and pptn. with $(NH_4)_2SO_4$, and separated into α and β fractions by pptn. from aq. solution with AcOH. The isoelectric point (III) of β was more acid than that of α . β contained less NH_2 -, arginine-, and lysine-N and more histidine- and cystine-N than α . Female (I) and (II) were similar to the β fractions of male (I) and (II). Ovovitellin is separated into α and β fractions by fractional pptn. with AcOH. The (III) of β was more acid than that of α . β contained less $(NH_2)_2$ -, arginine-, cystine-, and lysine-N and more NH_2 - and histidine-N than α . H. D.

Potassium [of muscle]. A. LEULIER and A. BERNARD (Bull. Soc. Chim. biol., 1934, 16, 1663— 1674)—In the dog, pigeon, cat, and rabbit, the K content of involuntary and voluntary muscle (I) increases from birth with age. The young guineapig has the same K content of (I) as the adult animal. Injections of pilocarpine increase the K content of the cardiac muscle, whilst eserine increases that of the skeletal muscles. Gastrocnemius muscle of the frog loses nearly all its K[•] on immersion in distilled H_2O , but in Ringer's solution with or without addition of K[•] the diffusion is much less. A. L.

Cataphoresis of normal and pathological crystallin. S. KREIMER and J. NORDMANN (Compt. rend. Soc. Biol., 1935, 118, 83–85).—Crystallin from 0x, rabbit (I), and man (II) has 3 isoeleotric points at $p_{\pi}3\cdot5-4$, $5\cdot2-6\cdot8$, and $8\cdot0-9\cdot5$. With spontaneous cataract in (II) and that caused by $C_{10}H_8$ in (I), the second isoelectric point is displaced to $6\cdot2-8\cdot0$.

Composition of flesh of domestic fowl. R. HOLCOMB and W. A. MAW (Canad. J. Res., 1934, 11, 613-621).—The % of H₂O, fat, ash, protein, and N in the combined skin, fat, and flesh of chickens are given. E. C. S.

Cholesterol and lecithin in teeth and saliva. F. KRASNOW (J. Dent. Res., 1934, 14, 226-227). In saliva, lipin-P (I) ranges from 0.1 to 0.4 mg. and cholesterol from 2.0 to 9.0 mg. per 100 ml. In enamel and dentine (I) ranges from 0.5 to 2.8 mg. and from 0.1 to 1.7 mg. per 100 mg., respectively.

NUTR. ABS. (m)

Determination of iron in dental enamel. L. L. ENGEL (J. Dent. Res., 1934, 14, 273—276).—Enamel is treated with HNO_3 and the mixture evaporated and ignited. After re-evaporation with HCl the residue is extracted with dil. HCl. Fe is determined colorimetrically with 2:2'-dipyridyl after adjusting the $p_{\rm II}$ of the solution to avoid pptn. of Ca₃(PO₄)₂.

CH. ABS. (p)

Spark-spectrographic detection of iron in animal tissues. R. MEYER (Protoplasma, 1934, 22, 34-43).—Appropriate apparatus is described and its application to the examination of pigmented cells in the liver of Salamandra maculosa recorded. A. G. P.

Copper and "inorganic" iron contents of human tissues. S. L. TOMPSETT (Biochem. J., 1935, 29, 480–486).—The Cu of tissues such as liver (I), kidney, brain (II), pancreas (III), and spleen (IV) is completely extracted with CCl₃·CO₂H and is determined directly in the extract with Na diethyldithiocarbamate (V) (A., 1932, 1182). Cu is deter-mined in bone and milk by dissolving the ash in aq. HCl, adding Na citrate, aq. NH₃ until alkaline, and aq. (V), and extracting the complex with Et_2O . The residue after removal of Et_2O is ashed with $HClO_4$ and H₂SO₄ and Cu is determined in the ash. "Inorg." Fe is determined by adding Na4P2O7 to the ground tissue followed by CCl₃·CO₂H. To an aliquot of the filtrate thiolacetic acid and aq. NH₃ are added and the colour is compared with a standard. (I)and (IV) have the greatest, and (II) and (III) the least, [inorg. Fe]. Vertebræ and ribs have fairly high and equal [Fe]. H. D.

Iodine content of oysters. E. J. COULSON (U.S. Dept. Comm., Bur. Fisher. Invest. Rept., 1934, 18, 2-10).—Analytical data are given. Differences in I and Fe contents of samples from various sources may be characteristic of locality of growth.

Сн. Abs. (p)

Biochemistry of invertebrates of the sea. P. S. GALTSOFF (Ecol. Monog., 1934, 4, 481-490).—Distribution of inorg. matter in invertebrates is discussed with special reference to the Zn, I, Cu, and Fe in oysters. CH. ABS. (p)

Iodine content of the human pituitary. G. F. KOPPENHÖFER (Z. ges. exp. Med., 1934, 94, 57– 62).—The pituitary (I) of the normal adult contains I; in males there is slightly > in females. In all conditions leading to cachexia the I content is reduced. In liver disease (cirrhosis and toxic atrophy) and in pregnancy no I is found. No correlation is evident between the I content of (I) and thyroid histology. The thyrotropic hormone of the anterior (I) contains no I. NUTR. ABS. (m)

Salts of young bone. C. M. BURNS and N. HEN-DERSON (J. Physiol., 1934, 82, 7P).—The H_2O content of the cartilaginous epiphyses and ossifying bones of young kittens (1 day to 12 weeks old) decreases with increasing age. From the vals. obtained for Ca, P, and CO₃" of different parts of the bones, bone salts are probably not deposited as a compound of Ca₃(PO₄)₂ and CaCO₃, but rather as a mixture of the two. Furthermore, the composition of the bone gives no indication of the changes occurring under different conditions, unless changes in size and modelling are also considered. NUTR. ABS. (b)

Composition of bones : the femur of the horse. L. SILBERSTEIN (Compt. rend., 1935, 200, 421-

A. L.

423).—The S, P, Ca, Mg, Na, K, Fe, Al, CO₂, Cl, F, and total ash contents of the femur of the horse, dried at 105°, have been determined. The principal inorg. constituent is $[Ca_3(PO_4)_2]_2$, CaCO₃. Small quantities of Ca(OH)₂ and salts of other metals are also present. J. W. S.

"Vital reduction" of silver salts by certain arthropodal organs. H. KOCH (Ann. Soc. Sci. Bruxelles, 1934, 54, B, 346-361).—The deposition occurring on certain organs of arthropoda immersed in 0.05-0.1% aq. AgNO₃ is due to selective ("vital") adsorption of Ag^{*} followed by a reduction which also occurs, but to a smaller extent, in dead tissue.

F. O. H.

Methylene-blue and acid fuchsin for subcutaneous tissue spreads. T. T. BARD (Stain Tech., 1935, 10, 35).—Subcutaneous tissue from the groin of an animal the tissues of which have been stained *in vivo* with trypan-blue is fixed in 5% neutral CH₂O, washed, stained with 1% aq. methyleneblue, washed, counterstained in 1% aq. acid fuchsin, washed, dehydrated in COMe₂, differentiated in EtOH, cleared in xylene, and mounted in Canada balsam. H. W. D.

Trichloroethylene as a solvent in histological technique. R. E. OLTMAN (Stain Tech., 1935, 10, 23-24).—CHCl:CCl₂ is a satisfactory substitute for xylene. H. W. D.

"Glychrogel" mounting solution. R. M. WOTTON and R. L. ZWEMER (Stain Tech., 1935, 10, 21– 22).—0.2 g. of $K_2Cr_2(SO_4)_4$, 24H₂O is dissolved in 30 c.c. of warm H₂O and added to a hot solution of 3 g. of gelatin in 50 c.c. of H₂O with which 20 c.c. of glycerol have been mixed. The liquid is then filtered and stored with a crystal of camphor as preservative. H. W. D.

Effect of diets low or high in chloride on the sodium chloride content of tears. D. MICHAIL and L. RUSU (Compt. rend. Soc. Biol., 1934, 116, 1091—1093).—A diet devoid of Cl' produces sometimes a rise in the NaCl content, sometimes a fall. These results are interpreted in the light of the previous demonstration that the NaCl content of tears depends directly on the tonus of the sympathetic nervous system. A diet containing an excess of Cl' caused a rise in the lachrymal NaCl, which returns to normal in 24 hr. NUTR. ABS. (m)

Excretory function of the saliva. J. K. MAYR (Klin. Woch., 1934, 13, 1270—1272).—The salivary glands (I) take an active part in the excretion of various substances, and the salivary excretion (II) of such substances as Au, Br, Bi, and neosalvarsan coincides with their accumulation in the tissue-fluids, *e.g.*, in the fluid of a blister raised by cantharides. The apparent (II) is due merely to permeation of (I), as of all tissues, with the substance in question.

NUTR. ABS. (m)

Action of snake venoms on surface films. A. HUGHES (Biochem. J., 1935, 29, 437–444).—The venoms (I) of *Pseudechis porphyriacus*, *Denisonia* superba, Notechis scutatus, Naia naia (II), and Vipera elegans decrease the surface potential of lecithin (III) spread on aq. NaCl to vals. rather > those of

lysolecithin; the discrepancy is due to the presence of protein associated with (I). (I) have no effect on films of cholesterol (IV) or of protein, and cause no hydrolysis of tripalmitin, triolein, cerebron, or sphingomyelin. (IV) has no sp. inhibiting power on the reaction. The influence of (I) is inhibited at $p_{\rm H}$ 10.8 and < 4.8; the optimal $p_{\rm H}$ is approx. 7.3. (I) are stable at $p_{\rm H}$ 1 but not at $p_{\rm H}$ 13. Compression of the film of (III) decreases the rate of hydrolysis. At concns. of (I) > 1 p.p.m. the reaction is of zero order and is complete in 5 min., whilst at lower concns. the reaction rate diminishes rapidly with concn. of (I). The heat-stability of (I) depends on the $p_{\rm H}$ of the medium, being least at $p_{\rm H} > 7.0$. There is a direct relation between hæmolytic and lecithinase activities in (I). The (I) of (II) differs from the others examined in that at concns. > 0.5 p.p.m. hydrolysis of (III) is inhibited. H. D.

Bile acid of snake's bile. V. DEULOFEU (Z. physiol. Chem., 1934, 229, 157—158).—The only bile acid isolated from *Crotalus terrificus* and *Bothrops alternata* was cholic acid. A little cholesterol was obtained. J. H. B.

Sulphur content of pancreatic blood and thoracic lymph. III. Sulphur content of thoracic lymph after pancreatectomy. IV. Sulphur content of thoracic lymph after ligature of the pancreas and after injection of secretin in dogs. S. KUMAMI (J. Biochem. Japan, 1934, 20, 431–440, 441–450; cf. A., 1933, 965; 1934, 1379).–III. Pancreatectomy in dogs gradually increases the thoracic lymph-S (I), an effect not appreciably influenced by stimulation of the vagus. Injection of glucose or 10% NaCl causes a slight decrease, the level returning to the normal (*i.e.*, increased) val. within 3–4 hr. The influence of pancreatic activity on (I) is discussed.

IV. With dogs in which the ligatured pancreas has atrophied, injection of glucose or vagal stimulation produces a definite but transient rise in (I); intravenous injection of secretin is without effect. Of the increase in (I), > 50% is probably due to increased secretion of insulin. F. O. H.

Sugar content of human amniotic fluid and the occurrence of fructose. M. ICHIJÔ (Japan J. Med. Sci., II, Biochem., 1934, 2, 359—368).—Reducing fermentable sugars in amniotic fluid decrease towards the time of parturition. Approx. 10% of the total sugar is fructose and the remainder probably glucose. CH. ABS. (p)

Inorganic constituents of gastric juice and their relationships to each other. G. KATSCH, F. BALTZER, and J. BRINCK (Arch. Verdauungskr. 1934, 56, 1-34).—The human gastric glands secrete HCl. There is also a neutral diluting secretion and an alkaline secretion in the stomach.

NUTR. ABS. (m)

Acid-base balance of gastric juice, blood, and urine before and after stimulation of the gastric juice by histamine. L. MARTIN (Bull. Johns Hopkins Hosp., 1934, 55, 57—80).—In normal subjects the changes observed indicate a relative alkalosis as a result of gastric secretion. In achlorhydric
patients, the differences are usually similar in kind but less in degree. NUTR. ABS. (m)

Formation of crop-milk of pigeons, its composition and importance for the growth of squabs. W. DABROWSKA (Mem. Inst. Nat. Polon. econ. rurale Pulawy, 1932, 13, 276—295).—The val. of crop-milk (I) for early growth of squabs is due to its high protein and fat contents. Secretion of (I) depends on sex hormones. CH. ABS. (p).

Calculating composition of milk from fat test alone. J. C. MARQUARDT (Food Ind., 1934, 6, 261).— The formulæ, total solids= $7.627 + 1.346 \times \text{fat}$ and protein content= $1.597 + 0.446 \times \text{fat}$ give results correct to within 0.1%. CH. Abs. (p)

Composition of the milk of an anthropoid ape. H. M. SCHUMACHER (Z. Kinderheilk., 1934, 56, 415).— 100 ml. of milk from a 9-year-old orang-outang which had been lactating for 2 years contained : total solids 11.47, fat 3.5, total protein 1.43, caseinogen 1.06, albumin 0.37, non-protein-N 0.026, sugar 6.02, ash 0.24; Cl 0.09%. NUTR. ABS. (m)

Seasonal variations in the composition of ewe's milk. T. M. B. (Riv. Zootec., 1934, 11, 357—358). The density of the milk and the whey, the cryoscopic const., the lactose and ash contents show max. vals. early in the year, fall steadily until Sept. and Oct. [end of lactation (I)], and rise in Nov. and Dec. at the beginning of the new (I). The fat and total solids vary inversely to the above. The proteins are approx. const. NUTR. ABS. (m)

Relation between milk yield, absolute fat production, and percentage fat content of milk in relation to the coefficient of Ezekiel. J. KŘí-ŽENECKÝ (Věstn. Česk. Akad. Zeměd., 1934, **10**, 6— 8).—Earlier results and conclusions (A., 1934, 678) are confirmed. NUTR. ABS. (m)

Passage of vegetable or animal material into the milk. M. LAGRANGE-FRANCÈS (Le Lait, 1934, 14,811-817).—Lists of plants which give a particular colour or flavour to milk, or facilitate or retard its coagulation, are given. On feeding 100 g. of codliver oil each day to a cow giving 11 litres of milk per day, there was a rise in the % of fat after 15 days and a deeper colour in the butter. A similar effect was obtained by feeding 1.5 kg. of red carrots for one month. NUTR. ABS. (m)

Human milk. XVI. Vitamin-D potency as influenced by supplementing the diet of the mother, during pregnancy and lactation, with cow's milk fortified with a concentrate of codliver oil (test on rachitic infants and rats). D. J. BARNES, F. COPE, H. A. HUNSCHER, and I.G. MACY (J. Nutrition, 1934, 8, 646-657).-Direct administration of vitamin-D to infants gives more effective correction of rickets than indirect methods using breast milk. A. G. P.

Influence of physical properties of milk on its rate of digestion *in vivo*. C. Y. CANNON and D. L. ESPE (Rept. Agric. Res. Iowa Agric. Exp. Sta., 1932, 25-26).—Curd tension (I) of milk (II) was reduced by pasteurisation at 61°, and still more by boiling. Heating at 116° for 15 min. destroys (I). The rates of digestion by calves of pasteurised, boiled, and autoclaved (II) were similar and > that for raw (II), the difference being most marked after the first 6 hr. of digestion. CH. ABS. (p)

Composition of intestinal secretions. E. J. DE BEER, C. G. JOHNSTON, and D. W. WILSON (J. Biol. Chem., 1935, 108, 113—120).—The intestinal juices of unanæsthetised dogs having isolated loops at various levels of the intestine were examined. The rates of secretion in the jejunal and ileal were > in the colonic loops. The concess of Na^{*}, K^{*}, and Ca^{**} were relatively const. in all secretions (I), but [HCO₃'] varied inversely with [Cl'], being higher in ileal and colonic than in the less alkaline jejunal (I). Intravenous injection of NaCl, but not of Na₂CO₃, caused an increase in the conce. of the injected anion in the jejunal and ileal (I). A. E. O.

Composition of mixed duodenal secretions. C. M. WILHELMJ, L. C. HENRICH, and F. C. HILL (Proc. Soc. Exp. Biol. Med., 1934, **31**, 969—973).— The average alkalinity, in dogs, of the pancreatic juice, succus entericus, and bile was 0.04N and [Cl] 307 mg. per 100 c.e. CH. Abs. (p)

Protein and nitrogen content of duodenal juice. J. KRAUSE (Arch. Verdauungskr., 1934, 56, 141— 148).—Coagulable protein is normally absent from the duodenal secretion and the bile, but appears when the liver parenchyma is damaged and when the biliary channels are inflamed. Total N is correspondingly increased. NUTR. ABS. (m)

Method of Terwen for the determination of urobilin. M. ROYER (Compt. rend. Soc. Biol., 1934, 117, 1240—1242).—The method is modified. Urobilin (I) is reduced in absence of air with $FeSO_4$. $(NH_4)_2SO_4$, and NaOH; urobilinogen is then oxidised with I in acid solution and (I) determined by the fluorescence method. R. N. C.

Detection and determination of urinary porphyrin. W. THIEL (Klin. Woch., 1934, 13, 700— 703; Chem. Zentr., 1934, ii, 2109).—The porphyrin is extracted and then detected, or determined colorimetrically, by the red colour developed in HCl solution. H. N. R.

Isolation of glycocyamine from urine. C. J. WEBER (Proc. Soc. Exp. Biol. Med., 1934, 32, 172— 174).—Details of the extraction of glycocyamine (I) from acidified urine with Lloyd's reagent are given. The urine of patients with pseudohypertropic muscular dystrophy (II) contains more (I) than normal urine. (I) is not produced during the isolation process from creatine, creatinine, or glycine and urea. The isolated (I) represents 23% of the substances (III) in the urine giving a positive Sakaguchi reaction. Glycine fed to a patient with (II) increases (III) in the urine by approx. 60%. R. N. C.

Colorimetric determination of the tyrosine index of urinary polypeptides. R. GOIFFON (Bull. Soc. Chim. biol., 1934, 16, 1686—1691).—The urine is heated with aq. $CCl_3 \cdot CO_2H$, the clear liquid being pptd. with the Folin phosphotungstic reagent (I). The washed ppt. is divided into two equal parts, one of which is treated with the Folin–Wu phenol reagent, and the other with (I). The difference in optical density ∞ the tyrosine content. A. L.

alloPregnandiol, an alcohol from urine of pregnancy.—See this vol., 341.

Diet and reaction of urine. L. M. MODEL, M. G. KUZIN, and Z. V. ANSHMID (J. Physiol. U.S.S.R., 1934, 17, 100—111).—The NH₃ content and $p_{\rm H}$ of urine cannot be predicted from the nature of the mineral matter of the diet alone. High-fat or potato diet increases [NH₃] and $p_{\rm H}$ in urine. Vitamin deficiency increases [NH₃]. Increased urinary NH₃ is not necessarily accompanied by greater alkalinity. CH. ABS. (p)

Daily fluctuations in urinary $p_{\rm H}$. F. KENYON, C. A. WILSON, and I. G. MACY (Arch. Pediat., 1934, 51, 490—500).—The vals. for children (I) range from 4.8 to 8.4 (average 6.0) and for women (II) from 5.0 to 7.9. Alkaline trends are seen after meals and definite alkaline tides appear in (I) in the afternoon following the heavy midday meal, and in (II) after breakfast. (I) show extensive individual variations throughout the day, and widely different positions in the $p_{\rm H}$ range from day to day. No correlations are found between urinary $p_{\rm H}$, vol., and sp. gr., emotional excitability, or incidence of dental caries.

NUTR. ABS. (m)

Concentration and dilution of urine. E. FREY (Arch. exp. Path. Pharm., 1935, 177, 134-141).--Direct observation of the injected (with blood or Indian ink suspension) vessels of rabbits' kidney indicates that with diuresis due to aq. Na_2SO_4 the greater pressure is in the glomeruli, whilst with that due to H_2O it is in the capillaries and afferent vessels. Hence the concn. or dilution of the urine is dependent on the direction of blood-flow, a phenomenon in agreement with the arrangement of the renal vessels. F. O. H.

Ultra-filtration in the glomeruli. J. MOSONYI and L. VOITH (Arch. exp. Path. Pharm., 1935, 177, 177-182).—Addition of electrolyte-free horse serumalbumin diminishes the Cl' content (Volhard) and osmotic pressure (I) of 0.85% aq. NaCl. Ultrafiltration of serum gives a residual fluid (II) of increased protein content and diminished [Cl'] and (I). Addition of erythrocytes to (II) increases its (I) and contents of Cl' and protein. The bearing of the results on glomerular filtration is discussed and the conclusions of Wearn and Richards (A., 1926, 195) are criticised. F. O. H.

Determination of magnesium in urine without preliminary removal of calcium. S. I. YOSHI-MATSU and M. HASEGAWA (Tôhoku J. Exp. Med., 1934, 22, 463—466).—Mg is pptd. directly from urine by 8-hydroxyquinoline in hot NH_4Cl-NH_3 solution. The ppt. is removed by centrifuging, washed with NH_4OAc solution, dissolved in HCl, and treated with excess of Na_2CO_3 and the Folin-Denis reagent for phenols. The colour is compared with that of standard solutions. CH. ABS. (p)

Neutral sulphur of urine. Criticism of the iodometric titration of ethyl sulphide. G. MEDES, K. EVANGELIDES, and K. SHINOHARA (Proc. Soc. Exp. Biol. Med., 1934, 32, 156-157).—The amount of I taken up at const. temp. by $\text{Et}_2 S \propto$ the amount of $\text{Et}_2 S$ added, and also [I], [I'], and p_{H} , the removal of I from solution being due probably to its solubility in $\text{Et}_2 S$. Hence the iodometric method for determining $\text{Et}_2 S$ in urine, based on the apparent formation of $\text{Et}_2 SI_2$ (cf. A., 1933, 850), is untrustworthy.

R. N. C.

Determination of digestibility of protein in the mixed excreta of fowls. N. I. CHLEBNIKOV, A. S. SOLUN, and A. K. DANILOVA (Trans. Poultry Res. Inst. Moscow, U.S.S.R., 1934, 1, No. 4, 20–28).— The mixed excreta are boiled with abs. EtOH for $2\frac{1}{4}$ —3 min. and filtered. The urea, creatine, and creatinine pass into the filtrate as oxalates, leaving $(NH_4)_2C_2O_4$, uric acid, and indigestible protein as an insol. residue. NUTR. ABS. (m)

Excretion by the colon. H. SALOMON (Rev. Soc. Argentin. Biol., 1933, 9, 223).—The H_2O -sol. ash [I] in faces (II) represents the portion excreted by the intestine. The insol. portion is derived from unabsorbed food. With diets rich in cellulose there is an increase in (I), lipins, and cholesterol in (II). Absorption bands of carotene and xanthophyll are observed in (II) after 9 days of diet lacking these pigments. CH. ABS. (p)

Physico-chemical character of the fæces of normal infants and children with special reference to the character of the fæces on apple and banana diet. T. BAUMANN (Monatsschr. Kinderheilk., 1934, 60, 81-135).-The p_H vals. of 24-hr. samples of fæces of infants and children on various diets were : meconium (I), 6.0-6.4; breast milk (II), 4.86-6.1; cow's milk (III), 5.15-8.45; buttermilk (IV), 7.8-8.35; mixed diet (V), 6.4-8.15; apple diet (VI), 5.3-7.95; banana diet (VII), 7.5-8.25. There was no relationship between the $p_{\rm H}$ and the Ca or $PO_4^{\prime\prime\prime}$ concess. or ratios. The $p_{\rm H}$ of the deposit was generally > that of the supernatant fluid, the difference being attributed to insol. PO_4''' . The content of free non-volatile org. acids, which were more abundant in (II), (VI), and (VII) faces than in the others, had a marked influence on the $p_{\rm H}$. The H_2O and volatile acid contents of the fæces or the reaction and Ca and PO₄" of the diet bore no const. relation to the p_{π} . Ca and $PO_4^{\prime\prime\prime}$ were high and their ratios low in (II), (VI), and (VII) faces and vice versa in the others. The buffering powers of the faces were in the order : (III), (IV), and (V)> (II) > (I), (VI), and (VII). Buffering power was (II) > (I), (VI), and (VII). Buffering power was not related to the $p_{\rm H}$ or Ca : PO₄^{'''} ratio of the faces. Buffering depended on the total Ca and PO₄^{'''} of the fæces (and consequently of the diet) and on the free org. acids and their salts in the fæces. According to the reaction fæcal Ca exists as $Ca_3(PO_4)_2$, CaHPO₁, or $Ca(H_2PO_4)_2$. NUTR. ABS. (b)

Colloid chemistry, homœopathy, and medicine. A. KUHN (Chem.-Ztg., 1935, 59, 85-86, 106-108).—A review.

Role of copper in hæmoglobin regeneration. H. L. KEIL and V. E. NELSON (Proc. Iowa Acad. Sci., 1932, 39, 163—167).—Among salts of a no. of metals examined only those of Cu induced regeneration of hæmoglobin (I) in anæmic rats. FeCl₃ added to market milk (II) increased (I) owing to the Cu content of (II). The effect of $FeCl_3$ in this case was increased by simultaneous additions of Mn, As, and Ni. CH. ABS. (p)

Protective action of copper and spleen extract in Bartonella anæmia in rats. G. PANDO (Z. Immunität., 1934, 82, 63—65; Chem. Zentr., 1934, ii, 1152).—Neither injection of $Cu(OAc)_2$ and feeding with $CuSO_4$ nor treatment with lipins extracted from the spleen has any effect on Bartonella anæmia. R. N. C.

Significance of the serum-iron in anæmia. J. F. McINTOSH (J. Clin. Invest., 1934, 13, 714).— In dogs after bleeding the serum-Fe (I) falls and remains low until hæmoglobin (II) regeneration is complete. In cases of hypochromic anæmia during Fe medication (II) tends to rise first, (I) later; narrow fluctuations in (II) are accompanied by wide changes in (I). In an untreated case of pernicious anæmia (I) was high; during reticulocytosis produced by liver extract it fell and rose gradually as treatment was continued. (I) appears to represent a balance between (II) synthesis and Fe available from food and Fe depôts. NUTR. ABS. (m)

Characteristics of the synovial fluid in various types of arthritis. C. S. KEEFER, W. K. MYERS, and W. F. HOLMES, jun. (Arch. Int. Med., 1934, 54, 872-887).—The corresponding bacteria could be cultured from the synovial fluid (I) from cases of gonococcal, hæmolytic streptococcal, and tuberculous arthritis (II), (I) from other types of (II) being sterile. Gonococcus complement fixation and Wassermann tests agreed with those given by the blood. The total cell count is increased in all types of (II), being highest for infected (I). The non-protein-N content is the same in infected or sterile (I) and in blood. The total protein is > normal. C. G. A.

Characteristics of synovial fluid in gonococcal arthritis. W. K. MYERS, C. S. KEEFER, and W. F. HOLMES (J. Clin. Invest., 1934, 13, 767-776).--Total protein and cell contents of the fluid characterise it as an exudate. The non-protein-N was identical with that of blood (I) and the sugar varied with the level of (I)-sugar and nos. of leucocytes and bacteria. CH. ABS. (p)

Glutathione content of the blood in chronic arthritis and rheumatoid conditions. B. D. SENTURIA (J. Lab. Clin. Med., 1934, 19, 1151— 1155).—Vals. are not appreciably different from normal. CH. ABS. (p)

(A) Technique for showing the presence of a principle acting on the adrenal cortex in urine of cancer. (B) Gonadostimulin in urine of cancer. M. ARON (Compt. rend. Soc. Biol., 1935, 118, 85—88, 88—90; cf. A., 1934, 206).—(A) Examination of the adrenal cortex of rabbits before and after injection of the animals with the COMe₂ ppt. (I) from urine of cancer indicates that (I) contains a principle which causes a large excretion of lipins.

(B) (I) causes, on injection into rabbits, a dilatation of the ovarian follicles. A. L.

Spontaneous precipitation of cholesterol in a [cancerous] plasma. C. SANNIE and R. TRUHAUT

(Compt. rend. Soc. Biol., 1934, 117, 1188—1190).— The cryst. substance pptd. on keeping from a sample of plasma from a case of ovarian cancer had the solubility and colour reactions of cholesterol (I). The (I) of the entire sample was 4.2 g. per litre. In later samples from the same subject, pptn. did not occur when (I) was 3.1 and 2.0 g., but an unidentified ppt. was obtained in a sample with 4.5 g. per litre. Analysis of the sample with 3.1 g. showed that the (I)-solubilisers (bile salts, soaps, etc.) were more or less increased, the (I)/lipin ratio being decreased. R. N. C.

Distribution of arginine in Jensen rat sarcoma. E. ANNAU and B. Gozsv (Z. Krebsforsch., 1934, 40, 572-576; Chem. Zentr., 1934, ii, 1804).—The average arginine (I) content of the sarcoma is 0.0385 mg. of extracted (I) per g. of fresh tissue, and 4.46% of the total (I), referred to the dried substance. Under the same conditions, rat liver contains 0.00—0.0047 mg. of extracted (I) per g. of tissue, and 3.16% of total (I). The high (I) content of the sarcoma is due to the presence of a histone containing 13.94% (I) and 18.38% N. R. N. C.

Malignant growth in relation to enzyme activity. M. COPISAROW (Protoplasma, 1934, 22, 137—144).—A review. A. G. P.

Typical chemical change of plasma-albumins in carcinoma. P. F. MERZBACH (Klin. Woch., 11, 1984—1985; Chem. Zentr., 1934, ii, 1491).— NH₂-N is high in patients with malignant tumours; in normal persons it is never > 8% of the total N. R. N. C.

Cyanosis from compressions of the mediastinum. F. C. ARRILAGA and A. C. TAQUINI (Compt. rend. Soc. Biol., 1934, 117, 1238—1239).—In three patients with mediastinal tumours, compression of the vena cava, and cyanosis there was an intense alveolar hyperventilation, the CO_2 of the alveolar air being low and the O_2 high. The arterial blood of the cyanosed area was perfectly oxygenated, the hæmoglobin being 94% saturated. The venous blood showed very low O_2 and high CO_2 , and the alkaline reserve was low. Cyanosis was due to the slowing-down of the local circulation, with consequent increased yield of O_2 to the tissues, and the passage into the tissues of an O_2 -poor capillary blood.

R. N. C.

Effect of vitamin-C on the growth of experimental mouse cancer. E. FODOR and S. KUNOS (Z. Krebsforsch., 1934, 40, 567—571; Chem. Zentr., 1934, ii, 1801).—Subcutaneous administration of ascorbic acid (I) increases very considerably the rate of growth (II) of Ehrlich mouse cancer; the increase is greater when (I) is given with the food. (II) increases ∞ the size of the tumour. R. N. C.

Effect of heavy water on viability of mouse sarcoma and rat carcinoma. K. SUGIURA and L. C. CHESLEY (Proc. Soc. Exp. Biol. Med., 1934, 31, 1108—1111).—In both cases proliferation was unaffected by immersion in 94% H₂O (I) containing isotonic amounts of Locke-Ringer solution. Destruction of growth capacity in hypotonic solution was influenced by (I). CH. ABS. (p) Effect of deuterium oxide on rat sarcoma R-39. C. E. REA and S. YUSTER (Proc. Soc. Exp. Biol. Med., 1934, 31, 1058—1060).—Multiple injections of $H_2^{\circ}O$ in the neighbourhood of the tumour stimulated the growth in some cases.

Сн. Авз. (р)

Carcinogenicity of chrysene and oleic acid. A. C. BOTTOMLEY and C. C. TWORT (Amer. J. Cancer, 1934, 21, 781—788).—The carcinogenic action (I) of chrysene (III) is increased by dissolution in oleic acid (II). Solutions in C_6H_6 have no (I), but cause tumours if small amounts of (II) are added. Solutions in lard are inactive. The (I) of (III) and of a synthetic pinene tar increases with the concn. used. The action resembles that of 1:2:5:6-dibenzanthracene. CH. ABS. (p)

Properties of the causative agent of a chicken tumour. IX. Effects of aqueous extracts of chicken tumour on yeast-nucleic acid. D. A. MACFAYDEN (J. Exp. Med., 1934, 60, 361-373).--Extracts contain a polynucleotidase (I) and a phosphatase, distinguished by reactions to H_2 , p_H , and rates of activity. (I) is adsorbed by Al(OH)₃.

CH. ABS. (p)

Occurrence of calcareous disease. I. Disease caused by fodder containing calcium compounds. T. SAIKI and K. FUJIMOTO (J. Agric. Chem. Soc. Japan, 1934, 10, 619-620).—Disease appeared in rats receiving a complete diet with 3.9% Ca as lactate, carbonate, or as calcite, but not in those receiving Ca phosphate. CH. ABS. (p)

Biochemical aspect of dental caries. C. T. GROVE and C. J. GROVE (Dental Cosmos, 1934, 76, 1029—1036).—Salivary mucin and dental plaques are sol. in NH_3 , and high salivary NH_3 (I) is a factor in immunity to caries. An alkaline diet influences caries by increasing (I). CH. ABS. (p)

Susceptibility of rats to dental caries. IV. Etiology of fissure caries. T. ROSEBURY, M. KARSHAN, and G. FOLEY (J. Amer. Dental Assoc., 1934, 21, 1599—1611).—The caries (I)-inducing ingredient of deficient rations is the cereal particle and not the sp. carbohydrate. Addition of Ca, P, and cod-liver oil to such diets did not prevent (I). Incidence of (I) was unrelated to the degree of calcification of teeth and bones or to the blood-Ca or -P.

Сн. Авз. (р)

Factors predisposing to immunity to dental caries. Vitamins. J. D. KING (Brit. Dental J., 1934, 57, 233-239).—A review. CH. ABS. (p)

Diet and its relation to dental disease. J. LENNOX (J. Amer. Dental Assoc., 1933, 20, 2203— 2210).—Caries is induced by P-deficient diets. Changes occur in saliva whereby its inhibitory action on activities of *Lactobacilli* is lowered and P is leached from the crowns of teeth. CH. ABS. (p)

Diet and nerve supply to dental tissues. M. MELLANBY and J. D. KING (Brit. Dental J., 1934, 56, 538-549).—Vitamin-A is an important factor in the maintenance of healthy tissues. CH. ABS. (p)

Residual nitrogen and its fractions in the liver in experimental diabetes. H. ELIAS, H. KAUNITZ, and R. LAUB (Z. ges. exp. Med., 1934, 94, 182–198).-- In dogs starved for 4 days the residual N of the liver was reduced. After total pancreatectomy the residual N and urea- and polypeptide-N were markedly increased, whilst the NH_2 -N was reduced. After partial pancreatectomy the vals. approached those found in normal and fasting animals. When insulin was given to dogs after complete pancreatectomy the vals, were within normal limits. NUTR. ABS. (b)

Fasting blood-carotene level in normal and diabetic individuals. H. BRANDALEONE and E. P. RALLI (Proc. Soc. Exp. Biol. Med., 1934, 32, 200–201).—Blood-carotene in diabetics is raised > 100%, and cholesterol approx. 30%, > normal. R. N. C.

Blood-cholesterol in diabetic children. P. NOBÉCOURT and P. DUCAS (Arch. Méd. Enfants, 1934, 37, 522—526).—There is no apparent correlation between the cholesterol content of the blood and level of blood-sugar, carbohydrate tolerance, or general health. The hypercholesterolæmia indicates a disturbance of lipin metabolism probably due to the diabetes. NUTR. ABS. (m)

Pathophysiology of fat metabolism in diabetes. S. LEITES, E. SORKIN, and A. AGALETZKAJA (Klin. Woch., 1934, 13, 1272—1276).—In man, the character of the changes of blood-neutral fat (I) and -ketones (II) depends on the amount of fat ingested and to a greater extent on the initial level of (I) and (II). In diabetes this autoregulation is disturbed, the initial, max., and min. lipæmic and ketonæmic thresholds being increased. The degree of disturbance measures the severity of the discase. When (II) val. exceeds the initial threshold, administration of butter has an antiketogenic effect. NUTR. ABS. (m)

Lipins of the skin in experimental diabetes. V. J. MATTHEWS, J. K. NEWTON, and W. R. BLOOR (J. Biol. Chem., 1935, 108, 145—151).—Experimental diabetes in the cat results in a mobilisation of neutral fat from the skin and muscles to the liver, the cholesterol (I) content of which decreases, and an increase in the phospholipin and (I) content of the skin.

A. E. O.

Synthetic production of β -hydroxybutyric and acetoacetic acids in fasting and in diabetes. J. MONGUIO (Klin. Woch., 1934, 13, 1116—1120).— Intravenous injection of 8 g. of NaOAc is followed, in fasting dogs, by a rise in the ketones of the blood. A more marked rise is produced by simultaneous administration of adrenaline. The same holds for human subjects on a diet poor in carbohydrate. After oral administration of 25 g. of NaOAc the ketone content of the urine of human diabetics increases considerably. AcOH may be a source of ketones when the liver contains little or no glycogen.

NUTR. ABS. (m)

Factors determining the effect of exercise on blood-sugar in the diabetic. R. RICHARDSON (J. Clin. Invest., 1934, 13, 699).—When the fasting blood-sugar (I) is < 175 mg. per 100 ml. it is reduced during exercise; when between 175 and 300 mg. it is unchanged, when > 300 mg. it is increased. Intravenous injection of 0·1 unit of insulin (II) causes a fall in (I) during exercise in the last group. Exercise after (II) or food is accompanied by a fall in (I) in patients in whom it is unchanged or increased during exercise in the fasting state. In diabetics this effect of an intravenous injection of 0.5 unit of (II) lasts for half an hr. NUTR. ABS. (m)

Glucose excretion after exercise in experimental diabetes. W. H. CHAMBERS, H. E. HIM-WICH, and M. E. KENNARD (J. Biol. Chem., 1934, 108, 217—225).—No increase in urinary glucose (I) or N occurs during exercise. In recovery (I) and N excretion together increase and the (I) rise is succeeded by a fall. A similar rise and fall in D: N ratio is found after injecting adrenaline. The source of the extra (I) may be muscle-glycogen. H. T.

Physiology of the surviving mammalian heart. VIII. Consumption of sugars by surviving hearts of diabetic cats. R. VON POMOTHY (Biochem. Z., 1935, 275, 448—454; cf. A., 1933, 630).— The glucose consumption by the hearts is < that of normal hearts (I), whilst the mannose, fructose, and glactose consumptions are about half those of (I), the extent of consumption decreasing as the severity of the disease increases. Lactose and maltose are not consumed. W. McC.

Influence of the pancreas and the liver on the glucose tolerance curve. S. SOSKIN, M. D. ALL-WEISS, and O. J. COHN (Amer. J. Physiol., 1934, 109, 155-165).—The liver is essential to the normal curve. The pancreas is not essential if blood (I) contains sufficient insulin to maintain (I)-sugar const. CH. ABS. (p)

Physiological disturbances during experimental diphtheritic intoxication. IV. Bloodelectrolyte and -hæmoglobin concentrations. D. C. DARROW, H. YANNET, and M. K. CAREY (J. Clin. Invest., 1934, 13, 553-560).—After injection of diphtheria toxin rabbits' blood showed increased hæmoglobin and serum-inorg. P and decreased Na and Cl' conens. CH. ABS. (p)

Pathogenesis of renal dwarfism. A. LOESCHKE (Jahrb. Kinderheilk., 1934, 143, 11—35).—The growth deficiency is not ∞ the impairment in renal function (I) and appears before (I) is at all marked. After administration of Na₂HPO₄ the blood-P reaches a level > in normal or rachitic children. The rise in blood-sugar after ingestion of glucose or subcutaneous injection of adrenaline is also greater in the renal dwarfs; this is attributed to acidosis. Urinary diastase is not increased. Dwarfism and renal changes are manifestations of a general congenital abnormality, and the development of rickets in renal dwarfs is probably due to lack of Ca and chronic acidosis. NUTR. ABS. (m)

Treatment of muscular dystrophy with glycine. D. P. CUTHBERTSON and T. K. MACLACHLAN (Quart. J. Med. [N.S.], 1934, 3, 411–435).—High muscular incapacity is associated with high creatinuria (I). Administration of glycine increased (I) for a period, with a subsequent return to normal or < normal levels. CH. ABS. (p)

Glycine deficiency and glycine therapy of progressive muscular dystrophy. W. LINNEWEH and F. LINNEWEH (Deut. Arch. klin. Med., 1934, 176, 526-531).—In muscular dystrophy (2 cases) there was no deficiency in glycine (I) stores or power to produce (I). The beneficial action of (I) is confirmed; its mode of action is not clear, but it is not a substitution therapy. When large amounts of BzOH were given to a patient on a diet poor in (I) there was no diminution in the excretion of creatine (II); hence direct formation of (II) from (I) seems not to occur. NUTR. ABS. (m)

Effect of gelatin feeding on cases of pseudohypertrophic progressive muscular dystrophy. P. KISNER, E. S. WEST, and J. A. KEY (Proc. Soc. Exp. Biol. Med., 1934, 32, 143—145).—The cases were temporarily improved by gelatin (I) feeding. The creatinine coeffs. were reduced during the feeding period, creatine excretion (II) being slightly increased. Feeding with glycine (III) increased (II), but the increased val. suggested that other constituents of (I) besides (III) were responsible. Ephedrine did not affect (II) excretion. (I) and (III) appeared to afford similar degrees of stimulation to the cases. R. N. C.

Creatine metabolism in muscle disease. A. T. MILHORAT and H. G. WOLFF (J. Clin. Invest., 1934, 13, 723).—Patients with muscle disease are classified as (1) those with marked creatinuria (I) and deficient creatine tolerance (II) exaggerated by administration of glycine, and (2) those with slight (I) and only slightly deficient (II) not exaggerated by glycine. The second group may have advanced atrophy in certain muscle groups. Creatine output and (II) appear to be an expression of the total mass of improperly functioning muscle and not an index of the amount of atrophied muscle or of the primary site of the disease. NUTR. ABS. (m)

Photosensitisation of animals in S. Africa. VII. Nature of the photosensitising agent in Geeldikkop. C. RIMINGTON and J. I. QUIN (Onderstepoort J. Vet. Sci., 1934, 3, 137—157).—The pigment responsible for the photosensitivity in Geeldikkop (a naturally occurring disease among sheep in S. Africa) and in experimental icterus produced in sheep by ligature of the bile duct is phylloerythrin (I). In a bile-fistula sheep on a chlorophyll-free diet there was no evidence of photosensitivity and (I) was not found in the bile, serum, or fæces. Probably (I) is produced in the forestomachs. NUTR. ABS. (m)

Respiratory exchange during exercise in heart disease. III. M. CAMPBELL (Quart. J. Med. [N.S.], 1934, 3, 369—380).—The CO_2 in expired air was < normal but O_2 utilisation was not much altered.

Сн. Авз. (p)

Iodine and cholesterol content of the blood as related to essential hypertension. M. BURGER and W. MOBIUS (Klin. Woch., 1934, 13, 1349— 1352).—Blood-I (I) was determined by Pfeiffer's wet ashing method, which gave results 3-4 times > that of Fellenberg. (I) varies with age; from the 5th decade it rises to reach a max. in the 8th decade. Essential hypertensive subjects, without signs of renal failure, exhibited, in the main, an increased (I), and many had an increased basal metabolic rate (II). There was no general correspondence between (I), (II), and blood-pressure. Blood-cholesterol was not increased; the occasional coincidence of high cholesterol with hypertension (III) is not of significance in the pathogenesis of essential (III). There is probably a causal connexion between increased thyroid activity and essential (III). NUTR. ABS. (b)

Glycogenetic function of the liver in experimental hyperthyroidism. M. V. BUELL and M. B. STRAUSS (Bull. Johns Hopkins Hosp., 1934, 55, 220-228).—In severe experimental hyperthyroidism in rats (produced by repeated intramuscular injections of thyroxine) oral administration of *d*-lactic acid (I) produces, as compared with normal lactate-fed controls, a higher blood-(I) and a lower liver-glycogen. The blood-sugar rise is the same. This supports the view that in such hyperthyroidism gluconeogenesis from (I) is retarded, rather than that glycogenolysis is accelerated. NUTR. ABS. (*b*)

Basal metabolism and specific dynamic action in cardiac disease and hyperthyroidism. A. BERLAND and T. DONSKOWA (Arch. Mal. Cœur, 1934, 27, 494—516).—In 31 cases of cardiovascular disease the basal metabolic rate (I) was > normal in 22 and < normal in 9 cases (Krogh's method). The increase in (I) is attributed to a disturbance in the resynthesis of glycogen from lactic acid, an anaërobic process which may be affected by the low O₂ tension and possibly acidosis. In these patients an absence of sp. dynamic action (II) was attributed to disturbance of cell metabolism. (II) is high in hyperthyroidism. NUTR. ABS. (b)

Bile in thyroid diseases. Bile-stone formation. L. M. GOLBER (Arch. exp. Path. Pharm., 1935, 177, 159—166).—Increase of thyroid gland activity (I) (e.g., Basedow's disease) increases the cholesterol (II) content of the liver-bile and diminishes the bile acid (III) level of the bile in the gall-bladder (IV). The ratio (III)/(II) thus falls and whilst it rises with decreased (I), the concn. function of (IV) is depressed with both types. The bearing of the data on bile-stone formation is discussed. F. O. H.

Importance of relative iodine deficiencies in certain forms of goitre. D. MARINE (J. Amer. Dietetic Assoc., 1934, 9, 1-5).—Goitre produced by the action of org. cyanides in cabbage on thyroid secretion is prevented by excess of I and by a factor occurring in fruits, possibly a hexuronic acid.

CH. ABS. (p)

Calcium metabolism in hyperparathyroidism. H. C. OLSEN (Diss., Nord. Insulinlab. Copenhagen, 1934, 195 pp.).—In the white rat urinary Ca increases, in general, with the degree of diuresis and is also greater whon the previous diet is meat, containing 5—6 mg. of Ca per 100 g., than after a prediet of cereals and milk products, with 770 mg. of Ca per 100 g. Administration of paroidin (I) (Parke Davis) causes an increased output of Ca with corresponding hypercalcæmia and increased Ca content of liver and kidneys. This extra Ca possibly comes from the bones. (I) administration or hyperparathyroidism fixes the Ca in the blood, so rendering it useless to the organism and causing the liberation of more and more Ca to preserve the ratio mobile Ca : fixed Ca.

NUTR. ABS. (m)

Effect of dietary deficiency or infestation of chickens with the nematode, *Heterakis gallina*. P. A. CLAPHAM (J. Helminthol., 1934, 12, 123—126).— Deficiency of Ca and P in the diet induces lowered resistance to infestation. CH. ABS. (p)

Resistance of chickens to parasitism. J. E. ACKERT (Kansas Agric. Exp. Sta. 6th Biennial Rept., 1932, 112—113).—Resistance to infection by the nematode A. lineata was increased by vitamin-A (cod-liver oil) and -B (yeast) and by feeding of skim milk. CH. ABS. (p)

Prophylactic effect of vitamin-A and -D on prevention of common cold and influenza. H. H. BEARD (J. Amer. Dietetic Assoc., 1934, 10, 193-199).—Daily administration of cod-liver oil reduced the no. and severity of colds, but did not affect influenza. CH. ABS. (p)

Progressive obstructive jaundice. Changes in certain elements of the blood and their relation to coagulation. J. L. CARR and F. S. FOOTE (Arch. Surgery, 1934, 29, 277—296).—In obstructive jaundice clots are abnormal owing to accumulation of incompletely metabolised products of proteins in blood [S compounds, probably cysteine (I) or related mercaptans]. PhBr reduces the amount of (I) in circulation and reduces bleeding. CH. ABS. (p)

Hydrogen-ion concentration of bile in relation to gallstone formation. H. BRONNER (Arch. klin. Chirurg., 1934, 180, 597—599).—In man, the reaction of the bile in hepatic ducts depends on the nature of the diet. Mainly vegetable food makes the bile alkaline, mainly animal food makes the bile acid. In an acid bile (I) the Ca content is high, whilst in an alkaline bile (II) the cholesterol (III), bile salt, and fatty acid contents are high. In mice, by alteration of the diet, it is possible to ppt. in the bile either Ca salts or (III), the Ca salts being pptd. in the (II), the (III) salts in (I). Thus sudden changes in the diet may lead to the typical gallstone with alternating concentric rings of Ca salts and (III).

NUTR. ABS. (b)

Fibrinolytic activity of hæmolytic streptococci on blood of cases of recurrent tropical lymphangitis. P. MORALES-OTERO and A. POM-ALES-LEBRON (Proc. Soc. Exp. Biol. Med., 1934, 32, 110—113).—Vals. are given for the fibrinolytic activity (I) of 33 strains of *Str. hæmolyticus* isolated from different conditions. The plasma clot derived from cases of recurrent tropical lymphangitis apparently develops a definite resistance to (I). R. N. C.

Phosphatides. X. Nature of the phosphatides of the spleen in Niemann-Pick disease. E. KLENK (Z. physiol. Chem., 1934, 229, 151-156; cf. A., 1934, 1245).—The chief phosphatide constituent of a Niemann-Pick spleen was sphingomyelin (I). Lecithin and kephalin were also present. The fatty acids obtained from hydrolysis of (I) were lignoceric, and probably palmitic, stearic, and nervonic acids.

J. H. B.

Character of the gaseous distension in mechanical obstruction of the small intestine. J. S. HIBBARD and O. W. WANGENSTEEN (Proc. Soc. Exp. Biol. Med., 1934, 31, 1063-1066).—Following obstruction near the ilio-cæcal junction, gas accumulations comprised N₂ 70%, CO₂ 6—12%, O₂ 10—12%, CH₄, H₂, NH₃, NH₂Me, in small amounts, and in some cases H₂S 1—14%, increasing after death. Of the total, 68% was swallowed air; of the remainder, 70% diffused from blood, and 30% was due to decomp. of food. CH. ABS. (p)

Chemical and physical relation between bloodserum and body-fluids. I. Nature of ædema fluids and evidence regarding the mechanism of ædema formation. D. R. GILLIGAN, M. C. VOLK, and H. L. BLUMGART (J. Clin. Invest., 1934, 13, 365—381).—Differences in concn. of electrolytes are governed by differences in protein concn. Fluid is a simple dialysate in equilibrium with serum in accordance with the Donnan law. CH. ABS. (p)

Effect of posture (standing) on serum-protein concentration and colloid osmotic pressure of blood from the foot in relation to formation of cedema. J. B. YOUMANS, H. S. WELLS, D. DONLEY, D. G. MILLER, and H. FRANK (J. Clin. Invest., 1934, 13, 447-450).—Standing increased serum-protein and colloid osmotic pressure. Albumin and globulin were equally affected. CH. ABS. (p)

Differentiation of the flocculation and "superflocculation" in the serum of paludism. F. TRENSZ (Compt. rend. Soc. Biol., 1935, 118, 11–12).— Henry's reaction for paludism should be carried out in 0.3% aq. NH₄Cl in order to prevent the "superflocculation" caused by H₂O alone. A. L.

Acid-base equilibrium and acidity of urine in peptic ulcer. F. B. LEWIN and A. M. BALZWINIK (Arch. Verdauungskr., 1934, 56, 81–93).—In patients [I] with ulceration, the urine during starvation is usually more acid, and the titratable acidity and urinary NH_3 are usually greater, than in the patients (II) with non-ulcerative gastro-intestinal affections. Intravenous injection of 50 ml. of 4% aq. Na₂CO₃ rarely produces alkaline urine in (I), whilst in (II) alkalinisation is the rule. NUTR. ABS. (m)

Porphyrin excretion in normal pregnancy and its relationship to blood-pigment metabolism. C. CARRIE and L. HEROLD (Arch. Gynäkol., 1934, 158, 54-59).—The average daily excretion of porphyrin (I) in normal pregnancy fell from about 20 to about 10×10^{-6} g. at the end of pregnancy, with a rapid rise to normal after parturition. Since the rate of red cell destruction is increased towards the end of pregnancy, the fall of (I) excretion may indicate passage of the liberated (I) into the foctus for use in foctal blood formation. NUTR. ABS. (b)

Sugar and calcium partition in blood of normal and diseased animals. A. C. GONZAGA (Univ. Philippines Nat. Appl. Sci. Bull., 1934, 1, No. 4, 1-40).—Methods for determining sugar partition are compared. *Post-partum* vals. for total sugars increase during the first day, decline on the second, and increase again on the third. Animals in late pregnancy show increased diffusible (I) and non-diffusible Ca (II) followed by a return to normal after parturition. Hyperglyczemia during milk-fever results from increased true sugar only. Hypocalcæmia is due to reduction of (I) and (II), (I) undergoing the greater change. CH. ABS. (p)

Blood-ammonia in eclampsia. J. B. LLUSIA (Zentr. Gynakol., 1934, 58, 1754—1771).—The slightly raised blood- NH_3 (I) of pregnancy is further increased in pre-eclampsia (II), still more so in eclampsia (III), and reaches its max. val. simultaneously with the onset of fits; the acidosis of pregnancy is similarly increased in (III). NH_3 precursors in the blood are diminished in (II) and (III), their place being taken almost entirely by free NH_3 . Eclamptic fits may be related to the high (I), but not so other symptoms. NUTR. ABS. (m)

Ketone content of the blood in labour and preeclamptic toxæmia. D. F. ANDERSON (J. Obstetr. Gynæcol. Brit. Empire, 1934, 41, 261—266).— Blood-COMe₂ and -CH₂Ac·CO₂H vals. in cases of normal labour and cases of pre-eclamptic toxæmia were $1\cdot 1$ — $3\cdot 2$ mg. per 100 ml. in the former and $1\cdot 1$ — $5\cdot 8$ in the latter group, all > normal. NUTR. ABS. (p)

Variations in serum-magnesium and in partition of serum-calcium in normal parturition and in milk-fever. W. GODDEN and J. DUCK-WORTH (Biochem. J., 1935, 29, 445-455).—In two out of three cows calving normally, raised serum-Mg (I) was observed at parturition (II); in milk-fever (III) a rise in (I) occurred at (II) which persisted for the duration of (III). The fall of serum-Ca following (II) was steeper in those animals in which (III) subsequently developed, corresponding with a greater depression in the Ca complexes adsorbable and nonadsorbable on BaSO₄. H. D.

Surface tension of urine during the menstrual cycle. C. F. SELOUS and P. W. PERRYMAN (Nature, 1935, 135, 233-234).--Variations in γ of urine during the menstrual cycle are recorded. The curve shows a min. during menstruation and a max. at the probable time of ovulation. L. S. T.

Sucrose in the urine in a case of pancreatic disease. T. BARANOWSKI and W. MOZOLOWSKI (Klin. Woch., 1934, 13, 955–956; Chem. Zentr., 1934, ii, 1480).—Sucrose has been isolated and identified in the urine in a case of pancreatic lithiasis. R. N. C.

Physico-chemical changes in the blood following pneumothorax and section of the phrenic nerve. A. RISI (Arch. exp. Path. Pharm., 1935, 177, 119—126).—Following hypotensive pneumothorax (I) in dogs, the osmotic pressure (II) of blood and serum is diminished for approx. 48 hr., a min. val. occurring $\frac{1}{2}$ hr. after (I). Unilateral phrenectomy (III) has the opposite effect. With (I), but not (III), the alkaline reserve (IV) and $p_{\rm H}$ of the blood are increased. The combined effect of (I) and (III) in normal or pregnant dogs is an increase in (IV), (II) being unchanged. F. O. H.

State of calcium in the blood of rickets. E. L. COMPERE, F. C. MCLEAN, and A. B. HASTINGS (J. Clin. Invest., 1934, 13, 687—688).—Concns. of total Ca and ionic Ca (determined and calc.) were within or very near the normal range in children with rickets (I). No correlation was found with the severity of the (I) as judged by the inorg. P concn. of the serum or by the clinical evidence. NUTR. ABS. (b)

Glycolysis in the tissues of rachitic animals. G. POPOVICIU and G. BENETATO (Compt. rend. Soc. Biol., 1934, 116, 1098-1100).-Anaërobic glycolysis is much diminished in the surviving kidney and liver of rachitic, as compared with normal, rats.

NUTR. ABS. (m)

Viosterol in the prophylaxis of rickets in premature infants. Clinical, chemical, and rontgenologic observations. L. T. DAVIDSON and K. K. MERITT (Amer. J. Dis. Children, 1934, 48, 281-308).-The Ca and inorg. P of the serum are substantially the same for full-term and premature infants, and do not vary in the first 5 months even in severe clinical and rontgenologic rickets. Low vals. for Ca occur in osteoporosis. In doses of 20 drops daily viosterol, 250D, is inadequate for protection.

CII. ABS. (p)Experimental scurvy. XXIII. Blood-ketones in guinea-pigs fed on a vitamin-C-free diet. J. SHIMADA (J. Biochem. Japan, 1934, 20, 395-404).-The blood-COMe₂ of guinea-pigs (normal average, 0.0018%) tends to increase during scurvy. The effect is more marked with the CH₂Ac·CO₂H and, to an even greater extent, with the β -hydroxy-butyric acid levels (normal averages, 0.0113 and 0.0073%, respectively). Inanition finally causes a decrease in the total blood-ketones, the disturbance in which is not associated with a disturbance of the carbohydrate metabolism. F. O. H.

Experimental scurvy in relation to the character of the basal diet. M. F. GLAZUNOV and K. L. POVOLOTZKAYA (Bull. Appl. Bot. Genetics, U.S.S.R. [Suppl.], 1934, 67, 217-224).-The Bezssonov diet even with addition of orange juice does not prevent scurvy in guinea-pigs. Addition of Сн. Abs. (p) autoclaved hay affords protection.

Experimental silicosis: quartz, sericite, and irritating gases. W. D. Robson, D. A. IRWIN, and E. J. KING (Canad. Med. Assoc. J., 1934, 31, 237-245).-Sericite did not increase irritation by N₂O and SO₂, but SiO₂ dust induced pulmonary silicosis in 3 weeks. CII. ABS. (p)

Detection of mineral particles in sputum in silicosis. H. E. BURKE (J. Ind. Hygiene, 1935, 17, 27-29).-Sputum is conc. by evaporation, and treated with aqua regia. Solid matter is removed by centrifuging and incinerated on a slide, leaving any SiO₂ in the form of birefringent particles. SiO₂ was present in sputum from silicosis. J. S. A.

Production of adrenaline in shock, and its role in defensive vaso-constriction against hypotension. F. D. ALSINA (Compt. rend. Soc. Biol., 1934, 117, 1251-1252).-Increased adrenaline secretion (I) occurs during severe hæmorrhage. In continued bleeding, (I) increases progressively until death. R. N. C.

Magnesium in calves. I. Tetany produced by ration of milk or milk with various supplements. C. W. DUNCAN, C. F. HUFFMAN, and C. S. ROBINSON (J. Biol. Chem., 1935, 108, 35-44).-Calves fed on a whole-milk diet with a Mg intake of 8-13 mg. per kg. of body-wt. exhibited tetany (I) with normal blood-Ca and -P. In all cases the

blood-Mg (II) was low. Supplementing the diet with cod-liver oil, parathormone, or linseed oil was without influence on (I) or (II). H. D.

General metabolism of nitrogenous substances in tuberculosis. I. BALANESCU, D. ZAMFIR, S. OERIU, and I. STANESCU (Wien. klin. Woch., 1934, 47, 1023-1024).-The NH2-acid content of the blood (I) decreased in severe cases of tuberculosis and rose to normal when clinical improvement occurred. (I)-creatinine was raised only when there was disturbance of renal function. Uric acid in (I) was low only in severe cases and rose with clinical improvement. The non-protein-N of (I) was usually low in severe cases, but in mild cases it was liable to rise with any exacerbation of the disease.

NUTR. ABS. (b)

Carbohydrate metabolism in tuberculosis. R. J. DRABKINA (Beitr. klin. Tuberk., 1934, 85, 295-301).—An increased post-prandial hyperglycæmia was observed in tuberculosis (I). In severe cases the hyperglycæmic effect of adrenaline was small. The effect of insulin was small in some cases and protracted in others. Insufficiency of both the adrenal and insular systems in severe (I) is deduced. NUTR. ABS. (b)

Proliferative and exudative tuberculosis with reference to their relationship to the various fractions derived from the tubercle bacillus. F. M. POTTENGER (Ann. Int. Med., 1934, 8, 123-128).-Phosphatides stimulate monocytes and young connective tissue to produce epitheloid and giant cells. Lipins build up structural defence. Waxes cause proliferation of fibroblasts, and COMe₂-sol. fats, that of all connective tissue cells and cells of blood vessels. Polysaccharides are toxic to leucocytes and damage the adrenals. Proteins are responsible for fever, cause proliferation of plasma cells, and produce allergic sensitisation. Сн. Авз. (р)

Determination of the proteins of blood-serum and its value in tuberculosis. W. PAGEL and L. B. STOTT (Tubercle, 1934, 15, 454-459).-The test is based on the ability of bile to keep proteins in solution after heating the serum. The test fails in cases of albuminuria or loss of albumin by other Сн. Авз. (р) means.

Action of intravenously-administered lecithin in pulmonary tuberculosis. G. SCORPATI (Rass. Clin. Terap., 1934, 33, 143-150; Chem. Zentr., 1934, ii, 1491-1492).-Injection of an emulsion of lecithin and cholesterol produced an improvement in blood-constitution, increased white-cell content, fall of temp., and improved general condition.

R. N. C.

Role of mineral metabolism in incipient infantile tuberculosis. G. POPOVICIU (Compt. rend. Soc. Biol., 1934, 116, 1101-1104).-A rise in Ca×P occurs in the blood of infants with fresh NUTR. ABS. (m) tuberculous infection.

Oxalic acid metabolism. A. ATHANASIOU and H. REINWEIN (Deut. Arch. klin. Med., 1934, 176, 475-479) .- In tuberculous and diabetic patients, elimination of H2C2O4 was not closely related to the amount present in blood (I). Vals. for (I) were > normal. There was little change in the $H_2C_2O_4$ content of dog's (I) after 7 days' fasting. A. G. P.

Ammonia content of brain during uræmia. J. ŠTEFL and H. KUNZOVÁ (Arch. exp. Path. Pharm., 1935, 177, 313—316).—Injection of normally nontoxic doses of soya-bean urease into animals in which nephritis (I) has been induced by $UO_2(NO_3)_2$ hastens the appearance of uræmic convulsions (II) and death. (II) are probably due to the increased NH₃ content of the brain which accompanies (I). F. O. H.

Basal metabolism of European women in south India and the effect of change of climate on European and south Indian women. E. D. MASON (J. Nutrition, 1934, 8, 695-713).

A. G. P.

Basal (standard) metabolism of the Australian merino sheep. II. Factors concerned. A. W. PERCE (Counc. Sci. Ind. Res. Australia Bull., 1934, No. 84, 22 pp.).—Data for lambs of various ages are given, and effects of differences in pasture, of shearing, and of sex are considered. A. G. P.

Gas metabolism of tissue in vitro. VII. Kidney tissue. 2. Tissue respiration under various carbon dioxide concentrations. T. OKABE and S. KODAMA (Tohoku J. Exp. Med., 1934, 23, 273-278).—At p_{Π} 6.72-7.68, the O₂ consumption and CO₂ output of liver, cortex, and medulla of rabbit kidney increased with p_{Π} .

Сн. Авз. (p)

Anomalous respiratory quotients of hibernating animals. L. DONTCHEFF and C. KAYSER (Compt. rend. Soc. Biol., 1935, **118**, 81-83).—The R.Q. of dormice recovering from CO_2 anæsthesia have vals. such as 2·2, 3·4, and even ∞ . These are explained by the ability of the anæsthetised animals to retain quantities of CO_2 and by the rise in the body temp. on revival. Analogous conditions occur during the awakening after seasonal hibernation. A. L.

Gaseous metabolism of prolonged voluntary contraction of skeletal muscle. H. REIN and J. H. TALBOTT (Z. Biol., 1935, 96, 15—27).—Continuous records of the O_2 consumption, expired O_2 , etc. (A., 1933, 1064) in men during periods of rest and physical exercise indicate that the gaseous metabolism of the recovery process occurs mainly in tissues other than contracted muscle, where, however, an increased elimination of catabolic products occurs. F. O. H.

Nature and physiological function of muscle ammoniogenesis, and the co-ordination of chemical processes in muscle. J. K. PARNAS, P. OSTERN, and T. MANN (Rocz. Chem., 1934, 14, 1358—1376).—Adenosinetriphosphoric acid (I) does not undergo deamination in muscle, but adenylic acid (II) arising from (I) may be resynthesised to (I), or be deaminated to inosic acid (III). The chief processes taking place during contraction are: (I)+*(glycogen)+H₂O-(II)+Harden-Young ester (V); (II)+phosphocreatine (V)-(I)+creatine (VI); (VI)+(IV)-(V)+2OH·CHMe·CO₂H; when the reaction of glycolysis is completed, the reaction

 $(II)+H_2O\longrightarrow(III)+NH_3$ takes place. During the resting stage resynthesis of (II) from (III) is possible. R. T.

Non-utilisation of alcohol during muscular work by the rat. E. LE BRETON (Compt. rend. Soc. Biol., 1935, 118, 62—64).—No difference is observed in the amount of EtOH (I) oxidised by resting and exercised rats injected with aq. EtOH. The energy obtained from (I) is therefore not used for muscular work. A. L.

Micro-technique for the study of alcohol oxidation by tissue in vitro. E. LE BRETON (Compt. rend. Soc. Biol., 1935, **118**, 64–67).—The technique is described. The rate of oxidation of EtOH is increased by substitution of O_2 for air, the presence of methylene-blue and deproteinised blood. A. L.

Chemical reactions in muscle. III. Phosphate transport by pyruvic acid. J. K. PARNAS, P. OSTERN, and T. MANN. IV. Specificity of phosphoglyceric acid as phosphate donator. C. MANN-LUTWAK (Biochem. Z., 1935, 275, 163—166, 167—168; cf. A., 1934, 1027).—III. Addition of AcCO₄H to muscle pulp (I) containing NaF inhibits NH₃ formation and leads to resynthesis of adenosinetriphosphoric acid (II) providing PO₄^{'''} is present. AcCO₂H probably first forms a phosphoric ester which then passes its PO₄^{'''} to adenylic acid. IV. Diphosphoglyceric acid has no effect on the

IV. Diphosphoglyceric acid has no effect on the formation of NH_3 , and the degradation of phosphocreatine and (II) in (I) and the action of phosphoglyceric acid in these reactions (A., 1934, 1027) appear to be highly sp. P. W. C.

Connexion between muscle metabolism and weather. II. O. RIESSER, G. KUNZE, and K. GALLE (Biochem. Z., 1935, 275, 169–186).—The P_2O_5 exchange of rabbit's muscle varies from day to day according to climatic conditions, cold dry air tending to give high, and warm moist air to give low, P_2O_5 contents. This relationship is especially marked using directly determined P_2O_5 vals. (inorg.+phosphagen- P_2O_5), but is not so marked with either phosphagen or pyrophosphate vals. (cf. A., 1934, 1253). P. W. C.

Demonstration of polar localised phosphoric acid liberation by directly stimulated muscle of cold-blooded animals. S. S. ROBBINS and M. L. WILHELM (Pflüger's Archiv, 1934, 234, 707— 715).—Prolonged passage of electric current in either direction through frog's muscle in Ringer's solution, or a series of shocks, causes localised H_3PO_4 liberation at the anode, independent of the type of physical effect of the current on the muscle. The amount of H_3PO_4 liberated \propto the quantity of electricity passed. The effect is due either to anodic breakdown of labile H_3PO_4 compounds or increase of permeability. An antagonistic effect occurs at the cathode. R. N. C.

Role of potassium in the electrolytic system of muscle. H. NETTER (Pflüger's Archiv, 1934, 234, 680-695).—A muscle (I) perfused with Ringer's solution containing K^{*} takes up about 1/5 of the quantity of K already present. Injection of adrenaline in frogs produces an accumulation of (I)-K, whilst CH₂I·CO₂H produces a decrease. The O₂ consumption of (I) in Ringer's solution is raised by increasing [K], which augments glycolysis and acid formation. The K taken up by perfused (I) is distributed between (I) and the perfusing solution in the ratio of its previous concus. in them. In the same way NH_4 is distributed according to the fall of concn. in (I). R. N. C.

Membrane potential of the muscle as a determining factor of excitability. I. Influence of chlorides on membrane potential and on excitability of the frog sartorius muscle. II. Action of hypertonic Ringer's fluid. III. Action of carbon dioxide on the muscle. IV. Effect of fatigue due to prolonged stimulation of the muscle. V. Effect of glucose-Ringer's fluid and highly hypertonic Ringer's fluid on the muscle. VI. Action of calcium chloride on the muscle. VII. Action of sodium thiocyanate on the muscle. S. OKABE (Japan J. Med. Sci., III, Biophys., 1934, 3, 1-15, 17-23, 25-34, 35-40, 41-44, 45-48, 49-54).—I. In small concns. all chlorides (K, Mg, Ba, Sr) increase membrane potential (I) and excitability (II); at higher concns. $(>10^{-2})$ there is a depressive effect on (I) and (II).

II. Ĥypertonic Ringer's solution decreases injury potential and (II).

III. CO_2 decreases (I) and (II), but not proportionally.

IV, V. In hypertonic solutions injury potential and (II) decrease in inverse proportion to the altered rheobase.

VI. In concess. from $4 \cdot 3 \times 10^{-3}$ to $1 \cdot 7 \times 10^{-2}$ in Ringer's solution CaCl₂ decreases injury potential in inverse proportion to alterations in rheobase.

VII. NaCNS increases (I) and (II). CH. ABS. (p)

Transparency and action metabolism of muscle. II. A. VON MURALT (Pflüger's Archiv, 1934, 234, 653-664).-The breakdown of creatinephosphoric acid (I) in muscle subjected to a short tetanus always causes a decrease in the extinction (II) produced in light transmitted through the muscle. The resynthesis of (I) on recovery under aerobic conditions is parallel with the return of (II) to its original val. In more prolonged anaerobic stimulation (II) falls to an equilibrium point, where further falls are balanced by equal rises on recovery. Inhibition of (I) resynthesis with CH₂I·CO₂H results in a small decrease of (II) with each tetanus, parallel with the amount of (I) destroyed. Lactic acid (III) formation does not affect primarily the optical properties of muscle, but in the isotonic aq. solution (IV) there is a slow increase of (II), the extent of which is associated with the amount of (III) formed and the amount of available ions (particularly Ca^{**}) in (IV). R. N. C.

Relative nutritional values of proteins. E. LESNÉ and R. CLÉMENT (Compt. rend. Soc. Biol., 1934, 116, 1311—1313).—Young rats grow well on diets containing caseinogen, meat peptone, and ovalbumin, less satisfactorily on diets containing proteins from soya bean and sunflower, and very poorly (death ensues) on a diet containing gelatin.

NUTR. ABS. (m)

Effect of heating caseinogen on [growth] gains in rats. W. D. SALMON (Ann. Rept. Alabama Agric. Exp. Sta., 1932, 20).—When used as sole source of protein in diets supplied with vitamin- B_1 (I) and $-B_2$ (II), caseinogen, after heating to 130° for 48 hr., failed to produce growth in rats. Subnormal growth followed supplementary feeding of extracted yeast (III) residues. Unheated caseinogen after thorough extraction with acidified H₂O produced normal growth when (I) and (II) were supplied as protein-free extracts of (III). CH. ABS. (p)

Derivation of factors for computing the gaseous exchange and heat production in the metabolism of caseinogen by the albino rat. M. KRISS and R. C. MILLER (J. Nutrition, 1934, 8, 669—674).— Of the total calories of caseinogen ingested 96.6% were digested and 80.8% were metabolisable. For computing gaseous exchange and heat production the factors given are : 1 g. urinary N=6.67 litres of respiratory O₂, 5.47 litres of CO₂ and 30.59 g.-cal. A. G. P.

Effect of the protein level of the ration on certain blood-constituents of the hen. W. C. RUSSELL and A. L. WEBER (Poultry Sci., 1934, 13, 376—378).—Blood-creatine was higher on a low- than on a high-protein diet. The non-protein-N, uric acid, urea, and sugar contents were less affected. A. G. P.

Influence of protein on the growth of ducks. W. L. HAMLYN, H. O. BRANION, and J. R. CAVERS (Poultry Sci., 1934, 13, 333—337).—Ducklings (I) utilise proteins more efficiently than do chicks. The optimum level for (I) is approx. 18%. A single protein supplement is as satisfactory as a mixture. A. G. P.

Passage of native proteins through the normal gastro-intestinal wall. B. RATNER and H. L. GRUEHL (J. Clin. Invest., 1934, 13, 517-532).-Undecomposed protein may pass unchanged through the walls of the intestinal tract. CH. ABS. (p)

Effect of fat on the utilisation of protein. F. MAIGNON (Bull. Soc. Chim. biol., 1934, 16, 1410-1450).-White rats fed on ovalbumin (I), fat (II), and vitamins (III) survived longer and had a greater period of fixed wt. than animals receiving (I), carbohydrate (IV), and (III) in equiv. calorific val., a result apparently contrary to the view that (IV) administration exerts a sparing effect on protein-N. The difference in the N balance (V) in animals fed on the alternative diets was therefore examined over the const. wt. period. With diets having the ratio (I)/(II) as 1/2 and (I)/(IV) as 1/4.7, (V) was the same in both cases, but with a greater proportion of protein, the diet containing the (II) caused a less negative (V). The results support the view of Falta and Gignon (A., 1908, ii, 961) that a min. amount of (IV) is necessary for life, this being derived from protein during starvation, (II) being incapable of providing A. L.

Nitrogen catabolism in invertebrates. II. Correlation between uricotelic metabolism and habitat in the phylum *Mollusca*. J. NEEDHAM. III. Arginase in the invertebrates ; new method for its determination. E. BALDWIN (Biochem. J., 1935, 29, 238—251, 252—262).—II. Data are given for the uric acid content of the nephridia and other tissues of a large no. of molluscs.

III. The tissue containing arginase (I) is allowed to act on an excess of arginine (concn. 2%) for 30 min. only, at 28° and at $p_{\rm H} 9.5$, controlled by means of a glycine buffer. The amount of urea produced then \propto (I) concn. under standard conditions. (I) is widely distributed among invertebrates. Among gastropod molluscs (II), (I) occurs only in fresh-H₂O and terrestrial species, the hepatopancreases of many of which contain (I) in concn. comparable with that in mammalian livers. (I) is probably concerned in the production of both urea and uric acid by (II). The (I) content of a tissue tends to disappear in starvation. A. E. O.

Biochemistry of allantoin. IV. Injection of adrenaline and allantoin excretion. V. Administration of yeast-nucleic acid and exogenous allantoin excretion. T. MIYAHARA (J. Biochem. Japan, 1934, 20, 383–386, 387–393).—IV. Injection of adrenaline into rabbits (I) fed on a diet poor in purines increases the urinary excretion of total N, allantoin (II), and uric acid (III), whilst the uricolytic index (IV) is somewhat decreased.

V. Intravenous or oral administration of yeastnucleic acid (as Na salt) into (I) markedly increases the excretion of (II) and (III), whilst (IV) is slightly diminished. F. O. H.

Metabolism of glyoxaline. P. LELU (Compt. rend., 1935, 200, 353—355).—Glyoxaline excretion (I) in the rabbit, dog, pig, and rat increases with increasing protein in the diet or during inanition, whilst in each case the proportions of (I) to total N or to total metabolic products excreted decreases.

H. D. Blood and urine chemistry during the specific dynamic action of glycine in normal subjects and in schizophrenics. C. REID (J. Mental Sci., 1934, 80, 379—396).—No significant differences in the distribution of blood- and urinary N of normal and schizophrenic patients followed oral administration of glycine. CH. ABS. (p)

Relationship between nutrition and wool production of Merino sheep. I. Technique employed for determining the utilisation of foodstuffs and the wool produced over short periods. II. Effect of the administration of cystine, cysteine, sulphur, and of methionine on the growth of wool of a merino ewe on a proteinpoor ration. H. R. MARSTON (J. Agric. Sci., 1935, 25, 103-112, 113-131).—I. Wool growth was calc. from vals. obtained by shaving marked areas on the shoulders at short intervals.

II. Wool production was increased by addition of l-cystine to the diet. Approx. 80% of the additional S was absorbed and about 50% was excreted in urine. Subcutaneous injection of l-cystine produced somewhat larger increases in wool growth and higher S retention. Injection of methionine produced a small increase, and the feeding of S was without effect.

A. G. P.

Partition of excreted sulphur in relation to metabolism. E. F. TERROINE and R. RAZAFI- MAHERY (Compt. rend., 1935, 200, 350-352).— Replacing a carbohydrate- by a protein-rich diet (I) in the pig, or fasting a rabbit after maintaining it on a min. diet, decreases the proportion of neutral to total SO₄" excreted. Ethereal SO₄" persists in the urine on a protein-free diet, increases slightly on (I), and greatly during total inanition. H. D.

Physiological availability of pentocystine and homomethionine. H. M. DYER and V. DU VIG-NEAUD (J. Biol. Chem., 1935, 108, 73—78).—Pentocystine and homomethionine, administered to rats on a cystine-deficient diet (A., 1933, 1149), produced no alteration in their growth curves. H. D.

Rôle of glutathione in living tissue. R. BIERICH and A. ROSENBOHM (Z. physiol. Chem., 1935, 231, 39—46).—The dilution factor shown by kidney tissue is, like that of liver extracts, due to cysteine (I). (I) arises from glutathione (II), fission of which is a function of both time and temp. The production of (I) is favoured by interruption of respiration. (II) is neither an oxidising nor reducing system of tissue, but an inactive store of thiol substance. (II) yields active thiols when heavy metals and (I) are present to form a complex salt specifically catalysing the oxidation of (II). J. H. B.

Passage of ovoglobulins through the shell membrane. E. McNALLY (Proc. Soc. Exp. Biol. Med., 1934, 31, 946—947).—The increased wt. of the mature as compared with the immature egg is due to higher content of thin albumin.

Сн. Abs. (p)

Behaviour of enzymes in hen's eggs during incubation. R. AMMON and E. SCHÜTTE (Biochem. Z., 1935, 275, 216-233).—The considerable increase in esterase content of hen's eggs during incubation is investigated, the enzymes being differentiated in terms of substrate into tributyrinase, methylbutyrase, and choline-esterase. P. W. C.

Effect of administration of carbohydrate, protein, or fat on the blood-sugar of children. A. PANOFF (Monatsschr. Kinderheilk., 1934, 60, 194— 204).—In children (I) of 8—14 years, suffering from non-metabolic diseases, 50 g. of sucrose or 100 g. of white bread always cause an increase in the fasting blood-sugar, lasting for < 2 hr. Butter (50 g.) causes a slight fall in blood-sugar (II) in (I) and in diabetics (III). After 50 g. of pure, cooked protein a delayed rise occurs in (II) in about 2 hr., except in some (III). NUTR. ABS. (m)

Glucose and non-glucose portions of "bloodsugar" in the hepatic and portal veins of the decapitate cat at different sugar levels. J. M. D. OLMSTED and L. S. READ (Amer. J. Physiol., 1934, 109, 303—306).—In the decapitate cat, without food since the previous night, the glucose portion (determined after pptn. with Zn salts) of the "bloodsugar" (I) (determined after pptn. with tungstate) is significantly higher in hepatic (II) than in portal vein blood (III). The average difference, 28 mg. per 100 ml. when the liver is supplied with (III) only, is relatively const. over a considerable range of (I) level. Since glycogen (IV) is deposited meanwhile in the liver it is unlikely that liver-(IV) can be formed from blood-glucose. There is no difference between (II) and (III) with respect to the concn. of the non-glucose fraction of (I), which is slightly increased immediately after decapitation and after asphyxia. NUTE. ABS. (m)

Carbohydrate tolerance during carbohydrate starvation. N. I. NISSEN (Hospitalstidende, 1934, 77, 241-252).—In young persons with normal carbohydrate metabolism, a few days on low-carbohydrate (I) diet causes a fall in fasting blood-sugar, an abnormally high and protracted hyperglycæmia following oral or intravenous administration of glucose, with similar results following oral but not intravenous administration of galactose. The degree of disturbance is not dependent on the degree of acidosis and is greater on a low than on a high calorie diet. The results are attributed to decreased or delayed glycogen production and possibly to reduced (I) utilisation. NUTR. ABS. (m)

Bile acids and carbohydrate metabolism. XXXIII. Liver-glycogenesis due to administration of constituents of hens' eggs and cholic acid. T. FURASE (J. Biochem. Japan, 1935, 21, 111—117; cf. this vol., 111).—The liver-glycogenesis (I) due to ingestion of egg-white by starved rabbits is increased by administration of Na cholate or of extracts of egg-yolk; large amounts of the latter, however, depress (I). F. O. H.

Relative nutritional values of carbohydrates. E. LESNÉ and R. CLÉMENT (Compt. rend. Soc. Biol., 1934, 116, 1313—1315).—In young rats, fed on adequate diets in which the source of carbohydrate is varied, the best growth occurs with wheat, oats, rice, or barley. Rye and maize flours are inferior. Sunflower, soya, and peanut flours, which contain less carbohydrate, are worst. When sugar or starch is used as 50% of the ration, the growth is poor, and when the proportion reaches 70%, the rats die. NUTR. ABS. (m)

Oxalic acid metabolism. A. ATHANASIOU and H. REINWEIN (Deut. Arch. klin. Med., 1934, 176, 475-479).-H₂C₂O₄ in blood (I) is determined by a new method. In dogs starved for a week there is little change in the (I) level. Normal human (I) contains 3-4 mg. per 100 ml. In tuberculosis and diabetes the (I) level is somewhat higher (mean vals. 4.76 and 4.52 mg., respectively), there being no apparent relation between the (I) level and either the severity of the disease or the urinary H₂C₂O₄ excretion. NUTR. ABS. (b)

Variations in fat and water content of the carp. M. STANGENBERG (Polish Agric. Forest. Ann., 1934, 32, 87–103).—The chemical composition of the carp is affected by the nature of the food, especially in the first three years; *e.g.*, rye increases fat and lupins increase protein contents. CH. ABS. (p)

Fat tolerance tests. H. BLOTNER and R. FITZ (J. Clin. Invest., 1934, 13, 707).—In the normal subject the blood-cholesterol remains unchanged after 500 ml. of 20% fat. In obesity or diabetes insipidus there is a progressive rise which can be sharply inhibited by injection of posterior pituitary extract. Insulin (I) causes a rise in normal individuals receiving (I) therapy for gain in wt.

NUTR. ABS. (b) Absorption of soluble, volatile fatty acids. R. H. HUCHES and E. J. WIMMER (J. Biol. Chem., 1935, 108, 141—144).—In the dog, there is no increase in sol., volatile fatty acids (I) present in the thoracic lymph as glycerides during the process of digestion of fats containing tributyrin. The (I) are probably absorbed by the blood, and thus escape glyceride synthesis. A. E. O.

Fat metabolism. V. Degradation of unsaturated fatty acids in the living organism. P. E. VERKADE and J. VAN DEE LEE (Proc. K. Akad. Wetensch. Amsterdam, 1934, 37, 590—597).—Following administration of triundecenoin (15 and 25 g.), male urine contained sebacic acid indicating a rupture of undecenoic acid at the double linking. With olive and rape oils, no decomp. products of oleic or erucic acid occurred in the urine. The conclusions of Smith (A., 1934, 210) are criticised and the degradation of fatty acids is discussed. F. O. H.

Liver and fat metabolism. F. X. AYLWARD, H. J. CHANNON, and H. WILKINSON (Biochem. J., 1935, 29, 169-178).-The changes in the liver-lipins of rats were studied over a period of 13 hr. following a meal of sucrose, caseinogen, fat (40%), and cholesterol (I) (2%), both with and without choline chloride (II) (2%). (II) partly prevented the fall in phosphatide content, occurring from the 4th to the 7th hr. The neutral fat (III) content rapidly increased from the 4th to the 10th hr., then returned to normal at the end of 13 hr. (II) lowered the (III) content uniformly. The I vals. of the total fatty acids decreased during the first 10 hr. both with and without (II). The free (I) content showed no change, but a striking linear increase in (I) esters [not affected by (II)] occurred from the 7th hr. onwards, evidently the first stage in the production of the (I)-fatty liver by (I)-feeding. The results are discussed in relation to the role of the liver in fat metabolism.

A. E. O.

Automatic regulation of fat metabolism in man. S. LEITES (Klin. Woch., 1934, 13, 1056– 1060).—On administration of butter to normal men, changes in the blood-fat (I) and -ketone (II) contents depend, during the first 9 hr., on the amount of fat fed, but in the subsequent period on the initial level of (I) and (II). If the latter is normal or low, the administration has a ketogenic, but if high an antiketogenic, action. The normal lipæmia and ketonæmia thresholds, respectively, of 60—90 and 6—9 mg. per 100 ml. are increased to 130 and 14 mg. A second administration of butter 3 hr. after the first leads to a decrease of hyper-lipæmia and -ketonæmia. Changes of R.Q. are also recorded.

NUTR. ABS. (m)

Effect of hydrogenated fat on abnormal carbohydrate respiratory quotients of rats on a fatdeficient diet. L. G. WESSON and F. C. MURRELL (Proc. Soc. Exp. Biol. Med., 1934, 31, 1118—1121).— Partial hydrogenation of the EtOH-sol. fraction of lard did not diminish the effectiveness of this fraction in lowering abnormally high R.Q. CH. ABS. (p)

Proteins of mottled gram bean (Phaseolus mungo, L. var.). T. Y. Lo (Dept. Agric. Chem. Peiping, Nutrit. Bull., 1934, B, No. 1, 1–12).— Mottled gram beans (I) contain 20.27% of crude protein [18.06% true protein (II)]. Of (II) 38.07%is H₂O-sol., 14.03% sol. in 10% aq. NaCl, 2.36% in 73% EtOH, and 2.14% in 0.2% aq. NaOH. The protein of (I), when fed as the sole protein, is incapable of supporting normal growth in rats.

NUTR. ABS. (m)

Mineral content of mottled gram bean. T. Y. Lo (Dept. Agric. Chem. Peiping, Nutrit. Bull., 1934, B, No. 1, 27-39).—Mottled gram beans (I) contain Ca 0.117, P 0.260, Fe 0.0073, Cl 0.0256, total ash 3.28%. Of the latter about 65% is sol. in H_2O and 93% in acid. For rats, on a diet of (I), caseinogen, maize starch, lard, yeast, and cod-liver oil, the main deficiencies are of P, Na, and Cl. NUTR. ABS. (m)

Vitamin content of the mottled gram bean. T. Y. Lo (Dept. Agric. Chem. Peiping, Nutrit. Bull., 1934, B. No. 1, 13-26).—The bean (I) is a fairly good source of vitamin-A (II), 20% in the ration being sufficient to support normal growth when no other source of (II) is present. In a diet otherwise deficient in the vitamin-B complex, 14% of (I) permits normal growth and development in young rats. A moderate amount of vitamin-D is present, but no -C. NUTR. ABS. (m)

Nutritive value of locusts. ANON. (Farming in S. Africa, 1934, 9, 232).—Redwing locusts before they reached the flying stage contained H_2O 10.5, protein 461, fat 9.6, fibre 12.5, ash 5.0, P_2O_5 1.2%. Locust meal can be fed to stock at a 10% level.

NUTR. ABS. (b)

Nutritive value of quinoa. P. MAZZOCCO (Compt. rend. Soc. Biol., 1934, 117, 1245—1246).— Quinoa alone is not a complete diet. The protein, mineral matter, and carbohydrate contents are sufficient, and it also contains vitamin-*B*, but the other vitamins are absent. R. N. C.

Chemical composition of quinoa. P. Maz-2000 (Compt. rend. Soc. Biol., 1934, 117, 1244-1245).—Quinoa resembles the cereals, but contains slightly more protein, fat, ash, and Ca. A complete analysis is given, and also analyses of the ash and proteins. R. N. C.

Nutritional value of Chinese oatmeal. T. Y. Lo (Dept. Agric. Chem. Peiping, Nutrit. Bull., 1934, B. No. 1, 47-56).—The protein of the meal is satisfactory in quality and quantity, but there is deficiency of mineral elements and of vitamin-D, although an appreciable amount of vitamin-A and of the vitamin-B complex is present. NUTR. Abs. (m)

Turkey nutrition investigations. H. M. Scorr and J. S. HUGHES (Kansas Agric. Exp. Sta. 6th Biennial Rept., 1932, 78—79).—Vitamin-A requirements of poults (I) are > those of chicks. (I) are sensitive to deficiencies of vitamin-D, which cause decline in Ca and inorg. P in blood. CH. ABS. (p)

Metabolism of silkworms. III. Reducing power of the hæmolymph of Bombyx mori, L. S. DEMJANOVSKI and E. PROKOVJEVA (Biochem. Z., 1935, 275, 455—463; cf. A., 1933, 631).—In the caterpillar (I) the reducing power (II) of the hæmolymph (III) decreases as the age increases, but exhibits increases at each shedding of skin, lowest vals. being reached half-way between sheddings. 100 c.c. of (III) contain the equiv. of 50—80 mg. of glucose. In the pupæ the val. is 140—190 mg.; it increases as the age increases. (II) of the blood of the moth falls rapidly as the age increases, especially in the female (IV) (from the time of laying onwards). At all stages of growth (II) of (III) in (IV) is > in the male. (II) of (III) in (I) increases after feeding and remains at the increased level, no matter what the amount or quality of the food, for extended periods. In diseased (I), (II) of (III) is greatly reduced, since (II) is greatly dependent on the health of (I). W. McC.

An often wrongly-interpreted character of the internal medium of Ascidiæ. M. FLORKIN (Compt. rend. Soc. Biol., 1934, 117, 1226—1228).— The CO₂ content of the internal medium (I) of *Ciona intestinalis* is < that of sea-H₂O (II) in equilibrium with the atm. (III), and is unchanged when (I) is brought into equilibrium with (III). Hence CO₂ partial pressures in (I) and (II) are in equilibrium. In an aquarium there is a rapid fall of CO₂ in (I). The CO₂ contents in (II) entering the buccal siphon and expelled by the cloacal siphon are identical. Hence the alkaline reserve of (I) is low, suggesting that the species does not utilise the CO₂ in (II).

R. N. C.

Passage of fluid and certain dissolved substances through the intestinal mucosa as influenced by changes in hydrostatic pressure. E. S. NASSET and A. A. PARRY (Amer. J. Physiol., 1934, 109, 614-625).-Absorption of glucose in aq. solution by the intestinal mucosa is independent of intra-intestinal pressure (I) between 50 and 250 mm. of solution below atm. pressure. Secretion of NaCl and enzymes increases linearly as (I) decreases. Increase of colloid osmotic pressure (II) in the lumen relative to that of blood-serum does not affect absorption of H₀; hence (II) of the lacteal lymph is inadequate to account for such absorption. In dogs with intestinal transplants, apparent absorption is increased by anæsthesia, which may result from inhibition of secretion. The temp. of the intestine influences fluid R. N. C. exchange within it.

Effect of $p_{\rm H}$ on the absorption of sugars. E. GELLHORN and L. F. MOLDAVSKY (Amer. J. Physiol., 1934, 109, 638-644).—In a prep. in which the intestine is perfused with isotonic glucose solution and simultaneously the blood-vessels supplying it are

perfused with PO, "-buffered Ringer's solution, the circulatory rate being kept const., alteration of p_{μ} in the blood-vessel perfusate (I) in either direction produces a reversible increase in glucose absorption, the min. sensitivities being +0.2 and -0.1. Increased acidity of (I) due to CO2 also increases absorption, the sensitivity being as above. If the intestinal perfusate (II) is buffered with $PO_4^{\prime\prime\prime}$ small changes of its $p_{\rm H}$ produce changes in $p_{\rm H}$ in (I), with consequent increased absorption; if (II) is unbuffered, large $p_{\rm H}$ changes cause only slight changes in absorption, the $p_{\rm H}$ of (I) being unchanged. Xylose is absorbed in the same way under similar conditions; hence alterations in intestine permeability by $p_{\rm H}$ changes are not due to interference with intermediary chemical processes involved in the glucose absorption. R. N. C.

Influence of various sugars on growth of cultures of fibroblasts *in vitro*: morphological changes produced by such sugars. II. (A) Hexoses. (B) Disaccharides and polysaccharides. Y. HUANG (Folia Pharmacol. Japan, 1934, 18, 122-133, 134-142).--(A) Growth of fibroblasts is favoured by d-glucose (I), d-galactose, d-fructose, and d-mannose (II) in small concns., but is inhibited by larger amounts. (I) is the least and (II) the most toxic.

(B) Maltose (III), sucrose (IV), and glycogen stimulate or retard growth according to concn. (IV) was more toxic than (III). CH. ABS. (p)

Influence of various sodium salts on growth and on morphology of cultures of fibroblasts in vitro. II. Sodium nitrate, nitrite, bromate, iodate, sulphate, thiosulphate, and phosphate. K. KIRASHIMA (Folia Pharmacol. Japan, 1934, 18, 163—180).—All salts examined decrease growth of fibroblasts, and in high concn. destroy the tissue. Greatest effects are produced by NaBrO₃ and least by Na₂SO₄. CH. ABS. (p)

Growth of human fibroblasts in media containing copper. J. P. M. YOGELAAR and E. ER-LICHMAN (Amer. J. Cancer, 1934, 22, 66-75).— Adult thyroid tissue grows actively in media containing 0.0075 mg. of Cu per c.c., but 0.0112 mg. is toxic. CH. ABS. (p)

Influence of arsenic compounds on growth of cultures of fibroblasts in vitro; morphological changes produced. H. OKADA (Folia Pharmacol. Japan, 1934, 18, 208–223).—H₃AsO₃ (I), Na₃AsO₃, H₃AsO₄, Na₃AsO₄, Na cacodylate, and atoxyl (II) produce identical changes in the tissue. Growth is favoured by low concerns., but larger amounts cause rapid degeneration. (I) is the most and (II) the least active. CH. ABS. (p)

Effect of glucose on the maintenance of acidbase equilibrium. G. LINO (Riv. Patol. sper., 1934, 13, 169-172).—The lowering of the alkali reserve caused by injection of 1% HCl in rabbits does not occur when glucose is injected simultaneously.

NUTR. ABS. (m) Organic acids and the acid-base relationship: oxalic acid. E. F. KOHMAN (J. Amer. Dietetic Assoc., 1934, 10, 100-106).—A review.

CH. ABS. (p)

Effect of alkaline and acid diet on oxidative processes in the body. K. E. BOHNDORF (Z. ges. exp. Med., 1934, 94, 300—304).—Acid diet (I) produced a fall in the C: N and vacat O_2 : N ratios of the urine of rats, whilst alkaline diet (II) caused an increase. The vacat O_2 : C ratio was not significantly changed. Hence (I) increases, and (II) decreases, oxidation. NUTR. ABS. (b)

Inorganic salts in nutrition. IX. Correlation between suppressed growth and the development of polycythæmia induced by feeding a ration poor in salts. P. P. SWANSON and A. H. SMITH (J. Nutrition, 1934, 8, 659-667).-Unless growth is repressed by feeding a salt-poor ration with caseinogen, a polycythæmia is not produced. A. G. P.

Factors influencing mineral metabolism of dairy animals. H. W. CAVE, W. H. RIDDELL, J. S. HUGHES, C. H. WHITNAH, and H. F. LIENHARDT (Kansas Agric. Exp. Sta., 6th Biennial Rept., 1932, 63-65).-Calves receiving an all-milk diet showed deficient hæmoglobin (V) and subnormal growth after 3 months. Ingestion of glucose (I) increased the blood-sugar (II) in lactating cows. Milk (III) drawn at the period of max. increase of (II) had higher concn. of lactose (IV). than that drawn on preceding or following days. Increase in (IV) was not ∞ the increase in (II). Fermentable sugars in (III) [calc. as (I)] increased over a period of 24 hr. after dosage with (I). The (V) content of blood was not affected by breed, age, or fasting. Silage is deficient in vitamin-C. CH. ABS. (p)

Determination of changes in body-fluids. P. H. LAVIETES (J. Clin. Invest., 1934, 13, 718).— Assuming that the concn. of Na+K in serum-H₂O is approx. equal to and varies with that in body-H₂O as a whole, and that practically all the Na and Cl of the body is restricted to interstitial fluids with concns. approx. those in serum-H₂O, changes in interstitial fluid (I) vol. may be deduced from the metabolism of Na or Cl. The (I) exchange calc. independently from Na and Cl changes usually shows remarkable agreement. The determination of total H₂O exchange from Na+K metabolism in many instances gives more reasonable vals. than those obtained by Newburgh's method.

NUTR. ABS. (m)

Importance of cations in the energy metabolism of warm-blooded cells, especially tumour cells. A. LASNITZKI (Protoplasma, 1934, 22, 274– 298).—The antagonistic effects of K^{*} and Ca^{**} on the respiration and development of embryonic and mature tissues are examined. A. G. P.

Metabolism of copper and iron in splenectomised rats free from *Bartonella muris* infection. M. SANDBERG and D. PERLA (J. Exp. Med., 1934, 60, 395-402).—Splenectomy (I) is followed after 2 weeks by increased Cu in fæces associated with a negative Cu balance. Fe retention increases during 4-6 weeks after (I) and subsequently returns to normal. Creatine and creatinine metabolism is unchanged and the amount of uric acid unaffected. N retention increases. The spleen is essential for the utilisation of Cu in the body. CH. ABS. (p) Copper metabolism in man. T. P. CHOU and W. H. ADOLPH (Biochem. J., 1935, 29, 476-479).— From Cu balance determinations in man the min. necessary Cu intake is 2 mg. daily. The total Cu in the adult body is 100-150 mg. H. D.

Influence of calcium and iodine on growing rats. J. THOMPSON (Endocrinol., 1933, 17, 537— 549).—Low-I diets induce symptoms of exophthalmic goitre. Addition of Ca intensifies the effect, causes enlargement of thyroid and degeneration of parathyroid gland, lowers blood-I, and also the % of Ca and ash in bones. CH. ABS. (p)

Calcium requirement of laying hens. L. C. NORRIS, G. F. HEUSER, A. T. RINGROSE, and H. S. WIGUS, jun. (Poultry Sci., 1934, 13, 308-309P).— For white Leghorn pullets a diet containing 1.65— 1.80% of Ca and 0.50—0.75% of P is optimum for egg production. NUTR. ABS. (m)

Calcium and phosphorus assimilation by dairy cows. J. P. LA MASTER, E. C. ELTING, and J. H. MITCHELL (Ann. Rept. S. Carolina Agric. Exp. Sta., 1933, 62).—Heavily milking cows show negative Ca and P balances on legume hay-grain rations. Addition to the ration of maize silage effected a return to positive balances. Addition of marl to an oat-hay ration increased Ca assimilation, but had no effect in the case of soya-bean hay, grain, and silage with moderately heavy milking cows.

CH. ABS. (p)Effect of acid, neutral, and basic diets on the calcium and phosphorus metabolism of dogs. A. F. MORGAN, E. A. GARRISON, H. HOUSEHOLDER, A. M. HANSEN, M. V. SEBERGER, J. T. WATENPAUGH, A. FELSHER, and M. L. LONG (Univ. Calif. Pub. Physiol., 1934, 8, 61–106).—Greatest growth was obtained on base-forming (Na_2CO_3) rations (I). lnorg. P of whole blood was lowest on acid-forming (NH₄Cl) rations (II) without cod-liver oil (III), and highest on neutral ration (IV) with or without (III). Total serum-Ca (V) was decreased by (II) with or without (III). Diffusible serum-Ca remained approx. 50% of (V), and was only slightly increased by (II). The Ca \times P product was lowest on (II) without (III) and highest on (IV). Storage of both Ca and P was greatest with (IV) or (I) whether supplemented or not with vitamin-D (VI). The ash content of bones and teeth was decreased by absence of (VI) on a low-Ca ration (VII) or (II). The Ca of bone ash was decreased by the case of the case o ash was decreased by (VII) and the P decreased by an acid (VII). Сн. Abs. (p)

Bone tests in pigs. V. HORN (Bied. Zentr. [Tierernähr.], 1934, B, 6, 213—226).—Addition of vitamin-D (I) to a low-Ca ration improved bone composition, but had no effect when the ration already contained adequate supplies of Ca and P. Bones from animals which, from the beginning, had received no supplement of Ca, P, or (I) had the same composition as those receiving these supplements throughout. A. G. P.

Calcium, phosphorus, and vitamin-D requirements of swine. G. DUNLOP (J. Agric. Res., 1935, 25, 22-49).—The effect of varying the Ca: P ratio (I) of the diet on the general condition and blood picture in pigs is examined. Under ordinary conditions the optimum level of dietary Ca is 0.45%of the dry matter with a (I) of 1:1.3. The P requirement is probably influenced by the proportion of phytin supplied. Blood-phosphatase reaches a min. with (I) at 1:2. A. G. P.

Calcium and phosphoric acid in nutritional physiology. O. LOEW (Deut. med. Woch., 1934, 60, 1242; Chem. Zentr., 1934, ii, 1944).—In rabbits, guinea-pigs, and mice the no. and wt. of the young were increased by additional Ca feeding. A. G. P.

Assimilation of phosphorus from di- and tricalcium phosphate, bone dicalcium phosphate, and cooked bone meal. K. V. ROTTENSTEN and L. A. MAYNARD (J. Nutrition, 1934, 8, 715—730).— Differences in the effectiveness of the phosphates were small, but indicated a slight superiority of secondary compounds. A. G. P.

Creeper fowl. VIII. Effect of bone extract on skeletal growth and the phosphatase content of the bones. W. LANDAUER, E. UPHAM, and F. RUBIN (J. Biol. Chem., 1935, 108, 121-126).—Aq. bone extract injected during the first 8 weeks of life was without effect on bone growth of normal or creeper chicks, the bones of each showing the same decline of phosphatase activity after the 3rd week.

A. E. O. Growth and calcification of bones. M. YOSHI-TOMI (J. Biochem. Japan, 1935, 21, 37–53).—With chick embryos grown *in vitro* (A., 1929, 1197; 1931, 259), optimal growth and calcification of the femur occur at $p_{\rm H}$ 7·2—7·4. Growth is inhibited by coenzyme (I) from pig's heart-muscle (A., 1932, 775) + Na hexose diphosphate (II), and direct ultra-violet irradiation (III), enhanced by glucose, sucrose, lactic acid, dipeptide phosphate (IV) (A., 1933, 1062), lecithin, and (III) of the culture medium, whilst fructose, AcCO₂H, (II), caseinogen, tryptophan, cystine, and cod-liver oil (V) have little or no effect. Calcification is inhibited by glucose and fructose, enhanced by (II), (III), (V), and lecithin, whilst lactic acid, AcCO₂H, (I), (I)+(II), (IV), caseinogen, tryptophan, and cystine have little or no effect.

F. O. H.

Development of calcifying mechanism in the long bones of the rabbit. J. S. F. NIVEN and R. ROBISON (Biochem. J., 1934, 28, 2237—2242).— The activity of the calcifying mechanism (I) in normal rabbit tissue is > that in the hypertrophic cartilage (II) of rachitic animals. (II) and the osteoid tissue become calcified *in vivo* soon after their formation, and (I) is present before the deposition of Ca occurs. The inorg. mechanism and the phosphatase are not destroyed by COMe₂ treatment or desiccation of the tissue. A. L.

Development of the calcifying mechanism in avian cartilage and osteoid tissue. H. B. FELL and R. ROBISON (Biochem. J., 1934, 28, 2243— 2253).—Whilst uncalcified normal osteoid tissue in its early stages could not be calcified *in vitro*, at a later stage, immediately before calcification (I) *in vivo* took place, this was possible. Fowl cartilage (II) in the long bones begins to hypertrophy at an early stage in embryonic life, but (I) begins about the 15th day of incubation, and is never complete. Whilst the early hypertrophic (II) contains phosphatase, it cannot be artificially calcified, but at later stages this is partly possible. Cultures of fibrous tissue from the periosteum were uncalcified under conditions suitable for the (I) of osteoid tissue. A. L.

Distribution of therapeutic and other substances in the organism. G. HEOHT (Angew. Chem., 1935, 48, 14—17).—The distribution, accumulation, and excretion of drugs administered by various routes are discussed. The urinary, but not the biliary, excretion of dyes can be correlated with their permeability through artificial (e.g., Cellophane) membranes. The excretion of acidic dyes depends on the degree of dispersivity. Thus with 1—3 SO₂H groups, finely dispersed dyes are excreted by the kidney (I) and liver (II) (*i.e.*, into urine and bile) and coarsely dispersed dyes by (II) alone, whilst with >3 SO₃H groups the former are excreted by (I) alone and the latter not at all. The differences are probably due to the hydrophilic character of SO₃H'. F. O. H.

Biological detection of abietic acid and parent substances. Sulphite-cellulose effluent. R. DANNEEL (Arch. exp. Path. Pharm., 1935, 177, 248-259).-The toxicity of colophony, abietic acid, and pine-resin (dissolved in aq. Na2CO3 or emulsified in H_2O) to fish is not diminished by aeration, is doubled by a rise of temp. of 10° (over a range of 5-21°), and is due to the effect on the nervous system. That of sulphite-cellulose effluents (I) is diminished by dilution with H₂O or addition of NaOH and is due to saponifiable constituents which are sol. in light petroleum and damage the respiratory (branchial) system. The bearing of the data on the toxicity of (I) (at Königsberg) is discussed. F. O. H.

Activity of substances from croton oil. R. BÖHM, B. FLASCHENTRÄGER, and L. LENDLE (Arch. exp. Path. Pharm., 1935, **177**, 212—220).—Croton resin (I), $[\alpha]_0$ approx. +70° in CHCl₃ (A., 1895, i, 680), loses its toxicity on treatment with alkali, whilst with CS₂ it yields an inactive cryst. resin, $[\alpha]_0^{-5}$ +167° in CHCl₃. (I) also affords inactive phorbol (II), C₂₀H_{28 or 30}O₆, a tricyclic substance with five OH, one O, and three double linkings. The toxicity of the Ac₄ derivative (III) of (II) equals that of (I); the Bz derivative is inactive. Loss of H₂O from (II) gives the ketone, crotophorbolone. A prep., $[\alpha]_0$ +20° in CHCl₃, of the toxic principle can be obtained by physical methods; hydrolysis by EtOH–alkali affords (I) and (II). The pharmacology of (III), a stimulant of the central nervous system, is described. F. O. H.

[Active principles of] Gleditschia triacanthos (Linné). Y. T. OESTER (J. Amer. Pharm. Assoc., 1934, 23, 1198—1200).—Aq. extracts (which are free from alkaloids and glucosides) of *G. triacanthos* (honey locust) contain an oxytocic principle ("hypoxysin") and a second constituent of marked depressor action. F. O. H.

Detection and distribution of narcotics in the brain. R. FISCHER and A. HAUSCHILD (Pharmaz. Mh., 1934, 15, 64-68; Chem. Zentr., 1934, ii, 1814).--- Established methods for the identification of narcotics fail in the case of brain materials. The narcotic is extracted with Et_2O , purified by means of NaOH, H_2SO_4 , and KMnO_4 , and finally identified by micromethods. In man and dogs, veronal (I) and luminal (II) are found principally in the cerebrum and, to a smaller extent, in the paleo-encephalon; (II) is never found in the cerebellum, but may be detected in the spinal cord; the converse is true of (I). H. N. R.

Action of anæsthetics on living protoplasm. L. V. HEILBRUNN (Proc. Amer. Phil. Soc., 1934, 74, .159-165).—Stimulation causes gelation of protoplasm comparable with blood-clotting. Et₂O prevents this effect in sea-urchin eggs when [Ca^{**}] is minimal CH. ABS. (p)

Determination of chloral hydrate in blood and urine. M. M. FRIEDMAN and F. A. CALDERONE (J. Lab. Clin. Med., 1934, 19, 1332—1333).—The bloodfiltrate is treated with C_5H_5N and NaOH and chloral vals. are obtained colorimetrically. CH. Abs. (p)

Avertin and liver function. T. KOBAYASHI (J. Biochem. Japan, 1934, 20, 405—421).—Rectal administration (I) of avertin (0.3 g. per kg.) to dogs (II), but not rabbits (III), increases the secretion of bile, whilst the relative and abs. concns. of bilirubin and bile acids markedly decrease. The effect is not appreciably influenced by the degree of narcosis or by the simultaneous action of insulin, adrenaline (IV), atropine, ingested glucose, or blocking of the reticulo-endothelial system. (I) of avertin produces a prolonged hyperglycæmia (V) in (III), but not (II), whilst with (II), the (V) due to (IV) is inhibited and that due to ingested glucose is enhanced. These facts together with the resulting diminution of liverglycogen in (III) indicate that avertin damages the liver. F. O. H.

Benzine and hydrocarbon therapy. J. KAR-IUKSTIS (Münch. med. Woch., 1934, 81, 493; Chem. Zentr., 1934, ii, 2098).—Physiological effects of the aliphatic hydrocarbons (I) in benzine are most marked in the case of C_7H_{16} . C_6H_6 has the action of a blood poison but xylene and C_6H_4 MeEt produce effects resembling those of (I). A. G. P.

Action of various compounds of the thymol and carvacrol series on respiration and bloodpressure and their antagonistic action to adrenaline in its raising of blood-pressure. T. MAEDA (Folia Pharmacol. Japan, 1934, 18, No. 2–3, 79–94).—The thymol nucleus accentuates the action of these compounds in lowering blood-pressure.

Сн. Авз. (р)

Action of induced fever on lachrymal elimination of sodium chloride. D. MICHAIL and P. VANCEA (Compt. rend. Soc. Biol., 1934, 117, 1273-1274).—The rise of temp. induced in man by intramuscular injection of sterile milk is accompanied by an increase in lachrymal NaCl, both reaching their max. at the same time. The parallelism becomes less evident in the later phases, the NaCl tending to remain high. Plasma-NaCl falls as lachrymal NaCl rises. R. N. C.

Substances causing fever, particularly dinitrophenol. J. DADLEZ and W. KOSKOWSKI (Compt. rend. Soc. Biol., 1935, 118, 97–99).—The fever (I) caused by administration of dinitrophenol, like that caused by methylene-blue, PH₃, and dinitro- α naphthol, is due to an increase in the rate of metabolism, and is of peripheral origin (II). (I) caused by neutral-red, Me-orange, peptone, and gelatin is of central origin (III). (I) caused by tetrahydro- β naphthylamine involves both (II) and (III). A. L.

Effect of 2:4-dinitrophenol on cellular respiration. R. H. DE MEIO and E. S. G. BARRON (Proc. Soc. Exp. Biol. Med., 1934, 32, 36-39).-2:4-Dinitrophenol (I) increases considerably the respiration of cells and tissues, but is without effect if respiration has been inhibited by CO or KCN. It does not oxidise lactate activated by α -hydroxyoxidase, and has no action on the respiration of gonococci. R. N. C.

Cellular oxidative mechanism involved in dinitrophenol stimulation of respiration. M. E. KRAHL and G. H. A. CLOWES (Proc. Soc. Exp. Biol. Med., 1934, 32, 226-228).-4: 6-Dinitro-o-cresol (I) accelerates the reduction of cytochrome (II) in normal yeast in the presence of many substrates, but only with glucose is the reducing ability of the combination equal to the sum of those of the individual agents. (I) is equally efficient with or without pyruvate and lactate. In yeast poisoned with $CH_2I \cdot CO_2H$, (II) reduction is not accelerated, even when lactate or glucose is present. The reactivity of tissues to (I) stimulation is inhibited to a limited degree by nonsp. dehydrase poisons such as $Na_4P_2O_7$ and narcotics. It is probable that (I) stimulates cellular respiration by accelerating the oxidation by (II) of a substrate previously or simultaneously acted on by cellular anaerobic dehydrases. R. N. C.

Relationship between blood-cholesterol and increased metabolism from dinitrophenol and thyroid. W. C. CUTTING, D. A. RYTAND, and M. L. TAINTER (J. Clin. Invest., 1934, 13, 547-552).-Changes in blood-cholesterol in thyroid disease are not related to the metabolic rate (I), but to other actions of the thyroid secretion. Dinitrophenol stimulates both a low and a normal (I).

CH. ABS. (p)

Variations in creatininuria during experimental fever. F. KAYSER (Bull. Soc. Chim. biol., 1934, 16, 1498—1517).—The changes in the amount of creatinine (I) excreted by man during malarial fever, and by rabbits during fever caused by injection of 2:4-dinitrophenol, tetrahydro- β -naphthylamine, and yeast are compared with the variations in bodytemp. (II). In all cases, although considerable variations in (I) occurred, no relationship of these with (II) could be established. A. L.

Effect of certain physical factors on the *in*vitro testing of anthelmintics. P. D. HARWOOD (Proc. Soc. Exp. Biol. Med., 1934, 32, 131-133).---The anthelmintic effect of solutions of alkylresorcinols (1) in 0.9% NaCl *in vitro* is max. when there is an undissolved excess present in the liquid state, the optimum temp. being 37°. For (I) that are solid at 31°, $n \cdot C_6 H_{14}$ can be used as a solvent, as it is nontoxic to ascarides and scarcely affects (I). R. N. C.

Pharmacological action of tannic acid. II. Drugs modifying the coagulant action of tannic acid on the proteins of ovalbumin. U. SAMMAR-TINO (Arch. Farm. sperim., 1935, 59, 1-28).-The coagulant action of tannic acid (I) on ovalbumin (II) is greatly increased by addition of HCl. With a const. (I) concn., the extent of pptn. increases progressively with addition of HCl; if [HCl] is kept const., the viscosity curve (III) rises rapidly to infinity, then falls sharply to a subnormal val. If (I) and HCl are increased together in the same proportion, (III) shows two infinity breaks, indicating that (I) in presence of HCl retains its power of pptg. (II) fractionally (cf. A., 1934, 1397). The $p_{\rm fr}$ of the mixture is not altered at the pptn. points. The action of (I) is decreased by addition of NaOH. Increasing (I) concn. with const. NaOH does not affect the viscosity, and $p_{\rm H}$ falls steadily. The action of (I) is not affected by addition of NaCl with const. (I) concn. Increase of (I) concn. with const. [NaCl] gives a (III) with two small breaks corresponding with the first and second fractions of (II) proteins; $p_{\rm H}$ falls steadily as for NaOH. Glucose has a similar action to NaCl with const. (I) concn. (III) shows breaks indicating that glucose does not affect pptn. of the first fraction, but for the second and third fractions its action is similar to that of NaCl, but stronger. The $p_{\rm ff}$ of the mixture falls steadily until the pptn. of the second fraction, when it falls sharply. R. N. C.

Nitrogen metabolism. II. Production of glycine during benzoic acid poisoning. U. LOM-BROSO, C. ZUMMO, and M. STASSI (Arch. internat. Physiol., 1934, 39, 1—23).—Guinea-pigs progressively lose 30—40% of their wt. when NH₄OBz or NaOBz is added to a diet previously proved adequate for wt. maintenance. About 80—90% of the NH₄OBz is eliminated in the urine as hippuric acid (I). The further addition of gelatin reduces the loss of wt., but neither NH₄ citrate nor NH₄ glycocholate gives protection. Na salts of org. acids (citric, tartaric, or glycocholic) not only prevent loss of wt., but cause a significant augmentation and reduce the amount of BzOH appearing as (I) to 60—65%. The fate of the remaining BzOH is unknown. (I)-N cannot be derived from NH₄ salts. NUTR. ABS. (m)

Amino-esters of naphthoic acid. M. E. BJER-REGAARD and B. HOUSTON (Proc. Oklahoma Acad. Sci., 1934, 14, 77).—The local anæsthetic activity of the hydrochlorides of γ -diethylaminopropyl and β diethylaminoethyl α -naphthoate (from α -C₁₀H₇·COCl and the alcohol) was comparable with that of cocaine, but the toxicity was less. CH. ABS. (p)

Action of quinoline derivatives on the gametocytes of *Plasmodium pracox*. I. L. KRITSCHEV-SKI and A. I. PINES (Klin. Woch., 1934, **13**, 807– 809; Chem. Zentr., 1934, ii, 1160).—Plasmoquin (I) in concn. 1:1000, and plasmocid (8- γ -diethylaminopropylamino-6-methoxyquinoline) (II), in concn. 1:1500, introduced into the *Spinus spinus* at the height of infection with *Plasmodium pracox* are able to destroy the power of the gametocytes to infect the *Culex pipiens*, 12–24 hr. after the treatment. Neither (I) nor (II) is effective in concns. 1:4000 or 1:8000. R. N. C. BRITISH CHEMICAL ABSTRACTS .---- A.

Toxic effect of phenylquinolinecarboxylic acids. A. RISI (Arch. int. Pharmacodyn. Thér., 42, 117-127; Chem. Zentr., 1934, ii, 1491).—The min. lethal doses for dogs, guinea-pigs, and rabbits, and the histological effects on peroral administration, of 2-phenylquinoline-4-carboxylic acid are given.

R. N. C.

Depressor action of extracts of organs, particularly kidney extract. J. DADLEZ and W. KOSKOWSKI (Compt. rend. Soc. Biol., 1935, 118, 95-97).—The depressor action of extracts of the following organs on the rabbit injected with atropine and under urethane anæsthesia decreases in the order : striped muscle, heart, kidney, spleen, uterus, liver, testicle, mammary gland. Extracts of brain, lung, and bone marrow have a hypertensive action.

A. L. Depressor extracts of human tissues. H. N. HARKINS and P. H. HARMON (Proc. Soc. Exp. Biol. Med., 1934, 32, 23—26).—Neither toxic thyroid nor carcinomatous tissue extract contains any unusual amount of depressor substance. The depressor resembles Chang and Gaddum's "P substance." R. N. C.

Cardiac depressor (acetylcholine ?) released by dorsal nerve-root stimulation. O. W. TIEGS (Austral. J. Exp. Biol., 1934, 12, 161—167).—The depressor effect obtained on the isolated frog's heart by dorsal nerve root stimulation is not due to a change of $p_{\rm H}$ of the perfusing fluid; it is augmented by eserine and inhibited by atropine, properties in common with acetylcholine. P. G. M.

Biological assay of cardiac stimulants. Toxicity of a national standard for digitalis powder compared with the international standard. J. LÉVY and K. OTTERSTRÖM (Bull. Soc. Chim. biol., 1934, 16, 1518—1530).—A comparison is made of the toxicities of the international and the French national digitalis standard preps. using the min. lethal dose (slow perfusion) method with dogs and guinea-pigs, and the method of % mortality following injection of increasing doses into frogs and guineapigs. The former (accuracy about 15%) is considered preferable. A. L.

Plant cardiac poisons. III. Degradation of a genin of the cardiac poisons to a bile-acid derivative. R. TSCHESCHE. IV. Constitution of trianhydrostrophanthidin. R. TSCHESCHE and H. KNICK (Z. physiol. Chem., 1934, 229, 219—232, 233—235; cf. A., 1934, 193).—III. Oxidation of the α_1 -lactone from uzarigenin with CrO₃ in AcOH gives a dicarboxylic acid, C₂₃H₃₆O₄, m.p. 245° (decomp.) [Me₂ ester (I), m.p. 160—162°, [α]b^r +4·9° in CHCl₃). (I) is converted (Grignard) into the ditert.carbinol, which with CrO₃ in AcOH affords the acid (II), C₂₀H₃₂O₂, m.p. 228—230° [Me ester (III), m.p. 140—142°, [α]b^s +48·3° in CHCl₃]. The α_2 -lactone similarly gives a dicarboxylic acid, C₂₃H₃₆O₄ (Me₂ ester, m.p. 106—107°, [α]b^s +1·0° in CHCl₃), which yields (II) on oxidation of the ditert.-carbinol obtained by Grignard reaction. Oxidation of the tert.-carbinol obtained from (III) affords an acid, C₁₉H₃₀O₄, decomp. 265° (anhydride, m.p. 186°), indicating that the lactone side-chain of the cardiac poisons is attached directly to a ring. (II) is probably identical with α tioallocholanic acid, m.p. 230° (Me ester, m.p. 140°), obtained by a method similar to that described by Wieland *et al.* (A., 1927, 247) for ætiocholanic acid. The constitution of the cardiac poisons is discussed. Strophanthidin is probably



IV. Oxidation of trianhydrostrophanthidin (VI) with HNO₃ affords $1:2:3:4-C_6H_2(CO_2H)_4$. Ring B of (V) has probably become benzenoid in (VI) with transference of the CHO from C_{10} to C_1 . J. H. B.

Calcium salts in the detoxication of gossypol. W. D. GALLUP and R. REDER (Proc. Oklahoma Acad. Sci., 1934, 14, 74—75).—Gossypol (I) inhibits hydrolysis of olive oil by lipase, the effect being most pronounced in presence of Ca. Detoxication of (I) in cottonseed meal is attained by feeding high-Ca diets. Na is nearly as effective in rats. Mixtures of NaHCO₃ and CaCO₂ give best results.

Сн. Авз. (р)

Lack of vitamin-A not the chief cause of cottonseed meal injury in pigs. W. L. ROBISON (Ann. Rept. Ohio Agric. Exp. Sta., 1934, 70).--Vitamin-A deficiency is not the cause, but is related to cottonseed injury. CH. ABS. (p)

Toxic substance occurring in certain samples of plant foodstuffs. III. Hæmoglobin levels in white rats which were fed with toxic wheat. K. W. FRANKE and V. R. POTTER. IV. Effect of proteins on yeast fermentation. K. W. FRANKE and A. L. MOXON (J. Nutrition, 1934, 8, 615-624, 625-631).-III. In many cases affected rats had low hæmoglobin levels.

IV. Protein (I) from healthy grain increased and that from "affected" grain did not materially affect the rate of fermentation of yeast (II). The stimulatory action of (I) is greater for wheat than for maize, and varies with the proportion of (I) to (II). A. G. P.

Surface activity of alkaloids. T. SUZUKI (J. Biochem. Japan, 1935, 21, 153—171).—The σ of 0.002—0.01 *M* solutions of 26 alkaloids in PO₄^{III} buffer at $p_{\rm H}$ 7.48 containing ovalbumin was determined. The data are correlated with their action as protoplasmic poisons, anæsthetics, etc., and, as far as possible, with their structure. F. O. H.

Preparation of simaruba bark as an abortive. F. W. FREISE (Sci. Pharmaceutica, 1934, 5, 65– 67; Chem. Zentr., 1934, ii, 2100).—The principal constituents are : a cryst. alkaloid, anthelmintic and refractive; a "bitter substance," antidiarrhœic; a soft resin, strongly emetic; an essential oil, therapeutically inactive; and tannin. The tannin content diminishes on keeping through phlobaphen formation. On animals, the drug acts as an abortive in small quantities, larger quantities producing fatal irritation of the mucosa and vomiting. R. N. C.

Comparison of the utero-adrenalinolytic activity of corynanthine, yohimbine, and ergotamine. E. ROTHLIN and R. HAMET (Compt. rend. Soc. Biol., 1935, 118, 33—36).—Previous results showing that the utero-adrenalinolytic activity of corynanthine was twice that of yohimbine by direct comparison are confirmed using ergotamine as standard.

A. L.

Influence of sympathetic nerve poisons on the glycosuria of splenectomised rabbits. C. TATEISHI (J. Biochem. Japan, 1935, 21, 101-110).--Splenectomy enhances alimentary glycosuria (I) in rabbits. Administration of atropine or ergotamine partly or totally inhibits this increase, but has no effect on the (I) of normal rabbits. F. O. H.

Preservation of the physiological activity of cocaine hydrochloride solution. J. RÉGNIER and R. DAVID (Bull. Sci. pharmacol., 1934, 41, 321— 328; Chem. Zentr., 1934, ii, 2100).—The activity of cocaine hydrochloride solution is stable to heat and storage only at $p_{\rm H}$ 4. A Na₂HPO₄ buffer is without effect, but a solution buffered with AcOH and NaOAc at $p_{\rm H}$ 4.2 retains its activity when heated, if the $p_{\rm H}$ is unchanged, and loses only 20% of its activity after $6\frac{1}{2}$ months. R. N. C.

Action of protein-organic base compounds on warm- and cold-blooded animals. H. LEONTJEV and V. ALEXANDROVSKI (Z. Biol., 1935, 96, 146-152).—Subcutaneous injection of an aq. prep. of nicotine (5-20 mg. per kg. in pigeons, mice, rats, guinea-pigs, rabbits, dogs, and cats and 150 mg. per kg. in frogs and axolotls) with an "equiv." amount (approx. 8 times by wt.) of caseinogen produces only mild symptoms of toxicity. The mechanism of the detoxication is discussed. F. O. H.

Colorimetric determination of morphine in biological fluids by the iodoxybenzoate method. G. A. EMERSON (Proc. Soc. Exp. Biol. Med., 1934, 31, 1004-1006).—Leake's method gives results accurate to $\pm 3\%$. CH. ABS. (p)

Morphine hyperglycæmia. P. T. SHEN (J. Biochem. Japan, 1935, 21, 173—195).—Injection of morphine into rabbits produces a hyperglycæmia (I) which decreases with continued administration. Section of the splanchnic nerves and administration of ergotamine or luminal depress (I), whilst adrenalectomy and decerebration (but not decortication) totally inhibit (I). F. O. H.

Metabolism during chronic morphine action. V. Pathology of morphine. G. ANTON and E. BIRK (Arch. exp. Path. Pharm., 1935, 177, 226— 234).—The abnormally high hyperglycæmia (I) following ingestion of glucose by human morphine (II) addicts (HI) (A., 1931, 1329) also occurs in dogs habituated to (II); with fructose (I) is normal. With (II)-habituated but not excessively weakened dogs, the loss in body-wt. due to (II) is prevented or reversed by administration of insulin, the tolerance to which of (III) and the extent of the preliminary (I) on injection are probably due to the liver damage caused by (II). F. O. H. Saliva tests. II. Heroin. J. C. MUNCH (J. Amer. Pharm. Assoc., 1934, 23, 1185—1187).— Mice respond to subcutaneously injected heroin by tail reactions (I) similar to those given by morphine (A., 1934, 1256), but at the lower threshold of 0.5 mg. per kg. body-wt. Following injection of heroin into horses, the saliva contains a substance giving positive (I) in mice. F. O. H.

Strychnine hyperglycæmia. P. T. SHEN (J. Biochem. Japan, 1934, 20, 481–490).—Section of the splanchnic nerves, administration of ergotamine, or adrenalectomy markedly inhibits the hyperglycæmia (I) due to injection of strychnine nitrate (II) into rabbits. (I) is not related to the convulsions due to (II). F. O. H.

Determination of caffeine in biological fluids and tissues. A. F. KUNZ (Biochem. Z., 1935, 275, 270-285).—A method is described for the determination of caffeine (I) in urine, blood, fæces, organs, and coffee which gives trustworthy results with 0.05-20mg. of (I). For identification of (I) C and N determinations are used. A modification of the prep. of the (I)-AuCl₃ complex is described which permits the detection of 0.00125% of (I). P. W. C.

Relationship between the constitution of some amino-ethers and their pharmacological action. J. LÉVY, D. KOHLER, and L. JUSTIN-BESANÇON (Compt. rend., 1935, 200, 259—261).—Of 16 NH₂ethers administered (dose 0.02 g. per kg.) to dogs previously given an intravenous injection of ephedrine hydrochloride (I) (0.005 g. per kg.) one group, containing aromatic derivatives of the type

ArO·CH₂·CH₂·N:, are adrenolytic, causing recession of the exophthalmia, the second group are nonadrenolytic, those of the type $CH_2R\cdotO\cdotCH_2\cdotN$: (R= Me or a ring) remove mydriasis but not the exophthalmia, whereas when R=an aliphatic C₃ chain, they sensitise the eye to the action of (I). J. W. B.

Creatinuria in adolescent males. II. Effects of oral administration of ephedrine sulphate. A. B. LIGHT and C. R. WARREN (J. Amer. Med. Assoc., 1934, 103, 410—411).—Ephedrine sulphate (25 mg. orally) administered 3 or 4 times to healthy boys (12—17 years) known to be excreting creatine (I) raises the blood-pressure and pulse rate, but has no appreciable effect on the vol. of urine or the daily output of preformed creatinine. Creatinuria is markedly reduced on the day of administration, and in half of the subjects on the next day also, but to a smaller extent, the others then having an output of (I) > on the pre-control day. NUTE. ABS. (m)

Action of hydroxyephedrines on the oxygen consumption of the white mouse. S. AHNSJÖ and R. OEHNELL (Skand. Arch. Physiol., 1934, 68, 181-186; Chem. Zentr., 1934, ii, 1157).—Metabolism was stimulated by small doses of adrenaline (I) and a no. of $(OH)_1$ - (II) and $3:4-(OH)_2$ -derivatives (III) of ephedrine and norephedrine. The activities of (I) and (III) were > those of (II), which decreased in the order m - > p - > o-(II). R. N. C.

Importance of chemical constitution, especially of a methoxy-group in the m- or p-position in the side-chain, for the pharmacological action E. L.

of phenoxyethylamine and phenoxyethylpiperidine derivatives. III. Action on blood-pressure. Y. FUGIMOTO (Folia Pharmacol. Japan, 1934, 17, No. 2, 31-44).—Removal of OMe lowered bloodpressure and, if in the *p*-position, depressed peripheral effect and enhanced central vaso-constrictor action >if in the *m*-position. CH. ABS. (*p*)

Vasomotor effect of phenoxyethylamine and phenoxyethylpiperidine derivatives from the viewpoint of the pharmacological importance of a methoxy-group in the *m*- or *p*-position in the side-chain. Y. FUGIMOTO (Folia Pharmacol. Japan, 1934, 18, No. 2—3, 100—105).—Compounds free from OMe dilated, and those having OMe constricted, the vessels of the rabbit's ear. The significance of the N side-chain is considered. CH. ABS. (*p*)

Variations in alkaline reserve during ophidian intoxication. J. VELLARD and M. MIGUELOTE-VIANNA (Ann. Acad. Brasil Sci., 1934, 6, 201-206). —The alkaline reserve (A) in the blood of dogs injected with the venom from *Crotalus terrificus* (I), *Lachesis atrox* (II), and *Naja tripudians* decreases slightly in the early stages of the poisoning; and more markedly [particularly in cases (I) and (II)] just before death. The final decrease in A seems to be associated only with the mechanism of the death, asphyxia being the principal controlling influence.

Influence of spleen extracts and bile acids on the sugar excretion threshold in rabbits with biliary fistulæ. C. TATEISHI (J. Biochem. Japan, 1935, 21, 55—62).—Withdrawal of bile increases the sugar excretion threshold, which returns to approx. normal levels on subcutaneous injection of Na cholate and/or spleen extract. F. O. H.

Influence of (a) liver and spleen extracts and (b) sympathetic nerve poisons on the sugar excretion threshold of splenectomised rabbits. C. TATEISHI (J. Biochem. Japan, 1935, 21, 63-76, 89-100).—(a) The increased sugar excretion threshold (I) of splenectomised rabbits (II) is diminished to normal vals. by administration of small amounts of liver extract (III), whilst large amounts further increase (I). Administration of small amounts of (III) + spleen extract decreases (I) to subnormal vals.

(b) The increased (I) of (II) falls to normal or subnormal vals. on administration of atropine or, to a smaller extent, of ergotamine. F. O. H.

Influence of liver-extract fractions on the sugar excretion threshold. C. TATEISHI (J. Biochem. Japan, 1935, 21, 77–88).—The increased threshold (I) due to splenectomy in rabbits (II) is further increased by the basic fraction [pptd. by phosphotungstic acid (III)] of the liver of (II) and diminished by the NH_2 -acid fraction [not pptd. by (III)]. Neither fraction influences the (I) of normal (II). F. O. H.

Blood changes in "mustard-gas" poisoning as an aid in diagnosis. O. MUNTSOH (Klin. Woch., 1934, 13, 482—485; Chem. Zentr., 1934, ii, 2099).— Poisoning with $(C_2H_4Cl)_2S$ produces lowering of the red cell count and hæmoglobin (I), pronounced neutropenia, lymphocytosis, and granule formation. Recovery is attended by increases in lymphocytes and eosinophiles; rate of decrease of red cells is raised after 3—4 hr., the val. remaining at the limit of normality. The progress of lung œdema can be studied from blood-(I). R. N. C.

Effect of some toxic gases on cell metabolism. J. JANY and C. SELLEI (Biochem. Z., 1935, 275, 234—241).—The effect on respiration (I) and glycolysis (II) of suspensions of *B. coli* of HCN (III), CNBr (IV), acraldehyde, AsEtCl₂ (V), AsPh₂·CN (VI), and $(C_2H_4Cl)_2S$ (VII) is investigated and compared with the effect of (VII) on the metabolism of animal tissue. All the substances exert considerable influence on both (I) and (II), but no relationship exists between this and other physiological effects. Thus (III) and (IV) have similar, but (V) and (VI) opposite, effects. In presence of substances inhibiting (I), aerobic (II) is increased more strongly or decreased less markedly than is anaerobic (II). P. W. C.

Delayed detection of carbon monoxide in the corpse. P. HEILMANN (Deut. Z. ges. gerichtl. Med., 1934, 23, 215—217; Chem. Zentr., 1934, ii, 1659).—CO poisoning could be detected 144 days after death by both chemical and spectroscopic tests. The tannin test was the best chemical method. H. J. E.

Sodium nitrite as antidote for hydrogen suphide poisoning. V. KARASSIK and V. CHELOK-HANOVA (Compt. rend. Soc. Biol., 1935, 118, 23– 25).—Aq. NaNO₂ injected into mice and rabbits before or after H₂S intoxication serves as an antidote. A. L.

Sodium tetrathionate as an antidote to hydrocyanic acid poisoning. A. CHISTONI and B. FORESTI (Arch. int. Pharmacodyn. Thér., 42, 140—172; Chem. Zentr., 1934, ii, 1490—1491).— Na₂S₄O₆ in neutral or alkaline solution, injected subcutaneously in ten times the theoretical quantity, decomposes NaCN forming non-toxic products (NaCNS, Na₂SO₄, Na₂S₂O₃). R. N. C.

Influence of various water-soluble heavy metal salts on blood-glutathione. T. MAEDA (Folia Pharmacol. Japan, 1934, 18, No. 2-3, 132-142).-Salts of Bi, Cu, Fe, Hg, and Sb increased the glutathione content of the blood of male rabbits. Heavy doses reversed the effect. Bi salts were the most active, but over long periods and in small dosages Fe salts produced the greatest increase.

mucous membrane. Resorption is hindered by H2S,

which forms insol. Bi₂S₃, and by reduction of BiCl₃

CH. ABS. (p)Bismuth poisoning. S. SEREFIS (Med. Klinik, 1934, 30, 968—971; Chem. Zentr., 1934, ii, 1490).— The org. acids (I) of the gastric juice, particularly lactates, are normally present in too small quantity to form sufficient Bi complex (II) in oral Bi medication; in pathological conditions (II) formation from (I) and polyhydric alcohols (III) is considerable. Bi(OH)₂NO₃ in the stomach forms BiCl₃ with gastric HCl and chlorides, which unites with (I) and (III) to form sol. (II), in which state Bi is resorbed by the

complex to Bi by proteins in alkaline solution. R. N. C. Argyrosis, especially of the eyes. W. GERLACH (Klin. Woch., 1934, 13, 797; Chem. Zentr., 1934, ii, 1645).—Intravenous injection of org. or inorg. Ag preps. causes rapid accumulation of Ag in the eyes and in certain internal organs. A. G. P.

Toxicology of some chromium derivatives. D. BRARD (J. Pharm. Chim., 1934, [viii], 20, 549– 576).—The effect of the administration (by the mouth and by injection) of Cr salts and $\text{Cr}_2\text{O}_7''$ to dogs is described. H. G. M.

Toxicity of chromium compounds. D. BRARD (J. Pharm. Chim., 1935, [viii], 21, 5–23).—Acute $K_2Cr_2O_7$ poisoning in the dog is chiefly due to the caustic and emetic properties of the salt, but if $K_2Cr_2O_7$ is slowly absorbed, e.g., after intradermal injection, death is produced by asphyxia due to the toxicity of Cr. In daily small doses, Cr^{***} is less toxic than Cr_2O_7'' , but produces the same symptoms, including severe anæmia, ultimately fatal. Considerable fixation of Cr takes place in the endocrine glands. A. E. O.

Chronic poisoning by manganese dioxide. L. LYON-CAEN and A. JUDE (Ann. Med. leg. Criminol. Police Sci., 1934, 14, 511—517; Chem. Zentr., 1934, ii, 1647).—Inhalation of MnO₂ dust affected the central nervous system. A. G. P.

Magnesium and liver-glycogen. S. L. SVEINS-SOX (Arch. exp. Path. Pharm., 1935, 177, 221— 225).—Subcutaneous or intramuscular injection of Mg gluconate does not increase the liver-glycogen of growing rats (cf. A., 1934, 553). F. O. H.

Biological action of copper. VON LINDEN (Med. Welt, 1934, 8, 1112—1115; Chem. Zentr., 1934, ii, 2098).—A review. Cu facilitates oxidative processes and stimulates growth through its action on the cell plasma. Excessive amounts inhibit cell activity.

A. G. P.

Arsenic habituation by means of cultivated tissue. H. OKADA (Folia Pharmacol. Japan, 1934, 18, 198—207).—Resistance of fibroblasts to As decreases with long-continued culture in As media or in those in which the As content is successively increased. As probably accumulates in the tissue.

Сн. Abs. (p)

(A) Action of lead and zinc sulphides [on animals]. (B) Solubility.in infusions of organs. C. G. SANTESSON (Skand. Arch. Physiol., 1934, 67, 177-195, 196-200; Chem. Zentr., 1934, ii, 1155-1156).--(A) Physiological effects are recorded.

(B) Of the sulphides of Hg^{II}, Bi, Cu, Pb, and Zn in Ringer's solution, only CuS dialysed through a collodion membrane. In presence of infusion of rabbit liver (I) HgS, Bi₂S₃, and CuS passed through the membrane. Addition of HCl and (I) lowered the solubility of all sulphides except CuS.

A. G. P.

Spectrographic determination of lead in urine. J. CHOLAK (J. Amer. Chem. Soc., 1935, 57, 104– 107).—The acidified (HNO₃) urine is evaporated to dryness, the residue is heated to $\geq 500^{\circ}$, and the ash dissolved in HNO₃. A known amount of Bi solution is added and the intensities of the spectrum lines 2833.2 (Pb) and 2898.1 Å. (Bi) are compared. The E E amount of Pb is found by comparison with standards. Solutions containing 0.01-0.2 mg. of Pb per litre can be analysed. H. B.

Lead content of bones in experimental lead poisoning. Influence of age. M. KASAHARA and S. I. NOSU (Arch. exp. Path. Pharm., 1935, 177, 272-275).—Following administration of the acetate, the deposition of Pb in the bones of young rabbits and goats is markedly > that with adult animals. F. O. H.

Significance of the changes in the red corpuscles in the early diagnosis of lead poisoning. I. M. FLECKEL, I. G. TSCHERNOW, and K. I. TURGEL (Zentr. Gewerbehyg., 1934, 21, 34—41; Chem. Zentr., 1934, ii, 1490).—Reticulocytosis and polychromosia are the earliest and most permanent changes in the red corpuscles in Pb poisoning. The change is lessened by simultaneous administration of I with Pb.

R. N. C.

Spasm-alleviating action of octin in lead poisoning. K. KÖTZING (Klin. Woch., 1934, 13, 592—593; Chem. Zentr., 1934, ii, 1160).—Octin (octenylmethylamine) is effective without attacking the kidneys. R. N. C.

Effects of fluorine in water on teeth. F. S. MCKAY (Water Works Eng., 1934, 87, 925–928).— H_2O containing 6 p.p.m. caused mottling, whereas 0.5 p.p.m. did not. The crit. val. is approx. 2 p.p.m.

Сн. Авз. (р)

Presence of fluorine in water supply of Colorado and its relation to occurrence of mottled enamel. C. H. BOISSEVAIN (Colorado Medicine, 1933, 30, 142—148).—Occurrence of F in H_2O is ascribed to fluorite-bearing granite. Mottled enamel in teeth is associated with the presence of > 1 p.p.m. of F in H_2O . CII. ABS. (p)

Effect of various amounts of sodium fluoride on the teeth of white rats. H. T. DEAN, W. H. SEBRELL, R. P. BREAUX, and E. ELVOVE (U.S. Pub. Health Repts., 1934, 49, 1075—1081).—In amounts of 25 p.p.m. NaF in drinking- H_2O affected rats' teeth. Addition of CaCO₃ to the diet caused no change.

CH. ABS. (p)

Fluorine in drinking-water. See this vol., 316.

Effect of fluorine on calcium and phosphorus metabolism in albino rats. E. M. LANTZ and M. C. SMITH (Amer. J. Physiol., 1934, **109**, 645—654).— Growing rats fed with a complete diet containing 0·1% of NaF (I) retain less Ca and P than controls (II) on the same diet without NaF. With (I) in the diet the Ca : P retention ratio is < in (II). At 60 days of age Ca and P retention by (II) decrease suddenly, calcification having practically ceased. In (I) administration calcification extends over a longer period, so that in the older animals Ca and P retention is > in (II). (I) animals excrete more Ca and P in the faces than (II), and the Ca : P excretion ratio is > in (II). F probably interferes with Ca absorption.

R. N. C.

 kg. in all cases) of NaF affects neither the P metabolism nor the health whilst with oral administration (II), the blood-inorg. P (III) is 40% >, and the -total P (IV) is 25% <, the normal val., the resulting P balance (V) being -4%. Following (I) and (II) of KHF₂, 44·3 and 50% of ingested P are retained, respectively, the blood-P remaining approx. const. With (I) and (II) of NH₄HF₂, retention of P occurs; transient changes in (III) and (IV) are corr. so that a positive (V) is maintained. (I) of CaF₂ produces an increased urine-P and a (V) of $-5\cdot8\%$; during the succeeding control period, however, (V) falls to $-158\cdot75\%$ whilst the urine-P/fæces-P becomes 20:1, changes due to Ca^{**}. (II) of CaF₂ also produces a negative (V),(III) being increased and (IV) diminished. F. O. H.

Differentiation between photosensitised and ultra-violet effects on frogs. H. F. BLUM and C. R. SPEALMAN (Amer. J. Physiol., 1934, 109, 605—613).— Frogs are photosensitised by injecting with hæmatoporphyrin or dyes of the fluorescein group. In presence of O_2 , irradiation with visible light (I) destroys bacteria, protozoa, and enzymes, inactivates bacteriophage, toxins, and viruses, hæmolyses erythrocytes, stimulates skeletal muscle to contraction, and prevents clotting of blood. The effects are not produced in absence of O_2 , whether replaced by H_2 , N_2 , CO, or a vac. Irradiation of non-sensitised frogs with ultraviolet light produces the above effects in presence or absence of O_2 ; its action therefore differs essentially from that of (I). R. N. C.

Mitogenetic radiation. A. GURVITCH (Ann. Inst. Pasteur, 1935, 54, 259-267).—A lecture.

Mechanism of action of enzymes. S. J. PRZYŁĘCKI (Rocz. Chem., 1934, 14, 1377—1388).— The action of enzymes is explicable on the basis of purely chemical reasoning, without introduction of considerations of surface energy. R. T.

Activity of enzymes in living cells. A. OPARIN (Ergebn. Enzymforsch., 1934, 3, 57—72; Chem. Zentr., 1934, ii, 1633—1634).—Factors concerned in controlling enzymic activity in living cells and causing changes of activity on the death of the cells are discussed. A. G. P.

Enzyme production in transplanted loop of upper jejunum. H. B. PIERCE, E. S. NASSET, and J. R. MURLIN (J. Biol. Chem., 1934, 108, 239—249).— Variation of enzyme content for different and the same dogs is confirmed. Carbohydrases are the most active enzymes of succus entericus. Lipase and peptidase are present, but no definite proof of the presence of proteinase is found. H. T.

Enzyme-chemical method. R. WILLSTATTER and M. ROHDEWALD (Z. physiol. Chem., 1934, 229, 241—254).—A discussion. Points stressed are : the influence of the colloidal carrier on inhibition, activation, $p_{\rm H}$ -activity curve, and determination of enzymes; action of COMe₂, which produces less alteration than EtOH, action of glycerol, differentiation of lyo- and desmo-enzymes; individual differences in the enzyme content of animal organs. J. H. B.

Preparation in the pure state of the active grouping of the yellow enzyme. H. THEORELL (Biochem. Z., 1935, 275, 344–346).—The active group of Warburg's yellow respiration enzyme is a monophosphoric ester of a flavin. P. W. C.

Restriction by phosphate of the rate of reaction in Warburg and Christian's system. H. THEO. RELL (Biochem. Z., 1935, 275, 416–421; cf. A., 1932, 74).—The rate (I) of uptake of O_2 during the reaction is restricted by inorg. $PO_4^{\prime\prime\prime}$ (II); the degree of restriction inversely ∞ the concn. of (II). (I) ∞ the amount of intermediate enzyme (III) and the amount of co-enzyme (IV) but is independent of the initial concn. of hexose monophosphate (V). (II) affects the reducing but not the oxidising system. (III) is a phosphatase. In any reaction between (IV), (III), and (V), reversible elimination of $PO_4^{\prime\prime\prime}$ must occur. W. McC.

[Base from] co-enzyme preparations. O. WAR-BURG and W. CHRISTIAN (Biochem. Z., 1935, 275, 464; cf. this vol., 249).—The base $C_6H_6ON_2$ is nicotinamide. W. McC.

Effect of supersonic rays on enzymes. XLIII. Peroxidase reaction. M. MATSUDAIRA and A. SATO (Tôhoku J. Exp. Med., 1934, 22, 412—416).—Irradiation inactivates milk peroxidase, and also the catalases in blood and taka-diastase when greatly diluted. CH. ABS. (p)

Catalase and oxidative processes in animal tissues as possible factors in adaptation. H. S. HOPKINS (Biol. Bull., 1934, 67, 115—125).—In lamellibranchs the catalase content (I) of the muscle was higher in intertidal than in wholly submerged species. The O_2 consumption was approx. parallel to (I). CH. ABS. (p)

Laccase. VI. Purification by sodium carbonate and ammonium sulphate treatment. VII. By dialysis and adsorption. VIII. By ultrafiltration. IX. By combined methods. General conclusions. P. FLEURY and C. CAMPORA (Bull. Soc. Chim. biol., 1934, 16, 1589—1602, 1603— 1607, 1608—1616, 1617—1624).—VI. Defecation of lac juice with an equal vol. of N-Na₂CO₃ and pptn. of the laccase in the filtrate (I) with saturated aq. (NH₄)₂SO₄ at $p_{\rm H}$ 6·1 gives a ppt. (II) which contains 60% of the enzyme activity and only 5% of the Mn in (I).

VII. Dialysis and adsorption on Al(OH)₃ at $p_{\rm H}$ 44 followed by elution at $p_{\rm H}$ 9.5 is used to concentrate the laccase in (II).

VIII. By ultrafiltration of (II) at $p_{\rm H}$ 5.2 through collodion membranes the laccase is retained and cone. considerably, the final prep. being three times as active as the original juice and containing 1.2% of ash, 0.0066% of Mn, and no Fe.

IX. A summary.

A. L.

"Intermediate enzyme "from frog's muscle. T. WAGNER-JAUREGG, E. F. MÖLLER, and H. RAUEN (Z. physiol. Chem., 1935, 231, 55—61).—The dehydrogenation of *l*-malic acid by methylene-blue (I) in presence of frog-muscle extract (II), flavoprotein, and co-enzyme is only slightly inhibited by KCN. If (I) is replaced by air, the O_2 uptake proceeds at only one fourth the rate. In the dehydrogenation of hexosephosphoric acid (Neuberg ester) by (I) in presence of "intermediate enzyme" (III) of Warburg and Christian, (III) may be replaced by (II), although the activity is lowered. KCN does not inhibit the reaction. With O_2 as H acceptor, in the presence of (III) the reaction proceeds normally, but with (II) practically ceases. When (II) and (III) are both present, the action of (III) is greatly depressed; (II) must therefore contain inhibitors. J. H. B.

Dehydrogenase activities of the gastro-intestinal mucosa. S. SAKISAKA (Fukuoka Ik. Zasshi, 1934, 27, 415—426).—The dehydrogenase oxidises succinic and maleic (I) acids, glyceraldehyde, candiolin, histidine (II), and glutamic acid (III). The action on (II) and (III) is accelerated by presence of (I), but retarded by fumaric acid. CH. ABS. (p)

Non-production of acetonedicarboxylic acid from citrate by citricodehydrase. D. MÜLLER (Biochem. Z., 1935, 275, 347-349).—Citricodehydrase from cucumber seeds or from yeast does not convert citric acid into acetonedicarboxylic acid (cf. Langecker, A., 1934, 1251). W. McC.

Xanthine-oxidase. J. TOYAMA (Fukuoka Ik. Zasshi, 1933, 26, 1483—1499).—Xanthine-(I)-oxidase, isolated from milk, hydrolyses (I) and hypoxanthine (II). The optimum $p_{\rm H}$ of the enzyme is 8-0 and optimum temp. 40°. (I), (II), and aldehyde are oxidised. Inhibitory agents include Et₂O, CHCl₃, PhMe, glycerol, and salts of Ag, Cu, and Hg. Sunlight, ultra-violet, and Ra radiation inactivate the enzyme. CH. ABS. (p)

Reduction of dinitrophenols by redox indicators and enzymes. G. D. GREVILLE and K. G. STERN (Biochem. J., 1935, 29, 487–499).-Reductive titration of 4:6-dinitro-o-cresol (I) with $Na_2S_2O_4$ or Pd-H2, or oxidative titration with K3Fe(CN)6, or the mixing of equimol. amounts of 4-nitro-2-amino- (II) and 2: 4-dinitro-phenol (III), with or without addition of yeast cells, gave no evidence of the reversibility of the systems involved. (I) does not increase the O_2 uptake of erythrocytes. The reduction of (I) was followed by a series of potential indicators (A., 1923, ii, 285) from $E_h + 0.040$ to -0.270 volt; the rate of reduction is not determined solely by the p.d. of the indicator system. Formic dehydrogenase does not reduce (I) or (III) except in presence of benzyl-viologen (IV), Nile-blue, and Janus-green. (II) is isolated as a reduction product of (III). (IV) is first reduced by the dehydrogenase and the reduced (IV) reacts with (I) or (III). Xanthine-oxidase reduces (I) without indicators. Lactic dehydrogenase reduces (I) only in the presence of pyocyanin, toxoflavin, and anthraquinone-2-sulphonate. Succinic dehydrogenase does not reduce (II) in the presence of indicators. Unwashed rat muscle reduces (I) and more rapidly in the presence of (IV). H. D.

Enzymic equilibrium. K. P. JACOBSOHN and J. TAPADINHAS (Bull. Soc. Chim. biol., 1934, 16, 1637— 1644; cf. A., 1934, 693).—Previous results on the influence of glycerol (I) and (·CH₂·OH)₂ (II) on the equilibrium const. for liver fumarase-fumaric-malic acid systems are confirmed by gravimetric methods. Glucose, like (I) and (II), favours the formation of fumarate. A. L. Stabilisation of carboxylase solutions. O. VON SCHOENEBECK and C. NEUBERG (Biochem. Z., 1935, 275, 330—338).—The maceration extract is prepared by grinding together dry yeast with 3 times its wt. of 50% glycerol (1), digesting for 5 hr. at 37°, and clearing the fluid by centrifuging. The solution can then be kept for a month without loss of carboxylase (II), although after 3 days co-enzyme must be added to ferment sugar. (II) cannot be removed from (I) solution by the usual adsorbents. P. W. C.

Emulsin. XVIII. Fission of phenol- β -dglucoside 6-methyl ether by almond emulsin. B. HELFERICH and E. GÜNTHER (Z. physiol. Chem., 1935, 231, 62—64; cf. this vol., 250).—Fusion of β -d-glucose 6-Me ether tetra-acetate with PhOH and p-C₆H₄Me·SO₃H and hydrolysis of the product gave a mixture of phenol- α - and - β -d-glucoside 6-Me ether, from which 2 fractions containing respectively about 50% and 70% of the β -compound were obtained. Both fractions were slowly hydrolysed by almond emulsin (I), indicating that methylation of the 6-OH of the β -d-glucosides retards but does not prevent fission by (I). J. H. B.

Specificity of amylases. Action of amylases on starch hydroxyethyl ether. W. ZIESE (Z. physiol. Chem., 1934, 229, 213—218).—The ether is attacked by α - but not by β -amylase, even in presence of amylokinase (I). The decrease in viscosity of the solution is used as a measure of the reaction, since the changes in [α] and reducing power are negligible. The degradation of starch by pancreas-amylase (optimum $p_{\rm fl}$ 6·1—6·3) is accelerated by (I).

J. H. B.

Endo enzymes of tissue and glands. V. Amylases of liver and other organs. R. WILLSTÄTTER and M. ROHDEWALD (Z. physiol. Chem., 1934, 229, 255—268).—Liver (I), muscle (II), and pancreas (III) contain mixtures of the various lyo- and desmoamylases. (III) contains mainly lyo-amylase-III with some -I. Amylase-I, -II, -III, and -IV are all found in some samples of (I), although usually one or more is absent. (II) contains amylase-III and -I (with a little -IV in one case). The amylolytic activity does not remain const. On keeping the organ pulp in the cold, there is usually loss of -II and -IV. In the COMe₂-dried preps. -III predominates, whilst -IV decreases in comparison with the fresh material. The desmo-preps. from heart consist of mixtures of -I and -III, from (I) almost exclusively -I. J. H. B.

Mechanism of enzyme action. Role of neutral salts in the action of amylase on starch. E. BAUER (J. Chim. phys., 1934, 31, 535-552).— Theoretical. The consequences of various theories of enzymic action are analysed and discussed in the light of experimental results, particularly those of Trautmann and Ambard (A., 1934, 693). The conclusion reached is that the action consists in (1) establishment of a chemical or adsorption equilibrium between the anions (X') of the added salt and the enzyme (ϕ), (2) progressive diffusion of mols. of the substrate (S) towards the mols. formed in (1), giving a complex $\phi X'S$, and (3) hydrolysis of the complex, liberating ϕ or $\phi X'$. The influence of $p_{\rm H}$ is best interpreted by considering that ϕ behaves as an amphoteric ion. F. L. U.

Effect of certain chemicals on amylase activity. R. H. CLARK and H. I. EDWARDS (Trans. Roy. Soc. Canada, 1934, [iii], 28, III, 107—125; cf. A., 1932, 427).—The activity of many compounds which act as accelerators or inhibitors, or have little effect, on the enzymic activity of malt diastase in starch solution at $p_{\rm fl}$ 6·4 at 30° is studied. Often concn. is the determining factor, a higher concn. favouring inhibition. KCNS (I), CH₂Cl·CH₂·OH (II), and glycerol monochlorohydrin may either accelerate or inhibit. Halogen ions have the greatest effect; Cl' accelerates in low concn., I' inhibits the reaction (cf. A., 1931, 1455; 1933, 1215). Accelerating org. Cl-compounds probably owe their activity to a slight dissociation into Cl'. (I) and (II) also break the rest period in plants, which indicates that there may be a relationship between amylase activity and the breaking of dormancy. J. L. D.

Starch-amylase viscosimetry. I. Determination of amylolytic activity applicable to human serum. W. R. THOMPSON, R. TENNANT, and C. H. WIES (J. Biol. Chem., 1935, 108, 85-104).-As a basis for comparison of amylase digestion curves with starch-CaCl₂ substrates, determined viscosimetrically, the time, t, such that in the last $\frac{3}{4}$ of this time a 7.5% change in η has occurred is taken. A modified pantograph is used in the determination of t. Enzyme concn. $\propto 1/t$. Introduction of human serum into a pancreatin digestion mixture has a purely additive effect on amylase activity (I). Only small changes in t are produced by variations in CaCl₂. The relation between serum (I) and $p_{\rm H}$ is the same as for pancreatin solutions. H. D.

Validity of iodine and copper reduction methods for amylase. L. C. CHESLEY (Proc. Soc. Exp. Biol. Med., 1934, 31, 1097—1101).—The achromic I method with or without added Cl' and $PO_4^{\prime\prime\prime}$ buffer is unsatisfactory. The Cu method gives quant. results. Dextrin and 3 samples of sol. starch were saccharified at the same rate. CH. ABS. (p)

Determination of invertase activity. J. B. SUMNER and S. F. HOWELL (J. Biol. Chem., 1935, 108, 51-54).—Invertase activity is determined by incubation of the solution with sucrose in NaOAc buffer and subsequent addition of NaOH. The invert sugar is determined by the dinitrosalicylic acid method (A., 1925, i, 1491). H. D.

Relationship between $p_{\rm H}$ and source of different carbohydrases. E. HOFMANN (Biochem. Z., 1935, 275, 320—327).—The $p_{\rm H}$ optima of preps. of invertase, α - and β -glucosidase, and β -galactosidase obtained from yeasts, bacteria, and moulds are determined and tabulated together with results of other authors. With bacteria the optima are about 7 and with moulds at 4—5. P. W. C.

Biochemistry of carbohydrates. XII. β -Glycuronosidase. G. OSHIMA. XIII. Enzymic decomposition of glucosamine. I. KAWAKAMI (J. Biochem. Japan, 1934, 20, 361–370, 423–429).–XII. The content of β -glycuronosidase (I) (A., 1934, 675), as indicated by hydrolysis of mentholglycuronic

acid, in the skeletal muscle, intestinal mucosa, submaxillary gland, brain, uterus, heart, and pancreas of oxen (II) and dogs (III) is low. The lung, kidney, and liver of (II) have a moderate, and those of (III) a low, content of (I). The endocrine organs and spleen of both (II) and (III) are rich in (I), the action of which appears to be reversible.

XIII. Preps. from rabbit and ox liver or kidney hydrolyse glucosamine (optimum $p_{\rm fl}$ 6.7—7.7) yielding *d*-lactic acid (I) but not NH₃ or urea. The changes in the reducing val. indicate a fission into AcCHO by "glucosaminase" (this vol., 111) and a subsequent conversion into (I) by glyoxalase. F. O. H.

Glycolysis in brain tissue. C. A. ASHFORD (Biochem. J., 1934, 28, 2229—2236).—The glycolytic rate (I) of sliced rabbit brain (II) is 3 to 4 times that of the chopped tissue, and (I) is reduced when the NaHCO₃-CO₂ (III) buffer is replaced by PO₄^{'''} buffer (IV) at the same $p_{\rm H}$. Glycolysis of (II) in (III) is lowered by the presence of (IV). Inorg. PO₄ is rapidly liberated from (II) in (III), the rate of liberation being decreased by glucose and remaining unaffected by the concn. of F which inhibits (I). (II) can produce lactic acid from pyruvate and α glycerophosphate only to a small extent. A. L.

Enzymic degradation of mucoitinsulphuric acid. C. NEUBERG and W. CAHILL (Biochem. Z., 1935, 275, 328—329).—The enzymic prep. from *B. fluorescens non-liquefaciens* which was previously used to degrade chondroitinsulphuric acid (A., 1931, 875, 1089) also attacks mucoitinsulphuric acid, liberating 95% of the SO₄" and yielding a strongly reducing substance. P. W. C.

Phosphatases. V. Separation of the accompanying esterase from the liver-phosphoesterase active in the acidic region. E. BAMANN and K. DIEDERICHS (Ber., 1935, 68, [B], 6-7; cf. this vol., 251).—The separation depends on the ready destructibility of the esterase action by N-AcOH, to which the phosphoesterase (activity max. $p_{\rm H}$ 5.5) is remarkably stable. H. W.

Occurrence of two phosphoesterases differentiated by their optimum $p_{\rm H}$ in animal organs. E. BAMANN and E. RIEDEL (Z. physiol. Chem., 1934, 229, 125—150).—The phosphoesterase activity shown by autolysates from animal organs has a $p_{\rm H}$ optimum at 5—6 as well as at 9.5, indicating the probable presence of two distinct enzymes. The effect is shown, although not to an equal extent, with autolysates of pig's kidney and ox and pig liver. The $p_{\rm H}$ optima are somewhat affected by the degree of purity of the enzymes, but not by change of buffer or addition of Mg", although the activity at the higher $p_{\rm H}$ is enhanced by Mg". The kinetics in both acid and alkaline ranges has been studied. J. H. B.

Anaërobic decomposition of hexosephosphoric acids by animal tissues. I. N. ARIYAMA. II. Production of methylglyoxal from hexosediphosphoric acid by various tissues. S. NAKA-MURA (J. Biochem. Japan, 1934, 20, 371-381; 1935, 21, 9-18).—I. Hydrolysis of hexosediphosphoric acid by muscle extracts free from co-enzyme (*i.e.*, heated at 60° for 15 min.) does not produce lactic acid, > 90% of the dephosphorylated product appearing as AcCHO. The data indicate that such a process is not identical with that occurring during natural glycolysis (I) and that the postulation of AcCHO as the main intermediary in (I) is incorrect.

II. Autolysed tissues (brain, muscle, liver, kidney, spleen, bone, blood, rabbit's sarcoma, rat's carcinoma) produce triosephosphoric acid (especially brain and tumour) and AcCHO (especially muscle) from hexose diphosphate, reactions not related to the formation of lactic acid. F. O. H.

Decomposition of hexose diphosphate by an enzyme of tobacco leaves. T. BABA (Biochem. Z., 1935, 275, 248—252).—Enzyme preps. from tobacco leaves are able to decompose hexose into triose phosphate. P. W. C.

Enzymic equilibrium reaction between hexosediphosphoric acid and dihydroxyacetonephosphoric acid. IV. O. MEYERHOF and K. LOHMANN (Biochem. Z., 1935, 275, 430-432; cf. A., 1934, 1261).—As regards heat of reaction, experimental only agree with calc. results when vals. formerly given are multiplied by 2.4 (cf. Iwasaki, A., 1929, 354; Kobel *et al.*, *ibid.*, 398; Jacobsohn, this vol., 121). W. McC.

Hydrolysis of adenosinetriphosphoric acid by phosphomonoesterase and pyrophosphatase. T. SATOH (J. Biochem. Japan, 1935, 21, 19-36).-Mono- (I) and pyro-phosphatase (II) with $p_{\rm H}$ optima for each at 4.0 and 9.0 (A., 1932, 305; 1933, 426) hydrolyse adenosinetri- (adenylpyro-)phosphoric acid (III), indicating that there are present 1 mol. of H_3PO_4 as a mono-ester and 2 mols. as $H_4P_2O_7$ ester. The behaviour of complexes formed by treatment of adenylic acid and $H_4P_2O_7$ and the non-influence of (II)-activator on the dephosphorylation of (III) by (II) indicate the formula O < CH[adenine (7)] - CH OCH[CH₂·O·PO(OH)₂]·CHP'-CH·OH $[P'=\cdot 0\cdot PO(OH)\cdot 0\cdot PO(OH)_2]$ for (III). (II) at $p_{\rm H} 4$ dephosphorylates 50% of (III) in approx. 10 hr. at 37°. From such a hydrolysate adenosinediphosphoric acid (Ca salt), containing 2-H2PO4 groups and hydrolysed by (I) but not (II), can be isolated. (111)with (I) at $p_{\rm H}$ 9 and with addition of Mg[•] yields inosine- and not adenosine-pyrophosphoric acid. Prolonged hydrolysis by (I)+(II) yields adenylic acid. The specificity of enzyme preps. from pig's liver hydrolysing (III) but not glycero- or pyro-phosphoric acid could not be confirmed (A., 1933, 980). F. O. H.

Behaviour of mono- and di-phosphoglyceric acid with hæmolysed red cells and organ fluids. W. SCHUCHARDT and A. VERCELLONE (Biochem. Z., 1935, 275, 261).—Earlier work (A., 1934, 1242) on the breakdown of mono- (I) and di- (II) -phosphoglyceric acids to $AcCO_2H$ by hæmolysed erythrocytes is extended to the use of tissue juices. Here both (II) and (I) are attacked. Use of $PO_4^{\prime\prime\prime}$ buffer is undesirable, enzymic activity being inhibited thereby. P. W. C.

Comparison of the Jenner-Kay and Bodansky methods for determining phosphatase in plasma and serum. L. S. PALMER and J. W. NELSON (Proc. Soc. Exp. Biol. Med., 1934, 31, 1070-1073).—The two methods had approx. the same accuracy.

CH. ABS. (p)Determination of serum- and bile-phosphatase activity. E. J. KING and A. R. ARMSTRONG (Canad. Med. Assoc. J., 1934, 31, 376—381).—Ph₃PO₄ (I) is preferable to glyceryl phosphate as a substrate in determining phosphatase activity, since it is hydrolysed more rapidly and PhOH is easily determined. Serum or plasma (0.5 c.c.) is mixed with (I) and barbital, the mixture is maintained at 37° for 30 min., and proteins pptd. by the Folin–Ciocalteu reagent. After filtration Na₂CO₃ is added to the liquid and the blue colour compared with that of standard preps.

CH. ABS. (p)Acid-base catalysis and the action of esterase. E. A. SYM (Act. Biol. Exp. Warsaw, 1932, 7, 197— 219).—Comparison of the system alcohol-acid-ester-H₂O in the presence of esterase with that in presence of HCl leads to the assumption that H₂O can produce enzymic catalysis at the contact interface.

CH. ABS. (p)

Enzymic esterification. E. A. SYM (Rocz. Chem., 1934, 14, 1418—1424).—The initial velocity, v, of esterification (I) in the system oleic acid-Bu^oOH is expressed by $v=k_{\rm E}$ [oleic acid][Bu^oOH] when the reaction is catalysed by pancreatic esterase (II), and by $v=k_{\rm H}$ [oleic acid][Bu^oOH]⁴ in presence of picric acid catalyst. The val. of v for enzymic (I) in a no. of org. solvents (CCl₄, CHCl₃, CH₂Cl₂, C₆H₆, PhMe, xylene, PhCl, PhNO₂, NH₂Ph) is inversely \propto the dipole moment of the solvent. The reaction of (I) in presence of highly dehydrated (II) is autocatalytic, owing to activation of (II) by the H₂O produced. R. T.

Specificity and inhibition characteristics of liver-esterase and pancreas-lipase. H. H. R. WEBER and C. G. KING (J. Biol. Chem., 1935, 108, 131-139).-The inhibitory power (I) of Na salts of *n*-fatty acids towards lipase (II) is always very small, but their (I) towards esterase (III) increases up to Na laurate and then decreases almost to zero for the palmitate and stearate. Hexyl and octyl alcohols, which produce a greater lowering in surface tension than the corresponding Na soaps, have also a greater (I) than the latter. The (I) of unsaturated acids, both aliphatic and aromatic, is much > that of the corresponding saturated acids. The effect of o-substitution on the (I) of substituted BzOH is I>OH>Br, NO₂, or Cl (cf. A., 1932, 543, 1166). The Bu₁ ether of $(\cdot CH_2 \cdot OH)_2$ (IV) [unlike the Et₁ ethers of (IV) and $OH \cdot [CH_2]_4 \cdot OH]$ is fairly active against (III) but not against (II). The max. velocity of hydrolysis of the a-monoglycerides by (III), which occurred at monohexoin both in solution and in emulsions, is > the velocity for simple esters of monohydric alcohols. The less sol. β -monoglycerides are not acted on by (III), but both α - and β -monoglycerides are equally readily hydrolysed by (II). A. E. O.

Enzyme action. XLIX. Lipase actions of tissues of rachitic rats. K. G. FALK and G. McGUIRE (J. Biol. Chem., 1935, 108, 61-71; cf. A., 1926, 757).—There is no significant difference between the esterase activities of extracts from the livers and kidneys of normal (I) and rachitic rats (II); lung extracts from (II) hydrolysed butyrates less in relation to their hydrolysis of other esters than did extracts from (I). H. D.

Biological chemistry of zinc. II. Effect of zinc salts on hydrolysis of triacetin by pancreatic lipase. III. Influence of zinc salts on the activity of salivary diastase. M. ANDREIT-CHEVA (Bull. Soc. Chim. biol., 1934, 16, 1730-1755, 1756-1760).-II. The inhibitory effect of ZnSO₄ (I) on the hydrolysis of triacetin (II) by pancreatic lipase decreases with decreasing amounts of (I), but the inhibitory effect of $Zn(NO_3)_2$ (III) is not quite so marked. Whilst 0.1N-Ca $(NO_3)_2$ inhibits (II) hydrolysis, at a concn. of 0.02N and 0.01N there is an accelerating action.

III. For a given $p_{\rm H}$ the effect of (III) on the action of salivary diastase (IV) ∞ the conen. of (III). At 0.05N concn., however, the action of (IV) is completely inhibited at all $p_{\rm fr}$ vals. At neutrality (III) even in small concn. inhibits the (IV) action, but in acid solution small quantities have an accelerating action which reaches a max. at $p_{\rm H}$ 4.8 with 0 0025N-(III).

A. L.

Acid-alkali equilibrium and acid-base coefficient. I. A. SMORODINCEV and L. A. PHILIPPOVA (J. Biochem. Japan, 1935, 21, 1-7).-The application of A/B, the acid-base coeff. (I) (A., 1933, 253), to biochemical systems is discussed. During autolysis of ox-muscle, B decreases, attaining a min. 24-28 hr. after death, whilst A rapidly increases, attaining a max. 24-48 hr. after death. Both A and B attain approx. const. vals. after 72 hr., (I) reaching a max. after 4 hr., after which it abruptly sinks and attains a const. val. approx. thrice that occurring 1 hr. after death. F. O. H.

Digestion in the plaice (Pleuronectes platessa). L. E. BAYLISS (J. Marine Biol. Assoc., 1935, 20, 73-91).-A 0.1N-HCl extract of the mucous membrane of the stomach contains a proteolytic enzyme, optimum $p_{\rm ff}$ 1.5—2.5, probably pepsin. The intestinal mucosa contains trypsin, erepsin, and a polypeptidase with optimum $p_{\rm H}$ 7.5-8.5; the liver is an even more potent source of trypsin. The liver, gall-bladder, and intestine also contain lipase and amylase, the first being the most potent source. No proteolytic enzyme was demonstrated in the bile even after administration of pilocarpine. Digestion of fats and carbohydrates does not take place in the stomach.

P. G. M.

Influence of toluene on the activity of pepsin and trypsin. Y. L. WANG (J. Chinese Chem. Soc., 1934, 2, 340-342).-PhMe decreases the action of pepsin on caseinogen, but has only slight effect on that of trypsin. R. S. C.

Influence of iron compounds on proteolytic and peptolytic processes. E. MASCHMANN and E. HELMERT (Z. physiol. Chem., 1935, 231, 51-54).-Fe" accelerates the action of crude and inhibits that of purified papain or gelatin (cf. this vol., 122). K_4 Fe(CN)₆ is an immediate activator which does not combine with the concomitant; K3Fe(CN)6 inhibits slightly. Hæmoglobin-Fe has a strong activating effect. Similar effects are shown with gelatinpeptone as substrate. J. H. B.

Labile glutamine peptides, and the origin of the ammonia set free during the enzymic digestion of proteins. J. MELVILLE (Biochem. J., 1935, 29, 179-186).-N-Benzylcarbonato-d-α-glutamylglyc-ine Et ester, m.p. 124° [in 47% yield from Nbenzylcarbonato-d-glutamic anhydride (I) (A., 1932, 935) and glycine Et ester], was converted into the acid chloride (by PCl₅), which, with NH₃, yielded N-benzylcarbonato-d-glutaminylglycine Et ester, m.p. 167°, hydrolysed by cold aq. NaOH to N-benzyl-carbonato-d-glutaminylglycine. Catalytic reduction of the latter yielded d-glutaminylglycine (II), $[\alpha]_{D}^{18} + 76^{\circ}$ in H₂O. d-Glutaminyl-d-glutamic acid (III), $[\alpha]_{D}^{18}$ +15° in N-HCl, was similarly prepared from Et₂ N-benzylcarbonato-d-a-glutamyl-d-glutamate (A., 1932, 935), the intermediates being Et_2 N-benzyl-carbonato-d-glutaminyl-d-glutamate, m.p. 181°, and N-benzylcarbonato-d-glutaminyl-d-glutamic acid. The tripeptide d-glutaminylglycylglycine (IV) was also prepared (but not completely purified) starting from glycylglycine Et ester, which with (I) gave N-benzyl-carbonato-d- α -glutamylglycylglycine Et ester, m.p. 136°, converted in the usual way into N-benzylcarbonato-d-glutaminylglycylglycine Et ester, m.p. 150-152°, which was then hydrolysed and reduced catalytically. d-isoGlutamine prepared by the method of Bergmann and Zervas (A., 1932, 935) contains some d-glutamine (V), and when the anhydride ring of (I) is opened by NH_3 (and perhaps also by NH_2 -acid esters), both α and y-amides are formed (about 17% y-amide). The peptides (II), (III), and (IV) all exhibit the labile characters of (V). All give abnormally high NH_2 -N (Van Slyke) and are unstable in aq. solution at 100°. At 37°, and at $p_{\rm H}$ vals. of 1.8, 7.0, 7.8, and 8.3, rapid hydrolysis of the amide group of (V) takes place, especially at $p_{\rm H}$ 1.8 when 80% is liberated as NH₃ in 2 days. (III) behaves similarly at $p_{\rm H}$ 8.3, so that it is probable that NH₃ formed during the digestion of proteins by pepsin, aminopolypeptidase, dipeptidase, and trypsin comes from the spontaneous breakdown of (V) and labile peptides containing (V). During the breakdown the liberated glutamic acid is rapidly transformed into pyrrolidonecarboxylic acid, even at 37°. (II), (III), and (IV) are readily hydrolysed by yeast peptidases. A. E. O.

Technique for study of tryptic-ereptic digestion of proteins. B. SURE, M. C. KIK, and K. S. BUCHANAN (J. Biol. Chem., 1935, 108, 11-18).—The stomach, pancreas (I), small intestine, and liver of the rat are extracted with glycerol and H₂O, the extracts are incubated with caseinogen at $p_{\rm H}$ 7, and NH₂-N is determined from time to time. The rate of tryptic-ereptic digestion increases with increasing concn. of the extracts. Extracts of (I) show considerable tryptic activity. H. D.

Behaviour of oxidising agents towards purified arginase. G. KLEIN and W. ZIESE (Z. physiol. Chem., 1934, 229, 209-212).-Although crude arginase (I) is inhibited by O_2 , pure (I) is quite insensitive to mol. O2 and is activated by traces of oxidising agents, such as KMnO4, H.O., I-KI, and K₂S₂O₈. It is inhibited by SH-compounds which activate crude (I). J. H. B.

Temperature coefficient and apparent energy of activation of the enzymic hydrolysis of arginine; stability of arginase under various conditions. A. HUNTER (Quart. J. Exp. Physiol., 1934, 24, 177-188) .- The temp. coeff. of the argininearginase reaction decreases with rising p_{II} . The enzyme is very susceptible to heat in alkaline media, and shows max. stability near to neutrality.

CH. ABS. (p)

Uricase. I, II, III. Resynthesis of uric acid from its cleavage products by uricase. IV. Effect of inanition on the uricolytic activity of liver extract. R. OIKAWA (Sei-i-kwai Med. J., 1933, 52, 1-24, 25-38, 38-42, 43-49).-I. Uricase (I) from rabbit liver has optimum $p_{\rm H}$ 7.1—7.2, optimum temp. 48°, is destroyed at 70°, is active in O2, less in N_2 , and inactive in CO₂, CO, and H₂. Autolysis does not affect activity.

II. Factors influencing activity of liver-(I) have no effect on the enzyme in vitro. Large dosages of uric acid (II) to the animal increase (I) and (II) in the liver. Allantoin (but not urea) inhibits activity. III. No evidence of resynthesis was obtained.

IV. Increased activity was observed after prolonged periods of starvation. CH. ABS. (p)

Influence of viscosity of the medium on the velocity of oxidation of uric acid in presence of insoluble uricase. R. TRUSZKOWSKI and Z. CHAJ-KINÓWNA (Rocz. Chem., 1934, 14, 1389-1395).-No relationship exists between the viscosity of the medium (aq. glycerol, sucrose, or gelatin) and the velocity of oxidation of uric acid in presence of insol. ox-kidney uricase. At above certain critical concns., % retardation of reaction ∞ the concn. of the solutes. R. T.

Metabolism, respiration, and gaseous exchange m yeast cells during the growth of yeast by the aeration method. H. CLAASSEN (Biochem. Z., 1935, 275, 350-360; cf. A., 1931, 263).-Equations (I) are given for the changes which occur during the process when the nutrient medium contains only sugar, NH₄ compounds, and salts. On the basis of (1) it is found that for the production of 100 parts of yeast (II) 80 parts of O_2 are required and 144 parts of CO_2 are liberated. Most of the O_2 is consumed in oxidising H in degradation products of the sugar and in NH3, whilst the greater part of the CO_2 is a fermentation (III) product. Since very dil. solutions are involved, the great production of (II) occurs only because of the very large surface of the (II) cells; this permits diffusion even when differences in concn. are very low. The factors which control the uptake of nutrient material and of O_2 at various stages during (III) are discussed.

W. McC. Respiration of yeast in water containing deuterium oxide. G. W. TAYLOR and E. N. HARVEY (Proc. Soc. Exp. Biol. Med., 1934, 31, 954-957).-The O_2 consumption was decreased by concess of $H_{20} > 20\%$ CH. ABS. (p)

Factors influencing autolysis of yeast cells. W. A. BELITZER (Protoplasma, 1934, 22, 17-21).-The sugar content of yeast cells becomes the limiting factor in autolysis. Effects of mechanical injury to

cells are examined in relation to the simultaneous increase in glycogen hydrolysis. A. G. P.

Respiratory action of nitrophenols. L. PLAN-TEFOL (Compt. rend. Soc. Biol., 1934, 117, 1167-1169).-Contrary to Genevois and Saric (this vol., 253), 2:4-dinitrophenol increases the respiration of brewer's yeast, the optimum concn. being 0.18-0.36 g. per litre of medium. R. N. C.

Effect of certain salts on enzyme activity. Effect of sodium selenate, selenite, selenide, tellurite, sulphate, sulphide, arsenite, and vanadate on rate of carbon dioxide production during yeast fermentation. A. L. MOXON and K. W. FRANKE (Ind. Eng. Chem., 1935, 27, 77-81).-The toxicity of the above compounds decreases in the order So, V, As, Te. The toxicity of SeO₃", Se", and SeO₄" decreases in that order. S" and SO₃" ac-celerate fermentation *pari passu* with the H₂S formed thereby. Na₂SO₄ has a slight retarding effect. Na₂S counteracts the toxic effect (T) of Se compounds. S has no accelerating effect and little counteracting effect on T. No SO (NH) SO counteracting effect on T. Na_2SO_4 , $(NH_4)_2SO_4$, and $Na_2S_2O_3$ do not counteract T. **E**. C. S.

Wildier's bios. W. L. MILLER (Trans. Roy. Soc. Canada, 1934, [iii], 28, III, 185-187).-Bios IIA (purification described), an aminohydroxybutyric acid (I) (cf. A., 1926, 749), when added [0.02 mg. of (I) per c.c. of culture medium] to sugar solution containing excess of inositol and bios IIB and Clark's salts, increases the yeast crop 4-5 times. Some yeasts give no crop under these conditions, but only when tomato or lemon juice is added. This effect is not due to vitamin-C. J. L. D.

Physiology of micro-organisms, Fusarium betæ, Macrosporium commune, and Verticillium lateritium. O. I. KUPLENSKAJA (Trans. Central Sci. Res. Inst. Sugar Ind. U.S.S.R., 1933, No. 12, 54-63).—F. betæ inverts sucrose (I) and utilises the products with the production of EtOH and org. acids. It decomposes pectins, and tolerates $p_{\rm H}$ $2 \cdot 5 - 9 \cdot 0$. It is resistant to antiseptics and is but little affected by low temp. M. commune inverts (I) but consumes products more slowly, and is not greatly affected by changes of temp. The p_{π} range $3\cdot 5 - 3\cdot 2$ is suitable for growth. V. lateritium inverts (I) and is sensitive to changes of temp. and $p_{\rm H}$. CH. ABS. (p)

Phases of the metabolism of Tricophyton interdigitale, Priestley. D. R. GODDARD (J. Infec. Dis., 1934, 54, 149-163).-Glucose (I), mannose, fructose, maltose, arabinose, and, to a smaller extent, sucrose favour the growth of T. interdigitale (II) and M. lanosum (III). Galactose increases growth of (II) but not of (III). Neither species uses lactose. (I) decreases protein hydrolysis in (II) without affecting NH₃ production. Caseinogen supports growth and is hydrolysed finally to NH3. During hydrolysis of peptone (IV) the initial increase in NH₂-acids is followed by decline with simultaneous increase in NH_3 and p_{π} . The latter changes are not affected by (I). In (I)-(IV) media, curves showing NH₃ and (I) formation and growth rate are of similar forms during the period of exponential growth.

CH. ABS. (p)

Chemistry of sclerotia of *Pachyma hoelen*, Rumph. IV. Comparison of β -pachyman with other related carbohydrates. V. Nutrient value of pachyman. K. TAKEDA (J. Agric. Chem. Soc. Japan, 1934, 10, 679–684, 685–690).—IV. β -Pachyman (I) resembles pectose or pachymose, but differs from fongose (II), callose, or paradextran. (II) from *A. niger* is separable into 2 fractions having $[\alpha]_{10}^{20}$ +219·33° and +268·0°, respectively.

V. (I) has low nutritive val. for rats.

Сн. Авз. (р)

Identification of a fungal carotenoid. W. H. SCHOPFER (Compt. rend. Soc. Biol., 1935, 118, 3-5).—Mucor hiemalis and Phycomyces blakesleeanus grown on media containing asparagine or glycine as N source synthesise β -carotene (I) (identified by its absorption spectrum). The presence of 1×10^{-6} g. of vitamin- B_1 per c.c. in the medium inhibits (I) formation, and the synthesis occurs to a greater extent in the mycelium of the (+) sex. A. L.

Effect of growth-factors on some Mucorinew. W. SCHOFFER (Ber. deut. bot. Ges., 1934, 52, 560— 563).—Differences between the growth-promoting action of wheat extract and that of vitamin-B on certain fungi are examined. A. G. P.

Effect of mineral constituents in the medium on acid production by Aspergillus niger. W. S. BUTKEVITSCH and A. G. TIMOFEEVA (Biochem. Z., 1935, 275, 405—415).—When growth (I) of the mould is checked by relative lack of (combined) P, S, or N in the nutrient medium accumulation of citric acid (II) occurs, the yield of (II) from sugar being high. With lack of N or P, accumulation of gluconic acid (III) and $H_2C_2O_4$ is restricted but the accumulation of (III) and $H_2C_2O_4$ increases with lack of S. Limitation of (I) due to lack of K or Mg leads to reduction in (II) production and in yield of (II) from sugar. (II) almost disappears when there is simultaneous lack of K and Mg. Lack of Mg causes reduction in accumulation of (III) and $H_2C_2O_4$, but lack of K causes large increase in $H_2C_2O_4$ production and smaller increase in (III) production.

W. McC.

Constitution of carolic and carolinic acids.— See this vol., 327.

Use of developed mycelia in the study of the physiology of moulds. D. BACH (Bull. Soc. Chim. biol., 1934, 16, 1708—1719).—The mycelium is allowed to develop on a suitable liquid medium which is then withdrawn, the culture being washed and placed in the experimental nutrient medium. A. L.

Photosynthetic organisms. G. R. CLEMO and H. MCILWAIN (Chem. and Ind., 1935, 134).—A porphyrin has been obtained from organisms of the chromatium type, and has been found to contain Mg. It also yields a cryst. ester. P. G. M.

Biochemical processes in deep-sea mud. T. GINSBURG-KARAGITSCHEVA and K. RODIONOVA (Biochem. Z., 1935, 275, 396-404).—The org. matter of mud from the floor of the Black Sea (depths 177-1920 m.) contains up to 10% of material (C 75-80, H 10-12, S 5-12, O 2-10%; m.p. 55-78°; average mol. wt. 344-512) sol. in org. solvents and consisting

chiefly of bituminous substances (hydrocarbons). Microflora (I) which reduce SO_4'' to H_2S and degrade cellulose, fats, and proteins are present. Those which attack fats and fatty acids decrease the I val. and increase the amount of unsaponifiable matter. The properties of (I) indicate close relationship to (I) of oil-bearing strata in N. Caucasus and in other oilproducing districts of the U.S.S.R. W. McC.

Distribution and conditions of existence of bacteria in the sea. S. A. WAKSMAN (Ecol. Monog., 1934, 4, 523—529).—Development of marine bacteria depends on the distribution and nature of org. matter and essential nutrients and on the presence of energy sources, e.g., H_2S , S, H_2 , NH_3 , NO_2 , and CH_4 .

Сн. Авз. (р)

Marine bacteria and their role in the cycle of life in the sea. II. Bacteria concerned in the nitrogen cycle. S. A. WARSMAN, M. HOTCHKISS, and C. L. CAREY (Biol. Bull., 1933, 75, 137-167).— Distribution of nitrifying, denitrifying, and N-fixing marine organisms is examined. CH. ABS. (p)

I. Conditions of life in the ocean. II. Conditions at great depths. A. KROGH (Ecol. Monog., 1934, 4, 421-429, 430-439).—I. Distribution of N. P. and org. matter is discussed in relation to the life of marine micro-organisms.

II. Vertical distribution of total and NH_3 -N and C is examined. The average content of org. N and org. C was approx. const. at all depths. CH. ABS. (p)

Interrelations between higher plants and micro-organisms. A. ISAKOVA (Bull. Acad. Sci. U.S.S.R., 1934, 7, 993—1006).—The distribution of micro-organisms in soil surrounding plant roots is examined. The decomp. of org. matter is effected by groups of organisms which are characteristic for each plant species. A. G. P.

Metabolism of purple sulphur bacteria. P.A. ROELOFSEN (Proc. K. Akad. Wetensch. Amsterdam, 1934, 37, 660-669).—The evolution of CO₂ by the bacteria (I) in media containing inorg. salts at 30° and in H₂ or $N_2 + CO_2$ is due to auto-fermentation (II), which can be reduced by 70% by prior keeping in the dark at 35° for 24 hr. and is not increased by addition of org. substances, nor influenced by Na₂SO₄ (cf. A., 1934, 698). In the dark (I) absorb H_2 (the rate of uptake $\propto [CO_2]$ and is increased by light) but do not thrive when $H_2 + CO_2$ is the only assimilable substrate. O_2 is rapidly absorbed (not due to respiration). After keeping in the dark (I) take up CO₂ rapidly for a short time and then slowly during the period of illumination. The supplementing of the H donator (111) from (II) by oxidisable S compounds, but not by glucose, acetate, butyrate, or malate, increases the CO_2 uptake. (I) grown in light of 590 mu can oxidise $Na_2S_2O_3$. (I) grown in peptone broth produce, in the dark, gas containing 8-30% of H_2 ; with such strains Na malate acts as (III) for the assimilation of CO_2 in the dark. The changes in oxidation-reduction potential of suspensions (IV) of (I) with variations in light. concn. of (III), etc. indicate that (IV) behave as a F. O. H. photo-electric half-cell.

Metabolism of purple bacteria. II. H. GAFF-RON (Biochem. Z., 1935, 275, 301-319).—Purple S bacteria (I) can utilise the energy of infra-red light. (I) contain catalase and can utilise O_2 . The CO_2 assimilation of (I) during anaërobic growth is investigated in presence of salts of a no. of fatty acids and the increase of assimilation val. with mol. size (cf. A., 1933, 639) confirmed. The brown bacteria which accompany (I) behave very similarly to (I). (I) in an atm. of H₂ can reduce CO_2 , NO_3' , acetate, lactate, pyruvate, and glycollate. P. W. C.

Respiration of acetone bacteria and bacterial autolysis. O. EHRISMANN (Z. Hyg., 1934, 116, 490—494).—The sp. action of pyocyanin and methylene-blue on the respiration of active bacteria is also produced by a no. of redox (I) indicators. The intensity of the action is related to the (I) potential and solubility of the dye, its constitution (notably the no. of sulpho-groups), and in a smaller degree to the velocity of re-oxidation and the electrolyte content of the medium. The enzyme system of *Gonococcus* occurs in other species of bacteria. A. G. P.

Citric acid fermentation. H. EMDE (Biochem. Z., 1935, 275, 373—374; cf. Apoth.-Ztg., 1932, 47, 1418, 1433).—The production of citric acid (I) from quinic acid (II) by oxidation (Fischer *et al.*, A., 1934, 1222) supports the view that (II) is an intermediate in the fermentative conversion of sugars into (I).

W. McC.

Biochemistry of bacilli of the coli-aërogenes group in milk. I. LIPSKA (Lait, 1934, 14, 673-683; Chem. Zentr., 1934, ii, 1861).—Classification of the organisms by chemical activities is examined. Fermentation tests, indole production, and the Voges-Proskauer reaction are the most characteristic.

A. G. P.

Oxidation-reduction studies of growth and differentiation of species of Brucella. C. D. TUTTLE and I. F. HUDDLESON (J. Infec. Dis., 1934, 54, 259-272).—Graphite electrodes may be utilised for determining E_h in liquid media under aerobic conditions. Change of E_h during incubation of cultures of different species of Brucella are recorded.

CH. ABS. (p)

Oxidation-reduction potentials of toxoflavin. K. G. STERN (Biochem. J., 1935, 29, 500-508).-Toxoflavin (I) (A., 1934, 537) is titrated oxidatively and reductively as previously described (A., 1934, 846). The system is fully reversible and electroactive between $p_{\rm H}$ 4 and 8; E_h at $p_{\rm H}$ 7 is -0.049 volt. The $E_h - p_H$ curve reveals two dissociation consts. pK 5.8 and 7.2. Individual titration curves are atypical in that the index p.d. averages 21 mv. between $p_{\rm H}$ 4.6 and 6.4 and rises to 34 mv. at $p_{\rm H}$ 8.3. No evidence of semiquinone formation during reduction is obtained. The theoretical treatments of Michaelis (A., 1933, 611) and of Elema (A., 1933, 464) are applied on the basis that a two-stage reduction occurs, and vals., agreeing well, for a const. related to the stability of the intermediate compound are obtained by the two methods. The ultra-violet absorption spectrum of (I) at $p_{\rm H}$ 6.5 has a steep band at 260 m μ and a lower band at 405 mu. Keeping at $p_{\rm H}$ 3 or 11 destroys the sp. absorption. (I) stimulates respiration of mammalian erythrocytes and converts oxy- into met-hæmoglobin. H. D.

Proteolytic and deaminising enzymes of Clostridium sporogenes and Cl. histolyticum. O. A. BESSEY and C. G. KING (J. Infect. Dis., 1934, 54, 123—127).—Proteolytic activity in filtrates or suspensions of Cl. histolyticum (I) is > that of Cl. sporogenes. The two proteases are similar, having optimum $p_{\rm H}$ 7.5 and producing mainly polypeptides. The deaminising enzyme of (I) is the less active. In both cases there is marked specificity of action in respect of NH₂-acids. CH. ABS. (p)

Tubercle bacillus. II. Fractional extraction of lipins from fresh unheated bacilli. M. MACHE-BEUF, J. DIERYCK, and R. STOOP (Ann. Inst. Pasteur, 1935, 54, 71-85).-COMe₂ extraction at $> 20^{\circ}$ in vac. yields a fraction (I) (17.2%) containing no P, with no acid-resisting properties, and devoid of "hapten" activity. (I) contains a large proportion of fats and unsaponifiable matter. Further extraction of the residue with cold Et_2O yields a fraction (II) (2.2%) which also contains no P, hapten sub-stances, or acid-resistant material. EtOH affects certain complexes present so that even cold Et₂O will extract phospholipins. Cold MeOH in vac. extracts a fraction (III) (6.13% of dried bacilli) which contains phospholipins (2.05%) of dried bacilli), and possesses powerful hapten activity without acid-resisting properties. Further extraction of the residue with boiling EtOH yields a product which can be divided into two fractions (IV) and (V), and finally, boiling C_6H_6 extracts fraction (VI). (IV), (V), and (VI) contain P, whilst only (V) and (VI) contain acid-resisting substances. P. G. M.

(A) Preparation and properties of "acid wax" from human tubercle bacilli. (B) Fatty acids of human tubercle bacilli. F. ULZER and H. GRUBER (Wiss. Mitt. österr. Heilmittelstelle, 1934, 12, 1–2, 4–6; Chem. Zentr., 1934, ii, 1474, 1475; cf. A., 1930, 1478).—(A) The mixture of Et_2O -sol. lipoid constituents obtained by acid hydrolysis of tubercle bacilli is termed "acid wax" (I). H_2SO_4 yields 21% of (I), m.p. 40–41°, acid val. 55–70, esterification no. 112–117, I val. 16·4–18·0.

(B) 10 g. of (I) yield 3.5 g. of mixed fatty acids (54%) solid, 46% liquid). The solid contains a *cerotic acid*, $C_{26}H_{52}O_2$, m.p. 80°, stearic and palmitic acids. The liquid has I val. 27 and probably consists of oleic acid with considerable amounts of saturated acids of high mol. wt. H. N. R.

Sterol content of bacteria, especially tubercle bacillus. Detection of cholesterol. E. HECHT (Z. physiol. Chem., 1935, 231, 29–38).—Sterols were detected in the light petroleum extract of the dried bodies of various acid-fast bacteria (I) grown on sterol-free media. (I) included human tubercle, "Bethge," bovine tubercle, "GA," strain "BCG," and timothy-grass bacilli. J. H. B.

Inhibitory action of sulphur on the growth of tubercle bacilli. G. B. LAWSON (Amer. Rev. Tuberc., 1934, 29, 650-651).—Addition of S in amounts ≤ 3 mg. per 100 c.c. of medium inhibited the growth of the organism. No increase in the $p_{\rm H}$ of the medium occurred with dosages up to 30 mg. CH. ABS. (p)

Media suitable for the culture of the tubercle bacillus. A. BERTHELOT, F. VAN DEINSE, and G. AMOUREUX (Bull. Soc. Chim. biol., 1934, 16, 1571— 1574).—The prep. of media containing AcCO₂H suitable for culturing tubercle bacilli is described. A. L.

Purification of tuberculin. G. A. C. GOUGH (Brit. J. Exp. Path., 1934, 15, 237-242).

Сн. Авз. (р)

Behaviour of blood-cholesterol following injections of tuberculin. K. KATO (Proc. Soc. Exp. Biol. Med., 1934, **32**, 12—13).—Injection of old tuberculin into rabbits produces an immediate increase in blood-cholesterol, followed in some cases by a fall below normal; all cases return to normal within a week. R. N. C.

Influence of nutritive conditions on acidfastness of bacteria. D. W. BRUNER (J. Infec. Dis., 1934, 55, 26-38).—Acid-fastness could not be induced in non-acid-fast (I) organisms by supplying fatty materials in media, but temporary (I) types of acid-fast bacilli were produced by starvation.

Сн. Авз. (р)

Application of the Ramon method to the titration of antibacterial sera. N. KOSSOVITCH (Compt. rend. Soc. Biol., 1934, 117, 1162—1165).—The method, applied to a mixture of the filtrate from a culture of anthrax bacilli and the corresponding antiserum, shows a very clear "initial flocculation zone," analogous to that for toxins and antitoxins. R. N. C.

Anticoagulant action of glucose and sucrose from the point of view of the study of the thermostability of the properties of antispirochætal sera. G. J. STEFANOPOULO and E. BÜDING (Compt. rend. Soc. Biol., 1934, 117, 1173—1175).—Addition of glucose to antispirochætal sera stabilises their agglutinating and lytic properties to warming at 90° for considerable periods, the length of which increases with the quantity of glucose added. Sucrose is even more effective, the sera being similarly resistant at 100°. R. N. C.

Relation of the potential and charge of bacteria to their agglutination. H. A. ABRAMSON (Trans. Electrochem. Soc., 1934, 66, 335-343).—During coagulation by simple salts the net surface charge of particles is not, in general, decreased; it is rather the surface potential, ζ , which is lowered while the surface charge usually increases. For proteins (cf. A., 1933, 567) the surface density of net charge, σ , frequently seems to depend primarily on the p_{Π} val., and there is, therefore, no max. in the ζ -concn. curve unless the total salt concn. itself also influences σ . The process of bacterial agglutination by salts and immune sera is discussed on the basis of these considerations. H. J. T. E.

Pigment elaborated by the diphtheria bacillus. M. PAIÓ and M. PHILIPPE (Compt. rend., 1935, 200, 173-175).—A culture of the bacillus at 0° changes in colour from brown to yellow [the bacillus having elaborated a pigment (I) which probably contains the pyrrole group], the original absorption band decreasing in intensity about 70%, although there is no diminution in toxicity. Atoxic diphtheria bacilli do not elaborate (I), nor do paratyphoid, tetanus, dysentery, and staphylococcal bacilli. (I) is partly dialysable, whereas the toxic element is much more indiffusible. J. L. D.

Influence of compounds of the moranyl series on the structure of colloids. Influence of compounds of the moranyl series on diphtheria toxin. H. GOLDIE (Compt. rend. Soc. Biol., 1935, 118, 38-42, 42-45). 1:4:6:8- NH_2 ·C₁₀H₄(SO₃Na)₃ (I) in the free state or combined with other groups ppts. serum-globulin at $p_{\rm H}$ 4—5. Only complexes of (I) such as "moranyl" (II), "inverse moranyl" (III), and "benzoyl-benzoyl" (IV) ppt. Fe(OH)₂ in acid medium. Of these substances only (II) produces a marked fluorescence in alkaline solutions of gonacrine, and only (III) will ppt. colloidal NaCl. (I) has only a slightly reducing action on the activity of diphtheria toxin and its pptn. by acid, and has no action on acid solutions of pig-stomach broth (V) or peptone (VI). (II), (III), and (IV) cause at $p_{\rm H}$ 4-5 a rapid pptn. of the toxin, the anatoxin, (V), and (VI). The action of (III) and (IV) on the activity of the toxin and the antigen, unlike that of (II), which is considerable, is similar to that of (I), although both reduce greatly the power of flocculation.

A. L. Influence of cysteine on production of hæmotoxin of *Cl. welchii.* J. H. ORR and G. B. REED (Canad. J. Res., 1934, 11, 622—627; cf. A., 1929, 474).—Addition of H_2S or of < 0.1% of cysteine (I) to Robertson's chopped-meat media completely inhibits the production of hæmotoxin (II) by *Cl.* welchii. The effect is related to the metabolism of the organism, and not to direct reaction with (II). Addition of these concess of (I) has little effect on the oxidation-reduction potential of the media, but has a marked effect on that of cultures during the most active period of growth. Beef-muscle media [with low % of cystine (III)] give a good yield of (II); fish-muscle media [with high % of (III)] give a poor yield. E. C. S.

Growth-stimulating properties of cystine and tryptophan. W. BURROWS (J. Infect. Dis., 1934, 54, 164—170).—Among 16 NH_2 -acids examined cystine and tryptophan alone exerted a stimulatory action on the growth of *Cl. botulinum* on glucose media containing hydrolysed caseinogen and gelatin.

CH. ABS. (p)Carbohydrate nature of pantothenic acid (Williams). A. J. SALLE and R. W. DUNN (Proc. Soc. Exp. Biol. Med., 1934, 32, 168—172; cf. A., 1933, 982).—Rice-bran extract contains a substance (I) which stimulates the growth of *Escherichia coli*, but not of *B. alcaligenes fæcalis*. Growth is accompanied by production of acid and gas, as for carbohydrates, but growth does not tend to a max., and $p_{\rm H}$ falls more rapidly with increasing concn. of (I) than with glucose (II). Stimulation by (I) and (II) together is not cumulative, and the final $p_{\rm H}$ increases with concn. (I) is therefore not a hexose, and is probably pantothenic acid. R. N. C.

Solid brilliant-green lactose bile medium for direct plating with results in seventeen hours. R. E. NOBLE and F. O. TONNEY (J. Amer. Water Works Assoc., 1935, 27, 108—120).—A solid medium described is a trustworthy substitute for liquid brilliantgreen lactose bile, although the productivity of both liquid and solid media was about 65% that of standard lactose broth (I). On the other hand, ferrocyanide citrate agar was 15% more productive than (I). The short incubation period required with the new medium gives sp. information on the incidence of coli-aerogenes organisms more quickly and accurately than liquid fermentation medium. C. J.

Choice of culture media, natural and synthetic. A. BERTHELOT (Bull. Soc. Chim. biol., 1934, 16, 1553-1557). A. L.

Synthetic media suitable for the study of *B.* tumefaciens. A. BERTHELOT and G. AMOUREUX (Bull. Soc. Chim. biol., 1934, 16, 1558—1560).—The composition and prep. of three synthetic media are described. A. L.

Culture media containing peptised ground-nut oil-cake. A. BERTHELOT and G. AMOUREUX (Bull. Soc. Chim. biol., 1934, 16, 1561-1564).—The prep. is described. A. L.

Culture media prepared from peptised soyabean oil-cake. A. BERTHELOT, G. AMOUREUX, and F. VAN DEINSE (Bull. Soc. Chim. biol., 1934, 16, 1565-1567).—The prep. is described. A. L.

Use of Stachys root in the preparation of culture media. A. BERTHELOT, F. VAN DEINSE, and G. AMOUREUX (Bull. Soc. Chim. biol., 1934, 16, 1568-1570).—Advantages of media containing Stachys root are described. A. L.

Agar-agar. Physico-chemical properties and influence on the growth of micro-organisms. A. Itano and Y. Tsugi (Bull. Agric. Chem. Soc. Japan, 1934, 10, 111—112).—Superior grades of agar contain relatively less N and ash and have lower d, osmotic pressure, surface tension, and higher $p_{\rm H}$. Microorganisms grew better on lower grades, possibly because of their I content. CH. Abs. (p)

Centrifuging of bacteriophages. A. GRATIA (Compt. rend. Soc. Biol., 1934, 117, 1228-1230).---The active material after centrifuging is contained in the sediment. R. N. C.

Protein-free suspensions of virus. VI. Purification of vaccine virus by absorption and elution. I. J. KLIGLER (Proc. Soc. Exp. Biol. Med., 1934, 32, 222—225).—Adsorption from a 10% suspenion (I) in 0.9% NaCl with kaolin and subsequent elution with aq. NH₃ gives a potent suspension of vaccine virus giving negative Esbach and ninhydrin reactions and containing 1.0—2.7 mg. of non-NH₃-N per 100 c.c. The severity of the reaction produced by (I) is > that of the same dilution of the purified virus. The eluates in general are active in as high a dilution as (I). R. N. C.

Destructive action of substances dissolved from glass on single-cell cultures. P. S. J. SCHURE (Proc. K. Akad. Wetensch. Amsterdam, 1934, 37, 669-674).-With drop-cultures of *Reticularia lycoper*don, Bull., containing few spores, a toxic action (I) (due to SiO₂?) arises from the use of cover-slips (II) of quartz, mica, Cu, and cetylamine, but not of collodion, starch, paraffin wax, zein, or steel. (I) is not related to the electric charge between (II) and H_2O . F. O. H.

Relation between change of temperature and the viscosity of the bacterial suspension and the thermal death point of bacteria. H. INOUE (Seii-kwai Med. J., 1934, 53, 1—31).—Sudden change in the colloidal condition of the proteins determines the death point of bacteria. CH. ABS. (p)

Fungicidal power of phenol derivatives. I. Effect of introducing alkyl groups and halogens. G. J. WOODWARD (J. Lab. Clin. Med., 1934, 19, 1216— 1223).—The fungicidal power (I) of alkyl derivatives of phenols (II) for pathogenic yeasts and moulds increases with the no. of C atoms in the side-chain. In dihydric (II) the alkyl may replace H in the ring or OH without appreciably affecting (I). Increased (I) due to halogen substitution is in the order Cl<Br<I. Introduction of NO₂ has little effect on (I). The position of the alkyl is, in general, immaterial, although salicylic is more effective than *m*- or *p*-hydroxybenzoic acid. CH. ABS. (*p*)

Biological problems in chemotherapy. W. YORKE and F. MURGATROYD (Lancet, 1935, 228, 191— 193).—A summary of the results obtained in the action of As and Sb compounds on trypanosomes.

L. S. T.

Bactericidal action of human blood. W. LEH-MANN (Z. Hyg., 1934, **116**, 495–506).—The presence of bactericidal matter in the plasma is not confirmed. A. G. P.

Bactericidal effects of X-rays. F. L. MOHLER and L. S. TAYLOR (J. Res. Nat. Bur. Stand., 1934, 13, 677-679).—Effects of X-rays in liquids are localised in columns of ionisation along the path of each highspeed electron. Such an ionisation column (I) must pass through a particular part of the bacillus (II) to cause death, the sectional area of (II) being > that of (I). H. J. E.

Parathyroid hormone. W. R. TWEEDY, W. P. BELL, and C. VICENS-RIOS (J. Biol. Chem., 1935, **108**, 105—112; cf. A., 1933, 319).—Inactivation of the hormone (I) by oxidation occurs without deamination by the action of H_2O_2 , and with only 35% deamination when (I) is carefully treated with HNO₂. (I) is stable to reducing agents including Na-Hg and H₂-Pt under pressure, and its S content (0.2%) is not due to cystine or other \cdot S·S groups. A. E. O.

Calcium and phosphorus. VII. Effect of variations in dosage of parathormone, calcium, and phosphorus in the diet on the concentrations of calcium and inorganic phosphorus in serum and on the histology and chemical composition of the bones of rats. D. H. SHELLING, D. E. ASHER, and D. A. JACKSON (Bull. Johns Hopkins Hosp., 1933, 53, 348-389; cf. A., 1933, 1329).-Parathormone (I) injections induce hypercalcæmia and hyperphosphotæmia, the latter depending on the dosage and P intake. Hypercalcification of bone by vitamin-D increases the ratio ash : org. matter and (I) causes a retention or decrease in the ratio. Action of (I) on bones varies with the dosage and with the amounts and ratio of Ca and P in diet. CH. ABS. (p)

Thyroid extract in prostate swelling. H. SMITH (Indian Med. Gaz., 1934, 69, 254—256; Chem. Zentr., 1934, ii, 1637).—Administration of thyroxine produces diminution of the prostate by inhibiting the internal secretion of the testes. R. N. C.

Urinary excretion of iodine. I. Loss of iodine in urine following thyroidectomy. G. M. CURTIS and F. J. PHILLIPS (J. Clin. Invest., 1934, 13, 777—787).—Part of the additional I excreted after thyroidectomy is derived from extra-thyroid sources. Increased urinary I also follows operations to tissues remote from the thyroid. CH. ABS. (p)

Reversal of thyroid activity by iodine. A. LOESER (Klin. Woch., 1934, 13, 533-534; Chem. Zentr., 1934, ii, 2095).—Administration of I causes an inversion of the secretory activity of the anterior pituitary, which secretes more or less thyrotropic hormone according to the quantity of I, resulting in a reversal of thyroid activity. In hypophysectomised animals the thyroid effect of I fails to appear, a proof of the direct action of I on the thyroid. R. N. C.

Extrathyroidal origin of thyroxine-like active iodine compounds. I. ABELIN (Klin. Woch., 1934, 13, 940-942; Chem. Zentr., 1934, ii, 1479-1480).-Hydrolysis of an iodised albumin produces small quantities of a substance rich in I which gives no biurct reaction, is sparingly sol. in acids, and easily sol. in alkalis. From its physiological resemblance to thyroxine (I) it is termed homothyroxine. It raises basal metabolism in normal and thyroidectomised rats, affects MeCN-resistance in white mice, and produces decolorisation and albinism in black hens' feathers. The physiological effect of iodoproteins depends on their I content and the nature of its union; overloading with I renders them inactive. The peripheral tissue is probably responsible for the extrathyroidal origin of (I)-like substances. R. N. C.

Significance of the thyroid for the respiration of tissue sections from warm-blooded animals. H. PAAL (Klin. Woch., 1934, 13, 207-209; Chem. Zentr., 1934, ii, 2094-2095).-The O₂ consumption (I) of liver tissue (II) in vitro is not increased by thyroxine (III) or the thyrotropic hormone (IV) alone, but addition to the serum, in which (II) is placed for respiration, of thyroid tissue (V), which is again removed during the actual measurement, produces a considerable increase, which with (IV) is > with (III) and remains const. over some hr., whilst that produced with (III) falls gradually. Hence (V) must secrete a substance that increases (I) in combination with (III) or (IV). Thyronine in quantities of 0.005 mg. or less produces an increase in (I) in 1-2 hr.; di-iodotyrosine has the same effect, but reduces metabolism to a more marked degree than (III). R. N. C.

Relationships between adrenal and thyroid. I. ABELIN (Z. gcs. exp. Med., 1934, 94, 353—358).— Removal of both adrenal glands, like over-secretion of the thyroid gland, led in rats to disappearance of glycogen (I) from the liver (II) and muscle (III), together with a diminution in their fat content. Administration of di-iodotyrosine or a special diet containing cod-liver oil, bone marrow, and yeast extract greatly reduced the loss of (II)-(I) both in adrenalectomised and hyperthyroid animals, although the former always died. The adrenal and thyroid hormones may have antagonistic effects on (II)- and (III)-(I). NUTR. ABS. (b)

Swelling of the muscles of adrenalectomised rats. E. PONDER and R. GAUNT (Proc. Soc. Exp. Biol. Med., 1934, 32, 202–204).—The conclusion of Winter and Hartman that adrenalectomy causes an increase in muscle permeability is not confirmed. The % of H₂O in the muscles is increased.

R. N. C. Inhibition of adrenaline glycogenolysis infrog's liver by metals. H. HAUSLER and H. SCHNETZ (Biochem. Z., 1935, 275, 204—215).—Salts of Cu, Cd, Zn, Mn, Ni, Co, Pb, Hg, Fe^{II}, and Fe^{III}, up to concess of 10^{-2} millimol. per litre, either do not increase the rate of liberation of sugar from frog's liver or (Cu, Zn, Hg) cause an increase only at a definite concern. The increase of glycogenolysis (I) in frog's liver brought about by adrenaline is completely inhibited only by salts of Cu, Zn, and Cd; Fe (both salts and in colloidal form) increases (I) and Mn, Ni, Co, Pb, and Hg salts are inactive. P. W. C.

Adrenaline and the blood-sugar level. M. C. HRUBETZ (Proc. Soc. Exp. Biol. Med., 1934, 32, 218—219).—Blood-sugar (I) in rabbits reaches a max. $1\frac{1}{2}$ hr. after subcutaneous injection of adrenaline, and has not returned to normal after 4 hr. With doses of 0.05—0.4 mg. per kg. of body-wt., (I) increases with the dose up to 0.2 mg. per kg., when the curve flattens out. The deviations of (I) from the level increase with the time after the injection, and with the dose. R. N. C.

Muscle-glycogenesis in splenectomised rabbits. S. TUZIOKA (J. Biochem. Japan, 1935, 21, 119– 122).—The muscle-glycogenesis in rabbits is diminished by splenectomy, whilst subsequent administration of spleen extracts produces a return to normal vals. F. O. H.

Hormonal control of the motion of the intestinal villi. II. Villikinin. E. VON KOKAS and G. VON LUDÁNY (Pflüger's Archiv, 1934, 234, 182—186).— The hormone (villikinin) controlling the motion of the intestinal villi is extracted by HCl from the duodenal mucosa. It is not destroyed by pepsin or trypsin, and hence is not secret in or cholecystokinin. It is not pptd. by saturation with NaCl, nor by $CCl_3 \cdot CO_2H$. R. N. C.

Villikinin. E. VON KOKAS and G. VON LUDANY (Pflüger's Archiv, 1934, 234, 589—593).—The action of villikinin (I) on the intestinal villi is not affected by atropinisation of the animal. Treatment of the extract of intestinal mucosa with histaminase, animal C, or CH_2O does not influence its (I) activity. The activity of the villi is not influenced by adenosine. Accordingly, (I) is not identical with choline, histamine, or adenosine. NUTR. ABS. (m)

Action of incretin on the glycosuria of depancreatised dogs. J. LA BARRE and J. LEDRUT (Compt. rend. Soc. Biol., 1934, 117, 1210-1212).-Intravenous injection of incretin in depanceatised dogs causes a decrease in glucose excretion in the urine. R. N. C.

Crystalline insulin. Nature of free aminogroups in insulin and isolation of phenylalanine and proline from crystalline insulin. H. JENSEN and E. A. EVANS, jun. (J. Biol. Chem., 1935, 108, 1-9).- α -Naphthyl- and phenyl-thiocarbimide (I) give products with insulin (II) containing only 5% of its original activity, unchanged S, and decreased NH₂-N contents. No NH₃ is liberated on treatment of the products with NaOH, whilst on acid hydrolysis the phenyl- (III) and *naphthyl-hydantoin*, m.p. 161-162°, of phenylalanine are obtained. Proline is also isolated as the aurichloride of its betaine.

Action of phenylthiocarbimide on insulin. S. J. HOPKINS and A. WORMALL (Biochem. J., 1934, 28, 2125—2132).—A detailed account of work already noted (A., 1934, 1142). A. E. O.

Determination of insulin in body-fluids and tissues. O. KAUSCH (Pharm. Ztg., 1935, 80, 33).—A review of methods in which insulin is pptd. with $(NH_4)_2SO_4$ or picric acid or determined spectrometrically. The methods of Knoop and Niederhoff (Pharm. Ztg., 1924), Wyss (A., 1925, i, 1220), of Folin and Marenzi, and of Sullivan are inapplicable.

W. McC.

H. D.

Immediate response of plasma-cholesterol to injection of insulin and of adrenaline in human subjects. M. BRUGER and H. O. MOSENTHAL (J. Clin. Invest., 1934, **13**, 399–409).—After injection of insulin in diabetic or non-diabetic subjects, hypoglycæmia (I) is not associated with change in plasmacholesterol (II). Injection of orange juice or glucose during (I) results in a decline in (II). Adrenaline sufficient to cause hyperglycæmia does not alter (I). CH. ABS. (p)

Influencing parasympathetic action by insulin. H. TSUDZIMURA (Pflüger's Archiv, 1934, 234, 255— 257).—Intravenous injection of insulin in normal and depancreatised cats does not alter the reaction of the blood-pressure to vagus or chorda-tympani stimulation, or to choline; hence it plays no part in parasympathetic action. R. N. C.

Liver-lipins in completely depancreatised dogs maintained with insulin. A. KAPLAN and I. L. CHAIKOFF (J. Biol. Chem., 1935, 108, 201-216).-The livers of depancreatised dogs (I) maintained with insulin are much larger than normal and contain 17-35 times the normal amount of total lipins (11) consisting chiefly (94%) of neutral fat. Since the proportion of phospholipins is below normal, the liver fatty acids appear relatively to be less un-saturated. In the post-absorptive state, the livers of (I) show a marked increase in cholesteryl ester (III) content, accompanied by the complete disappearance of (III) from the blood, the total (II) content of which is also below normal. The ratio of (III) to free cholesterol is also much > normal. The accumulation of (II) in the livers of (I) is not due to increased rate of transport of (II) to the liver. A. E. O.

Insulotropic hormone from intestinal mucosa ("duodenin"). II. H. HELLER (Arch. exp. Path.

Pharm., 1935, 177, 127–133).—Subcutaneous injection of "duodenin" (I), the hypoglycæmic principle from duodenal mucosa (A., 1930, 117), lowers the bloodsugar (II) of normal or glucose-fed rabbits (III); (I) is also active when taken orally by men or (III). Pepsin+HCl at $p_{\rm H}$ 4.5 does not destroy (I). With trypsin at $p_{\rm H}$ 8–8.5, slow destruction appears to occur, the product lowering (II) but not influencing the external secretion of the pancreas. F. O. H.

Melanophoric action of extracts of organs. J. DADLEZ and W. KOSKOWSKI (Compt. rend. Soc. Biol., 1935, 118, 99—101).—The melanophore-dilating effect on frogs of the extracts of the following organs decreases in the order, brain, liver, lung, spleen, and testicles. Extracts of striped muscle, heart, kidney, uterus, mammary gland, and bone marrow are without action. A. L.

"Fat-metabolism" hormone and hyperglycæmia. B. HARROW, B. NAIMAN, I. M. CHAME-LIN, and H. MAZUR (Proc. Soc. Exp. Biol. Med., 1934, **31**, 940—942).—Injection into rabbits of an anterior pituitary-like substance (from urine) caused an increase in sugar, COMe₂, and lactic acid contents of blood and a decrease in CO_2 -combining power.

Ĉн. Авз. (p)

Separate action on liver-glycogen and bloodketones of the carbohydrate- and fat-controlling hormones of the anterior pituitary. K. J. ANSEL-MINO and F. HOFFMANN (Klin. Woch., 1934, 13, 1052—1053).—A complete separation of carbohydrate-(I) and fat-controlling (II) hormones of the anterior pituitary has been made by ultrafiltration at different p_{π} . The purified (II) hormone increases the bloodketones (III) in the rat without alteration in liverglycogen (IV) and the pure (I) hormone decreases (IV) without changing (III). NUTR. ABS. (b)

Acetonuria following treatment with the fat metabolism hormone of the anterior pituitary. K. J. ANSELMINO and F. HOFFMANN (Z. ges. exp. Med., 1934, 94, 305-308).—Injection of the fat metabolism hormone of the anterior pituitary produced in dogs and rats a marked increase of ketonuria.

NUTR. ABS. (b)

Pituitary mechanism regulating carbohydrate metabolism and its disturbance in diabetes mellitus. Anterior pituitary hormone regulating carbohydrate metabolism. K. J. ANSELMINO and F. HOFFMANN (Klin. Woch., 1934, 13, 1048-1052).-A substance appears in the blood of healthy persons after carbohydrate feeding, but not after fat or protein feeding or in fasting subjects, which, on injection into rats, lowers liver-glycogen (I). This substance is probably identical with that from the anterior pituitary (II) which similarly diminishes (I). This substance is designated the (II) carbohydratecontrolling hormone and is not identical with any other known (II) hormone. More of this active substance is found in the blood (III) of fasting diabetics than in normal (III). These patients also have more of the fat-controlling hormone, since injection of their fasting serum into rats caused increases in the (III)-ketones. NUTR. ABS. (b)

Anterior pituitary gland and glycogenolysis. M. FLUCH, H. GREINER, and O. LOEWI (Arch. exp. Path. Pharm., 1935, 177, 167–176).—Extirpation (I) of the anterior lobe (II) of the pituitary gland in frogs does not influence the glycogen content of the liver. Perfusion with Ringer's solution alone or with small amounts of adrenaline produces in such frogs a glycogenolysis < that of controls, the inhibition being of gradual onset after (I). The influence of (II) on glycogen metabolism is discussed. F. O. H.

Adrenotropic substance of the pituitary as influenced by age, castration, sex, and thyroparathyroidectomy. F.E.EMERV and C.A. WINTER (Anat. Rec., 1934, 60, 381–390).—Implantation of pituitary (I) in young rats produces an adrenal hypertrophy (II) < that from injection of older rats with (I) extract. (II) in young male rats is > in females, but in mature animals it is approx. the same for both sexes. The female (I) has an adrenotropic potency >that of the male. Castration of the donors does not affect the potency. The adrenotropic hormone has no action in thyro-parathyroidectomised animals.

R. N. C.

Arrest-point of pitressin in the kidney. R. HAUPTFELD (Klin. Woch., 1934, 13, 839—842; Chem. Zentr., 1934, ii, 1942).—Immersion of weighed pieces of rabbits' renal medulla or cortex in NaCl solutions of variable concns. and subsequent weighing is used to determine the isotonic [NaCl] to the kidney cells and canal contents. The osmotic changes from pituglandol (I) are directly the reverse of those from diuresis. It is concluded that the action of (I) on the kidney canals is to increase resorption of H_2O . R. N. C.

Anterior-pituitary sex-hormone content in the urine of elderly men. A. KUKOS (Klin. Woch., 1934, 13, 943—944; Chem. Zentr., 1934, ii, 1478).— Of 17 healthy men aged 70—85, prolan could be detected in the urine of only six, the ovary reaction being very weak in all cases. R. N. C.

Effects of avian pituitary glands in salamanders. K. F. STEIN (Proc. Soc. Exp. Biol. Med., 1934, 32, 157—161).—Implantation of fowls' anterior pituitaries, or injection of the powdered gland in NaCl solution, causes ovulation out of season and hypertrophy of the thyroid gland in *Triturus viridescens*, showing that there is no specificity of the hormones causing these effects between birds and amphibians.

R. N. C.

Effect of feeding thyroid on anterior pituitary of the female albino rat. M. CAMPBELL, J. M. WOLFE, and D. PHELPS (Proc. Soc. Exp. Biol. Med., 1934, 32, 205-208).—In female rats fed with desiccated thyroid the α strus cycle is suppressed to a degree α the dose of thyroid, the pituitaries are subnormal in wt., and the anterior lobes exhibit histological changes. R. N. C.

Interactions of gonad-stimulating hormones in ovarian development. H. L. FEVOLD and F. L. HISAW (Amer. J. Physiol., 1934, 109, 655—665).— The follicle-stimulating (I) and luteinising hormones (II) of the anterior pituitary are extracted from the dried gland with 50% aq. C_5H_5N and partly separated by pptn. with BzOH. The sol. fraction is pptd. with 33% COMe₂, the ppt. taken up in H₂O, 1% cresol added at $p_{\rm H}$ 4·1—4·2, and the mixture left in the cold for 24 hr. The separated ppt. is added to the insol. $COMe_2$ residue, and the solution treated with $Ba(OH)_2$ until neutral to phenolphthalein; the ppt. is removed and the solution again pptd. at $p_{\rm H}$ 4·1—4·2 with 1% cresol, the ppt. being added to the other insol. fractions. (I) is pptd. from the solution by EtOH or $COMe_2$. (II) is extracted from the combined ppts. with PO₄⁽¹¹⁾ buffer solution at $p_{\rm H}$ 8·0, and pptd. at $p_{\rm H}$ 4·1—4·2. (II) combined with (I) in very small quantities produces marked increases in the wt. of the rat's ovary; the increase in wt. is, however, more related to the amount of (I) injected. The action of the gonadotropic hormone (III) of pregnancy urine is augmented by combining with (I), but not with (II). Similarly, the effect of (I) is augmented by small quantities of (III). The existence of Evans' "synergistic" substance (IV) (cf. A., 1933, 1086; 1934, 457) has not been confirmed. (I) and (IV) have not been identified as separate substances; preps. of (IV) exhibit marked luteinising power, and are probably mixtures of (I) and (II). R. N. C.

Effects of injection of ovarian and pituitary extracts on serum-calcium in normal, ovariectomised, and hypophysectomised toads. H. A. SHAFIRO and H. ZWARENSTEIN (J. Exp. Biol., 1934, 11, 267—272).—Extracts of ovarian tissue without corpus luteum increase serum-Ca (I). Antuitarin acts similarly after hypophysectomy (II). Pituitrin depresses (I) normally, and after ovariectomy and (II). CH. ABS. (p)

Morphological comparison of anterior pituitaries of normal castrated female rats and those receiving injections of pregnancy urine extracts. J. M. WOLFE (Proc. Soc. Exp. Biol. Med., 1934, 32, 184-186). R. N. C.

Anterior pituitaries of infantile female rats receiving pregnancy urine extracts. J. M. WOLFB (Proc. Soc. Exp. Biol. Med., 1934, 32, 214-216). R. N. C.

Response of the gonads of immature pigeons to various gonadotropic hormones. H. M. Evans and M. E. SIMPSON (Anat. Rec., 1934, 60, 405-421).-The testes of immature pigeons are stimulated by the gonadotropic hormone (I) of the anterior pituitary (II), and also feebly by the equine (I), which has a similar effect on immature pigeon ovaries. Neither prolan (III) from pregnancy or menopause urine, nor urine from a patient with embryonic carcinoma of the testes, has any effect. (II) secretes a "synergist" (IV), which has no sp. gonadotropic action, but activates (III), so that it stimulates the gonads of immature rats, but not those of pigeons. There is evidence that a mixture of (III) and (IV) is not identical with (I). R. N. C.

Reduction of the thymus by gonadotropic hormone. H. M. EVANS and M. E. SIMPSON (Anat. Rec., 1934, 60, 423-435).—Daily injections of the equine gonadotropic hormone (I) in young rats result in an atrophy of the thymus. The effect is inhibited in both sexes by castration, but is produced in males with cryptorchidism or avitaminosis-*E*, and also in castrated males injected with cestrin in addition to (I). R. N. C. Crystallographic and refractometric researches on α -folliculin. A. NEUNAUS (Z. Krist., 1934, 89, 505—512).—Three forms of the hormone, rhombic (stable), rhombic (metastable), and monoclinic (metastable), exist; goniometric, X-ray, and refractivity data are given. B. W. R.

Rapid hormonal diagnosis of pregnancy in mature mice. A. MANDELSTAMM and E. KAPLUN (Wien. klin. Woch., 1934, 47, 813—814; Chem. Zentr., 1934, ii, 1941).—Grown female mice, injected with 3—4 c.c. of urine over 24 hr., and irradiated with red light before and during the injections, showed blood-points in the ovary within 48—50 hr.

R. N. C.

Effect of œstrin on the mammary rudiments of male mice differing in susceptibility to tumour development. W. M. GARDNER, A. W. DIDDLE, E. ALLEN, and L. C. STRONG (Anat. Rec., 1934, 60, 457-468).—The mammary glands of normal male mice undergo a gradual growth for 60-75 days when injected daily with 3 mouse-units of œstrin.

R. N. C.

Effect of œstrin injections on experimental pancreatic diabetes in the monkey. W. O. NELSON and M. D. OVERHOLSTER (Proc. Soc. Exp. Biol. Med., 1934, 32, 150—151).—Injections of anterior pituitary extract (I) produce hyperglycæmia and glycosuria (II). Injection of œstrin (III) in depancreatised monkeys decreases or suspends (II) entirely; withdrawal or supplementing of (III) with (I) causes reappearance of (II). Blood-sugar in the diabetic animal is also lowered by (III), which probably suppresses the diabetogenic activity of the anterior pituitary. R. N. C.

Experimental colloid goitre after injection of folliculin. L. KARP and B. KOSTKIEWICZ (Klin. Woch., 1934, 13, 189—190; Chem. Zentr., 1934, ii, 1479).—Injection of folliculin (I) in rabbits produces a goitrous degeneration of the thyroid gland, the lumina of which become filled with colloids (II). The action of (I) is probably due to production of (II) and the prevention of their elimination from the gland. R. N. C.

Absorption of æstrogenic substances of pregnancy urine administered orally to young rats. C. B. FREUDENBERGER and P. M. HOWARD (Anat. Rec., 1934, 60, 267—272).—The æstrogenic hormones in 0-1 c.c. of pregnancy urine diluted 1:15, administered orally thrice daily to young ovariectomised rats, produce premature opening of the vagina in 4—5 days. R. N. C.

Estrin and corpus luteum hormones. K. PEDERSEN-BJERGAARD and B. KONSTANTIN-HANSEN (Dansk Tidsskr. Farm., 1935, 9, 29–51).—The biological assay, prep., and constitution of cestrin (I), corpus luteum hormones, and their associated derivatives are discussed. The urinary excretion of (I) by women increases during the intramenstrual period, attaining a max. at approx. the 18th—22nd days. F. O. H.

Hitherto unrecognised biological action of the temale sex hormone. K. EHRHARDT and K. KUHN (Endokrinol., 1934, 14, 245-256; Chem. Zentr., 1934, ii, 1796).—Injection of young female carps with the female hormone (I), or its addition to the aquarium H_2O , produces a rapid enlargement of the oviduct. The effect is so sensitive that it can be used to demonstrate (I) in the urine of a normal woman, or to follow (I) metabolism in the menstrual cycle. R. N. C.

Estrus in hypophysectomised rats parabiotically connected with castrates. E. WITSCHI and W. T. LEVINE (Proc. Soc. Exp. Biol. Med., 1934, 32, 101-107).—Parabiosis produces const. cestrus due to the increased secretion of folliclestimulating hormone (I) without luteinising hormone (II) by the anterior pituitary of the castrate. It is concluded that a high level of (I) in the bloodstream suppresses the secretion of (II). R. N. C.

No anti-hormones against œstrin. F. E. D'AMOUR, C. DUMONT, and R. G. GUSTAVSON (Proc. Soc. Exp. Biol. Med., 1934, 32, 192—194).—The action is not affected by simultaneous injection of serum from male, normal, or ovariectomised animals, either untreated or themselves injected with œstrin for considerable periods. R. N. C.

Follicular hormone and androkinin in the excreta during the normal menstrual cycle and the administration of folliculin per os. SIEBKE (Arch. Gynākol., 1934, 156, 317—320; Chem. Zentr., 1934, ii, 1477).—A healthy woman excretes 10,000 mouse-units of folliculin (I) in the urine (II) and fæces (III) during menstruation. Daily administration of 600 units produces no increase, but with 1500 units an increase is observed, particularly in the middle of the cycle. The (II) curve rises more sharply than the (III) curve. Androkinin (IV) can be demonstrated in (II), often in large quantities. No decrease in (IV) is detected after administration of (I). R. N. C.

Constitution of androsterone.-See this vol., 346.

Artificial preparation of male sexual hormone.—See this vol., 346.

Androsterone, a crystalline male sexual hormone. I. Isolation from men's urine. II. Chemical characterisation. A. BUTENANDT and K. TSCHERNING. III. Isolation of a physiologically inactive sterol derivative from men's urine, its relation to dehydroandrosterone and androsterone; constitution of androsterone. A. BUTENANDT and H. DANNENBAUM (Z. physiol. Chem., 1934, 229, 167-184, 185-191, 192-208).-I. Impurities are removed from the conc. acidified urine by successive processes as follows: extraction with CHCl₃, extraction with KOH, steam distillation, alkaline and acid hydrolysis, and treatment with C_6H_6 -light petroleum. The petroleum phase is extracted with 60% EtOH. The extract yields an oxime, m.p. 215-221°, which on hydrolysis with dil. acid gives androsterone (I), C₁₉H₃₀O₂, m.p. 178°, [a]²⁰_p +93° in EtOH (semicarbazone, m.p. 274-276°, phenylhydrazone, m.p. 153-154°; thiosemicarbazone, m.p. 250-255°). (I) has an activity of 1 unit in $15-20 \times 10^{-5}$ g. when tested by the comb-growth method on capons.

II. (I) forms physiologically active esters on treat-

ment with the appropriate anhydride in C_5H_5N : acetate, m.p. 160—161°, $[\alpha]_{D}^{so}$ +86·14° in EtOH (oxime, m.p. 219—220°), propionate, m.p. 145°, indicating the presence of OH. (I) is also a ketone and is saturated. It is therefore a saturated tetracyclic OH-ketone. (I) with CrO₃ in AcOH affords androstanedione, m.p. 129°, $[\alpha]_{D}^{so}$ +104·8° in EtOH, with about half the activity of (I). Clemmensen reduction of (I) yields androstane, $C_{19}H_{32}$, m.p. 49—50°.

III. The light petroleum fraction rejected in the isolation of (I) gave with semicarbazide a crude mixture, decomp. 240°, yielding a semicarbazone, m.p. 275°, giving on hydrolysis a singly unsaturated chloroketone (II), $C_{19}H_{27}OCl$, m.p. 157°, $[\alpha]_D^{20} + 15.5°$ in CHCl₃ (oxime, m.p. 168—169°). Catalytic hydrogenation (Pd) gives the dihydrochloroketone (III), m.p. 173° (semicarbazone, m.p. 285°). With KOBz at 180°, (II) affords the benzoate, m.p. 250°, of dihydroandrosterone, m.p. 148°, physiological activity about 1 that of (I). Similarly with KOAc (III) yields the acetate of (I) and a singly unsaturated ketone, C19H28O, m.p. 104°, which on hydrogenation (Pd) gives androstanone, $C_{19}H_{30}O$, m.p. 122° [semicarbazone (IV), m.p. 263–266°]. With NaOEt at 200° (Wolff-Kishner), (IV) affords and rostane (V), $C_{19}H_{32}$, m.p. 49-50°. (V) is not identical with atiocholane, m.p. 78-80°, obtained by Wolff-Kishner reduction of ætiocholanone-17; hence (I) does not belong to the cholanic acid-pregnandiol series. (I) is chemically and physiologically identical with 3-epihydroxyætioallocholanone (Ruzicka et al., A., 1934, 1221). J. H. B.

Differences between male hormone extracts from urine and from testes. E. DINGEMANSE, J. FREUD, and E. LAQUEUR (Nature, 1935, 135, 184).— Large differences in the size of the seminal vesicles are produced in rats treated with the male hormone extracted from urine or from testes. L. S. T.

Alleged œstrogenic activity of the male sex hormone. F. L. WARREN (Nature, 1935, 135, 234). —Male hormone (I) (androsterone) prepared from cholesterol has no effect on the female genital tract of mice. The œstrogenic activity of (I) preps. reported by previous investigators must be due to the presence of substances other than (I). (I) may be the precursor of the female hormone. L. S. T.

Vitamins: their specific and non-specific action. P. KARRER (Giorn. Chim. Ind. Appl., 1934, 16, 593-602).—A lecture.

Vitamins in apples. Vitamin-A, -B, and -C contents of the Rome Beauty, Delicious, Stayman, Yellow Newtown, and Winesap. I. A. MANVILLE, A. S. McMINIS, and F. G. CHUINARD (J. Amer. Dietetic Assoc., 1934, 10, 135—152).—Vitamin contents are recorded. The occurrence in apples of a substance, other than carotene, possessing vitamin-A activity is indicated. Vitamin-A and -C are more closely correlated with gene activity than with chromosome no. CH. ABS. (p)

Vitamins of pears. II. Vitamin-A, -B, and -C in the Winter Nelis, D'Anjou, and Bosc after a short storage period. I. A. MANVILLE and F. G. CHUINARD (J. Amer. Dietetic Assoc., 1934, 10, 217— 227).—Winter Nelis (I) and D'Anjou (II) pears contain about 4, and the Bosc about 3, Sherman units of vitamin-A (III) per oz. Two months' storage reduces these vals. by nearly 50%. The vitamin-C (IV) content is 4 Sherman units per oz. for (II), 3 for (I), and 2.5 for Bosc. The (IV) content also falls on storage, and no difference in (III) or (IV) contents of similar varieties grown in different districts is observed. The amount of vitamin-B complex in pears appears to be slight. NUTR. ABS. (m)

Vitamin-A and -C contents of brown algæ. L. L. PROZOROVSKAYA and A. N. SHIVRINA (Bull. Appl. Bot. U.S.S.R., 1934, Suppl. 67, 65—69).—Vitamin-A occurs in Fucus sp. (I). Vitamin-C was not present in Laminaria digitata (II). (I) contains more carotene than (II). CH. ABS. (p)

Size and fat and vitamin-A content of the liver of *Teleostei*. S. SCHMIDT-NIELSEN, A. FLOOD, and J. STENE (Kong. Norske Vid. Selsk. Forhandl., 1933, 6, 146—149; Chem. Zentr., 1934, ii, 1865).—Data for the fat content, Lovibond val., and wt. of the liver for a no. of species are recorded and discussed.

H. J. E.

Vitamin-A in animal and plant cells. P. JOYET-LAVERGNE (Compt. rend., 1935, 200, 346– 348; cf. this vol., 109).—A blue colour with ShCl₃ is obtained in the chromosomes of protozoa during growth and reproduction. H. D.

Absorption spectra characteristic of vitamin-A in animal and vegetable oils. J. B. PHILIPSON and J. W. WOODROW (Proc. Iowa Acad. Sci., 1932, 39, 220).—Absorption bands characteristic of vitamin-Ain animal fats are also shown by plant materials containing the growth-promoting factor. CH. ABS. (p)

Purification of biosterol (vitamin-A) and its crystalline derivatives. S. HAMANO (Sci. Papers Inst. Phys. Chem. Res. Tokyo, 1935, 26, 82–86).—A detailed account of work already noted (this vol., 260). The maleic anhydride *adduct*, $C_{35}H_{38}O_8$, of the Bz derivative of vitamin-A has m.p. 164°.

Relation between the biological, chemical, and physical methods of vitamin-A determination. K. C. LATHBURY (Biochem. J., 1934, 28, 2254 2264).—Comparison of the vitamin-A content of natural (I) and distilled (II) oils as determined by the Carr-Price colour test (III) and the biological assay indicates that the ratio between the no. of international units per g. and the result of (III) is greater in the case of (I) than of (II). The ratio between the result from (III) and that from the extinction coeff. method (IV) in the case of (II) is > than of (I). Vals. obtained from (IV) may be converted into biological units by multiplying by 1400 and the val. from (III) by multiplying by 40 in the case of (I) and 20 in the case of (II). A. L.

Spectrophotometric determination of vitamin-A. A. CHEVALLIER and P. CHABRE (Bull. Soc. Chim. biol., 1934, 16, 1451—1478).—A comparison of the intensity of absorption at 328 m μ of oils and their biological assay indicates that the spectrophotometric method (II) is trustworthy for vitamin-A (I) determination when the max. (III) in the absorption spectrum of the oil occurs at 328 m μ , and when these are not too greatly coloured and only slightly acid. Oils
badly prepared have (III) displaced due to the presence of (I) decomp. products, and the method is no longer trustworthy. It is possible to differentiate, using (II), between the effects of (I) and those of other carotenoid products. A. L.

Specific effect of vitamin-A on growth. W. D. GALLUP (Proc. Oklahoma Acad. Sci., 1934, 14, 53— 56).—Efficiencies of various sources of vitamin-A (I) in correcting ophthalmia in calves are compared. Nutritive requirements of calves and rats differ with respect to (I). CH. ABS. (p)

Transmission of vitamin-A from parents to young in mammals. IV. Effect of the liver reserves of the mother on the transmission of vitamin-A to the fœtal and suckling rat. W. J. DANN (Biochem. J., 1934, 28, 2141-2146).—The store of vitamin-A (I) in the young rat up to the time of weaning approx. ∞ but is very much < the (I) reserves of the mother, which are not likely to be seriously depleted in the rearing of a litter on a normal diet.

A. E. O. Physiological and therapeutic action of colloidal solutions of pro-vitamin-A when locally applied to the eye. P. A. RATSCHEVSKI (Klin. Woch., 1934, 13, 918; Chem. Zentr., 1934, ii, 1945).— Colloidal solutions of carotene are prepared by shaking EtOH-Et₂O and COMe₂ solutions with H₂O. Properties are recorded. R. N. C.

Effect of vitamin-A deficiency on the concentration of blood-lipins of albino rats. M. E. SMITH (J. Nutrition, 1934, 8, 675-687).—Relationships between the vitamin-A supply and the cholesterol, fatty acids, and lecithin of the blood are examined.

A. G. P.

Extraction of vitamin-B from a fuller's earth adsorbate. W. D. SALMON (Ann. Rept. Alabama Agric. Exp. Sta., 1931, 43-45).—The adsorbate is washed with H₂O followed by 80% EtOH containing 5% AcOH, and extracted repeatedly with a C_5H_5N- AcOH mixture. The extract is conc. and treated in successive stages with increasing amounts of EtOH. The final fraction has 75% of the activity of the original adsorbate. CH. ABS. (p)

Relation of vitamin-B to carbohydrate metabolism. G. A. SCHRADER (Ann. Rept. Alabama Agric. Exp. Sta., 1931, 35—39).—Beri-beri in pigeons is associated with high blood-sugar (I) vals., especially in the later stages. Rats deprived of vitamin-B [1] showed no significant increase in (I). (II)deficient pigeons could absorb glucose from the digestive tract. Starvation of (II)-deficient rats caused normal depletion of glycogen, which was replenished after feeding with d-glucose or lactic acid (half neutralised with NaOH). CH. ABS (p)

Enzymic efficiency in avitaminosis. I. Inluence of vitamin-B deficiency on tryptic and ereptic digestion of caseinogen. II. Influence of vitamin-B deficiency on efficiency of pancreatic lipase and esterase. B. SURE, M. C. KIK, and K. S. BUCHANAN (J. Biol. Chem., 1935, 108, 19-26, 27-33).-I. Vitamin-B deficiency (I) is without influence on the tryptic and ereptic activities of rats' pancreatic and intestinal extracts. . II. (I) produces a decrease in the pancreatic lipase digestion of tributyrin and olive oil, and the esterase digestion of $PrCO_2Et$. H. D.

Preparation and chemistry of vitamin- B_1 . H. KAKEFUDA (Fukuoka Acta med., 1934, 27, 99– 100).—Vitamin- B_1 (I) from rice germ is purified by means of the platinichloride or picrolonate, and the salt with AuCl₃. A 0.1% solution gives a strong diazo-reaction, but a 0.01% only a faint yellow colour. Ultra-violet (but not X-)rays destroy the activity of the crystals. The absorption spectrum of the hydrochloride shows a band at 265—280 m μ . The relative proportions of (I) in the germ, bran, and silverskin of rice are as 3:2:1. NUTR. ABS. (m)

Vitamin- B_1 . II. Oryzatoxin. I. A. SIMPSON (Bull. Inst. Med. Res. Fed. Malay States, 1934, No. 1, 24 pp.).—White rice (I), which produced polyneuritis in pigeons when used as the staple article of diet before or after heating to 160—165° for 6 hr., contained a strain of *B. vulgatus* (II). EtOH extracts of (I) or of (I) liquefied by (II) yielded emulsions innocuous to pigeons when administered orally, but fatal subcutaneously; the principal effect is hæmolysis, and the symptoms do not resemble those of beri-beri (cf. A., 1930, 827). F. O. H.

Relation between kinds of carbohydrate and vitamin- B_1 deficiency. T. ARIYAMA (J. Agric. Chem. Soc. Japan, 1934, 630-639).—The appearance of symptoms of vitamin- B_1 deficiency was not influenced by the kind of starch supplied as sole carbohydrate source in deficient rations. Addition of yeast corr. the toxic action of sucrose on the kidneys. CH. ABS. (p)

Vitamin- B_1 and blue fluorescent compounds. R. A. PETERS (Nature, 1935, 135, 107).—Preps. of vitamin- B_1 (I) are converted by oxidation in aq. solution into substances which give an intense skyblue fluorescence in ultra-violet light. The bearing of this result on the constitution of (I) is discussed. L. S. T.

Vitamin assay and its application in study of vitamin- B_1 and $-B_2$ contents of mung beans and grain sorghums. R. REDER (Proc. Oklahoma Acad. Sci., 1934, 14, 50–52).—Vals. for various food products are determined. The % of fat in diets did not affect results of rat tests.

CH. ABS. (p)

Isolation of lactoflavin (vitamin- B_2) from hay. R. KUHN and H. KALTSCHMITT (Ber., 1935, 68, [B], 128-131).—Lactoflavin (I) is isolated from dried Californian lucerne as the Ac₄ derivative identical in composition, optical activity, absorption spectrum, and growth-promoting power with that derived from milk. (I) is thus a vegetable pigment which, without chemical change, is stored in the livers of animals and passes into the milk. (I) may be involved in the assimilation of CO₂. H. W.

Concentration of vitamin- B_2 by adsorption and elution from fuller's earth. S. LEPROVSKY, W. POPPER, jun., and H. M. EVANS (J. Biol. Chem., 1934, 108, 257-265).--Vitamin- B_2 can be adsorbed by fuller's earth and recovered by washing with dil. NHEt₂ or NaOH. After a second adsorption the activity of the vitamin is diminished. H. T.

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Effect of p_{π} on stability of vitamin- B_2 . W. D. SALMON (Ann. Rept. Alabama Agric. Exp. Sta., 1931, 30-31).—The growth-promoting action of yeast extracts is destroyed by autoclaving more rapidly in alkaline than in acid media.

Сн. Abs. (p)

Effect of process of manufacture on the vitamin- B_2 content of dried skim-milk. H. J. DAVIS and L. C. NORRIS (Poultry Sci., 1934, 13, 305— 306P).—There was no measurable loss of vitamin- B_2 activity (determined on hens), whether the milk was dried by spray or roller process, or when the milk was overheated before or during the drying.

NUTR. ABS. (b)

Relation of dermatitis in chicks to lack of vitamin- B_2 and to dietary egg-white. J. G. LEASE and H. T. PARSONS (Biochem. J., 1934, 28, 2109—2115).—The dermatitis produced in chicks fed on a well-supplemented ration rich in egg-white is cured by an extracted liver residue (I) poor in vitamin- B_2 (II), but not by a liver extract rich in (II). A similar dermatitis due to lack of (II) is cured by the extract, but not by (I). The toxic effect of eggwhite is not due to its destructive action on (II) during storage, nor is it prevented by addition of yeast to the ration. A. E. O.

Non-identity of adenine and vitamin- B_4 . C. Y. CHEN (Bull. Agric. Chem. Soc. Japan, 1934, 10, 105-108).—Neither adenine nor adenylthiomethylpentose possesses vitamin- B_4 activity.

CH. ABS. (p)

Synthesis of vitamin-C by luteal tissue. G. BOURNE (Nature, 1935, 135, 148—149).—The corpus luteum of the guinea-pig can synthesise vitamin-C, and when the foctus is developed it either takes over or supplements the vitaminogenic function of the luteal tissue. L. S. T.

Fat-soluble vitamins and the synthesis of vitamin-C by the animal organism. P. ROHMER, N. BEZSSONOFF, and E. STOERR (Compt. rend. Soc. Biol., 1935, 118, 56—57).—Suckling infants fed on a diet of acidulated dried milk (I) ceased to eliminate vitamin-C (II) after 4 days. Administration of small quantities of egg-yolk or cod-liver oil with (I) caused reappearance of (II) after 7 days. Synthesis of (II) is therefore closely related to the presence of vitamin-A and/or -B. A. L.

Influence of non-alimentary factors on the synthesis of vitamin-C. P. ROHMER, N. BEZSSO-NOFF, and E. STOERR (Compt. rend. Soc. Biol., 1935, 118, 58-59).—The vitamin-C content of cow's milk is very low in winter, but increases rapidly in spring, even before the animals go to pasture.

A. L. Mannose dehydrogenase and ascorbic acid. B. C. GUHA and A. R. GHOSH (Current Sci., 1934, 3, 251).—Incubation of liver, spleen, and kidney tissue of the rat with mannose at $p_{\rm H}$ 7.4 yields 0.3—0.35 mg. of ascorbic acid per g. of tissue in 3 hr. These tissues are unable to synthesise the vitamin from glucose, fructose, galactose, xylose, or arabinose, whilst the same tissues from the guinea-pig have no action even on mannose. P. G. M. Biological formation of ascorbic acid. B. C. GUHA and A. R. GHOSH (Nature, 1935, 135, 234).— The brain, heart-muscle, and leg-muscle tissues of the rat can form ascorbic acid (I) from mannose (II), but to a smaller extent than the spleen, liver, and kidney tissues. The liver tissues of only those animals known to be independent of external sources of (I) can produce it from (II); that of the pigeon converts glucose into (I) (see preceding abstract). L. S. T.

Vitamin-C and narcotine. N. N. VOROSCHCOV, jun., and A. T. TROSHTZENKO (Bull. Appl. Bot. U.S.S.R., 1934, Suppl. 67, 161—164).—The product of demethylation of narcotine (with HCl) has no vitamin-C activity. CH. ABS. (p)

Antiscorbutic [in-]activity of a preparation of methylnornarcotine. K. L. POVOLOTZKAYA (Bull. Appl. Bot. U.S.S.R., 1934, Suppl. 67, 165—169).— The preps. are devoid of vitamin-C. CH. ABS. (p)

Nature and determination of vitamin-C. G. VIALE (Rev. sudamer. endocrinol., 1934, 17, 547– 552).—Iodometric determinations of glutathione include the val. for ascorbic acid (I). (I) prevents the oxidation of adrenaline in air, its reducing action being accentuated by light, especially in the presence of fluorescent substances. (I) is determined in $CCl_3 \cdot CO_2H$ extracts by means of methylene-blue. CH. ABS. (p)

Therapeutic method of determining vitamin-C. K. L. POVOLOTZKAYA (Bull. Appl. Bot. U.S.S.R., 1934, Suppl. 67, 225—232).—Compared with the prophylactic, the therapeutic method with guinea-pigs suffering from scurvy gives sufficiently exact results, wt. increase and macroscopic pathological changes being the criteria. The min. healing and preventive doses are nearly the same. NUTR. ABS. (m)

Biological method for determining vitamin-C. V. N. BUKIN, K. L. POVOLOTZKAYA, and M. F. GLAZUNOV (Bull. Appl. Bot. U.S.S.R., 1934, Suppl. 67, 195—215).—Prophylactic doses of vitamin-C (e.g., orange juice) do not improve the Bezssonov diet. Additions of irradiated cereals, carotene (I), and salts were also ineffective. A diet of autoclaved hay and autoclaved carrots (II) was satisfactory. (I) may replace (II), which serves as a source of $\cdot D$ and improves the $\cdot A$ content. CH. ABS. (p)

Chemical methods in determining vitamin-C. V. N. BUKIN and K. L. POVOLOTZKAYA (Bull. Appl. Bot. U.S.S.R., 1934, Suppl. 67, 179–194).—The Bezssonov reaction and I titration do not measure vitamin-C activity. Tillmans' 2:6-dichlorophenolindophenol reaction is not sp., but serves for preliminary observations. The reagent is reduced by sugars at high temp. CH. ABS. (p)

Probable presence of ascorbic acid in the vitreous humour of the ox eye. C. DUMAZERT and P. PASSELAIGUE (Compt. rend. Soc. Biol., 1934, 116, 1035—1036).—Vitreous humour (I) has an antiscorbutic action on guinea-pigs. (I) by neutral Pb(OAc)₂ treatment yielded a syrup having many of the reactions of ascorbic acid (II). From the 2:6-dichlorophenol-indophenol titration, the (II) content of ox-(I) should be 10—15 mg. per 100 c.c.

NUTR. ABS. (b)

Vitamin-C content of dried onions. S. N. MATZKO (Questions of Nutrition, U.S.S.R., 1934, 3, No. 3, 122-124).—Dried onions or leeks contain no vitamin-C. NUTR. ABS. (m)

Fermented cabbage (sauerkraut) as source of the antiscorbutic vitamin. K. L. POVOLOTZ-KAYA, V. N. BUKIN, L. A. HARDER, and M. M. MAKAROVA (Bull. Appl. Bot. U.S.S.R., 1934, Suppl. 67, 103—112).—Cabbage fermented in brine loses 50%, that fermented in pure culture of lactic acid bacilli only 10—20%, of its vitamin-*C* val.

NUTR. ABS. (m) Presence of the antiscorbutic vitamin in northern varieties of fruits, berries, and vegetables. V. N. BUKIN, K. L. POVOLOTZKAYA, and N. P. ONOKHOVA (Bull. Appl. Bot. U.S.S.R., 1934, Suppl. 67, 25-51).—The min. daily dose which prevented scurvy in guinea-pigs was for kohlrabi 1 g., head cabbage 1-4 g., turnip 6 g., potato 6-9 g., beetroot <12 g., carrot 18 g., apple 5-18 g., apple variety Antonovka 3 g., black currant (var. Lia prolific) 0-25-0.5 g., strawberry (var. Saxon) 1.5 g., and sweet potato 6 g. NUTR. ABS. (b)

Foodstuffs as vitamin-bearers. I. Contents of antiscorbutic factor in huckleberries stored during the winter and in preserve of blackcurrant juice. B. A. LAVROV, B. I. JANOVSKA, and N. S. JAROUSSOVA. II. Vitamin contents of spinach preserves and of garlic after winterstorage. N. S. JAROUSSOVA and B. I. JANOVSKA (Questions of Nutrition, U.S.S.R., 1934, 3, No. 2, 29-31, 31-33).—I. Stored huckleberries contain only traces of vitamin-C (I), but preserved blackcurrants are a good source of (I).

II. Preserved spinach is a rich, but stored garlic a very poor, source of (I). NUTR. ABS. (m)

Influence of the cooking of vegetables on the preservation of vitamin-C. V. N. BUKIN, N. A. LZMAILOVA, and A. P. BOGOCHUNAZ (Bull. Appl. Bot. U.S.S.R., 1934, Suppl. 67, 129—142).—On boiling, cabbage and potato lost 50%, swede turnip 30%, and kohlrabi none, of the vitamin-C content.

NUTR. ABS. (b)

Ascorbic acid and glutathione content of rapidly growing young tissue. R. BIERICH and A. ROSEN-BOHM (Z. physiol. Chem., 1935, 231, 47—50).—In brain, with the growth of the animal, the abs. amount of reducing substances (I) decreases, but the glutathione (II) content remains const.; the "X-substance" (III) [mainly ascorbic acid (IV)] decreases. In the liver, the abs. amount of (I) scarcely decreases, the (II) content increases, (III) remains const. (IV) and (II) are not related to growth or increased cellproduction in either healthy organs or tumours.

J. H. B.

Depigmentising action of *l*-ascorbic acid. (Hyperpigmentation produced by folliculin and vitamin-C.) W. JADASSOHN and F. SCHAAF (Klin. Woch., 1934, 13, 845—846; Chem. Zentr., 1934, ii, 1801).—Administration of large quantities of vitamin-*C* does not prevent the hyperpigmentation by folliculin of the mammary areolas of guinea-pigs. R. N. C.

Biological value of vitamin-C. T. MOLL (Deut. med. Woch., 1934, 60, 1197-1200).—A daily dose of 0.25 mg. of ascorbic acid (I) > doubles the survival time of guinea-pigs (II), as compared with controls, but the min. preventive dose for optimal growth and the production of completely normal teeth is 1.5-2.0mg.; 0.5 mg. of (I) is equiv. to 1.5 ml. of lemon juice. Mice receiving by mouth up to 50 mg. of (I) daily for 12 weeks show no signs of disease, but 100 mg. rapidly cause death. (II) receive 100 mg. daily for 5 weeks without development of pathological signs. The existence of hypervitaminosis-C is considered improbable. NUTR. ABS. (m)

Diagnosis of vitamin-C subnutrition by urine analysis; antiscorbutic value of human milk. L. J. HARRIS and S. N. RAY (Lancet, 1935, 228, 71-77).—Infants suffering from scurvy, or with a history of vitamin-C (I) underfeeding, excrete less (I) in their urine than do well-nourished infants on low-(I) diets. Human milk contains three to four times the amount of (I) in cow's milk. The determination of (I) in urine by micro-titration with 2 : 6-dichlorophenol-indophenol is described. L. S. T.

Determination of vitamin-D. B. O'BRIEN and K. MORGAREIDGE (Proc. Soc. Exp. Biol. Med., 1934, 32, 113—117).—Improvements of X-ray technique are described. R. N. C.

Determination of vitamin-D. II. Effect of seasonal variation and sex on calcification in rachitic chicks. L. L. LACHAT (Poultry Sci., 1934, 13, 353-357).—The ash content of bones of chicks receiving a rachitogenic diet showed definite seasonal variations. Differences between sexes were insignificant. A. G. P.

Existence of two forms of vitamin-D in fishliver oils. C. E. BILLS, O. N. MASSENGALE, and M. IMBODEN (Science, 1934, 80, 596).—The vitamin-D of bluefin tuna (*Thunnus thynnus*) liver oil and that of cod-liver oil are different substances or different mixtures of substances. One rat unit of the former has only 15% of the antirachitic effectiveness of one rat unit of the latter for the chicken. The former contains approx. 4×10^4 I.U. per g. L. S. T.

Relative antirachitic values of cod-liver oil, viosterol, and irradiated milk. T. G. H. DRAKE, F. F. TISDALL, and A. BROWN (Canad. Med. Assoc. J., 1934, 71, 368—376).—Irradiated milk and viosterol were more effective than cod-liver oil.

Сн. Авз. (р)

Effect of equivalent units of vitamin-D in the form of a cod-liver oil concentrate and irradiated ergosterol on the hatchability and vitamin-D content of the egg. R. M. BETHKE, P. R. RECORD, and O. H. M. WILDER (Ann. Rept. Ohio Agric. Exp. Sta., 1934, 74).—Supplementary feeding of vitamin-D (I) as cod-liver oil produced proportional increases in the (I) content of the egg-yolk. The corresponding increases with similar dosages of ergosterol were smaller. The hatchability of the eggs was unaffected. CH. ABS. (p)

Relation between the antirachitic factor and the weight and contents of the gall-bladder of the chicken. W. C. RUSSELL, M. W. TAYLOR, and D. F. CHICHESTER (J. Nutrition, 1934, 8, 689—694).—Gallbladders of chickens receiving a basal ration without cod-liver oil (I) contained bile (II) in larger quantities and having a higher % of total ash and lower % of Ca than those of birds receiving a (I) supplement. Retention of (II) is unrelated to the $p_{\rm H}$ of the duodenal contents. A. G. P.

Hypervitaminosis-D rickets: action of vitamin-D. A. W. HAM and M. D. LEWIS (Brit. J. Exp. Path., 1934, 15, 228-234).—Large dosages of vitamin-D inhibited normal calcification in rat bones. The mechanism of this effect is considered.

CH. ABS. (p)Unsaponifiable fraction of wheat-germ oil: vitamin-E. J. C. DRUMMOND, E. SINGER, and R. J. MACWALTER (Biochem. J., 1935, 29, 456-471).---C₂HCl₃ extraction of wheat-germ oil gave a product vitamin-E- (I) -active in a dose of 23 mg. daily. The fraction (II) unsaponifiable by EtOH-KOH contained 60% of sterols. (II) after removal of the sterols was divided into five fractions by adsorption from light petroleum on Al₂O₃. The adsorbed fractions were eluted with $MeOH-Et_2O$ (4:1), and the fractionation was followed by determinations of (I) activity and the ultra-violet absorption spectra (III). The material yielded by the lower zone of the adsorption column was active in doses of > 0.2 mg. daily and showed a band with a max. at 294 mµ and a min. at 265 mµ. Continued readsorption of this fraction on Al_2O_3 gave a product (I)-active in a daily dose of 0.1 mg.; the activity of one product was increased by hydrogenation. A parallel between (III) of the various fractions and (I) activity was observed; the ratio of the extinction coeffs. at the max. and min., respectively, and the increase in absorption at the max. are the best indices of concn. of the substance responsible for absorption. Acetylation of the active fractions gave β -amyrin acetate with little absorption and no (I) activity. Ultra-violet irradiation of a product active in a dose of 0.2 mg. daily decreased the activity by 80% and (III) was changed. Hydrogenation of the most active fraction reduced the I val. from 166 to 26 in 5 hr., whilst the (I) activity and (III) were unchanged. Extraction of 1 g. of sterol-free (II) by the method of Girard (A., 1933, 870) gave 10 mg. of a ketonic substance with, however, no change in absorption at 294 m μ . The remaining fractions from the Al₂O₃ adsorption contained, besides sterols, lutein, cryptoxanthin, squalene, a lipochrome, and a hydrocarbon similar to that found in mammalian livers.

H. D. Surface films of vitamin-*E* concentrates. F. E. ASKEW (Biochem. J., 1935, 29, 472—475).—A vitamin-*E*-active oil and a cryst. substance (I) derived from it are spread on dil. HCl and the surface pressure and p.d. plotted against area. The curves obtained are consistent with the presence of a polycyclic substance with a H₂O-attracting group near one end of the mol. The curve of β -amyrin is much steeper and shows a more marked rearrangement to a solid film than that of (I). H. D.

Growth-deficiency disease, curable by wheatgerm oil. H. BLUMBERG (J. Biol. Chem., 1934, 108, 227-238).—Purified diets containing vitamin-A, -D, and -F check the early and middle growth of rats. Wheat-germ oil and egg-yolk cure any irregularities in reproduction and growth. The growth factor contained in the oil may be either vitamin-E or another unknown fat-sol. substance. H. T.

Phototropism of the Avena coleoptile and the theory of the light-intensity gradient. H. G. DU BUY (Ber. deut. bot. Ges., 1934, 52, 530-559).—The light gradient in plants controls phototropic curvature. Light response of Avena coleoptiles is discussed as the resultant of photochemical changes and in relation to the activity of auxin. A. G. P.

Growth-promoting substances of the auxin and the bios group. F. Kögl (Ber., 1935, 68, [4], 16-28).—A lecture. H. W.

Identity of the growth-promoting and rootforming substances of plants. K. V. THIMANN and J. B. KOEPFLI (Nature, 1935, 135, 101—102; cf. A., 1934, 1418).—Synthetic 2-indolylacetic acid (I) is fully active in promoting root formation in peas. The growth-promoting and root-forming substances of plants are identical. Indole and certain homologues of (I) are inactive in root formation. L. S. T.

Activation of cambial growth. R. SNOW and B. LE FANU (Nature, 1935, 135, 149).—Cambium cells from strips of decapitated young sunflower hypocotls continue to grow and to produce xylem and roots when covered with gelatin containing auxin (I) from the Et_2O -sol. extract of urine. The hormone activating cambial growth may thus be identical with (I). L. S. T.

Effect of various endocrine preparations on growth of beans. I. S. YUN and W. L. HONG (J. Chosen Med. Assoc., 1934, 24, 568—591).—Thymoglandol stimulated soya-bean sprouts in all conces. Antuitrin, pituitrin, testiglandol, luteoglandol, interenin, epiglandol, spleen and liver extracts, thyroxine, and parathyroidin were inhibitory. Adrenaline (5%) inhibits growth, but not at lower conces. Insulin and ovarian hormone stimulate in 1% solution, but inhibit at 5%. CH. ABS. (p)

Influence of chemical stimulants on the growth of plants. A. ZLATAROFF (Bull. Soc. Chim. biol., 1934, 16, 1720—1729).—The calorific val. of the plantules of the cotyledons of the seeds of *Cicer* arietinum and Arachis hypogea immersed in 5% aq. MgSO₄ and MnSO₄ was 8% and 18%, respectively, > those immersed in H₂O. In the same manner barley immersed in aq. MnSO₄ and MgSO₄ gave a malt having 3% more diastatic activity than that from barley immersed in H₂O. A. L.

Influence of different concentrations of chlorides on the growth of tomatoes. A. V. JURIEVA (Bull. Acad. Sci. U.R.S.S., 1934, 7, 1065—1072).—The max. amount of NaCl tolerated by tomatoes is 0.2% of the dry wt. of soil. The stimulatory effect of 0.05%of NaCl is attributed to the direct ionic action and not to osmotic phenomena. A. G. P.

Electrophysiological [plant] growth theory. K. RAMSHORN (Planta, 1934, 22, 737-766).—The potential gradient (I) in various plant organs is examined. Tropic responses in plants are correlated with changes in (I) which, in turn, control the translocation of growth-promoting substance. A. G. P.

Effect of temperature on the growth and composition of Stayman and Baldwin apple trees. G. T. NIGHTINGALE and M. A. BLAKE (New Jersey Agric. Exp. Sta. Bull., 1934, No. 566, 20 pp.).-At 21°, both varieties grew well, and additions of NO3' produced increased growth. At 7.2° growth was checked and leaves accumulated sugar (I), starch (II), and anthocyanin pigments (III). Treatment with NO3' was followed by utilisation of carbohydrates (IV) and formation of org. N compounds, which in Stayman remained largely in the fine roots, but in Baldwin were translocated to aerial organs. At 35°, Baldwin lost (III), but made little growth, probably owing to exhaustion of (IV) and failure to reduce NO3'. Degradation and translocation of (II) in older roots and stems was insufficient to meet requirements of leaves. Stayman produced more growth and was less unfavourably affected by the high temp. A. G. P.

Effects of temperature on the growth and metabolism of Elberta peach trees and growth responses of other varieties. G. T. NIGHTINGALE and M. A. BLAKE (New Jersey Agric. Exp. Sta. Bull., 1934, No. 567, 20 pp.).-Sand-cultured peach trees, starved of N, were unaffected by transference to greenhouse conditions at 11° and 21°, but at 35° new weakly growth was produced, and stored carbohydrate (I) decreased rapidly, protein breakdown and re-utilisation occurred, respiration increased, but CO_2 intake was low. In a similar series of plants to which NO3' was given, little growth occurred at 11°. (I) accumulation remained high, respiration rates were low, and photosynthesis was active. NO₃ was absorbed by roots, but assimilation was limited. At 70°, NO₃' additions produced vigorous growth, with rapidly reduced (I) and appearance of org. N throughout the trees. NO_3' was completely assimilated in fine roots. At 35° NO_3' assimilation was very rapid, but growth was weak and leaves became mottled. A. G. P.

Effects of storage temperature on the propagation value of potato tubers. J. O. HARTMAN (Cornell Univ. Agric. Exp. Sta. Mem., 1934, No. 168, 39 pp.).—Tannin (I) vesicles are located at the base of young buds, but slowly disappear with advancing growth. Starch (II) grains appear in the cortex of buds when the latter develop to approx. 0.9 cm. in length. Walls of cells of very young leaves and apical tissue consist mainly of hemicellulose. In longer shoots (II) accumulation at the base is considerable, and (I) and solanine were abundant in and near the tips, green tips containing more than white tips. Microchemical changes in sprouts are related to the size of the sprout. Storage temp. affects the rate, but not the type, of the changes. A. G. P.

Factors affecting the development of the cotyledonary buds of the common bean, *Phaseolus tulgaris*. C. F. MORELAND (Cornell Univ. Agric. LAP. Sta. Mem., 1934, No. 167, 28 pp.).—Failure of lateral buds to develop is associated with a localised deficiency of N and, possibly, of carbohydrates.

A. G. P.

Effects of increasing the iodine content of tomato plant on respiration and enzymic activity.

F. L. WYND (Ann. Missouri Bot. Gard., 1934, 21, 367-431).—Addition of KI (1-20 p.p.m.) to nutrient media depressed growth and caused loss of green colour and dropping of leaves. Small concns. increased respiration, peroxidase and invertase activity, which declined when larger proportions were used. With high [KI] catalase activity increased and oxygenase declined to small extents. Peptase was unaffected. CH. ABS. (p)

Internal atmosphere of apples. O. J. DOWD (Proc. Amer. Soc. Hort. Sci., 1933, 30, 162—163).— During growth the vol.-% of CO₂ declines and that of O₂ increases. CH. ABS. (p)

Physiological factors affecting the germination of seed maize. J. L. ROBINSON (Iowa Agric. Exp. Sta. Res. Bull., 1934, No. 176, 67—112).—Differences in the rates of germination and development of seed harvested in different stages of maturity are examined. During preliminary soaking in H_2O seed collected in immature stages absorbed more H_2O and lost more sugars and sol. N than did fully matured seed. In air-dry maize most sugars (I) were non-reducing. After soaking, nearly all (I) in seed and in the solution were reducing (I). Manuring of the crop with superphosphate did not influence the germination of the seed produced. A. G. P.

Distribution of water, dry matter, and nitrogen during the germination of Impatiens balsamina, L. H. WELSCH (Protoplasma, 1934, 22, 63–127).— During germination the extent and nature of development of, and the distribution of H_2O in, the seedling are controlled by the imbibitional properties of the protein matter. Translocation of cotyledon-N is limited to the upper portion of the hypocotl (I) at an early stage, that to the lower portion of (I) and to roots ceasing entirely. Translocation of non-N dry matter proceeds steadily. Development of the lower portion of (I) ceases when the imbibition of the protein reaches a stable limit of approx. 0.1%. A. G. P.

Photodynamic phenomena in green and colourless strains of *Euglena gracilis*. O. JIROVEC and K. VÁCHA (Protoplasma, 1934, 22, 203-208).—The greater sensitivity to photodynamic influence of green than of colourless cultures is attributed to the O_2 excess due to assimiliation. A. G. P.

Stimulation process in Spirogyra and Vaucheria and potential measurements in plant cells. K. UMRATH (Protoplasma, 1934, 22, 193—202).—In a no. of species examined the cell contents exhibited a negative potential with respect to that of the external medium. A. G. P.

Permeability of plant cells. H. BONTE (Protoplasma, 1934, 22, 209—242).—Substances insol. or sparingly sol. in lipins penetrate cell walls in accordance with their mol. vols. (I). Lipin-sol. or surfaceactive substances penetrate more rapidly than their (I) suggest. The mechanism of plasmolytic effects is examined. A. G. P.

Capacity of isolated plant protoplasts to be drawn into threads. H. PFEIFFER (Kolloid-Z., 1935, 70, 26-31).--A discussion. E. S. H.

Chromosome and aster dimensions of dividing cells in regenerating tissues of Clymenella torquata exposed to thiol and sulphoxide. F. S. HAMMETT (Protoplasma, 1934, 22, 173–178).— Chromosomes increase in thickness under the influence of \cdot SH (glutathione), and become shorter and thinner under that of Ph₂SO. A. G. P.

Utilisation of nutrients by colonial bent (Agrostis tenuis) and Kentucky blue grass (Poa pratensis). H. B. SPRAGUE (New Jersey Agric. Exp. Sta. Bull., 1934, No. 570, 16 pp.).-In sand cultures the grasses showed a difference in tolerance of deviations from optimum nutrient composition. $(NH_4)_2SO_4$ was the dominant factor controlling growth, which was inversely related to the concn. of $(NH_4)_2SO_4$ supplied. The N content of tops and roots increased with the concn. of $(NH_4)_2SO_4$, which was probably absorbed in toxic amounts. NH_4Cl produced similar effects. Growth was increased by NaNO₃, unaffected by Na₂SO₄, and inhibited by NaCl to extents similar to those produced by NH₄Cl. Response to NaNO₃ at $p_{\rm H} 4.5$ was > that at 6.5. The PO₄" of tops and roots increased with that in the nutrient. No definite relationship existed between the [Ca"] and [Mg"] of the nutrient and the intake by the grasses. Tolerance of bent to acid conditions is not the result of a low Ca requirement. The ratio roots : tops was greatest in the more acid media. At $p_{\rm H}$ 4.5 NaNO₃ increased the tops without affecting roots, but at 6.5 root growth was much reduced. $(NH_4)_2SO_4$ did not affect the ratio at $p_{\rm H}$ 4.5, but decreased roots at 6.5. A. G. P.

Excretion of nitrogenous compounds from the root nodules of leguminous plants. A. I. VIR-TANEN and S. VON HAUSEN (Nature, 1935, 135, 184-185).—The excretion of N compounds (mainly NH₂acids) from the nodules depends largely on the supply of air to the roots. It is not due to a decomp. of the nodule-proteins or to a mechanical wounding of the root hairs. The N fixation is assumed to occur at the surface of the bacterial cells in the nodule, and the N compounds formed are partly utilised by the host plant and partly diffused into the soil. L. S. T.

Natural regulation of protein metabolism in plants. K. PAECH (Planta, 1934, 22, 794—799).— Decomp. of protein in intact leaves is approx. the same in the presence or absence of O_2 and is paralleled by the consumption of carbohydrates. Synthesis or hydrolysis of protein is controlled by the relative balance of sugars or NH₃. Breakdown of the cell structure, *e.g.*, after 60—80 hr. in anaërobiosis, is the cause and not the effect of increased proteolysis. A. G. P.

Mechanism of the inter-conversion of hexose sugars in living organisms. K. M. DAOUD and W. TADROS (Biochem. J., 1935, 29, 225-237).—It is suggested that the formation of an intermediate polysaccharide constitutes one stage in the interconversion of hexoses in the living organism. Starch, besides being the principal reserve carbohydrate (I) of seeds and the (I) into which other sugar reserves are converted during germination, also plays a direct part in the hexose inter-conversion, for which the intact living seed is necessary. If enzymic extracts of germinated seeds act on (I) reserves *in vitro*, the end-products are identical with those obtained by acid hydrolysis. The mannogalactan of carob and fenugreek (II) seeds gives rise to starch during germination, later hydrolysed to glucose by an amylase elaborated during germination. The fructosan formed in small quantities during germination of (II) seeds later diminishes or disappears. Possible mechanisms of inter-conversion are discussed. A. E. O.

Relation between the natural order of plants and their chemical composition. P. KLASOW (Svensk Papp. Tidn., 1934, 37, 302—306; Chem. Zentr., 1934, ii, 1938).—Differences in pentose : hex. ose ratio, type of lignin, and content of AcOH are cited as characteristic of plant families. A. G. P.

Plant reproductive cells. IV. Chemical constituents of the spores of Aspidium filix mas. A. KIESEL and G. SCHIPITZINA (Z. physiol. Chem., 1934, 229, 159; cf. A., 1926, 440).—Thymine, arginine, and lysine were identified in the acid hydrolysate of the spores. J. H. B.

Chemical composition of the round-leaved sundew (Drosera rotundifolia, L.). W. R. WITANOWSKI (Wiadomosci Farm., 1934, 61, 420–422, 432–433).—Freshly-dried plants contain BzOH, hydroxynaphthoquinones, and a naphthoquinone, droserone, $C_{11}H_8O_3$, m.p. 70–71°, sublimes at 100– 110°/3 mm. (oxime, m.p. 151°), which on oxidation yields γ -coccinic acid. CH. ABS. (r)

Chinese perilla. Y. F. CHI (J. Chinese Chem. Soc., 1934, 2, 315—325).—The extract (34%) obtained from the leaves of Chinese perilla, *P. Nankinensis*, Decne, by EtOH contains some furfuraldehyde, and 2.5% of a volatile oil; this oil contains no perilla-aldehyde, but 1% of an aldehyde and more of a ketone, C₁₁H₁₆O, m.p. 11.5—12°, b.p. 114—116°/22 mm., $[\alpha]_{10}^{20}$ +1.713° (oxime, m.p. 67°; semicarbazone, m.p. 240°). The non-volatile portion contains much glucose and a resin (I). Extraction of (I) with ligroin gives a mixture, from which, after treatment with o-C₆H₄(CO₂H)₂ and hydrolysis, are obtained hentriacontane, ceryl alcohol, a phytosterol, AcOH, PrCO₂H, a mixture of about equal parts of stearic and palmitic acids, and a mixture of oleic, linoleic, linolenic, and isolinolenic acids. Extraction of the ligroin exhausted (I) with Et₂O yields perillol, C₂₈H₅₀O₂, +2H₂O, m.p. 271—272° [acetate, m.p. 193.5° (decomp. above 285° after resolidification)]. R. S. C.

Root of Peucedanum decursivum, Maxim (Umbelliferæ). Y. F. CHI and Y. T. WONG (J. Chinese Chem. Soc., 1934, 2, 329–336).—These roots yield to EtOH tannins, glucose, a little AcOH, a substance, $C_{12}H_{13}O_4$ or $C_{15}H_{16}O_5$, m.p. 150–151°, and a resin which by hydrolysis affords a phytosterol (? spongosterol), AcOH, EtCO₂H, PrCO₂H, palmitic, stearic, oleic, and linoleic acids. R. S. C.

Constituents of Orthosiphon leaves. A. GOUDSWAARD (Pharm. Tijds. Nederl.-Indie, 1934, 11, 145—152; Chem. Zentr., 1934, ii, 1951).—The leaves of Orthosiphon stamineus, Benth., contain a phytosterol, m.p. 139°, and an unidentified substance, m.p. 192°. H. N. R.

Roots of Citrullus colocynthis, Schrader. R. R. AGARWAL and S. DUTT (Current Sci., 1934, 3, 250– 251).—EtOH extraction of the powdered root gave α-elaterin and hentriacontane. An impure saponin was also obtained. P. G. M.

Hemicelluloses of the wood of English oak. II. Composition and properties of hemicellulose-A from samples of wood dried under various conditions. M. H. O'DWYER (Biochem. J., 1934, 28, 2116-2124; cf. A., 1932, 202).-The composition of hemicellulose-A (I) of oak wood is not affected by drying below 40°. Sapwood-(I) suffers degradation if the parent wood is dried above 40°, but heartwood-(I) is stable at 100°. Sapwood-(I), but not heartwood-(I), gives a blue colour with I, and the transition from the former to the latter in wood is accompanied by constitutional change in (I), including an increase in the content of methoxyaldobionic acid (II) residues. Both sapwood- and heartwood-(I) contain chiefly anhydroxylose residues combined with uronic acid and with (II) residues, the former acids predominating in sapwood-(I). The (II) residues are much more resistant to hydrolysis than the uronic acids. The insol. residue remaining after acid hydrolysis of (I) contains much less OMe than lignin, and is probably formed from (II). Glucose was not isolated as a product of hydrolysis of sapwood-(I), and the latter still gave a reaction with I after treatment with takadiastase. (I) may be of similar composition in all hardwoods. A. E. O.

Nature, distribution, and development of certain cell-wall constituents of plants. H. W. BUSTON (Biochem. J., 1935, 29, 196-218).-In developing pods of beans and sweet peas, the relative proportion of pectin (I) and hemicellulose (II) remains almost const. throughout the greater part of the growth period, but the (II) content decreases towards the close. In the development of the woody stem of the rose, the increase in lignin (III) runs parallel with increase in (II), but there is no loss of (I), which therefore does not constitute the source of (III) during primary lignification. The (II) content [but not the (I) content] of detached leaves falls when they are starved or slowly dried. (II) is more labile than (I) and may be available for respiration in these circumstances, the loss consisting mainly of hexose units and, to a smaller extent, of pentosan. Rapid growth is conducive to the formation of galactoarabans and (I). The "A" types of (II) in the leaves of the bean and vine consist mainly of galactose units, whilst the corresponding (II) for certain monocotyledon leaves (e.g., grass, maize; but not hyacinth and narcissus) is mainly a xylosan. The relation between (I) and (II) and lignification is discussed. (I) is the precursor of only a limited type of (II), viz., the arabans. A. E. O.

Bog-moss. II. Sphagnum cellulose. M. SHIKATA and M. WATANABE (Proc. Imp. Acad., Tokyo, 1934, 10, 608—611, and Mem. Coll. Agric. Kyoto, 1934, 33, 1—8; cf. A., 1932, 889).—This is best purified by chlorination and gentle boiling with 1% NaOH. It then gives glucose quantitatively and is more resistant to degradation by 17.5% NaOH, but less resistant to oxidation; than other celluloses. R. S. C.

Arbutin content of leaves of Vaccinium vitis idea. R. GAGER and L. ZECHNER (Pharmaz. Mh.,

1934, 15, 93—95; Chem. Zentr., 1934, ii, 1474).— Cranberry leaves contain appreciable amounts of arbutin (I), the min. occurring in June, the period of max. growth. It is concluded that (I) is a reserve material. (I) is found, in smaller amounts, in other parts of the plant. H. N. R.

Formation of diketones from the ingredients of tobacco. C. NEUBERG and M. KOBEL (Biochem. Z., 1935, 275, 339–343).—Dry distillation of citrus pectin gave 0.066%, of tobacco pectic acid 0.069%, and of meso-inositol 0.135% of Ac₂. Dry distillation of Zn lactate gave 0.425% of AcCOEt. P. W. C.

Saponin from soya bean. R. C. BURRELL and E. D. WALTER (J. Biol. Chem., 1935, 108, 55—60).— Soya beans are extracted with EtOH, and the residue is electrodialysed and extracted with Et₂O. Crystals of a saponin (I) separate from the EtOH solution of the residue identical with those previously found (A., 1931, 1304). Galactose and possibly rhamnose are present in the hydrolysate from (I), also a sapogenin, m.p. 198—200°, C 77.8, H 11.13%, $[\alpha]^{25}$ +73.7° in CHCl₃. H. D.

Plant-phosphatides and lecithin. III. Phosphatides of wheat germ. W. DIEMAIR and B. BLEVER (Biochem. Z., 1935, 275, 242—247).—The phosphatide-fatty acids consist chiefly of palmitic and linoleic acids and the bases of choline and colamine. The ratio of saturated to unsaturated acids is 1:5. P. W. C.

Biogenesis of some terpenes.—See this vol., 351.

Purification of chlorophyll. H. A. BAKKER (Proc. K. Akad. Wetensch. Amsterdam, 1934, 37, 679-684).—Details of an improved extraction (in dark, or in green light) of chlorophyll (I) (0.5 g., 97% pure by Mg determination) from the dried leaves (75 g.) of *Brassica oleracea*, var. *acephala*, by a combination of the methods of Willstätter *et al.*, Winterstein *et al.* (A., 1934, 91), and Tswett (chromatographic adsorption, A., 1907, ii, 144) are given. No evidence of the presence of a third component of (I) (Zscheile, A., 1934, 1115) was obtained. J. W. B.

Photodecomposition of chlorophyll. B. HUBERT (Proc. K. Akad. Wetensch. Amsterdam, 1934, 37, 684—688).—When the colour curves, obtained by Weigert's method (A., 1916, ii, 545), for chlorophyll (I) (fresh spinach) are plotted at 15 min. intervals, log E decreases with time between 590 and 700 mµ, but increases between 500 and 590 mµ. In the range 625—680 mµ the decrease ishomogeneous, suggesting a decrease in concn., and at 700 mµ an increase in the concn. of some substance (II), produced by photodecomp. of (I), is indicated. The grey zone (confirmed) in Tswett's chromatogram (A., 1907, ii, 144) may correspond with (II). Weigert's colour curve for (I) may be obtained with partly photodecomposed (I). J. W. B.

Colouring matters of fungi. XI. Boletol, the colouring matter of the blue-coated *Boletus*. XII. Synthesis of boletol and *iso*boletol.—See this vol., 347.

Flavin-like pigment from linseed. H. WILL-STAEDT (Svensk Kem. Tidskr., 1934, 46, 259-261).-- Aq. NaCl extracts of various materials [eggs, linseed (I), etc.] which produce allergic symptoms in sensitive persons (II) frequently exhibit a yellowish-green fluorescence on ultra-violet irradiation (III). Aq. ovoand lacto-flavin, however, are inactive when tested on the skin of (II), by the Schultz-Dale guinea-pig uterus method, or by complement formation. Addition of EtOH (1 vol.) to aq. extracts of (I) gives filtrates (containing both flavin and allergic principle) which, on acidification after, but not before, treatment with 2N-NaOH and (III), yield a pigment on extraction with CHCl₃; this pigment resembles known flavins in its rapid adsorption on freshly pptd. PbS, but not on fuller's earth, and in its colour reaction with Zn in 10% HCl (A., 1934, 461). F. O. H.

Carotenes from roots and leaves at various stages of development. G. MACKINNEY (J. Biol. Chem., 1935, 108, 45–49).—Carotene (I) was extracted by the method of Smith (A., 1932, 619) modified by saponification of the light petroleum extract with KOH-MeOH before concn. Both components of (I) were obtained from individual carrot roots (II). There was no marked variation with age in the proportions of the components of (I) in (II) and in the leaves of *Hedera helix* and *Sequoia sempervirens*. H. D.

Extraction of carotene from carrot juice. G. ROSENBERG (Bull. Soc. Chim. biol., 1934, 16, 1761).— The carotene (I) is adsorbed by PbO–Pb(OAc)₂ (1:3), and eluted with light petroleum. The extract is saponified with KOH in EtOH. The (I) is transferred to CS_2 and pptd. by EtOH. A. L.

Products of oxidation of carotenes. Carotenoid of *Thiocystis* bacteria.—See this vol., 340.

Nitrogen metabolism of the apple fruit. I. Determination of amino-nitrogen by the Van Slyke method in presence of tannin. A. C. HULME (Biochem. J., 1935, 29, 263—271)—Abnormally high vals. obtained for NH_2 -N in apple extracts (I) by the Van Slyke method are due to the presence of tannin, which can only partly be removed from (I) (although almost completely from pure solution) by pptn. with caseinogen, but is completely removed by pptn. with K₂Cr₂O₇, without affecting NH_2 - or acid-amide groups. A. E. O.

Nicotyrine in tobacco. A. WENUSCH (Biochem. Z., 1935, 275, 361).—Dried Brazilian tobacco (I) contains nicotyrine (II) [isolated as picrate from the distillate obtained on subjecting (I) to steam-distillation in presence of KOH]. Possibly (II) does not occur in the plant, but is produced from nicotine during fermentation because of the absence from the leaves of reducing substances. W. McC.

Protoplasm. V. Nucleic acid and the nucleoproteins of pea embryos. A. KIESEL and A. BELOZERSKY (Z. physiol. Chem., 1934, 229, 160– 166).—Pea embryos contain two nucleoproteins differing in NH₂-acid content and in solubility, one being sol. in H₂O, the other in alkali. On hydrolysis they yield constituents similar to those of animal nucleic acid. There is no evidence for a basic, protamine- or histone-like substance in the protein constituent. J. H. B.

Alkaloid of the seeds of Leonurus sibiricus, L. C. F. SHU (J. Chinese Chem. Soc., 1934, 2, 337– 339).—The seeds contain leonurinine, $C_{10}H_{14}O_2N_2$, m.p. 262—263° (decomp.). R. S. C.

Misconceptions relative to the mineral composition of plants. W. THOMAS (Science, 1934, 80, 587).—A discussion. L. S. T.

Method for bleaching leaves. I. MoVEIGH (Stain Tech., 1935, 10, 33-34).—Leaves are bleached in 5% NaOCl after rinsing in 95% EtOH. H. W. D.

Lugol's solution for the Flemming triple stain. L. A. MARGOLENA (Stain Tech., 1935, 10, 35—36).— The application of alcoholic Lugol's solution after safranine and after crystal-violet improves, hastens the differentiation of, and stabilises preps. of botanical material stained by Flemming's method.

H. W. D.

Micro-nephelometry and its application to certain irradiated living tissues. W. M. MILLAB (Radiology, 1934, 23, 294—298).—A combination of microscope and photo-electric cell is described. Irradiation did not alter the opacity of ovalbumin, but did affect tadpole tissue. CH. ABS. (p)

Rapid standardisation of protein extracts by determining the nitrogen content. V. L. COHEN (J. Allergy, 1933, 5, 70-73).—The method is based on that of Hubbard and Sly (A., 1933, 1181).

Сн. Авз. (р)

Determination of glyoxaline compounds in urine, fæces, and sera. M. LOEPER, A. LESURE, and A. THOMAS (Bull. Soc. Chim. biol., 1934, 16, 1385— 1409).—A modification of the method of Hanke and Kocssler (A., 1919, ii, 67) for the determination of substances containing the glyoxaline group in blood (I), urine (II), and fæces (III) is described. (I) contains \geq 30, (II) \geq 300, and (III) \geq 100 mg. per litre.

A. L.

Diazo-reaction of histidine.—See this vol., 370.

Determination of very small amounts of thiocyanate in biological fluids. F. HARTNER (Mikrochem., 1935, 16, 141—152).—2 c.c. of liquid are deproteinised with $CdSO_4$ +NaOH, glutathione being thereby removed simultaneously. The liquid is acidified with HNO₂-free HNO₃, NaCl added, and AgCNS pptd. by 0.5N-AgNO₃. The ppt. is converted into AgBr by 0.8 c.c. of 10% NaBr. To the solution, containing CNS', 1 c.c. of 0.0001N-KBrO₃ is added and the solution acidified with HCl in a stoppered tube. Na₂HPO₄ is added as a buffer, KI added, and the I liberated by excess of Br titrated with 0.001N-Na₂S₂O₃. The alternative oxidation of CNS' with 0.001N-I+KI in alkaline solution tends to give erratic results. J. S. A.

Modifications of Leusden's method for determining carbon dioxide. T. AKABA (Sei-i-kwai Med. J., 1933, 52, 146—155).—The use of 0.07% $Ba(OH)_2$ solution containing 4 c.c. of phenolphthalein solution (0.04% in 50% EtOH) per litre, and of a 45-c.c. reservoir is recommended. CH. ABS. (p)