BRITISH CHEMICAL ABSTRACTS

A.-PURE CHEMISTRY

MAY, 1936.

General, Physical, and Inorganic Chemistry.

Intensity distribution of the continuous spectrum of hydrogen in mixtures with helium and with neon. N. D. SMITH (Physical Rev., 1936, [ii], 49, 345-350).—The intensity max. was shifted to longer $\lambda\lambda$. A study of the intensity distribution of the many-line spectrum in the presence of He showed that 20 cm. of He reduced the vibration in the excited states almost to zero, so that the continuous spectrum in presence of He must be due to transitions from the lowest vibrational level of its upper state. The λ distribution of energy in the continuous spectrum for 0.6 mm. H2 and 21 cm. He, determined by comparison with the radiation emitted from the positive crater of the C arc, showed a max. intensity at about 3200 Å. compared with 2500 Å. under ordinary conditions.

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N. M. B.

Comparison between the continuous molecular spectra of hydrogen and deuterium. (MLLE.) A. TOURNAIRE and E. VASSY (Compt. rend., 1936, 202, 562-564; cf. this vol., 127).-The distributions of intensity in the spectra have been measured at 1923-4990 Å. and 0.44-3 mm. pressure. T. G. P.

Nitrogen atom and the molecule. L. S. MATHUR and P. K. SEN-GUPTA (Proc. Acad. Sci. Agra and Oudh, 1935, 5, 187-226) .-- Recent measurements of the various band systems of N_2 are tabulated and discussed critically. J. W. S.

Fine structure of the metastable level of nitrogen. B. STEPANOV (Physikal. Z. Sovietunion, 1935, 8, 352–353).—The N₂ lines 1742.74 and 1745.26 Å, have been resolved and the components found to have the separation 2.13 cm.-1 Intensity distribution is discussed in relation to the scheme of Compton and Boyce (A., 1929, 365). R. S.

Glow discharge through oxygen. F. D. GREEVES and J. E. McF. JOHNSTON (Phil. Mag., 1936, [vii], 21, 659-686).-A discharge tube fitted with probe tubes has been used for investigating the negative sections of the cold-cathode glow discharge in Ω_2 , and the range of conditions under which probes can be used without introducing errors determined. Data are given for the electron energy distributions and conens., and for the potential in the discharge.

J. W. S. Reversal of the neon lines 744, 736 A. T. TAKAMINE and T. SUGA (Sci. Papers Inst. Phys. Chem. Res. Tokyo, 1936, 29, 1-7).—When a strong condensed discharge is passed through a long tube of Ne at several mm. pressure the resonance lines 744 and 736 A. are considerably broadened and the latter is much the more conspicuously reversed, with a

white gap in the core extending to about 0.3 Å. The contour of this line is quite asymmetric, with its wing extending towards the shorter λ side, and resembles that of the He resonance line 584 Å.

N. M. B.

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Perturbations of Ne I terms. Y. ISHIDA and T. TAMURA (Sci. Papers Inst. Phys. Chem. Res. Tokyo, 1936, 29, 9-18).-Anomalies in certain sequences can be explained, assuming that the displacement const. of all the series is 780 cm.-1 or 0, on the basis of Langer's perturbation theory. N. M. B.

Photo-electric measurement of the absorption of sodium resonance radiation. F. FAIRBROTHER and J. L. TUCK (Trans. Faraday Soc., 1936, 32, 624-633; cf. A., 1935, 466) .- A photo-electrometric method for measuring the intensity of a beam of Na resonance light with a precision of $\pm 0.1\%$ is described, and measurements of absorption between 210° and 100° are recorded. The ratio (intensity of transmitted light)/(intensity of incident light) is a nearly linear function of the no. of Na atoms in the path of the beam up to 45% absorption. Beer's law is followed over 25% of the absorption. F. L. U.

Effect of a magnetic field on the absorption spectrum of diatomic sulphur molecules. J. GENARD (Physica, 1936, 3, 125-130; cf. A., 1935, 1045). N. M. B.

Molecular spectrum of sulphur vapour. M. DESIRANT and J. DUCHESNE (Bull. Acad. roy. Belg., 1935, [v], 21, 1062-1068).-Available data are critically reviewed. Investigations towards longer $\lambda\lambda$ in the infra-red showed a new band system, degraded towards the violet, and extending to 7765 Å.; an expression is found for the band heads. The calc. heat of dissociation is $4\cdot41\pm0\cdot02$ e.v. N. M. B.

Inter-system combination lines of A III. J. C. BOYCE (Physical Rev., 1936, [ii], 49, 351).-Data and classifications for 6 of the lines found in the extreme ultra-violet are tabulated, and revised vals. for the singlet terms previously reported are given (cf. A., 1935, 1291). $\lambda\lambda$ of the "forbidden" lines of A III are calc.; one of them agrees closely with a nebular line at λ 7135.6. N. M. B.

Electron-optical investigations of the glow emission of nickel in cæsium vapour. D. SCHENK (Z. Physik, 1936, 98, 753-758). A. B. D. C.

First spark spectrum of copper. A. G. SHEN-STONE (Phil. Trans., 1936, A, 235, 195-243).—The spectrum of the Cu-cathode Schuler tube has been photographed in the range 10,000-600 Å. Tables

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of predicted and identified terms, odd and even terms, and full data on $\lambda\lambda$, intensity, wave-no., and classification for 1350 lines are given. N. M. B.

Extreme ultra-violet spectra of zinc and cadmium. L. BLOCH and E. BLOCH (Ann. Physique, 1936, [xi], 5, 325—354).—Using normal and tangent grating spectrographs and an oscillating electrodeless discharge, complete $\lambda\lambda$ and intensities are tabulated for the regions Cd 2322—221, and Zn 2349—227 Å. A fairly complete separation of the Cd II, III, IV, and Zn II, III, IV, spectra has been effected, and a classification of the fundamental multiplets of Cd IV and Zn IV is proposed. N. M. B.

Intensity distribution of red cadmium lines excited by electron collisions in molecular rays. R. MINKOWSKI (Z. Physik, 1936, 98, 791).—A printing error is corr. (cf. A., 1935, 1045). A. B. D. C.

Anomalous dispersion of the first doublets of Sr^+ and of Ba^+ . L. ALLEGRETTI (Atti R. Accad. Lincei, 1935, [vi], 22, 256—258).—The ratio of the anomalous dispersion coeffs., N_1/N_2 , for the first doublet of the principal series of Sr^+ and Ba^+ has the val. 2.07 and 2.16, respectively. O. J. W.

Absorption of monochromatic light in iodine vapour. J. HARDING (Phil. Mag., 1935, [vii], **21**, 773-778).—The absorption of the 5461, 4358 Å. Hg lines by I vapour ∞ the pressure up to 2.5 cm. The absorption of λ 5461 Å. is increased by the presence of 1.8 cm. of He. For λ 4358 Å. He has no effect.

Spectrum of trebly ionised thorium. R. J. LANG (Canad. J. Res., 1936, 14, A, 43–47).—The spectrum of Th IV has been analysed. The terms 7P, 6D, 7D, 8D, 7S, 8S, 9S, 5F, and 5G have been found. The ionisation potential of Th⁺⁺⁺⁺ is 29.38 volts. A. J. M.

Stabilisation of a glow discharge in a homogeneous field in air at atmospheric pressure by means of electrolytically produced films of aluminium oxide. T. RUMMEL (Naturwiss., 1936, 24, 158).—It was found possible to maintain a stable glow discharge between two plane, parallel Al electrodes covered electrolytically with a film of Al_2O_3 (500 μ). The stabilising effect of the Al_2O_3 is due to the arrangement of pores in the film, which run from the surface to the base, and give a favourable ratio for the length- to cross-section-conductivity.

A. J. M. **Positive ionic current on the glow cathode in** a gas discharge. M. J. DRUYVESTEYN (Physikal. Z. Sovietunion, 1936, 8, 579-581).—The method employed by Gvozdover (A., 1935, 1293) is criticised. A. J. M.

Positive ionic current on the glow cathode in a gas discharge. S. GVOZDOVER (Physikal. Z. Sovietunion, 1936, 8, 582—583).—A reply to Druyvesteyn (preceding abstract). A. J. M.

Electrical properties of the interrupted arc. K. GAULRAPP (Ann. Physik, 1936, [v], 25, 705–727). —Oscillograph records of current and voltage as the electrodes are separated have been obtained with a no. of metallic electrodes in air and H_2 at various pressures. At low pressures the p.d. across a short arc is independent of the current and length of the arc. Vals. are given for a no. of metals. Metals can be divided into three groups according to the type of trace left on the cathode. A const.-burning a.c. arc is described. L. J. J.

Fine structure of sudden luminous discharges obtained by discharging a condenser across a gas tube. M. LAPORTE and (MLLE.) PIERREJEAN (Compt. rend., 1936, 202, 643—645).—Arc and condensed spark spectra of A and Hg have been examined with a rotating mirror. In the cold Hg-A tube, arc and spark spectra of A are emitted; in the hot tube the arc spectrum of Hg is superimposed. L. J. J.

"Tube" discharges. R. SEELIGER and K. SOMMERMEYER (Z. Physik, 1936, 98, 733—739).— Constriction of electric discharges observed in electronegative gases is explained by the electrons normally diffusing outwards, forming negative ions which return towards the discharge. A. B. D. C.

Nebular red-shift. R. J. KENNEDY and W. BARKAS (Physical Rev., 1936, [ii], 49, 449–452).— The possible effect of free electrons in a highly ionised gas on the frequency of light traversing it was investigated. Electrons to a density of about 5×10^{12} per c.e. were produced in a series of low-voltage arcs through which passed light of $\lambda 5461$ Å. No frequency shift was observed with an interferometer in vac. sensitive to 2 parts in 10¹⁰. Results indicate that nebular red-shift is not due to interstellar electrons.

N. M. B.

Width of the K_{α_1} line of molybdenum. J. WEIGLE (Compt. rend., 1936, 202, 564-566).—The width, measured with a curved mica crystal, is 0.190 ± 0.005 X. T. G. P.

Monochromatic cobalt K_{α} radiation (1.787 Å.). E. I. Sovz and V. L. CHEIFETZ (Rept. Centr. Inst. Met., 1934, No. 17, 234—236).—The K_{α} and K_{β} Co radiations were separated by a filter composed of an electrolytic deposit of Fe on Al foil (0.01 mm. thick). CH. ABS. (e)

Atomic scattering factors of aluminium, nickel, and copper for Cu K_{α} radiation and their relation to the theory of X-ray dispersion. G. W. BRINDLEY (Phil. Mag., 1935, [vii], 21, 778– 790; cf. this vol., 3).—Data for Ni and Cu were restandardised using Al powder, in place of KCl, as a basis for intensity measurements. H. J. E.

X-Ray investigation of atomic vibrations in zinc. G. W. BRINDLEY (Phil. Mag., 1936, [vii], 21, 790—808; cf. this vol., 412).—Reflecting planes making specially small angles with the basal plane of the structure give low scattering factors, whilst planes making angles of approx. 90° give high scattering factors. This anomaly is discussed in relation to Zener's results (this vol., 273). The lattice vibrations of Zn are calc. H. J. E.

Al K β bands from Al-Cu alloys. S. YOSHIDA (Sci. Papers Inst. Phys. Chem. Res. Tokyo, 1936, 28, 243—248).—The bands of the X-ray spectrum emitted when targets of pure Al and Al-Cu alloys were bombarded with electrons have been studied. With pure Al (single band) the results agree with the assumption of three free valency electrons. With the alloys the

H. J. E.

band separates into two, and the intensity of the second band increases with the % of Cu. A theoretical interpretation is given. R. S. B.

Intensity ratio $E_{aa'}/E_{\beta\gamma}$ and yield coefficients $u_{aa'}$ and $u_{\beta\gamma}$ for the characteristic K-radiation from Co (27) to Te (52). W. GROTHEY (Ann. Physik, 1936, [v], 25, 577-599).—An elaboration of the differential filter method of Küstner (A., 1931, 993) has been employed to determine $E_{aa'}/E_{\beta\gamma}$, with an accuracy of $\pm 6\%$, for 20 elements from Co to Te and their compounds with light atoms. $E_{aa'}/E_{\beta\gamma}$ decreases with increasing at. no., and becomes const. after at. no. 47.

Wave-length determinations for the L series of elements 29 copper to 26 iron. F. TYREN (Z. Physik, 1936, 98, 768-774). A. B. D. C.

X-Ray diffraction by a film of counted molecular layers. C. HOLLEY and S. BERNSTEIN (Physical Rev., 1936, [ii], 49, 403).—Using a film of 301 mol. layers of Ba stearate on glass (cf. Blodgett, A., 1935, 931) and having a grating space of 48.8 Å., the thickness of two mol. layers, the first three orders of the L series and the M line of W were photographed. N. M. B.

Photo-electric effect of aluminium films evaporated in vacuum. E. GAVIOLA and J. STRONG (Physical Rev., 1936, [ii], 49, 441-443).—Sensitivity curves of Al films deposited by evaporation in vac. were determined. A new threshold val. of 2830 Å. and a selective max. around 2700 Å. were found.

N. M. B.

Photo-effect at thin adsorbed layers of alkali metals. V. GEI and I. TRUTEN (Physikal. Z. Sovietunion, 1935, 8, 342—351).—The production of multimol. layers of alkali metals on SiO₂ gel is described. Ohm's law is obeyed by the metal in this state when the e.m.f. < 5 volts, and the photo-effect is normal, with long-wave limits for K 7800 Å. and Cs 9550 Å. R. S.

Determination of the thermionic work function of nickel by a new method. R. M. BOWIE (Iowa State Coll. J. Sci., 1934, 9, 131—132).—The electron emission from a cooling Ni sphere charged a condenser, which was discharged through a ballistic galvanometer. CH. ABS. (e)

Changes of emission potentials of metals near the m.p. H. KURZKE (Z. Physik, 1936, 98, 684-691).—Theoretical. These changes imply a change in binding energy of "free" electrons near the m.p.

A. B. D. C.

Ionisation probability of He⁺⁺. W. BLEAKNEY and L. G. SMITH (Physical Rev., 1936, [ii], 49, 402; cf. *ibid.*, 1933, [ii], 43, 378).—The electron energy-ionisation current curve shows a sharp rise at 79 volts attributed to He⁺⁺. At 300 volts the current reaches a max. and is 1·1% of that ascribed to He⁺, indicating that 0·55% of the ions are doubly charged. N. M. B.

Effective cross-sections for ion collisions in the absence of resonance. F. WOLF (Ann. Physik, 1936, [v], 25, 527-544).—Collisions of He⁺ with Ne and A, Ne⁺ with He, and H₂⁺ with He, Ne, and A, at 30-1030 volts, have been studied. With increasing velocity (v), the effective cross-section (a) falls steeply at low v, owing to the decrease in the angular scattering; at high v, a increases slowly, owing to transference of charge, which is marked only at high v, in contrast to the effect for strict resonance. ais markedly < the kinetic theory vals. (e.g., < 0.3of this val. for Ne⁺-He collisions). For a given ion, the scattering decreases with increasing mass of the collision partner. a due to transference of charge corresponds roughly with the resonance principle.

L. J. J.

Individual effects in ion collisions in the absence of resonance (H⁺, H₂⁺, He⁺ \rightarrow He, Ne, A). F. WOLF (Ann. Physik, 1936, [v], 25, 737-756).—The role of charge transference in the collisions $H_2^+ \rightarrow A$, Ne, He, $H^+ \rightarrow A$, and $He^+ \rightarrow A$ has been investigated with velocities of 30-1030 volts. For $H_2^+ \rightarrow A$, as with other collisions, scattering decreases with increasing velocity, whilst ionisation is absent up to 1000 volts. The theoretical form of the charge transference cross-section (I)-velocity curve is realised only for $He^+ \rightarrow A$ and $H^+ \rightarrow A$. For $H_2^+ \rightarrow A$, I is large and approx. equal to the effective cross-section, increasing at both high and low velocities; the dissociation $H_2^+ \rightarrow H + H^+$ is absent. For $H_2^+ \rightarrow Ne$, I is extremely small at all velocities; dissociation is considerable. L. J. J.

Collision of corpuscular rays with solids. K. SOMMERMEYER (Ann. Physik, 1936, [v], 25, 481— 511).—Mainly theoretical. Sputtering of metals cannot arise from impact of electrons even of high energy, nor by excitation energy of colliding mols. The theory of cathodic sputtering by local heating is developed. Sputtering takes place from locally vaporised collision areas immediately above the crit. temp., and should increase with decreasing t_c , and be inversely ∞ the thermal conductivity of the cathode. Data for sputtering of KI by A⁺ rays are in agreement; the emission follows Knudsen's cosine law, and the degree of dissociation of the sputtered KI corresponds with a temp. about 3000° abs. The emission of secondary electrons is in agreement with the theory. L. J. J.

Effect of the electric field on hydrogen atoms in atomic beam experiments. H. SCHEFFERS and J. STARK (Physikal. Z., 1936, 37, 217–220; cf. A., 1934, 1053).—The deviation of a beam of H atoms in an inhomogeneous electric field gives the val. $(3\pm 1) \times 10^{-25}$ c.e. for the polarisability (α). A.J.M.

Calculation in atomic beam experiments in the electric field. H. SCHEFFERS (Physikal. Z., 1936, 37, 220—221).—Derivations of the formulæ used in computing results of at. beam experiments employing an electric field are given (cf. preceding abstract). A. J. M.

Scattering of protons by protons. M. A. TUVE, N. P. HEYDENBURG, and L. R. HAFSTAD (Physical Rev., 1936, [ii], 49, 402).—Data obtained for the angular range 15—45° and 320—980 kv. do not confirm White's results (cf. *ibid.*, 1935, [ii], 47, 573) for the variation of scattering with angle, but are of the order predicted by Mott's formula. N. M. B.

Positive and neutral rays. III. Ionisation by atomic collision. A. ROSTAGNI (Nuovo Cim., 1934, [ii], 11, 621-634; Chem. Zentr., 1935, ii, 15).-The ionisation produced by neutral A atoms in A, or He atoms in He, increases with the velocity. The effective area of A is about 10 times that of He at the same velocity. J. S. A.

Use of the magnetic field in the formation of ion-electron beams. A. A. SLUTZKIN (Physikal. Z. Sovietunion, 1935, 8, 255–269).—The influence of the strength and direction of the magnetic field on the ion-electron beam generated in a magnetron system has been studied R. S.

Anomalous secondary electron emission. L. MALTER (Physical Rev., 1936, [ii], 49, 478).—Al oxidised electrolytically in a bath of borax and H_3BO_3 assumes a resistive surface film having a high emission coeff. for secondary electrons. Electron bombardment results in the establishment of an intense potential gradient through the resistive oxide film, and this gradient gives rise to anomalous secondary electron emission. N. M. B.

Absolute values of the electron mobility in hydrogen. N. E. BRADBURY and R. A. NIELSEN (Physical Rev., 1936, [ii], 49, 388-393).—A new electrical shutter method for measuring electron mobilities in gases is described. Results are compared with those of the Compton mobility equation.

N. M. B.

Scattering of high-speed electrons. A. MAT-VEEV and F. VERGUNAS (Physikal. Z. Sovietunion, 1935, 8, 430—442).—The angular distribution of electrons of 200—240 kv. energy after nuclear scattering in Al, Pb, and Ag is investigated. The experimental results are compared with the theories of nuclear scattering and a difference is found in the magnitude of scattering with light and heavy nuclei. W. R. A.

Motion of electrons in crossed electric and magnetic fields with space-charge. L. TONKS (Physikal. Z. Sovietunion, 1935, 8, 572—578).—The conclusions of Braude (A., 1935, 1294) concerning the absence of a magnetic cut-off in the presence of a space-charge are criticised. A. J. M.

"Cut-off" in the plane magnetron with spacecharge. S. J. BRAUDE (Physikal. Z. Sovietunion, 1935, 8, 584—586).—A reply to Tonks (preceding abstract). A. J. M.

At. wt. of carbon. G. P. BAXTER and A. H. HALE (J. Amer. Chem. Soc., 1936, 58, 510-515). Gravimetric data obtained by combustion of pyrene, chrysene, $C_6H_3Ph_3$, and anthracene in O₂ give the val. 12.009. E. S. H.

Masses of light atoms. M. L. OLIPHANT (Nature, 1936, 137, 396-397).—The masses of elements up to and including F are recale. from at. transformation data and Aston's new data (this vol., 400). The high val. found for the mass of the neutron (1.0091) raises the question of its stability. Plotting the departure of the mass of an at. species from a whole no. in terms of $^{16}O=16\cdot0000$ against the mass no. gives a smooth curve showing repeated oscillations. Deductions concerning the stability of at. species are made, and the probable existence of He of mass 5.0125 is predicted. L. S. T. At. wt. of radiogenic lead. F. HECHT and E. KROUPA (Z. anorg. Chem., 1936, 226, 248-256). At. wts. of Pb determined by nephelometric titration with AgNO₃ of PbCl, obtained from various minerals are as follows: pitchblende from Great Bear Lake, 206.080; uraninite from Wilberforce, 206.183; pitchblende from Katanga, 206.044; ordinary galena, 207.216. The HCl-insol. part of the Katanga pitchblende was used. F. L. U.

At. wt. of uranium. O. HÖNIGSCHMID and F. WITTNER (Z. anorg. Chem., 1936, 226, 289—309).— The prep. and purification of UCl₄ and UBr₄ from four minerals of different origin and geological age are described. The mean at. wt. of U, determined argentometrically, from 18 analyses of UCl₄, is 238-073, and from 20 analyses of UBr₄, 238-076. The final val. is given as 238.07 ± 0.02 . The differences in the vals. given by the four minerals are within the experimental error, and afford no support for the suggestion that minerals of different geological age contain metal of varying isotopic composition. F. L. U.

Small chemical separation of the chlorine isotopes. R. S. BRADLEY (Nature, 1936, 137, 403– 404).—The slight increase in d observed for CCl₄ after some of it has been decomposed by refluxing with Na amalgam is attributed to a small separation of the Cl isotopes, the light isotope reacting preferentially. No isotopic separation occurs on repeated distillation of CCl₄ alone (cf. A., 1929, 484).

L. S. T.

Isotope separation for thallium by valency exchange? J. ZIRKLER (Z. Physik, 1936, 98, 790). —Previous results (this vol., 282) suggest that valency exchange gives isotopic separation. A. B. D. C.

Periodic system of the elements and its gaps. I. NODDACK (Uspechi Chim., 1935, 4, 11-21).--Negative results were obtained in a search for elements of at. no. 61 and 87 in minerals which might contain them. CH. ABS. (e)

Scattering of fast β -rays. D. SKOBELTZYN and E. STEPANOVA (Nature, 1936, 137, 456).—The anomalous scattering of fast β -rays observed in N₂ is probably due to an intranuclear effect. L. S. T.

 β -Rays of high energy. J. A. GRAY and W. J. HENDERSON (Physical Rev., 1936, [ii], 49, 477).— Intensity measurements show that there is no indication of the emission of β -rays of high energy beyond the main spectrum of Ra-E. N. M. B.

β-Activity induced by γ-rays. W. RARITA (Physical Rev., 1936, [ii], 49, 475).—A nucleus which is not naturally β-active may be stimulated to emit a $β^-$ or $β^+$ particle under the influence of a γ-ray. The mechanism and emission cross-section are examined. N. M. B.

Deviation of β -rays by nitrogen nuclei. M. LECOIN (Compt. rend., 1936, 202, 839-840).—The ratio of the loss of energy to the initial energy of a β -ray in N₂, when deviated by > 10°, has been determined for a no. of rays, and the effective sections of the nucleus for shocks corresponding with different energy losses have been calc. These are considerably > predicted by theory. M. S. B. Influence of pressure and temperature on the recombination coefficient and ionisation by γ -rays in air and carbon dioxide. W. MACHLER (Physikal. Z., 1936, **37**, 211—213).—The recombination coeff. α was determined for CO₂ up to 25 atm., and from 18° to 52°. Results agree closely with those of Langevin (Ann. Chim. Phys., 1903, 28, 433). α for air decreases with rising temp., but for CO₂ there is a very small increase. A. J. M.

 γ -Rays of radium-*E*. J. A. GRAY and J. F. HINDS (Physical Rev., 1936, [ii], 49, 477).—Absorption and intensity measurements show that the γ -rays of Ra-*E* are really *X*-rays produced by β -rays in escaping from the atoms in which they are produced. N. M. B.

Scattered and secondary radiation of hard γ -rays. W. BOTHE and W. GENTNER (Naturwiss., 1936, 24, 171—172; cf. A., 1934, 342, 713).—The dependence of the intensity of secondary radiation of hard γ -rays on the thickness of the radiator has been investigated for very thin layers of Pb (0.06 mm.) and Al (0.2 mm.). The thinness of the layers avoids the complications due to the multiple Compton scattering. A. J. M.

Excitation of γ -rays by fast neutrons. S. KIKUCHI, H. AOKI, and K. HUSIMI (Nature, 1936, 137, 398).—The relation between at. no. and the capture cross-sections for fast neutrons in various elements is tabulated. Discontinuities which may be connected with the internal structure of the nuclei of light elements are pointed out. L. S. T.

Disintegration of the deuteron by γ -rays. H. HALL (Physical Rev., 1936, [ii], 49, 401-402).—An upper limit to the range of the proton-neutron interaction is discussed in relation to the val. of the crosssection for photo-electric disintegration of a deuteron by γ -rays (cf. Bethe, A., 1935, 279). N. M. B.

Position of the lowest energy term of the deuteron. V. RAJEVSKI (Physikal. Z. Sovietunion, 1935, 8, 511—515).—The position of the 1¹s term of the deuteron can be obtained from the experimental val. of the scattering cross-section of slow neutrons in H₂. The term separation ${}^{3}E$ — ${}^{1}E$ thus derived is $1\cdot7 \times 10^{6}$ e.v. Consideration of the scattering of rapid neutrons in H₂ leads to a val. for the radius of the deuteron rather > 3×10^{-13} cm. A. J. M.

Relative positions of the resonance levels for the capture of neutrons by silver and iodine. P. PREISWERK and H. VON HALBAN, jun. (Compt. rend., 1936, 202, 840—842).—The energy of the resonance level of I is shown to be > that of the isotopes of Ag which form radio-Ag (period 22 sec.) by capturing a neutron. M. S. B.

Neutron capture and the structure of the atomic nucleus. N. BOHR (Naturwiss., 1936, 24, 241-245).—A lecture.

Determination of the selective absorption regions of slow neutrons. D. F. WEEKES, M. S. LIVINGSTON, and H. A. BETHE (Physical Rev., 1936, [ii], 49, 471-473).—A method is described for measuring energies of neutrons outside the thermal energy range (cf. Fink, this vol., 264), but in the range deduced from the Wigner-Breit resonance theory of selective absorption. N. M. B.

Absorption of neutrons detected by boron and lithium. D. P. MITCHELL (Physical Rev., 1936, [ii], 49, 453-458).—Data are given for the neutronnucleus collision cross-sections of H, HgO, Sm, Al, B, C, Fe, and Li for neutrons that are detectable by the B and by the Li neutron capture reaction and that are strongly absorbed by Cd. The vals, for the three first named differ considerably by the two detectors, and for the others are the same within 10%. Variation of the absorption coeff. of Cd, B, and Li with intensity, the effect of filtering through Ag, Cd, B, and Li, and through paraffin at 293° and 90° abs., and the velocity distribution were investigated. N. M. B.

Absorption of neutrons in water, paraffin, and charcoal. L. ARZIMOVITSCH, I. KURTSCHATOV, G. LATISCHEV, and V. CHROMOV (Physikal. Z. Sovietunion, 1935, 8, 472—486).—The γ -radiation, which results from the passage of neutrons through substances, is investigated and its intensity measured. The absorption coeffs. of neutrons for these substances are given and the effective cross-sections of neutrons compared with at. nuclei are ascertained.

W. R. A.

Scattering of slow neutrons. A. C. G. MIT-CHELL, E. J. MURPHY, and L. M. LANGER (Physical Rev., 1936, [ii], 49, 400).—Investigations previously reported (cf. A., 1935, 1441) are extended to a determination of the % scattering curves and data for C, Mg, Al, S, Cr, Mn, Ni, Zn, Ag, Cd, and Bi. The respective relative cross-sections for scattering are $3\cdot2$, $2\cdot8$, $0\cdot9$, $0\cdot8$, $1\cdot3$, $2\cdot0$, $17\cdot0$, $3\cdot4$, $5\cdot9$, $1\cdot2$, and $9\cdot5$. Results are compared with those by the "absorption" method (cf. Dunning, *ibid.*, 1186).

N. M. B.

Selective scattering of slow neutrons. A. C. G. MITCHELL, E. J. MURPHY, and M. D. WHITAKER (Physical Rev., 1936, [ii], 49, 401; cf. preceding abstract).—Using Ag, Rh, and In detectors, data are given for % scattering by Fe, Ni, Pb, Cu, Sn, Al, Bi, C, and Zn. Vals. differ widely for a given element with different detectors, and possible explanations are discussed. N. M. B.

General theory of fluctuations in radioactive disintegration. A. RUARK and L. DEVOL (Physical Rev., 1936, [ii], 49, 355-367; cf. this vol., 5).— Mathematical. N. M. B.

Coincidence investigations on nuclear processes. W. BOTHE and H. J. VON BAEYER (Nachr. Ges. Wiss. Gottingen, 1935, [ii], 1, 195–197; Chem. Zentr., 1935, ii, 646).—A concentric arrangement of eight counters around a central source and counter, with interposed absorbing screens, gave the expected coincidences between β - and γ -radiation from Rn. With artificially radioactive B, no coincidences between proton and γ -ray emission were found, in support of the views of Bothe and Becker (A., 1931, 1208). J. S. A.

Capacity of the elements for disintegration. T. SEXL (Physikal. Z., 1936, 37, 221-222).-A formula used by Stetter (this vol., 265) is not applicable for elements with at. no. in the region of 5. A. J. M.

Slowing down of neutrons. S. GOUDSMIT (Physical Rev., 1936, [ii], 49, 406; cf. Wick, this vol., 264).—Mathematical. N. M. B.

Method for investigating artificially radioactive elements with very short periods. K. S. KNOL and J. VELDKAMP (Physica, 1936, 3, 145— 146).—A wheel, coated at the circumference with the element under investigation, rotates along the bombarding neutron source and is used with one or more counters. For Li₂CO₃ bombarded with slow neutrons the resulting half-period is 0.7 sec., ascribed to the active isotope $_{3}$ Li⁸. N. M. B.

Efficiencies of production and the half-lives of radio-carbon and radio-nitrogen. S. K. ALLIson (Proc. Camb. Phil. Soc., 1936, 32, 179–182).— The half-life of the activity produced by bombardment of a thick, solid target of B_2O_3 by deuterons varies with time elapsing after the bombardment, the limits being 17.5 and 21.5 min. The low vals. are obtained immediately after bombardment, and are due to radio-N obtained from deuteron bombardment of C present as an impurity in the B_2O_3 . Only radio-C is produced by the deuteron bombardment of B_2O_3 , the mean half-life of radio-C removed from B_2O_3 being 21.0±0.6 min. The half-life of radio-N obtained by bombardment of graphite by protons and deuterons, respectively, is the same $(10.3\pm0.3$ min.). The efficiencies of production of radio-C and radio-N by various methods are compared.

A. J. M. Radiations emitted from artificially produced radioactive substances. I. Upper limits and shapes of the β -ray spectra from several elements. F. N. D. KURIE, J. R. RICHARDSON, and H. C. PAXTON (Physical Rev., 1936, [ii], 49, 368– 381).—The β -ray spectra of N¹³, F¹⁷, Na²⁴, Si³¹, P³², Cl, A⁴¹, and K⁴², investigated by measuring the curvature of the tracks due to the β -rays in a cloudchamber traversed by a known magnetic field, give results in good agreement with theory (cf. Konopinski, A., 1935, 1048), which, however, gives an upper limit > is found from the data. The upper limit of N¹³ is 1.5 mv. N. M. B.

Induced radioactivity of mercury. E. B. ANDERSEN (Nature, 1936, 137, 457).—Bombardment of HgO by neutrons from a Rn-Be source yields an active product, probably ${}_{80}$ Hg²⁰⁵, decaying with a period of 40 ± 5 hr. CCl₄, irradiated with neutrons, yields an active isotope of S decaying with a period > 2 months. Irradiation of Bi₂O₃ gives no measurable activity. L. S. T.

New transformation processes in the irradiation of uranium with neutrons. L. MEITNER and O. HAHN (Naturwiss., 1936, 24, 158—159).— In addition to the elements of half-life 13 min., 100 min., and 3 days, respectively, previously discovered (A., 1935, 278, 1050), an element of halflife 12 hr. has been obtained by irradiation of U with neutrons. It is a higher homologue of the Pt group (eka-Os²³⁷). For the investigation of the

processes by which these and other transformations with U occur, the activity produced in U by bom-bardment with rapid and with slow (through paraffin) neutrons, respectively, has been examined. Three concurrent processes take place. (1) U^{238} + $\begin{array}{l} n \rightarrow \mathrm{Th}^{235} + \alpha; \ \mathrm{Th}^{235} \xrightarrow{\beta} \mathrm{Pa}^{235} \xrightarrow{\beta} \mathrm{U}^{235} \xrightarrow{\beta} \mathrm{eka}\mathrm{-Re}^{235} \rightarrow (?). \\ \text{This occurs only when slow neutrons are used.} (2) \ \mathrm{U}^{238} + n \rightarrow \mathrm{U}^{237} + 2n_1; \ \mathrm{U}^{237} \xrightarrow{\beta} \mathrm{eka}\mathrm{-Re}^{237} \xrightarrow{\beta} \end{array}$ eka-Os²³⁷ $\xrightarrow{\beta}$ eka-Ir²³⁷ (?). This process is confirmed by the fact that the 13-min. element (eka-Re²³⁷; Z=93) is formed in smaller amount when the bombarding neutrons are slower. The process is brought about by rapid neutrons. U²³⁷ has half-life 40 sec. U^{238} , an α -radiator of long life, and U^{237} , a β -radiator of short life, are analogous to Th^{232} and U-Y. (3) $U^{238} + n_1 \rightarrow U^{239}$; $U^{239} \xrightarrow{\beta} eka-Re^{239} \xrightarrow{\beta} eka-Os^{239} \xrightarrow{\beta} eka-Ir^{239}$. This process occurs for bombardment with slow neutrons. Half-lives are eka-Re²³⁹ 2.2 min., eka-Os²³⁹ 59 min., eka-Ir²³⁹ 3 days. A. J. M.

Absorption of penetrating corpuscular radiation under different zeniths. G. BERNARDINI and D. BOCCIARELLI (Ric. sci. Prog. tec., 1935, 6, 33—39; Chem. Zentr., 1935, ii, 12).—At three different inclinations, a superimposed soft and a hard radiation were detected, which were similarly distributed spatially. J. S. A.

Measurement of cosmic-ray showers by means of Geiger-Müller counters. C. G. MONTGOMERY and D. D. MONTGOMERY (J. Franklin Inst., 1936, 221, 59-64).—Mathematical. A statistical basis for the formulation of experimental data is deduced. L. J. J.

Can protons represent the primary cosmic rays at sea level? W. F. G. SWANN (Physical Rev., 1936, [ii], 49, 478; cf. A., 1935, 1442).— Difficulties in this view are discussed. The protons probably function through the production of secondary rays which are then observed by the counters. N. M. B.

Variations of properties of cosmic shower radiations with altitude. J. C. STEARNS and D. K. FROMAN (Physical Rev., 1936, [ii], 49, 473-474, 591).—Curves for rates of shower detection in the determination of optimum thickness of Pb for shower production at altitudes of 120, 5300, 10,800, and 14,200 feet show no variation in shape or optimum Pb thickness with altitude, but the shape and max. vary with the method used. Curves for absorption measurements with Pb thickness are given.

N. M. B.

Cloud chamber photographs of counterselected cosmic-ray showers. E. C. STEVENSON and J. C. STREET (Physical Rev., 1936, [ii], 49, 425-428).—Cosmic-ray showers from a Pb plate 1.3 cm. thick in a large cloud chamber controlled by three counters are described and discussed. N. M. B.

Direct photographic tracks of atomic cosmicray corpuscles. T. R. WILKINS and H. ST. HELENS (Physical Rev., 1936, [ii], 49, 403).— A photograph obtained on a stratosphere flight shows a track interpreted as due to an x-particle; at a point on the path is the track of an ejected particle which is probably a proton. N. M. B.

Periods of natural and artificial radioactive bodies, the existence of shells, and the classification of atomic nuclei. B. KEVAL and (MLLE.) A. RIEDERBERGER (Compt. rend., 1936, 202, 566— 567).—The existence of closed shells of protons suggests the possibility of a natural classification of at. nuclei. T. G. P.

Theory of the atomic nucleus. P. JORDAN (Naturwiss., 1936, 24, 209-216).—A review.

Structure of the electron and positron. U. KAKINUMA (Sci. Papers Inst. Phys. Chem. Res. Tokyo, 1936, 28, 249—270).—Theoretical. A wave equation for the electron similar to Schrödinger's is derived on the assumption of finite and continuous energy density. The radius of the electron is cale. to be approx. 10⁻³⁰ cm. The nature of the electron and positron and their bearing on cosmology are discussed. R. S. B.

Interaction between protons and neutrons. G. WATAGHIN (Compt. rend., 1936, 202, 833-835).-Theoretical. M. S. B.

Electron-neutron interaction. E. U. CONDON (Physical Rev., 1936, [ii], 49, 459-461).-Mathematical. N. M. B.

Polarisation effects in the positron theory. W. PAULI and M. E. ROSE (Physical Rev., 1936, [ii], 49,462—465).—Mathematical. N. M. B.

Light quanta and neutrinos. P. JORDAN (Z. Physik, 1936, 98, 759-767).—Postulates two neutrinos corresponding with positive and negative electrons. A. B. D. C.

Consequences of Dirac's positron theory. W. HEISENBERG and H. EULER (Z. Physik, 1936, 98, 714— 732).—Theoretical. Necessary modifications of Maxwell's equations are deduced. A. B. D. C.

Effects of exchange forces on the excitation function of Li⁷ under proton bombardment. M. OSTROFSKY, W. E. BLEICK, and G. BREIT (Physical Rev., 1936, [ii], 49, 352—354).—Van Vleck's recently reported effective potential due to Majorana exchange forces varies with proton or neutron velocity (cf. A., 1935, 1296). The effect of this variation on the shape of the excitation curve of Li under proton bombardment is negligible, but the position of stationary proton levels is largely affected. Agreement of calculations with the mass defect of Be⁸ is improved by using the exchange potential. N. M. B.

Depth distribution of energy absorbed from cathode rays by aluminium. K. GENTNER and W. ROLLWAGEN (Physikal. Z., 1936, 37, 214—215).— The experimental distribution curve agrees with theory. A. J. M.

Lower limit of the helium ground state calculated by Ritzsch's method. W. ROMBERG (Physikal. Z. Sovietunion, 1935, 8, 516—527).—Calculations of the lower limit of the ground state for He by the methods of Hylleraas (A., 1928, 698; 1929, 616), Ritzsch (Kellner, A., 1927, 912), and Weinstein (A., 1932, 787) are discussed. The method of Ritzsch gives good results. A. J. M.

Analytical wave-functions for beryllium-like atoms. V. FOCK and (MISS) M. PETRASHEN (Physikal. Z. Sovietunion, 1935, 8, 359–368). Analytical wave-functions of H-like type are constructed for atoms with four electrons and an arbitrary nuclear charge. Energy vals. are compared with those calc. by the method of self-consistent field with and without exchange, and with observed vals. for Be, B⁺¹, C⁺², N⁺³, O⁺⁴. A semi-empirical formula for the energy in terms of the nuclear charge is deduced. W. R. A.

Deuteron theory. D. BLOCHINZEV (Physikal. Z. Sovietunion, 1935, 8, 270-274).—The theory of the deuteron is discussed from the relativistic viewpoint. R. S.

Atomic dimensions. M. PIERUCCI (Nuovo Cim., 1934, [ii], 11, 690—700; Chem. Zentr., 1935, ii, 322; cf. A., 1921, ii, 583).—At. radii are exact multiples of 0.0398 Å. This rule is consistent with wave mechanics. H. J. E.

Definition of electromagnetic field in terms of potentials; magnetic moment of the electron. A. PROCA (Compt. rend., 1936, 202, 641-643).—A complete description of an electromagnetic field must take into account the magnetic as well as the electric potential. The existence of the magnetic moment of the electron is implicit in the Maxwell-Lorentz equations. L. J. J.

Proper mass of the photon and the electromagnetic tensor. J. GÉHÉNIAU (Compt. rend., 1936, 202, 559-560).—Mathematical. T. G. P.

Franck-Condon principle. A. S. COOLIDGE, H. M. JAMES, and R. D. PRESENT (J. Chem. Physics, 1936, 4, 193—211).—Theoretical. M. S. B.

Interaction of "spinor "-particles. P. JORDAN (Z. Physik, 1936, 98, 709-713).—Theoretical.

A. B. D. C.

Photon counters for visible and ultra-violet. Z. OLLANO (Nuovo Cim., 1934, [ii], **11**, 603-620; Chem. Zentr., 1935, ii, 18).—The sp. sensitivity of a variety of photo-electrically active surfaces has been determined over the spectral range indicated.

J. S. A.

Application of a simplified model of the Jamin polarisation interferometer to the study of absorption. P. BARCHEWITZ (Compt. rend., 1936, 202, 300-301). H. J. E.

Absorption spectrum of solid oxygen. II. A. PRICHOTKO and M. RUHEMANN (Physikal. Z. Sovietunion, 1935, 8, 294—299; cf. A., 1935, 1291).— Five band groups similar to the first two series in the visible have been observed between 4000 and 3000 Å. with layers of α -O of different thickness. Preliminary results for the region below 3000 Å. are given. R. S.

Continuous absorption spectra of diatomic molecules. H. TRIVEDI (Proc. Acad. Sci. Agra and Oudh, 1935, 5, 171-186).—Mathematical.

J. W. S.

Far ultra-violet absorption spectra and ionisation potentials of H_0O and H_2S . W. C. PRICE (J. Chem. Physics, 1936, 4, 147–153).—The absorption spectra of H_2O and H_2S for $\lambda < 1600$ Å. give Rydberg series of which the limits indicate 12.56 ± 0.02 and 10.42 ± 0.01 volts, respectively, as the ionisation potentials of the two mols. The analysis agrees with Mulliken's prediction that the bands should be due to the excitation and removal of a non-bonding electron localised near O or S.

M. S. B. Spin coupling in the ³Σ-state of phosphorus deuteride. R. W. B. PEARSE and M. ISHAQUE (Nature, 1936, 137, 457). L. S. T.

Ultra-violet absorption in hydrogen fluoride. H. J. PLUMLEY (Physical Rev., 1936, [ii], 49, 405; cf. *ibid.*, 1935, [ii], 48, 105).—A correction.

N. M. B.

Optical properties of lithium fluoride in the extreme ultra-violet. E. G. SCHNEIDER (Physical Rev., 1936, [ii], 49, 341-345).—Variations similar to those for natural fluorite were found for the absorption coeff. of 50 laboratory-produced crystals of LiF in the extreme ultra-violet. Light lost at the surface from a transmitted beam and effects of surface cleaning and polishing were investigated. The refractive index (about 1.65 at 1200 Å.) was extended into the Schumann region by a modified min. deviation method. N. M. B.

Influence of fluorides on the spectral absorption of coloured iron complexes. W. WEYL and H. RUDOW (Z. anorg. Chem., 1936, 226, 341-349).--Addition of F' to Fe(CNS)₃, Fe salicylate, sulphosalicylate, or acetylacetonate leads to formation of the colourless $\text{FeF}_{6}^{\prime\prime\prime}$, and thereby diminishes the intensity of coloration. Simultaneously the absorption bands are broadened and their max. shifted towards shorter λ , owing to loose addition of F'. The effect of added F' diminishes with rising temp., whilst simultaneous addition of H₃BO₃, which yields a complex with F', shifts the bands towards longer λ . J. W. S.

Photochemistry of nitrites, nitrates, and nitrocompounds. H. W. THOMPSON and C. H. PURKIS (Trans. Faraday Soc., 1936, 32, 674—680).—Absorption spectra of Me and Et nitrites, MeNO₃, EtNO₃, nitro-methane and -ethane have been measured. The results are discussed. V.p. of the three Me compounds have been determined over a wide range and are expressed in formulæ. F. L. U.

Intensities in the bands of the violet cyanogen system. N. R. TAWDE (Proc. Indian Acad. Sci., 1936, **3**, **A**, 140—147).—Vibrational intensities in the ${}^{2}\Sigma \rightarrow {}^{3}\Sigma$ system of CN, emitted by a C arc in air, are estimated by the method of heterochromatic spectral photometry. The experimental distribution of intensities is compared with that derived by the application of the Franck-Condon principle of max. transitions from the potential energy functions of Morse and of Rydberg. O. D. S.

Absorption spectra of chromium, molybdenum, and tungsten hexacarbonyls in vapour and dissolved states. G. MILAZZO and G. SCHEIBE (Z. physikal. Chem., 1936, **B**, 31, 431–438).—The absorption curves in the vapour state in the visible and down to about 1600 Å. consist of three continuous absorption regions at about 3800, 2800, and 2300 Å.,

respectively. It is inferred that light absorption in all three regions leads to dissociation; to what products of dissociation they are to be attributed is uncertain. The absorption curves of the EtOH and hexane solutions are practically the same as those of the vapours. R. C.

Werner complexes. Absorption of hexacoordinated cobalt and chromium derivatives in aqueous solution. J. P. MATHIEU (Bull. Soc. chim., 1936, [v], 3, 463—475).—The absorption spectra of 24 complexes in aq. solution have been determined in the visible region. A wide absorption band is observed in each spectrum at a position varying with the chemical lability of the co-ordinated groups. In certain cases the wide band splits into two bands. E. S. H.

[Optical absorption of substituted benzenes. VI.] H. CONRAD-BILLROTH (Z. physikal. Chem., 1936, B, 31, 475—476).—Corrections and comments on Steurer's paper (this vol., 8). R. C.

Influence of physical state on absorption and fluorescence spectra of organic substances. P. K. SESHAN (Trans. Faraday Soc., 1936, 32, 689-694).—The positions of some absorption bands of fluorene, naphthacene, and pervlene have been measured in the vapour, liquid, and solid state, and in liquid and solid solution. Corresponding with the change vapour \rightarrow solution \rightarrow liquid \rightarrow solid there is a progressive broadening of the absorption bands and a displacement of the whole band system towards the red. For solutions in different solvents, the shift towards the red is the greater, the higher is the refractive index of the solvent. For a given solvent the position of the bands is nearly independent of concn. when the solutions are dil. Similar results have been obtained for the fluorescence bands.

F. L. U. Alterations in the spectra of solutions of diacenaphthylidene. I. Influence of solvent on fluorescence and absorption spectra. II. Influence of temperature on the fluorescence spectrum. B. TWAROWSKA (Acta phys. polon., 1933, 2, 267—272, 273—281; Chem. Zentr., 1935, ii, 346— 347).—I. The fluorescence max. move towards the violet as the d of the solvent decreases. In xylene and *iso*amyl alcohol the fluorescence bands and, less markedly, the absorption bands tend to come together.

II. At lower tomp. the fluorescence bands become smaller and sharper, and tend to split up into groups; the effect varies somewhat from solvent to solvent.

H. N. R.

Absorption spectra of some aromatic compounds. I. Hydrocarbons. II. Quinones and quinols. P. K. SESHAN (Proc. Indian Acad. Sci., 1936, 3, A, 148—171, 172—187).—I. An investigation of the variations produced in absorption spectra of aromatic compounds by the progressive addition of benzene rings to the mol. Absorption spectra have been determined from 7000 to 2300 Å. of $C_{10}H_8$, anthracene, naphthacene, phenanthrene, 1:2-benzphenanthrene, pyrene, and fluorene in solid and vapour states and in EtOH, of 1:2:5:6-dibenzanthracene in the solid state and EtOH solution, of perylene, acenaphthene, fluoranthrene, CH_2Ph_2 , and $C_2H_4Ph_2$ in the vapour state and in EtOH, and of Ph_2 , $C_6H_4Ph_2$, $CHPh_3$, $s-C_6H_3Ph_3$, $s-C_6H_2Me_4$, and C_6Me_6 in the vapour state. Characteristic vibrational and electronic frequencies are calc. The relation between the structure of the mol. and the nature of the absorption spectrum is discussed.

II. Absorption spectra have been determined between 7000 and 2200 Å. of p-benzoquinone (I) and quinol (II) in solid and vapour states and in EtOH solution, of 1:4-naphthoquinone (III), anthraquinone (IV), phenanthraquinone (V), 2-hydroxyanthraquinone in the vapour state and EtOH solution, and of naphthazarin, phloroglucinol, and quinhydrone (VI) in the vapour state. The spectra of (I) and (II) show rotational fine structure. Vibrational and electronic frequencies are calc. for (III), (IV), and (V). Vibrational fine structure is absent in the spectra of the quinols. The absorption of (VI), at $t > 100^\circ$, is a superposition of those of (I) and (II) which are probably present as dissociation products.

0. D. S.

Absorption spectra of pyocyanine, prodigiosine, and violaceine. O. EHRISMANN and W. NOETHLING (Biochem. Z., 1936, 284, 376-382).--Max. absorption occurs at 264-300, 294 and 550, and 480 and < 250 mµ, respectively. F. O. H.

Optical absorption of porphyrins. IV. A. STERN and H. WENDERLEIN (Z. physikal. Chem., 1936, 175, 405-437; cf. this vol., 8).-The absorption of porphin (I), tetra- and hexa-substituted porphyrins, esters of porphyrins with higher alcohols, porphyrins having one or two groups containing CO, $\beta\delta$ -di-iminocoproporphyrin Me₄ ester, rhodin g_3 Me ester, and 2-de-ethyldeoxyphylloerythrin has been determined. Alkyl substitution in (I) shifts all the band max. but one towards the red. If the absorption curve of a porphyrin is of the "rhodo" type a CO group is present in a nucleus of the (I) systems or conjugated with it. If the CO group is attached to a methine bridge of the (I) framework the absorption curve is not of the rhodo type. If there are two groups containing CO in two nuclei of the porphyrin, only those porphyrins which have the groups in the nuclei I and III or II and IV have curves of the rhodo type. The nucleus of the porphyrin system in which substitution with a group containing CO emphasises the "rhodo" character of the absorption curve has a pyrrolene structure. In the formation of a monoxime of a porphyrin with two CO groups it is possible to determine from the absorption curve at which CO group the oxime has been formed. The application of these observations to the determination of configuration is discussed. R. C.

[Absorption] spectra of solutions of chemical warfare materials. H. MOHLER and J. PÓLYA (Helv. Chim. Acta, 1936, **19**, 283—287).—Preliminary. Extinction curves are given for C_6H_{14} solutions of nineteen compounds belonging to the four divisions of chemical warfare materials. F. L. U.

Fine structure of the absorption band of water vapour at 0.94 μ . J. H. Hsu (Chinese J. Physics, 1935, 1, 59-67).— $\lambda\lambda$ for 28 absorption lines are recorded, and agree with some absorption lines in the solar spectrum. Doublet structure in agreement with a triangular H₂O mol. is indicated. L. J. J.

Hindered rotation in liquid H_2O and D_2O . C. H. CARTWRIGHT (Physical Rev., 1936, [ii], 49, 470—471).—Assuming a tetrahedral quartz-like structure for the H_2O mol., the calc. intermol. field leads to the prediction of a characteristic frequency at 60 μ due to a mutual vibration between the mols., and a frequency at 20 μ due to hindered rotation. The observed characteristics and shifts of these bands, their variations in H_2O and D_2O , and a theoretical explanation are described and discussed. N. M. B.

Structure of the infra-red absorption of crystals. F. SEITZ (Physical Rev., 1936, [ii], 49, 405; cf. A., 1935, 1444).—A correction. N. M. B.

Infra-red absorption of hydrogen chloride in non-ionising solvents. W. WEST and R. T. ED-WARDS (Physical Rev., 1936, [ii], 49, 405; cf. Plyler, this vol., 406).—Observations on the infra-red absorption for the harmonic at 1.76 μ are in general agreement with results obtained from Raman spectra (cf. A., 1934, 583). Information for solutions in PCl₃, POCl₃, CCl₄, and SO₂ is outlined. N. M. B.

Infra-red absorption spectra of mixtures of acetone and water. D. WILLIAMS and E. K. PLYLER (J. Chem. Physics, 1936, 4, 154—157).—The infra-red absorption spectra of $COMe_2$ —H₂O mixtures have a band indicating association near 2.7 μ . The intensity of the band increases with increasing H₂O content, but [H₂O] as low as 0.1% may be detected by the presence of the band. M. S. B.

Infra-red absorption spectra of deuteroxide solutions in deuterium oxide. E. K. PLYLER and D. WILLIAMS (J. Chem. Physics, 1936, 4, 157—160).— The infra-red absorption spectra of D₂O and solutions of NaOD, Na₂CO₃, and K₂CO₃ in D₂O have been measured for the range $2\cdot5-9\mu$. Intense bands are observed in NaOD solutions at $3\cdot1$, $4\cdot95$, and $7\cdot1\mu$. Na₂CO₃ and K₂CO₃ in D₂O also give rise to bands in these regions, but with a shift in λ probably due to absorption by CO₃" and D₂CO₃ formed in solution. The band at $3\cdot1\mu$ is attributed to OD', corresponding with the OH' band at $2\cdot3\mu$. The two bands at $4\cdot95\mu$ and $7\cdot1\mu$ are probably due to hydration and correspond with the bands at $3\cdot65\mu$ and $5\cdot2\mu$ in hydroxide solutions (cf. A., 1934, 1154). M. S. B.

Temperature dependence of the absorption spectra of alcohols in the near infra-red, up to and above the critical point. A. NAHERNIAC (Compt. rend., 1936, 202, 649-651).—For MeOH, EtOH, Pr^oOH, Pr^{β}OH, and Bu^{β}OH, the intensity of the OH band at about 10,000 Å. increases continuously with rise of temp. The positions of the band for the liquid and vapour at const. vol. approach one another with rising temp., and coincide at the crit. temp. Thus the λ -t curve resembles the density curve.

L. J. J.

Infra-red absorption spectrum of HDS and D_2S . A. H. NIELSEN and H. H. NIELSEN (J. Chem. Physics, 1936, 4, 229).— D_2S has bands at 3.65, 4.55, and 10.8 μ and HDS at 2.1, 3.15, 4.1, and 9.0 μ . The H₂S bands are shifted towards longer $\lambda\lambda$ in the anticipated manner. M. S. B.

Infra-red absorption spectra of chlorinated methanes. C. CORIN (Compt. rend., 1936, 202, 747-749).—Data are recorded for 15, 15, and 18 bands in the infra-red absorption spectra of liquid MeCl, CH_2Cl_2 , and $CHCl_3$, respectively. CCl_4 gave no bands in this region $(0.7-2.6 \ \mu)$. The bands of $CHCl_3$ were not observed in $CCl_3 \cdot NO_2$, but 7 new bands, associated with the C·NO₂ group and occurring for $C(NO_2)_4$, were observed. The intensity of absorption increases with the no. of C·H linkings in the mol. H. J. E.

Vibration frequencies of chlorine derivatives [of some aliphatic compounds] deduced from infra-red absorption and Raman spectra. H. C. CHENG and J. LECOMTE (Ann. Physique, 1936, [xi], 5, 427—443; cf. A., 1935, 1053).—Infra-red absorption spectra measurements in the frequency range 640—1400 cm.⁻¹ lead to interpretation of available Raman data and of C-Cl vibrational frequencies. The latter, in the case of Cl₃-derivatives, show marked divergence from theory, and anomalous bands are classified. N. M. B.

Raman effect in chemistry. G. DUPONT (Bull. Soc. chim. Belg., 1936, 45, 37-56).—A lecture.

Raman effect and problems of constitution. IX. Stability of the aromatic C·X linking.— See this vol., 599.

Polarisation in the molecular diffusion spectrum of liquid carbon tetrachloride. A. ROUSSET (Compt. rend., 1936, 202, 654—656).—Depolarisation factors ± 0 are recorded for the Rayleigh scattered radiation and the line of undisplaced λ , and are due, respectively, to depolarised rotational wings (Cabannes-Daure effect) and to the depolarised Qbranch. This can be explained by anisotropy of the CCl₄ mol., which is confirmed by the incomplete polarisation of the symmetrical vibration Raman line 459 cm.⁻¹ (isotopy effect of Cl), and the incomplete depolarisation and splitting of the Raman lines 219 and 316 cm.⁻¹, due to dissymmetry of the C valencies. L. J. J.

Polarisation of Raman radiation and constitution of molecules. II. B. TRUMPY (Z. Physik, 1936, 98, 672-683).—Polarisation measurements show Bu'OH to have C_{3v} symmetry, and give an allocation of Raman frequencies. Measurements on the Raman spectrum of $C_2H_2Br_4$ show absence of free rotation, the cis- and trans-forms being equally probable. $C_2D_2Cl_4$ and cis- and trans- $C_2D_2Cl_2$ have Raman spectra in agreement with their H equivs. (cf. A., 1935, 565). A. B. D. C.

Raman effect in chemical dynamics. W. F. BEEZHOLD and L. S. ORNSTEIN (Physica, 1936, 3, 154—172).—The Raman spectrum of transformer oil showed, after oxidation, a decrease in the intensity of the C-H oscillation lines. The photochemical chlorination of CHCl₃ was followed completely by the Raman effect, the amount of CCl₄ being estimated by the intensity of the lines; the reaction is independent of [CHCl₃]. A theoretical interpretation of the empirical reaction equation is given. Results are compared with those for the vapour state (cf. Schumacher, A., 1934, 740). A new method of illumination and measurement by means of a photo-electric cell is described. N. M. B.

Deformation frequencies in the Raman spectra of linear molecules : acetylene. S. BHAGAVAN-TAM and A. V. RAO (Proc. Indian Acad. Sci., 1936, 3, A, 135—139).—New bands at Δ_{ν} 589 and 646 have been recorded with long exposure. The negligible intensity of the Q branch and the observed separation support an interpretation as the max. of the unresolved O, P, R, and S branches of the total symmetric deformation vibration of the mol. The mean frequency shift is in good agreement with the val. deduced from infra-red absorption. N. M. B.

Raman spectrum of some derivatives of pyrrole. G. B. BONINO and R. MANZONI-ANSIDEI (Atti R. Accad. Lincei, 1935, [vi], 22, 349—354).— The Raman spectra of 1-ethyl-, 1-allyl-, 1-methyl-2:5-diethyl-, 2:5-dimethyl-1-ethyl-, and 2:5-dimethyl-3-ethyl-pyrrole have been measured. They all give the two pyrrole ring lines at 1460—1520 and 1370—1390 cm.⁻¹ The interpretation of other lines found is discussed. O. J. W.

Raman spectrum of pyrrole and some derivatives. A. STERN and K. THALMAYER (Z. physikal. Chem., 1936, B, 31, 403—419).—In the Raman spectrum of pyrrole (I) frequencies due to the CH₂ group and to the C:C, C:N, and aliphatic C·H linkings have been observed. Hence even in unsubstituted (I) there must be an equilibrium between the pyrrole and pyrrolenine forms. The position of equilibrium between these forms and the supposed centric form is very much in favour of the latter. The model of (I) and interpretation of the Raman spectra of its derivatives proposed by Bonino (A., 1934, 830) are criticised. R. C.

Comparison of Raman spectra of *cis*- and trans-cinnamyl derivatives. (MLLE.) B. GREDY (Compt. rend., 1936, 202, 664—666).—In contrast to the corresponding *cis*- and *trans*- α -derivatives of Δ^{β} -octene, the *cis*- and *trans*-cinnamyl derivatives (RH, ROH, ROMe, ROAc, RBr) have only one or two lines in common in their Raman spectra, apart from the C_gH₆ lines. Data are recorded. The *trans*- have higher b.p., *n*, and *d* than *cis*-derivatives. L. J. J.

Raman spectra of some organic liquids under high dispersion and resolving power. R. ANAN-THAKRISHNAN (Proc. Indian Acad. Sci., 1936, 3, A, 52—74).—Detailed data, including a no. of new faint lines, are recorded for C_6H_6 , PhMe, PhOH, PhCl, C_5H_5N , and cyclohexane. \vee and relative intensities for the line 992 cm.⁻¹ of C_6H_6 and its satellites are : 979 ($\frac{1}{2}$), 984 (1), 992.5 (10), 998 (1), 1006 ($\frac{1}{2}$). The corresponding line (802 cm⁻¹.) in cyclohexane shows no fine structure; in C_5H_5N and mono-derivatives of C_6H_6 it has a faint satellite, \vee and intensity of which, however, bear no simple relation to those of the main line. It is concluded that the satellite 984 cm.⁻¹ in C_6H_6 is not due to the C¹³ isotope. The constitution of the C_6H_6 ring is considered. I. J. J.

Raman effect. LIV. cycloHexyl derivatives and symmetry of cyclohexane and dioxan. K. W. F. KOHLRAUSCH and W. STOCKMAIR (Z. physikal. Chem., 1936, B, 31, 382-401; cf. this vol., 137).—The spectra of monosubstituted cyclohexane (I) derivatives, $C_6H_{11}X$ (X=NH₂, OH, Me, CN, Cl, Br, I) and of (I), dioxan (II), and piperidine have been determined. Substitution depresses the ring frequencies in (I) less than in C_6H_6 . $C_6H_{11}X$ show fewer Raman lines than would be anticipated, possibly owing to "accidental" degeneracy. The results are reconcilable with the "chair" configuration for the (I) ring, but not with the trough form, or a form intermediate between the trough and chair forms and having the C atoms 1, 2, 4, and 6 in one plane. For (II) also the trough and intermediate forms are excluded. R. C.

Raman effect of organic sulphides. P. DONZE-LOT and M. CHAIX (Compt. rend., 1936, 202, 851— 852).—The Raman spectra of $(C_6H_4)_2O$ and $(C_6H_4)_2S$ have been compared with those of Ph₂O and Ph₂S (A., 1935, 1301) in order to study the effect of a third closed ring connecting the two C_6 rings. A marked displacement of the C_6H_6 frequencies takes place, and, instead of two frequencies in the neighbourhood of 1000, as in Ph₂O, Ph₂S, and some other C_6H_6 derivatives, there is one only for $(C_6H_4)_2O$ and $(C_6H_4)_2S$. Raman spectra of Et₂S, Et₂S₂, and Et₂S₃ indicate that the frequencies in the neighbourhood of 635, 655, 960, 1045, and 1150 are associated with the C·S linking, and that the frequency 179, associated with the S·S linking in Et₂S₂, is doubled, giving 151 and 204, in Et₂S₃. A frequency in the neighbourhood of 500 is probably associated with S·S in both compounds. M. S. B.

Raman spectrum of tetraethylsilane. Vibrational resonance of tetra-alkyls. T. F. ANDER-SON (J.Chem. Physics, 1936, 4, 161—164).—The Raman spectrum of SiEt₄ is given together with the data available for other tetra-alkyl compounds and assignments of frequencies are made. The presence of extra lines in the spectra is explained by resonance between vibrations. First-order perturbation calculations of the observed resonance effects are given. M. S. B.

Molecular clustering in liquid fatty acids. R. S. KRISHNAN (Proc. Indian Acad. Sci., 1936, 3, A. 126-134; cf. A., 1935, 11).—The intensity and depolarisation of light scattered transversely by dust-free samples of HCO_2H , AcOH, $EtCO_2H$, and Pr^*CO_2H are measured between 20° and 90°. The depolarisation of the horizontally polarised light is high for HCO₂H and AcOH and is greatest at room temp. In opposition to the theory of mol. scattering, the depolarisation decreases with rising temp. These anomalies show the presence in the liquids, at low temp., of mol. aggregates of a size comparable with the λ of light. Anomalies in the optical anisotropy of HCO₂H and AcOH in the liquid and vapour state observed by Ramanathan (Indian J. Physics, 1926, 1, 401) and Rao (A., 1928, 1311) are explained. No evidence is obtained of the presence of mol. clusters in EtCO₂H and PrCO₂H. O. D. S.

Slightly modified scattered radiation of crystals and the characteristic vibrations of the molecules in the lattice. M. VUKS (Compt. rend. Acad. Sci. U.R.S.S., 1936, 1, 73–76; cf. A., 1935, 281, 564, 914).—The scattered spectra of the α and β modifications of p-C₆H₄Cl₂ show marked differences, whilst the usual Raman spectrum is found for both forms to be identical with that for the liquid substance. This is held to support the theory that the "wings" in the Raman spectra are produced by the linkings between mols. in the lattice, and give the characteristic vibrations of the mol. The Raman spectra of the isomorphous p-C₆H₄Cl₂ and p-C₆H₄Br₂ are compared. A. J. M.

Selective light scattering in mercury vapour. G. LANDSBERG and L. MANDELSTAM (Physikal. Z. Sovietunion, 1935, 8, 378—400).—The selective scattering at 2558 Å. of Hg is studied and a method is given for investigating the mol. and at. parts of the radiation. The intensity of the at. part agrees with the theoretical val. The mol. part is feebly polarised and the at. part almost completely polarised. The extinguishing effect of N₂ is slight. W. R. A.

Longitudinal scattering of light according to Plotnikov. M. KATALINIĆ (Kolloid-Z., 1936, 74, 288—296).—A crit. discussion of published work. E. S. H.

Raman effect of ammonia. P. DAURE, A. KASTLER, and H. BERRY (Compt. rend., 1936, 202, 569-572).—The Raman spectra of gaseous, liquid, and aq. NH_3 have been investigated and the polarisation has been determined. The spectrum in liquid NH_3 is ascribed to association, which is destroyed by H_2O , probably in two stages. T. G. P.

Raman spectra of sulphates at different concentrations. S. M. MITRA (Z. Physik, 1936, 98, 740—741).—Variation of Raman displacements with concn. of Li_2SO_4 and $MgSO_4$ observed by Embrikos (A., 1930, 1499) could not be detected. A. B. D. C.

Raman spectra of orthophosphoric acid and some phosphates. C. S. VENKATESWARAN (Proc. Indian Acad. Sci., 1936, **3**, **A**, 25–30).— H_3PO_4 at concns. 3—85% shows new lines indicating ionisation to H^{*}+H₂PO₄' and 2H^{*}+HPO₄'', as well as weak lines due to OH vibrations. For MH₂PO₄, M₂HPO₄, and M₃PO₄ (M=Na, K, and NH₄), spectra due to H₂PO₄', HPO₄'', and PO₄''' have been identified. Comparison with data for sulphates and selenates indicates tetrahedral structure for PO₄'''. L. J. J.

Raman spectra of organic borates. M. S. JOGLEKAR and V. N. THATTE (Z. Physik, 1936, 98, 692-701).—Raman lines are given for Me, Et, Bu, amyl, *iso*amyl, and Ph borates. Some BO₃ frequencies appear in the org. borate spectra, indicating similarity of BO₃^{'''} and B(OR)₃. A. B. D. C.

Fluorescence of sodium salicylate. G. DEJAR-DIN and L. HERMAN (Compt. rend., 1936, 202, 651— 654).—The spectrum of the diffused light from cryst. Na salicylate irradiated with the continuous H₂ spectrum is continuous, with weak intensity max. at $\lambda \lambda$ 2500, 2700, and 3300 Å., in addition to the fluorescence band in the blue-violet. With the Hg line 2482 Å., only the fluorescence band can be distinguished; the energy distribution in this band is independent of the incident λ for $\lambda \lambda$ 3130—2537 Å. L. J. J. Displacement of fluorescence and absorption spectra of tribenzyldecacyclene in relation to the solvent. P. MARGULIES (Acta phys. polon., 1934, 3, 373-384; Chem. Zentr., 1935, ii, 31).--From measurements in 26 solvents connexions are traced between the displacement of the spectra and the properties of the solvent. H. N. R.

Absorption and fluorescence spectra of a dicinnamoylmethane derivative and the carrier of this fluorescence. E. RAKOWER (Acta phys. polon., 1934, 3, 415—420; Chem. Zentr., 1935, ii, 32).—The spectra of Me 3-cinnamoylacetylcoumarin-7-carboxylate, dicinnamoylmethane, and coumarin are described and discussed. H. N. R.

Influence of viscosity and temperature on fluorescent power. J. BOUCHARD (J. Chim. phys., 1936, 33, 232—246).—The extinction coeff. (k) of the fluorescence of a solution, corr. for its variation due to changes in the sp. inductive power of the medium, decreases with increasing viscosity (η) of the medium. The $k-\eta$ curve is analogous to a velocity of diffusion $-\eta$ curve, in accord with the view relating the decay in fluorescence with the concn. and velocity of diffusion of fluorescent mols. Perrin's law represents satisfactorily the variation of fluorescent power (Φ) as a function of concn. at 2-80°. The extrapolated val. of Φ for rhodamine-B decreases with rise of temp., but for uranine, eosin, erythrosin, and acridine-yellow it is approx. const. k increases with rise of temp. for solvents of low inductive power (alcohols, COMe2, etc.), probably owing to the low association in these solvents and the increased probability of collision between dissolved mols. at higher temp. For aq. solutions k decreases with rising temp., probably because the extinction of fluorescence depends on the presence of associated mols., the concn. of which decreases with rising temp. J. W. S.

Influence of specific inductive capacity on fluorescent power. I. Influence of the specific inductive capacity of the solvent on the decrease of fluorescent power as a function of the concentration of fluorescent material. Uranine. II. Fluorescent materials other than uranine. J. BOUCHARD (J. Chim. phys., 1936, 33, 127-149; cf. this vol., 408) .- The fluorescence of uranine in aq. mixtures of MeOH, EtOH, Pr⁸OH, Bu⁸OH, C₅H₅N, and COMe₂ containing 0.1N-NaOH has been studied. The fluorescent power, Φ , varies with concn., c, and composition of the solvent according to Perrin's law, $\Phi = \overline{\Phi}_0 e^{-kc}$, whilst the extrapolated fluorescent power, Φ_0 , is approx. const. Determinations of the dielectric consts. of the solvents lead to the relation k=1/2 $(A-B\varepsilon)$ where A and B are consts. Eosin, acridine-yellow, rhodamine-B, -G, -S, -3B, and -6G behave similarly. In the case of rhodamine-B in EtOH-CCl₄ mixtures, k increases with [CCl₄] as if this acted only as a diluent. R. S.

Theories of phosphorescence. M. CURIE (Compt. rend., 1936, 202, 751-753).—A discussion. H. J. E.

Spectrum of the thermoluminescence of fluorite. H. STEINMETZ and A. GISSER (Naturwiss., 1936, 24, 172).—In contrast to the thermoluminescence spectra of most minerals, which are continuous, that of CaF_2 is composed of several bands, the $\lambda\lambda$ of which are given. A. J. M.

Inner photo-effect with semi-conductors. H. FRÖHLICH (Physikal. Z. Sovietunion, 1935, 8, 501— 510).—The electron distribution function for a semiconductor illuminated with monochromatic light is calc., and the result is confirmed by consideration of the Dember effect. A. J. M.

Influence of temperature on the photo-electric effect of the metal-cuprous oxide interface. J. ROULLEAU (Compt. rend., 1936, 202, 749—751).— Anomalies in the temp. variation of the photopotential are explained by the simultaneous temp. variation of the contact resistance and of the photopotential.

H. J. E. Photo-electric activity of iron and its oxides. J. S. HUNTER (Nature, 1936, 137, 460; cf. A., 1935, 682).—The surface of Fe_2O_3 is photo-electrically insensitive. The spectral distribution curve for FeO showed a max. at 2190 Å. with a photo-electric threshold at < 2500 Å. The results support a theory of gas adsorption, in preference to instantaneous oxidation, as the initial change undergone by a clean metal surface on exposure to air. L. S. T.

Electrical behaviour of cuprite crystals. P. BRAUER (Ann. Physik, 1936, [v], 25, 609—624).—The resistance and Hall const. of Cu₂O crystals increase with the partial pressure of H₂O vapour in the surrounding atm., a surface effect due to variation in the concn. of conductivity electrons. The effect of H₂O vapour is not associated with any detectable change in the cryst. structure. L. J. J.

Primary photo-electric current in NaCl crystals. W. THIELE (Ann. Physik, 1936, [v], 25, 561-568).—Irradiation of rock-salt crystals containing absorption centres (free Na atoms) with $\lambda\lambda 405$ and 436 mµ gives rise to a new absorption band in the infra-red. Subsequent irradiation with $\lambda > 800$ mµ gives a photo-electric effect which decays with time. It is concluded that some of the electrons initially liberated from Na atoms combine with positive ions to form new loosely bound absorption centres. The half-life period of these centres diminishes as the tempis raised. L. J. J.

Destruction of an adsorbed rectifying film by pressure. F. TREY (Physikal. Z., 1936, **37**, 213– 214).—Pressure of 4000 kg.-per sq. cm. on a rectifying PbS pastille destroys its rectifying powers.

A. J. M.

R.S.

True conductivity and back e.m.f. in layered dielectrics. F. QUITTNER (Physikal. Z. Sovietunion, 1935, 8, 275—278; cf. A., 1930, 1504).—A model consisting of alternate thick and thin layers of good and bad conductivity is discussed in relation to previous experimental data on rock-salt. The simple form of model does not account for the results.

Normal cathode fall at the m.p. of bismuth. H. KURZKE (Ann. Physik, 1936, [v], 25, 688-696; cf. A., 1934, 1291).—Bi shows a decrease (2 volts with a normal cathode fall of 160 volts) in passing from solid to liquid, in contrast to Sn and Pb. This corresponds with a change of 0.05 volt in the emission energy. L. J. J.

Substances of low conductivity, and the Reboul effect. O. VIKTORIN (Chem. Listy, 1936, 30, 60– 64).—A discussion. R. T.

Abnormal electrical conductivity in powdered tellurium. C. H. CARTWRIGHT (Physical Rev., 1936, [ii], 49, 443—448).—Under 1000 kg. per sq. cm. pressure Te powder had about 10 times greater conductivity than that of a single crystal under the same pressure. The anomaly was most marked in pure Te, disappearing, probably due to masking, in presence of impurities. Momentary passage of an electric current through the powder under pressure diminished its vol., and greatly decreased its conductivity. Under 20,000 kg. per sq. cm. hydrostatic pressure massive Te increases in conductivity > 100 times, and the rate of increase rises rapidly with pressure. The anomaly may be due to local pressures in excess of the measured average; other explanations are discussed.

N. M. B. Electrical conductivity of cuprous oxide in strong electric fields. M. D. BORISSOV, I. I. KARA, and K. D. SINELNIKOV (Physikal. Z. Sovietunion, 1935, 8, 425–429).—Using different field strengths the increase in conductivity depends on the no. of conducting electrons. W. R. A.

Mechanism of electrical conduction of solid ionic conductors. A. SMEKAL (Physikal. Z., 1936, 37, 150-153).—The theory of Schottky (A., 1935, 1302, 1305) is discussed. The equation used by Schottky et al. for the polarisation effect is not applicable. According to the theory, in ionic conduction, an ion jumps from its place to a void in the lattice. The probability of this will depend on the properties of the ion and the frequency of the thermal vibrations of the lattice. When equal nos. of cationic and anionic voids are present, differences in mobilities of the ions must be due only to differences in properties of the ions. It is not necessary to assume any different mechanism for the conduction of AgCl and AgBr, where it is entirely cationic. Since lattice conduction is due to disorder phenomena, and these can be "frozen," it should be possible to observe unstable conditions of conduction at low temp. Reversible low-temp. decreases in conduction are therefore not always to be ascribed to electrolytic purification. This is probably the explanation of Kassel's experiments with rock-salt (A., 1934, 1163). A. J. M.

Breakdown with internal photo-electric effect. I. M. GOLDMAN and B. M. VUL (Physikal. Z. Sovietunion, 1935, 8, 369-377).—For rock-salt crystals changes in electronic conductivity within a large range do not influence the dielectric strength. Stained crystals give lower breakdown potentials with d.c. and a.c. when subjected to light; this is due to secondary factors. W. R. A.

Dielectric constant of wool fibre. F. W. HOLL (Helv. Chim. Acta, 1936, 19, 281-283).—The dielectric const. of washed and fat-free Cape wool, determined by the bridge-condenser method, is $4.56\pm10\%$. F. L. U.

Dielectric constant and electrostriction of amino-acids and peptides. J. P. GREENSTEIN and J. WYMAN, jun. (J. Amer. Chem. Soc., 1936, 58, 463-465; cf. A., 1935, 694).—Data for *l*-asparagine, acetylhistidine, glycyl-leucine, alanyl-, *N*-methylleucyl-, glycyl-, and glycylphenyl-alanine, leucyl-, phenylalanyl-, and leucylglycyl-glycine are recorded. E. S. H.

Determination of dielectric constants and dipole loss at high frequencies. I. Introduction. M. WIEN. II. Dipole loss in liquids for long waves. C. SCHRECK. III. Determinations with sucrose and fructose solutions. W. DAHMS. IV. Determinations with different kinds of glass. W. HACKEL. V. Determination of losses in different liquids by the thermometer method. C. SCHMELZER (Physikal. Z., 1936, 37, 155—156, 156—158, 158—160, 160—162, 162—164).—I. Results previously obtained for the behaviour of liquids in powerful and high-frequency electric fields are summarised. The most important results of the Debye theory of dipole loss are collected.

II. Determinations of dipole loss were made using the barretter method with a non-polar liquid (C_6H_6) and polar liquids (aq. solutions of sucrose and fructose, Bu^oOH). The variation of dipole conductivity $(\Delta \chi)$ with λ was linear in the case of Bu^oOH and sucrose. For dil. solutions of fructose $\Delta \chi \propto 1/\lambda^2$, but for conc. solutions $\Delta \chi \propto 1/\lambda$. There was no loss in C_6H_6 .

III. Aq. solutions of sucrose and fructose give qual. agreement with theory as regards variation of $\Delta \chi$ with $1/\lambda^2$ for short $\lambda \lambda$, but deviations occur with more conc. solutions. Similar results are obtained as for long $\lambda \lambda$ (see above). There is a considerable decrease of dielectric const. (c) of fructose solutions with increase of d of solution. This is not found for sucrose, contrary to theory. The deviations of the dipole effect from theory may be due to inhomogeneity, or to the possibility that the Debye theory is not accurate for very viscous solutions.

IV. A method for the simultaneous determination of ε and conductivity (χ) of solids is described in which the solid is placed between the plates of a condenser filled with a liquid of which the ε and χ are varied until they are the same as those of the solid. ε and χ of the liquid are then determined. The method was used with various Jena (Schott) glasses over the λ range 12,000-10 m. The highfrequency χ is strongly dependent on the kind of glass. At first $\chi \propto 1/\lambda$ but with shorter $\lambda\lambda$ it increases more slowly than this. The variation of ε with λ is different for the different glasses, and although there are deviations from the Debye theory, the phenomena can still be explained as connected with dipole loss. The results are compared with those obtained for fructose solutions (see above).

V. The thermometer method of Harms and Malsch (A., 1932, 214) was used to determine the highfrequency χ and dipole loss ($\Delta \chi$) of various liquids. Non-polar substances (e.g., dioxan) show no loss. For Pr^aOH $\Delta \chi \propto 1/\lambda^2$, although the slope of the curve between $\Delta \chi$ and $1/\lambda^2$ is > theory; this, however, is accounted for. Solutions of HgCl₂ and AcOH in COMe₂ show a considerable increase in χ at high frequency above that at low frequency. This is due to formation of ion pairs of large dipole moment. A solution of $NBu^{\alpha}_{4}Br$ in $C_{0}H_{6}$ behaves similarly. $\Delta \chi$ in this case depends on field strength, which causes alteration in the no. of ion pairs. A. J. M.

High-frequency loss of polar solutions. G. MARTIN (Physikal. Z., 1936, 37, 164–165).—If dissolved mols. are regarded as spheres rotating in a viscous medium, an expression connecting relaxation time with coeff. of viscosity (η) and size of mols. can be obtained on the basis of Stokes' law. C₆H₆ solutions of o-, m-, and p-C₆H₄Cl₂ show a highfrequency loss \propto (dipole moment)². The effect of size of mol. was investigated with PrOH, hexyl, octyl, and cetyl alcohols in dil. C₆H₆ solutions. The loss, extrapolated to infinite dilution, increased linearly with the no. of C in the alcohol mol. The results agree with theory. The effect of η was investigated with solutions of o-C₆H₄Cl₂ in C₆H₁₄, C₆H₆, CCl₄, and decalin. The relaxation time was not accurately $\propto \eta$ as required by theory.

Dielectric losses at high frequency in liquids. M. DIVILKOVSKI and M. FILIPPOV (Physikal. Z. Sovietunion, 1935, 8, 311—318).—The dielectric losses in EtOH, Pr[°]OH, and glycerol have been obtained by determination of the expansion of the liquid in a thermometer vessel when placed in a high-frequency electric field. No rise of temp. could be observed in the case of C_6H_6 . R. S.

Electric moments of solute molecules. E. A. GUGGENHEIM (Nature, 1936, 137, 459-460).—The new formula deduced is claimed to give vals. more accurate than the Clausius-Mosotti formula when applied to the experimental data of other investigators. L. S. T.

Calculation of various physical constants of heterogeneous substances. II. Dielectric constants and conductivities of polycrystals of nonregular systems. D. A. G. BRUGGEMAN (Ann. Physik, 1936, [v], 25, 645—672).—The theory (this vol., 151) developed for mixtures of isotropic substances is extended to anisotropic aggregates. The new theory gives vals. in agreement with existing data for the dielectric const. of S and CaCO₃ polycrystals and suspensions in liquids, and for BaSO₄– air and PbCl₂–air mixtures. The influence of texture in the case of Sb, Bi, Sn, Cd, and Zn polycrystals explains anomalies in existing conductivity data.

L. J. J. Minimum estimate of the dipole moments of two oxonium salts. (Mrs.) C. G. LE FÉVRE and R. J. W. LE FÉVRE (J.C.S., 1936, 398-399).-2-Phenyl- and 2-phenyl-3-methyl-benzopyrylium perchlorates in NPhMe₂ at 25° have dipole moments at least about 8 and 7, respectively. Four pyrylium ferrichlorides are sol. in NPhMe₂ but have very high κ . R. S. C.

Dipole moment and solvent. K. HIGASI (Sci. Papers Inst. Phys. Chem. Res. Tokyo, 1936, 28, 284-309).—The polarising influence of an ellipsoidal dipole with an axis of symmetry (c) on a non-polar solvent is considered. The dipole moment of the solute in solution, μ' , is given by $\mu + 4\pi n \alpha A \mu$, where μ is the moment in the gaseous phase, n is the no. of solvent mols. per c.c., α is the polarisability of the solvent, and A is dependent only on the shape of the solute mol. If a is the axis perpendicular to the symmetry axis, μ' is >, =, or < μ according as a is <, =, or > c; Müller's theory considers only the case $\mu' < \mu$. Examples agree with theory, CHCl₃, Et₂O, and the alcohols (data of Higasi) in C₆H₆ and C₆H₁₂ giving $\mu' > \mu$. The shape of the mols. is considered in relation to X-ray evidence, optical polarisabilities, and Kerr const.; in general negative vals. of the Kerr const. are correlated with $\mu' > \mu$. μ' can be "corr." for solvent effect by plotting μ' against $(\varepsilon - 1)/(\varepsilon + 2)$ (ε is dielectric const. of solvent), the slope of $\mu'/\mu - 1$ against $(\varepsilon - 1)/(\varepsilon + 2)$ being positive or negative, and extrapolating to $\varepsilon = 1$. If extrapolation is not possible the solvent with the smallest ε gives the best val. for μ . R. S. B.

Steric configuration and the condition of strain of some ring compounds. J. BÖESEKEN (Chem. Weekblad, 1936, 33, 206—214).—The importance of the study of dipole moments (in parentheses), the formation of *B*-compounds, and the velocity of the

reaction $>C:C<+AcO_2H \rightarrow _2>O+AcOH$, for

determining stereochemical configurations are discussed and applied to dioxan (0·3), tetra-, m.p. $61-64^{\circ}$ (1·85), $99\cdot5-101\cdot5^{\circ}$ (1·05), $143-144^{\circ}$ (0), hexachlorodioxan (0), naphthodioxans, m.p. 111° (1·90), 136° (0·72), pyrocatechol dimethylene ether (1·40), and several cyclic hydrocarbons including terpenes. The mol. wt. of metaldehyde is twice that of paraldehyde. S. C.

Dipole moment and structure of organic compounds. XV. Electric moments of some chlorinated naphthalenes. G. C. HAMPSON and A. WEISSBERGER (J.C.S., 1936, 393—398).—Data are recorded for the two $C_{10}H_7Cl$ and the ten $C_{10}H_6Cl_2$ in C_6H_6 solution at 25°. The C-Cl moment in 2- $C_{10}H_7Cl$ (1.65*D*) is approx. the same as in PhCl, whilst in the 1-position it is less (1.51*D*). μ is 0.48*D* for 1:4- $C_{10}H_6Cl_2$, but zero for the 1:5- and 2:6isomerides. There is no evidence of fixation of single and double linkings. The results indicate that each C-Cl is directed as from the centre of the ring, and induces in the rest of the mol. a moment corresponding with the calc. polarisability of the system, including an "ortho-effect" when two Cl are close together.

L. J. J.

Structure of anisotropic liquids. R. D. SCHULVAS-SOROKINA and M. V. POSNOVA (Physikal. Z. Sovietunion, 1935, 8, 319—325).—The dielectric const. of *p*-azoxyanisole is unaffected by electrical fields of frequencies 10³—35 Hertz. The conductivity-temp. curve is inflected at 116° and 136° corresponding with the change from the supercooled state and the change anisotropic-isotropic state, respectively. R. S.

Molecular volume of normal liquids. R. LAUTTÉ (Compt. rend., 1936, 202, 753—754; cf. A.; 1935, 435, 814).—The val. of K in the expression $(T_c/\theta) \log (24\theta/V_c) = K$ is always < 3 for the rare gases or for light mols. or mols. containing few atoms. For associated liquids it is > 3. Typical vals. are given. H. J. E.

A. J. M.

Werner complexes. Optical activity and configuration of ions containing the groups [Me en₂] or [Me ox₂]. J. P. MATHIEU (Bull. Soc. chim., 1936, [v], **3**, 476–498).—The optical rotation and circular dichroism of 20 complexes of Co, Cr, and Ir have been studied in the visible region. The bearing of the results on the configuration of the ions is discussed. E. S. H.

Heats of combustion and refractivity data of crotonic esters. E. SCHJANBERG (Z. physikal. Chem., 1936, 175, 342—346).—The energy of cleavage of the C.C linking, calc. from the heats of combustion, shows slight constitutive variations. The refractive and dispersive increments of the linking are \gg the vals. calc. from Eisenlohr's at. refractions, and the increments for normal, *iso*-, and *sec.*-esters are all different. R. C.

Magnetic rotatory power of nitric oxide. H. BIZETTE and B. TSAI (Compt. rend., 1936, 202, 648– 649).—The Verdet const. for NO is -0.0068' for the Hg green line at 16° and 90 kg. per sq. cm. Data for the variation of the magnetic rotation with λ are given. L. J. J.

Absolute determination of the magnetic rotatory power of water. R. DE MALLEMANN, P. GABI-ANO, and F. SUHNER (Compt. rend., 1936, 202, 837— 838).—Verdet's const., Λ , for H₂O for the green Hg line is $(1.543'\pm0.001)\times10^{-2}$ at 11.5° . The val. of Λ calc. from this for the D line, using the known val. of the dispersion, is 1.312×10^{-2} , in agreement with the val. obtained by other investigators. M. S. B.

Magneto-optical dispersion of acetylacetone. L. SHIUEQ-SHANN (Chinese J. Physics, 1935, 1, 54–58).—Data for magneto-optical dispersion and Verdet const., measured in a field of 6000 gauss, are recorded. $M[\alpha]$, and e/m calc. from the data, are compared with calc. and accepted vals., respectively. L. J. J.

Optic moments of organic molecules in relation to crystalline and magnetic birefringence. M. RAMANADHAM (Proc. Indian Acad. Sci., 1936, 3, A. 43-50; cf. A., 1935, 565).—Vals. of $C_{\rm M}$ are recorded for $C_{10}H_8$, Ph₂, acenaphthene, benzil, salol, COPh₂, and phenanthrene, in CCl₄ solution. For $C_{10}H_8$, observed vals. of C_M agree with vals. calc. from Salceanu's data for the fused state (A., 1932, 561). For Ph2, the results of Groth for the positions of the optic axes, and of Hendricks and Jefferson (A., 1933, 1104) for n, are confirmed. The direction of max. n coincides with the length of the mol., making an angle $20^{\circ} 42'$ with the crystallographic c axis. The optic moments b_1 , b_2 , b_3 (length, breadth, and thickness of mol.), calc. from n in CCl₄ solution, are 33.32, 23.06, and $12\cdot13$ (×10⁻²⁴) e.g.s., respectively, for Ph₂, and 32.36, 28.74, and 14.36 (×10⁻²⁴), respectively, for $(CH_2Ph)_2$, in agreement with *n* for the liquids, and in the case of Ph_2 with the observed C_M . L. J. J.

Linking of magnesium oxide. H. LESSHEIM and R. SAMUEL (Current Sci., 1936, 4, 584—586).— Mols. of MgO, CaO, etc. crystallise with the NaCl type of lattice, yet do not show ionic properties. It is suggested that it is possible for a covalent non-ionic mol. to crystallise in this type. The infra-red absorp-

tion spectrum of MgO contains several main max. and in its gross structure appears to be much too complicated for a symmetrical cubic lattice, resembling more that of the hexagonal BeO lattice. It is therefore possible that the MgO crystal is a giant mol. with covalent linkings. The assumption that the NaCl lattice is a rigorously valid criterion of the electrovalent linking is criticised on the ground that many examples are known of substances crystallising in the same lattice type, yet possessing quite different linking forces. A. J. M.

Symmetry of the benzene molecule. P. TERP-STRA and W. J. VAN WEERDEN (Rec. trav. chim., 1936, 55, 161–169; cf. this vol., 274).—Consideration of available data leads to the conclusion that the symmetry of the C_6H_6 mol. is either D_{3d} or D_{6h} , the former being the more probable. Models are suggested and discussed. F. L. U.

Chemical constitution of planetary atmospheres. K. WURM (Chem.-Ztg., 1936, 60, 266– 268).—A review.

Rearrangement of molecules in unimolecular films. Polycyclic compounds of the five-ring series. W. D. HARKINS, H. E. RIES, jun., and E. F. CARMAN (J. Chem. Physics, 1936, 4, 228—229).— In unimol. films of certain compounds such as betulin, containing five C_6H_6 rings, an increase in pressure is followed by a rapid rearrangement of the mols. resulting in an almost complete disappearance of the pressure increase. M. S. B.

Distribution of molecules in a model liquid. W. E. MORRELL and J. H. HILDEBRAND (J. Chem. Physics, 1936, 4, 224-227).—A three-dimensional model mol. assemblage has been constructed and employed to determine the relative frequency of occurrence of different intermol. distances. The model can also be made to simulate thermal expansion. The distribution is similar to that observed by Menke in liquid Hg by X-ray diffraction (A., 1932, 986). M. S. B.

Virial theorem and the theory of fusion. E. L. HILL (Physikal. Z. Sovietunion, 1935, 8, 401-406). —The force function used to describe the mutual interactions between mols. is discussed, and it is emphasised that this function contains a contribution from the kinetic energy terms of the electrons. From this fact, with further simplifying assumptions about the process of melting, a schematic explanation of the observed changes in kinetic and potential energies of the mols. along the melting curve is proposed.

Ŵ. R. A.

Some relationships between atomic lattices. E. L. FEINBERG (Physikal. Z. Sovietunion, 1935, 8, 407-415).—An approximation of the metallic crystal by means of a space lattice formed by the ions, the inter-ion space being filled with the gas of free electrons, and the division of the crystal into the Wigner and Seitz spherically-symmetrical cells, permits determination of the interat. distance which corresponds with the stable state of the crystal expressed as the function of the valency z of the element. In this way the dependence of the valency on the at. vol. is obtained and Lothar Meyer's at. vol. curve is explained. Also, the dependence on the valency of the energy of the ionisation which deprives the atom of all its z valency electrons is obtained, in good agreement with experimental data. W. R. A.

Theory of the accommodation coefficient. L. LANDAU (Physikal. Z. Sovietunion, 1935, 8, 489—500; cf. Jackson *et al.*, A., 1932, 1074; 1934, 6).—Calculation of the accommodation coeff. α on classical lines gives $\alpha \propto T^{3/2}$ for T not too great and for $(h/2\pi)\eta \ll kT$, where η is collision frequency. Where $(h/2\pi)\eta \gg kT$ a quantum treatment gives $\alpha \propto T^3$.

A. J. M. Possibility of applying the Thomas-Fermi method to the problem of metallic cohesion. E. L. FEINBERG (Physikal. Z. Sovietunion, 1935, 8, 416—424).—Mathematical. The energy of the crystal calc. on the basis of the Thomas-Fermi method, when expressed as a function of the interat. distance, has no min. and confirms the calculations of the energy curve (Slater, Krutter). The Thomas-Fermi method does not explain the stability of the crystal lattice.

W. R. A.

Heitler-London repulsive state of hydrogen. H. M. JAMES, A. S. COOLIDGE, and R. D. PRESENT (J. Chem. Physics, 1936, 4, 187-193).—Theoretical. M. S. B.

American measurements on supercooled steam. M. JAKOB (Z. tech. Physik, 1935, 16, 83— 86; Chem. Zentr., 1935, ii, 22—23).—Yellott's curve for the spontaneous condensation of ion- and dustfree H_2O vapour indicates that condensation occurs on nuclei 1.5—2 times the radius of unassociated H_2O mols., in agreement with Wilson's theory that associated mols. are involved. J. S. A.

Calculation of surface tension from experiment. II. [Capillary] rise in tubes of circular section of all widths. III. Height of the meniscus in wide or narrow tubes when the angle of contact is zero; or the determination of the capillary constant for sessile drops of all sizes. A. W. PORTER (Phil. Mag., 1936, [vii], 703-706, 706-708; cf. A., 1933, 250).—II. A satisfactory correction of Richards and Coombs' formula (A., 1915, ii, 522) can be obtained by using Bashford and Adams' tables and extending these by Rayleigh's formula for very wide tubes.

III. The treatment developed previously can be extended by Bashford and Adams' tables to include very narrow capillaries or very small sessile drops.

J. W. S.

R. S.

Parachor and chemical constitution. Structure of nitrobenzyldialkylamines. B. SINGH and A. SARUP (J. Chim. phys., 1936, 33, 183—187).— The surface tensions, d, and parachors of o-, m-, and p-nitrobenzyl-dimethyl-, -dipropyl-, and -dibutylamine are given. The parachors of the o-compounds correspond to a non-co-ordinated mol. structure.

Double refraction of X-rays in crystals. J. FRENKEL (Physikal. Z. Sovietunion, 1935, 8, 587— 588).—The failure of Hertzrücken *et al.* (*ibid.*, 1933, 4, 50) to detect double refraction of X-rays in quartz is due to the fact that the λ of X-rays is < interat. distances. This, as well as some other optical effects due to anisotropy of separate mols., cannot occur with X-rays, since the electrostatic interaction of the atoms vanishes compared with the radiative interaction, and the latter is unable to give rise to anisotropy. A. J. M.

Distribution of electron density and potential in a crystal lattice from X-ray data. V. E. LASCHKAREV (Physikal. Z. Sovietunion, 1935, 8, 227— 239; cf. A., 1935, 1308).—A new method of calculation is described. R. S.

Calculation of potential distribution in certain crystal lattices. V. E. LASCHKAREV and A. S. TSCHABAN (Physikal. Z. Sovietunion, 1935, 8, 240– 254; cf. preceding abstract).—The potential distributions in Li, Al, NaCl, and diamond have been calc. R. S.

Distribution of X-ray reflexions from a crystal lattice. W. KOSSEL (Ann. Physik, 1936, [v], 25, 512-526; cf. A., 1935, 1306).—The directions of reflexion from a crystal for a given λ can be represented by the intersections with the surface of a sphere of a series of planes corresponding with the lattice planes. The development of such a system of reflexions with decreasing λ for a face-centred cubic lattice is illustrated. L. J. J.

Theoretical and experimental Laue patterns from bent sodium chloride crystals. A. P. KOMAR (Nature, 1936, 137, 397–398).—A method of calculation and construction of Laue patterns from bent crystals of NaCl which gives good agreement with experimental patterns is proposed. The agreement shows that in the process of plastic deformation the crystal behaves as a mosaic aggregate of blocks which change their orientation practically independently. L. S. T.

Stability of closest packing of spheres. R. NIINI (Ann. Acad. Sci. fenn., 1934, 39, A, No. 10; Chem. Zentr., 1935, ii, 13).—The hexagonal closepacked arrangement has the smallest potential energy. J. S. A.

Transition mechanism of cubic body-centred into hexagonal close-packed zirconium. Relation with the modifications of calcium. W. G. BURGERS (Metallwirts., 1934, 13, 785-786; Chem. Zentr., 1935, ii, 318).—A cubic face-centred intermediate phase is assumed, but has not been detected. For Ca all three forms are known. H. J. E.

Kinetics of recrystallisation of tin, cadmium, and iron. M. KORNFELD and F. SAVIZKI (Physikal. Z. Sovietunion, 1935, 8, 528—532).—In the recrystallisation of these metals, as with Al (Karnop, A., 1930, 530; B., 1930, 911) and rock-salt (Mūller, A., 1934, 1058), there is an incubation period before the appearance of cryst. nuclei. The rate of growth of crystals is linear with time. Recovery from deformation is complete before the appearance of the first visible nucleus. A. J. M.

Formation of nuclei in recrystallisation. II. Nature of the incubation period. M. KORNFELD (Physikal. Z. Sovietunion, 1935, 8, 533-535; cf. A., 1935, 1307).—The existence of the incubation period can be explained in two ways: (1) the formation of a

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nucleus in a small vol. of the deformed material takes place suddenly owing to a single thermal fluctuation. and (2) a continuous irreversible process takes place in a definite part of the deformed material from the commencement of heating. The incubation period corresponds with the time taken for the completion of this process. The dependence of the no. of recrystallisation nuclei on the duration of heating is cale, on the basis of each of these explanations. The results of experiment favour the second explanation.

A. J. M.

Effect of heat-treatment on the structure of gold- and silver-leaf. G. D. PRESTON and L. L. BIRCUMSHAW (Phil. Mag., 1935, [vii], 21, 713-727). -The contraction when Au-leaf is heated in air at 350-400° was shown by electron diffraction to be due to recrystallisation and reorientation. The new grains grow in a position favourable for reflexion from the (110) planes. The effect may be connected with transitory oxide formation, since it does not occur in H, or in vac. up to 700°. Similar, though less definite, results were obtained for Ag heated in air at 290°. Certain "extra" rings were attributed to the presence of Hg, but do not correspond with known phases in the Au-Hg and Ag-Hg systems. Phases present in thin films may have a different structure from those in the massive state. H. J. E.

Structure of solid y-oxygen. W. H. KEESOM and K. W. TACONIS (Physica, 1936, 3, 141-144).-Results obtained by the X-ray goniometer are identical with those of Vegard (cf. A., 1935, 1450). N. M. B.

Theoretical diffraction patterns corresponding with some simple types of molecular arrangement in liquids. J. A. PRINS and H. PETERSEN (Physica, 1936, 3, 147-153).-Computations are made for the structures: (a) cubic and hexagonal close-packed, (b) body-centred cubic, (c) simple cubic, (e) diamond structure; the respective co-ordination numbers are 12, 8, 6, and 4. Results are confirmed experimentally by taking for (a) inert gases and Hg, (b) alkali metals, (c) Sb, (d) SiO_2 and H_2O .

N. M. B.

Structure of stannous sulphide and teallite. W. HOFMANN (Fortschr. Min., 1935, 19, 30-31; Chem. Zentr., 1935, ii, 820).-Herzenbergite SnS (I), teallite PbSnS₂ (II), and synthetic ZnS have very similar deformed galena structures. (I) and (II) have a 3.98, 4.04, b 4.33, 4.28, c 11.18, 11.33 A., respectively. J. S. A.

X-Ray study of anhydrous ferric phosphates. P. BRASSEUR (Compt. rend., 1936, 202, 761-762).-X-Ray diagrams showed the existence of only two forms of the metaphosphate $Fe_2(PO_3)_6$. Character-istic diagrams were obtained from $Fe_3(PO_4)_2$ and from a pyrophosphate $Fe_4(P_2O_7)_3$. No characteristic dia-gram was observed for $Fe_2O_3(P_2O_5)_2$. An impure basic phosphate was identified. H. J. E.

Interpretation of X-ray diffraction pattern of liquid carbon tetrachloride. I. NITTA and T. WATANABÉ (Sci. Papers Inst. Phys. Chem. Res. Tokyo, 1936, 28, 277–283).—It is inferred that under the influence of the van der Waals forces adjacent mols. orient themselves preferentially with

PP

tetrahedral faces towards one another, giving a quasi-association. The distance between the centres of Cl atoms of adjacent mols. is 3.90 Å., i.e., the "envelope" around a Cl atom is 0.98 Å. thick.

R. S. B. Structure of cellulose nitrates. I. Normal high nitrates. II. X-Ray patterns and structure of nitrates of various nitrogen contents. III. Density of nitrates and the properties of the recovered cellulose. IV. Existence of various space lattices of nitrates of the same nitrogen content. M. ISHIHARA (J. Soc. Chem. Ind. Japan, 1936, 39, 62-65B, 65-68B, 68-70B, 70-74B).-I. Details are given of the X-ray pattern of nitrated hemp (13.3% N); it is concluded that the lattice unit contains 20 glucopyranose nitrate units in four chains each five units long. No period corresponding with two units was observed.

II. The X-ray patterns of nitrates containing 3.95-13.54% N are described, and differences are observed between the classes 0-7, 10.01, 10.87, 12.80-13.2, 13.3-13.5, and 13.5% N.

III. Measurements of d of cellulose nitrates in H₂O show that, with some exceptions, d increases with increasing N content, but not linearly.

IV. Nitrates with approx. the same N content (>13%) have different X-ray diagrams, and hence different lattices, according to their mode of prep. or subsequent treatment. A. G.

β-Modification of the gutta-percha hydro-carbon. G. W. PANKOW (Helv. Chim. Acta, 1936, 19, 221-222).-The stretched β-hydrocarbon shows interference in the X-ray diagram corresponding to a unit of length about 115 Å. along the length of the R. S. C. fibre.

X-Ray study of amorphous rubber. G. L. SIMARD and B. E. WARREN (J. Amer. Chem. Soc., 1936, 58, 507-509).-The X-ray scattering curve for unstretched rubber has been submitted to a Fourier analysis. The distribution agrees with the view of a long-chain mol. E. S. H.

Electron microscope for filaments : emission and adsorption by tungsten single crystals. R. P. JOHNSON and W. SHOCKLEY (Physical Rev., 1936, [ii], 49, 436-440).-A simple electron microscope for small cylindrical filaments is described. The activation of thoriated W was investigated. Electron emission from single crystals grown in drawn pure W filaments varies around the wire circumference and depends on crystallographic direction; the variation with this is more pronounced and complex for filaments self-activated in Cs or K N. M. B. vapour.

Surface structure of polished cleavage faces of calcite. H. G. HOPKINS (Phil. Mag., 1936, [vii], 21, 820-830) .- The polished eleavage face of calcite was shown, by electron diffraction, to be cryst. The action of very dil. acids is essentially one of pitting. Kikuchi lines were observed at a depth of 200 Å. The polishing action extends to a depth of 6000 Å., as a twinned layer was observed at this H. J. E. depth.

Experiments with models on the theory of the Kikuchi lines. A. LICHTENFELD and K. SCHWARZ (Naturwiss., 1936, 24, 172–173).—The λ of electrons used in investigation of crystal structure is about 100 times < the distance between the lattice planes. It is suggested that besides diffraction phenomena, purely optical processes, such as shadow formation, will be encountered, and that the latter gives rise to the Kikuchi lines. Models of the NaCl lattice, with the lattice const. about 1000 times > λ of visible light, give shadow effects with such light similar to the Kikuchi lines. A. J. M.

Experiments with models on the theory of the Kikuchi lines. M. VON LAUE (Naturwiss., 1936, 24, 218).—The model suggested by Lichtenfeld et al. (see above) for explaining the Kikuchi lines as a shadow effect is criticised on the ground that the shadows appear to be cast by the rods joining the spheres representing atoms in the model, instead of by the spheres themselves, and that the shadows fall in the direction of the incident light, whereas the position of the Kikuchi lines is determined only by the lattice. A. J. M.

Theory of Kikuchi lines. M. VON LAUE (Ann. Physik, 1936, [v], 25, 569-576; cf. A., 1935, 1306). L. J. J.

Examination by electron beams of some aliphatic esters. G. NATTA and R. RIGAMONTI (Atti R. Accad. Lincei, 1935, [vi], 22, 342—348).— Investigation of thin films of some aliphatic longchain compounds (fatty acids, ethers, esters, and ketones) by means of electron diffraction shows that they all give two fundamental distances lying in the plane of the film and normal to the chain axis, viz., 7.46 and 4.98 Å. These are found also in the paraffins. It is suggested that these long-chain compounds show a two-dimensional isomorphism, which is independent of the active terminal groups and persists when $\cdot CH_2$ groups are replaced at long intervals by $\cdot CO \cdot \text{ or } \cdot O \cdot$ O. J. W.

Supposed dependence on temperature of spontaneous magnetisation. K. HONDA and T. NIS-HINA (Z. Physik, 1936, 98, 657—665).—Variation of remanent magnetisation with temp. has been measured for the three principal axes of single Fe crystals, and shows no dependence on temp. of spontaneous magnetisation. A. B. D. C.

Volta potential, work function, and thermopotential. I. G. MÖNCH (Erlanger Ber., 1934, 65, 191-201; Chem. Zentr., 1935, ii, 20).—A survey of the author's results as to (i) the relation between the Volta potential and the work function; (ii) the variation of the Volta potential of metals with temp. (no measurable variation up to 400°); (iii) the variation with temp. of the Volta potential of semiconductors. Cu₂O becomes more negative at high temp., probably due to alteration in the Volta potential; (iv) the connexion between Volta potential and thermopotential; (v) relationships between Volta potential, lattice dimensions, and at. vol.

J. S. A. Connexion between work function and Volta potential. II. G. MÖNCH (Erlanger Ber., 1934, 65, 202—207; Chem. Zentr., 1935, ii, 20).—For the metal pair W-Pt, the difference between the work functions is equal in magnitude to the difference in Volta potentials. J. S. A.

Dependence of Volta potential on state of strain of a metal surface. VI. G. MÖNCH (Erlanger Ber., 1934, 65, 211—214; Chem. Zentr., 1935, ii, 21).—The work function of a Ni surface, measured by the Volta potential, was not changed by the surface strains and lattice distortion resulting from flexion below the elastic limit. With Cu₂O a reproducible change occurred. J. S. A.

Internal energy of ferromagnetics. E. C. STONER (Phil. Trans., 1936, A, 235, 165—193).— Theoretical. A crit. analysis of the results obtained for the magnetisation, magneto-caloric effect, and sp. heat of Ni by various experimental methods is given. Discrepancies in $-(1/\sigma)(dE/d\sigma)$ (E=internal energy, σ =sp. magnetisation) derived by different methods can be explained by supposing that a small amount of the Ni consists of domains of 10^3 — 10^4 atoms. It is suggested that such domain-structure is not confined to ferromagnetics, but is practically equiv. to the mosaic structure met with in metals in general, due to distortion arising from impurity atoms.

A. J. M. Refraction and dispersion in crystals and solids. XII. Molecular refractivities and molecular volumes in the glasses B_2O_3 , B_2O_3 , xNa_2O_3 , and B2O3, xNa2O, yNaCl. P. WULFF and S. K. MAJUMDAR (Z. physikal. Chem., 1936, B, 31, 319-342).—The *d* of anhyd. B_2O_3 is < that of B_2O_3 containing a small amount of H_2O , whilst the mol. refractivity, R, is larger; apparently d passes through a max. at a very small H_2O content. The apparent mol. vol., Φ , and R of Na₂O in Na₂O-B₂O₃ glass rise with the Na₂O content, but approach a limit at $Na_2O: B_2O_3=1:2$. For $B_2O_3 \Phi$ is approx. const. in presence of varying amounts of Na2B4O7, but is < the val. for pure B_2O_3 glass. For $Na_2B_4O_7 R$ and Φ fall with increase in the ratio B_2O_3 : $Na_2B_4O_7$, the effect being large compared with those observed with ag. solutions. These variations are ascribed to the effect of the Naⁱ ions and dipole mols. on the B₂O₃ glass, acting as solvent of small dielectric const. The R and Φ of NaCl dissolved in Na₂O-B₂O₃ glass are rather < those of cryst. NaCl, corresponding with the view that a one-sided deformation of ions in the formation of mols. has a greater effect on refractivity than a deformation on all sides, as in a R. C. crystal lattice.

[Optical] dispersion of crystalline and vitreous quartz. J. ENGL (Ann. Physik, 1936, [v], 25, 600– 608).—Theoretical. A formula is given for the refractive power of SiO₂ as a function of λ . The relation between the dispersive power and the absorption coeff. with varying λ is discussed. L. J. J.

Theory of elastic after-effect in un-ordered mixed crystals. V. S. GORSKI (Physikal. Z. Sovietunion, 1935, 8, 457–471).—Mathematical. The aftereffect in polycryst. metals and alloys is discussed in relation to diffusion and a theory is developed.

W. R. A.

Metallic crystals. E. SCHMID (Rev. Mét., 1935, 32, 638—648).—A survey is given of the properties of single crystals in which attention is given to lattice types and the mechanism of transformation from type to type. Properties discussed are anistropy of physical properties, mode of plastic deformation, pptn. from supersaturated solid solution, and the relationship between the polycryst. aggregates and single crystals. E. H. B.

Electrical and optical investigations of the conversion of non-metallic into metallic antimony. R. SUHRMANN and W. BERNDT (Physikal. Z., 1936, 37, 146-149).-Sb vapour was condensed in vac. on a quartz surface cooled by liquid No, and the absorption spectrum of the substance immediately after condensation compared with that shown by the film after it had warmed to a temp. > transition temp. at which the film becomes metallic in character. Well-defined absorption lines were found at low temp. but they disappeared on warming to 373° abs., indicating a transition from the non-metallic to the metallic state. The transition temp. varied with the thickness of the film, three vals. obtained being 325° (15 m μ), 280° (35 m μ), and 270° abs. (109 m μ). The higher val. obtained by Kramer et al. (A., 1932, 1192) is possibly due to the film containing gas.

I. J. M.

[Allotropy of] potassium metaphosphate prepared by dehydration of potassium dihydrogen orthophosphate. A. BOULLÉ (Compt. rend., 1936, 202, 662—664).—Thermal analysis of KPO₃ obtained by dehydration of KH_2PO_4 at 225° indicates reversible transformations at 460° and 650°. The X-ray spectrum and the m.p. (810°) are unaffected by washing the product. The same X-ray spectrum is given by the initial dehydration product, the product of slow cooling from fusion, and specimens cooled rapidly from 300°, 550°, 615°, 700°, and 800°, which give different viscosities in 0-1N-Na₄P₂O₇ solution. It is concluded that only the amorphous form and a single cryst. form can exist at room temp. L. J. J.

Transition of solid ammonium bromide at about -39° . A. SMITS, J. A. A. KETELAAR, and G. J. MÜLLER (Z. physikal. Chem., 1936, 175, 359– 376).—The results of the study of the transition of NH₄Cl (A., 1933, 1119) are examined thermodynamically in relation to Smits' theory of allotropy. Dilatometric studies have shown that at about -39° NH₄Br undergoes a heterogeneous transition, arising from a homogeneous transformation above or below the transition region. There is a region of heterogeneous hysteresis extending over 0.06°. It is suggested that one pseudo-component of the system NH₄Br contains oscillating, the other rotating, NH₄ groups. R. C.

Sodium benzylsulphonate: dimorphism. F. D. DODGE (J. Amer. Chem. Soc., 1936, 58, 437– 438).—The conditions of formation of an unstable orthorhombic and a stable mono- (or tri-)clinic modification are described. Peculiar optical properties of the latter form may be due to twinning of the crystals. E. S. H. Dispersion of sound and stereochemistry of nitrogen atom. O. STEL (Z. physikal. Chem., 1936, B, 31, 343-360).—By means of an acoustic interferometer capable of measurements up to 150° the velocity of sound, v, in NH₃ at room temp. has been measured. Between 300 and 1000 kilohertz there is anomalous dispersion of v, which is probably connected with the N atom moving through the H₃ plane so as to turn the pyramidal mol. inside out. A relation between v and frequency is deduced.

R. C.

Velocity of ultrasonic waves at low pressures. E. J. PUMPER (Physikal. Z. Sovietunion, 1935, 8, 300-310).—The influence of pressure on the velocity of ultrasonic waves in air and in CO₂ at low pressures has been studied, and the reasons for the observed deviations from classical laws are discussed.

R. S.

Absorption of ultrasonic waves in certain liquids. P. BASHULIN (Physikal. Z. Sovietunion, 1935, 8, 354—358).—The absorption coeffs. α of ultrasonic waves in vaseline-petroleum mixtures and in CCl₄ have been determined by two methods depending on the diffraction of light. Agreement with the hydrodynamic theory is only partial. α is unaffected by rise of temp. R. S.

Diffraction of light by high-frequency sound waves. III. Doppler effect and coherence phenomena. C. V. RAMAN and N. S. N. NATH (Proc. Indian Acad. Sci., 1936, 3, A, 75-84; cf. this vol., 148).—Theoretical. The variation of the refractive index of the medium with time is taken into account. L. J. J.

Diffraction of light by high-frequency sound waves. IV. Generalised theory. C. V. RAMAN and N. S. N. NATH (Proc. Indian Acad. Sci., 1936, 3, A, 119-125).—Mathematical. O. D. S.

Theory of volume anomalies for ferromagnetic substances. L. NÉEL (Compt. rend., 1936, 202, 742-744).—Theoretical. H. J. E.

Magnetic atomic moments of manganese dissolved in copper, silver, and gold. G. GUSTAFS-SON (Ann. Physik, 1936, [v], 25, 545-560).—A method of measuring para- and dia-magnetic susceptibilities of samples in the form of wire at 20- 450° is described. Data are recorded for the at. susceptibility (χ_A) and at. moment of Mn for a no. of dil. solid solutions in Cu, Ag, and Au. There is a linear relation between χ_A and 1/T. L. J. J.

Magnetic susceptibility of single crystals of lead, thallium, and tin. S. R. RAO and K. R. SUBRAMANIAM (Phil. Mag., 1936, [vii], 21, 609— 624).—No change in the magnetic susceptibility (χ) of single Pb or Sn crystals is noted as they are rotated about the cylindrical axis. For α -Tl, χ parallel to and perpendicular to the hexagonal axis is 0.412 and 0.165 (\times 10⁻⁶), respectively, indicating a magnetic anisotropy (2.5) > for other similar metals. The average val. for polycryst. α -Tl is 0.247. The mean val. of χ for β -Tl (cubic) is 0.158 \times 10⁻⁶, becoming 0.131 \times 10⁻⁶ after melting. It is suggested that two of the three valency electrons in α -Tl have orbits in the hexagonal planes and that their linking is homopolar, whilst the third electron is free. In β -Tl there are probably only Tl ions, with the remaining electron free. J. W. S.

Magnetochemical investigations. XX. Magnetic behaviour of simple vanadium compounds. W. KLEMM and E. HOSCHEK (Z. anorg. chem., 1936, 226, 359–369).—The magnetic susceptibilities (χ) of V_2O_5 , VCl_4 , VO_2 , VCl_3 , VBr_3 , V_2O_3 , V_2S_3 , VCl_2 , and VBr_2 have been measured at 20°, -78°, and -183°. χ for VCl_4 , VCl_3 , and VBr_3 is in accord with theory, but for VCl_2 and VBr_2 divergencies are obtained, especially at low temp. χ for V_2O_5 is in accord with theory; VO_2 in spite of its odd no. of electrons is almost non-magnetic. V_2O_3 and V_2S_3 show deviations from the vals. expected for ionic compounds, of the magnitude observed with other analogous compounds. V_2S_5 does not exist, and heating of V_2S_3 with S yields only a polysulphide of composition between $VS_{3\cdot8}$ and VS_4 . J. W. S.

New types of complex paramagnetic salts of the iron series. L. CAMBI and A. CAGNASSO (R. Ist. lomb. Sci. Lett., 1934, [ii], 67, 741-747; Chem. Zentr., 1935, ii, 331; cf. A., 1934, 1057).—The vals. of χ for complex salts of Fe(CNS)₂ and Co(CN)₂ with o-phenanthroline and 2:2'-dipyridyl point to the existence of forms derived from the homopolar valency $3d4sp^2$, as predicted by Pauling (A., 1931, 670, 1356). H. J. E.

Determination of magnetic susceptibilities of some diamagnetic compounds. Calculation of ionic susceptibilities. O. E. FRIVOLD (Avh. norsk. Vidensk.-Akad. Oslo, Mat.-nat. Kl., 1933, No. 9, 21 pp.; Chem. Zentr., 1935, ii, 331).—The vals. for $\chi_m \times 10^6$ in aq. solution at 20° were : HCl 21·0, HBr 32·5, LiCl 24·2, LiBr 36·0, KBr 50·3, KF 24·1, CaCl₂ 56·7, CaBr₂ 78·5, SrCl₂ 65·3, SrBr₂ 87·9, BaCl₂ 76·3, CdBr₂ 92·1, K₄Fe(CN)₆ 134·1, ZnCl₂ 60·1. Vals. of the ionic χ were calc. H. J. E.

Measurement of the coefficient of magnetisation of organic liquids. C. COURTY (Bull. Soc. chim., 1936, [v], 3, 420–422).—The mol. susceptibilities of pyrrole and nicotine are 46.029×10^{-6} and 116.316×10^{-6} , respectively. E. S. H.

Thermomagnetism of rare earth salts in solution. G. DUPOUY (Compt. rend., 1936, 202, 646-648).—Data are recorded for the paramagnetic ions Pr^{...}, Nd^{...}, Sm^{...}, Eu^{...}, and Gd^{...}, for which the magnetic moment and Curie temp. are calc. Weiss' law is obeyed by all the solutions studied. The existence of different magnetic states is indicated. L. J. J.

Magnetic effects and current-sensitivity of superconducting films. A. D. MISENER (Canad. J. Res., 1936, 14, A, 25-37).—The extent to which an external magnetic field will penetrate a thin superconducting film of Sn, mounted on a German-silver tube, has been studied for films of various thicknesses $(12\cdot2-0\cdot3 \mu)$ at different temp. < transition point. There is a crit. field which will penetrate the film, this field being < that required to restore the resistance of the film at the same temp. The currentsensitivity of the films is due to a surface increase of c.d. The restoration of resistance is caused by the magnetic field associated with the current, but this field is < that which has to be applied externally to produce the same result. Thin films of Sn are anomalous superconductors. A. J. M.

Superconductive tantalum. K. MENDELSSOHN and (MISS) J. R. MOORE (Phil. Mag., 1936, [vii], 21, 532—544).—A discrepancy exists between the magnetic threshold curve and the penetration curve for superconducting Ta, similar to that observed for alloys (A., 1934, 480; 1935, 20). This is attributed to the formation of a non-homogeneous sponge-like structure, since thermodynamically if the same free energy difference occurs between superconductive and normal Ta, much higher magnetic threshold vals. would be expected for small regions than for solid material. J. W. S.

Relaxation phenomena in the transition from the superconductive to the non-superconductive state. W. H. KEESOM and P. H. VAN LAER (Physica, 1936, 3, 173—181).—The transition in the case of Sn, if caused by a rise of temp. with const. magnetic field, takes place with a relaxation of several sec.; if caused by an increase of external magnetic field no appreciable relaxation is found. These results agree with the view that, the threshold val. curve being reached, there is a weak coupling between the at lattice and the system of superconductive electrons, and a strong coupling between the latter and the external magnetic field and between the non-superconductive electrons and the at, lattice. N. M. B.

Transition of a monocrystalline tin sphere from the superconductive to the non-superconductive state. W. J. DE HAAS and O. A. GUINAU (Physica, 1936, 3, 182—192).—Transition is investigated at const. temp. with increasing magnetic field and at const. external field and rising temp. Relations between permeability, applied field, and crit. field are determined. N. M. B.

Energetic theory of thermo-electric phenomena. F. MICHAUD (J. Chim. phys., 1936, 33, 161-179).—The classical theory is criticised. It is shown that thermo-electric phenomena are partly irreversible in nature, and an appropriate equation has been deduced. R. S.

Thermo-electric and voltaic properties of normal and abnormal metallic films. R. DEAG-LIO (Compt. rend., 1936, 202, 831-832).—The electrical properties of Au films vary with variation in colour by transmitted light. An e.m.f. of 0.6 volt may be obtained from the system : red or blue Au film|H₂O|massive Au, but, after replacement of the red by a green film, the voltage is < 0.005. By combining the green film with massive Au in a hot and cold junction, however, a definite e.m.f. is obtained. The results may be explained by Perucca's theory (A., 1930, 280) of a difference between the surface and bulk concn. of electrons in a metal. In the first case the surface concn. is involved and in the second the bulk concn. M. S. B.

Atomic heats and heats of fusion of neon, argon, and krypton. K. CLUSIUS (Z. physikal. Chem., 1936, B, 31, 459-474).—The at. heats have been determined between 10° abs. and the normal b.p. The Debye 0 vals. and latent heats of fusion are: Ne, 64°, 80·1; A, 80°, 280·8; Kr, 63°, 390·7 g.cal. per mol.; Xe, 55°. For A, Kr, and Xe the observed 0 vals. agree with those calc. from Lindemann's formula with a modified numerical factor: $0=163\sqrt{(T_e/Av^{2/3})}$ ($T_e=m.p., A=at.$ wt.). The calc. (approx.) compressibilities and the relative space demands of the individual atoms in the solid decrease with increasing at. wt. With He the zero point energy has a decisive influence on the thermal behaviour, and with Ne the effect is still appreciable, but from A onwards it is negligible. In applying the principle of corresponding states to the thermal data the zero point energy must be allowed for. R. C.

Specific heats of liquid carbon tetrachloride at high temperatures. G. DAMKÖHLER (Z. physikal. Chem., 1936, B, 31, 439-453).—The isentropic cooling on adiabatic expansion, the coeff. of expansion, and the isothermal compressibilities have been determined at room temp. to 200°, and from them C_{ρ} and C_{v} under 26 atm. calc. The difference between C_{v} and that part of it due to at. vibrations within the mol. is const. at 10.4 g.-cal. up to 100°, then slowly rises with the temp. and approaches 6R. It is inferred that the rotation of the mols. in the liquid is not completely free, neither is there pure rotationvibration. R. C.

Determination of molecular heat of gases at low temperatures by thermal conductivity method. A. EUCKEN and A. BERTRAM (Z. physikal. Chem., 1936, B, 31, 361-381).-The method previously described (A., 1934, 20) has been developed further and used to determine the mol. heat of Kr, N_2 , CO₂, CH₄, C₂H₄, C₂H₆, SF₆, SeF₆, TeF₆, CF₂Cl₂, C₂H₄, C₂N₂, and CF₄ at 150–280° abs. From the results the following fundamental frequencies have been deduced: CF₂Cl₂, $v_{\text{rotation}}=408$; C₂N₂, $\delta(a)=740$; CF₄, $v_3=503$, $v_4=1000$ (± 100) cm⁻¹. At temp. equal to about $\frac{3}{4}T_b$, where T_b is the b.p. abs., the accommodation coeffs. of the above gases and A the accommodation coeffs. of the above gases and A on an oxidised Ni wire in respect of translational degrees of freedom are ~ 1 . For the variation with temp., T, of the accommodation coeff. in respect of rotational and vibrational degrees of freedom, α' , the equation $\log_e (1/\alpha'-1) = -A/T + B$ has been deduced theoretically and agrees with the experimental data. In general, A increases with T_b . R. C.

Thermal data on organic compounds. XVI. Heat capacity, entropy, and free energy data for typical benzene derivatives and heterocyclic compounds. G. S. PARKS, S. S. TODD, and W. A. MOORE (J. Amer. Chem. Soc., 1936, 58, 398-401; cf. this vol., 278).—Data for $C_6H_3Ph_3$, PhNO, PhSH, $CH_2Ph\cdotOH$, $o-C_6H_4(CO_2H)_2$, $o-C_6H_4(CO)_2O$, C_3H_5N , and quinoline are recorded. E. S. H.

[Boiling points of elements.] J. J. VAN LAAR (Chem. Weekblad, 1936, 33, 215-216).—A criticism. The following b.p. are recorded : Zn 907°, Cd 767°, Hg 356·71°, Sc 2400°, Cu 2369°, Pb 1730°. S. C.

Critical temperatures of simple deuterium compounds. H. KOPPER (Z. physikal. Chem., 1936, 175, 469-472).—The crit. temp. for various D compounds have been determined. They are < those of the corresponding H compounds. R. C.

Fusion. E. L. HILL (Physical Rev., 1936, [ii], 49, 406).—A discussion of Herzfeld's theory of the fusion of solid A and He (cf. A., 1935, 157).

N. M. B.

X-Ray measurement of the thermal expansion of pure nickel. E. A. OWEN and E. L. YATES (Phil. Mag., 1936, [vii], 21, 809—819).—The parameter of Ni at 18° was 3.5172_4 Å. Its structure was facecentred cubic (12—600°). In the region of magnetic transformation (320—390°) there was an abnormally high rate of expansion (max. at 370°), followed by a rapid decrease. The ferromagnetic change in length per unit length for 99.98% pure Ni was 2.4×10^{-4} .

H. J. E.

Vapour density of water. R. SCHARF (Z. phys. chem. Unter., 1935, 48, 108-110; Chem. Zentr., 1935, ii, 87).—A modification of the Victor Meyer method is described, using apparatus filled with H₂. J. S. A.

Temperature dependence of the vapour pressure of metals. W. LEITGEBEL (Metallwirts., 1935, 14, 267—270; Chem. Zentr., 1935, ii, 334).—A summary and crit. discussion of available data.

H. J. E.

Vapour pressure of cæsium. J. A. M. VAN LIEMPT (Rec. trav. chim., 1936, 55, 157—160).— Formulæ for the v.p. of liquid and solid Cs, based on the most accurate published data, are given.

F. L. U.

Vapour pressure abnormalities of capillaryactive amalgams. H. H. VON HALBAN (Helv. phys. Acta, 1935, 8, 65—79; Chem. Zentr., 1935, ii, 334).—Na, K, and Zn amalgams have abnormally low Hg v.p. unless the surface is fresh. The hypothesis of surface enrichment of the dissolved metal is not entirely satisfactory. An adsorbed film of COPh₂ does not alter the v.p. of Hg. H. J. E.

Methods and apparatus in use at the Bureau des Etalons Physico-Chimiques. IX. Variation of the density as a function of temperature for a series of ten hydrocarbons. L. MASSART (Bull. Soc. chim. Belg., 1936, 45, 76—94).—Liquid and v.d. of C_6H_6 , PhMe, o-, m-, and p-xylene, PhEt, PhPr^a, PhBu^a, cyclohexane, and methylcyclohexane have been determined dilatometrically from the m.p. to > b.p. R. S.

Vapour pressures and association of metallic and non-metallic alkyls. H. W. THOMPSON and J. W. LINNETT (Trans. Faraday Soc., 1936, 32, 681-685).—V.p. of the following have been measured : ZnMe₂, ZnEt₂, HgMe₂, HgEt₂, SnMe₄, PEt₃, NMe₃, NEt₃, MeI. The Trouton consts. are calc., and indicate little or no association. The results are compared with those for other similar compounds.

F. L. U.

Formation of drops in supersaturated D_2O vapour. Surface tension of D_2O . H. FLOOD and L. TRONSTAD (Z. physikal. Chem., 1936, **175**, 347— 352).—The adiabatic expansion required for drop formation in D_2O vapour is \ll than that necessary with H_2O . This is explained on Volmer's theory (A., 1935, 25) by the variation of the metastable limit with temp. The difference in the crit. supersaturations, however, is small, because the supersaturation of D_2O increases with the degree of supercooling more rapidly than that of H_2O . At 12—50° the surface tension of 99% D_2O is the same as that of H_2O (cf. *ibid.*, 1059). R. C.

Application of kinetic theory to the problems of evaporation and sublimation of monatomic gases. P. D. CROUT (J. Math. Phys. Mass. Inst. Tech., 1936, 15, 1-54).—The complete relationship between surface pressure and rate of evaporation for all rates of evaporation is derived. At the boundary of the liquid surface where isotropy has not been attained, it is necessary to assume two temp. corresponding with mol. motions parallel and normal to the liquid surface. It is assumed that velocity distribution of the emitted mols, is unaffected by that of the incident mols. It follows that the rate of evaporation cannot exceed that corresponding with a drift velocity equal to the velocity of sound in the isotropic gas. The anisotropic region has a depth of the order of several mean free paths. The theory is illustrated by data on the evaporation of Hg. C. R. H.

Theoretically interesting aspects of high-pressure phenomena. P. W. BRIDGMAN (Rev. Modern Phys., 1935, 7, 1-33). CH. Abs. (e)

Extreme values of the Joule-Thompson effect. Inversion points of the second order. V. JACYNA (Z. Physik, 1936, 98, 775-789).—Theoretical.

A. B. D. C.

Glass. XIV. Compressibility of glucose glass. J. C. LYMAN and G. S. PARKS (J. Chem. Physics, 1936, 4, 218—219).—The coeff. of cubic compressibility of glucose glass (I) at 24° is $18\cdot8 \times 10^{-4}$ atm.⁻¹ at 7—25 atm. Liquid glycerol and (I) have a smaller compressibility and thermal expansion than org. substances such as EtOH and C₆H₆ (liquid and cryst.), indicating that the intermol. forces in polyhydroxy-compounds are considerably > in ordinary liquids, or even in a typical non-polar crystal. This is probably a factor governing the formation of a stable glass. M. S. B.

Gas-kinetics properties of light and heavy hydrogen. O. HALPERN and E. GWATHMEY (J. Chem. Physics, 1936, 4, 229).—The effect of statistical wts. of mols. on the difference between the viscosity of ordinary and para-H at different temp. has been calc. The difference is thus shown to be vanishingly small for D. M. S. B.

Viscosity of "ice sol" as dependent on temperature and concentration. E. EMBLIK (Z. ges. Kalte-Ind., 1935, 42, 71-74; Chem. Zentr., 1935, ii, 23).—Data for the dynamic and kinematic viscosity are given. J. S. A.

Viscosity of methyl alcohol and acetone above their b.p. P. C. BLOKKER (Rec. trav. chim., 1936, 55, 170—172; cf. this vol., 291).—Viscosities of MeOH and COMe₂ at temp. up to 218° have been measured. The vals. for COMe₃ up to 140° agree with Batschinsky's formula. Deviations observed at higher temp. are discussed. F. L. U.

Viscosity formula for binary mixtures, the association degrees of constituents being taken into consideration. T. ISHIKAWA and T. BABA (Bull. Chem. Soc. Japan., 1936, 11, 64-101).--Viscosity formulæ are applied to the published results of other observers. The characteristic consts. for various binary mixtures are tabulated. C. R. H.

Interpretation of diffusion and viscosity curves in binary mixtures. H. LEMONDE (Compt. rend., 1936, 202, 731-733).—The interpretation of curves connecting the diffusion coeff. (D), the viscosity (η), and the product D_{η} with the composition of EtOH-H₂O mixtures at 10° and 18° is discussed. The $D-\eta$ curve leads to the same conclusions about association as the b.-p. curve. H. J. E.

Viscosity of solutions of phenol and of camphor. A. CASTIGLIONI (Gazzetta, 1935, 65, 1214– 1217; cf. A., 1934, 1166).—PhOH, like camphor (I), lowers the viscosity of oils. Data are recorded for mixtures of olive oil and a second liquid (CHCl₂, C_6H_6 , PhMe, xylene) and for mixtures of vaseline and PhMe, before and after the addition of 10% of (I). For certain mixtures, the viscosity is not affected by the addition of (I). O. J. W.

Viscosity of the critical mixture for the ternary system benzene-alcohol-water. O. KIMURA (Bull. Chem. Soc. Japan., 1936, 11, 57-63).—Viscosity data for mixtures in the crit. region indicate that increase of viscosity, accompanied by opalescence, is due to the presence of colloid particles, supposed to be C_6H_6 droplets covered with a thin EtOH film. The concn. of the colloid particles is of the order of 0.0001 near the crit. point. C. R. H.

Magnetic susceptibility and other properties of binary mixtures of organic liquids. V. C. G. TREW and J. F. SPENCER (Trans. Faraday Soc., 1936. 32, 701—708; cf. A., 1934, 137).—The density, n, heat of mixing, sp. heat, and magnetic mass susceptibility have been determined for mixtures of C_6H_6 with PhMe, *m*-xylene with C_6H_6 , PhMe, PhNO₂, and NH₂Ph, and PhNO₂ with NH₂Ph. Deviations from the mixture law are shown by all the pairs and for all the properties considered. The mol. magnetic susceptibility is a more nearly additive property than the others studied. F. L. U.

Diamagnetic susceptibility of sulphuric acidwater mixtures. B. N. RAO (Proc. Indian Acad. Sci., 1936, 3, A, 188–192).—Deviations from additivity are attributed to the formation of H₂SO₄,2H₂O. O. D. S.

Condensation and b.p. curves of nitrogencarbon monoxide mixtures up to 17 atmospheres. F. STECKEL (Physikal. Z. Sovietunion, 1935, 8, 337-341).—The data are tabulated and show good agreement with the theory of Roozeboom. R. S.

Heats of vaporisation of ternary mixtures. V. FISCHER (Ann. Physik, 1936, [v], 25, 728-736).— Theoretical. Expressions are deduced for heats of vaporisation at const. pressure and temp., and these are used to calculate heats of mixing and entropy changes. L. J. J.

Rectification of ternary mixtures, especially oxygen-nitrogen-argon mixtures. H. HAUSEN (Forsch. Ingenicurw., 1935, 6, A, 9-22; Chem. Zentr., 1935, ii, 730).—Equilibrium diagrams between 1 and 5 atm. are given and methods for calculating the composition of the products of rectification under various conditions are discussed. J. S. A.

Classification of binary, ternary, and quaternary alloys. E. JANECKE (Z. Elektrochem., 1936, 42, 128–138).—A lecture. F. L. U.

Binary systems of alkali metals. II. C. GORIA (Gazzetta, 1935, 65, 1226—1230; cf. this vol., 23).—Thermal diagrams for the systems Na-Cs, K-Cs, and Rb-Cs are recorded. The first shows the formation of the compound Na₂Cs, a cutectic at -28° with 7.0 wt.-% Na, and no solid solution formation. The second suggests the formation of the compound KCs. In the third system there is a cutectic at -39° (13 wt.-% Rb) but neither compound nor solid solution formation is indicated. O. J. W.

Structure of some alloys of copper. W. BRONIEWSKI (Rev. Mét., 1935, 32, 649-657).—The constitution and properties of binary alloys of Cu with Ni, Ag, Al, Zn, Sn, and Au are reviewed.

E. H. B.

Elastic after-effect in the ordered Cu-Au alloys. (Elastic after-effect of the first kind.) V.S. GORSKI (Physikal. Z. Sovietunion, 1935, 8, 562— 571; cf. A., 1935, 439).—An after-effect amounting to 60—100% of the elastic deformation is shown by polyeryst. alloys; for single crystals the corresponding magnitude of the after-effect is 10—60%. The influence of temp. on the time factor involved has been examined in both polycryst. material and single crystals. Results are in agreement with theory.

A. J. M.

Transitions in alloys. IV. Theory of arrangement processes and diffusion in mixed crystals of AuCu. V. S. GORSKI (Physikal. Z. Sovietunion, 1935, 8, 443—356).—Mathematical. The temporary change in the degree of orderliness and the diffusion coeff. for an ordered CuAu lattice has been calc. by three methods: atom migration in the inter-lattice plates, migration of empty lattice plates, and direct atom plate alternation. Experimental data disagree with the vals. given by each of these methods. W. R. A.

Gold-copper alloys. W. BRONIEWSKI and K. WESOŁOWSKI (Ann. Physik, 1936, [v], 25, 757—758). —Polemical, against Le Blanc and Wehner (A., 1935, 1198). L. J. J.

[Gold-copper alloys.] M. LE BLANC and G. WEHNER (Ann. Physik, 1936, [v], 25, 759-760).—A reply to the above. L. J. J.

Electrical conductivity and equilibrium diagram for binary alloys. XVIII. System palladium-cobalt. G. GRUBE and H. KASTNER (Z. Elektrochem., 1936, 42, 156—160; cf. A., 1935, 291). —Data for the f.p. and m.p., variation of sp. resistance with temp., and Curie temp. of alloys of Pd and Co have been determined. The phase-equilibrium diagram is given. F. L. U.

Equilibrium diagram of the magnesium-rich magnesium-aluminium-silicon ternary system. H. SAWAMOTO (Suiyo.-Shi, 1935, 8, 713-727).—The ternary eutectic temp. coincides with that of the Mg-Al binary system at 437° (Al 32.7, Mg 67.3%). CH. ABS. (e)

Effect of nickel on the limits of the α -phase of copper-aluminium alloys. V. GRIDNEV and G. KURDJUMOV (Metallwirts., 1936, 15, 229–231, 256–259).—Additions of 2% and 4% Ni reduce the limit of the α -range from 9.8 to 8.6% Al at the eutectoid temp., and raise the latter from 570° to 605°. Below this temp. the α -range is const. in alloys containing 2% Ni, but narrows slightly with falling temp. when 4% Ni is added. The eutectoid point is displaced to higher Al contents. C. E. H.

Spectrographic study of modifications undergone by the surface of light alloys; application to duralumin. H. TRICHÉ (Compt. rend., 1936, 202, 745—747).—The spectrum obtained with a high-frequency spark between a Au wire and a duralumin electrode has been examined. After electrolysis in conc. aq. H_2CrO_4 the intensity of the lines of Cu, Si, and Ca became much feebler, or even disappeared. The spectrum was unaltered after electrolysis in H_2SO_4 . After short treatment with H_2CrO_4 , electrolysis in H_2SO_4 restores the surface to its initial state (as judged by the spark spectrum), but after prolonged treatment with H_2CrO_4 the H_2SO_4 electrolysis merely increases the thickness of the surface film. H. J. E.

Special magnetic behaviour of cold-rolled iron-nickel alloys. (Development of isoperms.) O. DAHL and J. PFAFFENBERGER (Metallwirts., 1935, 14, 25-28; Chem. Zentr., 1935, ii, 659).---Binary Fe-Ni alloys, like those containing Cu, show isoperm properties, but these can be made use of only if the hysteresis is depressed. X-Ray investigation shows a well-developed cubic macrostructure.

J. S. A.

Compensation of nickel-beryllium alloys. W. GERLACH (Naturwiss., 1936, 24, 218).—An alloy containing 2% Be is weakly magnetic after heating to 1200° and quenching. After annealing at 500° with mechanical compensation, the magnetisation increases by 50%, and the coercive force, residual magnetism, and Curie point also show a rise. The phenomenon is due to the separation during the annealing of Be from the Ni–Be mixed crystals, which are supersaturated at low temp. A mixed crystal with higher Curie point results. There is also considerable distortion of the Ni lattice. The distorted lattice is very stable, and the magnetic properties are not changed by long heating at 300°.

A. J. M.

Critical solution temperatures of aliphatic acids with nitromethane. G. BROUGHTON and D. C. JONES (Trans. Faraday Soc., 1936, 32, 685— 689; cf. A., 1934, 477).—Crit. solution temp. of mixtures of MeNO₂ with normal saturated fatty acids are as follows: C₆ (hexoic) $-3\cdot4^{\circ}$, C₈ $34\cdot85^{\circ}$, C₉ $48\cdot60^{\circ}$, C₁₂ $78\cdot90^{\circ}$, C₁₆ $104\cdot55^{\circ}$, C₁₈ $114\cdot0^{\circ}$. F. L. U.

Calculation of the solubility of a mixture of hydrogen and nitrogen in water at 25° in the pressure range 50—1000 atmospheres. J. KIEL- LAND (J. Amer. Chem. Soc., 1936, 58, 426-427).--Theoretical. E. S. H.

Solubility of nickel sulphate in mixtures of sulphuric acid and water. A. V. BABAEVA and E. I. DANILUSCHKINA (Z. anorg. Chem., 1936, 226, 338—340).—The solubility of NiSO₄ in H₂SO₄– H₂O mixtures has been measured at 0°, 20°, 40°, and 80°. Besides the known hydrates NiSO₄,7H₂O, NiSO₄,6H₂O (blue), NiSO₄,6H₂O (green), and NiSO₄,2H₂O, the hydrate NiSO₄,5H₂O (green) has been found to occur at 40° in presence of higher [H₂SO₄]. J. W. S.

Solubility of monometric As_2O_3 in acids and compounds $AsXO_4$. D. GHIRON and G. MANGLLI (Gazzetta, 1935, 65, 1244—1249).—The solubility in dil. acid solutions (< 1.0M) is approx. the same as in H₂O, but the rate of dissolution is > in the acid solutions. In more conc. acid solutions the solubility depends on the basicity rather than on the strength of the acid, and is greatly increased in H₃AsO₄ and in H₃PO₄. The existence of the compounds AsAsO₄ and AsPO₄ is confirmed. O. J. W.

Solubility of potassium silicofluoride under different conditions. A. A. VASILIEV and N. N. MARTJANOVA (J. Appl. Chem. Russ., 1936, 9, 152— 154).—At 17° the solubility in H₂O is 0·1147, in 50% EtOH 0·0042, in saturated aq. KNO₃ and KCl 0·0055 and 0·0054, respectively, and in 50% EtOH (containing 2% KCl) 0·0022 g. per 100 ml. When used for washing the ppt., 100 ml. of the last named solution dissolve 0·9 mg. of K_2SiF_6 . R. T.

Solubility of sodium naphthalene-1: 6-disulphonate in aqueous sodium chloride at 15°. N. A. TOLMATSCHEV (Anilinokras. Prom., 1935, 5, 219-220).—The solubility falls from 18% in H_2O to 1% in 25% NaCl. R. T.

Congruent solubility of dolomite. F. HALLA (Z. physikal. Chem., 1936, 175, 396–399).—Whether a double carbonate dissolves in H_2O congruently or incongruently is independent of the pressure of CO_2 above the solution. R. C.

Influence of foreign ions on the double [zinc] mercuric thiocyanate reaction. B. V. J. CUVE-LIER and F. BOSCH (Natuurwetensch. Tijds., 1936, 18, 9—11).—The solubility of $\text{ZnHg}(\text{SCN})_4$ in various salt solutions increases in the order $\text{NaNO}_3 < \text{Na}_2\text{SO}_4 <$ NaCl < NaBr < NaI. The solubility in aq. NaNO_3 is \Rightarrow in H₂O, and for its determination Zn should therefore be in the form of nitrate (cf. A., 1935, 441, 721, 1068). D. R. D.

Simultaneous solubility of sulphur and iodine in carbon tetrachloride. A. A. JAKOVKIN and P. A. ARCHANGELSKI (Z. anorg. Chem., 1936, 226, 350– 352).—At 0° the solubility of S in CCl₄ is almost unaltered in presence of I, whilst the solubility of I is slightly increased. At 25° the solubility of each solute is increased in presence of the other, equilibrium being reached with 0.178 g. of I and 0.137 g. of S per 100 c.c. of solution. The results can be explained by the formation of a small amount of an unstable compound between the solutes. J. W. S.

Liquid ammonia as a solvent for inorganic compounds. III. Vapour pressure measurements. M. LINHARD (Z. physikal. Chem., 1936, 175, 438-458; cf. A., 1934, 138).-The v.p. of solutions of alkali chlorides, bromides, and iodides, and of alkali and alkaline-earth nitrates have been determined at 0° from 0.2N to saturation. The ionisation in liquid NH_3 solution is much < in aq. solution at the same concn. With NH₄Cl, AgI, and alkalineearth nitrates there is appreciable association even at small concns. The solvation of the ions and the tendency to association in conc. solution and in the ammoniated cryst. salts largely run parallel. Solvation increases from the chlorides to the iodides and from the Cs to the Na salts. The solubility increases, in general, in the same order, and for a series of salts with a common ion increases as the solvation increases and the lattice energy of the salt diminishes. With the alkaline-earth nitrates solvation is especially high, owing to the double charge of the cation, and the solubility falls with increasing at. vol. of the metal. The Raman spectrum of NH, solutions of AgI indicates the presence of polymerised mols. R. C.

Supersaturation. R. E. LIESEGANG (Scientia, 1935, 57, 345-353; Chem. Zentr., 1935, ii, 476).-A discussion. H. J. E.

Growth of crystals. VIII. Stabilising action of cations which accelerate the crystal growth on the supersaturated solution. T. YAMAMOTO (Bull. Inst. Phys. Chem. Res. Japan, 1936, 15, 183-200).—Data for the supersaturation, crystallisation temp., and supersolubility of KCl, NH_4Cl , and KCl in presence of Pb", and of NH_4Cl in presence of Mn", are given and discussed. N. M. B.

Distribution of radium in crystals of radiumcontaining barium salts. (MME.) B. E. MARQUES (J. Chim. phys., 1936, 33, 219—225).—A comparison of the effects produced on a photographic plate by outer and inner crystal faces has shown that BaBr₂ crystals which contain RaBr₂ have a higher [Ra] near the centre than in the outer layers. Doerner and Hoskins' formula holds for the distribution in a single crystal as well as for the distribution between solid and liquid phases. J. W. S.

Calorimetric investigation of adsorption of light and heavy hydrogen on active nickel. MAGNUS and G. SARTORI (Z. physikal. Chem., 1936, 175, 329-341).-The rate of absorption at 0° and 25° and initial pressures of 0.25-1.25 mm. has been studied by observations on the heat evolved and the change in pressure. The results agree with the view that the sorption consists in an almost instantaneous physical adsorption of a small amount of H which undergoes adsorption at a high but measurable rate on the active centres; the sorbed H then slowly changes into another state, perhaps the dissolved state, the heat effect accompanying this process being too small to be detectable calorimetrically. H is adsorbed much more rapidly than D, the heat of activation being ~ 1.0 as compared with ~ 1.7 kg.-cal. The heats of adsorption vary little with R. C. temp.

Absorption of gases on sodium chloride. F. C. TOMPKINS (Trans. Faraday Soc., 1936, 32, 643– 653).—Adsorption isotherms for NO, CO, CH_4 , N_2 , A, and O_2 at -183° , and for $(CN)_2$, CO_2 , N_2O , and C_2H_4 at $-78\cdot2^\circ$ on cryst. NaCl have been determined at pressures > 0.4 mm. The dipole gases are highly adsorbed according to the val. of their electric moment. Adsorption of non-polar gases increases with their polarisability. The shape of the isotherms is explained. No lateral diffusion of adsorbed mols. occurs at -192° or -183° , but slow secondary absorption is observed at $-78\cdot2^\circ$. Heats of adsorption of A, CH_4 , and CO in the range -183° to -192° are < those theoretically expected.

Adsorption isotherm for lead chloride as an adsorbent. F. DURAU and G. TSCHOEPE (Naturwiss., 1936, 24, 156—157).—The adsorption of C_6H_6 , C_6H_{14} , and COMe₂ on purified PbCl₂ has been examined by a method based on measurements of vol. The adsorption-pressure curves for dry C_6H_6 and C_6H_{14} are linear at low pressures, but that for COMe₂ dried over CaCl₂ shows some deviations due to H₂O vapour not removed by CaCl₂. The curves deviate from the linear as the saturation pressure is approached and do not agree with Langmuir's theory. A. J. M.

Mathematical formula for determination of the total adsorbable substance of an adsorption system by means of repeated extractions. J. Voicu (Kolloid-Z., 1936, 74, 316-328).--Mathematical. E. S. H.

Structural changes taking place during the ageing of precipitates. IX. Mechanism of adsorption of lead on aged barium sulphate. I. M. KOLTHOFF and W. M. MACNEVIN (J. Amer. Chem. Soc., 1936, 58, 499-504; cf. this vol., 284).— Th-B is removed from aq. solution when shaken with pptd. $BaSO_4$ (a) by rapid exchange of the ions with Ba" in the surface, (b) by incorporation of exchanged Th-B in the $BaSO_4$ lattice as a result of recrystallisation. The rate of recrystallisation depends on the degree of perfection of $BaSO_4$, the temp. and composition of the solution; it is reduced markedly by addition of 50% EtOH. Th-B can be desorbed by adding a large excess of Ba salt. E. S. H.

Separation of amino-acids. I, II. Adsorption of diamino-acids on Japanese acid clay. M. MASHINO and N. SHIKAZONO (J. Soc. Chem. Ind. Japan, 1936, 39, 54—55B).—Japanese acid elay, especially when activated by treatment with HCl, is a powerful absorbent for the $(NH_2)_2$ -acids from hydrolysed soya-bean protein. Adsorption is a max. at $p_R 5$ —7 and falls rapidly in alkaline media. The following amounts % of NH_2 -acids were absorbed from 0.5% solutions : glycine 8.45, alanine 9.38, leucine 6.5, phenylalanine 11.14, aspartic acid 3.55, glutamic acid 4.18, arginine 86.80, histidine-HCl 84.80, lysine-2HCl 62.92%. Active C adsorbs NH_2 and $(NH_2)_2$ -acids equally; SiO₂ gel is much less effective. S. C.

Application of Bangham and Sever's formula of sorption velocity. I. HIGUTI (Bull. Inst. Phys. Chem. Res. Japan, 1936, 15, 96—108).—Bangham and Sever's formula $\log [S/(S-x)] = kt^n$, where S is the saturation val., x the quantity adsorbed at time t, and k and n are consts., has been found to hold for a wide range of published results. k and n change abruptly near the saturation point. The formula holds for chemisorption as well as occlusion, but when several compounds are formed, as with NH₃ and AgCl, n and k are sp. for each compound. R. S. B.

Surface tension of soap solutions. N. K. ADAM (Trans. Faraday Soc., 1936, 32, 653-656).— Increase in the surface tension of soap solutions caused by adding small amounts of alkali is due to suppression of hydrolysis, which is greatly magnified in the surface layer because the surface activity of the acid, or acid soap, \gg that of neutral soap. The adsorption of neutral K dodecoate is calc. from published data. The adsorbed film is gaseous.

F. L. U.

Transport numbers of ions through membranes, as a characteristic of their electroosmotic properties. I. I. I. SHUKOV and A. I. JURSHENKO (J. Appl. Chem. Russ., 1936, 9, 9–22).— The ζ -potentials of membranes (porcelain, gelatin, cellulose, bakelite paper, leather) interposed between the anode and cathode in the electrolysis of aq. KCl-HCl, at different $p_{\rm H}$, do not run parallel with the transport nos. of the ions within the membranes. In the case of leather different results are obtained according to which side is directed towards the anode or cathode. R. T.

Cryoscopy of solutions in formamide. I. F. H. GETMAN (Rec. trav. chim., 1936, 55, 231– 243).—From measurement of the surface tension between 4° and 78° the association factor for HCO·NH₂ is calc. to be about 6 at room temp. The f.p. const. is 3.50, and $n_D^{25}=1.44682$. The mol. wts. of HCO·NH₂ and H₂O, each dissolved in the other, are those of non-associated mols. A modification of the Beckmann f.-p. method is described. F. L. U.

Electrolytic solutions. XVIII. Molecular polarisations and polar moments of electrolytes in benzene solutions. J. A. GEDDES and C. A. KRAUS. XIX. Conductance of mixed electrolytes in ethylene chloride. Tetrabutyl- and tetramethyl-ammonium picrates. D. J. MEAD, R. M. FUOSS, and C. A. KRAUS (Trans. Faraday Soc., 1936, 32, 585-593, 594-606).-XVIII. Dielectric consts. of C_6H_6 solutions of various alkyl-ammonium salts have been determined at 25° at concns. down to $4 \times 10^{-5} N$. Polar moments ranging from 7 to 20×10^{-18} indicate the existence of electrical dipoles. Polarisation-concn. curves of three types are obtained, the form being related to the structure of the ions concerned, and determined by the association of dipoles. The results agree with f.p. and conductance measurements in C_6H_6 (A., 1933, 1120; 1934, 1304).

XIX. Conductances of solutions of NMe₄ and NBu₄ picrates, and of mixtures of the two, in $C_2H_4Cl_3$, have been determined at 25° between 10⁻⁵ and 10⁻³N. Up to about 10⁻⁴N, conductances of the mixtures calc. theoretically agree within 0⁻¹% with the observed vals. Improved technique for making dilutions with a volatile solvent is described.

F. L. U.

Polar structure of betaines. II. G. DEVOTO and M. ARDISSONE (Gazzetta, 1935, 65, 1235—1239; cf. A., 1934, 1100).—Further measurements of the dielectric const. of aq. solutions of betaines of varying concn. show that the latter all have a polar amphoteric structure. O. J. W.

Highly polymerised compounds. CXXXV. [Viscosity of solutions of aliphatic hydrocarbons.] H. STAUDINGER (Helv. Chim. Acta, 1936, 19, 204– 218).—Criticism of a paper by Meyer and van der Wyk (A., 1935, 1318). F. L. U.

[Viscosity of solutions of aliphatic hydrocarbons.] K. H. MEYER and A. VAN DER WYK (Helv. Chim. Acta, 1936, 19, 218—221).—A reply to the above. F. L. U.

Constitution of ferric oxide sols. W. HELLER, O. KRATKY, and H. NOWOTNY (Compt. rend., 1935, 202, 1171—1173).—By magneto-optical and X-ray observations of the sols over several years it has been shown that the normal course of the ageing process is FeOCl $\rightarrow \beta$ -FeO·OH $\rightarrow \alpha$ -FeO·OH. The time required varies with the method of prep. of the sol.

M. S. B.

Viscosity of aqueous suspensions. R. HER-MANN (Forsch. Ingenieurw., 1935, A, 6, 1-8; Chem. Zentr., 1935, ii, 815).—Aq. suspensions possess no true viscosity. The η val. derived from the Hagen-Poiseuille law is a function of the tangential stress at the wall and decreases to a const. val. at high tangential stress. η increases on ageing. Aq. suspensions exhibit no external friction. J. S. A.

Viscosity of suspensions and solutions. III. Viscosity of sphere suspensions. (Calculation of wall effect and reciprocal influence in viscosity, with rotating spheres.) E. GUTH and R. SIMHA (Kolloid-Z., 1936, 74, 266-275; cf. this vol., 426).—Mathematical. E. S. H.

Viscosity of suspensions and solutions. IV. Viscosity of sphere suspensions. F. EIRICH, M. BUNZL, and H. MARGARETHA (Kolloid-Z., 1936, 74, 276—285).—Measurements made with the Couette, falling-sphere, and capillary viscosimeters agree with Einstein's relation between η and the vol. of disperse phase. E. S. H.

Tyndall light of milk. T. KATSURAI (Kolloid-Z., 1936, 74, 287–288).—The turbidity-concn. relations of whole and skimmed milk have been determined in the region of visible $\lambda\lambda$, and the theoretical aspects are discussed. E. S. H.

Stability of emulsions. H. M. CASSEL (Nature, 1936, 137, 405).—Theoretical. L. S. T.

Emulsions. V. Heterogeneous regions of the sodium oleate-phenol-xylene-water system and the corresponding binary and ternary systems. J. WEICHHERZ and N. PLETENJEVA (Kolloid-Z., 1936, 74, 330-343; cf. A., 1932, 994, 1086).—Equilibria in the above systems have been determined at 25°. E. S. H.

Observations of the coagulation of cellulose acetate under the ultramicroscope. K. ATSUKI and S. OKAJIMA (J. Soc. Chem. Ind. Japan, 1936, 39, 57-58B).—When cellulose acetate in CHCl₃ is coagulated by EtOH the behaviour is similar to that observed when suspensoids are coagulated by electrolytes; the particles are probably rod-shaped. The rate of coagulation is expressed by Smoluchowski's equation $1/n=1/n_0+kt$, in which n is the no. of particles. A. G.

ζ-Potential and stability of cellulose [nitrate and] ethers. S. GLIKMAN and E. MEDVEDKOV (J. Chim. phys., 1936, 33, 150-160; cf. A., 1934, 1069).-- ζ-Potentials have been determined by the method of electrophoresis under the ultramicroscope using (a) lyophobes present as impurity in the sol, and (b) added lyophobes such as AgI. The ζ -potential decreases with the cellulose nitrate concn. to a limiting val. corresponding to the adsorption max. This is the same for different cellulose nitrate fractions. ζ-Potentials of benzyl- and ethyl-cellulose in various solvents have also been derived. Increasing concn. of salts lowers the potential and in the case of CaCl₂ the charge may be reversed, whilst in different COMe,-H₂O mixtures there is a sharp increase corresponding with the change lyophile \rightarrow lyophobe (16-18% H₂O). It is inferred that the ζ-potential is not the essential factor determining the stability of colloids. R. S.

Mechanism of coagulation by ultrasonic waves. K. SOLLNER and C. BONDY (Trans. Faraday Soc., 1936, 32, 616-623; cf. A., 1935, 820).-Coagulation of emulsions or suspensions by ultrasonic waves is primarily due to a "radiation pressure," caused by diffraction of sound energy by the individual particles, imparting to the latter a movement which results in a kind of orthokinetic coagulation. When stationary waves are produced the coagulating effect is accentuated by the increased concn. of the disperse phase through accumulation of particles at the nodes, if the particles are less dense than the dispersion medium, or at the antinodes if they are denser. This effect is most marked with large $(> 1 \mu)$ particles, and hardly observable with those of truly colloidal size. The limiting concn. of an emulsion formed by ultrasonic radiation is the resultant of the formative and destructive actions which proceed simultaneously. If the energy supplied is < the crit. val., or if cavitation is prevented by applying external pressure, coagulation only takes place. F. L. U.

Physical chemistry of amino-acids, peptides, and related substances. VI. Densities and viscosities of aqueous solutions of amino-acids. J. DANIEL and E. J. COHN (J. Amer. Chem. Soc., 1936, 58, 415—423; cf. A., 1935, 1467).—The increase of apparent mol. vol. of the free NH₂-acids with concn. is greater with increasing dipole moment and diminishing hydrocarbon chain. The increase of η with length of hydrocarbon chain is given by $(\eta/\eta_0) - 1 = (0.052 + 0.10 \times n_{OII})C = 2.5k_{\varphi}$, where φ is the vol. fraction occupied by the solute, C its concn., and V its mol. vol. Solutions of the Na salts are more viscous than those of the free acids. E. S. H.

Gans effect, streaming double refraction, and particle shape in protein solutions. E. Wön-LISCH and B. BELONOSCHKIN (Biochem. Z., 1936, 284, 353-364).—The polarisation of Tyndall light and the presence of streaming double refraction have been examined in sols of ovalbumin, caseinogen, serumand ovo-globulin, fibrin, fibrinogen, and myosin. The behaviour is compared with that of inorg. sols and discussed with reference to particle shape. F. O. H.

Determination of diffusion constants of proteins by a refractometric method. O. LAMM and A. POLSON (Biochem. J., 1936, 30, 528-541).-A refractometric method for measuring diffusion consts. of proteins is described and several methods for calculating the diffusion consts. from the curves are discussed. The consts. of ovalbumin (I), human CO-hæmoglobin (II), serum-albumin (III), gliadin, erythrocruorin, and lactoglobulin are determined and it is shown that the consts. for (I), (II), and (III) increase greatly on dilution below 0.5%. In monodisperse systems the diffusion follows closely the ideal dispersion law, but in polydisperse systems deviations from normal curves are obtained. The refractive indices are calc. from the areas included by the diffusion curves and the mol. wts. from the diffusion and sedimentation consts. P. W. C.

Hæmocyanin in heavy water. T. SVEDBERG and I. B. ERIKSSON-QUENSEL (Nature, 1936, 137, 400—401).—Determinations of the sedimentation const. for solutions of hæmocyanin (I) containing different amounts of D₂O indicate that the mol. of (I) has the same wt. and shape in D₂O as in H₂O. The $p_{\rm H}$ vals. at which dissociation occurs in buffered 94.5% D₂O and in buffered H₂O are the same, but since [D'] is different from [H'] the dissociation points actually alter. E.m.f. measurements indicate that the buffers in D₂O are 0.5 $p_{\rm H}$ more alkaline than the corresponding buffers in H₂O. The isoelectric point and the stability curve of (I) in D₂O probably change by the same amount. L. S. T.

Preparation of thorium gels. S. M. MEHTA, M. U. PARMAR, and M. PRASAD (J. Indian Chem. Soc., 1936, 13, 69—71).—Clear, firm gels may be prepared from $Th(NO_3)_4$ and H_3PO_4 and these exhibit the sol-gel transformation. E. E. A.

Thorium phosphate gels. M. U. PARMAR, S. M. MEHTA, and M. PRASAD (Proc. Indian Acad. Sci., 1936, 3, **A**, 107—118; see preceding abstract).— The time of setting (t) of Th phosphate gels is diminished by increasing $[H_3PO_4]$, by rise in temp., and by addition of electrolytes. It is increased by increase in $[Th(NO_3)_4]$ and by the addition of NaOH, MeOH, EtOH, PrOH, and glycerol. The effect produced by HCl, HNO₃, and H_2SO_4 varies with the conen. of the acid. O. D. S.

Gelation of albumin in aqueous propyl alcohol containing salts. Thixotropy and syneresis of albumin-propyl alcohol gel. B. JIRGENSONS (Kolloid-Z., 1936, 74, 300–305).—Sols of 2.5% albumin in 40–60 vol.-% PrOH, containing 0.5 mol. per litre of K or Na salt, set to a reversible gel at 60–70°. Anions accelerate the gelation in the order SO₄"> Cl'>NO₃'>Br'>l'>CNS'. The gels are thixotropic and undergo syneresis. E. S. H.

Mesomorphic state of soaps and washing materials. W. SECK [with G. ŠKRILECZ] (Angew. Chem., 1936, 49, 203—206).—The Na salts of stearic, hydroxystearic, hydroxystearin- and stearyl-sulphonic (I) acids, cryst. directly from solution, are shown (X-ray) to form single mols. inclined at 39-41° to the basal plane. The formation of double mols. observed previously by other workers is attributed to orienting polar effects due to crystallisation at a foreign solid surface. The take-up of H₂O by the anhyd. soaps leads to two-dimensional swelling; the spacing which corresponds with the breadth of the mols. persists in the case of (I) down to 10% solutions. The formation of nematic hydrogels on dissolution of the dry soaps is indicated. The effect of interfaces in promoting the transition between the nematic and smectic states is discussed, and related to the detergent action of soaps. J. S. A.

Rôle of coacervation in the resorption of fats. A. DE KUTHY (J. Chim. phys., 1936, 33, 247-249; cf. A., 1929, 466).—When 15 c.c. of a 5% EtOH solution of oleic acid are added to 50 c.c. of M/30phosphate buffer solution of $p_{\rm H}$ 6.5 and the mixture is then warmed to expel EtOH and mixed with 50 c.c. of 10% Na taurocholate solution, a clear solution is obtained which yields drops of coacervate when mixed with 0.4% hæmoglobin solution in the same buffer. Addition of acid to the solution produces coacervation only at $p_{\rm H}$ 3.5-4.0, a condition never present in organisms. These observations are applied to explain the fact that fat particles are formed only after passage of the fatty acids through the membranes of the intestines. J. W. S.

Influence of light intensity on the periodic formation of $Ag_2Cr_2O_7$ precipitates in gelatin. V. K. NIKIFOROV and M. R. LEMECHE (J. Chim. phys., 1936, 33, 250—256).—The "pressure" of rings produced by AgNO₃ and $K_2Cr_2O_7$ diffusing in gelatin varies with the intensity of illumination (I) according to the law $\lambda_n I^k = a_n$, where λ_n is the distance between the rings, a_n is a const., for any frequency, and k is a const. independent of frequency. The greater is the energy of the light quanta, the greater is the energy which is associated with the formation of rings. The results are explained on the wave theory of periodic reactions. J. W. S.

Liesegang phenomena. T. OKAYA (Proc. Phys.-Math. Soc. Japan, 1935, 17, 101-118).—The calc. energy of pptn. of Ag' in the formation of Liesegang rings is approx. 17.8 g.-cal. per mol. An expression is given for the diffusion coeff. of Ag' in gelatin.

Сн. Авз. (е)

Dissociation of products of combustion. W. L. DE BAUFRE (Combustion, 1935, 6, No. 11, 23–31).— The dissociation of H_2 and CO_2 is discussed.

Сн. Abs. (e)

Thermodynamics of ammonia-water mixtures. V. FISCHER (Forsch. Ingenieurw, 1935, A, 6, 57—66; Chem. Zentr., 1935, ii, 23).—Equilibrium data for the NH_3 - H_2O system at 1 atm. and 10 atm. calc. from the heats of mixing and the contractions agree with experimental vals. J. S. A.

Practical application of electrostatic valency. Strength of acids. A. E. VAN ARKEL and G. CARRIERE (Chem. Weekblad, 1936, 33, 182–184).— Data relating to the strengths of inorg. acids and of bases of the NH_3 type are reviewed and the causes of the differences are discussed. D. R. D. Ionisation of lactic acid. L. F. NINS and P. K. SMITH (J. Biol. Chem., 1936, 113, 145-152).---E.m.f. data between 0° and 50° for cells, without liquid junction, containing the lactates of Li, Ca, Sr, Ba, and Zn, show that the ionisation of lactic acid is greatest at 23.5°; the val. of pK at 25° is 3.862, at 37.5° is 3.872. F. A. A.

Anomalies in the dissociation constant of some halogenated organic acids. II. M. BETTI and M. MANZONI (Atti R. Accad. Lincei, 1935, [vi], 22, 284–287).—For the Cl- and Br-substituted acids $o - C_6 H_4 X \cdot CH_2 \cdot CO_2 H K = 1.35 \times 10^{-4}$ and 1.92×10^{-4} , respectively. O. J. W.

Calculation of intramolecular atomic distances from dissociation constants of dibasic acids. **IV.** Acidity of aliphatic dithiols. G. SCHWARZEN-BACH and A. EPPRECHT. V. Dissociation constants of hydrazine. G. SCHWARZENBACH (Helv. Chim. Acta, 1936, 19, 169—178, 178—182; cf. A., 1933, 665).—IV. Normal acidity potentials of SH·[CH₂]_n·SH (n=2-5) in aq. EtOH are calc. from results of H electrode potential measurements at 20°. The dithiols are all extremely weak acids. The acidity increases as *n* decreases, owing to the influence of the second ·SH. The results are compared with those obtained for the corresponding dicarboxylic acids and diammonium ions.

V. H electrode potential measurements in N₂H₄ give for K_1 8.5×10⁻⁷. Colorimetric determination of the second stage gives $K_2 = 8.9 \times 10^{-16}$. F. L. U.

Chemical union of acids with one another. J. A. CRANSTON and H. F. BROWN (J. Roy. Tech Coll., 1936, 3, 569-575).—An acid may act as proton acceptor in presence of stronger acid and therefore come under definition of a base. Other factors, e.g., the symmetry of the ion produced, may favour this complex ion formation. [H'] of aq. HCl shows an increase in the order $H_3PO_4>H_2SO_4>HClO_4$ when these acids are substituted for an equal vol. of H_2O in aq. HCl. Formation of complex ions, e.g., $H_4PO_4^+$, accounts for this, and an explanation is given for the concomitant reduction in sp. conductivity of these mixed solutions (cf. A., 1928, 369). The behaviour of solutions obtained by absorption of dry HCl by H_3PO_4 is ascribed to the initial formation of H_4PO_4Cl . D. C. J.

Determination of basic dissociation constants and ionic products of solvents in acetic acid. I. Equations. S. KILFI (Suomen Kem., 1936, 9, B, 7-8).-Equations are developed for calculating the consts. from the buffer capacity of the solutions in the initial stages of acid-base titrations. J. S. A.

Determination of basic dissociation constants and the ionic product of the solvent in acetic acid. II. Experimental results. S. KILPI (Suomen Kem., 1936, 9, B, 9).—o-NH₂·C₆H₄·CO₂H has been titrated with HClO₄ in AcOH (0.9% of H₂O) and K_B and K_I calc. R. S.

Dissociation constants of alkylamines. G. SCHWARZENBACH (Helv. Chim. Acta, 1936, 19, 182-183).—Normal acidity potentials at 20° have been determined for NH₂Me, NH₂Pr, NH₂Bu, and *n*-amylamine. F. L. U. Activity coefficients of strong electrolytes. S. KANERO (J. Chem. Soc. Japan, 1935, 56, 411-414).--Mathematical. A simpler differential equation for strong electrolytes is given, and its solution is discussed. CH. ABS. (e)

Theory of strong electrolytes and activity of cadmium chloride. (MLLE.) M. QUINTIN (J. Chim. phys., 1936, 33, 111—126; cf. A., 1934, 492).—The e.m.f. of the cell Cd (amalgam two phases) $CdCl_2(c)|AgCl|Ag$ has been measured at different temp. When c>0.005M the plot of c against temp. gives two intersecting straight lines. This is attributed to the formation of a compound between AgCl and $CdCl_2$. E_0 has been calc. using the method of Gronwall *et al.* (A., 1931, 1127), and the activity coeffs. at different temp. are given. The ionic radius is $3\cdot8$ Å. at 25° and it is inferred that the association of the ions is negligible. The method used is applicable up to concns. of 0.005M. R. S.

Phase diagrams of low-melting mixtures. II. M.p. diagram of oxygen-nitrogen and the phase diagram of nitrogen-carbon monoxide. M. RUHEMANN, A. LICHTER, and P. KOMAROV (Physikal. Z. Sovietunion, 1935, 8, 326—336; cf. A., 1935, 447).— Variation of sp. heat with temp. has been studied in a special calorimeter and the results applied to the derivation of phase diagrams. N₂ and CO form two complete series of mixed crystals whilst the diagram for N₂+O₂ shows a eutectic at 23% N₂ and 50·1° abs. The latent heat of fusion of O₂-N₂ is a min. at 69% O₂. R. S.

Thermal diagram for system ferrous sulphide-cuprous sulphide. Determination of dissociation pressures of iron sulphides. D. D. HOWAT (J. Roy. Tech. Coll., 1936, 3, 587-598).-Cu₂S is sol. in FeS up to 20% and FeS in Cu₂S up to 40%; the eutectic at 970° corresponds with 61%FeS. The cooling curves for all melts containing from 95% to 55% FeS show a lower arrest point at 890-910°, and it is suggested that this may be due to dissociation of FeS. A method is described for the measurement of dissociation pressures of Fe sulphide mixtures which depends on the reducing action of H₂. D. C. J.

Equilibrium between the sulphates of cobaltic chloropentammine and their sulphuric acid solutions. L. O. TAO and W. S. MO (Compt. rend. 1936, 202, 846—848).—Equilibrium data for the system Co^{III} chloropentammine sulphate- $H_2SO_4-H_2O$ suggest the formation of

System naphthalene-hexachloroethane. S. PARJS (Z. anorg. Chem., 1936, 226, 425–428).— The m.-p. diagram of the system $C_{10}H_8$ – C_2Cl_6 shows a eutectic at 56.6° and a transition point at 71° corresponding with the change of C_2Cl_6 from the triclinic to the cubic form. No transition point was observed at 125° (cf. A., 1912, i, 330). The heats of fusion of $C_{10}H_8$ and of the two forms of C_2Cl_6 are 4.56, 4.5, and 2.01 kg.-cal. per mol., respectively. J. W. S.

Equilibrium of the light and heavy isotopes of hydrogen with crystalline cuprous chloride. A. F. KAPUSTINSKY (J. Amer. Chem. Soc., 1936, 58, 460-463).—The equilibrium has been studied at 320-400°. The entropy, free energy, and heat of formation of CuCl, and the equilibrium const. for reduction of HCl by D_2 have been calc. E. S. H.

CaO,TiO₂,SiO₂-CaO,SiO₂-CaO,Al₂O₃,2SiO₂ system. I. Equilibrium diagram of the system CaO,SiO₂-CaO,Al₂O₃,2SiO₂. U. NISHIOKA (Kinz.no-Kenk., 1935, 12, 168–171).—The diagram shows a eutectic at 1283° (57 wt.-% CaO,SiO₂). CH. ABS. (e)

Geometrical theory of heterogeneous equilibria. E. SCHEIL (Z. Elektrochem., 1936, 42, 153— 155).—The elements of a geometrical treatment of the phase rule, based on the principle that the boundary between two *n*-dimensional figures has n-1dimensions, is developed. F. L. U.

Specific heat of concentrated aqueous lithium, sodium, and potassium chlorides. A. J. Bogo-RODSKI and G. P. DEZIDERIEV (Trans. Kirov Inst. Chem. Tech. Kazan, 1935, No. 4-5, 29-40).-Data are recorded for 11.4-36.68% LiCl, 7.42-26% NaCl, and 6.95-24.8% KCl, for the range 16-34°. R. T.

Specific heats of sodium hydroxide solutions. J. W. BERTETTI and W. L. MCCABE (Ind. Eng. Chem., 1936, 28, 375-378).—The sp. heats of NaOH solutions (4-51 wt.-%) have been determined at 37-191° F. using the adiabatic method. The results agree with those of Richards and Gucker (A., 1929, 652) but the work of Tucker (A., 1915, ii, 674) seems to involve a const. error. R. S. B.

Correction in calculation of the heat of formation of sodium ferrite. M. MATSUI (J. Soc. Chem. Ind. Japan, 1936, 39, 55–56B; cf. A., 1934, 1174).— The heat of formation of $Na_2Fe_2O_4$ is given as 34,714 g.-cal. M. S. B.

Heat of formation of iron nitrides. S. SATOH (Sci. Papers Inst. Phys. Chem. Res. Tokyo, 1936, 28, 271–276).—The heats of formation of Fe_4N and Fe_2N derived from the Nernst heat theorem and the equilibrium data of the systems $Fe-NH_3-Fe_4N-H_2$ and $Fe_4N-NH_3-Fe_2N-H_2$ are 4322 and 3090 g.-cal., respectively. The calorimetric vals. are 4460 and 3040 g.-cal., respectively. R. S. B.

Heat of formation and specific heat of aluminium nitride. S. SATOH (Sci. Papers Inst. Phys. Chem. Res. Tokyo, 1936, 29, 19–30).—The mean sp. heats of Al and of a specimen of AlN containing 10.18% Al were measured by the ice calorimeter in the intervals 0–100°, 0–420°, and 0–598°. The corresponding corr. vals. of the sp. heat of pure AlN are 0.193, 0.226, and 0.239, respectively. An equation for the true sp. heat is found, and using this, the heat of formation, computed from the equilibrium data of the reaction $Al_2O_3+3C+N_2=$ 2AlN+3CO at high temp., gives the result : Al+N=AlN+74,700 g.-cal. N. M. B. Gallium and indium compounds. XI. Heat of formation of gallous oxide. W. KLEMM and I. SCHNICK (Z. anorg. Chem., 1936, 226, 353-358).----By sublimation of mixtures of Ga₂O₃ and Ga, products of composition between GaO and Ga₂O are obtained. Repetition of the sublimation with addition of Ga increases the Ga₂O content to about 84%. From the heat of combustion of this mixture Ga₂O+O₂ \rightarrow Ga₂O₃=175±2 kg.-cal. per mol., whence the heat of formation of Ga₂O is 82±2 kg.-cal. and its heat of decomp. into Ga₂O₃ and Ga is $3\cdot7\pm2$ kg.-cal.

J. W. S.

Free energy of ethylene hydration. E. R. GILLIAND, R. C. GUNNESS, and V. O. BOWLES (Ind. Eng. Chem., 1936, 28, 370–372).—From equilibrium data for $C_2H_4+H_2O \Longrightarrow$ EtOH at 176— 307°, with H_2SO_4 as catalyst, the free energy of hydration in the gaseous phase is found to be $26\cdot9T$ — 8300 ± 500 g.-cal. The val. 326,610 g.-cal. for the heat of combustion of C_2H_4 , due to Rossini, is confirmed. R. S. B.

Conductance of non-aqueous solutions. II. Temperature coefficient of conductivity. A. S. COOLIDGE and H. E. BENT (J. Amer. Chem. Soc., 1936, 58, 505—506; cf. A., 1935, 1462).—Theoretical. The negative temp. coeff. is discussed and the role of the solvent in determining ΔH and ΔS emphasised. The calc. entropy of ionisation of Na triphenylboron is —60 entropy units. E. S. H.

Measurement of absolute rates of migration of ions by the method of moving boundaries. II. J. MUKHERJEE, R. MITRA, and N. SEN-GUPTA (J. Indian Chem. Soc., 1936, 13, 42-68; cf. A., 1935, 825).-Rising boundaries between HCl and pieric acid, KCl and K picrate, NaCl and Na picrate, KCl and K compound of tetraiodocosin and also boundaries between mixtures of these electrolytes have been investigated. The variations of p.d. between two fixed planes with the linear displacement of the boundary have been directly measured and the abs. rates of migration of the "leading" and "indicator" ions have been calc. from such variations and the observed rate of motion of the boundary. Simultaneous measurements of the transference nos. of the leading ion have been made from observations of the vol. displacement of the boundary. The effects of the area of cross-section of the tube, the current strength, and the addition of small quantities of the leading solution to an approx. adjusted solution of the indicator electrolyte, have been studied. Light is thrown on the mechanism of concn. adjustments at and near the boundary, whilst the need of securing the condition of adjustment for obtaining correct and reproducible results is emphasised. The method gives vals. of abs. rates of migration of ions and may be applied to ascertain the changes taking place in different layers of the solutions at the boundary. As in the MacInnes method (A., 1929, 1390) the transference nos. can be obtained simul-E. E. A. taneously.

Breakdown and conductivity of anodically oxidised aluminium. J. W. HOLST (Z. Elektrochem., 1936, 42, 138-143).—The breakdown potentials of the dried oxide layer in anodically oxidised Al are found, in conformity with the results of Just and Betz (A., 1933, 555, 667), to differ widely according to the direction of the applied p.d. An explanation is afforded by the observation that the conductivity (κ) of the oxide layer in the negative (Al⁻) direction > in the positive (Al⁺). Comparison of oxide layers when dry and when immersed in electrolyte solutions shows that κ does not depend on the electron concn. in the adjacent layers of Al and electrolyte. The experiments indicate that κ is determined by the migration of H^{*} and OH' within the oxide layer. F. L. U.

Oxido-reduction potential of reductone. R. WURMSER, N. MAYER, and O. CRÉPY (J. Chim. phys., 1936, **33**, 101—110; cf. A., 1934, 1072).—It has been shown spectrographically that reductone (I) forms a reversible oxidation-reduction system. The absorption max. shifts from 2650 to 2900 Å. when the $p_{\rm H}$ changes from 4 to 6 and (I) regenerated by reversible oxidation behaves identically. (I) is more stable in alkaline solutions whilst the product of oxidation is more stable in acid solutions. The normal potential of the system at different $p_{\rm H}$ vals. has been determined. R. S.

Displacement of the oxidation-reduction potential on illumination of methylene-blue solutions containing iron. H. HELLSTRÖM (Naturwiss., 1936, 24, 217; cf. A., 1935, 1087; this vol., 270).—The reduction-oxidation potential of the methylene-blue (I)-Fe[•] system decreases reversibly when the system is illuminated. The potential depends on p_{π} in a manner similar to the fluorescence. In the system (I)-leuco-base in equal concns. no change of potential occurred on illumination. Addition of K₄Fe(CN)₆ in place of Fe[•] was ineffective. This further supports the view that there is combination between (I) and Fe, (I) being probably activated in the compound. A. J. M.

Diffusion potential. Y. KAUKO and V. MANTERE (Suomen Kem., 1936, 9, B, 9–12).—The e.m.f. of the electrode $H_2|0\cdot1N$ -HCl $|0\cdot1N$ -KCl in combination with the Hg_2Cl_2 electrode is unaffected by movement of the $0\cdot1N$ -HCl into the $0\cdot1N$ -KCl or by stirring of the latter. Investigation of the diffusion potentials of a series of cells shows that in previous work (A., 1935, 1321) the error from this source is small and can be calc. At greater ionic concns. the calculation is uncertain. R. S.

Preparation and investigation of oxide cathodes of colloid structure. E. PATAI and Z. TOMASCHEK (Kolloid-Z., 1936, 74, 253-265).--Alkaline-earth oxide cathodes have been prepared by electrophoretic deposition from colloidal hydrosols of the corresponding carbonates under controlled conditions. The influence of composition, concn., c.d., temp., and cathode material on the structure and emissive properties of the cathodes has been investigated. E. S. H.

Influence of colloids on electrode processes. V. J. VOLKOV (Trans. Kirov Inst. Chem. Tech. Kazan, 1935, No. 4—5, 57—79).—Anode polarisation is absent in the electrolysis of 0.5—1N-ZnSO₄ in presence of gelatin, ovalbumin, or agar, whilst cathode polarisation rises to a max., and then falls with increasing concn. of these colloids. The rise is ascribed to the binding of Zn by the colloids, with consequent diminution in its ionic concn., whilst the subsequent fall is due to increase in [Zn"], owing to binding of H_2O by the colloids. R. T.

Mineral electrodes. III. Adsorption of calcium by gum arabic. H. J. C. TENDELOO (Rec. trav. chim., 1936, 55, 227–230; cf. A., 1935, 706).—CaF₂ (fluorite) electrodes can, with suitable precautions, be used to measure p_{Ca} . The potential is not affected by changes of acidity. Measurement of the p_{Ca} of solutions of gum arabic containing varying amounts of Ca shows that a part of the Ca is adsorbed, the solution behaving as a Ca buffer. F. L. U.

Cathode effect in electrolysis of cadmium salts. O. KUDRA (Z. physikal. Chem., 1936, 175, 377-382; cf. B., 1935, 857).—If the c.d. at the cathode, σ , is kept const. the deposit of Cd, which is initially smooth and white, suddenly becomes black and spongy when electrolysis has proceeded for a time τ , which depends on the concn. of the solution, c, according to log $c=\alpha \log \sigma+\beta \log \tau+\gamma$, where α , β , and γ are consts. which depend on the salt being electrolysed. Probably the formation of a spongy deposit is promoted by the presence in it of oxide, which agrees with the observation that the effect is the more marked the greater is the oxidising power of the salt anion. R. C.

Polarisation phenomena at the ferric-ferrous electrode. W. L. H. MOLL (Z. physikal. Chem., 1936, 175, 353—358).—In the electrolysis of a mixed solution of a Fe^{II} and a Fe^{III} salt with a fresh electrode of Pt or Au there is no overvoltage, showing that the change in ionic charge occurs without any considerable hindrance. If the electrode has been in contact with the solution for some time, however, it exhibits a continually increasing chemical polarisation, which can be eliminated by polarising the electrode cathodically or anodically so far that gas is evolved. R. C.

Production of aluminium by electrolysis of fused cryolite and aluminium oxide. P. DROSS-BACH (Z. Elektrochem., 1936, 42, 144–147).—Decomp. potentials of NaF and AlF₃ (cf. A., 1934, 1078) are recalc. The vals. at 950° are : NaF $4\cdot4-4\cdot6$, AlF₃ $3\cdot4-3\cdot7$ volts. F. L. U.

Neutralisation of aqueous solutions of metaphosphimic and di-imidotriphosphoric acids. A. M. DE FICQUELMONT (Compt. rend., 1936, 202, 848—850).—Variations of conductance during titration by NaOH have been determined for N/3000solutions of di-imidotriphosphoric (I), tri- (II) and tetra-metaphosphimic (III) acids. (I) and (II) are tribasic, but (III) has a fourth ionisable H with an ionisation const. which is much < that of the other three, but of the same order as that of the second H of H₃PO₄. M. S. B.

Devaux's observation of the modification of a film of copper sulphide by means of copper. J. CAYREL (Compt. rend., 1936, 202, 926-929; cf. this vol., 435).—When a piece of Cu is placed in contact with the film and with a $CuSO_4$ solution Cu is deposited. The e.m.f. of the cell CuS|10% aq. $CuSO_4|Cu$ is 0.2 volt (15°). The thickness of the Cu film is independent of the current, extent of the film, and $[CuSO_4]$. H. J. E.

Recent theoretical and experimental researches on unimolecular reactions. A. LA-LANDE (Bull. Soc. chim., 1936, [v], 3, 521-537).—A lecture.

Chemical reaction in ionised gases. K. G. EMELÉUS and R. W. LUNT (Nature, 1936, 137, 404).— The assumption that, in the reactions in ionised gases, one or more of the reacting atoms or mols. react while ionised is unnecessary. The kinetics of reactions in discharges can be accounted for on the assumption that the reacting particles are all neutral. Reactions appear to be related only incidentally to the conductivity of the gas. L. S. T.

Ignition of hydrogen-chlorine gas [mixtures] by high-velocity electrons. A. E. MALINOVSKI and K. A. SKRINNIKOV (Physikal. Z. Sovietunion, 1935, 8, 289–293; cf. A., 1935, 1212).— H_2 -Cl₂ mixtures are not exploded by high-velocity electrons in concns. up to 0.6×10^5 per c.c. R. S.

Rate of reaction of deuterium with hydrogen chloride. P. GROSS and H. STEINER (J. Chem. Physics, 1936, 4, 165—169).—The reaction D_2 + HCl=HD+DCl between 765° and 843° abs. is bimol. and mainly homogeneous over a range of D_2 and HCl partial pressures of 80—300 mm. Conditions appear to change at pressures below 50 mm. Measurements made in packed vessels indicate that a wall reaction takes place also, but to an extent of > 15% at the lowest temp. The activation energy is 52·1 kg.-cal. and the homogeneous bimol. const. is $k=6.27 \times 10^{13}$. $T^{0.5}$. $e^{-26.200/T}$ mole⁻¹ c.e. sec.⁻¹ Deviations observed at the highest temp., 843° abs., are probably due to at. reactions. M. S. B.

Reactions involving hydrogen molecules and atoms. J. HIRSCHFELDER, H. EYRING, and B. TOPLEY (J. Chem. Physics, 1936, 4, 170—177).—The best potential energy surface for three H atoms has been constructed, and from it the rates of all the possible reactions between H and D have been calc. by means of the general theory of abs. rates. The agreement with experimental data is satisfactory.



Absolute rates of reaction of hydrogen with the halogens. A. WHEELER, B. TOPLEY, and H. EYRING (J. Chem. Physics, 1936, 4, 178—187).—The statistical-mechanical method is applied to the calculation of the abs. rates of reaction of I, Cl_2 , and Br with H_2 , HD, and D_2 . The correct relative rates are obtained and, in agreement with experiment, the potential surfaces indicate that H is much more reactive than D. M. S. B.

Rate of elementary reactions of hydrogen and deuterium. L. FARKAS and E. WIGNER (Trans. Faraday Soc., 1936, 32, 708–723; cf. this vol., 32).— Velocity coeffs. of the following reactions are calc. on the basis of recent theory (A., 1932, 343; 1933, 30): $H+H_2 \rightarrow H_2+H$; $D+D_2 \rightarrow D_2+D$; $D+H_2 \rightarrow DH$ +H; $H+D_2 \rightarrow HD+D$. The vals. obtained are discussed in relation to available experimental data. F. L. U.

Para-hydrogen conversion on glass. A. M. MAGID and S. Z. ROGINSKI (J. Phys. Chem., U.S.S.R., 1934, 5, 1278—1282).—The para-ortho conversion of H on soda-glass at 160—320°/20—200 mm. is a firstorder reaction (energy of activation 17000 g.-cal. per mole). Only about 1% of the sufficiently activated mols. striking the walls undergo conversion. On Pyrex and Mo-glass the reaction is much more rapid. On the latter it is rapid at < 200°. CH. ABS. (e)

Kinetics of the thermal chain reaction in mixtures of hydrogen and oxygen. M. PRETTRE (J. Chim. phys., 1936, 33, 189-218; cf. this vol., 32).-At 500-600° glass walls adsorb considerable amounts of H, and H₀O with a low velocity which increases with rise of temp., and these adsorbed gases, respectively, decrease and increase the velocity of reaction between H₂ and O₂. The H₂ probably increases the no. of centres of chain formation, but also breaks the chains, whereas H₂O promotes their branching. A KCl surface, which is less adsorbent than glass, diminishes the no. of centres of chain formation, and also breaks the chain more than a glass surface. Near ignition conditions at 400-700 mm., the velocity of reaction no longer obeys Arrhenius' law and rises increasingly rapidly with rise of temp., indicating the occurrence of a homogeneous reaction with frequently branched chains, which is responsible for ignition.

J. W. S.

Theory of the chamber process. Mechanism and kinetics of oxidation of SO_2 by nitrogen dioxide in the gas phase. I. N. KUZMINIOH, E. J. TURCHAN, and M. S. ARCHIPOVA (Z. anorg. Chem., 1936, 226, 310–320; cf. A., 1935, 308).—SO₂ is oxidised by NO₂ in the gas phase at 80° in the absence of liquid. Increasing the amount of H₂O vapour above 0.1 vol.-% does not increase the speed of reaction, whilst drying with P₂O₅ diminishes it to about $\frac{1}{3}$ of the normal val. The reaction is bimol. Velocity coeffs. are given for the range 65—150°. The velocity depends on the shape of the reaction vessel and decreases with decreasing rate of flow in a manner consistent with a chain mechanism. H₂O acts as a homogeneous catalyst. F. L. U.

Reaction of nitric oxide with hydrogen and with deuterium. C. N. HINSHELWOOD and J. W. MITCHELL (J.C.S., 1936, 378-384).-A reinvestigation at 801° of the reaction between <900 mm. of $\rm H_2$ and ${<}500~\rm mm.$ of NO in $\rm SiO_2$ bulbs affords no evidence of long reaction chains and shows that the proportion of heterogeneous reaction is much < was previously supposed (A., 1926, 579). When [H₂] is < 100 mm., the initial rate of reaction decreases more rapidly than corresponds with the linear relation, at const. [NO], between velocity and [H2]. The reaction, although homogeneous and essentially termol., probably involves binary collision complexes of different lives. The hypothesis leads to an equation which accords with the data. With H₂, the rate of change of pressure (mm. per 100 sec.) is [NO]2[H2]{1.0+ $30/(1+8.0[NO])+11/(1+3.4[H_2])$ and with D_2 , $[NO]^{2}[D_{0}](0.7 + 12.5/(1 + 8.0[NO]) + 7.7/(1 + 2.4[D_{0}]))$

(concn. unit, 100 mm.); the differences between the velocities are ascribed chiefly to the different mol. speeds. The temp. coeff. of the H_2 reaction at 700— 825° leads to the activation energy 47 kg.-cal.

J. G. A. G.

Reactions between sodium vapour and volatile polyhalides. Velocities and luminescences. W. HELLER and M. POLANYI (Trans. Faraday Soc., 1936, 32, 633-642).—See A., 1935, 150. F. L. U.

Pressure and ionisation in the front of the explosion wave in the pre-detonation period. A. E. MALINOVSKI, B. I. NAUGOLNIKOV, and K. T. TRATSCHENKO (Physikal. Z. Sovietunion, 1935, 8, 536-540).—A method for registering simultaneously the flame velocity, the spreading of the compression wave, and the ionisation at the front of the wave when a mixture of C_2H_2 and air was exploded, is described. The conductivity at the explosion wave-front was determined by a method similar to that of Kirkby (A., 1931, 688) and the pressure changes by Töppler's method. A. J. M.

Kinetics of the decomposition of ethyl ether at high pressures. E. W. R. STEACIE, W. H. HATCHER, and S. ROSENBERG (J. Chem. Physics, 1936, 4, 220—223).—A more accurate investigation of the decomp. of Et_2O at 426° and pressures up to 260 atm. confirms previous approx. data (A., 1934, 1179). The rate of reaction increases with pressure throughout the range in which it was examined. The results are explicable, qualitatively, on the basis of the Rice-Herzfeld free radical mechanism, but the reaction is too complicated for quant. comparison with theory. M. S. B.

Decomposition of ethylamine and diethylhydrazine. H. A. TAYLOR and J. G. DITMAN (J. Chem. Physics, 1936, 4, 212–218).—The decomp. of NH_2Et has been reinvestigated (cf. A., 1931, 175). The reaction is now shown to be bimol., giving $(NHEt)_2$ (I) and H_2 without vol. change. (I) subsequently decomposes by a first-order chain reaction at a rate < that of the first reaction. This mechanism accounts for the induction period and its rapid variation with temp. and pressure. M. S. B.

Decomposition of methyl nitrite at high pressures. E. W. R. STEACIE and S. ROSENBERG (J. Chem. Physics, 1936, 4, 223).—Measurements of the decomp. of MeO·NO at high pressures indicate that, within a rather large experimental error, there is no appreciable increase in the rate of decomp. on changing the pressure from 65 cm. to 35 atm. The previous conclusion that the reaction is unimol. (A., 1935, 938) is confirmed. M. S. B.

Homogeneous unimolecular decomposition of gaseous alkyl nitrites. V. Decomposition of methyl nitrite at low pressures. E. W. R. STEACIE and D. S. CALDER (J. Chem. Physics, 1936, 4, 96—99).—Measurements of the rate of decomp. of MeO·NO at pressures of 0.005—5-0 cm. and 210—240° have been made in packed and empty vessels. The reaction is about 5% heterogeneous at 1.5 cm. initial pressure and about 15% at 0.05 cm. The average val. of the activation energy is 36,100 g.-cal. The results are in good agreement with previous data at high pressures (A., 1934, 1312). The fall in rate with diminishing pressure can be accounted for by Rice and Ramsperger's theory on the assumption of a mol. diameter of 5.0×10^{-8} cm. and 13 degrees of freedom. M. S. B.

Thermal decomposition of divinyl ether. H. A. TAYLOR (J. Chem. Physics, 1936, 4, 116—120).— The thermal decomp. of divinyl ether has been studied at 460—500°/30—1000 mm. The reduction in velocity at low pressures by increasing the surface of the reaction vessel, or at high pressures by adding N_2 , the variation of temp. coeff. with pressure, and the induced decomp. with azomethane indicate a chain reaction in which the chains are broken on the walls at low and in the gas phase at high pressures. The overall order of the reaction at high pressures is 1.5. M. S. B.

Influence of pressure of the surrounding gas on the luminosity accompanying the detonation of explosives. A. MICHEL-LÉVY and H. MURAOUR (Compt. rend., 1936, 202, 755—757).—The transmission of detonation from one PbN₆ granule to the next becomes increasingly difficult as the pressure (p)of the surrounding gas is increased. At the same p it occurs more readily in A than in CO₂. With increasing p the deposit of Pb became more localised. At vals. of $p \ge 20$ mm. a diffuse luminosity was observed at distances ≥ 40 cm. from the explosive. This was attributed to a shock wave. H. J. E.

Practical rule permitting the interpretation of certain reactions of organic chemistry from the electronic point of view. P. CARRÉ (Compt. rend., 1936, 202, 740—742; cf. this vol., 453).—The difference in reactivity of directly bound elements corresponds with a difference in polarity, which increases with the electronic displacement. Examples are discussed. H. J. E.

Bimolecular reactions in solution. C. N. HIN-SHELWOOD and C. A. WINKLER (J.C.S., 1936, 371-377).—Theoretical. The transition-state method does not supersede the collision method for treating bimol. reactions. Existing data for series of bimol. reactions in solution lead to vals. of the probability factor between P=1 and $P=10^{-8}$, where (no. of mols. reacting) = $PZe^{-E/RT}$ and Z is the no. of collisions. The factors affecting P are discussed, and it is shown, by assigning plausible magnitudes to each effect, that the whole range of observed behaviour can be explained, at least qualitatively, in terms of (i) the orientation of the mols. at collision, (ii) the phase of vibration at which the linkings rupture, (iii) steric hindrance, and (iv) solvent effects. J. G. A. G.

Kinetics of the oxidation of nitrites with nitric acid. A. F. POPOVITSCH (Chimstr., 1935, 7, 202– 205).—The reaction is bimol. in aq. solution, the temp. coeff. at 20—80° being given by $\log k=11.77-$ 3767/*T*. CH. ABS. (e)

Kinetics and mechanism of reaction of ferrous ion with nitrous and nitric acids. E. SCHRÖER (Z. physikal. Chem., 1936, **176**, 20–47).—Fe^{••} does not react with NO₂' or HNO₂, but only with NO₂, the rate being given by $d[\text{Fe}^{••}]/dt = k'[\text{HNO}_2]^2[\text{Fe}^{••}]/[\text{NO}]$. Here k' is the product of a velocity coeff. by $\sqrt{(K_1K_2)}$, where K_1 and K_2 are the equilibrium consts. of $4HNO_2 \Longrightarrow N_2O_4 + 2NO + 2H_2O$ and $N_2O_4 \Longrightarrow 2NO_2$, respectively. The reaction mechanism is $2HNO_2 \Longrightarrow$ $NO_2 + NO + H_2O$, $Fe'' + NO_2 \rightarrow Fe''' + NO_2'$, $NO_2' + NO_2'$ $H \rightleftharpoons HNO_2$. The energy of activation of the second of these is small or zero. Reaction begins normally, but after a time the velocity increases considerably and falls only towards the end. The explanation is that the NO formed retards the reaction because it depresses [NO₂] and at first the NO remains almost entirely in solution combined with the Fe" salt, but as [Fe"] falls the distribution ratio of the NO changes in favour of the gaseous phase. The velocity is independent of [Fe^{**}], and is influenced by [H^{*}] only in so far as this affects the dissociation of the HNO₂. The velocity-time relations for the reaction between Fe" and HNO₃ catalysed by HNO₂ are similar to the above, but here the NO is removed by $NO_{2}+NO+$ $H_{2}O \rightarrow 2HNO_{2}$; the amount of HNO_{2} which must be added to effect complete reactions decreases with rising temp. and is zero above 65° (cf. A., 1932, 242). R. C.

Hydrolysis of starch by hydrogen peroxide and ferrous sulphate.—See this vol., 594.

Kinetic study of addition of methyl hypobromite to stilbene.—See this vol., 600.

Rates of alcoholysis of triarylmethyl chlorides. A. C. NIXON and G. E. K. BRANCH (J. Amer. Chem. Soc., 1936, 58, 492–498).—The kinetics of reaction of p-monosubstituted CPh₃ chlorides with EtOH in Et_2O solution at 25° has been studied by electrical conductivity determinations. The heats of activation of all the reactions have been determined. The influence of substituent groups is discussed.

E. S. H.

Heats of activation of the related reactions involved when *l*-bromosuccinic acid is treated with chloride ion. A. R. OLSON and F. A. LONG (J. Amer. Chem. Soc., 1936, 58, 393—398).—The heats of activation and the collision factors for the 6 related reactions (cf. A., 1934, 847) have been determined at 25—88°. The collision factors of the four bimol. reactions are of the same order of magnitude as those cale. from kinetic theory. E. S. H.

Oxidation of cyclic compounds by potassium permanganate. C. N. HINSHELWOOD and C. A. WINKLER (J.C.S., 1936, 368—370).—The velocity coeffs. at 0—80° lead to the following activation energies of the oxidations using 0·1N-KMnO₄ and 0·02N-H SO₄: picric acid (I) 12,200 g.-cal., BzOH (II) 12,700, 2 : 4 : 6-trinitro-3-methylnitroaminophenol (III) 13,100, trinitro-m-cresol (IV) 14,600, 2 : 4dimitrophenol (V) 15,300, 2 : 6-dinitrophenol (VI) 15,600, and m-C₆H₄(NO₂)₂ (VII) 17,300. The primary ring-breaking step is an interaction of MnO₄' with a mol. (or ion) of the org. compound. (I), (III), and (IV) react as ions, (II), (V), and (VII) react as mols., and (VI) reacts chiefly as mols. The structure of the mols, has very sp. effects on the probability factor.

Velocity of the exchange reaction of the hydrogen atom between sugar and water. M. HARADA and T. TITANI (Bull. Chem. Soc. Japan, 1936, 11, 55-56).—By adding D₂O to neutral, acid, or alkaline aq. solutions of glucose and distilling portions at intervals, it is concluded from the absence of any difference in the d of the distillates that the exchange of H between glucose and H₂O is rapid and that equilibrium is attained in < 1 min. C. R. H.

Mutarotation of glucose in H_oO-D_oO mixtures. W. H. HAMILL and V. K. LA MER (J. Chem. Physics, 1936, 4, 144-145),-If the changes in velocity with α -d-glucose (I) in heavy H₂O are ascribed solely to the replacement of H by D in that position in the (I) mol. involved in the mutarotation, viz., in the OH on the terminal C, and not, as before (A., 1935. 309), to the relative concess of H₂O, HDO, and D₂O, an exchange const., $K = [D - (I)] \cdot [H_0 O] / [H - (I)] \cdot [HOD]$ may be determined from previous experimental data. The average val. of K is 0.83, in exact agreement with that for tetramethyl-a-d-glucose found directly from exchange experiments (A., 1935, 1212), but not with that for (I), 0.69, which is, however, an average val. for the 5 possible variations due to the 5 exchangeable H in the (I) mol. The correct explanation may be between the two extreme views advanced.

M. S. B.

Reaction rates of propionic and acetic propionic anhydrides. E. S. BARR and E. K. PLYLER (J. Chem. Physics, 1936, 4, 90–92).—The velocities of hydrolysis of propionic (I) and acetic propionic (II) anhydrides in H_2O have been determined at 27° by the rate of change in intensity of the infra-red spectra (cf. this vol., 34). The reactions are apparently unimol., but the val. of the coeff. is influenced by the concn. of the anhydride and \propto [H₂O], approx. The val. for (II) is about double that for (I). M. S. B.

Mechanism of aromatic side-chain reactions, etc. IV. (Addendum.) Velocity of the reaction between o-nitrobenzyl bromide and pyridine. J. W. BAKER (J.C.S., 1936, 399–400; cf. this vol., 195).—The data indicate that the enhanced reaction rate observed with $2:4-(NO_2)_2C_6H_2$ ·CH₂Br results from augmented electron attraction due to two ·NO₂ radicals suitably oriented to the side-chain (cf. Bennett, Chem. and Ind., 1935, 1008). J. G. A. G.

Adsorption velocity of active carbon. M. TARLÉ (Bull. Mukden Arsenal, No. 8, 11 pp.).—The adsorption of 0.1N-KMnO₄ by active C is a unimol. surface reaction, the active area of the C being inversely \propto the KMnO₄ removed by adsorption at any given time. CH. Abs. (e)

Oxidation of metals. III. Kinetics of the oxidation of molten tin. L. L. BIRCUMSHAW and G. D. PRESTON (Phil. Mag., 1936, [vii], 21, 686-697). —The rate of oxidation (v) of molten Sn rises rapidly at 400-800°, but at any given temp. v is found to vary even with similar samples. The parabolic law is not obeyed, especially at high and low O₂ pressures, so v is controlled by a factor other than progressive increase in film thickness. It is suggested that the orientation of the crystals in the oxide film is a controlling influence in determining the rate of oxidation. J. W. S.

Oxidation of metallic magnesium at high temperature. Y. SUZUKI (Bull. Inst. Phys. Chem. Res. Japan, 1936, 15, 147-165).—The increase in wt.

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J. G. A. G.

N. M. B.

of Mg at about 560° in air, plotted by means of a fac thermobalance, was a linear function of time. The fac initial atm. corrosion film and the oxide film produced I had no measurable resistance to the reaction. Only a by

Dust explosions. W. P. M. MATLA (Rec. trav. chim., 1936, 55, 173-191; cf. B., 1935, 1024).-The reaction regions of mixtures of air with dusts of Al, dextrin, Ph₂, anthracene, and picric acid have been determined, using spark ignition. The quenching effect of added shale, stone, fuller's earth, bone C, Fe₂O₃, C₂Cl₆, MnO₂, hopcalite, and various inorg. K and Na salts depends partly on the nature of the combustible dust. With anthracene the order of effectiveness is: KF>KNO3>KI>KBr>KCl; NaF> NaI>NaNO₃>NaBr>NaCl; KCl>C₂Cl₆>NaCl. With dextrin, KClO₃>MnO₂>Fe₂O₃>hopcalite. Fe₂O₃ is more effective than KClO3 with Al, whilst the reverse is true for picric acid. K salts are invariably more effective than the corresponding Na salts. The quenching effect of Fe2O3 on different combustible dusts is in the order Al>dextrin>picric acid>Pho. There is no parallelism between the quenching power and the sp. heat of the quenching material, and the cause of the effect is at present obscure.

F. L. U.

Reduction of iron oxides by gaseous reducing agents. II. Rate of reduction of magnetic iron oxide by hydrogen. G. I. TSCHUFAROV and B. D. AVERBUCH (J. Phys. Chem. U.S.S.R., 1934, 5, 1292— 1298; ef. this vol., 166).—Natural samples and those prepared from piano wire show autocatalytic effects on reduction. The initial rate of reduction increased with the temp. $(350-900^\circ)$, but above 600° the rate decreases quickly with time, and the curve for 800° crosses those for 400° and 600° at approx. 70% reduction. Above 800° this effect is less marked. FeO is formed as an intermediate. The max. rates were observed at 600° . CH. ABS. (e)

Oxidation of aromatic hydrocarbons at high pressures. I—III.—See this vol., 599.

Hydrolysis in the vapour phase. S. YAMASAKI (Bull. Chem. Soc. Japan., 1936, 11, 43—44).— Using HCl or I as a catalyst, EtOAc is only slightly hydrolysed at 200°. The catalytic effect of gas ions, obtained by exposing the reaction mixture to X-rays, is also negligible. C. R. H.

Thermal decomposition of ethylene oxide and an induced acetaldehyde decomposition. C. J. M. FLETCHER (J. Amer. Chem. Soc., 1936, 58, 534– 535).—The production of free radicals and aldehydes at 400°, followed by decomp. of the aldehydes, is suggested as a mechanism of reaction. E. S. H.

Kinetics of polymerisation processes. II. G. GEE. III. Effects of catalysts and inhibitors. G. GEE and E. K. RIDEAL (Trans. Faraday Soc., 1936, 32, 656—666, 666—674; cf. A., 1935, 1080).— II. Theoretical. In polymerisations in which chainbreaking occurs through spontaneous deactivation or deactivation by a special type of collision with the monomeride, the fraction polymerised before the max. velocity is attained varies from 0 with strong deactivation to $\frac{1}{3}$ with no deactivation and zero steric factor, and finally approaches 0.5 for large steric factors. The theory is applied to actual examples.

III. All experimental observations can be explained by assuming that the action of a catalyst depends on its forming a reactive complex. The assumption that the effect of an inhibitor is to diminish the velocity of a polymerisation process and the chain length of the polymeride in the same ratio is approx. valid only in the early stages of the reaction. F. L. U.

Ozone as oxidising catalyst. X. Ozonisation of ferrous ammonium sulphate and of stannous chloride. E. BRINER and (MLLE.) B. BEVER (Helv. Chim. Acta, 1936, **19**, 367—369; cf. A., 1935, 1328).— Ozonised O₂ acts on aq. $Fe(NH_4)_2(SO_4)_2$ thus: $2Fe(NH_4)_2(SO_4)_2 + O_3 + H_2SO_4 = Fc_2(SO_4)_3 +$ $(NH_4)_2SO_4 + H_2O + O_2$. The autoxidation is > 1-2%. Aq. SnCl₂ containing 10% of HCl reacts thus: $3SnCl_2 + 6HCl + O_3 = 3SnCl_4 + 3H_2O$. The action of O₃ is indirect, *i.e.*, it oxidises the HCl in presence of SnCl₂, although it has no effect in its absence. Autoxidation amounts to 8-12%. F. L. U.

Interpretation of the immeasurably fast reaction in a solution containing oxalic acid, permanganate ion, and manganous ion. M. J. POLISSAR (J. Chem. Educ., 1936, 13, 40–42).—The reduction of MnO_4' with Mn'' in acid solution is autocatalytic. The reaction is catalysed by MnO_2 . Skrabal's mechanism for the reaction between MnO_4' , Mn'', and C_2O_4'' in acid solution needs modification. The assumption of a rapid equilibrium between MnO_4' , Mn''', Mn'''', and Mn''' explains this reaction, and also the accelerating effect of other complex-forming ions on the $Mn''-MnO_4'$ reaction. L. S. T.

Organic catalysts. XIII.-See this vol., 589.

Catalytic action of copper oxide on the combustion of hydrogen. [New catalysts.] G. TED-ESCHI (Gazzetta, 1936, 66, 57—64).—If the catalytic action of CuO on the combustion of H₂ is due to the reactions: CuO+H₂=H₂O+Cu, and 2Cu+O₂= 2CuO, and if O₂ is in great excess, $-d[H_2]/dt=k_1[H_2]$. If O₂ is not in great excess, but $[H_2] \ge 2[O_2]$, the catalyst will be partly reduced, and $-d[H_2]/dt=k_1[H_2]$. $k_1'[H_2]$, where $k_1' < k_1$. The first approximation $k_1' = k_1 - a[H_2]/[O_2] = 0.18$, 1, and 2, and graphs obtained agreeing with the integrated equations and the val. $k_1 = 6 \cdot 10 \times 10^{-4}$, $a = 5 \cdot 14 \times 10^{-5}$. CuO+Al₂O₃, prepared by simultaneous pptn., is an unsatisfactory catalyst. CuO+MgO, obtained from MgO and CuSO.. has increased activity if MgSO.

 $CuO+Al_2O_3$, prepared by simultaneous pptn., is an unsatisfactory catalyst. CuO+MgO, obtained from MgO and $CuSO_4$, has increased activity if MgSO₄ is well washed out. CuO+CaO, and CuO+BaO, obtained similarly, and dried at 90–100°, are very much more active as catalysts than the CuO ordinarily used. E. W. W.

Influence of different metals and metallic oxides on the decomposition of carbon monoxide. W. BAUKLOH and G. HIEBER (Z. anorg. Chem., 1936, 226, 321–332).—The catalytic effects of Fe_2O_3 , Fe_3O_4 , Fe, Co_3O_4 , Co, Ni_2O_3 , NiO, Ni, Cr_2O_3 , Cr, Mn_3O_4 , Mn, Al_2O_3 , Al, ZnO, Zn, and CuOon the decomp. of CO have been studied at 350– 850°. The results indicate that the decomp. is cata-

trace of nitride was detected.

lysed by reduced metal, and not by the oxides, the activity of easily reducible oxides being > that of the metal, but decreasing as the active centres become coated with C. Oxides which are difficult to reduce show little or no activity. J. W. S.

Vanadium catalysts for the manufacture of sulphuric acid.—See B., 1936, 315, 316.

Platinised nickel gauze for contact oxidation of ammonia.—See B., 1936, 316.

Effect of magnesia on the synthesis of tricalcium silicate. S. KONDO and M. HIGUCHI (J. Japan. Ceram. Assoc., 1935, 43, 273—280).—Mixtures of 100 parts of $3CaO+SiO_2$ and 0-6 parts of MgO were heated for 90 min. at 1500°. Formation Ca_3 silicate was accelerated by MgO. Pulverisation and reheating also favoured its formation.

Сн. Авз. (е)

Catalytic decomposition of bleaching powder liquor.—See B., 1936, 368.

Effect of water vapour on the rate of interaction between iodine and metals (iron and copper). A. V. SOLOVIEV (Compt. rend. Acad. Sci. U.R.S.S., 1935, 4, 185—188; cf. A., 1931, 698).— The interaction between I and Fe or Cu in presence of different $[H_2O]$ has been studied. The rate decreases with time, but not always according to a parabolic law. R. S.

Interaction between aluminium and iodine in an air atmosphere of different humidities. A. V. SOLOVIEV (Compt. rend. Acad. Sci. U.R.S.S., 1935, 4, 189–191).—The rate of reaction between I and Al is a max. at 6·18 and at 12·7 mm. of H₂O at 15°. Absorption of H₂O occurs as the reaction proceeds, resulting in an increase in the rate owing to electrochemical and chemical action. R. S.

Properties and industrial application of catalysts. O. KOSZTELITZ (Tech. Kurir, 1936, No. 3, 1-3; No. 4, 2-5).—A review. E. P.

Catalytic combustion of methane. I. W. DAVIES (Phil. Mag., 1936, [vii], 21, 513-531; cf. A., 1935, 455) .- The temp. at which reaction between CH_4 and O_2 is initiated on a Pt wire is nearly 1000° at low $[CH_4]$, but the rate of heating of the wire is then rapid, whereas at high [CH₄] combustion begins at 400°, but the catalytic activity of the wire decreases rapidly with further rise of temp. With small quantitles of CH₄ and H₂ in O_2 , combustion of the H₂ begins at 200°, whilst the CH₄ remains inert up to about 900°. Hence the wire acts as a preferential catalyst for the combustion of H₂ between 200° and 900°. These limits are reduced as the ratio $[CH_4]$: $[O_2]$ is increased. The reaction between CH_4 and O_2 probably involves adsorption of both reactants, whereas that between H_2 and O_2 involves adsorbed O_2 and H_2 from the gas phase. J. W. S.

Preparation and catalytic oxidation of pure amorphous carbon.—See B., 1936, 305.

Phosphoric acid as catalyst for alkylation of aromatic hydrocarbons.—See B., 1936, 309.

Properties of zinc-chromium catalyst for methyl alcohol synthesis.—See B., 1936, 309. Catalytic decomposition of alcohols. P. J. IVANNIKOV and E. J. GAVRILOVA (J. Chem. Ind. Russ., 1935, 12, 1256—1260).—The process of catalytic (CuO+0·1%ThO₂) conversion of EtOH (I) into EtOAc (II) at 220—450° (optimum 350°) consists of the reactions (I) \Rightarrow MeCHO (III) +H₂; 2(III) \Rightarrow (II); (III)+2(I) \Rightarrow CHMe(OEt)₂ (IV)+H₂O; (II)+ H₂O \rightleftharpoons (I)+AcOH (V); (III)+H₂O \Rightarrow (V)+H₂; (IV) +(V) \Rightarrow (II)+(I)+(III). Production of (II) through the intermediary of (IV) is the dominant reaction at 300—350°. The reactions take place at the catalytic surface, and not in the vapour phase. R. T.

Electrolysis of phosphate melts. II. New tungsten phosphide W_4P . H. HARTMANN and J. ORBAN (Z. anorg. Chem., 1936, 226, 257–264; cf. A., 1931, 805).—The mixture of PH₃ and H₂ produced at the cathode during electrolysis of fused NaPO₃+ LiPO₃ containing WO₃ reacts with the latter at temp. below 520° and at c.d. > 0.0085 and < 0.04 amp. per sq. cm. to give the *compound*, W₄P, d 16.03. Chemical properties are described. At 500–550° W₄P decomposes irreversibly into W₂P and α -W. The substance is amorphous. X-Ray examination of W₂P shows it to be hexagonal, with a 6.18, c 6.78 Å. F. L. U.

Electrolytic polishing of copper, lead, tin, and their alloys, and its applications to metallography. P. JACQUET (Bull. Soc. chim., 1936, [v], 3, 705—723).—A procedure for polishing metal and alloy specimens for micrographical examination consists in anodic treatment in a suitable acid between certain limiting c.d. The treatment of Cu surfaces in aq. H_3PO_4 , and of Pb, Sn, and Pb–Sn alloys in aq. $HClO_4$ -AcOH is described. The structures thus revealed are different from those obtained by mechanical polishing, as distortion does not occur. The mechanism of the electrolytic process is discussed.

E. S. H.

"Electrolysis" of a solid gold-copper alloy. G. NEHLEP, W. JOST, and R. LINKE (Z. Elektrochem., 1936, 42, 150—153; cf. A., 1935, 936).— Passage of a current of 3.2 amp. for 3 months at 1000° through wires of a Cu-Au alloy with Au 65.7% produced an accumulation of Au at the anode. The transport no. for Cu was $5-10\times10^{-11}$. F. L. U.

Protection and decoration of aluminium and its alloys.—See B., 1936, 278.

Electrolysis of alkali zincate solution.—See B., 1936, 332.

Platinum plating.—See B., 1936, 329.

Chemical action of electric discharges. VIII. Production of nitric oxide by the electric arc at different frequencies. B. SIECRIST, C. H. WAKKER, and E. BRINER. IX. Effect of addition of alkali and alkaline-earth metals to the electrodes on the yield of nitric oxide in industrial furnaces. E. BRINER, C. H. WAKKER, H. PAILLARD, and G. CARRISSON. X. Effect of increase of frequency conjoined with addition of lithium to the electrodes and enrichment of the air with oxygen on the yield of nitric oxide. C. H. WAKKER and E. BRINER (Helv. Chim. Acta, 1936, 19, 287-308, 308-320, 320-322; cf. A., 1932, 820).--VIII. Yields of NO have been determined, using arcs cycles. For the same power consumption, the yield given by d.c. is > that given by a.c. at 50 or 1410 cycles, above which the yield increases with frequency. For any given type of discharge the yield increases with decreasing power consumption. The best yield, 128.5 g. HNO₃ per kw.-hr., was obtained with a.c. 12 watts at 10⁷ cycles.

IX. Using a 15-kw. Schönherr furnace, the effect of adding Li, Na, K, Be, Ca, and Ba to the Cu electrodes has been studied. The best result is obtained by the addition of 4.25% of Li, which increases the yield by 35%. The improvement is attributed to the Li facilitating ionisation and contributing to cooling of the arc. By combining the use of Cu-Li electrodes with addition of O_2 to give an equimol. mixture of N_2 and O_2 the yield has been increased by 61%.

and O_2 the yield has been increased by 61%. X. Improvement of the yield by 115% is obtained by combining Cu-Li electrodes and addition of O_2 with the use of an a.e. are at 1800 cycles. F. L. U.

Control experiments on graphite oxidation by high-tension alternating current. V. SIHVONEN and R. NASANEN (Suomen Kem., 1936, 9, B, 5-6).---In accordance with earlier views (A., 1933, 1019, 1020), the discharge of negative O ions at a graphite surface passes over at high voltage from passive discharge at the crystal face to an oxidative action on the edge atoms. The reaction due to the anodic component increases with increasing asymmetry of the discharge. J. S. A.

Spectral analysis of the flame of an acetyleneair mixture in an electric field. A. E. MALINOV-SKI and V. S. ROSSICHIN (Physikal. Z. Sovietunion, 1935, 8, 541—546).—The spectra of the inner and outer cones of the stationary flame of a mixture of C_2H_2 and air were examined with and without the application of an electric field (800—1300 volts per cm.). No difference in the structure or intensity of the lines in the bands due to C·C and C·H could be detected with the application of the field (direct and alternating). The continuous spectrum of both the inner and outer cones, however, decreases in intensity on application of the field. A. J. M.

Decomposing action of X-rays on potassium iodide. T. TOYOMA (Tohoku J. Exp. Med., 1935, 24, 405-409).—The I-eliminating activity of the rays varies inversely with λ , and increases with the temp.

Сн. Авз. (е)

Mercury-photosensitised decomposition of arsine. N. L. SIMMONS and A. O. BECKMAN (J. Amer. Chem. Soc., 1936, 58, 454—459).—The rate of decomp. into As and $H_2 \propto$ the intensity of radiation and is independent of AsH₃ pressure at high pressures; at low pressures the rate is decreased on account of the fluorescence of activated Hg atoms. The decomp. is inhibited slightly by H_2 . The quantum yield is 1.03 ± 0.05 mols. of AsH₃ per quantum of $\lambda 2537$ Å. The mechanism of decomp. is discussed. E. S. H.

Law of blackening of photographic plates by ultrasonic rays. N. MARINESCO (Compt. rend., 1936, 202, 757—759).—The blackening produced on a photographic plate by ultrasonic radiation of v=625,000 cycles per sec. follows the Hurter and Driffield law. The latter also governs the blackening of plates by ordinary light. H. J. E.

Evolution of the latent photographic image. C. JAUSSERAN (Ann. Physique, 1936, [xi], 5, 355-426; cf. A., 1935, 943).-An investigation of the modifications undergone spontaneously by the latent image in the time interval between exposure and development shows that the density of the developed image increases with the log of the age of the impression. The increase depends on the illumination of the plate, showing a max. for normal exposure, and on the nature and duration of action of the developer, and is attributed to a definite property of the latent image on Ag gelatinobromide. The properties of the real image and its susceptibility to chemical weakening are modified by the evolution of the latent image. It is concluded that the latent image and the developed image are not defined by the density val. of the latter.

N. M. B.

Photo-oxidation of methylene iodide. R. A. GREGORY and D. W. G. STYLE (Trans. Faraday Soc., 1936, 32, 724-736).—The photo-oxidation of CH_2I_2 in the vapour phase has been studied at 20°, 30°, 35°, and 45°, and at different low partial and total pressures (<24 mm.). The products are H_2 , C0, CH_2O , HCO_2H , and $(CH_2 \cdot OH)_2$. A mechanism is proposed, in which it is assumed that CH_2 and the peroxidic substances CH_2O_2 and $(CH_2O)_2$ are first formed, the latter two changing spontaneously into HCO_2H and CH_2O respectively. F. L. U.

Oxidation of monochloroacetic acid by potassium permanganate at wave-lengths 366 m μ and 436 m μ with uranyl salt as photosensitiser. J. C. GHOSH and B. B. RAY (J. Indian Chem. Soc., 1936, 13, 1–10).—The velocity of the reaction is zeromol. with respect to KMnO₄, \propto intensity of incident radiation, and is influenced by change in [UO₂SO₄], whilst 1/velocity plotted against 1/[CH₂Cl·CO₂H] gives a straight line. A reaction mechanism is suggested. E. E. A.

Sensitised photolysis of glycollic acid and glyoxylic acid. E. BAUR (Helv. Chim. Acta, 1936, 19, 234—246; cf. A., 1913, i, 443).—Aq. OH·CH₂·CO₂H is decomposed by light in presence of fluorescein, eosin, erythrosin, chlorophyll, FeCl₃, or UO_2SO_4 , giving CH₂O and CO₂, whilst HgCl₂ used as a depolariser is reduced to Hg₂Cl₂. O₂ plays no direct part in the photolysis, but in presence of FeCl₃ it re-oxidises the Fe^{**} produced. Under similar conditions CHO·CO₂H yields only CO₂. The Na salts are changed more rapidly than the acids themselves. In all cases a stationary state is reached, in agreement with the author's theory. F. L. U.

Decomposition of fructose in ultra-violet light. —See this vol., 594.

Comparative velocities of hydrolysis of certain glucosides under the influence of ultra-violet rays, acids, and enzymes. G. TANRET (Compt. rend., 1936, 202, 881—883).—Nine glucosides have been examined. The order of velocity of hydrolysis is different for the different hydrolytic agents employed, the order for acids differing most markedly from that of the other two, for which a certain degree of similarity
may be observed. Glucosides with reducing properties are most readily hydrolysed by enzymes. M. S. B.

Photochemical decomposition of oxalyl chloride vapour. K. B. KRAUSKOPF and G. K. ROLLEF-SON (J. Amer. Chem. Soc., 1936, 58, 443-448).-(COCl)₂ is slowly decomposed by light of $\lambda < 3800$ Å. The reaction is unimol. and has a low quantum yield. The final products are COCl₂ and CO, although Cl₂ and CO are probably formed initially. It is probable that light of short λ breaks the mol. at the C·C linking, and that of long λ at the C·Cl linkings. The absorption coeffs. of (COCl)₂ at 3700-2400 Å. have been measured. E. S. H.

Photolysis of lead tetramethyl and lead tetraphenyl. P. A. LEIGHTON and R. A. MORTENSEN (J. Amer. Chem. Soc., 1936, 58, 448—454).—The pure liquid or vaporised compounds, or solutions in octane, absorb light in the ultra-violet region, decomp. thus : $PbR_4 \rightarrow Pb+2R_2$. The method of radioactive indicators has been applied to determine quantum yields. The formation of Me radicals has been demonstrated. E. S. H.

Effect of simultaneous irradiation with several wave-lengths on oxidation of mandelic acid by bromine. J. C. GHOSH and S. K. BHATTACHARYYA (Z. physikal. Chem., 1936, **B**, 31, 420–430).— The photochemical oxidation in aq. solution in presence of KBr in light of $\lambda\lambda$ 366, 436, and 546 mµ is a reaction of zero order. The effect of simultaneous irradiation with two of these $\lambda\lambda$ is < the sum of the effects produced by the two separately. In monochromatic light the velocity coeff. α the square root of the energy absorbed. The reaction mechanism is : Br+AH₂' \rightarrow HBr+AH', AH'+Br₂ \rightarrow HBr+A'+Br. Quantum efficiencies have been determined. R. C.

Concentration of artificially produced radioelements by means of an electric field. J. W. J. FAY and F. A. PANETH (J.C.S., 1936, 384-390; cf. A., 1935, 802).—The effects of bombardment by slow neutrons on AsH3 and org. bromides and iodides have been investigated. The active isotope 33As76 does not retain any characteristic charge which may be given to it at the moment of formation, but picks up positive and negative ions in the gas and can be deposited on electrodes of either sign. With EtI, I atoms which are activated and detached from the Et groups acquire, by exchange processes, the negative charge of I ions which are usually present in the liquid or are supplied by adding SO2 etc. The active isotope, ${}_{53}1^{128}$, is collected on Cu and Ag anodes, but not Pt, by electrolysis. Similarly, active I is collected from MeI and BuI, and active Br from Fills. BuB. (III) EtBr, BuBr, CH₂Br₂, and (·CH₂Br)₂. The method is not effective in some cases, which are discussed. Practically pure radioactive isotopes are obtained in certain cases by the electric field method and conen. factors as high as 19,000 are recorded. J. G. A. G.

Direct production of organic compounds containing artificial radio-elements.—See this vol., 588.

Heavy hydrogen : its importance for the study of chemical and biological problems. W. BRANDT (Chem.-Ztg., 1936, 60, 285-288).---A review. Para-ortho composition of hydrogen gas produced from hydrogen atoms. N. SASAKI and O. MABUCHI (Proc. Imp. Acad. Tokyo, 1936, 12, 39— 41).—The composition of the H₂ formed in the reaction $H+HI=H_2+I$ was investigated, the H atoms being obtained by the photochemical decomp. of HI. The product, examined by the thermal conductivity method, contained 25% p-H₂. A. J. M.

Deuterohydrates of krypton and xenon. M. GODCHOT, (MLLE.) G. CAUQUIL, and R. CALAS (Compt. rend., 1936, 202, 759—760).—The unstable compounds Kr,6D₂O and Xe,6D₂O have been prepared and their dissociation pressures measured. They resemble the corresponding hydrates very closely. H. J. E.

Production of large single crystals of lithium fluoride. D. C. STOCKBARGER (Rev. Sci. Instr., 1936, [ii], 7, 133-136).—The molten salt is cooled in a Pt crucible under carefully controlled conditions. C. W. G.

Preparation of single crystals of sodium nitrate from the molten salt. E. V. TZECHNO-VITZER (J. Phys. Chem. U.S.S.R., 1934, 5, 1452– 1458).—NaNO₃ crystals of dimensions up to $24 \times 20 \times$ 12 mm. were prepared from NaNO₃, containing KNO₃ 0.03 and Fe₂O₃ 0.05%, by heating in a Ni crucible to \Rightarrow 350°, and cooling at a uniform rate to room temp. (40 hr.) so that crystallisation started at the bottom of the crucible. CH. ABS. (e)

Production of potassium and sodium hydroxides from the sulphates.—See B., 1936, 273.

Ammoniates of simple salts. I. Ammoniates of copper salts. G. SPACU and P. VOICHESCU (Z. anorg. Chem., 1936, 226, 273–288; cf. A., 1934, 613).—Isobars of systems consisting of NH₃ and the cupric salts of H_2CrO_4 , HCNS, HCO₂H, AcOH, OH·CH₂·CO₂H, NH₂·CH₂·CO₂H, (·CH₂·CO₂H)₂, [·CH(OH)·CO₂H]₂, BzOH, o-NH₂·C₆H₄·CO₂H, and sulphosalicylic acid have been determined between -80° and 140°. The capacity for co-ordinating NH₃ mols., and the stability of the ammoniates formed, increases with increasing strength of the acid. F. L. U.

Dissolution of metals in potassium cyanide solution. R. HAY (J. Roy. Tech. Coll., 1936, 3, 576-586).—Results of experiments on the dissolution of Cu, Al, Ag, Zn, Pb, and Zn-Pb in aq. KCN are discussed. H₂ is evolved under certain conditions, and O_2 functions as a depolariser. The composition of the deposits on partly immersed metals in air has been determined, and the cause of their formation investigated. The influence of OH' on [H'] of aq. KCN and on the rate of dissolution of Ag in KCN solution has been determined. Addition of CaO to aq. cyanide does not depend for beneficial results on the OH radical introduced; presence of OH reduces the rate of dissolution of Ag and probably that of Au.

D. C. J.

Factors influencing reduction of alkaline copper reagents by glucose. W. H. FORBES and A. ANDREEN-SVEDBERG (Skand. Arch. Physiol., 1934, 70, 168—185; Chem. Zentr., 1935, ii, 1067—1068).— $p_{\rm ff}$ is without effect, < 1% of NaCl or Na₂SO₄ is without action, but ZnSO₄, NaHSO₄, and NaCN have a disturbing influence; the influence of sugar conen. is small. H. N. R.

Hydration of dicalcium silicate and tricalcium silicate. N. B. KEEVIL and T. THORVALDSON silicates, exposed to saturated steam between 110° and 350°, formed three cryst. products. X-Ray diffraction patterns and optical properties showed two of these to be identical with products previously described (A., 1935, 50), whilst the third (I) had distinctive structure but variable H₂O content with limiting composition 2CaO,SiO2,H2O. When conditions did not favour hydrolysis, Ca, silicate hydrated to a cryst. product (II) with probable limiting composition 3CaO,SiO, 2H,O. Hillebrandite (III), heated at 160°, remained unchanged, but dehydrated (III) gave a product similar to (I). (I) could be dehydrated but (II) liberated CaO. When treated with a large excess of H₂O the hydrated silicates hydrolysed to the same extent as, but more rapidly than, the anhyd. silicates.

L. A. O'N.

Hydration of $4CaO,Al_2O_3,Fe_2O_3$. Y. SANADA (J. Soc. Chem. Ind. Japan, 1936, 39, 46B).—The compound brownmillerite, $4CaO,Al_2O_3,Fe_2O_3$, was prepared by heating together $CaCO_3$, Al_2O_3 , and Fe_2O_3 in the required proportions at 1400° for 3 hr. 0.5 g. of the finely ground product, when treated with 50 c.c. of CO_2 -free H_2O , gave $3CaO,Al_2O_3,aq$. and CaO,Fe_2O_3,aq . Under the microscope the product was observed to form cryst. needles, hexagonal plates, and, with excess of H_2O , rhombic dodecahedra. M. S. B.

Formation of mercurianmonium salts from mercurianmonium nitrate by double decomposition. II. Mercurianmonium chlorate. S. AUGUSTI (Boll. Chim. Farm., 1936, 75, 129–135).—A yellowish-white ppt. of mercurianmonium chlorate, Hg₂NClO₃, is obtained on adding aq. KClO₃ to aq. ammoniacal Hg₂NNO₃. The following quant. reactions are shown to occur : Hg₂NClO₃+8KI+4H₂O $\rightarrow 2K_2$ HgI₄+NH₄ClO₃+4KOH at room temp.; Hg₂NClO₃+8KI+3H₂O $\rightarrow 2K_2$ HgI₄+NH₃+KClO₃ +3KOH at the b.p.; Hg₂NClO₃+2Na₂S+3H₂O \rightarrow 2HgS+NH₃+3NaOH+NaClO₃ at the b.p.; Hg₂NClO₃ +4Na₂S₂O₃+4H₂O $\rightarrow 2Na_2$ Hg(S₂O₃)₂+4NaOH+ NH ClO₃ at room temp.

Potassium and sodium mercury sulphites. Potentiometric investigation. II. G. SPACU and C. DRAGULESCU (Z. anorg. Chem., 1936, 226, 416– 424; cf. A., 1935, 1469).—Potentiometric methods indicate the existence only of the following mercurisulphites: K[HgClSO₃], K₂[Hg(SO₃)₂], and

sulphites : $K[HgClSO_3]$, $K_2[Hg(SO_3)_2]$, and Na₂[Hg(SO₃)₂], no evidence of HgSO₃,NaCl or of Na₂SO₃,2HgSO₃ being obtained. The formation of the complex ion [Hg(SO₃)₂]" provides a method for determination of SO₃". J. W. S.

Mercurous salts and their amino-compounds. I. E. GLEDITSCH and T. F. EGIDIUS (Z. anorg. Chem., 1936, 226, 265–272, and Compt. rend., 1936, 202, 574–576).—The primary product of reaction between aq. NH₃ and Hg₂X₂ (X=Cl or NO₃) is NH₂·Hg₂·X (I), which decomposes reversibly into NH₂·Hg·X (II) and Hg. Comparison of the X-ray diagrams of (I) and (II) shows the former to be a distinct compound. F. L. U.

Reducing action of mercury. I. Formation of hydrogen peroxide in the interaction of mercury with hydrochloric acid in presence of oxygen. N. H. FURMAN and W. M. MURRAY, jun. (J. Amer. Chem. Soc., 1936, 58, 429–433).—The reaction may be represented stoicheiometrically as (1) $2Hg+2HCl+O_2=Hg_2Cl_2+H_2O_2$, (2) 2Hg+2HCl+ $H_2O_2=Hg_2Cl_2+2H_2O$. The mechanism is discussed. E. S. H.

Halides of boron, and their m.p. A. M. VASILIEV (Trans. Kirov Inst. Chem. Tech. Kazan, 1935, No. 4-5, 93-95).—The m.p. is 2507°, as calc. by Flavitski's formula (A., 1906, ii, 152) from the physical consts. of BBr₃, and 2593° from those of BI₃. R. T.

Borovanadates. D. GHIRON (Atti R. Accad. Lincei, 1935, [vi], 22, 259–264).—The existence of two series of borovanadates has been shown, viz., $2M^{11}O, V_2O_5, 3B_2O_3$ (M=Pb, Cd) and $M^{11}O, V_2O_5, B_2O_3$ (M=Pb, Cd, Zn). O. J. W.

Fused "onium" salts as acids. Reactions in fused pyridinium hydrochloride. L. F. AUDRI-ETH, A. LONG, and R. E. EDWARDS (J. Amer. Chem. Soc., 1936, 58, 428–429).—Al, Cd, Ca, Mg, Zn, and Cu react rapidly and Mn, Ni, Sn, Pb, and Fe slowly with fused C_5H_5N ,HCl (I), yielding H_2 and the corresponding chlorides. Many metallic oxides dissolve in (I), forming chlorides. Solutions of metallic chlorides in (I) are electrolytically conducting; Sn, Pb, As, Sb, and Bi can be electrodeposited thereform. E. S. H.

Action of dilute acids on aluminium.—See B., 1936, 327.

Enrichment of carbon in the heavier isotope by diffusion. D. E. WOOLDRIDGE and F. A. JEN-KINS (Physical Rev., 1936, [ii], 49, 404).—Using an apparatus containing 35 separation members for the separation of gaseous isotopes by diffusion, gaseous CH_4 of increased abundance in C^{13} was obtained. Spectroscopic observations showed the $C^{12}C^{13}$ band head at 4744 Å., the relative intensity indicating an abundance of 6.6 at.-% of C^{13} , or an enrichment factor 47. A faint head corresponding with $C^{13}C^{13}$ was observed. N. M. B.

Reactions in the solid state at high temperatures. XIII. Course of reaction in formation of magnesium, strontium, and barium silicates. W. JANDER and J. WUHRER (Z. anorg. Chem., 1936, 226, 225—247; cf. A., 1935, 944).—Mixtures of SiO₂ with MgO at 1170°, with SrCO₃ at 920°, and with BaCO₃ at 1010° give rise primarily to the orthosilicates (I), even when SiO₂ is in excess, in which latter case metasilicate is formed in a subsequent reaction between SiO₂ and (I). The result is in part explained by the greater readiness of (I) to crystallise, as is to be expected from the structures of the two substances. F. L. U.

Titanium chlorosulphonato-chloride. G. P. LUTSCHINSKI with A. I. LICHATSCHEVA (Z. anorg. Chem., 1936, 226, 338-337).-Interaction of TiCl, (1 mol.) and SO₃ (2 mols.) in CHCl, or SO₂Cl, solution yields the compound Ti(SO₃Cl)₂Cl₂ (I), a yellow cryst. substance, d20 2.012, fuming in moist air and turning white. It is insol. in $CHCl_3$ and SO_2Cl_2 . When heated it darkens and vaporises, being completely sublimed on vigorous heating, with production of TiCl₄ and SO₃. Action of SO₃ converts it into the compound Ti(SO₃Cl)₃Cl. When SO₂Cl₂ vapour is passed over heated TiO₂ (I) is obtained only when the TiCl, and SO, produced condense together. J. W. S.

Allotropic modifications of lead monoxide. E. RENCKER and M. BASSIÈRE (Compt. rend., 1936, 202, 765-767) .- The a-modification of PbO is transformed into β -PbO at 530°. These two forms give distinct X-ray diagrams. The reverse transformation was not observed. Methods of preparing these forms are discussed. The action of conc. aq. NaOH on Pb(OH)₂ at 20° yields β -PbO, which is transformed on keeping in contact with the solution into red α -PbO. β -PbO prepared at a high temp. is also converted by conc. aq. NaOH into a-PbO.

H. J. E.

Raschig's hydrazine synthesis. M. MøLLER (Kong. dansk. Vidensk. Selsk., 1934, 12, No. 16, 59 pp.; Chem. Zentr., 1935, ii, 985–986).—With pure reagents, a 40% yield of N₂H₄ can be obtained in the absence of gelatin (I). Cu in $1.66 \times 10^{-6}M$ solution practically inhibits formation of N₂H₄. Fe^{III} to some extent, but not Co, Ni, Mn, or Pb, behaves like Cu. (I) or mannifed suppresses the inbehaves like Cu. (I) or mannitol suppresses the in-hibiting action. Electrolysis of NaCl-NaOH-NH₃-(I) solutions, or use of NaOBr, affords only traces of N.2H4. J. S. A.

Proof of the existence of free NH (imine) in the thermal decomposition of ammonia. H. H. FRANCK and H. REICHARDT (Naturwiss., 1936, 24, 171).—The existence of NH in the thermal decomp. of NH₃ at atm. pressure and 2000° is shown by the presence of the NH absorption band at 3360 A. The stationary [NH] is estimated at 0.1-1%. That the radical is produced by decomp. of NH3 and not by combination of N and H is shown by the fact that the band could not be obtained when N₂ and H₂ were heated together at 2500°. A. J. M.

Causes of spontaneous inflammation of red phosphorus prepared by the dry method. I. I. KUKUSCHKIN and A. A. KORINFSKI (J. Chem. Ind. Russ., 1935, 12, 1240-1249).-Spontaneous inflammation takes place when the product contains > 10% of a bright red, active form of P, distinguished from ordinary red P by its smaller d, and by its ability to ppt. Cu from its solutions; contamination with white P, P_2O_5 , or SiO₂ does not affect the flash point of red P. The content of active P in red P may be reduced from 11 to 2% by heating for several nr. in a steel autoclave at 340-350°. R. T.

Vanadium oxychloride as a solvent. II. F.E. BROWN and F. A. GRIFFITHS (Iowa State Coll. J. Sci., 1934, 9, 89-93; cf. A., 1931, 1405).-Cs, Rb, K, and Na react violently with VOCl₃ at 30°,

60°, 100°, and 180°, respectively. Li also reacts. Ca and In react slightly, and Ga forms a blue ppt. Br, Cl, I, Hg, Se, S, and V have little reaction with VOCl, at room temp. S reacts at high temp. The reaction of P is explosive at 100°. As and Sb are less vigorous and Bi is inert. Liquid SO, and VOCL, are immiscible. Liquid H₂S reacts, forming ppts. varying in composition between VSCl₃ and V(OH)(SH)Cl. No stable compound was formed with MgPhBr. CH. ABS. (e)

Constitution of vanadium carbide. A. MORETTE (Compt. rend., 1936, 202, 572-573; cf. A., 1935, 313).—V₂O₅ and excess of C heated at > 1800° yield V4C3. T. G. P.

Behaviour of zinc and lead arsenites and arsenates at high temperatures. I. M. DUBROVIN (J. Appl. Chem. Russ., 1936, 9, 49-60).-Zn₃(AsO₃)₂ (I) yields ZnO and As₂O₃ when heated at 400-500°; at 500-550° oxidation-reduction reactions take place, associated with sublimation of As, leaving a residue of $Zn_3(AsO_4)_2$ (II) and ZnO. At $550-675^{\circ}$ loss of As is small, the reaction consisting chiefly of (I)+ $O_2 \Rightarrow$ (II), whilst at > 675° (II) dissociates as follows: (II) \Rightarrow ZnO+As₂O₃+O₂. Decomp. of Pb₃(AsO₃)₂ commences at 250°, and is associated with oxidation by atm. O₂; at 700-850° the reaction consists almost exclusively of oxidation to arsenate, which undergoes thermal decomp. at 1000°. R. T.

Dehydration of sodium niobates. P. SUE (Compt. rend., 1936, 202, 762–764).—In the dehydration of $6Nb_2O_5$, $7Na_2O$, $32H_2O$ intermediate diand tetra-hydrates were formed. Dehydration commenced at 80°. The tetrahydrate was stable at 110°. Nb₂O₅,Na₂O,7H₂O was stable up to 40°. It yielded a monohydrate, stable to 110°.

H. J. E. Existence of perchromic acid, H₂CrO₈,2H₂O. R. SCHWARZ and G. ELSTNER (Ber., 1936, 69, [B], 575-579).—The product of the interaction of CrO₃ and conc. H₂O₂ in Me₂O is the etherate CrO₅, Me₂O, which is stable at low temp. and does not possess appreciable vapour tension, but explodes with great violence at $> -30^{\circ}$. The compound $H_3CrO_8, 2H_2O$ (Riesenfeld *et al.*, A., 1914, ii, 279) does not exist. The reaction between CrO₂Cl₂ and H₂O₂ does not lead to a definite product, an equilibrium, formulated $\operatorname{CrO}_{2}\operatorname{Cl}_{2} + 2\operatorname{H}_{2}\operatorname{O}_{2} \Longrightarrow \operatorname{CrO}_{5} + 2\operatorname{HCl} + \operatorname{H}_{2}\operatorname{O},$ being reached. H. W.

Reinecke's salt, NH₄[**Cr**(**NH**₃)₂(**SCN**)₄],**H**₂**O**. H. D. DAKIN (Org. Syntheses, 1935, **15**, 74–76). The prep. from NH4SCN and (NH4)2Cr2O7 is described. CH. ABS. (r)

Reaction of tris-3-hydroxyethylamine with tungstic acid. F. GARELLI and A. TETTAMANZI (Gazzetta, 1935, 65, 1239-1243).—The prep. of the following compounds is described

 $\begin{array}{c} [\mathrm{R} = \mathrm{NH}(\mathrm{CH}_2,\mathrm{CH}_2,\mathrm{OH})_3]: \\ \mathrm{R}_6\mathrm{H}_4[\mathrm{H}_2(\mathrm{W}_2\mathrm{O}_7)_6], 2\mathrm{H}_2\mathrm{O}; \\ \mathrm{(NH}_4)_0\mathrm{RH}_4[\mathrm{H}_4(\mathrm{WO}_4)_6(\mathrm{W}_2\mathrm{O}_7)_3], 4\mathrm{H}_2\mathrm{O}; \\ \mathrm{(NH}_4)_5\mathrm{R}_5\mathrm{H}_4[\mathrm{H}_4(\mathrm{WO}_4)_6(\mathrm{W}_2\mathrm{O}_7)_3], 3\mathrm{H}_2\mathrm{O}; \\ \mathrm{(NH}_4)_5\mathrm{R}_5\mathrm{H}_4[\mathrm{H}_4(\mathrm{WO}_4)_6(\mathrm{W}_2\mathrm{O}_7)_3], 3\mathrm{H}_2\mathrm{O}; \\ \mathrm{(NH}_4)_2\mathrm{O}, \mathrm{R}_2\mathrm{O}, 6\mathrm{WO}_3; \\ \mathrm{(NH}_4)_2\mathrm{O}, \mathrm{R}_2\mathrm{O}, 0\mathrm{WO}_3 + \mathrm{O}_4\mathrm{O$ (NH₄)₂O,2R₂O,9WO₃,3H₂O. 0. J. W. Phospho- and silico-tungstates.—See this vol., 620.

Hydrogen bromide (anhydrous). J. R. Ru-HOFF, R. E. BURNETT, and E. E. REID (Org. Syntheses, 1935, 15, 35–38).—Prep. from H₂ and Br is described. CH. ABS. (*p*)

Preparation and properties of bromine oxide Br₂O. W. BRENSCHEDE and H. J. SCHUMACHER (Z. anorg. Chem., 1936, 226, 370-384; cf. A., 1935, 1334).—No Br₂O could be isolated after heating Br in presence of HgO, or after passing Br vapour over heated HgO. It was obtained in concn. $\Rightarrow 50\%$ of the total [Br] by action of HgO on Br in CCl₄. The reaction probably occurs thus : HgO+Br₂=HgOBr₂; HgOBr₂+Br₂=HgBr₂+Br₂O. The absorption spectrum of the Br₂O solution in the visible region has been measured. J. W. S.

Exchange reactions of iodine by the method of radioactive indicators. D. E. HULL, C. H. SHIFLETT, and S. C. LIND (J. Amer. Chem. Soc., 1936, 58, 535).—Preliminary results, indicating exchange between I and radio-I, are reported. E. S. H.

Action of nascent iodine and hydriodic acid on oxides. E. MONTIGNIE (Bull. Soc. chim., 1936, [v], 3, 704—705).—I and HI, liberated from CHI_3 by photochemical decomp., can react with the oxides of alkali and alkaline-earth metals, Ag_2O , HgO, $Ni(OH)_2$, and $Cu(OH)_2$ to form iodides. E. S. H.

Preparation and properties of pure iron. J. G. THOMPSON and H. E. CLEAVES (J. Res. Nat. Bur. Stand., 1936, 16, 105-130).—A crit. review of available information. E. S. H.

Modern theories of corrosion. I. Water-line corrosion. J. E. O. MAYNE (J.C.S., 1936, 366– 368).—A steel plate partly immersed in de-aërated 0.01-0.1N-KCl in vac. corrodes at the water-line and Fe(OH)₂ is formed. This reaction, which does not occur when the plate is completely immersed, may be due to the potential existing at the surface of the solution. Corrosion is retarded by adding EtOH, possibly owing to negative adsorption of the solute at the surface of the solvent. Similarly, water-line corrosion is caused by KBr, KI, KNO₃, and K₂SO₄, but not by KClO₃, KOH, K₂CrO₄, K₂CO₂, and Na₂HPO₄. J. G. A. G.

Fundamental theories of metal corrosion. I. IITAKA (Bull. Inst. Phys. Chem. Res. Japan, 1936, 15, 131—146).—Necessary and abs. factors to promote corrosion of the following metals are shown in parentheses: Fe (H₂O, O₂), Al (H₂O, O₂, Cl'), Mg (H₂O, Cl'), Cu (H₂O, Cl'), Zn (H₂O), α -brass (H₂O, Cl'), α + β -brass (H₂O, Cl', O₂). Equations for the mechanism of corrosion are given. N. M. B.

Oxides. VII. Thermal dissociation of γ -Fe₂O₃. A. SIMON and A. LANDGRAF (Kolloid-Z., 1936, 74, 296-300; cf. A., 1932, 468).—Tensicudiometric and X-ray investigations show that γ -Fe₂O₃ is unchanged by heating in vac. at 300°. Observations to the contrary are due to the presence of reducing agents, which cause conversion into Fe₃O₄ and α -Fe₂O₃. Finely-divided Pt does not catalyse the decomp. of γ -Fe₂O₃ at 300°. E. S. H. Ferric oxalate. C. DUVAL (Compt. rend., 1936, 202, 845—846).—The absorption spectrum of aq. Fe^{III} oxalate is identical with that of K ferrioxalate and, under the influence of an electric current, Fe^{III} migrates to both anode and cathode. These results apparently confirm the formula Fe[Fe(C_2O_4)₃],4H₂O. Since, however, there is no reaction with KSCN, the cationic Fe is apparently not free and a probable formula is [Fe(H₂O)₄][Fe(C_2O_4)₃]. An examination of the ionic migration in abs. EtOH supports this formula, since H₂O is detected at the cathode only, by the use of a very hygroscopic complex Co chloride.

Preparation of alkali ferrates. II. Basicity and chemical properties of ferrates. A. D. DEL BOGA (An. Farm. Bioquim, 1934, 5, 120—126; Chem. Zentr., 1935, ii, 817).—FeO₂ is considered to be O:Fe:O, giving rise to salts M_2 FeO₃ without peroxidic properties. With acids, autoxidation occurs, H_2 FeO₄ and its salts being formed. H_2O_2 initially yields H_2 FeO₄, finally giving H_2O_2 . HMnO₄ yields Mn^{*}, Fe^{III}, and O₂. J. S. A.

Bisdimethylglyoxime diamine cobaltic salts and their configuration.—See this vol., 598.

Formation and decomposition of nickel ferrites. A. D. POGORELUI (Tzvet. Metal, 1935, No. 2, 79-96).—NiO,Fc₂O₃ was prepared by heating NiO and Fc₂O₈ at 600—1000°. The products dissolved more slowly in aq. HCl and H₂SO₄ than did NiO, and were less readily reduced by CO and H₂. Reaction with CaS proceeded equally readily in both cases. That with SO₂ or SO₃ at 550° proceeded more readily with NiO,Fe₂O₃ than with NiO. CH. ABS. (e)

Nickel ammine complexes. IV. Nickel hexammine and tetrammine compounds with water of crystallisation. E. J. KOCSIS (Magyar chem. Fol., 1934, 40, 147—150; Chem. Zentr., 1935, ii, 494). —The following *compounds* are described:

 $\begin{array}{ll} & [\mathrm{Ni}(\mathrm{NH}_3)_6](\mathrm{ClO}_3)_2, \ [\mathrm{Ni}(\mathrm{NH}_3)_6](\mathrm{ClO}_4)_2, 2\mathrm{H}_2\mathrm{O}, \\ & [\mathrm{Ni}(\mathrm{NH}_3)_6]\mathrm{MoO}_4, \ [\mathrm{Ni}(\mathrm{NH}_3)_6]\mathrm{S}_2\mathrm{O}_3, 2\mathrm{H}_2\mathrm{O}, \\ & [\mathrm{Ni}(\mathrm{NH}_3)_6]\mathrm{S}_2\mathrm{O}_6, 2\mathrm{H}_2\mathrm{O}, \ [\mathrm{Ni}(\mathrm{NH}_3)_4](\mathrm{CN})_2, 2\mathrm{H}_2\mathrm{O}, \\ & [\mathrm{Ni}(\mathrm{NH}_3)_4](\mathrm{SCN})_2, 2\mathrm{H}_2\mathrm{O}, & \mathrm{H. J. E}. \end{array}$

Ruthenium carbonyls and nitrosyls. W. MANснот and W. J. MANCHOT (Z. anorg. Chem., 1936, 226, 385-415).-Action of CO at 180°/200 atm. on Ru yields the compound Ru(CO)₅ (I), m.p. -22°. (I) decomposes in light or an warming, yielding orangeyellow crystals of the compound, Ru₂(CO)₉ (II), which is best prepared by heating a solution of (I) in C_6H_6 . (II) is stable in light and air, in org. solvents, and in conc. HCl. Decomp. begins at 150° in air and at 200° in absence of O2. Another carbonyl, of unknown composition, is obtained as a green amorphous powder in the decomp. of (I) and by the action of dil. alkali on (II). Compounds $\operatorname{RuX}_2(\operatorname{CO})_2$ are obtained by action of halogens on (II). When heated with Ag in a current of CO these yield (I). The action of NO on (II) yields a nitrosyl compound, $\operatorname{Ru}(\operatorname{NO})_4$ or $\operatorname{Ru}(\operatorname{NO})_5$. These compounds are compared with the correspond-J. W. S. ing Fe compounds.

Collision effects in mechanical analysis by Oden's method. A. ROMWALTER (Mitt. berghuttenm. Abt. Univ. Sopron., 1934, 6, 52-57; Chem.

M. S. B.

Zentr., 1935, ii, 886).—The method eliminates possible errors in sedimentation analysis due to collision effects. J. S. A.

Capillary analysis and its applications. R. DUBRISAY (Bull. Soc. chim., 1936, [v], 3, 631—640).— The change of surface tension produced by addition of alkali or acid can be used as a means of tracing titration curves. Examples of the application of this principle to acid-alkali and similar reactions are given. E. S. H.

Analytical notes. H. TRAPP (Z. anal. Chem., 1936, 104, 255—257).—(a) Approx. formulæ are given for calculating the composition of gas mixtures by the displacement of one gas from a known vol. by another gas at a measured streaming rate. (b) $SnCl_4$ is reduced by Sn to $SnCl_2$. J. S. A.

Difficulties in colorimetric determination of $p_{\rm H}$ values. A. B. Cox (Soc. Chem. Ind. Victoria, 1935, 35, 1001—1005).—Sources of error in colorimetric $p_{\rm H}$ determinations on biological solutions due to (a) reaction of NH₂-acids with certain indicators (e.g., bromocresol-purple), (b) formation of coloured lakes by Cu and other metals, (c) colour matching by light of composition differing from sunlight are discussed. J. S. A.

Determination of $p_{\rm H}$. A. VAN VIANEN (Pharm. Weekblad, 1936, 73, 350—352).—The accuracy of $p_{\rm B}$ determinations using a commercial comparator consisting of a mixed indicator and a series of comparison tubes was determined by comparing the results obtained by 17 observers for the same standard buffer solutions. An accuracy of ± 0.2 —0.5 was obtained. D. R. D.

Absolute colorimetry. XIII. Azobilirubin as an indicator. A. THIEL and H. LOGEMANN (Biochem. Z., 1936, 284, 347—352; cf. this vol., 44).— The light extinction curves of azobilirubin (prepared from bilirubin by diazotisation in EtOH-CHCl₃ and extraction with Et₂O) are given for the $p_{\rm H}$ range of 1.54—3.10 (red—blue) (cf. A., 1934, 912; 1935, 1290). Anomalous colour changes occur in the presence of certain buffer salts. F. O. H.

Titration of hydrogen peroxide in presence of oxalic acid (alkali oxalates). A. SIMON and T. REETZ (Z. anal. Chem., 1936, 104, 249–255).— Total $H_2O_2+C_2O_4''$ is titrated with KMnO₄, first at room temp. (H_2O_2) and then in hot solution. To a second portion an excess of M-Ca(NO₃)₂ in 10% aq. NH₃ is added, +FeCl₂ as catalyst, and the H_2O_2 is then destroyed by boiling. The solution is finally acidified with H_2SO_4 , and C_2O_4'' is titrated with KMnO₄. J. S. A.

Mercurometry. Titration of halogens. M. SCHTSCHIGOL (Ann. Chim. Analyt., 1936, [iii], 18, 61-64).—The solution of Cl' or Br' + a mixture of 0.05N·NH₄CNS and Fe(NO₃)₃ is titrated with 0.1N-Hg₂(NO₃)₂ until colourless. I' is treated with an excess of Hg₂(NO₃)₂, and the ppt. of Hg₂I₂+HgI₂+Hg is filtered off. Excess of Hg' in the filtrate is oxidised with KMnO₄, and is then titrated back with NH₄CNS.

(A) Determination of chlorates, bromates, and iodates by the use of liquid amalgams. (B) Application of Wood's alloy as a reducing reagent. P. G. POPOV (Ukrain. Chem. J., 1935, 10, 413–416, 428–430).–(A) ClO_3' is determined by adding 10 ml. of 50% H_2SO_4 to 10 ml. of the solution, and shaking for 10 min. with Zn-Hg, after which Cl' is determined by Volhard's method. BrO_3' and IO_3' are determined similarly, except that $7N-H_2SO_4$ is used, and the titration is performed after 3 min.

(B) Wood's alloy may be substituted for Zn-Hg in the above procedure (at 90°). R. T.

Sensitive reaction for chlorates, bromates, and sulphites. I. M. KORENMAN (J. Appl. Chem. Russ., 1936, 9, 157—158).—A mixture of 1 drop of solution, 1 drop of 0.02% indigo-carmine, 1 drop of saturated aq. Na₂SO₃, and 1 drop of 3N-HCl is decolorised in presence of $< 0.2 \times 10^{-6}$ g. of KClO₃, or 0.24×10^{-6} g. of KBrO₃ or K₂Cr₂O₇; Fe(CN)₆^{''} and IO₃' do not interfere. The reaction is given by MnO₄' and OCl' in absence of Na₂SO₃. SO₃'' (< 1.6 in 10⁶) can be detected by the above reaction with KClO₃, but without Na₂SO₃; S'' and S₂O₃'' interfere. R. T.

Determination of iodine in air. H. CAUER (Z. anal. Chem., 1936, 104, 161–169).—A measured vol. of air is washed intensively through 13% aq. K₂CO₃, using the apparatus described previously (this vol., 47). For work at low temp., saturated aq. K₂CO₃ may be used. The K₂CO₃ solution is evaporated down, and K₂CO₃ is pptd. by addition of EtOH. The EtOH containing KI is decanted, evaporated, and the separation from K₂CO₃ repeated. The residue so obtained, freed from org. matter by cautious heating, is dissolved in 0.3 e.c. of H₂O. 0.02 e.c. of CHCl₃ is added, and I is liberated by addition of 0.05 c.c. of 3N-H₂SO₄ containing NaNO₂. The colour of the CHCl₃ drop is matched against solutions of known I content. Alternatively, I may be oxidised to IO₃' with Cl-H₂O. KI is added, and the I liberated is titrated with 0.004N-Na₂S₂O₃. J. S. A.

Titrations with 0.001*N*-iodine. A. B. Cox (Soc. Chem. Ind. Victoria, 1935, **35**, 996–1000).—The indicator correction may be reduced by adding 0.25 ml. of 0.2N-KI per 20 ml. of solution. Titration of I with 0.001N-Na₂S₂O₂ is not practicable.

J. S. A.

Standard iodine solutions. A. H. SCOTT (J. Biol. Chem., 1936, 113, 511-513).—I solutions diluted with H_2O show an apparent loss of I; titrations should be made in 0.3M-KI. F. A. A.

Hydrochemical analysis. I. [Determination of hydrogen sulphide.] W. OHLE (Angew. Chem., 1936, 49, 206–208).—H₂S in H₂O is pptd. as CdS immediately after sampling by the addition of slightly acid 50% aq. CdSO₄. The ppt. is collected and treated with acidified 0.01N-I. The excess of I is titrated back with 0.02N-Na₂S₂O₃. J. S. A.

Reversible indicator for detection of small quantities of hydrogen sulphide in the atmosphere.—See B., 1936, 349.

Direct titration of sulphates. Tetrahydroxybenzoquinone as internal indicator. R. T. SHEEN and H. L. KAHLER (Ind. Eng. Chem. [Anal.], 1936, 8, 127-130).—The procedure of Schroeder (A., 1934, 46) is modified so as to extend the range of [SO₄"]. $PO_4^{\prime\prime\prime}$ interferes, but when > 60 p.p.m. are present can be eliminated by $p_{\rm fl}$ control. EtOH may be replaced by $Pr^{\rm e}OH$. The end-point may be sharpened by adding NaCl. E. S. H.

Determination of sulphate by titration with lead nitrate, using eosin as indicator. J. E. RICCI (Ind. Eng. Chem. [Anal.], 1936, 8, 130–132).— 0.10-0.25 g. of Na₂SO₄ may be determined by titration with 0.1M-Pb(NO₃)₂, using 0.5% eosin as indicator, with an accuracy of about 0.0005 g. of Na₂SO₄. E. S. H.

Determination of selenocyanides in presence of cyanides. R. RIPAN-TILICI (Z. anal. Chem., 1936, 104, 189–192).—The potential curve shows discontinuities corresponding with formation of $[Ag(CN)_2]'(a)$; pptn. of AgSeCN (b); and pptn. of AgCN (c). Then SeCN'=(a) - (b). J. S. A.

Semi-micro-method of analysis for nitrogen. A. R. RONZIO (Ind. Eng. Chem. [Anal.], 1936, 8, 122– 123).—The main difficulties in the Dumas method are avoided by placing at the end of the combustion tube a heated section containing I_2O_5 . A modified nitrometer is recommended. E. S. H.

Determination of small amounts of nitric acid in sulphuric acid.—See B., 1936, 316.

Determination of total oxidising power, nitrite, ozone, and total chlorine in air. II.— See B., 1936, 349.

Colour reaction for nitric acid. A. S. VASILIEV (J. Appl. Chem. Russ., 1936, 9, 155–156).—3 drops of 0.1% β -methylumbelliferone in conc. H₂SO₄ are added to 2 drops of the solution, and 2 litres of H₂O are added; a lemon-yellow coloration is obtained in presence of 0.5×10^{-6} g. of HNO₃. R. T.

Determination of nitrate, nitrite, and ammonia in water and effluents.—See B., 1936, 398.

Determination of ortho- in presence of pyrophosphate by Copaux' method. J. COURTOIS (J. Pharm. Chim., 1936, [viii], 23, 232–238).—Conditions for accuracy have been determined (A., 1921, ii, 707). P_2O_7''' is also pptd. by NH₄ Mg reagent by heating in dil. AcOH, PO₄''' being pptd. from the filtrate on adding alkali. F. O. H.

Acidimetric determination of water-soluble and total phosphoric acid in superphosphate.— See B., 1936, 368.

Spectral-analytical determination of arsenic, phosphorus, and sulphur in metals, particularly platinum.—See B., 1936, 375.

Application of Copaux' technique to determination of arsenic acid. J. COURTOIS (J. Pharm. Chim., 1936, [viii], 23, 269–283).—Acid solutions containing $AsO_4^{\prime\prime\prime}$, treated with Na_2MoO_4 in presence of Et_2O , ppt. an oil of very indefinite composition, considered to be AsO_4 ,12 MoO_3 ,24–27 Et_2O ,24– 33 H_2O , which may be separated and measured. The method is proposed for the determination of $AsO_4^{\prime\prime\prime}$ in presence of $AsO_3^{\prime\prime\prime}$, HCl solutions giving the least unsatisfactory results. J. S. A.

Determination of arsenic in steel.—See B., 1936, 323.

Ignition of silicic acid. K. A. KRIEGER and H. S. LUKENS (Ind. Eng. Chem. [Anal.], 1936, 8, 118).—SiC may be produced when SiO₂ ppts. arc ignited in contact with a moist filter-paper.

E. S. H.

Determination of silica in presence of fluorine. S. S. KOROL and V. M. KALUSHSKAJA (J. Appl. Chem. Russ., 1936, 9, 148—151).—The methods of Tischtschenko *et al.* (cf. A., 1932, 488) and of Millner *et al.* (A., 1933, 41) are equally trustworthy for determining SiO₂ in presence of F compounds; that of Tananaev and Babko (B., 1930, 863, 1110) is preferred for silicofluorides. Siegel's method (A., 1929, 1158) is applicable to all cases. R. T.

Detection and determination of carbon monoxide and dioxide in air.—See B., 1936, 396.

Colorimetric micro-determination of cyanides. Application to officinal preparations, especially to mercuric cyanide. A. D. MARENZI and A. J. BANDONI (An. Farm. Bioquim., 1934, 5, 135—140; Chem. Zentr., 1935, ii, 883).—CN' is converted into CNS' and determined as such. H. N. R.

Analysis of alkali metals. I. Separation of alkali metals. II. Determination of alkali metals. T. KATÔ (J. Chem. Soc. Japan, 1935, 56, 373-397, 398-410).—I. MeOAc is recommended instead of EtOH for dissolving Na₂PtCl₆ and Li₂PtCl₆.

II. The determinations of Li and Na by treating the platinichlorides with MeOAc, of Rb as $Rb_4P_2O_7,24WO_3$, of Cs as $CsP_2O_7,24WO_3$, and of Li as Li_2SO_4 are described. CH. ABS. (e)

Analysis of the system $NH_2 \cdot CO_2 NH_4$, $NH_2 \cdot CO_2 Na$, $NH_4 Cl$, NaCl, and adsorbed NH_3 . I. L. SCHERESCHEVSKI (J. Appl. Chem. Russ., 1936, 9, 166-170).—A scheme for the analysis of mixtures of the above substances is given. R. T.

Drop reaction for cæsium, and its adaptation to drop colorimetry. E. S. BURKSER and M. L. KUTSCHMENT (J. Appl. Chem. Russ., 1936, 9, 145— 147).—A drop of the solution is placed on a drop of conc. aq. AuBr₃-PtBr₄ on filter-paper, when a black stain due to the compound $Cs_2Au_2PtBr_{12}$ (decomp. 175—180°) is formed in presence of $< 0.25 \times 10^{-6}$ g. of Cs. NH₄, K, Na, and Li do not interfere, but Rb gives a similar reaction when present in considerable amount. The amount of Cs may be determined by comparing the intensity of the stain obtained with a series of standards. R. T.

Precipitation of silver chloride. II. From silver nitrate and hydrochloric acid. C. H. GREENE and L. D. FRIZZELL (J. Amer. Chem. Soc., 1936, 58, 516—522; cf. A., 1934, 860).—Nephelometric investigations reveal two distinct stages: an initial, rapid growth in opalescence, followed by a period of slow development to a max. and subsequent fall. The rate of development depends mainly on the concn. of the reagent in excess. Centrifugal, ultramicroscopical, and coagulation experiments support the view that there is a progressive diminution of particle size with the increasing supersaturation that results from increased concn. of pptg. reagent.

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Analysis of groups I, II, and III cations in presence of phosphoric acid. C. N. POTSCHINOK (J. Appl. Chem. Russ., 1936, 9, 140—144).—Group I metals are detected by the usual procedure, as are group II and III cations after elimination of PO₄^{'''} as AlPO₄. R. T.

Precipitation of barium sulphate in presence of hydrochloric and nitric acids, in the cold. L. A. VASILIEVA (Trans. Kirov Inst. Chem. Tech. Kazan, 1935, No. 4—5, 97—105).—The wt. of the ppt. obtained rises with increasing $[HNO_3]$ to a max. when H_2SO_4 : $HNO_3=1:60$, and then falls to the theoretical val. when the ratio is 1:150; the variations obtained in presence of HCl are similar, although less marked. The phenomena are ascribed to co-pptn. of BaCl₂ or Ba(NO₃)₂, together with diminishing [Ba''] and [SO₄''] due to reversal of dissociation. R. T.

Precipitation of barium sulphate. N. A. RUD-NEV (Trans. Kirov Inst. Chem. Tech. Kazan, 1935, No. 4-5, 107-109).—The amount of precipitant pptd. together with $BaSO_4$ when different salts of Ba are added to aq. H_2SO_4 varies inversely with the solubility of the precipitant, and directly with the conen. of its anion; hence $Ba(NO_3)_2$ is co-pptd. even in absence of HNO_3 , $BaCl_2$ in presence of HCl, and $BaBr_2$ only when H_2SO_4 : HBr=1:240. R. T.

Determination of magnesium metal, magnesia, and magnesium fluoride in the products of electrolytic recovery of metallic magnesium.— See B., 1936, 329.

Determination of zinc in sea-water using sodium diethyldithiocarbamate. W. R. G. ATKINS (J. Marine Biol. Assoc., 1936, 20, 625).—The approx. concn. is determined by adding 10 c.c. of a 0.1%solution of the reagent to Nessler tubes containing the test sample and various concns. of Zn in neutral solution, respectively. The comparison is completed in Hehner tubes. The colour due to Cu obtained with conc. sea-water can be compared with the white standards if a Schott No. 0G2 filter is used in conjunction with the latter. English Channel water contains < 8 mg. per cu.m., the limit of detection.

J. W. S.

[Detection and determination of] cadmium. K. HELLER and F. MACHEK (Mikrochem., 1936, 19, 147-161).—A review.

Volumetric determination of lead by Fajans' method. S. N. Roy (J. Indian Chem. Soc., 1936, 13, 40-41).—Na₂CO₃ with a Na fluoresceinate indicator has been employed. E. E. A.

Rational analysis of lead compounds in oxide and semi-sulphide lead ores.—See B., 1936, 317.

Polarometric titrations. V. MAJER (Z. Elektrochem., 1936, 42, 120—123).—By measuring the current between two electrodes to which a const. p.d. is applied, one of the electrodes having a large surface of Hg at rest (and therefore unpolarisable for sufficiently small currents) and the other being a dropping Hg electrode, "polarometric" titrations involving pptn., neutralisation, or complex formation, as well as oxidation and reduction, can be carried out. The principles of the use of a dropping Hg cathode are discussed. F. L. U. Polarometric precipitation titrations with dropping mercury cathode. V. MAJER (Z. Elektrochem., 1936, 42, 123—127; cf. preceding abstract). —Results of polarometric titrations of $Pb(NO_3)_2$ with H_2SO_4 and of BaCl₂ with K_2SO_4 (all 0·1*N*) are given and discussed. F. L. U.

Determination of copper in presence of interfering elements. Modified iodometric method. H. W. FOOTE and J. E. VANCE (Ind. Eng. Chem. [Anal.], 1936, 8, 119—121).—The modified iodometric procedure (A., 1935, 837), with controlled $p_{\rm H}$, may be used to determine Cu accurately in presence of Sb^v or As^v. Addition of NaF prevents the interference of Fe^{III}. E. S. H.

Objective colorimetric determination of copper. C. A. GOETHALS (Z. anal. Chem., 1936, 104, 170—182).—Using a photo-electric colorimeter and filtered light, Cu may be determined colorimetrically by the following methods, at conens. down to the limit indicated. (a) As CuSO₄ in acid solution; limit 2×10^{-3} mol. per litre. (b) As $[Cu(C_5H_5N)_4]^{"}$ in presence of $0.5M.C_5H_5N+0.003M.H_2SO_4$; limit 3×10^{-4} mol. per litre. (c) As $[Cu(NH_3)_4]^{"}$ in presence of 10 c.c. of 28% aq. NH_3+20 g. of NH_4Cl in 300 c.c. of solution; limit 5×10^{-4} mol. per litre. (d) In neutral solution in the absence of Fe, Zn, or an excess of other electrolytes, from the colour of colloidal suspensions of $Cu_2Fe(CN)_6$; limit 3×10^{-5} mol. per litre. (e) From the colour given by Cu with oxidised dimethylglyoxime (I). To the slightly acid solution, C_5H_5N is added, and then $(I)+(NH_4)_2S_2O_8+$ 5 c.c. of $0.01M.AgNO_3$ as catalyst. An unstable reddish violet colour is developed; limit 2×10^{-6} mol. of Cu per litre. (f) From the catalytic accelerating effect of Cu" on the Fe-Na_2S_2O_3 reaction, in presence of NH₄CNS as indicator; limit 2×10^{-6} mol. per litre. By adding to an Ag solution 2 c.c. of $0.01M.CuSO_4$, method (e) may be applied to the determination of 10^{-5} mol. of Ag per litre. J. S. A.

Iodometric determination of copper in sugar and other liquids containing organic substances. —See B., 1936, 388.

Permanganate method of determining reduced copper in the determination of reducing sugars. —See B., 1936, 388.

Inorganic complex compounds in analytical chemistry. IV. Detection and determination of mercury. C. MAHR (Z. anal. Chem., 1936, 104, 241-245; cf. this vol., 179).—Hg is pptd. by aq. $NH_4[Cr(CNS)_4(NH_3)_2]$ from acid (0·1*N*-HCl) solution as the very insol. salt Hg[Cr(CNS)_4(NH_3)_2]_2 (I). $2\cdot5 \times 10^{-6}$ g. of Hg may be so detected in presence of 20,000 parts of Cu or Pb, or 5000 parts of Cd. (I) is quantitatively pptd. from hot HCl solution, and may be dried at 105°, or ignited to Cr₂O₃. Alternatively, (I) may be dissolved in aq. KCN+HCl. Cr is then oxidised to CrO₄" by means of KBrO₃, and determined iodometrically. J. S. A.

Volumetric determination of mercuric chloride. C. CHINES (Ann. merc. Siciliana, 1934, 2, 282— 286).—To 50 c.c. of boiling Fehling's CuSO₄ solution are added 10 c.c. of a solution of approx. 0.5 g. of HgCl₂ and 6 g. of KI in 100 c.c. of H₂O. On cooling and keeping, $Cu(NH_3)_4HgI_4$ is pptd. It is filtered off, and excess of I is determined in the filtrate after acidifying with AcOH. CH. Abs. (e)

Determination of aluminium in presence of iron. W. DAUBNER (Angew. Chem., 1936, 49, 137– 138).—Fe is determined by reduction of FeCl₃ to FeCl₂ by HI (Mohr's method); the HI is added dropwise to the heated and agitated solution, any volatilised I being trapped. Another portion of the solution is treated, in presence of AcOH, with $(NH_4)_3AsO_4$, and the ppt. $[AlAsO_4 + Fe_2(HAsO_4)_3]$ is washed with 90% EtOH and dissolved in HCl. The H₃AsO₄ in this solution is determined in known manner by reduction with HI; by subtracting the amount equiv. to the Fe present that equiv. to the Al is obtained, whence the Al present can be calc.

A. B. M.

Analysis of aluminium alloys.—See B., 1936, 327.

Determination of gallium in aluminium.—See B., 1936, 327.

Detection of rhenium in the sodium carbonate bead. H. YAGODA (Ind. Eng. Chem. [Anal.], 1936, 8, 133—134).—With 0.015 mg. of Re a transitory yellow is formed in the oxidising or reducing flame. Tungstates and molybdates do not interfere.

E. S. H. Determination of rhenium. II. Geilmann reaction. L. C. HURD and B. J. BABLER (Ind. Eng. Chem. [Anal.], 1936, 8, 112—114; cf. A., 1932, 1224).— The conditions under which the Geilmann reaction gives quant. results have been determined.

E. S. H.

Determination of iron in sea-water. N. W. RAKESTRAW, H. E. MAHNCKE, and E. F. BEACH (Ind. Eng. Chem. [Anal.], 1936, 8, 136–138).—Mg and Fe are co-pptd. by boiling with NH_4HS . FeS is dissolved in dil. HCl, oxidised with Br, and pptd. as $Fe(OH)_3$ by aq. NH_3 . The ppt. is redissolved in HCl, oxidised, and Fo is determined colorimetrically by KCNS. The colour is stabilised by the addition of $OH \cdot [CH_2]_2 \cdot OBu$. E. S. H.

Brucine sulphate as internal indicator in titrations with standard dichromate solution. D. S. NARAYANAMURTHI and T. R. SESHADRI (Proc. Indian Acad. Sci., 1936, 3, A, 38–42; cf. A., 1933, 800).—With a 1% solution of brucine in 3N-H₂SO₄ as indicator, and total acidity < 2N, the colour change (green to red) is more distinct than that of NHPh₂, and its distinctness is unaffected by Fe^{***} (in large excess), Hg^{**}, Hg₂^{**}, or Sn^{****}. It can also be used in titration of Fe^{**} with KMnO₄ in presence of HCl. L. J. J.

Diphenylcarbazide. An internal indicator for use in the titration of iron with dichromate. H. E. CROSSLEY (Analyst, 1936, 61, 164—169).— A standardised method is described. The endpoint, from violet to colourless, is very sharp and the titration is not affected by the previous use of SnCl₂ and HgCl₂ or Zn for reduction. A correction is necessary for the amount of indicator oxidised, but the method is of general application and gives accurate results. E. H. S.

Determination of iron by titanium titration and by 2:2'-dipyridyl colorimetry. W. D. MCFARLANE (Ind. Eng. Chem. [Anal.], 1936, 8, 124-126).—A horizontal micro-burette for titration with dil. TiCl₂ solutions is described. Modified colorimetric procedure is recommended. E. S. H.

Spectral determination of chromium [alloyed with aluminium].—See B., 1936, 375.

Tests for molybdenum, lead, and cobalt in minerals and rocks. H. LEITMELER and F. FEIGL (Tsch. Min. Petr. Mitt., 1936, 47, 313–327).—The following are delicate colour reactions for detecting the presence of minute quantities. Ca xanthate gives a reddish-violet colour with Mo. In AcOH solution benzidine gives a deep blue with PbO (in the absence of Mn). Alkali thiocyanates form double salts with Co (even in presence of much Fe and Ni) which are sol. in a mixture of Et_2O and EtOH giving a blue colour. L. J. S.

New indicators for direct titration of tungstate with lead nitrate. Z. RAICHINSTEIN and N. KORO-BOV (Z. anal. Chem., 1936, 104, 192–198; cf. A., 1935, 951).—Diamine-scarlet and diamineazo-scarlet may be used as adsorption indicators. The presence of NH_4NO_3 interferes. J. S. A.

Separation of stannic oxide from various oxides by ignition with ammonium iodide. Application to analytical purification of ignited stannic oxide. E. R. CALEY and M. G. BURFORD (Ind. Eng. Chem. [Anal.], 1936, 8, 114—118).— SnO_2 is quantitatively volatilised as SnI_4 when heated at 400—500° with excess of NH_4I . Separation from most other oxides may thus be effected. In the determination of Sn in alloys as SnO_2 , the method may be used advantageously for purification of SnO_2 . E. S. H.

Precipitation of tin and antimony salts by organic bases in presence of potassium iodide: application to analytical characterisation of these metals. J. A. GAUTIER (J. Pharm. Chim., 1936, [viii], 23, 283—290).—Antipyrine (I) gives with solutions of Sb in presence of KI a yellow-orange ppt.; Sn similarly gives a less sensitive white ppt. The reaction is applied to the solution, containing Sb but little Sn, obtained by digesting the Sb, Sn, and As sulphides with HCl at 80°. Other org. bases give reactions similar to, but less sensitive than, that of (I). J. S. A.

Determination of tin in minerals and metallurgical residues by 0.1*N*-potassium bromate.— See B., 1936, 278.

Colour reaction of titanium with ascorbic acid and other molecules containing the group ·C(OH):C(OH). J. ETTORI (Compt. rend., 1936, 202, 852—854).—When a very dil. solution of Ti(SO₄)₂ is added to ascorbic acid no coloration is observed at $p_{\rm H} <3$. At $p_{\rm H}$ 3 there is a light yellow coloration which gradually changes until it becomes an intense reddish-brown at $p_{\rm H}$ 4-6. This diminishes with diminishing acidity and disappears at $p_{\rm H}$ 5-2. In alkaline solution the colour is pale rose. With too large a proportion of Ti(SO₄)₂ pptn. of Ti(OH)₄ may take place with decolorisation of the solution. All other compounds found to give the same type of reaction, e.g., dihydroxymaleic acid, pyrocatechol, gallic acid, etc., contain the group •C(OH):C(OH). M. S. B.

Determination of gold with avoidance of the cupellation process. J. DONAU (Z. anal. Chem., 1936, 104, 257-270).-A method described previously (cf. A., 1935, 1096) is improved. A Cd (87%)-Zn alloy is used for inquartation, permitting the use of glass ignition tubes. In presence of Pd repeated treatment of the inquartation mass with HNO₃ is necessary: with >20% of Pd repeated inquartation may be required. In the presence of Sn, the Au+ SnO, resulting from the HNO, treatment of the inquartation mass is heated with an excess of NH₄Cl, whereby Sn is quantitatively removed as SnCl₄.

J. S. A.

Apparatus for extraction on a very small scale. K. SCHMALFUSS (Chem. Fabr., 1936, 9, 161-162).-- A modified Soxhlet apparatus has the advantage of using only small amounts of substance and of solvent (e.g., 0.5 g. and 40 c.c., respectively). Fewer solvent (e.g., 0.5 g. and 10 only extractions, of only 1.5 hr., are necessary. D. R. H.

Calibration of platinum thermometers at the b.p. of sulphur. C. D. NIVEN (Canad. J. Res., 1936, 14, A, 1-15).—Experimental technique, errors, and calculation are discussed. The accuracy of determination of δ is considered to be limited to the third decimal place. L. A. O'N.

Recent revisions of high temperatures. H. T. WENSEL (J. Amer. Ceram. Soc., 1936, 19, 81-86).-The correct method of converting temp. vals. based on Wien's law to those based on the International Scale is described. In giving corrections to be applied to quoted temp. such corrections must have been cale. from the consts. used in the original temp. scale. The implication that a recent correction table (B., 1936, 21) can be universally used is erroneous.

J. A. S.

Determination of surface temperatures. T. YOSHII (J. Japan. Ceram. Assoc., 1935, 43, 352-357) .- Methods depending on fusion, ignition, or colour changes of suitable substances applied to the surface are proposed. Сн. Авз. (е)

Low-temperature thermostat. G. B. HEISIG (Ind. Eng. Chem. [Anal.], 1936, 8, 149).—A const. temp. between 25° and -75° can be maintained by means of solid CO_2 , using the apparatus described. The bath contains $COMe_2$, EtOH, or kerosene, according to the temp. required. E. S. H.

Electrically heated thermostat. G. VAN DE VOORDE (Natuurwetensch. Tijds., 1936, 18, 21-22). D. R. D.

Photo-electric photometer. L. E. HOWLETT (Canad. J. Res., 1936, 14, A, 38-42).-Apparatus for measuring light transmitted by glasses and solutions is described. It has been used for the determination of the amounts of dyes removed from solution by adsorbents, and the concn. and purity of substances in solution. A. J. M.

Photometry of different coloured light sources. M. PIRANI and R. ROMPE (Naturwiss., 1936, 24, 142).

-It is suggested that a phosphor or fluorescent liquid should be used as a frequency transformer for light, thus enabling the intensities of different coloured lights to be compared by comparison of the intensity of phosphorescence or fluorescence. The process is especially simple if a fluorescent liquid is used in such concn. that the incident light is completely absorbed by a thin layer of the liquid, since in this case a knowledge of the absorption curve of the liquid is not necessary, and the intensity of the fluorescence ∞ the no. of incident light quanta. The method gave the val. 250:1 for the intensity ratio of the Hg lines (5770+5791 Å.) and 4916 Å. The errors of the method are discussed. Suitable fluorescent liquids for ultra-violet light are an EtOH solution of æsculin, and an EtOH solution of Et dihydrocollidinedicarboxylate. A. J. M.

Photomagnetron and its applications in measuring low light intensities. A. DAUVILLIER (Compt. rend., 1936, 202, 738-740).-A photoelectric method, with a photo-electric device for varying the light flux, is described. H. J. E.

Microscopical determination of indices of refraction of resinous substances and minerals of high refringence. N. VEDENEJEVA, S. GRUM-GRSHIMAILO, and A. VOLKOV (Compt. rend. Acad. Sci. U.R.S.S., 1935, 4, 207-210) .- An interferometric method, in which a plano-convex lens is utilised, is described. The dispersions of 16 samples of piperine containing 24-84% of LiI, NaI, etc. have been determined. R. S.

Rotating sector for quantitative analytical spectrography. M. F. HASLER and R. W. LIND-HURST (Rev. Sci. Instr., 1936, [ii], 7, 137-139).--A half-cylindrical shutter is mounted in front of the film. C. W. G.

Recent results and methods of vacuum spectroscopy. H. BOMKE (Physikal. Z., 1936, 37, 222-260).—A review.

Arrangement for converting a spectrograph into a monochromator. A. CHEVALLIER and P. DUBOULOZ (Bull. Soc. Chim. biol., 1936, 18, 428-430). A. L.

Standard source of ultra-violet radiation for calibrating photo-electric dosage intensity meters. W. W. COBLENTZ and R. STAIR (J. Res. Nat. Bur. Stand., 1936, 16, 83-92).-The quartz Hgarc lamp is well adapted for the purpose by reason of the high intensity and favourable distribution of the ultra-violet emission lines at 2967-3132 Å. Methods of calibration of ultra-violet output in abs. units are E.S.H. described.

Refractometer and other refractive index methods. B. W. ANDERSON (Gemmologist, London, 1934, 3, 216–222).– C_2I_4 and S dissolved in $C_2H_2I_2$ give a stable liquid of n_D 1.81. AsPhI₂ has n_D 1.843. Se₂Br₂ has n_{Li} 1.96. The use of a hemisphere of Zn blende $(n_{\rm D} 2.37)$ is suggested for measuring liquids. Сн. Авѕ. (е)

Colorimetric analysis by the photo-electric cell. N. STRAFFORD (Analyst, 1936, 61, 170-177) .---A photo-electric colorimeter for the measurement of relative colour intensities by use of absorption density determinations is described. Measurements are independent of the human eye, and the calibration curve, which is virtually a straight line, is always available. Notes on the choice of working conditions and on the applications are given. E. H. S.

X-Ray powder camera. M. J. BUERGER (Amer. Min., 1936, 21, 11-17). L. S. T.

Precision lattice constants from X-ray powder photographs. M. U. COHEN (Rev. Sci. Instr., 1936, [ii], 7, 155).—Corrections (cf. A., 1935, 598).

C. W. G.

General-utility vacuum chamber for X-ray fine structure photographs. E. FRANKE (Z. physikal. Chem., 1936, B, 31, 454-458).—A convenient high-precision apparatus is described.

R. C. Measurement of the angle between the optical axes and determination of the optical sign (of crystals) by means of the refractometer. H. BUTTGENBACH (Bull. Acad. roy. Belg., 1936, [v], 22, 125-133). A. J. M.

Guarded-field X-ray ionisation chamber. L.S. TAYLOR and G. SINGER (J. Res. Nat. Bur. Stand., 1936, 16, 165—169).—Modified apparatus is described (cf. A., 1930, 1502). E.S. H.

Electrophysical methods in analytical chemistry. J. KRÖNERT (Chem. Fabr., 1936, 9, 133— 138).—The applications of $p_{\rm H}$, conductivity, electrooptical, and magnetic measurements to technical problems are reviewed. J. S. A.

Ionisation gauge for atomic beam measurements. R. D. HUNTOON and A. ELLETT (Physical Rev., 1936, [ii], 49, 381–387).—Various factors influencing the design of a gauge are discussed, and an arrangement to fulfil the necessary requirements is described. Beam pressure changes as low as 3×10^{11} mm. Hg, or approx. 3×10^9 Hg atoms per sq. cm. per sec., can be measured. N. M. B.

Single sparks and interrupted alternatingcurrent arcs and their application to quantitative spectroscopic analysis. T. KOSBAHN (Ann. Physik, 1936, [v], 25, 625-644).—The optical and electrical conditions necessary for obtaining light sources of max. reproducibility have been investigated. Electrically and spectroscopically reproducible single sparks can be produced in non-inductive circuits. An arrangement for producing intense interrupted a.-c. arcs, and the effect of discharge conditions on their spectral character, are described. L. J. J.

Apparatus for the conductometric determination of carbon monoxide and dioxide (and benzine vapour) in air.—See B., 1936, 349.

Differential electrometric titration apparatus. S. SAITO (Bull. Inst. Phys. Chem. Res. Japan, 1936, 15, 109—123).—A differential electrode and galvanometer are used, and polarisation is reduced. Al may be determined volumetrically, using $H_2C_2O_4$, with a sharp end-point. The addition of a little H_2SO_4 increases the sharpness of the end-point in the titration of Cl' and Br', and 0·1 mg. of Br' in presence of 6 mg. of Cl' is titratable. R. S. B.

Glass electrode with galvanometer reading. L. MICHAELIS (Science, 1936, 83, 213-214).

L. S. T. Glass electrode for measurement of $p_{\rm H}$ of unbuffered solutions in simple compensation circuit. K. SCHWABE (Z. Elektrochem., 1936, 42, 147—150; cf. A., 1935, 1341).—A spherical glass electrode permanently housed in an outer tube, with provision for a continuous renewal of the liquid in which it is immersed, is suitable for measuring the $p_{\rm H}$ of unbuffered solutions, using the ordinary compensation method. A full description is given.

F. L. U. Permanent glass electrode for measurement of $p_{\rm R}$ values. G. PARSY (J. Soc. Leather Trades Chem., 1936, 20, 188—195).—In a new form of glass electrode a piece of Pt foil is suspended in aq. PtCl₄ in a Haber glass bulb, mounted in a glass vessel filled with the solution under test. The apparatus is always ready for immediate use and results are quickly obtained. D. W.

Potentiometric volumetric analysis with three electrode pairs connected in series. L. SZEBEL LÉDY and J. JÓNÁS (Z. anal. Chem., 1936, 104, 271– 278).—The titration vessel has three pairs of electrodes recessed in its side, which are brought into action without short-circuiting each other when the vessel is tilted. A threefold increase in sensitivity is thus obtained. J. S. A.

Thermionic titrimeter without batteries. H. H. WILLARD and O. B. HAGER, jun. (Ind. Eng. Chem. [Anal.], 1936, 8, 144—145).—An a.e. voltmeter for potentiometric titrations is described. E. S. H.

Electrostatic dust count sampler. E. C. BARNES and G. W. PENNEY (J. Ind. Hyg., 1936, 18, 167– 172).—Of the three methods of collecting dust particles from samples of air, centrifugal, thermal, and electrostatic pptn., the last has definite advantages. An apparatus for carrying it out is described. W. O. K.

Continuous-reading electron-tube conductance meter. R. L. GARMAN (Ind. Eng. Chem. [Anal.], 1936, 8, 146—147).—The apparatus combines an audio oscillator bridge and a detector meter system. Its application to conductometric titration is described. E. S. H.

Investigation of piezo-electric substances in powder form. J. ENGL and I. LEVENTER (Naturwiss., 1936, 24, 217—218).—The powder is supended in a liquid of no dielectric loss $(e.g., C_6H_6)$ in a highfrequency field (400 volts per cm.), the mixture being placed in a condenser vessel for determination of dielectric loss. The measured expansion is supposed ∞ temp. change, and the loss (product of temp. change and λ) plotted against λ . For quartz powder there is a resonance at 103 m., agreeing with the val. for quartz plates. The max. heating at resonance ∞ (field strength)². A. J. M.

Visual conductometry. II. L. WOLF (Chem. Fabr., 1936, 9, 139—140; cf. this vol., 305).—An improved a.-c. circuit for conductometric titrations is given. J. S. A. Apparatus for direct determination of radon in water and in air. F. BEHOUNEK (Physikal. Z., 1936, 37, 203—208).—The first apparatus will measure the radioactivity of H_2O to 2 Mache units. The second is portable, and is adapted for the determination of the activity of air. In both methods the strength of the activity is read directly on a scale. A. J. M.

Modified Nessler tube set. G. W. CORNELL (Soc. Chem. Ind. Victoria, 1935, 35, 1008-1010). J. S. A.

Burette for alkali titrations. L. S. KEYSER (Ind. Eng. Chem. [Anal.], 1936, 8, 121). E. S. H.

Burette for potentiometric titrations. L. S. KEYSER (Ind. Eng. Chem. [Anal.], 1936, 8, 82). E. S. H.

Emulsifier. R. AUERBACH (Kolloid-Z., 1936, 74, 285–287).—Apparatus and technique are described. E. S. H.

Accuracy attainable with the Chattock tilting manometer. W. F. COPE and R. HOUGHTON (J. Sci. Instr., 1936, 13, 83-88).—An accuracy of 0.1% can be obtained by the application of corrections. C. W. G.

Micromanometer. H. W. SMITH (Rev. Sci. Instr., 1936, [ii], 7, 157—158).—Liquid in an inclined tube is brought to a predetermined mark by means of a micrometer screw. C. W. G.

Measurement of the coefficients of absorption of ultrasonic waves in gases. L. BELAVSKAJA (Bull. Acad. Sci. U.R.S.S., 1935, 917-925).—The piezo-electric properties of quartz are utilised.

C. W. G.

Bacteria-proof filter. F. WOKES (Pharm. J., 1936, 136, 313).—Pressure generated by a cycle pump forces the liquid through a Seitz filter. C. W. G.

Laboratory sublimation apparatus. S. T. BOWDEN (J. Sci. Instr., 1936, 13, 97-98).—Sublimation may be carried out in vac. or in a current of inert gas. C. W. G.

Surface-tension measurements of viscous liquids. A. H. PFUND and E. W. GREENFIELD (Ind. Eng. Chem. [Anal.], 1936, 8, 81–82).—The depth of the small depression, produced when an air jet impinges on the surface of a viscous liquid, is an inverse function of the surface tension of the liquid. Apparatus and technique for application of the method are described. E. S. H.

Application of viscosimetry and plastometry to problems of applied mineralogy. M. P. Volarovirsch (Trans. Inst. Econ. Min. U.S.S.R., 1934, No. 66, 56 pp.).—A high-temp. viscosimeter consisting of two coaxial Pt–Ir cylinders, the outer of which rotates, is described. Measurements with various slags, glasses, and minerals are described and discussed. CH. Abs. (e)

Extraction apparatus. F. C. OPPEN (Ind. Eng. Chem. [Anal.], 1936, 8, 110-111).—A modified Soxhlet-type apparatus is described. E. S. H.

[Efficiency of] desiccators. H. S. BOOTH and L. MCINTYRE (Ind. Eng. Chem. [Anal.], 1936, 8, 148—149).—A considerable time must elapse before the air inside a desiccator is reasonably dry, after the cover has been removed momentarily. BaO is a useful desiccant. E. S. H.

Laboratory desiccants : silica gel. F. G. LENNOX (Soc. Chem. Ind. Victoria, 1935, 35, 988—996). —The use of SiO₂ gel as a laboratory desiccant is described. J. S. A.

Apparatus for isolation of fluorine. Willard and Winter method. W. K. GILKEY, H. L. ROHS, and H. V. HANSEN (Ind. Eng. Chem. [Anal.], 1936, 8, 150-151).—Modified distillation procedure is recommended (cf. A., 1933, 242). E. S. H.

Device for determining rate of siphoning in metal extraction systems. R. S. ASBURY (Ind. Eng. Chem. [Anal.], 1936, 8, 152).—An electrical device for registering siphoning in a steel Soxhlet apparatus is described. E. S. H.

Rapid mixer. D. H. NELSON (Ind. Eng. Chem. [Anal.], 1936, 8, 111).—A spiral bit is recommended for preparing analysis samples of emulsions and plastics. E. S. H.

Control of high lights in reading microbalance swings. P. H. M. P. BRINTON (Ind. Eng. Chem. [Anal.], 1936, 8, 104).—Observation is facilitated by using a dark cardboard screen, provided with a circular hole, in front of the lens. E. S. H.

Control of pressure during vacuum distillation. G. GOETHALS (Natuurwetensch. Tijds., 1936, 18, 18—20).—P may be maintained const. within ± 0.04 mm. by means of Jacobs' apparatus (A., 1935, 321). D. R. D.

Formation of metallic blacks on thin foils by evaporation. R. V. JONES and B. V. ROLLIN (J. Sci. Instr., 1936, 13, 130–131).—In H_2 or He at 0·1—3 mm. there is no difficulty in condensing metals evaporated from hot filaments. C. W. G.

Ozoniser. R. P. JACQUEMAIN and G. BALLOUÉ (Bull. Soc. chim., 1936, [v], 3, 701–704).—The simple apparatus described gives a higher yield of O₃ than is obtained with the Berthelot ozoniser. E. S. H.

Guide for crystal drawing. W. M. McNABB and J. W. McNABB (J. Franklin Inst., 1936, 221, 539—546).—Directions for drawing crystals from gnomonic projections are given. C. W. G.

Geochemistry.

Ozone measurements and the possible connexion of ozone with the sunspot cycle. F. E. Fowle (Trans. Amer. Geophys. Union, 1934, 160– 162; cf. A., 1935, 59).—New data show an even higher mean val. of O_3 , despite the min. for sunspots. CH. ABS. (e)

Determination of the ozone content of the air layer near the ground by a photo-electric counter. R. STOLL (Helv. phys. Acta, 1935, 8, 3-38; Chem. Zentr., 1935, ii, 343).—Measurements were made with a photo-electric counter at distances of 405-1555 m. from a Hg arc. The atm. [O₃] was deduced from light intensity measurements in the region 2600—3100 Å. An average O_3 layer of 27×10^{-4} cm. per km. (Arosa) and 10×10^{-4} cm. per km. (Zurich) was found. H. J. E.

Isotopes in snow and rain water. W. A. ALEXANDER and L. A. MUNRO (Canad. J. Res., 1936, 14, B, 47).—April snow H_2O , investigated by the balanced float method, showed a decrease in d of 3.9×10^{-6} g. per c.c. Appreciable fractionation of H_2O into its isotopic forms occurs in April.

L. A. O'N. Radioactivity of spring water. Y. DEUX (Petit J. Brasseur, 1935, 43, 507, 510; Chem. Zentr., 1935, ii, 734).—The determination of the radioactivity of natural H_2O is described. J. S. A.

Radioactivity of mineral springs of the group Cachat d'Evian. R. CASTAGNÉ and (MLLE.) D. OSBORNE (Compt. rend., 1936, 202, 567-569).--Data are recorded. T. G. P.

Oceanographic research at the Scripps Institute of Oceanography. T. W. VAUGHAN (Trans. Amer. Geophys. Union, 1934, 222-225).—Salinity data for the region between the Californian coast and the Philippines are recorded and discussed.

CH. ABS. (e) Temperature-salinity correlation with the Florida Current. C. o'D. ISELIN (Trans. Amer. Geophys. Union, 1934, 208-209). CH. ABS. (e)

German calcium chloride springs. H. HAR-RASSOWITZ (Kali, 1935, 29, 75—80; Chem. Zentr., 1935, ii, 820).—Analyses are given of German mineral springs of secondary origin with Ca : Cl=1 : 2.

J. S. A.

Morven meteorite, New Zealand. C. O. HUT-TON (Min. Mag., 1936, 24, 265-275).—This stone, weighing 7100 g., was found in 1925 near Morven in South Canterbury. The microscopical characters are described and detailed chemical analyses were made of the magnetic and non-magnetic portions sol. and insol. in aqua regia. The mineral (modal) composition is olivine 40.74, bronzite 20.93, diopside 3.68, felspars 10.34, metallic Ni-Fe 13.19, troilite 5.67% etc. Fe+Co:Ni in the metal 9.58; MgO:FeO in silicates 2.45. The stone is classed as a veined and brecciated grey bronzite-olivine-chondrite. This is the fourth meteorite to be recorded from New Zealand. L, J. S.

The Bruno meteorite. H. H. NININGER (Amer. J. Sci., 1936, [v], 31, 208–222).—Analyses are given. C. W. G.

Diabase-porphyrite and glaucophane rocks in the North Calabrian trias. H. W. QUITZOW (Nachr. Ges. Wiss. Gottingen, 1935, [iv], 1, 83—118; Chem. Zentr., 1935, ii, 342). H. J. E.

Maxixe beryl. II. Analysis and separation of beryllium and aluminium and alkalis. W. ROEBLING and H. W. TROMNAU (Zentr. Min., A, 1935, 134–139; Chem. Zentr., 1935, ii, 495; cf. this vol., 49).—Analysis gave SiO₂ 62.52, Al₂O₃ 18.08, Fc₂O₃ 0.03, BeO 11.30, CaO 0.22, MgO 0.25, CuO trace, Li₂O 0.98, Na₂O 1.28, Cs₂O 2.80, B₂O₃ 0.39, and loss on ignition 2.20%. Al and Be were separated by the hydroxyquinoline or guanidine carbonate methods, after repeated pptn. with aq. NH_3 to remove alkalis. H. J. E.

Alteration of the rocks of the Eibenstock-Neudek [Saxony-Bohemia] granite massif. E. O. TEUSCHER (Tsch. Min. Petr. Mitt., 1936, 47, 273-312).—Later pneumatolytic and hydrothermal processes have given rise to greisenisation, kaolinisation, silicification, chloritisation, etc. in the various granitic rocks, with the production also of tourmaline, topaz, and deposits of Sn ore. L. J. S.

Lead-uranium ratio of siliceous pitchblende from Great Bear Lake, N.W.T., Canada, and its possible age. J. P. MARBLE (J. Amer. Chem. Soc., 1936, 58, 434-437).—A sample yields a "corr." Pb ratio of 0.193, corresponding with an age of 1323×10^{6} years. E. S. H.

Hydrothermal synthetic investigations on Al_2O_3 -SiO₂-H₂O system. W. NoLL (Fortschr. Min., 1935, 19, 46-47; Chem. Zentr., 1935, ii, 819).—Under the conditions of hydrothermal epimagmatic and metamorphic mineral formation, up to 400° with SiO₂: $Al_2O_3 > 2: 1$, kaolin is formed, and at 400-500° a pyrophillite mineral. With excess of Al_2O_3 , böhmite is formed up to 400°; corundum is formed at 500° from pure Al_2O_3 . J. S. A.

Stability of an argillite inclusion in basalt. H. VON WARTENBERG (Nachr. Ges. Wiss. Göttingen, 1935, [iv], 1, 119—121; Chem. Zentr., 1935, ii, 342).—The inclusion was fused only on the outside. The basalt was probably near its m.p. when the inclusion was formed. H. J. E.

Alkaline trachite from Dschebel Auenat in the Lybian desert. P. GALLITELLI (R. Ist. lomb. Sci. Lett., 1934, [ii], 67, 731-736; Chem. Zentr., 1935, ii, 342).—The chief constituent was sanidine, together with pyroxene, agirine, nepheline, and sodalite. H. J. E.

Geological-petrographical investigation of potash deposits in the Werra region. F. BESSERT (Kali., 1935, 29, 27-30, 40-43, 53-58, 63-66, 73-75; Chem. Zentr., 1935, ii, 343). H. J. E.

Crystallisation of hornblende and mica from artificial silicate melts. D. P. GRIGORIEV (Zentr. Min., 1935, A, 117–123; Chem. Zentr., 1935, ii, 341–342).—Hornblende was synthesised from a melt containing (in parts by wt.): K₂O 1, Al₂O₃ 0.4–0.5, MgO 6, SiO₂ 6, CaF₂ 1. Optical data are given. H. J. E.

Mineralogy of asbestos. Ishkyldite, a new structural variety of chrysotile. F. V. SIROMIAT-NIKOV (Amer. Min., 1936, 21, 48-54).—Ishkyldite (I), $H_{20}Mg_{15}Si_{11}O_{47}$, d 2.62, $n_g 1.573$, $n_p 1.566$, from Ishkyldino, Middle Volga District, has SiO₂ 42.49, Al₂O₃ 1.27, Fe₂O₃ 2.01, FeO 2.73, MgO 38.28, CaO none, Na₂O+K₂O 0.02, H_2O - 0.79, H_2O + 11.88, CO₂ 0.35, TiO₂ trace, MnO 0.06, Cr₂O₃ trace, NiO 0.38, volatiles 0.04, total 100.30%. It resembles actinolite-asbestos in appearance, chrysotile-asbestos (II) in composition, and antigorite in optical properties. X-Ray analysis reveals a peculiar at. arrangement. The dehydration curve shows distinct peaks. (I) is probably an earlier mineral than (II) and grew under conditions of stress. L. S. T. Cubanite from [the Frood Mine,] Sudbury, Ontario. M. A. PEACOCK and G. M. YATSEVITCH (Amer. Min., 1936, 21, 55—62).—The orthorhombic, dipyramidal crystals, d^{27} 4·101, hardness 3·5, contain Cu 22·88, Fe 41·41, S 35·35, total 99·64%, in agreement with CuFe₂S₃. The identity of cubanite and chalmersite is confirmed. L. S. T.

Ganophyllite and zincian amphibole from Franklin Furnace, New Jersey. W. F. FOSHAG (Amer. Min., 1936, 21, 63-67).—Ganophyllite (I) from this locality has SiO₂ 44·36, Al₂O₃ 11·40, Fc₂O₃ nonc, FeO 0·09, CaO 2·64, MgO 3·82, MnO 24·24, Na₂O 2·86, K₂O 0·26, H₂O 10·72, total 100·39%, corresponding approx. with 5MnO,Al₂O₃,7SiO₂,5H₂O; d 2·878, hardness 3·5, n_a 1·545, n_β 1·586, n_s 1·589. Comparison with Swedish (I) shows that the chemical composition is variable. The zincian amphibole closely associated with (I) has SiO₂ 53·20, Al₂O₃ 5·37, Fe₂O₃ 8·03, FeO 4·46, MgO 11·12, TiO₂ 0·12, ZnO 4·70, MnO 2·97, CaO 3·36, Na₂O 4·35, K₂O 0·21, H₂O 1·79, total 99·68% corresponding with (Na,Ca,Zn,Mn)₃(Mg,Fe^{**})₃(Al,Fe^{***})Si₈O₂₂(O,OH)₂. L. S. T.

Felspar twinning in a differentiated sill. W. M. CHAPMAN (Amer. Min., 1936, 21, 33-47).— A statistical increase in the no. of twins occurs with an increase in basicity, or anorthite content, of the sill. There is apparently no control of, or change in, the type of twinning with the composition of the rock as it appears after crystallisation. An unknown factor and not composition must be responsible for the variation in twinning in different types of rocks.

L. S. T.

Silica-fluorite pseudomorphs. J. MURDOCH (Amer. Min., 1936, 21, 18-32).— SiO_2 -fluorite pseudomorphs, closely related to intrusions of basalt, occur in Los Angeles County, California. They consist mainly of finely fibrous SiO_2 and partly of normal quartz (I) grains which may be largely replaced by later fibres. Optical and X-ray examinations show that the apparently different fibrous forms of SiO_2 are probably due to variant orientations of microcryst. (I). Formation of the pseudomorphs is due to replacement of fluorite from outside, the character of the resultant SiO_2 depending on the conditions of temp. and concn. at the time of deposition. L.S.T.

Vesuvianite [and grossularite] from Georgetown, California. A. PABST (Amer. Min., 1936, 21, 1–10).—Veins of vesuvianite (I) occurring in a serpentine belt along Traverse Creek are described. (I) has SiO₂ 36.60, Al₂O₃ 19.75, Fe₂O₃ 0.80, FeO 1.64, MgO 2.58, CaO 37.80, H₂O- 0.20, H₂O+ 0.40, TiO₂ trace, Cr₂O₃ 0.18, MnO trace, F, CO₂, and Ni none, total 99.95%, d_4^{23} 3.326. Spectroscopic traces of Na, B, and V are present. An analysis of grossularite, d 3.5062, is also given. L. S. T.

Uranium-rich xenotime from Yu, Japan. S. HATA (Sci. Papers Inst. Phys. Chem. Res. Tokyo, 1936, 29, 37–40).—The specimens showed 5—10 times the normal activity. Physical data and those of a gravimetric analysis are given. The total Ra and UO₂ content, determined by the emanation method, was Ra (10⁻¹⁰ g.) 9.54, UO₂ 5.28%. A new

method of separating U and Zr consists in dissolving their mixed phosphates in 10% H₂SO₄, the dissolved part being regarded as U, and the remainder as Zr; the correctness of this was confirmed by the emanation data. N. M. B.

Emanation capacity of ores and rocks of the Taboshar uranium-radium deposit. A. P. KIRI-KOV, T. BOGOSLOVSKAJA, and G. GORSCHKOV (Bull. United Geol. Prospecting Serv. U.S.S.R., 1932, 44, 1293—1299).—The Rn capacity of ores containing yellow U phosphates was considerably > that of torbernite ores. The capacity was greater in H₂O than in air, and increased with fineness of particles. CH. ABS. (e)

Geological age of bauxite and manganese ore formation in Dunantul (Hungary). E. VADASZ (Banyaszati kohaszati Lapok, 1935, 68, 163—168, 193—196; Chem. Zentr., 1935, ii, 987).—Both ores are of Lower Cretaceous age. J. S. A.

Mineral structure of the Ivdel (Ural) bauxite. F. V. SIROMIATNIKOV (Bull. Soc. nat. Moscow, Sect. geol., 1933, 11, 437–442).—The main components are chamoisite and diaspore, with a small admixture of limonite. The val. as an Al ore is not high.

CH. ABS. (c)

Bababudanite, a soda-amphibole from the banded ferruginous quartzites on Mysore, India. C. S. PICHAMUTHU (Gcol. Mag., 1936, 73, 39–45).— Bababudanite from the Bababudan Hills, Mysore, has SiO₂ 49·80, Al₂O₃ 1·56, Fe₂O₃ 18·62, FeO 10·59, MgO 9·30, CaO 0·45, Na₂O 8·80, K₂O trace, H₂O 0·65, total 99·77%, corresponding with $4NaFe^{III}(SiO_3)_2, 2FeSiO_3, 3MgSiO_3$ or $2Na_2Fe_2Si_4O_{12}, 5(Mg, Fe, H_2, Ca)SiO_3$. In chemical and

 $2Na_2Fe_2Si_4O_{12},5(Mg,Fe,H_2,Ca)SiO_3$. In chemical and optical properties it is allied to rhodusite. (1) is of contact metamorphic and not primary origin, and is not connected with the origin of the Bababudan ironstones. L. S. T.

Geology of an area in the Kavirondo District, Kenya Colony. W. PULFREY (Geol. Mag., 1936, 73, 26—38).—The greater part of the area is occupied by arenaceous and argillaceous sediments of Muva-Ankolean age. Au occurs in the area as a metasomatic phase of the end stages of the granite intrusion. L. S. T.

Sulphur deposits of the Sierra de Gador, Province of Almeria, Spain. D. WILLIAMS (Bull. Inst. Min. Met., 1936, No. 378, 29 pp.).—Analyses and geology of the S deposits are given and the mode of formation is discussed. D. K. M.

Gold and silver in crystalline rocks of the Malvern Hills. A. BRAMMALL and D. L. DOWIE (Min. Mag., 1936, 24, 260—264).—Numerous assays were made of various types of rocks. Appreciable amounts of Au (trace up to 72 grains per ton) and Ag (to 42.4 dwt. per ton) were found only in red granite. L. J. S.

Silver ores of Freiberg [Saxony]. E. ZIMMER (Tsch. Min. Petr. Mitt., 1936, 47, 328—370).—Polished sections of ores examined by the metallographic method show an intimate intergrowth of various minerals. Argentiferous galena, Zn blende, and pyrite contain minute enclosures of pyrargyrite and

RR

tetrahedrite. A "Weissgiltigerz" containing Ag 4— 6% replacing Pb is identified with jamesonite. L. J. S.

Microscopic analysis of opaque minerals. F. L. STILLWELL (Soc. Chem. Ind. Victoria, 1935, 35, 983—987).—Procedure is described. J. S. A.

"Chloropal" nontronite ferrosilicates of Satschkovie Chutory. I. J. MIKEI (Ukrain. Chem. J., 1935, 10, 467—472).—Analytical and other data are recorded. R. T.

Dielectric constants of rocks and their dependence on moisture. N. K. SCHTSCHODRO and N. M. MASLOV (Bull. Acad. Sci. U.R.S.S., 1935, 933— 950).—Results are tabulated. C. W. G.

Variable composition of cordierite in the Dartmoor granite. A. BRAMMALL and B. R. RAO (Min. Mag., 1936, 24, 257—259).—The range in optic axial angles $(2V 56-82^{\circ})$ shown by different crystals of cordierite suggested a variation in chemical composition. Partial analyses of material fractionated in heavy liquid from the crushed rock gave FeO 4.00— 9.10%, MgO 2.07-9.3% (but this variation is not correlated with 2V and d). L. J. S.

Variability of garnet in granites. A. BRAM-MALL and S. BRACEWELL (Min. Mag., 1936, 24, 254– 256).—Two detailed and several partial analyses of manganiferous garnet from the granite of Dartmoor show MuO $3\cdot37-22\cdot00\%$, $d 3\cdot7-4\cdot2$. Garnet from the granite of Eskdale, Cumberland, shows MnO $4\cdot15-7\cdot08\%$, $d < 4\cdot15$ to $> 4\cdot2$. L. J. S.

Zeolites. IX. Scolecite and metascolecite. M. H. HEY [with F. A. BANNISTER] (Min. Mag., 1936, 24, 227—253; cf. A., 1935, 1345).—Two new chemical analyses with detailed crystallographic, optical, and X-ray data are given of scolecite from India and Iceland. Discussed with the best analyses from the lit. these confirm the unit-cell formula $Ca_8Al_{16}Si_{24}O_{s0},24H_2O$, the dimensions of the unit cell being a 18.48, b 18.95, c 6.54 Å., β 89° 21′, and the space-group S⁴. Ca may be replaced by Na, to the extent of 1 atom of Na per unit cell, and by K_2 about 0·1 atom. The base-exchange products, introducing Na, K, Li, NH₄, Ag, and Tl in place of Ca, are in several cases natrolites, confirming the view that natrolite and scolecite are isostructural. V.-p. measurements show that on partial dehydration a transition to meta-scolecite occurs at a degree of hydration dependent on the temp. and usually before the composition CaAl₂Si₃O₁₀,2H₂O is reached. In both scolecite and metascolecite the H₂O consists of two distinct groups, in the former a more volatile 16 mols. and a less volatile 8 mols.; and in the latter, a group of 8 mols. is more volatile. L. J. S.

Mineralogical composition of the volcanic rocks of Easter Island. A. LACROIX (Compt. rend., 1936, 202, 527-530).—The rocks are described. Attention is directed to the existence of rhyolites and obsidians. T. G. P.

Composition of Easter Island lavas. A. LA-CROIX (Compt. rend., 1936, 202, 601-605).—Analyses of plagioclasic rocks are recorded. Basalts and leucocratic types are associated, Na predominating over K even in the most siliceous members (rhyolites and dacitoids). Easter Island therefore belongs to the nepheline-free series of lavas in the author's classifiation. L. J. J.

Volcanic rocks of Pitcairn Island. A. LACROIX (Compt. rend., 1936, 202, 788—791).—The volcanic rocks of Pitcairn Island are andesites and trachytes and not, as in the neighbouring islands, basalts and oceanites. Analyses of 7 different rocks are given. M. S. B.

Mineralisation of the Precambrian of the Anti-Atlas. F. BLONDEL and J. BONDON (Compt. rend., 1936, 202, 673-674).—The association of Co with Au in this formation has been investigated. Co and Au are distributed independently, Co having been introduced subsequently to the Au, which is associated with intact or dolomitised quartz. L. J. J.

Transformation of fatty acids in the course of geological periods. See this vol., 589.

Organic Chemistry.

Electronic theory and organic chemistry. IV. Structure of saturated and unsaturated molecular systems. V. RASUMOVSKI (Bull. Soc. chim., 1935, [v], 3, 568—580; cf. A., 1935, 431, 843).— The theory developed previously (*loc. cit.*) is applied to open-chain compounds containing contiguous and conjugated ethylenic linkings. It explains the difference in the capacity for reaction of the groups Me, CH₂, and CH and, in normal, saturated hydrocarbons, the enhanced reactivity of CH₂ placed towards the end of the chain. H. W.

Catalytic production of optically active substances and chemical necessity of a unidirectional course in biochemical processes. W. KUHN (Angew. Chem., 1936, 49, 215-219).—A lecture. E. W. W. Isomerism and structural theory. Y. L. GOLD-FARB and L. M. SMORGONSKY (J. Chem. Educ., 1936, 13, 22-27). L. S. T.

[Viscosity of solutions of aliphatic hydrocarbons.] K. H. MEYER and A. VAN DER WYK(Ber., 1936, 69, [B], 545—548; cf. A., 1935, 1318).— A reply to Staudinger (this vol., 309). H. W.

Mechanism of oxidation of paraffin hydrocarbons. A. K. PLISSOV (Bull. Soc. chim., 1936, [v], 3, 425-429).—During atm. oxidation of Grozni paraffin, m.p. 52°, at 120° or 150°, the amount of peroxides (I) formed increases slowly to a max. after 3 hr. and then decreases; after 5-6 hr. (I) are not detectable. (I) are thus not the principal reaction products. In presence of catalysts (Na and Ca salts of naphthenic and higher fatty acids) the concn. of

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(I) does not pass through a max. but diminishes steadily and after 4-5 hr. is zero; the catalysts do not, therefore, activate O_2 . (I) are determined by a slight modification of Yule and Wilson's method (B., 1932, 7). H. B.

Hexadecane. P. A. LEVENE (Org. Syntheses, 1935, 15, 27–28).— $C_{16}H_{33}I$ is reduced with Zn and HCl. CH. ABS. (r)

Chlorination of paraffins. H. B. HASS, E. T. MCBEE, and P. WEBER (Ind. Eng. Chem., 1936, 28, 333-339).-The following rules are deduced for the reaction between paraffins and Cl2. (1) At 300° in the vapour phase H atoms attached to primary, sec., and tert. C are replaced at the relative rates 1.00: 3.25: 4.43. (2) At rising temp. the relative rates approach unity in both the liquid- and vapourphase reactions. (3) Liquid-phase chlorination gives relative rates of primary, sec., and tert. substitution obtainable only at much higher temp. in the vapour phase. (4) Presence or absence of moisture, C, or light does not appreciably affect the relative rates of substitution. (5) Excessive temp. and/or reaction time results in appreciable pyrolysis of the chloroparaffins in the order primary <sec. <tert. (6) With a mol. excess of paraffin and const. conditions the yield of monochlorides against polychlorides may be obtained from an equation. (7) Dichlorination proceeds by (a) loss of HCl followed by addition of Cl_2 , and (b) progressive substitution; (a) is favoured by slow, thermal reaction, (b) by rapid liquid- or vapour-phase, single-pass thermal reaction, or low-temp. photochemical conditions. (8) In vapour-phase chlorination the presence of Cl attached to C tends to hinder further substitution on that atom. Herzfelder's rule (cf. A., 1893, i, 449) does not apply to chlorinations. The above rules are illustrated by the calculation of the proportions of isomerides formed by chlorinating C₃H₈, n- and iso-C₄H₁₀, n- and iso-C5H12. P. G. C.

Photo-oxidation of methylene iodide.—See this vol., 572.

Dodecyl bromide (lauryl bromide). E. E. REID, J. R. RUHOFF, and R. E. BURNETT (Org. Syntheses, 1935, 15, 24—26).—The prep. from the alcohol and HBr is described; cyclohexyl, heptyl, tetradecyl, and octadecyl bromides are prepared similarly. CH. ABS. (r)

Hexadecyl iodide. W. W. HARTMAN, J. R. BYERS, and J. B. DICKEY (Org. Syntheses, 1935, 15, 29-30).—The prep. from the alcohol with I and red P is described. CII. ABS. (r)

Use of wetting and emulsifying agents [in facilitating reactions]. J. COLONGE (Bull. Soc. chim., 1936, [v], 3, 501—503).—Hydrolysis (H₂O) of CMe₂Br·CHMeBr to COMePr^{β} (yield 80%) (cf. Evers et al., A., 1933, 485) occurs much more readily in presence of a little of Twitchell's reagent (I) or Gardinol R (II). (I) also accelerates hydrolysis of CH₂[CH(CO₂Et)₂]₂ to CH₂(CH₂·CO₂H)₂. Reduction of PhNO₂ to azoxybenzene is conveniently carried out in presence of (II); the emulsion formed renders shaking unnecessary. H. B.

Nitration of gaseous paraffins. H. B. HASS, E. B. HODGE, and B. M. VANDERBILT (Ind. Eng. Chem., 1936, 28, 339-344).—Nitration was effected in the vapour phase at 420°; CH₄ is not affected under the conditions used. Some oxidation occurs and probably leads to nitroparaffins of lower C content. The following products are obtained. From C_2H_6 : MeNO₂ (10-20), EtNO₂ (80-90) (total yield, 9%). From C_3H_8 : McNO₂ (9), EtNO₂ (26?), a.nitropropane, (I), b.p. 131° (32), β-nitropropane (II), b.p. 118° (33) (total yield, 21%). From n-C₄H₁₀: MeNO₂ (6), EtNO₂ (12), (I) (5), a.nitrobutane, b.p. 151° (27), β-nitrobutane, b.p. 139° (50) (total yield, 28%). From iso-C₄H₁₀: MeNO₂ (3), (II) (20), a-nitroisobutane, b.p. 140·5° (65), β-nitroisobutane (III), b.p. 126·4°, m.p. 25·6° (7), COMe₂ (5) (total yield, 25%). At 150° in sealed tubes iso-C₄H₁₀ affords 22% of (III). Total yields are practically const. from 150° to 420° if the optimum reaction rate for each temp. is used, but the ratios of isomerides vary, increase of temp. favouring production of primary isomerides. Presence of O₂ results in increased oxidation. Increase of pressure increases reaction rate and yields (slightly). With the exception of MeNO₂, the nitroparaffins could not be exploded; they are stable, non-toxic, good solvents for gums and resins, and can be used in admixture with alcohols as solvents for cellulose nitrate.

P. G. C.

Determination of the terminal methylene group. J. DŒUVRE (Bull. Soc. chim., 1936, [v], 3, 612-620).—A very dil. solution of the substance in EtOAc-AcOH (3:2) is treated with O_3 (about 5%) at -15° to -20°, excess of O_3 being avoided. The ozonide is reduced by SO₂ and CH₂O determined colorimetrically (Deniges). Substances containing the groups CH₂:CMe°, CH₂:CH°CH₂°, and CH₂:CH° give, respectively, 90-95%, 75-90%, and about 50% of the expected amounts of CH₂O. Two conjugated CH₂ groups behave as a single group. Unsaturated compounds devoid of :CH₂ give only negligible amounts of CH₂O. Acraldehyde-2: 4-dinitrophenylhydrazone has m.p. 184°. H. W.

Olefine formation. W. TAYLOR (Chem. and Ind., 1936, 275-276).—Polemical against Ingold et al. (this vol., 433). The author claims that his results (A., 1935, 1465; cf. Olivier, *ibid.* 62) first made possible a general theory of olefine formation. J. W. B.

J. W. B. Ring tension of cyclenes. J. BOESEKEN and J. STUURMAN (Proc. K. Akad. Wetensch. Amsterdam, 1936, 39, 2—9; cf. A., 1935, 1103).—Vals. of E and B obtained from log. k=-E/RT+B are given for the interaction of C_2H_4 , C_3H_6 , $CHPr^{\bullet}.CH_2$, CHBu*:CH₂, CH₂Ph·CH:CH₂, CMe₂:CH₂, CHEt:CHMe, CHPr*:CHMe, CHEt:CHEt, CHPh:CHMe, CPh₂:CH₂, CHPh:CHPh, CMe₂:CHMe, CPh₂:CHPh, CHPh:CH₂, cyclohexene, cyclopentene, cyclobutene, indene, 1:2and 1:4-dihydronaphthalene, and methylcyclopentene, respectively, with AcO₂H. R. S.

Gutta-percha hydrocarbon. Amorphous rubber.—See this vol., 553.

Preparation and properties of an $\alpha\gamma$ -disubstituted allene : $\Delta^{\beta\gamma}$ -hexadiene. H. VAN RIS- SEGHEM (Bull. Soc. chim. Belg., 1936, 45, 95–96; cf. this vol., 187).—Corrigenda. The hydrocarbon, b.p. 67·75—68·25°, as shown by its Raman spectrum, is not an allene, but a mixture of *cis*- and *trans*isomerides of a disubstituted ethylene. The Brcompound, b.p. 49·0—49·2°/26 mm., is fully saturated and does not absorb Br or H₂. J. L. D.

Dehydration of methylditert.-butylcarbinol. Fission and isomerisation of ditert.-butylethylene. N. NAZAROV (Compt. rend. Acad. Sci. U.R.S.S., 1936, 1, 79-82; cf. A., 1933, 1271).--CMeBu⁷₂·OH when distilled with I gives $CBu⁷_2$ ·CH₂ (cf. A., 1933, 1140), which when distilled with I : 4-C₁₀H₆Br·SO₃H (A., 1935, 62) gives CMe₂·CH₂ along with CMe₂:CMe₂, CMePr^{\$}·CH₂, and CHBu^{*}:CH₂. The origin of these products is discussed. J. L. D.

Direct production of organic compounds containing artificial radio-elements. E. GLÜCKAUF and J. W. J. FAY (J.C.S., 1936, 390-393).---When org. halogen compounds are irradiated with slow neutrons, all the halogen atoms activated are ejected and then enter other mols., replacing other halogens, OH, NH₂, CO,H, or CH, OH. Some of the newly formed compounds can be separated with high activity. In the following experiments the figure in parentheses is the % of the total activity which is found in the reaction product named. MeI gives CH₂I₂ (11). CH₂Br₂ gives CHBr₃ (14). CHBr₃ gives CBr₄ (19). PhCl gives C₆H₄Cl₂ (15). CH₂Br·CO₂H gives CH₂Br₂ (22). EtOH-I (saturated) gives MeI (6) and EtI (4). AcOH-I (saturated) gives MeI (10). C₆H₆-CCl₄ (1:1) gives PhCl (10). C_6H_6 -CBr₄ (1:1) gives PhBr (15). PhOH-MeBr (1:1) gives MeBr (6), PhBr (2), and C_6H_4 Br·OH (2). NH₂Ph,HBr gives PhBr (1) and C_6H_4 Br·OH (2). C_6H_6 -MeI (10:1) gives PhI (15). Since often relatively small amounts of the products are isolated, the degree of activity contained in them is often very high. MeI gives the same result at -175° as at room temp., so that exchange of atoms is not due to ordinary chemical action; moreover, large dilution with an inert material $(e.g., CHBr_3 \text{ with } CS_2)$ prevents formation of the active product $(e.g., CBr_4)$, because no mols. are available for collision. If air saturated with MeI is passed through KI-80% AcOH which is irradiated, is collected for the saturated in the saturated in the saturated is collected for the satura highly active MeI is collected from the issuing air in a liquid air trap; no material is used up in this transformation, which can proceed indefinitely. An experiment under modified conditions shows that $\ll 80\%$ of the activity is due to slow neutrons.

R. S. C.

H. B.

Allylic rearrangements. III. Action of zinc on crotyl and methylvinylcarbinyl bromides. W. G. YOUNG and S. WINSTEIN (J. Amer. Chem. Soc., 1936, 58, 441–443).—Reduction (Zn dust, boiling aq. EtOH) of various mixtures of CHMe:CH·CH₂Br and CH₂:CH·CHMeBr gives the same mixture of Δ^a - (62·1±1·9%) and Δ^β - (30·5±0·5% cis and 7·5±2·4% trans) -butene, the composition of which differs somewhat from that of the mixture obtained (this vol., 451) from the Grignard reagent.

Electron in organic chemistry. IV. Monohydroxy-compounds. M. S. KHARASCH, O. REIN- MUTH, and F. R. MAYO (J. Chem. Educ., 1936, 13, 7-19; cf. *ibid.*, 1934, 11, 82). L. S. T.

Catalytic decomposition of alcohols.—See this vol., 571.

Thermal decomposition of ethylene oxide and an induced acetaldehyde decomposition.—See this vol., 570.

Preparation and properties of keten diethyl acetal. F. BEYERSTEDT and S. M. MCELVAIN (J. Amer. Chem. Soc., 1936, 58, 529—531; cf. A., 1933, 258, 259).—Attempts to prepare keten Et₂ acetal (I) by Scheibler's modified procedure (A., 1933, 377) were unsuccessful. (I), b.p. $124-126^{\circ}$, is now prepared in 52° /₀ yield from CH₂I·CH(OEt)₂ (II) and NaI in COMe₂ at 110°], and boiling Bu'OH-KOBu'. (I) reacts rapidly and exothermically with H₂O and EtOH at room temp. yielding EtOAc and CMe(OEt)₃, respectively. Polymerisation of (I) occurs slowly at room temp. and is accelerated by heat. Reduction [H₂ (2000 lb.), Raney Ni, Et₂O, 100°] of (I) occurs rapidly and gives CHMe(OEt)₂ (35%); much polymerised (I), which inactivates the catalyst, is also formed. CH₂Cl·CH(OEt)₂ and EtOH-KOH (10% excess) at 150° give 95% of OH·CH₂·CH(OEt)₂ (IV); (III) similarly affords (at 130°) (IV) (70%) and EtOAc (24%), whilst (II) yields (IV) (30%), EtOAc (23%), and CMe(OEt)₃ (42%). (II) and EtOH-NaOEt give OEt·CH₂·CH(OEt)₂ (30%). EtOAc (21%), and CMe(OEt)₃ (46%). (I) *is un*doubtedly formed in these reactions with (II) but it then reacts with H₂O and EtOH. H. B.

Trichloroethyl alcohol. W. CHALMERS (Org. Syntheses, 1935, 15, 80–84).—Al(OEt)₃ and $CCl_2 \cdot CHO$ afford $Al(O \cdot CH_2 \cdot CCl_3)_3$, which is hydrolysed to $CCl_3 \cdot CH_2 \cdot OH$. CH. ABS. (r)

Biochemical hydrogenations. III. Hydrogenation of conjugated double linkings by fermenting yeast. F. G. FISCHER and O. WIEDEMANN (Annalen, 1936, 522, 1-16).—The hydrogenation (method: A., 1935, 123) of conjugated systems containing ·CH:CH·CO· or ·CH:CH·CH. OH results in aB-addition and differs (cf. below) from reduction with Na or Na-Hg. Thus, the hexenol (I) obtained (loc. cit.) from $\Delta^{\alpha\gamma}$ -hexadienal (II) or $\Delta^{\beta\delta}$ -hexadien- α -ol (III) is essentially Δ^{δ} -hexen- α -ol (IV), since careful ozonolysis in cold EtCl and subsequent reductive fission (Zn, AcOH) gives MeCHO (0.72-0.84 mol.) and (after oxidation of non-volatile residue with KMnO₄ in aq. Na₂CO₃) succinic acid (V) (0.76-0.82 mol.). Oxidation (KMnO₄, aq. Na₂CO₃) of (I) affords AcOH ($\Rightarrow 0.6 \text{ mol.}$) and (V) ($\Rightarrow 50\%$). The octadienol previously described (*loc. cit.*) is Δ^{87} . octadien-a-ol since it is oxidised (KMnO4, COMe2) to (V) (66-77%). CHMe:CH·CH:CH·COMe (VI) is hydrogenated (cf. *ibid.*, 1367) to Δ ^c-hepten- β -one (ozonolysis products, MeCHO and lævulaldehyde) and -β-ol (ozonolysis products, MeCHO and y-hydroxyvaleraldehyde), whilst CHPh:CH·CH:CH·COMe (VII) similarly gives (cf. loc. cit.) ζ -phenyl- Δ^{ϵ} -hexen- β -one and - β -ol, which are oxidised (O₃ followed by H₂O₂) to BzOH and lævulic acid.

Reduction (Na, MeOH) of (III) gives approx: 33% of

(IV) and 66% of Δ^{γ} -hexen- α -ol; undistillable products are obtained from (II) and Na- or Al-Hg. (VI) is reduced (3% Na-Hg, EtOH) to mainly Δ^{δ} -hepten- β -one (ozonolysis products, EtCHO and CH₂Ae·CHO), whilst (VII) and Na-Hg in EtOH-AcOH afford ζ -phenyl- Δ^{δ} -hexen- β -one (ozonolysis products, CH₂Ph·CHO and CH₂Ae·CHO) and products of higher mol. wt. H. B.

Dibutylcarbinol. G. H. COLEMAN and D. CRAIG (Org. Syntheses, 1935, 15, 11–13).—The prep. from MgBuBr and HCO₂Et is described.

CH. ABS. (r) Oleyl alcohol (Δ^{θ} -octadecenol). E. E. REID, F. O. COCKERILLE, J. D. MEYER, W. M. COX, jun., and J. R. RUHOFF (Org. Syntheses, 1935, 15, 51– 54).—The reduction of $C_{17}H_{33}$ ·CO₂Bu with NaOBu is described. CH. ABS. (r)

General method for preparation of aa'-diethylenic glycols, OH·CHR·CHR'OH. Conversion of some of these glycols into sugars. J. WIEMANN (Ann. Chim., 1936, [xi], 5, 267-336).-By the method previously described (A., 1935, 608, 963) the following were obtained : Dae heptadiene-y8-diol (two phenylurethanes, m.p. 151.5-152° and 160°); E-phenyl-DBpentene- $\delta \epsilon$ -diol, b.p. 139°/2 mm.; $\gamma \zeta$ -dimethyl- $\Delta^{\beta \zeta}$ -octadiene- $\delta \epsilon$ -diols, b.p. 133—135°/12 mm., m.p. 36— 38°, and b.p. 133–135°/12 mm.; δ_{η} -dimethyl- $\Delta^{\gamma\eta}$ -decadiene- ϵ_{ζ} -diols, m.p. 72–73° and b.p. 148– 149°/12 mm. [not identical with the compound, m.p. 89.5°, described by von Lenz (A., 1903, i, 460)]; ε -methyl- $\Delta^{\alpha\epsilon}$ -heptadiene- $\gamma\delta$ -diol, b.p. 116—117°/ 12 mm.; ζ -methyl- $\Delta^{\beta\xi}$ -octadiene- $\delta\varepsilon$ -diol, b.p. 124— 125°/12 mm., ζ -methyl- $\Delta^{\beta\zeta}$ -nonadiene- $\delta\varepsilon$ -diol, b.p. 130–131°/12 mm.; $\gamma\zeta$ -dimethyl- $\Delta^{\beta\zeta}$ -nonadicne- $\delta\varepsilon$ -diol, b.p. 140–141·5°/12 mm. A mixture of two isomeric $\Delta^{\beta\zeta}$ -octadiene- $\delta\varepsilon$ -diols (Charon, A., 1899, i, 848) was separated by fractional crystallisation of phenylurethanes from EtOH into dl- and mesoforms, m.p. 23-24° (phenylurethane, m.p. 168°) and 48° (phenylurethane, m.p. 190°), respectively. The *dl*- and meso-forms of $\Delta^{\alpha\epsilon}$ -hexadiene- $\gamma\delta$ -diol previously separated by Romburgh et al. (A., 1932, 718) have m.p. 14° (phenylurethane, m.p. 124°) and 17-18° (phenylurethane, m.p. 181°). A more detailed account is also given of the oxidation of these glycols (A., 1932, 718; 1933, 47; 1935, 605, 1104). d and $n_{\rm p}$ for the above compounds are recorded.

F. R. G.

Hexose monophosphates. Glucose 4-phosphate. A. L. RAYMOND (J. Biol. Chem., 1936, 113, 375-382).-Benzylideneglucose when heated with AcOH-NaOAc affords α - (sol. in 95% EtOH) and β -4 : 6-benzylideneglucose triacetate (insol.), converted by hydrolysis (HCl-aq. COMe2) and subsequent acetylation (Ac₂O-C₅H₅N in CHCl₂) into β -glucose 1 : 2 : 3 : 6tetra-acctate (Helferich et al., A., 1927, 135), which with $POCl_3-C_5H_5N$ in dry CHCl, at -30° to 0° followed by hydrolysis with Ba(OH)2 gives glucose 4phosphate (I) (Ba salt), isolated as its dibrucine salt, $[\alpha]_{D}^{23} - 45.3^{\circ}$ in C_5H_5N . (I) behaves differently from the 3- and 6-phosphates : it gives no osazone, but its Ba H salt gives an osazone : the course of glucoside formation (at room temp. and at 76°) differs from that of the 3- and 6-phosphates (Levene et al., A.,

1929, 423), but is related to that of tetramethylglucopyranose. At low conens. (0.005, 0.02M) the rate of fermentation of the Na salt of (I) with zymin $(p_{\rm H} 6.4)$ is negligible, and both in the presence and absence of glucose and of hexose diphosphate, no reduction in the induction period occurs. At higher conen. (0.06M) (I) has an inhibiting effect on fermentation. J. W. B.

Alkane-αω-disulphonates. G. C. H. STONE (J. Amer. Chem. Soc., 1936, 58, 488-489).--

 $(CH_2)_n(SO_3Na)_2$ are prepared in 30–50% yield from $(CH_2)_n(SO_3Na)_2$ are prepared in 30–50% yield from $(CH_2)_nBr_2$ (1 mol.) and saturated aq. Na₂SO₃ (2.5 mols.) at 100° (bath). Na ethylene- and tri-, tetra-, penta-, hexa-, and deca-methylene-disulphonates are described. Titration curves of $(CH_2)_n(SO_3H)_2$ are identical with that of H_2SO_4 . Decamethylene dibromide has b.p. 161–162°/10 mm., f.p. 25–26°.

H. B. **Tautomerism of butadiene sulphone**. J. BÖESEKEN and E. DE ROY VAN ZUYDEWIJN (Proc. K. Akad. Wetensch. Amsterdam, 1936, 39, 31; cf. A., 1935, 326).—Treatment of butadiene sulphone with KOH gives $\frac{\text{HO} \cdot \text{CH} - \text{CH}_2}{\text{CH}_2 \cdot \text{CH}_2} \text{SO}_2$ (I), m.p. 35° (Ac derivative, m.p. 74—75.5°). Irradiation of (I) in presence of aq. KOH does not yield α - or β -butadiene sulphone (cf. Backer et al., A., 1935, 1105). R. S.

Organic catalysts. XIII. Esterase models. W. LANGENBECK and F. BAEHREN (Ber., 1936, 69, [B], 514-520; cf. this vol., 476).-Measurements of the rate of hydrolysis of PraCO, Me alone and in presence of CH₂Bz·OH, 1- or 2-U₁₀H₇·CO·CH₂·OH, OH·CH2·CO·NHPh, and 1- or 2-C10H2·NH·CO·CH2·OH by a modified technique are recorded whereby the last-named substance is shown to be the most active catalyst. The previous hypothesis that hydrolysis is preceded by alkyl exchange, $Pr^{\circ}CO_{2}Me + CH_{2}Bz \cdot OH \rightarrow$ $Pr^{\circ}CO_{2} \cdot CH_{2}Bz(I) + MeOH and(I) + H_{2}O \rightarrow PrCO_{2}H +$ CH.Bz.OH, is supported by the observed rate of hydrolysis of esters (I), so that it appears that the alkyl exchange is the slowest part of the total reaction. Gradual addition of $3:2 \cdot OAc \cdot C_{10}H_6 \cdot COCl$ in anhyd. Et₂O to CH_2N_2 in Et₂O at 0° affords 3-acetoxy-2naphthyl diazomethyl ketone, m.p. 120-121°, converted by HCl in Et₂O into 3-acetoxy-2-naphthyl CH₂Cl ketone, m.p. 90-91°, by warm AcOH into 3-acetoxy-2-naphthoylcarbinyl acetate, m.p. 127°, and by boiling 50% AcOH into 3-acetoxy-2-naphthoyl-carbinol, m.p. 117°. $6:2-OAc^{+}C_{10}H_6 \cdot CO_2H$ and PCl_5 in ligroin afford 6-acetoxy-2-naphthoyl chloride, m.p. 124°, whence 6-acetoxy-2-naphthyl diazomethyl ketone, m.p. 123°, 6-acetoxy-2-naphthyl CH2Cl ketone, m.p. 112°, and 6-acetoxy-2-naphthyl $C1_2$ contact, in p. 112°, and 6-acetoxy-2-naphthyl carbinyl acetate, m.p. 112°. 1:2-OH·C₁₀H₆·CO₂H does not appear to be affected by NaOAc and boiling Ac₂O and is resinified by Ac₂O containing a little conc. H₂SO₄. H. W.

Transformation of fatty acids in the course of geological periods. G. STADNIKOV and O. EGO-ROVA (Brennstoff-Chem., 1936, 17, 48-49; cf. A., 1933, 928).—The residue obtained after extraction of balkashite with org. solvents was dissolved by heating with 2% aq. NaOH/25 atm. On acidifying the solution the acids separated as a clear yellow liquid, which rapidly changed into a viscous dark brown mass insol. in org. solvents. On acidifying the solution in presence of Et_2O the acids dissolved therein, but subsequently changed into the insol. form. This tendency to change was diminished by heating the balkashite residue with the aq. NaOH under high H₂ pressure. It is concluded that the conversion into a viscous or rubber-like form is not a polymerisation, but a colloid-chemical process similar to the conversion of humic acids into the insol. form by ageing.

A. B. M.

Interaction of carbon monoxide and alcohols. II. Synthesis of propionic and *iso*butyric acids. III. Synthesis of methylethylacetic and pivalic acids. D. V. N. HARDY (J.C.S., 1936, 358–362, 362–364; cf. A., 1934, 1200).—II. In presence of H_3PO_4 - $Cu_3(PO_4)_2$ EtOH and CO at 250–370° give 3.7% of EtCO₂H, 2% of EtCO₂Et, and 8–24% of polymerised C_2H_4 , the % of polymerides rising rapidly with rising temp. Pr^aOH and Pr^βOH react at 150– 300° to give Pr^βCO₂H (max. about 30–33% at 210°) (no Pr^aCO₂H), small amounts of esters, much higher acids (mainly $C_{3n}H_{6n+1}$ ·CO₂H), and polymerised hydrocarbons, C_3H_6 , and some COMeBu^β and COPr^β₂. It is concluded that reaction occurs by preliminary dehydration of the alcohol, and, in conformity with this view, Pr^βOH, being more readily dehydrated, reacts more completely than does Pr^oOH. The ketones are formed by two routes, (i) condensation of alcohol or olefine to higher alcohol and dehydrogenation, and (ii) loss of CO₂ from acids formed.

III. In presence of H_3PO_4 with or without $Cu_3(PO_4)_2$ at 200—210° Bu°OH or Bu^gOH and CO give much Bu^gCO₂H, a little CHMcEt·CO₂H, large amounts of a mixture, C_8H_{17} ·CO₂H, and polymerised hydrocarbons. CHMcEt·OH gives similar products, except that only traces of CHMcEt·CO₂H are formed. Reaction occurs only by way of the butylenes, which are interconvertible under the conditions used. R. S. C.

Interaction of olefines, carbon monoxide, and steam. D. V. N. HARDY (J.C.S., 1936, 364-365). --At 290-300°/150 atm. in presence of H₃PO₄ C₂H₄, CO, and H₂O give EtCO₂H (1 mol.), EtOH (3 mols.), and polymerised hydrocarbons (2 mols.). At 200°/ 200 atm. C₃H₆ gives similarly much Pr^oCO₂H and homologues; and (CHMe.)₂ gives Bu^oCO₂H and other acids and some CHMeEt-CO₂H. These reactions exactly resemble those with alcohols (preceding abstract) and confirm the mechanism suggested. For reaction the olefine must be activated; in presence of H₃PO₄ activation occurs by formation and decomp. of alkyl phosphates. R. S. C.

Elaidinisation of oleic acid and cis-trans isomerism. J. STUURMAN (Chem. Weekblad, 1936, 33, 201, 255).—Polemical against Bertram (this vol., 189, and below). D. R. D.

Elaidinisation of oleic acid and cis-trans isomerism. S. H. BERTRAM (Chem. Weekblad, 1936, 33, 216, 255).—Replies to Stuurman (preceding abstract). S. C.

Telfairic acid. G. D. GOODALL and R. D. HAWORTH (J.C.S., 1936, 399).—Telfairic acid (A., 1900, i, 473) from the seeds of *Telfairia pedata* is really linoleic acid. R. S. C.

Ketolic condensations of ethyl acetoacetate with acetaldehyde. H. GAULT and T. WENDLING (Bull. Soc. chim., 1936, [v], 3, 369–388).—Partly a more detailed account of work previously reviewed (A., 1935, 65). The following appears to be new. Et di- α' -hydroxyethylacetoacetate (I) is decomposed by PhNCO; Et ethylideneacetoacetate (II) and resinous products are formed. (I) and AcCl give an unstable Cl-containing compound, b.p. 104–105°/ 14 mm.; in presence of C₅H₅N, (II) results. Decomp. of (I) also occurs with BzCl (in C₅H₅N) or Ac₂O; EtOH-NH₃ leads to MeCHO,NH₃ and resin. Attempted prep. of a pyrazolone and phenylhydrazone from (I) gives the corresponding derivatives (*loc. cit.*) of Et α' -hydroxyethylacetoacetate (III). The stability of (III), alone and in various solvents, is studied. (III) is dehydrated (H₃PO₄) to (II).

H. B.

Ketolic condensations of ethyl acetoacetate with acetaldehyde. H. GAULT and T. WENDLING (Bull. Soc. chim., 1936, [v], 3, 549-568; cf. preceding abstract).-OH·CHMe·CHAc·CO,Et (I) appears to be dehydrated and resinified by PhNCO in Et₂0. With AcCl it affords an unstable compound, probably CEtAcCl·CO, Et, b.p. 109-112°/17 mm., whereas it is dehydrated by Ac.O and NaOAc to Et ethylideneacetoacetate. With N₂H₄,H₂O in EtOH (I) yields 3-methyl-4-a-hydroxyethylpyrazol-5-one, m.p. 275°, whilst with NHPh·NH2 in EtOH it gives the phenylhydrazone, m.p. 92°, which loses MeCHO and resinifies when heated. (I) is resinified by NH2.CO.NH2.NH2 Alkaline or acidic hydrolysis of (I) does not give welldefined results, whilst EtOH-NH₃ gives MeCHO.NH₄ (I) with CH_2O in presence of K_2CO_3 and H_2O gives a mixture of products from which Et2 as-dihydroxyβδ-diacetylpentane-βδ-dicarboxylate, m.p. 97°, is isolated; with MeCHO Et di-a'-hydroxyethylacetoacetate is produced. (1) and CH2Ac·CO2Et in presence of NHEt2-EtOH afford Et2 2-hydroxy-2: 6-dimethylcyclohexan-4-one-1: 6-dicarboxylate, m.p. 78-79°. (J) and NHEt2 at -10° give crude Et2 E-hydroxy-ay diacetyl- β-methylpentane-ay-dicarboxylate, identified by conversion into the dipyrazolone,

 $\begin{array}{c} \mathrm{NH} \cdot \mathrm{CO} \\ \mathrm{N=CMc} > \mathrm{CH} \cdot \mathrm{CHMe} \cdot \mathrm{C(CHMe} \cdot \mathrm{OH}) < \begin{array}{c} \mathrm{CO-NH} \\ \mathrm{CMe} \cdot \mathrm{N} \\ \mathrm{CMe} \cdot \mathrm{N} \\ \mathrm{H} \cdot \mathrm{W} \\ \end{array}$

Ferric oxalate.—See this vol., 576.

Polymembered heterocyclic compounds. IX. Polymembered cyclic esters from dihydric alcohols and dicarboxylic acids. M. STOLL and A. ROUVÉ (Helv. Chim. Acta, 1936, 19, 253-261; cf. A., 1935, 1351).—The relative ease of formation of various polymembered cyclic lactones, di- and trilactones is in harmony with probability considerations if the effect of change of mol. concn. is taken into account. $OH \cdot [CH_2]_9 \cdot OH$ and $CO_2H \cdot [CH_2]_7 \cdot CO_2H$ in 0-005*M* solution give *di*- (I), $CO < [CH_2]_7 \cdot CO_2H$ in 0-012°, b.p. 147—148°/0·01 mm., and *tetra-lactone* (II), $CO < [CH_2]_9 \cdot O \cdot CO \cdot [CH_2]_7 - CO_2 - [CH_2]_9 - OCO, m.p. 65-68°;$ the ratio, (I) : (II) = 46 : 54, is < expected from the $lactonisation of <math>OH \cdot [CH_2]_3 \cdot CO_2H$; this is attributed to formation of more highly complex esters.

OH·[CH₂]₃·OH, CO₂H·[CH₂]₈·CO₂H, and anhyd. PhSO₃H give the di, CO< $\begin{bmatrix} CH_2 \end{bmatrix}_3 \cdot CO \\ O = \begin{bmatrix} CH_2 \\ O \end{bmatrix}_3 \cdot CO \\ O = \begin{bmatrix} CH_2 \\ O \end{bmatrix}_3 \cdot CO \\ O = \begin{bmatrix} CH_2 \\ O \end{bmatrix}_3 \cdot CO \\ O = \begin{bmatrix} CH_2 \\ O \end{bmatrix}_3 \cdot CO \\ O = \begin{bmatrix} CH_2 \\ O \end{bmatrix}_3 \cdot CO \\ O = \begin{bmatrix} CH_2 \\ O \end{bmatrix}_3 \cdot CO \\ O = \begin{bmatrix} CH_2 \\ O \end{bmatrix}_3 \cdot CO \\ O = \begin{bmatrix} CH_2 \\ O \end{bmatrix}_3 \cdot CO \\ O = \begin{bmatrix} CH_2 \\ O \end{bmatrix}_3 \cdot CO \\ O = \begin{bmatrix} CH_2 \\ O \end{bmatrix}_3 \cdot CO \\ O = \begin{bmatrix} CH_2 \\ O \end{bmatrix}_3 \cdot CO \\ O = \begin{bmatrix} CH_2 \\ O \end{bmatrix}_3 + CO \\ O = \begin{bmatrix} CH_2 \\ O \end{bmatrix}_3 + CO \\ O = \begin{bmatrix} CH_2 \\ O \end{bmatrix}_3 + CO \\ O = \begin{bmatrix} CH_2 \\ O \end{bmatrix}_3 + CO \\ O = \begin{bmatrix} CH_2 \\ O \end{bmatrix}_3 + CO \\ O = \begin{bmatrix} CH_2 \\ O \end{bmatrix}_3 + CO \\ O = \begin{bmatrix} CH_2 \\ O \end{bmatrix}_3 + CO \\ O = \begin{bmatrix} CH_2 \\ O \end{bmatrix}_3 + CO \\ O = \begin{bmatrix} C$ 14-17°, b.p. 100-102°/0.02 mm., and tetra-lactone, $CO < \frac{[CH_2]_3 \cdot CO_2 \cdot [CH_2]_3 \cdot O}{O \cdot [CH_2]_3 \cdot O \cdot CO \cdot [CH_2]_3} > CO$, m.p. 113—113.5°, but 70% of the material is converted by primary esterification of the PhSO₃H into the esters, SO₂Ph·O·[CH₂]₃·O·CO·[CH₂]₈·CO₂·[CH₂]₃·OH, an oil, and CO2H. [CH2] & CO2. [CH2] O.CO. [CH2] & CO2. [CH2] 3 O.SO,Ph (not obtained pure), a glass. R. S. C.

Two crystalline d-talomucolactones. (FRL.) M. STEIGER and T. REICHSTEIN (Helv. Chim. Acta. 1936, 19, 195-203).-d-Talomucic acid (modified prep. from d-talonic acid), m.p. 155-158°, [a]¹⁴ $+29^{\circ} \rightarrow [\alpha]_{D}^{24} + 6.7^{\circ}$ in H_2O in 61 days, when boiled with H₂O, gives a mixture of $\alpha\delta$ - (I), m.p. 187–189° (decomp.; corr.), $[\alpha]_{\rm b}^{14} - 49\cdot1^{\circ} \rightarrow [\alpha]_{\rm b}^{24} + 8^{\circ}$ in H₂O in 62 days, and $\gamma\zeta$ -lactone (II), +H₂O, double m.p. about 66–70° and 133° (corr.), $[\alpha]_{\rm b}^{23} + 32\cdot5^{\circ} \rightarrow [\alpha]_{\rm b}^{20} + 10\cdot6^{\circ}$ in H₂O in 60 days. Na-Hg reduction of (I) gives d-altronic acid, that of (II) d-talonic acid. R. S. C.

Hydrazine compounds of *d*-galacturonic acid and the isolation of crystalline d-galacturonic acid from tobacco. H. COLLATZ (Ber., 1936, 69, [B], 485-492; cf. Neuberg et al., A., 1932, 202).-Conditions are precisely defined for the conversion of d-galacturonic acid (I) into its phenylhydrazone, m.p. 134° (corr.; decomp.), p-bromophenylhydrazone, m.p. 152—153° (corr.; decomp.), p-nitrophenylhydr-azone, m.p. about 170—175° (decomp.) according to the rate of heating, 2:4-dinitrophenylhydrazone (II), m.p. 152° (corr.; decomp.), and thiosemicarbazide derivative, $C_7H_{15}O_7N_3S,H_2O$, m.p. 147° (corr.; decomp.). Tobacco leaves are repeatedly extracted with H_2O , and the dry residue is hydrolysed with boiling 2.5% H_2SO_4 . The mixture is treated with BaCO₃ and filtered. The filtrate is conc. at 50°/vac. and the mixture (III) of Ba and Ca galacturonate (IV) is pptd. by EtOH. From (III) the free uronic acid is obtained by treatment with H₂SO₄ in amount equiv. to Ba and from (IV) by means of H₂C₂O₄. The solutions are conc. to a syrup, which is dissolved in EtOH. Treatment of the solution with 2: 4-C6H3(NO2)2·NH·NH2 affords (II), converted by MeCHO into (I), $[\alpha]_{D}^{23}$ +50.74° in H₂O (equilibrium val.). H. W.

d-Saccharodilactone. K. REHORST and H. SCHOLZ (Ber., 1936, 69, [B], 520-526).-Potato starch (200 g.) is mixed with H_2O (200 c.c.) and HNO_3 (d 1.20, 800 c.c.) and then evaporated at 100° to incipient discoloration. Treatment of the product with a slight excess of K_2CO_3 followed by AcOH gives pure K H d-saccharate, converted through the Ca salt into d-saccharomonolactone. Since for further work the purity of the product is essential it is recryst. from Et₂O in a continuous extraction apparatus, thus giving a material of m.p. 133°, [a]¹⁰_D $+40.2^{\circ}$ in H₂O. It suffers partial hydration during titration with 0.1N-NaOH. When heated over P_2O_5 at 100°/vac. it is transformed into d-saccharodilactone (I), m.p. 134-135° after softening at 132°, [a]¹⁸ $+164.6^{\circ}$ to $+33.5^{\circ}$ in H₂O in 10 days. The presence

of the δ -lactone ring is shown by the immediate and

-CO HC-Ò. OH·CH -ĊH Ó H.C.OH Ċ0-(I.)

rapid mutarotation and the immediate neutralisation of alkali in presence of phenolphthalein. The total consumption of alkali exceeds that required for the opening of the two lactone riugs. Chemically (I) resembles mannosaccharodilactone, since it is resinified by alkali and reduces Fehling's

solution and Ag₂O-NH₂; with I-KOH it affords CHI2. H. W.

Attempts to reduce carbon monoxide electrocatalytically. G. FESTER and M. SCHIVAZAPPA (Rev. fac. quím. ind. agr., 1930, 1, 53-57) .- The combination of catalytic and cathodic reduction of CO in solution gave determinable amounts of CH₂O, and small amounts of HCO₂H and MeOH.

CH. ABS. (e)

Polymeride of acetaldehyde. M. LETORT (Compt. rend., 1936, 202, 767-768; cf. this vol., 316).—Pure MeCHO (prep. described) when distilled from a vessel at -15° to one at -185° at 10^{-3} to 10^{-5} mm. affords a spongy polymeride, which is slowly reconverted at room temp. into MeCHO, and reacts reconverted at room temp. Into violently with fuming HNO_3 to give $PhNO_2$. J. L. D.

Methylglyoxal. T. BERSIN (Ber., 1936, 69, [B], 560-562; cf. Schubert, this vol., 55).-The bimol. form of AcCHO (in H₂O) is the hydrate OH.CHAc.O.CMe(OH).CH(OH), or

O<CMe(OH)·CH(OH) CH(OH)·CMe(OH)>0, b.p. 25-27°/14-17 mm., 104-105°/743 mm.; in AcOH it suffers partial

decomp. into AcCHO and H₂O. Reversible dissociation with production of yellow colour occurs during distillation under atm., but not under diminished, pressure. Schubert's semi-mercaptal from AcCHO and SH·CHMe·CO₂H or glutathione is unimol. in H₂O and has the structure OH-CHAc-SR. The substrate of methylglyoxalase has the constitution $CO_2H \cdot CH(NH_2) \cdot [CH_2]_2 \cdot CO \cdot NH \cdot CH(CO \cdot NH \cdot CH_2 \cdot CO_2H) \cdot CH_2 \cdot S \cdot CHAc \cdot OH.$ Under the influence of

the flavin enzyme (I) gives an acid, probably OH-CHMe-CO,H. H. W.

Photo-activation of the carbonyl group in prototropic reactions. W. S. NATHAN (Nature, 1936, 137, 460). L. S. T.

Acetonecyanohydrin. R. F. B. Cox and R. T. STORMONT (Org. Syntheses, 1935, 15, 1-2).-An improved prep. from COMe2, NaCN, and H2SO4 is recorded. Сн. Авз. (7)

Action of mixed organomagnesium compounds on aliphatic a-ethylenic ketones. II. J. COLONGE (Bull. Soc. chim., 1936, [v], 3, 413–418; cf. A., 1935, 847).—COMe·CPr. OH is dehydrated (99.5% H₂SO₄) to CHEt.CPr.COMe, b.p. 66–74°/9 mm., separated (method: Locquin and Heilmann, A., 1928, 509) into cis-, b.p. 72°/9 mm., and trans-, b.p. 71—75°/9 mm., forms, both of which with MgEtBr at 15—20° give approx. equal amounts of Me β-ethyl-α-propylbutyl ketone, b.p. 199-200°/747 mm. (semicarbazone, m.p. 125°), and γ -methyl- δ -propyl- $\Delta\delta$ -hepten- γ -ol (not obtained pure). COMe·CH₂·CHPr·OH is dehydrated (trace of I) to trans-CHPr:CH·COMe, b.p. 58—59°/13 mm., 158—159°/750 mm., whilst the cis-form, b.p. $61\cdot5-63^{\circ}/13$ mm., is prepared (cf. Eccott and Linstead, A., 1930, 893) from PrCHO, COMe₂, and 15% NaOH; both forms with MgEtBr give 40% of Me β-ethylamyl ketone, b.p. 72°/12 mm. (semicarbazone, m.p. 115°), and 60% of γ -methyl- Δ^{3} octen- γ -ol, b.p. 69—70°/10 mm. (cf. Grignard and Dubien, A., 1925, i, 111). H. B.

Reducibility of bromo-ketones by hydrogen bromide and consequences thereof. F. KRÖHNKE and H. T. TIMMLER (Ber., 1936, 69, [B], 614—621).— In principle, all Br-ketones and related compounds are reducible by HBr, the ease depending on their constitution. Simple Br-ketones such as

 $COPh \cdot CH_2Br$ in which no activating group except CO is present require a Br acceptor. The ready reducibility of others is shown by the ease with which in EtOH or COMe, they liberate I from aq. KI. CO.H or CO.Et are feebly activating, but 2 CO.Et facilitate elimination of Br as in CHBr(CO₂Et)₂, which gives a marked "I reaction." CHPhBzBr, COPh CHBr, CBr, CHO, and CHBr, CO CO, H react in order of increasing ease. The difficulty of introducing 2 Br at the same C atom is due to the counteraction of HBr. Thus the direct conversion of COPhEt into COPh·C₂H₃Br₂ appears impossible, but the *compound*, m.p. 31°, is formed if HBr is removed after formation of COPh·C₂H₄Br and bromination is then repeated. $CHBr_2 \cdot CO_2H$ is resistant towards HBr, but $CBr_3 \cdot CO_2H$ is somewhat affected. CH_2Bz_2 is readily brominated, but an equilibrium, CH₂Bz₂+ $Br_2 = CHBz_2Br + HBr$ is established unless HBr is removed. With CH2Ac·CO2Et the initial product is CHAcBr·CO, Et; Br removed therefrom by HBr reenters in the γ -position, giving thus CH₂Br·CO·CH₂·CO₂Et as final product. Treatment

CH₂Br·CO·CH₂·CO₂Et as final product. Treatment of CH₂AcBz with NaOBr gives CHAcBzBr, transformed by C₅H₅N through a non-isolated enolbetaine into AcOH and phenacylpyridinium bromide; with HBr-AcOH the Br of CHAcBzBr wanders with preduction of CH₂Bz·CO·CH₂Br, converted by C₅H₅N into benzoylacetonylpyridinium bromide, m.p. 181° (decomp.) (corresponding perchlorate, m.p. 169°), which with alkali yields BzOH, AcOH, and methylpyridinium salt. Since NO₂ is more strongly activating than CO, Br can be readily removed from aliphatic Br-NO₂-compounds such as CH₂Br·NO₂ and NO₂·CBr(CO₂Et)₂; N^{∇} in quaternary salts also activates if CO also is present. Determination of otherwise stable Br-ketones can be effected if a suitable acceptor, such as β -C₁₀H₇·OH, is present. The bearing of the observation on the indirect enol titration is discussed. The suggested mechanism of debromination is ·CO·CHBr·++HBr \rightarrow

 $(OH)CBr \cdot CHBr \cdot \rightarrow \cdot (OH)C:CH \cdot + Br_2 \rightarrow \cdot CO \cdot CH_2.$ H. W.

Reaction of sulphur and keto-alcohols in glycerol containing iron. E. ZMACZYNSKI (Compt. rend., 1936, 202, 668—669).—Benzoin, fructose (I), or CO(CH₂·OH)₂ heated with S in glycerol (II) containing combined Fe gives a black coloration and then a ppt.; the change does not occur in pure (II). The reaction appears to be sp. for the OH·CH·CO· group : 0.1 mg. of S in 1 c.c. of (II) is also detectable and (I) can be distinguished from glucose or sucrose.

H. B. d-Psicose. (FRL.) M. STEIGER and T. REICH-STEIN (Helv. Chim. Acta, 1936, 19, 184-189) .-d-Ribose, HCN, and Ba(OH), give d-altronic acid (Cd salt, cryst.) and d-allonolactone (disopropulidene derivative, b.p. about 130°/1 mm.); the lactone with Na-Hg gives d-allose (I), m.p. 128-130° (corr.), which is isomerised by hot C5H5N to a mixture, whence is obtained a poor yield of d-psicose (II), an oil, $[\alpha]_{p}^{20} + 3 \cdot 1^{\circ}$ in H₂O, stable to yeast and best isolated as diisopropylidene derivative, b.p. 104-105°/0.3 mm., m.p. 57-58.5°, [a]20 -98.2° in COMe. 1-Psicose (III) gives an oily dicyclohexylidene derivative. Hydrogenation (Ni-kieselguhr) in EtOH at 140°/120 atm. gives allodulcitol, m.p. 150-151° (corr.). d-Allosazone, m.p. 173-174° (decomp.), $\left[\alpha_{D}^{20} - 19.2^{\circ}\pm4^{\circ}\right]$ in EtOH, variable in $\dot{C}_{5}H_{5}N$, is obtained from (I) and (II), and the 1-isomeride from (III); the dl-form has m.p. 204° (decomp.).

R. S. C. **Preparation of d-ribose.** (FRL.) M. STEIGER (Helv. Chim. Acta, 1936, 19, 189–195).—d-Ribose is prepared in 17% over-all yield from arabinose by electrolytic oxidation to Ca d-arabonate, isomerisation by boiling C_5H_5N to d-ribonolactone, and controlled reduction of this by 2.5% Na-Hg; it is isolated as p-bromophenylhydrazone, m.p. 166–167°, from which it is obtained by PhCHO. R. S. C.

Determination of O- and N-acetyl and structure of osazone acetates. M. L. WOLFROM, M. KONIGSBERG, and S. SOLTZBERG (J. Amer. Chem. Soc., 1936, **58**, 490—491).—Freudenberg and Harder's method (A., 1923, ii, 884) of determination of Ac gives O + N-Ac, whilst Kunz and Hudson's method (A., 1926, 941) gives O-Ac only. It is thus possible to distinguish, e.g., aldehydo- and β -d-glucoseoxime hexa-acetates, since the latter contains 1 N-Ac. d-Glucose-, m.p. 115—117°, $[\alpha]_D^{\pm}$ (in CHCl₃) $-55^{\circ} \rightarrow$ -45° (cf. Maurer and Schiedt, this vol., 193), and d-galactose-phenylosazone tetra-acetate, m.p. 178— 179° (decomp.), $[\alpha]_D^{\pm4} + 87^{\circ}$ in CHCl₃ (from the osazone and Ac₂O in C₅H₅N at room temp.), contain 4 O-Ac groups, indicating open-chain structures. H. B.

Carbohydrates. VII. Xanthate reaction of glucose. T. LIESER and R. THIEL (Annalen, 1936, 522, 48-55).—The solution (A) from α -methyl-glucoside (I), 2N-NaOH, and CS₂, with CO₂ followed by CuOAc, gives $Cu_2 \alpha$ -methylglucosidyl dixanthate. (A) with AcOH (slight excess), followed by CO₂ and Cd(OAc)₂, yields the Cd dixanthate (II); with CO₂ and Cd(OAc)₂, yields the Cd dixanthate (II); with CO₂ and Cd(OAc)₂, yields the Cd dixanthate (II); with CO₂ and Cd(OAc)₂, yields the Cd dixanthate and a poly-is obtained. β -Phenylglucosidel (III) similarly leads to Cd β -phenylglucosidyl dixanthate and a poly-xanthogen (shown by fractionation to be mainly di-with small amounts of mono-, tri-, and tetra-xanthogens). A small amount of dixanthate is also obtained (cf. A., 1935, 1354) from (I), 0.36N-Ba(OH)₂, and CS₂; the purified solution (B) and Cd(OAc)₂ give a little (II). (B) with MeI or Me₂SO₄ affords the H₂O-sol. Me α -methylglucosidyl xanthate (loc. cit.) and a little of the non-cryst., H₂O-insol. Me₂ α -

methylglucosidyl dixanthate [also obtained from the previously described (loc. cit.) Ag salt and MeI]. Ba β -phenylglucosidyl xanthate (loc. cit.) with CH₂Cl·CO·NEt₂ and MeI gives 52·6% of NEt₂·CO·CH₂, m.p. 133—135° (corr.), and 66% of Me, m.p. 173— 174°, β -phenylglucosidyl xanthate, respectively. (III) with 3·5N-NEt₄·OH and CS₂, followed by MeI (or Me₂SO₄) or I (slight excess), yields Me₄ β -phenylglucosidyl tetraxanthate (26%), m.p. 135° (corr.) or the trixanthogen, respectively. Homogeneous cryst. di- and tri-xanthates could not be prepared from glucose. H. B.

Position of the equilibrium and specificity of the β -glucosidase action. C. N. IONESCU (Ber., 1936, 69, [B], 588—591).—Further evidence (cf. A., 1934, 927) is adduced in favour of the view that the law of mass action is unreservedly applicable to reactions catalysed by β -glucosidase if the concn. of β -glucose instead of total glucose is considered. The apparent deviations caused by increasing [EtOH] are not due to inactivation of the enzyme but to displacement of the equilibrium β - $\Longrightarrow \alpha$ -glucose towards the α -form. H. W.

Kinetics of β -glucosidase action. C. N. IONESOU and A. KIZYK (Ber., 1936, 69, [B], 592-597).-The experiments of Bourquelot and present experiments with β -methyl- (I) and β -ethoxyethylglucoside show no deviation from the law of mass action. If, separately, the hydrolysis of a definite amount of (I) and parallel to it the syntheses of the same glucoside are effected whereby equiv. amounts of glucose and (I) are involved, it is possible to calculate four velocity coeffs. The hydrolysis experiment gives a velocity coeff. for the hydrolysis k_2^* and for the synthesis k_1^* by reason of the reversible process. Analogously from the synthetic experiment velocity coeffs, for the synthesis k_1 and for the opposed hydrolysis k_2 are derived. The ratio of any velocity coeff. of hydrolysis to any velocity coeff. of synthesis is the same and is identical with the equilibrium consts. from the conces. at the completion of the reaction. von Euler's hypothesis is not applicable to the synthesis of β -glucosides even in those cases in which the affinity of the glucoside for β -glucosidase may be assumed to differ appreciably from that of glucose. H. W.

Photochemical reactions of o-nitrobenzylideneacetals. IX. o-Nitrobenzylideneacetals of the oses. I. TANASESCU and E. CRACIUNESCU (Bull. Soc. chim., 1936, [v], 3, 581—598; cf. A., 1933, 275, 393; 1934, 169).—Treatment of galactose with o-NO₂·C₆H₄·CHO in presence of P₂O₅ or, preferably, anhyd. Na₂SO₄ at 40—45° for 5—6 hr. gives 1:2(i 1:3)-4:6-di-o-nitrobenzylidenegalactose (I), m.p. 135° after softening, $[\alpha] \pm 0^{\circ}$ in CHCl₃ or C₅H₅N. It is very resistant to acid hydrolysis, which, however, can be effected by HNO₃ (1:1). It does not react with AcCl or BzCl in C₅H₅N or in presence of alkali, and is indifferent towards PhSO₂Cl or p-C₆H₄Me·SO₂Cl. It does not give a phenylhydrazone or reduce Ag₂O– NH₃. Reduction of (I) with Zn dust in boiling COMe₂ containing CaCl₂ gives a very unstable basic substance, m.p. 118°. Insolation of (I) in CHCl₂ affords 1:2(i 1:3)-o-nitrobenzylidenegalactose 4-o-

nitrosobenzoate, m.p. 147° after shrinking, $\lceil \alpha \rceil + 0^{\circ}$ in C₅H₅N, the constitution of which is deduced from the isolation of the corresponding 6-benzoate, m.p. 165° (decomp.) after softening, 6-acetate, m.p. about 135° after softening, and 6-benzenesulphonale, m.p. 162° after softening, and its condensation with 1 mol. of NH₂Ph in glacial AcOH to 1:2(?1:3)-onitrobenzylidenegalactose 4-0-phenylazobenzoate, m.p. 154° after shrinking. 1:2(?1:3)-4:6-Di-m-nitro-benzylidenegalactose, m.p. 122° after softening, is obtained similarly but in poorer yield, and is similarly reduced to an unstable base. a-Methylgalactoside and o-NO₂·C₆H₄·CHO in presence of P₂O₅ (but not of anhyd. Na₂SO₄) at (45° afford 2:3-4:6-di-onitrobenzylidene-a-methylgalacloside, m.p. 105° after softening, rapidly isomerised by insolation in CHCl, to the substance $C_{21}H_{20}O_{10}N_2$, m.p. 155° after softening. 1:2(?1:3)-4:6-Di-o-nitrobenzylidenemannose, m.p. 120° after softening, readily obtained at $> 50^{\circ}$, is hydrolysed by HNO₃ (1:1), cannot be acylated, and does not give a phenylhydrazone; insolation of it affords 1:2(?1:3)-o-nitrobenzylidenemannose 4-o-nitrosobenzoate, m.p. 145° after softening, $[\alpha] + 0^\circ$, which yields a 4-benzoate, m.p. 165° after softening, and 4-benzenesulphonate, m.p. 160° after softening, and is transformed by NH2Ph into 1:2(?1:3)-onitrobenzylidenemannose 4-o-phenylazobenzoate, m.p. 154° after softening. 1:2(?1:3)-Di-m-nitrobenzylidenemannose, m.p. 110° after softening, is reduced to a very unstable base. In presence of P₂O₅ at 40°, rhamnose is rapidly condensed to 1:2-3:4-dio-nitrobenzulidenerhamnose, m.p. about 105° (decomp.), which cannot be acylated and is isomerised to the m.p. 112° after softening, $[\alpha] \pm 0^{\circ}$ in C_5H_5N , gives a phenylhydrazone, m.p. 126°, after softening. Lactose in presence of P2O5 and Na2SO4 at 70° slowly affords tri-o-nitrobenzylidenelactose, m.p. about 220° after softening, isomerised by light to the compound $C_{33}H_{31}O_{47}N_3$, m.p. > 300°. Sucrose more readily yields di-o-nitrobenzylidenesucrose, m.p. 135° after softening, converted by insolation into the substance $C_{26}H_{28}O_{13}N_2$, m.p. 185° after softening. H. W.

Hyperacetylation of aldoses. N. W. PIRIE (Biochem. J., 1936, 30, 374—376).—The heptaacetates of d-galactose, m.p. 106°, $[\alpha]_{\rm D} + 4\cdot0°$, dmannose, m.p. 122°, $[\alpha]_{\rm D} + 0\cdot4°$, d-glucose, m.p. 121— 122°, $[\alpha]_{\rm D}^{\rm ij} + 7\cdot9°$, and the hexa-acetates of l-arabinose, m.p. 91°, $[\alpha]_{\rm D}^{\rm ij} - 27\cdot7°$ (all in CHCl₃), l-rhamnose, m.p. 72—73°, $[\alpha]_{\rm D}^{\rm ij} - 7\cdot5°$ in MeOH, and d-xylose, $[\alpha]_{\rm h}^{\rm ij'}$ +4·0° in CHCl₃, were prepared from the appropriate aldose penta- and tetra-acetate Et₂ mercaptals. d-Mannose penta-acetate, m.p. 51—52°, $[\alpha]_{\rm D}^{\rm ij} + 31\cdot2°$ in CHCl₃, and l-rhamnose tetra-acetate Et₂ mercaptal, m.p. 60°, $[\alpha]_{\rm D}^{\rm ij} + 39\cdot5°$ in CHCl₃, are described. H. D.

Preparation of dl-galactose hepta-acetate by the acetolysis of agar. N. W. PIRIE (Biochem. J., 1936, 30, 369—373).—dl-Galactose hepta-acetate (I) is prepared by treatment of agar with Ac₂O and H₂SO₄. After slight hydrolysis of agar with 0·1N-H₂SO₄ for 40 min., Ac₂O gave the usual yield of (I); completely hydrolysed agar gave no (I) but dl- and d-galactose penta-acetate were isolated. H. D. Oxidation of mannose to mannonic acid by **B.** gluconicum.—See this vol., 640.

(A) Delay and "prolongation" of reaction during the decomposition of fructose in ultraviolet light. Light-induced [light-activated] fructose. (B) Effect of sodium chloride and other metal halides on [the decomposition of] fructose in ultra-violet light. R. CANTIENI (Helv. Chim. Acta, 1936, **19**, 270—276, 276—280).—(A) 10% aq. fructose solution decomposes in ultra-violet light to give CO with a little CO₂ and (in light of short λ) H₂ (cf. A., 1932, 237). Reaction commences only after irradiation for about 45 min., then increases to a fixed val. ("delay of reaction"), and continues at a decreasing rate for many hr. after irradiation has ceased ("prolongation of reaction"). The vol. of gas liberated after cessation of irradiation about equals the decrement due to the delay of the reaction. It is assumed that a "light-induced" (light-activated) fructose mol. is formed by absorption of a light quantum, that this mol. has a moderate stability, and decomposes at a rate α its conc. partly into ordinary fructose and partly into CO and $C_5H_{12}O_5$. In accordance with this view, (a) the activated mol. is less stable at 100° than at room temp. (since the "prolongation" is very slight at 100°), and (b) light of short λ gives a less stable activated mol. (less "prolongation") than does light of long λ . Increase of pressure increases both the delay and prolongation of the reaction, indicating increased stability of the activated mol.

(B) Addition of 25% of NaCl to a 10% fructose solution irradiated by ultra-violet light of long λ decreases the delay and prolongation of the reaction, without affecting the total vol. of gas liberated. The stability of the activated mol. is reduced by about 50%; the time required to give sufficient CO to be detected by hæmoglobin is reduced from 255 to 97.5 sec. KBr and, more so, KI reduce the total vol. of gas liberated, presumably by favouring decomp. of the activated mol. to ordinary fructose. R. S. C.

Velocities of hydrolysis of glucosides.—See this vol., 572.

Digitalis glucosides. VI. Existence of two anhydrodigoxigenins. S. SMITH (J.C.S., 1936, 354-355; cf. A., 1935, 1355).—Digoxigenin and conc. HCl at 10—0° give an unstable Cl-compound, m.p. 185° after decomp. at 120°, converted by hot aq. MeOH into α -anhydrodigoxigenin, m.p. 192°, $[\alpha]_{5541}^{30} + 46°$ in MeOH (diacetate, m.p. 155°, $[\alpha]_{5641}^{30} + 68°$ in MeOH), oxidised by CrO₃ to α -anhydrodigoxigenone, m.p. 178°, $[\alpha]_{5641}^{30} + 136°$ in MeOH [semicarbazone, m.p. 235° (decomp.); dioxime, an oil], and a substance, m.p. 215°. The similarity of this anhydro-compound and its known isomeride (now called β -), m.p. 182°, $[\alpha]_{5461}^{30} - 16\cdot3°$, to α - and β - $([\alpha]_{5461}^{30} - 17\cdot3°)$ -anhydrodigitoxgenin, respectively, is noted. R. S. C.

Determination of particle size of polysaccharides by osmotic pressure measurements. S. R. CARTER and B. R. RECORD (Chem. and Ind., 1936, 218— 219).—Preliminary results obtained with methylated and acetylated inulin or glycogen, and methylated starch or dextrin, point to the association of the chemical units of the polysaccharide mols. into larger aggregates and confirm the structural views of Haworth and collaborators. E.S.H.

Colloid-chemical aspects of starch. J. ALEX-ANDER (Chem. and Ind., 1936, 206-209).—Starch from maize, potato, tapioca, wheat, or rice swells and ultimately disperses in cold, conc. HCO₂H. The optical properties and behaviour on dilution with H₂O of such solutions are described. The rôle of colloidal protection in the behaviour of starches is discussed. E. S. H.

Hydrolysis of starch by hydrogen peroxide and ferrous sulphate. W. R. BROWN (J. Biol. Chem., 1936, 113, 417—425; cf. Omori, A., 1932, 346). —The reaction is one of hydrolysis and appears to be a true catalysis, producing dextrins, sugars of high mol. wt., and simple sugars. It is analogous to that of amylase except that the simple sugars are further hydrolysed and oxidised to aldehydes and acids. It is assumed that the Fe transfers energy from the H_2O_2 breakdown to the starch, causing it to be reactive. J. N. A.

Starch nitrate. G. CENTOLA (Gazzetta, 1936, 66, S-15).-Rice starch with HNO₃ of varying conen. yields nitrates with 8-5-12-4% N. The last, the trinitrate, gives an X-ray spectrogram corresponding with a lattice distance of 7-15 Å., and similar to that given by collodion cotton of 12% N; it thus has the same structure as unstable cellulose trinitrate. Products of lower N content give diffraction lines in the same position, but wider and less distinct; the trinitrate is mixed with unchanged starch. Reaction is much more rapid than that of cellulose, owing to ease of penetration of starch grains. $HNO_3-H_2SO_4-H_2O$ mixtures containing $H_2O > 20\%$ or $H_2SO_4 > 73\%$ give very poor yields, owing to hydrolysis and oxidation. The product obtained when H_2SO_4 is present can be fractionated into amylose nitrate, sol. in MeOH, and amylopectin nitrate, insol.; these are hydrolysed to amylose and to amylopectin. Differences in X-ray spectra of starches of groups A, B, and C (A., 1933, 464) disappear when the latter are converted into nitrates, which thus have the same structure.

E. W. W.

Behaviour of cellulose in solutions of mineral acids. I. Determination of its mol. wt. in phosphoric acid solution. II. Kinetics of the degradation of cellulose in acid solutions. A. AF EKENSTAM (Ber., 1936, 69, [B], 549-552, 553-559). -I. The process of dissolution of cellulose (I) in acids involves swelling. The initial process consists m the formation of oxonium compounds such as $(C_6H_{10}O_5,2H_2O,H_3PO_4)_n$, $(C_6H_{10}O_5,4H_2O,H_2SO_4)_n$, and $(C_6H_{10}O_5,H_2O,HNO_3)_n$. These compounds, if obtained from hemicolloidal (I), are sol. in very dil. acid, but if derived from highly polymerised (I) require acid of increasing conen. as the mol. wt. increases. At low temp, they are dissolved by a more dil, acid than at a higher temp. From the clear solutions ppts. in more or less swollen form are obtained by addition of H2O or dil. acid (provided the material is moderately complex), and these yield (I) free from acid if sufficiently washed with H2O. Except with HNO3 esterification does not take place. H_3PO_4 is preferable to H₂SO₄ as solvent for (I), since it is less degrading;

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the solutions can be kept unchanged for several hr., particularly at low temp., and are not sensitive to air, so that, in this respect, H_3PO_4 is preferable to Schweitzer's reagent as solvent. Viscosimetric determinations of the mol. wt. of (I) in H_3PO_4 are recorded. The highest val. (157,000) is observed for Swedish filterpaper, which contains very little native (I). The vals. for native (I) such as cotton are very uncertain and are greater in H_3PO_4 than in Schweitzer's reagent. Pure hydrocellulose (II) gives concordant results in each solvent.

II. Correlation of viscosity with age of the solution shows that (II) in H₃PO₄ is degraded initially at a const. rate which alters when the mol. wt. has declined to a few thousand. Native (I) is very rapidly degraded shortly after its dissolution, but the rate soon declines and gradually approaches that of (II). The relationships in H₂SO₄ are similar but the initial rates are not so obvious as with H₃PO₄. A const. initial rate of degradation of (II) is not observed, the val. declining steadily. With native (I) the initial rate is somewhat > with (II), but the rates for (I) and (II) gradually become identical. It appears therefore that (II) of high mol. wt. contains a single type of linking affected by acid, whereas native (I) usually contains much larger mols. than (II) and has, in addition to the ordinary glucosidic linking, a type of union much more rapidly hydrolysed by acid.

H. W.

Constitution of cellulose xanthates. IV. T. LIESER and E. LECKZYCK (Annalen, 1936, 522, 56-65).-Cellulose (I) undergoes pronounced swelling in 2N- but dissolves in 2.27-4N-NEt₄. (I) swells in 2N-, dissolves in $2 \cdot 1 - 3 \cdot 6N$ -, and is insol. in $3 \cdot 8N$ p-tolyltrimethylammonium hydroxide (II); the corresponding N for NEtBu₃·OH are 1.5, 1.7-2.4, and 2.6. The min. concn. for complete solubility thus decreases with increased mol. wt. of the base. (I) reacts rapidly with CS_2 in 3.7N-NEt₄.OH at 0° to give $(NEt_4)_3$ cellulose trixanthate (III), which is oxidised by 0.1N-I in MeOH to the nearly pure trixanthogen, $[C_6H_7O_5(CS_2)_3]_2$. (III) is sol. in MeOH (pptd. by Et₂O) or COMe₂, but is insol. in EtOH. When solutions of (III) in H₂O or MeOH are kept for 3 days at room temp. and then oxidised by 1, the xanthogen formed contains 18-20% S; the "ripen-ing" is much slower in McOH at 0°. The dixanthogen, $[C_6H_8O_6(CS_2)_2]_2$, is the main product from (I), CS_2 , and 2.5*N*-NPr₄·OH, 2.35*N*-NEtBu₃·OH, or 3.6*N*-(II), followed by oxidation. (I) is insol. in CsOH (all conens.). H.B.

Degradation of simple amines during "kjeldahlisation." E. KAHANE and J. G. CARRERO (Bull. Soc. chim., 1936, [v], 3, 397–408).—NH.Me is produced rapidly from NHMc₂, and slowly from Mle₃, during the action of boiling conc. H₂SO₄; slow conversion into NH₃ then occurs. The analogous changes with NHEt₂ and NEt₃ take place more readily. Catalysts, in increasing order of efficiency, are K₂SO₄+CuSO₄ (A), HClO₄, SeO₂; NH₂Et is thus completely converted into NH₃. NH₃ is formed to the extent of 87-97% during "kjeldahlisation" [catalyst (A)] of (CH₂)₆N₄, NHPhMe, NPhMe₂, and novocaine; ephedrine, adrenaline, and hordenine similarly give (mainly) NH_3+NH_2Me , whilst betaine affords $NH_2Me+NHMe_2$. The amine mixtures are determined by Weber and Wilson's method (A., 1918, ii, 377). H. B.

Decomposition of ethylamine and diethylhydrazine.—See this vol., 568.

Action of ammonia on esters. F. D. CHATTA-WAY (J.C.S., 1936, 355-358) .- The normal action of NH₃, NH₂R, or NH₂NHR on esters, $R' \cdot CO_2 R''$ ($\rightarrow R'' \cdot OH + R' \cdot CO \cdot NH_2$ etc.), is due to the cationoid nature of the C of the CO. If, however, the alkyl carries a sufficiently powerful cationoid centre, the N will become attached to R", yielding R'-CO₂H and NH₂R" etc., as in the following cases. With the appropriate basic reagents under the usual conditions CCl₃·CH(CH₂·NO₂)·OAc yields γγγ-trichloro-α-nitro-β-aminopropane, b.p. 108°/2 mm. (hydrochloride, cryst.; Ac derivative, m.p. 137°), and the corresponding β -p-toluidino-, m.p. 61°, β -phenyl-, m.p. about 120° (decomp.) [Ac2 derivative, m.p. 199-200° (decomp.)]. -p-tolyl-, m.p. 115° (Ac2 derivative, m.p. 157-158°), -p-chlorophenyl-, m.p. 118° (Ac₂ derivative, m.p. 152°), -2:4-dichlorophenyl-, m.p. 79° (Ac₂ derivative, m.p. 125°), and -m-nitrophenyl-hydrazino-compounds, m.p. 112-113°. CHMeCl·CCl2·CH(CH2·NO2)·OAc gives similarly $\gamma\gamma\delta$ -trichloro- α -nitro- β -amino-, m.p. 54—55° (hydrochloride, cryst.; Ac derivative, m.p. 104°), - β -p-toluidino-, m.p. 110°, and - β -phenylhydrazino-pentane, m.p. 129° (Ac, m.p. 111°, and Ac₂ derivative, m.p. 158—159°). R. S. C.

Reaction of tris- β -hydroxyethylamine with tungstic acid.—See this vol., 575.

Oxidation of amino-acids by hypochlorite. I. Glycine. M. F. NORMAN (Biochem. J., 1936, 30, 484-496).—For complete oxidation of glycine (I) by NaOCl, 1 mg. of (I) requires 4.26 mg. of Cl, the observed increase in Cl' being equiv. to one half of the Cl used. The reaction is complete in 2 hr. between concns. of 0.05 millimol. per 100 ml. of acid or alkali, but is retarded at a higher concn. During the reaction the $p_{\rm H}$ falls, oxidation being most rapid between $p_{\rm H}$ 7 and 9. In the first stage HCN, CO₂, and H₂O are formed; HCN then gives HCO₂H and NH₃ and finally CO₂, H₂O, and N₂, thus accounting for 4¹/₄ atoms of O per mol. of (I). H. G. R.

Effect of heat on betaine. H. T. STRAW and H. T. CRANFIELD (J.S.C.I., 1936, 55, 40-41T).--Betaine as the free base was prepared by neutralising betaine hydrochloride dissolved in MeOH with 25%NaOH-MeOH, pptd. NaCl being removed by filtration. On heating the recryst. and dried betaine in a current of air no decomp. occurred below 200°, but at 260° a pale yellow oil began to distil over, the rate of evolution increasing up to 295° and decomp. being complete at 300°. The products isolated were NMe₂·CH₂·CO₂Me (max. yield 30%), NMe₃, NHMe₂. NH₂Me, N₂, CH₂O, pyrrole. and a carbonaceous residue containing N. The distribution of N in the main decomp. products was 7·2% as NHMe₂, 29·7% as NMe₃, 19·9% as N₂, 32·6% as oil, and 10·6% as residues.

Stepwise degradation of polypeptides. M. BERGMANN, L. ZERVAS, and (in part) F. SCHNEIDER

(J. Biol. Chem., 1936, 113, 341-357; cf. A., 1934. 802).-Stepwise degradation of polypeptides is effected thus : NH_{2} ·CHR·CO₂H \rightarrow NHBz·CHR·CO₂H \rightarrow $\cdot \text{CON}_3 + \text{CH}_2\text{Ph}\cdot\text{OH} \rightarrow \text{NHBz}\cdot\text{CHR}\cdot\text{NH}\cdot\text{CO}\cdot\text{O}\cdot\text{CH}_2\text{Ph}$ $+H_2$ $-Pd \rightarrow NHBz$ ·CHR·NH₂ $+H_2O \rightarrow R$ ·CHO (characterised). Thus N-benzoyl-1-leucine Me ester, m.p. 104° (from *l*-leucine-HCl-MeOH-BzCl), with N₂H₄,H₂O-EtOH gives the *hydrazide*, m.p. 153°, converted by NaNO2-5N-HCl-50% AcOH at 0°, and CH_Ph.OH into a-benzamido-a-carbobenzyloxyamido-, m.p. 178°, reduced (H2-Pd-5N-HCl) to a-amino-abenzamido- γ -methyl-n-butane hydrochloride, $[\alpha]_{\rm D}^{23} - 47^{\circ}$ in MeOH [converted by boiling MeOH into a (NHBz). derivative, m.p. 210°, of Bu^gCHO], converted by dis-tillation with H₂O into Bu^gCHO, isolated as its *p*-nitrophenylhydrazone. Similar degradation of *benzyl*-dl-*phenylalanine* Me ester, m.p. 90°, affords, successively, its hydrazide, m.p. 192°, α -benzamido- α -carbobenzyloxyamido-, m.p. 196°, and α -amino- α -benz-amido- β -phenylethane, m.p. 156°, previous sintering (converted by HNO, into a substance, m.p. 128°), the hydrochloride of which gives NH, Bz and CH, Ph·CHO (as oxime). Similarly Me benzoyl-1-glutamate, m.p. 83°, gives its dihydrazide, m.p. 216°, diazide, decomp.
75°, α-benzamido-αγ-biscarbobenzyloxyamidopropane, m.p. 174°, hydrogenated to the *dihydrochloride*, m.p. 158°, $[\alpha]_{p}^{n}$ -50.7° in H₂O (*dipicrate*, +H₂O, decomp. 100°), hydrolysed to NH₂·CH₂·CH₂·CHO (I) (dimedon compound, m.p. 208-209°). The Et ester of *l*-alanine and CH2Ph.O.CO.NH.CH2.COCl with 10% Na2CO3 in EtOAc gives the Et ester, m.p. 59°, of carbobenzyloxyglycyl-l-alanine, converted into the hydrazide, m.p. 133°, and the azide, which with l-leucine Me ester gives the Me ester, m.p. 112°, of carbobenzyloxyglycyl-I-alanyl-1-leucine, converted through the hydrazide. m.p. 186°, into Me carbobenzyloxyglycyl-1-alanyl-1leucyl-l-glutamate, m.p. 149°, hydrolysed to glycyl-l-alanyl-l-leucyl-l-glutamic acid $+1.5H_2O$ {Bz derivative, m.p. 215° [Me2 ester (II), m.p. 178°]}. Degradation of (II) is effected through its dihydrazide, m.p. 253°, diazide, the dicarbobenzyloxy-derivative, m.p. 201°, hydrogenated to (I) and benzoylglycyl-l-alanyl-l-leucylamide, m.p. 186°, the hydrazide, m.p. 230°, of which similarly affords the benzoylglycyl-1alanyl derivative, m.p. 212°, of a-amino-a-carbobenzyloxyamido-y-methylbutane, hydrogenated to Bu^gCHO and benzoylglycyl-l-alanylamide, m.p. 192°, the hydrazide, m.p. 212°, of which is degraded to the benzylqlycyl derivative, m.p. 207°, of a-amino-a-carbobenzyloxyamidoethane, hydrogenated to MeCHO and hippuramide. JWB

Occurrence of prolinase. E. ABDERHALDEN and R. MERKEL (Fermentforsch., 1936, 15, 1-23; cf. A., 1933, 615).—Attempts have been made to isolate the enzyme following observations of the effects of enzyme complexes on prolyl peptides. Of the peptides tested only those containing tyrosyl directly united to CO_2H are hydrolysed by trypsin (I). (I) attacks glycyl-1-prolyl-1-phenylalanine (II) slightly, 1-leucyl-1-prolyl-1-tyrosine (III) strongly, and d1-alanyl-1-prolyl-1-phenylalanine (IV), 1-prolylglycine (V), 1prolyl-1-alanine (VI), 1-prolyl-1-serine (VII), d1-leucyl-1-prolylglycine (VIII), and d1-leucyl-1-prolyl-1-alanine (IX) not at all. (I) [but not erepsin (X)] hydrolyses

chloracetyl-1-prolyl-1-phenylalanine. dl-a-bromopropionyl-1-prolyl-1-phenylalanine, and dl-a-bromoisohexoyl-1-prolyl-1-alanine. (X) attacked all the prolyl di- and tri-peptides. H₂S inactivated prolinase (XI) and dipeptidase (XII) and diminished the activity of aminopolypeptidase (XIII). Ag' and HCN diminished, in different degrees, the activity of (XI), (XII), and (XIII). The activity of (XI) and (XIII) is greatly and that of (XII) is slightly diminished by shaking (15-35 hr.). (XI) could not be isolated from solutions containing also (XII) and (XIII) by adsorption on Fe oxide and Al₂O₃ but partial separation was effected. 1-Prolyl-1-tyrosine (XIV) has m.p. 228°, [a]20 -7.56°. 1-Prolyl-1-phenylalanine (XV) is obtained from the product of interaction of N-carbobenzyloxy-l-proline (XVI) and PCl_5 by treatment with *l*-phenylalanine Et ester and subsequent hydrolysis. The N-carbobenzyloxy-1-prolyl-1-phenylalanine produced gives (XV) with Pd-H2. The product of interaction of l-serine and (XVI) chloride gives, with Pd-H2, (VII), m.p. 215-216°, [a]²⁰ -47.9° in H₂O. N-Carbobenzyloxy-(V) has m.p. 127°. Alanine with (XVI) chloride gives N-carbobenzyloxy-1-prolyl-1-alanine, m.p. 153°, which, with Pd-H₂ yields (VI), m.p. 232°, [a]²⁰_D - 66.33° in H₂O. (XV) with AcCl gives the chloroacetyl derivativo, m.p. about 78°, which yields (II), m.p. 200-202°, on amination and with dl_{α} -bromopropionyl chloride it gives α -bromopropionylprolylphenylalanine, m.p. 153—154°, which with \tilde{NH}_{2} gives (IV), m.p. 176°, $[\alpha]_{20}^{20}$ -58.3° in H₂O. (XIV) with *d*- α -bromoisohexoyl chloride gives a-bromoisohexoylprolyltyrosine, m.p. about 108°, which with NH₃ yields (III), m.p. about 222°, $[\alpha]_{15}^{25} - 7.46^{\circ}$ in H₂O. In the same way (V) gives dl-a-bromoisohexoylprolylglycine, m.p. 89-91°, which yields (VIII), m.p. 224°, $[\alpha]_{24}^{24}$ -9.71° in H₂O, and (VI) gives α -bromoisohexoylprolylalanine, m.p. 107—109°, $[\alpha]_{D}^{25}$ —67° in EtOH, which yields (IX), m.p. 221°, $[\alpha]_{D}^{25}$ —37·36° in H₂O. W. McC.

Oxidation of cystine in non-aqueous media. V. Isolation of a disulphoxide of *l*-cystine. G. T. TOENNIES and T. F. LAVINE. VI. Reactions of the disulphoxide of *l*-cystine, especially its dismutative decompositions. T. F. LAVINE (J. Biol. Chem., 1936, 113, 571-582, 582-597).-V. Two improved techniques for the oxidation of l-cystine perchlorate by BzO₂H in MeCN (A., 1934, 284) to give a 75% yield of *l-cystine disulphoxide* (I), m.p. 179—182° (decomp.) (corr.), $[\alpha]_{H_R}^{29} - 30.2^{\circ}$ in *N*-HCl, isolated by virtue of its slight H₂O-solubility, obtained cryst. by dilution of its saturated solution in N-HCl, are described. Rise of temp. from -10° to 25° favours this reaction at the expense of the formation of higher oxidation products, only a slight excess of BzO,H being necessary to ensure complete removal of cystine (essential). O, consumption in the non-aq. solution is controlled by titration of the I liberated from N-KI-0.05N-H2SO4, and cystine removal by colorimetric determination (cyanide-nitroprusside). The effects of varying the cystine BzO₂H ratio, total concu., and temp. are tabulated. Oxidation of (I) by I: $R \cdot [SO]_2 \cdot R + 3I_2 + 4H_2O \rightarrow 2R \cdot SO_3H + 6HI$ (a), and reduction by KI-HCl: (I)+4HI \rightarrow ($\cdot SR$)₂+2I₂+2H₂O, are almost quant. The isoelectric point of (I) is at p_{π} 3.

VI. Various decomps. of (I) are studied by determination of the intermediate oxidising val. by use of reaction (a) (complete in 1-2 hr. with 1-2N-HCl-KI), and by determination of cystine (above). Aq. solutions of (I) undergo dismutative decomp. with formation of cystine (to an equilibrium val. of 33 mol. %), and acid derivatives, the rate of decomp. increasing with increasing $p_{\rm H}$ and rise of temp. In alkaline solution decomp. occurs thus: 3(I)+ $4NaOH \rightarrow (\cdot SR)_2 + 4R \cdot SO_2Na$, isolation of the sulphinic acid, decomp. 152-153° (corr.), [a], -28 +33.4° in N-HCl, $\pm 11^{\circ}$ in H₂O, $\pm 23.8^{\circ}$ as its Na salt, being described. In acid solution, decrease in available intermediate O occurs, but the equation $3(I) + 2H_2O \rightarrow (\cdot SR)_2 + 2R \cdot SO_2H + R \cdot SH \cdot O + R \cdot SO_3H$ approx. represents the data. With cysteine, in either acid or alkaline solution, (I) reacts almost instantaneously: $(I) + RSH \rightarrow (\cdot SR)_2 + R \cdot SO_2H$, the sulphinic acid then reacting slowly with cysteine : $R \cdot SO_2H + 3RSH \rightarrow 2(\cdot SR)_2 + 2H_2O$. Similar reaction occurs with H₂S, thioglycollic acid, and p-thiocresol $[(\cdot S \cdot C_{6}H_{4}Me - p)_{2} \text{ isolated}]$. $2(I) + 2ArSH \rightarrow (\cdot SR)_{2} + (\cdot SAr)_{2} + 2R \cdot SO_{2}H$. With NaCN the reaction is (I)+NaCN \rightarrow R·SCN+R·SO₂Na, and with phospho-18-tungstic acid a blue colour develops at $p_{\rm H}$ 5.2, probably due to formation of cysteine : $2(I) + H_2O \rightarrow$ $2RS \cdot OH + 2R \cdot SO_{H}$: $2RS \cdot OH \rightarrow RSH + R \cdot SO_{H}$ which is thus prevented from further reaction with (I). J. W. B.

Reduction of cystine by sodium sulphite. T. CHEN (Chinese J. Physiol., 1936, 10, 187—189).— One mol. of cystine yields only one mol. of cysteine (I) on reduction by Na_2SO_3 , whilst by electrolysis 2 mols. of (I) are produced. J. N. A.

Nickel nitroprusside reaction for reduced glutathione. D. ZIMMET (Arch. Sci. phys. nat., 1935, [v], 17, Suppl., 225-226).—The use of a reagent containing 5 g. of NiCl₂ and 5 c.c. of a 10% solution of $Na_2Fe(NO)(CN)_5$ made up to 100 c.c., for the detection of reduced glutathione (I) is described. In the presence of (I) the colour of the reagent changes from pale green to pale pink. 1 p.p.m. of (I) can thus be detected. The necessity of adding a base as in the nitroprusside test for (I) is avoided. Advantages of the new method are the greater persistence of the colour and the absence of any colour reaction with COMe₂. E. A. H. R.

Synthesis of cyanamide by oxidation of formaldehyde and ammonia. R. Fosse and P. DE GRAEVE (Compt. rend., 1936, 202, 799-803).— Oxidation of $(CH_2O)_n$ in aq. NH₃ with $CaMn_2O_8$ gave a small yield of CN·NH₂, which could be oxidised to HCNO and HCN. J. N. A.

Sensitive colour reaction of carbamide. J. A. SANCHEZ (Ann. Chim. Analyt., 1936, [iii], **18**, 65— 66).—A solution of $CO(NH_2)_2$ is evaporated down with aq. NHPh·NH₂.HCl and heated at 160—170° for 5 min. The product is heated at 100° with a 0.5% solution of vanillin in conc. HCl. In presence of $CO(NH_2)_2$, urethanes, or carbazides a cerise coloration is obtained. J. S. A.

Transformation products of some hydrazides of organic acids. III. (SIGNA.) M. FRERI (Gazzetta, 1936, 66, 23-30; cf. A., 1934, 1372).-Me isocrotonate or chloroisocrotonate and NoH, HoO yield 5-methylpyrazolone. Me, itaconate, b.p. 105°/ 12 mm. (new prep. using Me₂SO₄), forms the dihydrazide, m.p. 150° (dibenzylidene derivative, m.p. 220°), which gives the diazide, m.p. 50° (decomp.). Mesacon-dihydrazide, m.p. 215° (decomp.), and -diazide. m.p. 111° (decomp.), are similarly obtained. Citracondihydrazide, m.p. 177° (dibenzylidene derivative, m.p. 222°), in dil. solution is converted by HNO. in HCl into the diazide, m.p. 114° (decomp.), and in AcOH into 3: 6-diketo-4-methyltetrahydropyridazine, m.p. 277°, whilst in conc. solution in HCl it gives 4-oximino-3-methyl-5-pyrazolone, m.p. 232° (decomp.) (K and Ag salts; Bz, m.p. 177°, and p-nitrobenzoyl, m.p. 188°, derivatives). The last is oxidised by O_2 + O₃ in KOH to nitromethylpyrazolone, m.p. 276°, and is reduced (SnCl.) to the hydrochloride, m.p. 225°, of aminomethylpyrazolone [p-nitrobenzylidene, m.p. 257° (decomp.), anisylidene, m.p. 202-203°, and piperonylidene, m.p. 245°, derivatives]. The hydrochloride is oxidised by H_2O_2 to a "rubazonic acid," Me·C₃H₂ON₂·N:C₃HON₂·Me, m.p. 282–283° (decomp.); this is reduced (SnCl2) to 5:5'-diketo-3: 3'-dimethyl-4: 4'-dipyrazolylammonium chloride, m.p. 247° (decomp.), which is easily re-oxidised. E. W. W.

Fluorination of silver cyanide. I. O. RUFF and M. GIESE (Ber., 1936, 69, [B], 598-603).— Hg(CN)₂ burns in F₂ after being gently heated at one point in a SiO₂ tube, giving essentially CF₄, N₂, and HgF₂; SiF₄ and CO₂ from the tube and C₂N₂ from the original material are also obtained. A violent explosion ensues when AgCN and F₂ come in contact at room temp., but the reaction can be controlled if AgCN is mixed with CaF₂ and F₂ is used under diminished pressure. AgF remains and is ultimately converted into AgF₂. The volatile products contain N₂, CF₄, trifluoronitrosomethane, b.p. ~-80°/760 mm., m.p. ~-150°, CF₃·NF₂, SiF₄. COF₂, CO₂, N₂O, C₂F₆, a mixture of isomerides (CNF₃)₂, and a mixture (CNF₄)₂. The course of the change is represented : Ag·N·C+F₂ \rightarrow Ag·N·CF₂ (I); (I)+F₂ \rightarrow AgF+NF·CF₂ (II). (II) is exceedingly unstable by reason of the double linking and polymerises in many directions, mainly towards (CNF₃)₂ with some production of (CN₃F)₃ and production of combined polymerised substances. Further fluorination of CNF₃ gives (CNF₄)₂, CNF₅(NF₂·CF₃), and C₃F₆. The presence of O in the AgCN gives rise to CF₃·NO and N₂O whilst SiO₂ is the source of SiF₄, COF₂, and CO₂.

Isomerism of dicyanohexafluoride, $C_2N_2F_6$. II. O. RUFF and M. GIESE (Ber., 1936, 69, [B], 604-607).—The crude $C_2N_2F_6$ is treated first with NH₃ and then with Hg whilst a second portion is treated with the reagents in the reverse order, and the products are analysed. In evaluating the results

the following considerations are involved. NH3 reacts particularly on the $CF_2:N$ and CF:N double linkings, Hg only on mobile F attached to N in :NF. This is shown by the instability of unimol. CF2:NF (which is not present among the products of the action of F on AgCN) and by the observation that :NF is far less stable than .NF, (CF3.NF, is remarkably stable) whilst F is not removed from CF by Hg. NH, is added to fluorinated N:C linkings and causes their fission with elimination of N. In presence of NH₃ H cannot exist in union with a fluorinated C atom to which a fluorinated N is attached; NH₄F is produced with brown substances containing C: N: F=2:1:1. The chemically less active forms are regarded as trans varieties, increasing reactivity being shown by the cis- and as-forms. On this basis the isomerides CF3.N.N.CF3 (cis- and trans-), CF3.N.CF.NF2 (cisand trans-), CF2:N·CF2·NF2, and CF2<NF>CF2 or

 $CF_2 < \frac{CF_2}{NF} > NF$ are shown to be present. H. W.

Action of thiocyanogen on unsaturated hydrocarbons. A. KRASSILCHIK (Ann. Off. nat. Combust. lig., 1935, 10, 923-987).-The CNS method of determining unsaturation is more trustworthy than the Winkler-Dubowitz Br method. The prep. and use of the reagent are described. With 300% excess of CNS the reaction is bimol. and is practically complete in 10-40 hr. with absorption 60-95% of theoretical depending on the hydrocarbon. Certain hydrocarbons like stilbene do not react. Addition of I in AcOH is not as regular as that of CNS and is greatly influenced by traces of Cl or Br. Differences in the rate of addition of CNS may be used to fractionate mixtures of olefines, e.g., a mixture of Δ^{α} - and Δ^{β} -octene. R. B. C.

Diazomethane. F. ARNDT (Org. Syntheses, 1935, 15, 3-5).-An improved prep. from NH₂·CO·NMe·NO is described. $C_{\rm H}$. ABS. (r)

Quantitative studies of organometallic compounds. E. A. ZOELLNER (Iowa State Coll. J. Sci., 1934, 9, 213-214).-The yields of MgRHal obtained from a large no. of alkyl halides under various conditions are given; the practical significance of the results is discussed. CH. ABS. (r)

Organic magnesium compounds. II. Reactions of aryl p-toluenesulphonates with Grigactions of ary1 p-totuenesupponates with Grig-nard reagents. K. MINE (J. Chem. Soc. Japan, 1934, 55, 1087–1090; cf. A., 1935, 739).—Two reactions occur: (i) $R \cdot SO_3R' + MgXR'' \rightarrow R \cdot SO_2 \cdot R'' +$ $OR' \cdot MgX$ and (ii) $R \cdot SO_3R' + MgXR'' \rightarrow R \cdot SO_2 \cdot OMgX$ +R' + R''; when R' = ary1 (i) is the main reaction, but is replaced by (ii) when R' = alky1.

CH. ABS. (r)

Photolysis of lead tetramethyl and lead tetraphenyl.-See this vol., 573.

Bisdimethylglyoxime diamine cobaltic salts and their configuration. Y. NAKATSUKA and H. IINUMA (Bull. Chem. Soc. Japan, 1936, 11, 48-54; cf. A., 1935, 51) .- An EtOH solution of CoCl₃ and of OH·N:CMe·CMe:N·OH (AH₂) treated with aq. NH₃ or with an org. base (B) and allowed to oxidise in the air gives compounds of type [CoB2(AH)2]Cl, from which

other salts are obtainable. In this way the chlorides in which B=NH3, NH2Ph, o- and p-C6H4Me·NH2, *m*-4-C₆H₃Me₂·NH₂, and α - and β -C₁₀H₇·NH₂, are prepared, and in most cases converted into the bromides, iodides, thiocyanates, nitrates, sulphates, and H sulphates; the bases

[Co(p-C₆H₄Me·NH₂)₂(AH)₂]OH,2H₂O and

[Co(β-C₁₀H₂·NH₂)₂(AH)₂]OH,2H₂O are also prepared. Since $o \cdot C_6 H_4(NH_2)_2$ gives the *chloride* [Co($o \cdot NH_2 \cdot C_6 H_4 \cdot NH_2$)₂(AH)₂]Cl,4H₂O, and not one

containing 1 mol. of o-C6H4(NH2), with both NH2 coordinated, the groups of the bases must be in trans configuration, and those of (AH) must lie in the same plane. In presence of NaOH, a compound [Co(o-NH2.C6H4.NH2)2(AH)2Cl],4H2O, containing nonionisable Cl, is obtained. [Co(AH2),]Cl, treated in COMe2 with NH3 or NH2Ph gives the same compound, and not one of type [CoB₂(AH)₂]Cl; if, however, $o \cdot C_6 H_4(NH_2)_2$ is used, the compound $[Co(o \cdot NH_2 \cdot C_6 H_4 \cdot NH_2)(AH_2)_2(H_2O)]Cl_2,COMe_2$ is obtained, from which H_2O is not lost at 110° or over H₂SO₄, and which in H₂O has an acid reaction, owing apparently to the formation of

 $[Co(o-NH_2 \cdot C_8H_4 \cdot NH_2)(AH_2)_2(OH)]Cl+HCl.$

E. W. W. Phosphoric oxide, catalyst for polymerisation of unsaturated hydrocarbons. Decahydrodiphenyl obtained by dimerisation of cyclohexene. R. TRUFFAULT (Bull. Soc. chim., 1936, [v], 3, 442-459).—1-cycloHexyl- Δ^1 -cyclohexene (I), b.p. 103— 105°/12 mm., 238-239°/760 mm., m.p. about -45°. is obtained in 80-90% yield when cyclohexene (II) is condensed on P_2O_5 (using a Soxhlet apparatus). (I) is reduced (H2, Ni-Cr, hexane, room temp.) at nearly the same rate as (II), and is oxidised (CrO₂, AcOH) to adipic and *\varepsilon*-keto-\varepsilon-cyclohexylhexoic acids. (I) and HHal in CHCl₃ at 0° give 1-chloro-, m.p. 40° (similarly obtained from 1-cyclohexylcyclohexanol), 1-bromo-, m.p. 46° [converted by boiling H_2O or AgOH into (I)], and 1-iodo-, m.p. 52°, -dicyclohexyl. (I) and Br in CHCl₃ at 0° afford 25% of (probably) 1:2:1'-tri-bromodicyclohexyl, m.p. 127°. (I) is also obtained in much smaller yield from (II) and H₃PO₄; HPO₃ is not a catalyst. (II) and 85% H₂SO₄ give (cf. Brooks and Humphrey, A., 1918, i, 286; Nametkin and Abakumovskaja, A., 1933, 152, 385) 23% of cyclohexanol and 48% of cyclohexyl H sulphate or cyclohexanesulphonic acid. P205 is a good catalyst for the prep. of diamylene (from C_5H_{10}) and a hydro-carbon, $C_{20}H_{32}$ (from limonene). H. B.

Δ^{1:3}-cycloHexadiene and structure of its monoxide. P. BEDOS and A. RUYER (Compt. rend., 1936, 202, 671–673; cf. A., 1933, 500).—Successive treatment of the dibromide (I), m.p. 108°, of $\Delta^{1:3}$.cyclohexadiene (II) with AgOAc and dry KOH in Et₂O gives the oxide (III) of (II). (III) and H_2O at \overline{O} afford the cyclohexenediols previously described (loc. cit.). (III) and PBr₅ in Et₂O give (I) and a liquid isomeride (cf. Farmer and Scott, A., 1929, 304). (111) does not immediately decolorise Br in CCl₄ unless a little H₂O is present; it reacts slowly with BzO₂H to give the dioxide (loc. cit.). It is unlikely that (III) is a mixture (cf. loc. cit.); the activity of the double linking present is reduced whilst the oxide reactions are enhanced. The Raman spectra of (II) and (III) are given; (III) shows the frequency characteristic of the double linking, whilst that at 1581 cm.⁻¹ for (II) is considered to be due to the conjugated double linkings. H. B.

Orienting rule of Svirbely and Warner. K. GANAPATHI (Current Sci., 1936, 4, 482).—Various derivatives with electric moments > 2.07 D yield o- and p-products, and not m- as required by this rule (A., 1935, 684), which further fails to explain why a m-directing group R, of high moment, becomes o- and p-directing when in the group $\cdot CH_2R$ or $\cdot CH_2 \cdot CH_2R$, of similar moment. E. W. W.

Aromatic hydrocarbons. XX. Simple principle of the structure of aromatic hydrocarbons and their absorption spectra. E. CLAR (Ber., 1936, 69, [B], 607-614).—Examination of the absorption spectra of C_6H_6 , $C_{10}H_8$, anthracene, benzanthracene, and dibenzanthracene shows that the square roots of the absorption frequencies are inversely to 6, 7, 8, 9, and 10. Similar comparison of C_2H_6 , C_2H_4 , C_6H_6 , phenanthrene, and dibenzphenanthrene gives the figures 6, 7, 8, 9, and 10. The reasons are discussed. H. W.

Raman effect and problems of constitution. IX. Stability of the aromatic C·X linking. K. W. F. KOHLRAUSCH (Ber., 1936, 69, [B], 527-532; cf. this vol., 136, 137) .-- It is shown mathematically that in compounds PhX (X=I, Br, SH, Cl, Me, F, OH, NH₂), p-C₆H₄X₂, and 1:3:5-C₆H₃X₃ the individual substituents have no important constitutive influence on the ring and that all C.X linkings are similarly affected by the transition from the aliphatic to the aromatic C atom. The change in the strength of union on entrance of a new C·X linking is almost independent of the presence or absence of a second OX linking in the m- or p-position. The aromatic C·X linking is about 20% stronger than the aliphatic linking. H. W.

Oxidation of aromatic hydrocarbons at high pressures. I. Benzene. II. Toluene. III. Ethylbenzene. D. M. NEWITT and J. H. BURGOYNE (Proc. Roy. Soc., 1936, A, 153, 448-462).-At suitable temp. and pressures the slow combustion of C_6H_6 proceeds smoothly without any induction period or sudden change in reaction velocity, whereas PhMe and PhEt exhibit well-marked induction periods, and in each case oxidation of the nucleus and side-chains occurs simultaneously. Combustion takes place by hydroxylation of either the ring or the sidechain, giving as primary products PhOH and alcohols respectively. For comparable rates of reaction, C₆H₆-O₂ mixtures require a higher temp. than either PhMe- or PhEt-O2 mixtures of similar composition. Increased surface retards the rate of exidation of C_6H_6 but has no effect on PhMe or PhEt; the addition of N_2 retards all three reactions equally. Probably a "chain" mechanism is involved in each case, but a difference exists in the chainpropagating reactions according to whether oxidation of the nucleus or side-chain is taking place. The course of combustion up to the point at which rupture of the ring occurs may be represented : $C_8H_6 \rightarrow$

PhOH → I: 4·C₆H₄(OH)₂ → 1: 2: 4·C₆H₃(OH)₃ → C₆H₄O₂ → ring ruptures. In suitable circumstances, as much as 53·5% of the C of the C₆H₈ burnt appears as PhOH. PhMe → CH₂Ph·OH → CHPh(OH)₂ → H₂O+PhCHO → BzOH → ring ruptures. Oxidation of the nucleus gives mainly 2: 4·C₆H₃Me(OH)₂. Under suitable conditions either one of the side-chain derivatives may be obtained in optimum amounts. PhEt → CHPhMe·OH → CPhMe(OH)₂ → COPhMe → COPh·CH₂·OH → COPh·CH(OH)₂ → PhCHO → BzOH → ring ruptures. Oxidation of the nucleus gives mainly 2: 4·C₆H₃Et(OH)₆.

L. L. B. **Chlorination of benzene**. F. F. KRIVONOS (Ukrain. Chem. J., 1935, 10, 417–427).—Stirring the C_6H_6 during chlorination leads to diminution in the amount of polychlorides formed, and to a greater yield of PhCl. R. T.

Halogenation. XIII. Bromination and iodination of some halogenated benzenes. P. S. VARMA and S. SHANKARNARAYANAN (J. Indian Chem. Soc., 1936, 13, 31–33).—Substitution of p-C₆H₄Cl₂, PhBr, p-C₆H₄Br, and PhI by Br and I in presence of halogenating agents gives known derivatives of C₆H₆. F. R. G.

Replacement of chlorine by fluorine in organic compounds. H. B. GOTTLIEB (J. Amer. Chem. Soc., 1936, 58, 532—533).—2:4- $(NO_2)_2C_6H_3Cl$ with successive amounts of anhyd. KF in PhNO₂ at 205° gives 30% of 2:4- $(NO_2)_2C_6H_3F$, m.p. 24—25°, which reacts slowly with H₂O at 60° forming HF. *Diphenoxyphosphoryl fluoride*, b.p. 150—155°/6 mm., similarly prepared in 7% yield from (OPh)₂POCl at 90—100°, is decomposed rapidly by H₂O and when distilled in a vac. undergoes partial decomp. to Ph₃PO₄ and POF₃. H. B.

Chlorination of toluene in presence of (a) activated charcoals, and (b) iron-impregnated silica gel. Production of side-chain substitution, nuclear substitution, and tolan derivatives. J. B. FIRTH and T. A. SMITH (J.C.S., 1936, 337-339).—Addition of heat-activated sugar-C, better if iodised or Fe-impregnated, increases the rate of chlorination and amount of side-chain substitution of PhMe in the dark. Prolonged reaction gives 2:2'-dichlorotolan dichloride, b.p. about 220°/30 mm., m.p. of isomerides between 139° and 170°. Fc-impregnated SiO₂ gel increases nuclear substitution, giving 2:4:5-C₆H₂Cl₃Me and a substance, C₁₄H₁₀Cl₂, m.p. 145°, and much glue-like material. CH₂PhCl and SiO₂ gel give a similar glue exothermally. R. S. C.

Velocity of reaction between *o*-nitrobenzyl bromide and pyridine. Mechanism of sidechain reactions, etc. IV. J. W. BAKER (J.C.S., 1936, 399-400; cf. this vol., 195).—*o*- $NO_2 \cdot C_6 H_4 \cdot CH_2 Br$ reacts with $C_5 H_5 N$ slightly faster than does $CH_2 PhBr$, but not fast enough for the *o*-NO₂ to account for the much faster reaction of the $2: 4 \cdot (NO_2)_2$ -compound. R. S. C.

Derivatives of *tert.*-butylbenzene and transmitted polar effects. (THE LATE) J. B. SHOE-SMITH and A. MACKIE (J.C.S., 1936, 300–303).— Boiling *m*- and *p*-C₆H₄MeBu^{γ} and Br give m-, b.p. 115.5°/8 mm., and p-tert.-butylbenzyl bromide (I), m.p. 12—13°, b.p. $132\cdot5^{\circ}/14$ mm., oxidised to m-, m.p. 127°, $k \ 5.2 \times 10^{-5}$, and $p \cdot C_6 H_4 Bu^{\gamma} \cdot CO_2 H$, m.p. 165° (lit. 164°), $k \ 4.2 \times 10^{-5}$, respectively. (I) and HI-AcOH give p-tert.-butylbenzyl iodide, m.p. 29·5— 30·5°. The relative vals. of k of the acids and of the rates of hydrolysis of the bromides in aq. EtOH $(p > m \cdot Bu^{\gamma} > unsubstituted)$ indicate both electromeric and inductive effects due to Bu^{γ} , but the relative ease of reduction of the bromides by HI $(m - > p \cdot Bu^{\gamma} > unsubstituted)$ requires an additional explanation not yet apparent. R. S. C.

o-Nitrophenylsulphur chloride (o-nitrobenzenesulphenyl chloride). M. H. HUBACHER (Org. Syntheses, 1935, 15, 45–47).— $NO_2 \cdot C_6 H_4 \cdot SCl$ is obtained by the action of Cl_2 in CCl_4 on $(o-NO_2 \cdot C_6 H_4 \cdot S)_2$. CH. ABS. (r)

Mechanism of additive reactions. Kinetic study of addition of methyl hypobromite to stilbene. P. D. BARTLETT and D. S. TARBELL (J. Amer. Chem. Soc., 1936, 58, 466-474).-Reaction between (:CHPh)₂ and Br in MeOH at 0°, whereby OMe·CHPh·CHPhBr (I) is formed in 99% yield, is not inhibited by O_2 . The rate is steadily diminished by increased conen. of added Br⁻ (using solutions of const. ionic strength 0.2, containing NaBr supplemented by PhSO₃Li); the yield of (I) also decreases (83% in presence of 0.2M-NaBr) whilst that of (•CHPhBr), increases. The rate is not, however, diminished by H^{*}, indicating that MeOBr is not responsible for the production of (I). The kinetics are of the second order only when the initial concn. of Br^- is much > that formed during the reaction; they indicate a two-stage mechanism with mol. Br as the active agent. The results are inconsistent with any mechanism attributing activity to Br⁺ or to MeOBr catalysed by acid. The following changes are considered to occur : $(:CHPh)_{o} + Br_{o} \rightarrow$ CHPhBr·CHPh (II)+Br⁻; (II)+MeOH \rightarrow (I)+H⁻; $(II) + Br^- \rightarrow (\cdot CHPhBr)_2.$ H. B.

Structure of naphthalene. E. BERGMANN and J. HIRSHBERG (J.C.S., 1936, 331-336).—The effect of 2-Cl on k of $1-C_{10}H_7$ ·CO₂H and of 1- and 3-Cl on k of 2-C₁₀H₇·CO₂H and on the rates of hydrolysis of the esters is not identical, indicating that the Cl-C2 and C2-C3 linkings differ in nature and that the linkings in C₁₀H₈ are static. Some close effect (possibly steric) is exerted by 1- and 8-substituents on one another, particularly noticeable in dipole moments. 3-Amino-2-naphthoic acid yields Et 3-chloro-2-naphthoate, b.p. 195-197°/18 mm., m.p. 57-59°. 9:1-C₁₀H₆Cl·CO₂H, m.p. 169-170° (Me ester, b.p. 188-189°/16·2 mm.), Me 1-chloro-2-naphthoate, m.p. 48-49°, 2-, m.p. 76°, and 1-naphthoate, b.p. 165°/17 mm., and 2-chloro-1-naphthoate, b.p. 176-180°/18·5 mm., m.p. 50°, are described. 8:1-C₁₀H₆Cl·NH₂ gives the diazonium borofluoride, m.p. 106-107° (decomp.), and leads to 1-chloro-8-fluoro-, m.p. 44°, b.p. 130-132°/12·5 mm., -bromo-, m.p. 94-95° (lit. 87-88°, 119°), and -iodo-naphthalene, m.p. 79-80°, b.p. 197-198°/19 mm., 1:8-C₁₀H₆Cl₂, m.p. 84-85°, and 9-chloro-1-naphthonitrile, m.p. 145-146°, b.p. 242-244°/15·5 mm.

Nitration of polycyclic aromatic hydrocarbons by means of nitrous fumes. (SIGNA.) L. MONTI. V. MARTELLO, and F. VALENTE (Gazzetta, 1936, 66, 31-38).-Acenaphthene treated in Et.O or in light petroleum at 15-16° with nitrous fumes yields 3-nitroacenaphthene; in C_6H_6 or AcOH at $8-10^\circ$, or with liquid N_2O_4 , the $3:4-(NO_2)_2$ -compound is formed. Fluorene in any of these solvents at low temp. gives 2-nitrofluorene; in AcOH at 90-95°, a mixture of the 2:5- and 2:7-(NO₂)₂-compounds is obtained. Ph, is unchanged at 0-25°; in AcOH or petroleum at 90-95°, or with liquid N.O. at room temp., 4-nitrodiphenyl is formed, whilst prolonged action of nitrous fumes at 90-95° vields a mixture of the 4:4'- and 4:2'-(NO,),-compounds. CHPh, is not nitrated, but gives CPh3. OH, or, at 0° in EtOH, its nitrite. CH, Ph, and (. CH, Ph), are not appreciably E. W. W. nitrated.

Thermolysis of cholesteryl chloride. E. BERGMANN and F. BERGMANN (Chem. and Ind., 1936, 272– 273).—When heated for 3 hr. at 300° in dry N₂, cholesteryl chloride affords (by loss of 1 mol. of HCl) a distillate, b.p. 118—125°/758.5 mm., containing 75—67% of C₈H₁₈ and 25—33% of C₈H₁₆, and a residue from which are isolated (1) a small amount of a hydrocarbon (C, 88.8; H, 11.2%), b.p. 156—157°/ 30 mm., $[\alpha]_{\rm D}$ +17.3° in C₆H₆; (2) a hydrocarbon C₁₅H₂₃ or (?) C₁₆H₂₄, b.p. 150—155°/0.03 mm., $[\alpha]_{\rm D}$ +34.9° in C₆H₆, containing 2 double linkings, one of which is resistant to Br-titration (partial structure suggested); and (3), the main fraction, a tetracyclic hydrocarbon C₁₉H₃₀ (lit. C₁₉H₂₈), b.p. 180—185°/0.02 mm., $[\alpha]_{\rm D}$ +31.4° in C₆H₆, containing only 1 double linking, showing that pyrolysis is accompanied by H transfer. J. W. B.

[Reversible chemical absorption of free oxygen by organic compounds.] A. SCHÖNBERG (Ber., 1936, 69, [B], 532-533).—A question of priority regarding rubenes. H. W.

Reversible oxidisability of organic compounds. Reducible, but not dissociable, monoxide of diphenyldi-*p*-bromophenylrubene. L. ENDER-LIN (Compt. rend., 1936, 202, 669-671; cf. A., 1935, 650).—The oxide (I), $C_{42}H_{26}OBr_2$, m.p. 284-285° (when free from solvent of crystallisation), most simply prepared by oxidation (15% HNO₃ in C_6H_6) of diphenyldi-*p*-bromophenylrubene (II), is not dissociable by heat but is reduced (Fe, AcOH) to (II). (I), which is probably an *endo*-oxide, is also obtained by dehydration of dihydroxydiphenyldi*p*-bromophenylrubene and by partial reduction (Zn, AcOH) of the dissociable dioxide of (II). H. B.

Interaction of sulphur dichloride with substances containing the reactive methylene group. II. K. G. NAIK and S. A. VAISHNAV (J. Indian Chem. Soc., 1936, 13, 25–27).—SCl₂ with acetoacetarylamides (I) in pure, dry C_6H_6 gives CSAc·CO·NHR, which with Na₂S yields (I) and with KOH yields NH₂R. The following were prepared : α -thionacetoacet-anilide, m.p. 196°, -o-, m.p. 184°, and -ptoluidide, m.p. 130°, - α -, m.p. 184°, and - β -naphthylamide, m.p. 179°, -1 : 4 : 5-, m.p. 209°, and -1 : 3 : 4xylidide, m.p. 201°. F. R. G.

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Interaction of thionyl chloride with substances containing the reactive methylene group. V. K. G. NAIK and S. A. VAISHNAV (J. Indian Chem. Soc., 1936, 13, 28—30).—SOCl₂ reacts with malonarylamides in presence of Cu with presumed intermediate formation of SCl₂, SO₂, and CuCl₂ to give CS(CO·NHR)₂ (cf. preceding abstract). The following were prepared : thionmalondi-phenylamide, m.p. 105° (shrinks at 80°), -o-, m.p. 138° (shrinks at 110°), -p-, m.p. 108° (shrinks at 60°), and -m-tolylamide, m.p. 114° (shrinks at 60°), - α -naphthylamide, m.p. 168°, -1 : 3 : 4-, m.p. 126° (shrinks at 95°), and -1 : 4 : 5-xylidide, m.p. 146° (shrinks at 100°). F. R. G.

[o- and p-Derivatives of o-toluidine.] 2:6-Diacetamidotoluene. A. KORULEV and E. ROSTOVT-ZEVA (Ber., 1936, 69, [B], 640).—The non-cryst. product of the technical prep. of $1:2:4-C_6H_3Me(NO_2)_2$ from a mixture of o- and $p-C_6H_4Me\cdot NO_2$ is reduced and acetylated. The product is treated with EtOH, which dissolves 2:4-diacetamidotoluene leaving 2:6diacetamidotoluene (I), m.p. 309—311°. Since (I) is smoothly hydrolysed to $1:2:6-C_6H_3Me(NH_2)_2$, m.p. 103—104°, and obtained from $1:2:6-C_6H_3Me(NO_2)_2$, the m.p. 202° recorded for (I) by Green et al. (J.C.S., 1891, 59, 1017) requires correction. H. W.

Secondary reactions in reduction of aromatic nitro-compounds. Rôle of ferrous salts in reduction process. K. G. MISUTSCH (J. pr. Chem., 1936, [ii], 145, 60-64).--C₆H₄Hal·NH₂ are not formed during reduction of PhNO₂ by Sn (or SnCl₂) and 6*86N-HCl, -HBr, or -HF in presence of AcOH and 1 mol. of FeHal₂. Since NAcPhCl with FeCl₂-dil. HCl or HI gives NHAcPh and no C₆H₄Cl·NHAc, the function of the FeHal₂ (above) is to reduce the intermediate NHPhHal to NH₂Ph. Reduction (Sn, HBr) of PhNO₂ in absence of FeBr₂ affords *p*-C₆H₄Br·NH₂ (44·85% of total amine) and small amounts of azoxybenzene and *p*-NH₂·C₆H₄·OH (formed by rearrangement of NHPh·OH; this occurs much more slowly than the changes NHPh·OH-> NHPhBr->C₆H₄Br·NH₂). H. B.

Aromatic N-substituted cyanoamides. J. BIECHLER (Compt. rend., 1936, 202, 666-667).p-Anisyl-, m.p. 33°, p-phenetyl-, m.p. 69°, and 4-chloro-3-aminophenyl-, m.p. 136°, -dicyanoamides are prepared (cf. A., 1935, 482) from KNAr CN and CNBr; o-tolyl-, m.p. 36°, p-chlorophenyl-, m.p. 59°, and a-naphthyl-, m.p. 126°, -dicyanoamides are similarly obtained (cf. loc. cit.) using CNCl. KNPh CN (I) and CPh₃Cl give phenylcyanoamidotriphenylmethane, m.p. 124°; CPh₂Cl₂ (?) similarly affords di(phenylcyanoamido)diphenylmethane, m.p. about 200°, whilst COPh CH, Br yields phenacylphenylcyanoamide, m.p. 123°. (I) and S_2Cl_2 give di(phenyleyanoamido)-disulphide, m.p. 83°; AsCl₃ affords tri(phenyleyano-amido)arsine, m.p. about 250°. A bromophenylcyanoamide is obtained from (I) and Br. Me, m.p. 63°, CH₂Cl, m.p. 48°, and CCl₃, m.p. 84-85° (with liberation of COCl₂), phenyleyanoamidocarbonates are prepared. H. B.

Substituted naphthalenesulphonic acids and their derivatives. W. M. CUMMING and G. D. MUIR (J. Roy. Tech. Coll., 1936, 3, 562-568).—Diazotised

1:8-NH₂·C₁₀H₆·SO₃H (I) with KI and C₅H₅N (or COMe₂) gives the 1:8-sultone, and after saturation with NaCl, the Na salt of $1:8-C_{10}H_6I\cdot SO_3H$ (cf. A., 1934, 519). The chloride, m.p. 115°, of the latter yields, with dil. aq. NH₃ in cold COMe₂, the amide, m.p. 187° (decomp.), or, in boiling COMe₂, the 1 : 8-naphthasultam. The anilide, m.p. 140°, is converted by Cu in boiling EtOH into the N-phenylsultam. new m.p. 165°. An improved prep. of 1:8-C10HaCl·SO3H from the solid diazo-compound of (I) and cold Cu₂Cl₂ in conc. HCl is described. Neither this nor the C₅H₅N method is successful for 1:8-C10H6Br·SO3H; its chloride, m.p. 110°, is, however, obtained by adding the solid diazo-compound to the cold suspension obtained after boiling Cu₂O in aq. NH₄Br, by adding KCl, and treating the product with PCl₅. By adding the diazo-compound to CuCN, 1:8-CN·C₁₀H₆·SO₃H is obtained (chloride, m.p. 139° amide, m.p. $334-336^{\circ}$). The diazo-compound treated with Cu in conc. HCl, with Cu in Cu₂Cl₂-HCl, with Sn(OH)₂, or with Zn in H₂O gives $1 \cdot C_{10}H_7 \cdot SO_3H$. The diazo-compound from $2 : 1 \cdot NH_2 \cdot C_{10}H_6 \cdot SO_3Na$ and KI, followed by KOH, gives the K salt (+H₂O) and K1, followed by KOH, gives the A sait $(+H_2O)$ of 2:1-C₁₀H₆I·SO₃H (chloride, m.p. 109.5°; amide, m.p. 154°); with the suspension from Cu₂O and NH₄Br, followed by KCl, the K salt of 2:1-C₁₀H₆Br·SO₃H (chloride, m.p. 97°; amide, m.p. 140°) is obtained. 1:4-, 1:5-, and 1:8-C₁₀H₆(SO₃H)₂ have been identified among the respective reaction products of the diazo-compounds from 1:4-, 1:5-, and 1:8-NH₂·C₁₀H₆·SO₃H and a solution of CuSO₄ in aq. NH₃, treated with SO₂. E. W. W.

Carbonitrosohydrazines. IV. Azohydroxamic acids [and hydrochloric acid] A. QUILICO and R. JUSTONI (Gazzetta, 1936, 66, 19-22; cf. A., 1935, 855).—When p-chlorobenzene- and ptoluene-azoformhydroxamic acids are boiled with conc. HCl, they are chlorinated in the nucleus and reduced, yielding, respectively, 2:4-dichlorobenzene-, m.p. 184-185°, and 2-chloro-p-toluene-hydrazoformhydroxamic acid, m.p. 169°, which are reduced respectively to 2:4-dichloroaniline and 2-chloro-ptoluidine. E. W. W.

Influence of cyclisation on "colour" of molecules. Absorption of diphenyleneazone and its mono- and di-oxides. (MME.) P. RAMART-LUCAS and (MLLE.) D. BIQUARD (Bull. Soc. chim., 1936, [v], 3, 430-435).—Comparison of the absorption spectra of (:NPh)₂ and diphenyleneazone (I) (Tāuber, A., 1892, 183) shows that, unlike the case of carbocyclic compounds, cyclisation is accompanied by a marked hypsochromic effect and a diminution in absorption intensity (ascribed to deformation of the valency angles). The curves for axoxybenzene (II) and the mono- and di-oxides of (I) show little difference. The absorption intensity of o-azoxytolucne is < that of (II). H. B.

Velocity of diazotation. E. ROSTOVTZEVA (Anilinokras. Prom., 1935, 5, 199—201).—The velocity of diazotisation of aromatic amines is determined relatively to that of benzidine, giving a series of characteristic ratios k_1/k , where k and k_1 are the respective velocity coeffs. The content of each constituent in binary mixtures of isomeric amines can be derived from determination of k_1/k for the mixture. B. T.

Electronic theory of valency and the constitution of aromatic diazo-compounds. P. B. SARKAR (J. Indian Chem. Soc., 1936, 13, 19—22).— Theoretical. The structure of diazonium compounds and of normal and *iso*-diazotates can be explained by electronic theory. F. R. G.

α- and β-Anthracenediazonium salts. M. BAT-TEGAY and P. BOEHLER (Compt. rend., 1936, 202, 769—771).—β-Anthramine hydrochloride at 0° affords a sol. diazonium chloride ($+ZnCl_2$, decomp. about 105°; $+CdCl_2$), which is decomposed by light. The α-isomeride ($+ZnCl_2$, decomp. about 100°) is similar. J. L. D.

Phosphoric acid as a condensing agent. A. E. TSCHITSCHIBABIN (Bull. Acad. Sci. U.R.S.S., 1935, 951-969) .- Alkylation of phenols is readily effected by heating mixtures of the alcohol, the phenol, and H₃PO₄. Thus, o-tert.-butyl-m-cresol, b.p. 121-122°/ 16 mm., m.p. 23°, is obtained from Bu⁹OH, o-cresol, and H_3PO_4 at 50°; o-sec.-butyl-, b.p. 111-116°/ 12 mm., o-tert.-amyl-, b.p. 119-122°/10 mm., and o-menthyl-m-cresol, b.p. 153-156°/2·5 mm., o-tert.-butyl-, b.p. 122·5°/14 mm., m.p. 27° (lit. 85-86°), and o- and p-benzyl-o-cresol, o-tert.-butyl-p-cresol, b.p. 118-119°/14 mm., m.p. 44°, o-tert.-butyl-, b.p. 125.5-126°/17 mm., and o-isopropyl-m-xylenol, b.p. 127-130°/17 mm., tert.-butyl-B-naphthol, b.p. 186-189°/13 mm., m.p. 113°, 4-tert.-butyl-, b.p. 134-136°/1.5 mm. (Me, ether, b.p. 126-129°/13 mm., m.p. 4°), and 4:6-di-tert.-butyl-resorcinol, m.p. 121° (Me, ether, b.p. 136-140°/13 mm., m.p. 76°), are obtained analogously. m-Cresol and octene yield o-octyl-mcresol, b.p. 153-154°/11 mm., and PhOH and allyl alcohol afford o-propenylphenol, b.p. 200-205°.

R. T. Condensation of aliphatic alcohols with aromatic compounds in presence of aluminium chloride. I. R. C. HUSTON and T. Y. HSIEH (J. Amer. Chem. Soc., 1936, 58, 439-441).-CHAlk. OH (1 equiv.) added to a well-stirred mixture of C₆H₆ (2-5 equivs.) and AlCl₃ (0.5 equiv.) at $< 30^{\circ}$ gives 25-28% of CHPhAlk₂; PhPr^β, CHPhMeEt. CHPhMePr^a, and CHPhMePr^a are thus prepared. Bu⁷OH similarly affords 67% of PhBu⁷ whilst CH₂Alk·OH (I) do not react. CAlk₃·OH (0·25 mol.), PhOH (0·25 mol.), and AlCl₃ (0·125 mol.) in light at 25-30° petroleum give 45-60% of p-OH·C₆H₄·CAlk₃; (I) (Alk = Me—Pr) and sec.-BuOH do not react, whilst Pr^{β}OH affords a small amount of an unidentified product. The following are described : p-C₆H₄Bu^v·OH (benzenesulphonate, m.p. 70-71°; ptoluenesulphonate, m.p. 109-110°); p-tert.-amylphenol (benzenesulphonate, b.p. 184-185°/3 mm.; p-toluenesulphonate, m.p. $54-55^{\circ}$); β -p-hydroxyphenyl- β -methyl-pentane (II), b.p. $259-261^{\circ}/740$ mm., m.p. $37-38^{\circ}$ (from CMc₂Pr^a·OH) (benzoate, b.p. 169-171°/3 mm.; benzenesulphonate, b.p. 174-175°/3 mm.; p-toluenesulphonate, b.p. 194-195°/3 mm.); β-p-hydroxy-phenyl-βγ-dimethylbutane (III), b.p. 266-268°/740 mm., m.p. 105-106° (from CMe2Pr^β·OH) (benzoate, m.p. 54-55°; benzenesulphonate, b.p. 178-179°/3

mm.; p-toluenesulphonate, b.p. 187—188°/3 mm.); γ -p-hydroxyphenyl- γ -methylpentane (IV), b.p. 268— 269°/740 mm., m.p. 59—60° (from CMcEt₂·OH) (benzoate, m.p. 77—78°; benzenesulphonate, b.p. 183— 184°/3 mm.; p-toluenesulphonate, b.p. 188—189°/3 mm.). CPhMe₂Pr^a, CPhMe₂Pr^β, and CPhMeEt₂ with HNO₃ (d 1·52) at room temp. give the p-NO₂-derivatives, b.p. 124—126°/3 mm., 122—124°/3 mm., and 123—125°/3 mm., respectively [which are all oxidised by HNO₃ (d 1·2) at 130° to p-NO₂·C₆H₄·CO₂H], reduced (Sn, conc. HCl) to the p-NH₂-derivatives, b.p. 107—109°/3 mm., 109—111°/3 mm., and 108— 110°/3 mm., respectively, which are then converted (diazo-method) into (II), (III), and (IV), respectively.

Comparative acetylation of naphthols. A. LEMAN (Compt. rend., 1936, 202, 579–581; see A., 1935, 856).—The order of the reactivity of the OH towards Ac_2O in C_5H_5N solution is α - and β - $C_{10}H_7$ ·OH > 1:5->1:7- $C_{10}H_6(OH)_2$. In AcOH solution the order is β - $C_{10}H_7$ ·OH > 1:7- $C_{10}H_6(OH)_2$ > α - $C_{10}H_7$ ·OH and 1:5- $C_{10}H_6(OH)_2$. J. N. A.

Interaction of groups in the same molecule. J. BOESEKEN, P. C. HENRIQUEZ, and J. J. VAN DER SPEK (Rec. trav. chim., 1936, 55, 145-152).-Factors, especially abnormal dipole moments (µ), pointing to mutual influences of groups in the same mol. are reviewed. µ of pyrocatechol cyclic ethers is determined, and is as follows : o-methylene-, 1.0; o-isopropylidene-, 1.02; o-a-phenylethylidene-, 1.05; and 4-bromo-, 2.70; 4-chloro-, 2.74; 4:5-dibromo-, 3.28; and 4:5-dichloro-o-methylene-dioxybenzene, 3-39. These vals. are much > those calc. by vectorial addition, on the assumption that the total moment is in the normal direction, and slightly > those calc. on the converse assumption. Thus there is a strong mutual interaction, either between the ether groups and the halogen atoms, or between the moments which constitute a part of the 5-ring. E. W. W.

Bromo-derivatives of pyrocatechol. J. FREJKA and B. SEFRANAK (Coll. Czech. Chem. Comm., 1936, 8, 130-139).-o-C₆H₄(OH)₂ (I) with Br (4 mols.) in cold CHCl₃ or, better, in conc. H₂SO₄, gives its Br₄. derivative, m.p. 191-192°. Lit. methods fail to give the 3:4:5-Br₃-derivative (II), m.p. 144° (corr.), which is obtained by the action of Br-CHCl₃ or Br vapour on a 3% CHCl₃ solution of (I) at $< 20^{\circ}$ (monohydrate could not be obtained; Ac_2 derivative, m.p. 120°), characterised by conversion (MeI-MeOH-K₂CO₃) into its known Me₂ ether. With Br (2 mols.)-AcOH a 22% solution of (I) in AcOH (Cousin, A., 1895, i, 456) or CO₂-Br vapour into (I)-CHCl₃, gives the 4: 5-Br₂-derivative (III), but if SO₂-Br vapour is passed into (I)-CHCl₃ at room temp. an 80% yield of the 3:4-Br2-derivative, m.p. 73-74° (Ac2 derivative, m.p. 95-96°) [converted by Br-CHCl₃ into (II)], is obtained. (III) is not obtained by the method of Kohn et al. (A., 1927, 966), which gives only a mixture, possibly containing the 3:6-Br₂-derivative, m.p. 120° (Ac derivative, m.p. about 170°), which could not be isolated pure. J. W. B.

β-Phenyl sulphide. O. HINSBERG (Ber., 1936, 69, [B], 492-495; cf. A., 1929, 310).—The yield of β-Ph (isophenyl) sulphide (I) is greatly increased when

the action of $HClO_A$ on α -Ph sulphide (II) is effected in considerable amounts of AcOH or EtCO₂H. The product is treated with MeOH-KOH and light petroleum and (I), b.p. 324-329°/atm. pressure, is readily isolated by fractional distillation of the petroleum extract. (I) is not isomerised to (II) when repeatedly distilled or heated at 290-300° in a sealed tube, but transformation occurs when it is boiled with P_2O_5 . (I) is transformed at 16° by HClO₄ into its perchlorate, which is produced from diphenylsulphonium hydroxide (III) and HClO4 in AcOH at room temp., thus indicating a constitutive change during the transformation of (I) into (III). The residues from the distillation of (I) contain diphenylphenylene disulphide, $C_6H_4(SPh)_2$, m.p. 80°, converted by H_2O_2 in AcOH into the corresponding disulphone, m.p. 229°. (II) and HClO₄ in boiling MeOH afford a-diphenylmethylsulphonium perchlorate, SPh.Me ClO₄, m.p. 76°, which breaks down in warm EtOH containing KOAc into (I), KClO₄, and MeOH. β-Diphenylmethylsulphonium perchlorate, which does not solidify at -10° , and phenyldimethylsulphonium perchlorate, m.p. 160°, are obtained analogously. H. W.

cycloHexene peroxide. H. HOCK and O. SCHRADER (Naturwiss., 1936, 24, 159; cf. Stephens, A., 1928, 401).—Irradiation of cyclohexene in O₂ yields 20% of the peroxide (I), isolated (96% purity) by distillation in high vac.; presence of eosin doubles the velocity of reaction. Treatment of (I) with 1-2N-H₂SO₄ affords 50% of cis-cyclohexane-1: 2-diol, m.p. 104°, and 10-20% of cyclopentenealdehyde (semicarbazide, m.p. 208°) and with conc. NaOH Δ^1 -cyclohexen-3-ol (naphthylurethane, m.p. 156°) [also afforded by reduction of (I) with aq. Na₂SO₃]. F. O. H.

Osmic acid esters as intermediate products in oxidations. R. CRIEGEE (Annalen, 1936, 522, 75— 96).—Böeseken's view (cf. A., 1920, ii, 219) that the production of *cis*-diols from olefines and NaClO₃ in presence of a little OsO₄ (Hofmann, A., 1913, ii, 62, 609) occurs through the intermediate ester,

 $R < CH \cdot O > OsO_2$, is proved by the following results. Such esters (decomp. temp. quoted after substance) are prepared from accepanthylene (I) 236° independence

are prepared from acenaphthylene (I), 236°, indene, 204°, 1:4-dihydronaphthalene, 170°, and Δ^9 -octahydronaphthalene, 200°, in 89-99% yield by treatment with an equiv. of OsO4 in abs. Et2O. These are converted by oxidative hydrolysis ($\tilde{M}/3$ -NaClO₃ in dioxan-AcOH) or, better, by reductive hydrolysis (aq. EtOH-Na₂SO₃) [whereby the insol. salt, Na₄Os(SO₃)₃,6H₂O, is also produced] into cis-7: 8-dihydroxyacenaphthene (II), cis-1:2-dihydroxyindane (III), cis-2: 3-dihydroxy-1:2:3:4-tetrahydronaphthalene, and cis-9: 10-dihydroxydecahydronaphthalene, m.p. 89.5° [oxidised by Pb(OAc)₄ in C₆H₆ to cyclodecane-1: 6-dione (Hückel et al., A., 1930, 76)], respectively. The above ester from (I) forms a 1:2-additive compound with C_5H_5N ; this is converted by warm AcOH or 0.2N-NaOH in H2 (and subsequent acidification) into the diester (IV), 1:8- $C_{10}H_6 < CH \cdot O > OsO < O \cdot CH > C_{10}H_6 - 1 : 8,$ decomp. 292° [K₂ salt (+4H₂O)], also obtained (a) on attempted hydrolysis (H2O or EtOH-HCl in dioxan; alkali

followed by CO_2) of the original ester, (b) from the ester and (II), (III), or *cis-cyclo*hexanediol (V) in dioxan, and (c) from (II) and K_2OSO_4 in 1% KOH followed by dil. AcOH. Analogous *diesters* are also prepared [method (c)] from *cis-7*: 8-dihydroxy-7: 8diphenylacenaphthene (VI), decomp. 274°, (III), decomp. 204°, (V), decomp. 165°, (·CMc₂·OH)₂, decomp. 197°, and β -anethole glycol, decomp. 171°; esters could not be prepared from *trans*-diols. Similar diesters (as K_2 salts) are obtained from hydrobenzoin and *iso*hydrobenzoin. The monoester from (I) with (VI) (but not the *trans*-isomeride) gives a mixed *diester* of (II) and (VI) together with smaller amounts of (IV) and the above diester of (VI). Os in the above compounds is determined by oxidation with CrO_3 +conc. H₂SO₄; the OsO₄ formed is distilled into a mixture of 0·4N-KI, 2N-H₂SO₄, and CHCl₃, and then titrated with Na₂S₂O₃.

cycloHexene (VII) in O_2 and sunlight yields Δ^2 -cyclohexenyl H peroxide (VIII); in presence of, e.g., OSO_2 , which is oxidised by (VIII) to OSO_4 , the following reactions occur: (VII)+ $OSO_4 \rightarrow C_4H_8 < CH \cdot O > OSO_2$, which is then oxidised by (VIII) to $(CH_2)_4(CHO)_2$; (VIII) is thus reduced to cyclohexenol. Willstätter and Sonnenfeld's results (A., 1913, i, 1200) on the autoxidation of (VII) in presence of Os and OSO_2 are thus satisfactorily explained.

[With W. RICHTER.] The esters $CHR - O_{CHR' \cdot O} > OsO_2$, when treated with H₂O₂ in absence of H₂O undergo oxidative fission to RCHO, R'CHO, and OsO₃ (which then gives OsO₄). Thus stilbene, H₂O₂, and a little OsO₄ in Et₂O+anhyd. Na₂SO₄ give 77% of PhCHO and a little BzOH. Anethole, *iso*eugenol Me ether, *iso*eugenol acetate, and *iso*safrole similarly afford MeCHO (54-98%) and *p*-OMe·C₆H₄·CHO, veratraldehyde, acetylvanillin, and piperonal, respectively, in 47-75% yield; small amounts of the corresponding ArCO₂H are also produced. H. B.

Constitution of dihydrovitamin- D_2 . S. VON REICHEL and M. DEPPE (Z. physiol. Chem., 1936, 239, 143—146; cf. this vol., 69).—The allophanate of dihydrovitamin- D_2 (I) in CHCl₃ gives, with BzO₂H,



the trioxide (II), m.p. 190°, $[\alpha]_{\rm D}^{10}$ -3.4° in CHCl₃, 3 O being taken up. (II) with CrO₃ an AcOH gives a monocarboxylic acid (III), m.p. 219°, $[\alpha]_{\rm D}^{20}$ -23.3° in AcOH, which yields the OH-acid, C₂₃H₃₄O₆, m.p. 244° (Me ester, m.p. 216°, and its acetate, m.p. 155—156°, $[\alpha]_{\rm D}^{10}$ -55°), when boiled with KOH in EtOH and gives the CHI₃ reaction, but does not react with NH₂OH or semicarbazide or absorb ultra-violet light. The oxidation yields also a neutral substance, C₃₀H₄₈O₈N₂, m.p. 239—240°, $[\alpha]_{\rm D}^{20}$ -68.2° in CHCl₃, which does not absorb ultra-violet light. When (II) in $CHCl_3$ is treated with O_3 and the product oxidised with CrO_3



in AcOH (III) is produced. The structures A and B are therefore assigned to (III) and (I), respectively. W. McC.

Sterols. IV. Androsterone derivatives. V. epiCholesterol. R. E. R. E. MARKER. MARKER, T. S. OAKWOOD, and H. M. CROOKS (J. Amer. Chem. Soc., 1936, 58, 480-481, 481-483).-IV. Reduction (Na, amyl alcohol) of androsteroneoxime gives 17-aminoandrosterone [hydrochloride, m.p. 340° (decomp.)], converted (diazo-method) into into 3:17-androstanediol, m.p. 218-220°, which, like isoandrosterone, is oxidised (CrO₃, AcOH) to 3:17-androstanedione, m.p. 128-129°. Similar reduction of the oxime of α -3-chloroandrosterone (I) affords 17-aminoandrostane [hydrochloride, m.p. 345° (decomp.)], converted into 17-androstanol, m.p. 166°, which is also prepared by reduction of (I).

V. Cholesteryl chloride and Mg give Mg dl-cholesteryl chloride (II), which with dry O_2 at -7° to 0° affords cholesterol and epicholesterol (III), m.p. 141°, not pptd. by digitonin. Reduction (H₂, PtO₂, Et₂O) of (III) gives a quant. yield of epicholestanol, thus showing the presence of the $\Delta^{5:6}$ double linking. (II) and CO₂ at 0° afford dl- $\Delta^{5-cholestene-3-carboxylic}$ acid, m.p. 222-225° (Me, m.p. 101·5-102·5°, andEt, m.p. 82·5-83°, esters), reduced (H₂, PtO₂, Et₂O-AcOH) to dl-cholestane-3-carboxylic acid, m.p. 209-211° (Me, m.p. 70-71°, and Et, m.p. 66·5-67·5°,esters). Cholesteryl bromide similarly affords Mgdl-cholesteryl bromide. H. B.

Thermal decomposition of diacyl peroxides. H. ERLENMEYER and W. SCHOENAUER (Helv. Chim. Acta, 1936, 19, 338—342).—Contrary to Wieland et al. (A., 1934, 1215), decomp. of Bz_2O_2 gives C_6H_6 even in vac. and none of the products necessarily involves the intermediate formation of free radicals. Disproportionation is preferred as a general explanation of the reactions occurring. R. S. C.

Alleged dihydrophenylbenzamidine. A. V. KIRSANOV (Bull. Acad. Sci. U.R.S.S., 1935, No. 6-7, 979-984).—Phenylbenzamidine (I) and Na-Hg react as follows: (I) + 2H \rightarrow NH₂·CHPh·NHPh (II) \rightarrow NH₃+CHPh:NPh (III); (III)+H₂O \rightarrow PhCHO+ NH₃Ph; (III)+2H \rightarrow CH₂Ph·NHPh; (II) \rightarrow NH₂Ph+ CHPh:NH (IV); (IV)+2H \rightarrow NH₂·CH₂Ph. (II) cannot be isolated from the reaction products, and probably decomposes immediately on formation; the product identified as (II) by Bernthsen *et al.* (A., 1880, 639) was probably unchanged (I). R. T.

Hexadeuterobenzene and a trideuterobenzoic acid. H. ERLENMEYER, H. LOBECK, H. GARTNER, and A. EPPRECHT (Helv. Chim. Acta, 1936, 19, 336—337; cf. this vol., 61).—Hexadeuterobenzene of constitution $C_6D_{5\cdot59}H_{0\cdot41}$ has b.p. 79.4°, m.p. 6.8°, $d_{2^{0}}^{*0}$ 0.9465, n_D^{*0} 1.4997. With ClCO·NH₂ and AlCl₃ in CS₂, followed by decomp. of the complex with H₂O, this gives a benzamide, which, when hydrolysed, affords a nearly pure *trideuterobenzoic acid*, $C_6H_{2\cdot91}H_{2\cdot08}$ ·CO₂H, m.p. 121.3°. The positions

R. S. C.

Asymmetric carbon atom, CHDRR'. II. Attempted resolution of a deutero- β -phenylpropionic acid. H. ERLENMEYER and H. GARTNER (Helv. Chim. Acta, 1936, **19**, 331–335; cf. this vol., 467).—C₆H_{2:18}D_{2:82}·C₂H_{1.62}D_{2:38}·CO₂H could not be resolved by strychnine. R. S. C.

of the 3 D are unknown.

Mechanism of Perkin's reaction. D. A. BROD-SKI (Monatsh., 1936, 67, 137—140).—The study (A., 1933, 392) of the effect of NaOAc on the yield of CHPh:CH·CO₂H (I) in Perkin's synthesis was overlooked by Bock *et al.* (A., 1934, 1348). The modes of formation and decomp. of CHPh(OAc)₂ are not considered to accord with their conclusion that it is involved in a side-reaction detrimental to the yield of (I). H. G. M.

Tafel rearrangement. II. Electrochemical reduction of ethyl cyclopentanonecarboxylate. H. STENZL, F. FICHTER, and H. ARNI (Helv. Chim. Acta, 1936, 19, 302—398; cf. A., 1934, 631).— Cathodic reduction of Et cyclopentanone-2-carboxylate gives cyclohexanol and some Et cyclopentane- and cyclopentanol-2-carboxylate and El_2 1:1'-dihydroxy-1:1'-dicyclopentanyl-2:2'-dicarboxylate, m.p. 108° (corresponding acid, decomp. 230°), which favours interpretation of the Tafel rearrangement by migration of acyl. Reduction of CO_2 Et occurs only before the CO is reduced and is accompanied by migration of COR. R. S. C.

Synthetic substances resembling thyroxine from diphenyl ether. K. H. SLOTTA and K. H. SOREMBA (Ber., 1936, 69, [B], 566—572).—p-OPh·C₈H₄·CHO and McNO₂ in EtOH are converted by KOH in MeOH-H₂O at 0° into ω -nitro-p-phenoxystyrene, m.p. 102°, electrolytically reduced in EtOH-EtOAc-HCl to β -p-phenoxyphenylethylamine hydrochloride (I), m.p. 209—210°. p-OPh·C₆H₄·CHO is transformed by KCN and (NH₄)₂CO₃ in EtOH-H₂O at 80°/10—12 atm. (CO₂) into 5-p-phenoxyphenylhydantoin, m.p. 203—204°, hydrolysed by boiling 21% KOH to p-phenoxyphenylaminoacetic acid (II), m.p. 242° [hydrochloride, (III), m.p. 218—220° (decomp.)]. Hippuric acid, NaOAc, p-OPh·C₆H₄·CHO, and Ac₅O at 100° afford the azlactone,

CPh N C:CH·C₆H₄·OPh, m.p. 158°, hydrolysed to α -benzamido- β -p-phenoxyphenylacrylic acid, m.p. 188— 189°, which is converted by red P, HI (d 1·7), and Ac₂O into α -amino- β -p-phenoxyphenylpropionic acid (IV) (deiododeoxythyroxine), m.p. 247° when rapidly heated [hydrochloride (V), m.p. 218—220° (decomp.)]. Similarly p'-C₆H₄I·O·C₆H₄·CHO gives successively the azlactone, C₂₂H₁₄O₃NI, m.p. 158—159°, α -benzamido- β -p-4'-iodophenoxyphenylacrylic acid, m.p. 222—223°, and α -amino- β -p-4'-iodophenoxyphenylpropionic acid (VI), m.p. 249—250°.

 $p'-NO_2 \cdot C_6 H_4 \cdot O \cdot C_6 H_4 \cdot CHO$ gives the azlactone. C22H14O5N2, m.p. 177°, α-benzamido-β-p-4'-nitrophenoxyphenylacrylic acid, m.p. 210°, and a-amino-B-p-4'aminophenoxyphenylpropionic acid (VII), m.p. 239-240° [hydrochloride, m.p. 270-275° (strong decomp.)]. Treatment of (III) with ICl in AcOH gives the iodo-derivative, m.p. 238-240°. Iodination of (IV) could not be effected by I and NaOH, I, KI, and conc. NH_{2} , or by ICl in 2N-HCl whereas (V) with ICl in AcOH yields (VI) [hydrochloride, m.p. 235-240° (decomp.)]. No physiological activity is shown by (I), (II), (IV), (VI), or (VII). H. W.

Condensation of piperonal with hippuric acid. II. G. LABRUTO and L. IRRERA (Gazzetta, 1935, 65, 1201-1202).-The condensation product (I), the lactimide of a-benzamido-3:4-methylenedioxycinnamic acid (II) [cf. A., 1934, 526, in which the formula (I) should read CH2O2:C6H3.CH:CH<CO

reacts with NHPh·NH₂ to give a compound, C₇H₈ON, m.p. 220°, insol. in EtOH, and a compound, m.p. 130°, sol. in EtOH. When (II) is boiled with MeOH, the Me ester, C₁₀H₁₅O₅N, m.p. 150°, is formed E. W. W.

General method for synthesis of substituted phthalidecarboxylic acids. S. K. CHAKRAVARTI and P. R. VENRATARAMAN (Current Sci., 1936, 4, 483–484).—o-Nitromandelic acid, and substituted acids, can be smoothly converted by FeSO₄ and Ba(OH)₂ into the corresponding NH₂-acids, and then (Sandmeyer) into cyanomandelic acids, which are hydrolysed to phthalidecarboxylic acids. E. W. W.

Bile acids. XLVIII. Method of production of the compound $C_{24}H_{36}O_{10}N_2$ (bilianic acid series). Mode of action of nitric acid in oxidations. M. SCHENCK (Z. physiol. Chem., 1936, 239, 135-142; cf. this vol., 74).-The compound is a lactamamide of which the precursor, in each of the 5 methods described, is the ketolactam. HNO2 originally present or produced during the reaction is the active agent in the HNO3 oxidation, which is restricted or prevented by addition of $CO(NH_2)_2$. W. McC.

New diene syntheses. II. E. LEHMANN (Ber., 1936, 69, [B], 631-635; cf. A., 1935, 978).-2-m-4'-Xylyl-2-methyl- Δ^3 -tetrahydrobenzaldehyde (I) (loc. cit.) is reduced by Zn-Hg and 6N-HCl to 1:3:1':2'tetramethyl- Δ^{5} -tetrahydrodiphenyl, b.p. 155—158°/12 mm. (very unstable bromide), which could not be satisfactorily dehydrogenated. (I) with CrO3 in AcOH or with conc. aq. KOH affords 2-m-4'-xylyl-2methyl-∆3-tetrahydrobenzoic acid (II), m.p. 102° (accompanied when NaOH is used by 2-m-4'-xylyl-2-methyl- Δ^3 -tetrahydrobenzyl alcohol, b.p. 145—146°/0.8 mm.).

CO.H (III.)

tone (III), m.p. $> 300^{\circ}$.

Phenylmethylallylcarbinol is transformed by PCl₃ in CHCl₃ or by HCl in EtOH into the corresponding unstable chloride, converted by KOH at 210-230° into β -phenyl- $\Delta^{\beta\delta}$ -pentadiene (IV), which could not be purified owing to its great ease of polymerisation. When heated with acraldehyde in $C_8 \hat{H}_8$ at 100–105° it gives 2-phenyl-2-methyl- Δ^3 -tetrahydrobenzaldehyde, b.p. 172-174°/12 mm., m.p. 48° (additive compound with NaHSO₃). Similarly, p-tolylmethylallylcarbinol affords successively the corresponding chloride, impure α -p-tolyl- $\Delta^{\beta\delta}$ -pentadiene, and 2-p'-tolyl-2-methyl- Δ^3 -tetrahydrobenzaldehyde, b.p. 176—178°/12 mm., m.p. 51° (corresponding NaHSO, compound). H. W.

Ethyl acetal of cyclohexanone, and its transformation into cyclohexenyl ethyl ether. A. E. ARBUSOVA and B. M. MICHAILOVA (Trans. Kirov Inst. Chem. Tech. Kazan, 1935, No. 4-5, 41-45).-cycloHexanone and CH(OEt)₃ in presence of H₂SO₄ afford $CH_2 < CH_2 \cdot CH_2 > C(OEt)_2$ (I), in 38% yield. 1:2:4 mixtures of (I), P_2O_5 , and C_5H_5N (5 hr.; 100°) yield Δ^1 -cyclohexenyl Et ether. R. T.

Pyrolysis of tetrahydronaphthyl naphthyl ketones. L. F. FIESER and A. M. SELIGMAN (J. Amer. Chem. Soc., 1936, 58, 478-480; cf. A., 1935, 480).-The Grignard reagent from 1-bromo-5:6:7:8-The Grignard reagent from 1-bromo-5:6:7:8-tetrahydronaphthalene, b.p. $130^{\circ}/2$ mm. (from the 1-NH₂-derivative), with α - and β -C₁₀H₇-COCl gives ar- α -tetrahydronaphthyl α - (I), m.p. 107°, and β - (II), m.p. 98°, $-C_{10}H_7$ ketone, respectively. (I) heated at 395—400°/45 min. in N₂ affords 1:12-trimethylene-chrysene, m.p. 116·5—117° (corr.) (picrate, m.p. 170—171°), oxidised (Na₂Cr₂O₇, AcOH) to (probably) a ketoquinone, C₂₁H₁₂O₃, m.p. 268—270° (decomp.). (II) heated at 400°/30 min. gives a hydrocarbon (III), C₂-H₂, m.p. 113—115° (corr.) (nicrate, m.p. 168—169°) (11) nearest at 400 [30 mm. gives a hydrocarbon (111), $C_{21}H_{16}$, m.p. 113—115° (corr.) (picrate, m.p. 168—169°) (31%), a hydrocarbon (IV), $C_{21}H_{14}$ (? dehydro-8 : 9-trimethylene-1 : 2-benzanthracene), m.p. 149—149.5° (corr.) (picrate, m.p. 146—147°) (10%), about 7% of (probably) 8:9-trimethylene-3: 4-benzphenanthrene, m.p. 138-138.5° (corr.) (picrate, m.p. 125-126°), and a little of a hydrocarbon, $C_{21}H_{16}$, m.p. 96.5—97° (corr.). The hydrocarbon, m.p. 270°, previously obtained (*loc. cit.*) from crude (II), has not been encountered. (III) and (IV) are oxidised to compounds, $C_{21}H_{10}O_4$, m.p. 220–223°, and $C_{21}H_{12}O$, m.p. 201°, respectively. Ketones containing the tetrahydrobenzo-group are thus unsuitable for the Elbs synthesis; dehydrogenation and migration of H may take place [as with H. B. (II)].

Phenylbenzoyldiazomethane. C. D. NENITZ-ESCU and E. SOLOMONICA (Org. Syntheses, 1935, 15, 62-63).-The prep. from CPhBz.N.NH, is described. CH. ABS. (r)

2': 6'-Dihydroxy-4'-methoxy-β-phenylpropiophenone from essential oil of Populus balsamifera, L.-See this vol., 533.

Constituents of the adrenal gland. II. "β-Adrenosterone." T. REICHSTEIN (Helv. Chim. Acta, 1936, 19, 223-225).-The diketone, G (this

CO 0

vol., 473), has no œstrogenic effect on mice, but one fifth of the activity of androsterone by the capon test; it is called adrenosterone and given the partial formula shown; it is

probably a normal constituent of the adrenal gland.

The absorption spectrum of its disemicarbazone is given. R. S. C.

Sex hormones. XIII. Preparation of 17ethyltestosterone and the 3-trans-17-cis-diols of androstane and androstene. Specificity of the sex hormones. L. RUZICKA and H. R. ROSENBERG (Helv. Chim. Acta, 1936, 19, 357-366; cf. this vol., 467).-Dehydro-trans-androsterone (I) and transandrosterone (II) with MgMel give mixtures. (I) affords 17-ethyl-A5-androstene-3-trans-17-?-diol (III), m.p. 199-200°, and 30-40% of A5-androstene-3trans-17-cis-diol (IV), m.p. 173-173.5°, sublimes at 100°/0.01 mm. (diacetate, m.p. 149-151°). (I) affords 17-ethylandrostane-3-trans-17- ?-diol, m.p. 205°, and androstane-3-trans-17-cis-diol (V), m.p. 178-179°, sublimes at 150°/0.01 mm. (V) is also obtained by hydrogenation (PtO₂) of (IV) in AcOH-EtOH and from (II) and MgPrI with a little 17-Pr derivative. (IV) and CrO_3 give and rostane-3: 17-dione. (III) and Br-AcOH, followed by CrO₃ (1.5 O), give 17-ethyltestosterone, m.p. 143°. New and revised data are given of the activity of 15 compounds by the capon and rat tests. 17-Methyltestosterone is the most active and also has considerable progesterone activity. The presence of a Δ^4 - or Δ^5 -ethylenic linking and the position of the 17-OH are without effect. 3-cisare more effective than 3-trans-OH-compounds. Me in position 17 raises the efficiency, Et reduces it.

R. S. C.

Behaviour of magnesium diphenylyl bromide with benzoquinone. D. E. WORRALL and S. COHEN (J. Amer. Chem. Soc., 1936, 58, 533).—p- C_6H_4Ph ·MgBr (I) and p- $C_6H_4O_2$ give (p- C_6H_4Ph ·)₂ (44%) [also formed from (I) and (:NPh)₂], p- $C_6H_4(OH)_2$, and smaller amounts of Ph₂ and p- C_6H_4Ph ·OH. Hydrocarbon formation does not occur with MgPhBr or MgBu^aBr and p- $C_6H_4O_2$. H. B.

Sugar-absorption by hydroxyanthraquinones. I. S. MüLLER (Magyar chem. Fol., 1934, 40, 135– 146; Chem. Zentr., 1935, ii, 514–515).—Co-ordination between the 1-OH and the CO is assumed to occur; the effect of 2- and 8-OH groups in lowering the reactivity of the 1-OH is due to their action in stabilising the ring so formed. H. N. R.

1:1'-Dianthraquinonylglyoxal and the anthraflavone of the α -series. R. SCHOLL and H. D. WALLENSTEIN (Ber., 1936, 69, [B], 503-513).-Oxidation of 4-chloro-1-methylanthraquinone with MnO₂ and H₂SO₄ and successive treatments of the product with boiling H₂O and C₅H₅N (whereby autoxidation takes place) yields 4:4'-dichloro-1:1'dianthraquinonylglyoxal [(I) R=Cl], decomp. 280-300°, which readily gives an alkaline vat from which it cannot be regenerated, is oxidised by HNO₃ in



 $PhNO_2$ to 4-chloroanthraquinone-1-carboxylic acid (II), and is transformed by Me_2SO_4 into Me 4-chloroanthraquinone-1-carboxylate. Treatment of (I) with

conc. H₂SO₄ under defined conditions leads to the violet hexasulphate of the lactol form of 4:4'-dichloro-1: 1'-dianthraquinonylethylenediol (III) R=Cl, R'= H], which passes when treated with H₀O into a blue, then violet, powder and ultimately in presence of air affords (I). (III) and NaNO₂ in conc. H_2SO_4 at 60–90° yield (II). Treatment of the sulphate of (III) with boiling EtOH gives the Et, ether [(III) R=Cl; R'=Et], m.p. 240-241°, which is not sensitive to light, does not give a vat, and is de-alkylated to (III) by conc. H_2SO_4 . The corresponding Me_2 ether has m.p. 241-243°. 1 : l'-Dianthraquinonylglyoxal (IV) [(I) R=H], m.p. 320° (decomp.) when rapidly heated, is obtained by the oxidation of 1-methylanthraquinone with MnO, and conc. H.SO, at 65-70°, from anthraquinone-1-carboxyl chloride and Na in xylene at $120-130^{\circ}$, or (best) from Bz-1-Bz'-1-dibenzanthronyl and CrO_3 in boiling AcOH. The corresponding cryst. dilactol sulphate is very sensitive towards H_2O ; with MeOH and EtOH it gives the corresponding ethers. (IV) is transformed by NaOMe in boiling MeOH into anthraquinone-1carboxylic acid, is converted by NH2OH,HCl in boiling C_5H_5N into the (?) oxime, m.p. > 360°, and a substance $C_{13}H_7O_3N$, m.p. 238–239°, and a bis-diazine, m.p. > 500°. Treatment of (IV) in conc. H_2SO_4 with Cu powder at 50° gives the dianhydride of dianthranol-9:9'-yl-1:1'-ethylenediol (V), m.p.



about 400°. A further argument in favour of the dilactol structure is found in the conversion of 1methylanthraquinone by KOH and a little anhyd. NaOAc in EtOH at 165° into s-1 : 1'-dianthaquinonylethylene [isoanthraflavone] (VI), m.p. $> 360^{\circ}$, which dissolves in conc. H_2SO_4 to a yellow solution which becomes bluish-red and then shows the absorption spectrum of the dilactol and yields (V) with Cu powder. The following compounds are incidentally described : 9:9'-dihydroxy-9:9'-dianthronyl-1:1'-dicarboxydilactone, m.p. 282° (decomp.), from anthraquinol-1carboxylactone in boiling PhNO2, which behaves towards NaOH in the same manner as does (IV); acetic 4-chloroanthaquinone-1-carboxylic anhydride, which softens and evolves Ac₂O at 141° and passes in C₆H₃Cl₃ at 180° into 4-chloroanthraquinone-1-carboxylic anhydride, m.p. 260-262° (decomp.).

H. W. Perylene and its derivatives. LXVII. Vat dye of the isoviolanthrone series from perylene-1:12-quinone. A. ZINKE, W. PENECKE, and F. HANUS (Ber., 1936, 69, [B], 624—630; cf. B., 1929, 891, 1008).—Perylene-1:12-quinone (I) is converted by Zn dust and anhyd. NaOAc in boiling Ac₂O into 1:12-diacetoxyperylene, m.p. 196°, transformed by AlCl₃ and BzCl in CS₂ followed by hydrolysis into 1:12-dihydroxy-3:9-dibenzoylperylene (II), m.p. about 217° (decomp.). When heated with AlCl₃ (II) gives a blue vat dye also obtained from 1:12dibenzoyldioxyperylene (III), which cannot be oxidised subsequently to the green dye (loc. cit.). The latter compound is, however, obtained from (II) or (III) and $AlCl_3$ in presence of MnO_2 or from (I) and BzCl in absence of added oxidising agent. Oxidation of (II) with PbO₂ gives a product insol. in NaOH which does not give the analytical data of 3:9dibenzoylperylene-1:12-quinone. The production of the blue and green dyes from (II) indicates the occurrence of a Fries displacement during their formation from (III). Early interruption of the process or the use of milder conditions does not lead to the isolation of intermediate products but establishes the fission of (III). The dyes therefore arise from 1:12dihydroxyperylene and BzCl. Since the green com-



pound is converted by red P and HI (d 1.7) at 220° into isoviolanthrene it has the constitution (IV). (I) is transformed by Br in C₆H₆ into tetrabromotetrahydroperylene - 1 : 12 quinone, decomp. 220—230° after darkening at 170°, which passes in boiling C₅H₅N into dibromoperylene-1 : 12quinone, m.p. 272° (decomp.). Dichlorodibudroperylene - 1 : 12 - quinone.

(IV.) chlorodihydroperylene - 1 : 12 - quinone, from (I) and Cl₂ in cold C₆H₆, is very unstable, readily yielding chloroperylene-1 : 12-quinone, m.p. 271-272° (decomp.). (I) with warm HNO₃ (d 1·34) affords dinitroperylene-1 : 12-quinone, decomp. $> 300^\circ$, transformed by Zn dust and NaOAc in boiling Ac₂O into tetra-acetyldiamino-1 : 12-diacetoxyperylene, m.p. 246-247°. 1 : 12-Di-p-bromobenzoyl-, m.p. 247°, and 1 : 12-dianisoyl-, m.p. 188°, -dioxyperylene are described. H. W.

Perylene and its derivatives. XLV. A tribenzoylperylene. A. ZINKE and E. GESELL. XLVI. A perylene-1: 12-cycloperoxide. A. ZINKE and K. J. VON SCHIESZL [with F. HANUS] (Monatsh., 1936, 67, 187—192, 196—202).—XLV. 3:9-Dibenzoylperylene when heated (water-bath; 5 hr.) with anhyd. AlCl₃ and BzCl affords a tribenzoylperylene (I), m.p. 236—237° [the $(NO_2)_3$ -derivative, decomp. about 300°, is reduced by NaOH-Na₂S₂O₄ (water-bath) to a dark blue compound], which on Clemmensen reduction yields a compound C₄₁H₂₆O₂, m.p. 208°, and when heated at 160° with AlCl₃ gives a trace of an isoviolanthrone-like derivative. It is concluded that migration of Bz from position 3 or 9 during formation of (I) has not taken place, and that the third Bz is not in one of the remaining peripositions (cf. A., 1930, 1587).

XLVI. 1:12-Dihydroxyperylene (improved prep.) when heated at 450—500° with moist ZnCl₂ and Zn yields perylene, but with anhyd. ZnCl₂ at 250—260° yields also *perylene*-1:12-cyclo*peroxide*, m.p. above 340° (cf. A., 1933, 552). This is very stable, being unaffected by N_2H_4 , H_2O in boiling PhMe, or when heated with HI. Only a part dissolves in 20% NaOH-MeOH during 3 hr. at 130° (sealed vessel). In accord with the structure given, it cannot be used as a vat dye. H. G. M.

Linalool in coriander oil. Oil from flowering Coriandrum saticum.—See B., 1936, 348.

Isomerisation of α -pinene to an aliphatic terpene (alloocimene). VI. Isomerisation of nopinene, $d-\Delta^3$ -carene, camphene, and pinocamphone. B. A. ABBUSOV (Trans. Kirov Inst. Chem. Tech. Kazan, 1935, No. 4—5, 53—56; cf. A., 1935, 1246).—alloOcimine is obtained in 20% yield by passing nopinene over glass at 345—350°; under these conditions Δ^3 -carene, camphene, and pinocamphone do not undergo conversion into (I). R. T.

Terpenes and camphors. I. Isomerisation of α -pinene by activated charcoal. T. MOCHIDA (J. Pharm. Soc. Japan, 1933, 53, 936—947).—l- α -Pinene with active C at 145—150° affords 95—98% of monoterpenes (75—80% monocyclic, 20—25% camphene) and 2—3% of diterpenes; B₂O₃ and H₃BO₃ catalyse the reaction. In the gaseous state camphene (12—30%), limonene, dipentene, diterpenes (6—7%), and p-cymene are produced. CH. ABS. (r)

apoBornylene from camphenilyl chloride. P. LIPP and J. DANIELS (Ber., 1936, 69, [B], 586—588).— The removal of HCl from camphenilyl chloride (I) by NaOEt is effected with difficulty so that an exact repetition of Snitter's work (A., 1933, 1300) is impossible. Treatment of (I) with KOPh gives a semisolid cryst. product from which apobornylene is readily isolated. Santene could not be detected. The composition of camphenilene appears to vary greatly and to depend on the mode of elimination of HCl from (I). H. W.

Polyterpenes and polyterpenoids. CI. Constitution of cedrene and cedrol. L. RUZICKA and E. JUTASSY. CII. Constitution of components of the caryophyllene mixture. L. RUZICKA, W. ZIMMERMANN, and K. HUBER. CIII. Synthesis of the five isomeric methoxy-1:2:7-trimethylnaphthalenes (methoxysapotalins). L. RUZICKA, H. HÖSLI, and K. HOFMANN [with H. BLEULER, S. DEUTSCH, P. J. G. VAN HEEK, L'ORANGE, O. NERACHER, E. VON ORELLI, G. PÜRNER, E. REICH, T. SCHINZEL, N. STERNBUCH, W. ZÜRCHER, G. ZUNANA, (FRLNS.) R. ALLEMANN and A. M. SIRKS]. CIV. Synthesis of 3:9:10-trimethyl- and 3:8dimethyl-picene. L. RUZICKA and E. MÖRGELI. CV. Constitution of the trimethylnaphthols formed during dehydrogenation of triterpenes. Carbon skeleton of pentacyclic terpenes. L. RUZICKA, K. HOFMANN, and J. FREI (Helv. Chim. Acta, 1936, 19, 322-325, 343-353, 370-377, 377-386, 386-392; cf. this vol., 477).-CI. The formation of p-cymene at $> 420^{\circ}$ does not necessarily indicate the presence of its C-skeleton in cedrene, which may have either of the formulæ shown. Cedrenedicarboxylic



acid with HN_3 -CHCl₃ and H_2SO_4 at 40—45° gives a 40% yield of a diamine, $C_{12}H_{24}N_2$ [picrate and hydrochloride, hygroscopic; Ac_2 derivative, m.p. 180—181° (corr.)], the phosphate of which at about 320° gives a hydrocarbon, $C_{12}H_{18}$, b.p. 85—87°/10 mm.

CII. The chemistry of caryophyllene (I) is discussed at length. Ruzicka's formula is preferred, mainly because the Me ester of the derived acid, $C_{11}H_{18}O_{21}$, and Me₂ ester of the acid, $C_{13}H_{18}O_{41}$, are completely hydrolysed by hot 0.1N-KOH-EtOH in 10 hr. cisNorcaryophyllenic acid, m.p. 149—150°, is described. The neutral portion obtained on ozonisation of (I) in AcOH yields a ketone, $C_{10}H_{18}O$, b.p. 84—85°/12 mm. (semicarbazone, m.p. 181°; oxidised by KMnO₄ to an acid, $C_8H_{14}O_2$, b.p. 108—110°/12 mm.), possibly $CH_2 < CMc_2 > CH \cdot CH_2Ac$, and a diketone, $C_{13}H_{22}O_2$ (lit., $C_{12}H_{20}O_2$), b.p. 136°/12 mm. (disemicarbazone, m.p. 219°, oxidised by KMnO₄ to caryophyllenic acid

and CO2H.CH2.CMe2.CO2H), possibly

 $CH_2 < CHe_3 > CH \cdot CH_2Ac$ (R=CH₂·CH₂Ac). The dicarboxylic acid, $C_{10}H_{16}O_4$ (A., 1931, 735), is obtained purc, b.p. about 175°/0·4 mm.; when heated with Ac₂O at 200° and then decarboxylated, it gives a ketone, $C_{10}H_{14}O$ (semicarbazone, m.p. 186—188°).

ketone, C₁₀H₁₄O (semicarbazone, m.p. 186—188°). CIII. The OH-compound, m.p. 153°, obtained from oleanolic acid by Se, with Ni-pumice in H, at 300° gives 1:2:7-C10H5Me3, but its Me ether is not identical with any of the five possible methoxy-1:2:7-trimethylnaphthalenes, which are synthesised. 4-Methoxy-2:3-dimethylbenzaldehyde (prep. by a Gattermann reaction) with CHMeBr·CO2R and Mg (not Zn) in C₆H₆ gives a 60-70% yield of a mixture of esters, (?) Et β -hydroxy- β -4-methoxy-2: 3-dimethylphenylisobutyrate and β -4-methoxy-2 : 3-dimethylphenyl- α -methylacrylate, from which the latter ester is obtained pure, b.p. 180-185°/12 mm., m.p. 49-50°, by dehydration with PBr_3 in C_6H_6 . Bouveault reduction then affords β -4-methoxy-2: 3-dimethylphenylisobutyl alcohol, b.p. 170-175°/12 mm., converted by PBr₃ at 100° into the bromide, b.p. 165-170°/12 mm. (decomp.), which leads by way of the nitrile to γ -4-methoxy-2: 3-dimethylphenyl-\beta-methyl-n-butyric acid, m.p. 107-108°, b.p. 165-170°/0.2 mm. The corresponding acid chloride (prep. by SOCl₂) with AlCl₂ in CS₂ at 20° gives 1-keto-7 - methoxy - 3 : 5 : 6 - trimethyl - 1 : 2 : 3 : 4 - tetrahydronaphthalene, b.p. 158-160°/0.2 mm., reduced (Clemmensen) to a hydrocarbon, which with Pd-C at 300° gives 3-methoxy-1:2:7-trimethylnaphthalene, m.p. 69-70° [1:3:5-C6H3(NO2)3 compound, m.p. 169-170°]. 2-Methoxy-4: 5-dimethylacetophenone (prep. by Fries rearrangement of 1:2:4-C6H3Me2 OAc and subsequent treatment with Me₂SO₄), b.p. 150-152°/12 mm., with Br in $Et_2O-CHCl_3$ (3:1) gives the ω -Brketone, which by condensation with CHMe(CO,R), leads to γ -keto- γ -2-methoxy-4: 5-dimethylphenyl- α methyl-n-butyric acid, b.p. 233-238°/15 mm., reduced (Clemmensen) to γ -2-methoxy-4: 5-dimethylphenyl- α methyl-n-butyric acid, b.p. 208-211°/15 mm. The corresponding acid chloride (prep. by SOCl₂), b.p. 183-184°/15 mm., gives (AlCl₃) 1-keto-5-methoxy-2:7:8-trimethyl-1:2:3:4-tetrahydronaphthalene, b.p. 197-198°/15 mm., which affords (Clemmensen and then Pd-C) 4-methoxy-1:2:7-trimethylnaphthalene, m.p. 89-90°, b.p. 175-177°/15 mm. [1:3:5- $C_6 \dot{H}_3 (NO_2)_3$ compound, m.p. 193—194°]. m-C6H4Me.OAc leads (Fries; Me2SO4) to 2-methoxy-4 methylacetophenone, b.p. 135-138°/15 mm., which yields the w-Br-ketone, b.p. 190°/15 mm. (decomp.), and thence $[CHMe(CO_2R)_2] \gamma$ -keto- γ -3-methoxy-p-tolyl- α -methylbutyric, m.p. 121-122°, b.p. 225-230°/15 mm., and (Clemmensen) y-3-methyl-p-tolyl-a-methylbutyric acid, b.p. 200-215°/15 mm. The chloride, b.p. 165-170°/13 mm., of the latter acid gives 1-keto-

5-methoxy-2:7-dimethyl-1:2:3:4-tetrahydronaphthalene, b.p. 185-190°/15 mm., converted by MgMeI into the impure 1-hydroxy-1:2:7-trimethyltetrahydrocompound, b.p. 165-170°/14 mm., which with Pd-C yields 5-methoxy-1:2:7-trimethylnaphthalene, m.p. $81-82^{\circ}$ [1:3:5-C₆H₃(NO₂)₃ compound, m.p. $212-213^{\circ}$]. 2-Methoxy-p-toluic acid (from the OHacid by Me.SO, and subsequent hydrolysis), b.p. 168-170°/11 mm., m.p. 158°, gives the acid chloride, b.p. 127-129°/13 mm., and thence ω-chloro-2-methoxy-4methylacetophenone, b.p. $157-160^{\circ}/10$ mm. This with CHMe(CO₂R)₂ leads to γ -keto- γ -2-methoxy-ptolyl-a-methyl-n-butyric acid, m.p. 106-107°. Clemmensen reduction and ring-closure afford 1-keto-6methoxy-2:7-dimethyl-1:2:3:4-tetrahydronaphthalene, m.p. 95-96°, converted by MgMeI in Et₂O and subsequent heating with Pd-C into 6-methoxy-1:2:7trimethylnaphthalene, m.p. 83-84° [1:3:5-C6H3(NO2)2 compound, m.p. 160-161°]. o-C.H.Me.OAc leads (Fries, etc.) to 2-methoxy-3-methylacetophenone, b.p. 125-128°/15 mm., which with CHMeBr·CO. Et gives a mixture of esters converted by PBr, and finally NPhMe, into Et β -2-methoxy-m-tolyl- α -methylcrotonate; Bouveault reduction affords y-2-methoxy-m-tolyl-Bmethyl-n-butyl alcohol, b.p. about 165°/12 mm., converted by way of the bromide and nitrile into γ -2methoxy-m-tolyl-B-methyl-n-valeric acid, b.p. 146-147°/0.2 mm. The corresponding acid chloride with AlCl, in CS, gives 1-keto-5-methoxy-3:4:6-trimethyl-1:2:3:4-tetrahydronaphthalene, b.p. 137-138°/15 mm., which yields 8-methoxy-1:2:7-trimethylnaphthalene, b.p. 151-153°/9 mm. [1:3:5-C6H3(NO2)3 compound, m.p. 176-177°].



CIV. 3:9:10-Trimethylpicene (II) is not identical (depression of m.p.) with the hydrocarbon,

 $C_{25(24.26)}H_{20(18.22)}$, m.p. about 306°, obtained from various triterpenes, but closely resembles it in absorption spectrum and is thus probably an isomeride thereof. $\gamma \cdot p$ -

Tolylbutyryl chloride, b.p. 132°/11 mm., with AlCl₃ in CS₂ gives a 90% yield of 1-keto-7-methyl-1:2:3:4tetrahydronaphthalene (III), b.p. 131-132°/9 mm., converted by Pd-C at 300-320° in good yield into 7methyl-a-naphthol, m.p. 110-111°, b.p. 155-156°/10 mm. With $(NH_4)_2SO_3$ and aq. NH_3 at 160-170° this gives 7-methyl-a-naphthylamine, m.p. 58-59°, b.p. 162°/10 mm. [Ac derivative, m.p. 178-179° (lit. 175-176°)], which [diazo-reaction; Hg(NO₃)₂-KBr] gives the salt, [C10H6Me·N2Br]2, HgBr2, converted by heating with KBr into 1-bromo-7-methylnaphthalene, b.p. $144.5-146^{\circ}/12$ mm. (*picrate*, m.p. 101-102°). The Grignard reagent therefrom with $(CH_2)_2O$ gives β-7-methylnaphthyl-1-ethyl alcohol, b.p. 154-157°/0.5 mm. (p-nitrobenzoate, m.p. 118–119°), and thence $(SOCl_2-NPhMe_2)$ the chloride (IV), b.p. 124–125°/04 mm. β-3-o-Xylylethyl bromide and CH2(CO2R)2 lead to y-3-xylyl-n-butyric acid; the corresponding chloride, b.p. 144—146°/10 mm., and AlCl₃ in CS_2 yield 1-keto-5:6-dimethyl-1:2:3:4-tetrahydronaphthalene, b.p. 154-158°/8 mm., m.p. 61-62°, which with the Grignard reagent from ($\hat{I}V$) gives α -1-7-methylnaphthyl-
β-1'-5': 6'-dimethyl-3': 4'-dihydronaphthylethane, b.p. 215—217°/0·3 mm., dehydrogenated by Pd-C to α -1-7-methylnaphthyl-β-1'-5': 6'-dimethylnaphthylethane, b.p. 225—230°/0·2 mm., m.p. 108·5—109·5° (picrate, m.p. 167—168°). With AlCl₃ in CS₂ (3 days; room temp.) this gives (II), b.p. 270°/0·1 mm., m.p. 308—310° after sintering at 305°. The Grignard reagent from (IV) with (III) gives α-1-7-methylnaphthylβ-1'-7'-methyl-3': 4'-dihydronaphthylethane, b.p. 198—205°/0·2 mm., which yields (Pd-C) α β-di-(1-7methylnaphthyl)ethane, b.p. 220—225°/0·3 mm., m.p. 122·5—123·5°, and thence (AlCl₃) 3: 8-dimethylpicene, m.p. 293—294°. Temp. in this paper are corr.

CV. Hydrogenation (PtO₂) of 7-methoxy-2: 6-dimethylnaphthalene in AcOH at 60—70° gives the dimethyldecahydronaphthalene, converted by Pd-C at 300—320° into 2: $6-C_{10}H_6Me_2$. The triterpene degradation product (V), $C_{10}H_4Me_3$ ·OH, m.p. I53°, gives similarly 1: 2: 8-trimethyldecahydronaphthalene and thence 1: 2: $8-C_{10}H_5Me_3$. The conversion of (V) by Se or H₂-Ni at 300° into 1: 2: $7-C_{10}H_5Me_3$ must thus be due to migration of Me; (V) is thus 7-hydroxy-1: 2: 8-trimethylnaphthalene. Formation of 1: 2: 7- $C_{10}H_5Me_3$ during treatment of pentacyclic terpenes



with Se or Ni is probably due either to a similar interchange of Me and OH or to a pinacolin change

OH or to a pinacolin change $[(VI) \rightarrow (VII)]$. Ring A of pentacyclic terpenes is probably as in either (VI) or (VIII). Other $C_{10}H_8$ derivatives isolated may also (less probably) have been formed by such reactions and four structures are thus possible for ring E. Sixteen

C-skeletons derived from picene are thus possible for triterpenes and all contain only isoprene units; (IX) is favoured. R. S. C.

Mono- and sesqui-terpene series. XI. [Caryophyllenes and related compounds.] E. DEUSSEN (J. pr. Chem., 1936, [ii], 145, 31-59).-Caryophyllenic acid (I) (prep. essentially that of A., 1929, 931) (as chloride) and Br (1 mol.) give the Br1-derivative, converted by aq. Ba(OH₂) into impure hydroxycaryophyllenic acid (Pb and Ba salts), which is oxidised (2% KMnO4, dil. H2SO4, room temp.) to a-hydroxyisovaleric acid. KOH-fusion of pinic acid (prep.; von Baeyer, A., 1896, i, 245) affords AcOH and isovaleric acid; more AcOH is obtained than with (1) (loc. cit.). Evidence (lit.) proving the homogeneity (cf. Ruzicka and Wind, A., 1931, 734) of y-caryophyllene (II) is reviewed. The reactions of (II) are better explained by the Semmler-Deussen (cf. A., 1926, 1252) than the modified structure (Ruzicka, A., 1935, 866). The mechanism previously suggested (A., 1926, 1252) to explain the interconversion of the blue and colourless β-caryophyllene nitrosites is reaffirmed. Contrary to Chapman (A., 1928, 646;

1929, 450), humulene is considered to be identical with optically inactive α -caryophyllene.

[With E. ROTTSAHL.] Crude verbanol [obtained by reduction (H₂, Pt) of crude verbenol] is oxidised (CrO_3 , 75% AcOH) to verbanone, b.p. 93—94°/

CHMe



8–9 mm., α +49.46⁶ (10 cm.) [when purified through the semicarbazone, m.p. 225° (decomp.)], which with Mg isoamyl bromide gives the carbinol (III), b.p. 120–125°/8 mm., de-

hydrated (KHSO₄ at 175°) to an impure hydrocarbon [as (III) with double linking at **], b.p. 135°/17 mm. isoCaryophyllene alcohol (IV) is oxidised (MnO₂,

isoCaryophyllene alcohol (IV) is oxidised (MnO₂, dil. H_2SO_4) to $o - C_6H_4(CO_2H)_2$; definite products are not obtained by the prolonged action of fuming HNO₃ at 60—100°. (IV) and Br (3 mols.) in AcOH-I (trace) give *iso*caryophyllene bromide (V), m.p. 61— 62°; with 25—26 mols. of Br a product (A) (58·25— 59·28% Br) results. Treatment of (A) with 20% EtOH-KOH and 50% NaOH (?) affords products containing less Br; KOH in boiling amyl alcohol removes almost all the Br. Little depression of m.p. is found with (V) and *iso*caryophyllene chloride or with α -caryophyllene nitrosobromide and α bromocaryophyllene nitrosobromide. H. B.

Lignin and related compounds. XX. Methanol lignin and its relation to the so-called "primary lignin" of Friedrich and Diwald. E. G. KING and H. HIBBERT (Canad. J. Res., 1936, 14, B, 12–19; cf. A., 1935, 1373).—Treatment of spruce wood with 5% aq. NaOH at room temp. in N₂ does not affect the properties or OMe content of the lignin extracted by MeOH. Treatment with 17% HCl leads to lignin of lower OMe content. Thus the "primary lignin" of Friedrich *et al.* (B., 1926, 151) is a degradation product. Hot alkali is without effect on methanol or "primary" lignin in absence of air, but in air gives an acid of lower OMe content. Lignin thus contains no ester groups (cf. *loc. cit.*). If dioxan solutions of lignins with 21% of OMe are treated with Et₂O, 80–85% is pptd., but the sol. portion has > 23% of OMe. R. S. C.

Lignin and related compounds. XXI. Insoluble methanol lignin. H. W. MACKINNEY and H. HIBBERT (Canad. J. Res., 1936, 14, B, 55–64).— Spruce wood meal when treated with MeOH dry HCl affords some sol. methanol lignin, $C_{42}H_{32}O_6(OMe)_6(OH)_4$ (A., 1934, 74), and the residue after complete methylation (Me₂SO₄) followed by MeOH-dry HCl at 100° affords insol. methanol lignin (I), $C_{42}H_{32}O_6(OMe)_9$, (OMe 31·1%), which cannot be further methylated or acetylated. (1) with a large excess of 40–59% HI at 100° is partly demethylated. The product (II) (OMe 4·6%) with CH_2N_2 in Et₂O gains 4 OMe (III) [showing that 4 OH are acidic; the original lignin must contain three of these as OMe as only one is phenolic in character (A. 1934, 74)], and after acetylation (Ac₂O-C₅H₅N) is converted by Me₂SO₄ into a (*OMe*)₅-derivative (OMe 18·5%), which indicates that demethylation of (1) is accompanied by secondary intramol. changes involving loss of H_2O from 4 OH groups. p- C_6H_4Me ·SO₂Cl converts (III) into a mono-p-toluenesulphonate (OMe 12·3%). (II) with Ac₂O- C_5H_5N affords a Ac_4 derivative. The basis of the lignin structure is probably a group of heterocyclic rings containing O. J. L. D.

Acidity of pine nitrolignin. W. RUZICKA and K. KURSCHNER (J. pr. Chem., 1936, [ii], 145, 18— 22).—The acidities of the nitrolignin (I) (obtained by nitration of the technical lignin in EtOH-suspension) and its Ac derivative (II) are determined by Kolthoff's iodometric method (A., 1926, 813); 89·14 and 90·7%, respectively, of the H of the CO₂H are calc. to have reacted. The results afford a further proof that (I) contains NO₂ and CO₂H in the ratio 1:1. The "iodometric acid vals." (cf. B., 1930, 1118) of (I) and (II) are determined under various conditions; hydrolysis is best accomplished with dil. aq. EtOH-NaOH at 100° (bath). H. B.

Action of carbon disulphide and aqueous potassium hydroxide on alkali lignin. R. L. GLOVER and J. W. BAIN (Canad. J. Res., 1936, 14, B, 65-75).—Alkali lignin (A., 1926, 209) shaken in dil. KOH with CS_2 is converted into a lignin-like material containing chemically bound S. An interpretation of the results, involving the formation of a xanthate as the main reaction, is given. J. L. D.

Constituents of natural phenolic resins. IV. Synthesis of dehydroanhydropicropodophyllin. R. D. HAWORTH and J. RICHARDSON (J.C.S., 1936, 348-352).-Safrole oxide (I) and Et sodiomalonate give Et β -(3: 4-methylenedioxybenzyl)butyrolactone- α carboxylate, b.p. 210-215°/0.5 mm., which with Na and 3:4:5-trimethoxybenzoyl chloride affords Et $\alpha - (3:4:5 - trimethoxybenzoyl) - \beta - (3:4 - methylene$ dioxybenzyl)butyrolactone-a-carboxylate, m.p. 156-157°. (I) and Et sodioacetoacetate form α -acetyl- β -(3:4methylenedioxybenzyl)butyrolactone, m.p. $91-92^{\circ}$, which is hydrolysed with NaOH to Me γ -hydroxyβ-(3: 4-methylenedioxybenzyl) propyl ketone, m.p. 79-80°, or with MeOH-KOH to β -(3:4-methylenedioxy-benzyl)butyrolactone, b.p. 183-186°/0.5 mm., and with Na and 3:4:5-trimethoxybenzoyl chloride gives α -(3:4:5-trimethoxybenzoyl)- β -(3:4-methylenedioxybenzyl)butyrolactone, m.p. 110-111°. This lactone with McOH-HCl yields the lactone of 1-hydroxy-6:7-methylenedioxy-1-(3':4':5'-trimethoxyphenyl)-3hydroxymethyl - 1:2:3:4-tetrahydronaphthalene - 2carboxylic acid, m.p. 138-139°, dehydrated (KHSO4) to the lactone of 6:7-methylenedioxy-1-(3':4':5'trimethoxyphenyl)-3-hydroxymethyl-3: 4-dihydronaphthalene-2-carboxylic acid, m.p. 248-249°, which with Pd. or Pb(OAc)₄ in AcOH gives the lactone of 6 : 7-methylenedioxy-1-(3': 4': 5'-trimethoxyphenyl)-3-hydroxymethylnaphthalene-2-carboxylic acid, identical with dehydroanhydropicropodophyllin. F. R. S.

Identity of noroxylin and baicalein. R. C. SHAH, C. R. MEHTA, and T. S. WHEELEB (Current Sci., 1936, 4, 587).—A mixed m.p. indicates the identity. F. N. W.

Distinction between strophanthins "g" and "k" on the basis of microchemical identification of the sugars obtained on fission. R. FISCHER and W. PAULUS (Sci. pharm., 1935, 6, 32– 33; Chem. Zentr., 1935, ii, 722).—Strophanthin-g gives rhamnosephenylosazone and strophanthin-k gives glucosephenylosazone. H. N. R.

Columbin. II. Bitter principles of Colombo root. II. F. WESSELY, W. ISEMANN, G. SINGER, and K. SCHÖNOL (Annalen, 1936, 522, 41–47; cf. A., 1935, 1432).—A reply to Feist *et al.* (this vol., 89). The methods of isolation and determination of the purity of columbin are described. H. B.

Constitution of aloins. E. LEGER (Bull. Soc. chim., 1936, [v], 3, 435-439; cf. A., 1931, 490).--Structures proposed by Rosenthaler (Pharm. Acta Helv., 1929, 4, 128), Hauser (A., 1932, 370), Cahn and Simonsen (*ibid.*, 1252), and MacDonnell and Gardner (A., 1934, 774) for barbaloin and aloemodin are criticised. H. B.

Erythrodiol. J. ZIMMERMANN (Helv. Chim. Acta, 1936, 19, 247–253).—Erythrodiol stearate, m.p. 125° (corr.) [isolation from Erythroxylon novogranatense (A., 1932, 1178) described], with CrO₃ gives a compound (oxime, $C_{48}H_{84}O_3N$, m.p. 132°) and thence oleanolic acid. The diol, m.p. 232° (corr.) [diformate, m.p. 195°, very readily formed; diacetate, m.p. 232° (corr.); formate stearate, m.p. 65–66°], with CrO₃ gives a ketoaldehyde, $C_{30}H_{46}O_2$ (oxime, m.p. 275°; dioxime, m.p. 263°), and thence oleanonic acid, m.p. 231°; although it gives a colour in C(NO₂)₄, it is not hydrogenated under conditions effective for betulin and thus differs therefrom in the position of the ethylenic linking and of the •CH₂•OH. R. S. C.

Constituents of Dicranopterus glauca, Nakai. I. New catechutannic substance, "dicranin." S. AKAI and K. NAKAZAWA (J. Pharm. Soc. Japan, 1933, 53, 891—903).—Dicranin, $C_{44}H_{40}O_{18}$ (Ac, Bz, Me_6 , and Me_{10} derivatives), containing 10 free OH, is extracted from the dried roots. KOH fusion affords p-OH·C₆H₄·CO₂H and phloroglucinol.

CH. ABS. (r)

Fukugetin, the colouring matter of the bark of "Fukugi." III. J. SHINODA and S. UEDA (J. Pharm. Soc. Japan, 1933, 53, 921—931).—Garcinol (I) $(Ac_3$ derivative, m.p. 202°; Bz_3 derivative, m.p. 224°; Et_3 ether, m.p. 168.5°; dihydro-compound, m.p. 242— 243°; dihydrotrimethyl ether, m.p. 95°) is now shown to be $C_{16}H_{12}O_5$. Alkali fusion of (I) yields phloroglucinol (III), while oxidation of its Me derivative (II) affords p-OMe·C₆H₄·CO₂H; (I) contains 3 phenolic OH, one double linking, and a lactone ring. Possible formulæ are discussed. Alkali fusion of fukugetin (IV) affords (I), AcOH, 3: 4-dihydroxyacetophenone, and (III); possible structures are discussed. Garcinin (Murakami, A., 1933, 398) is the Ac derivative, not an isomeride of (IV). (II), with EtOH–NaOH, gives a substance, $C_{19}H_{18}O_6Me_2$, m.p. 146°, which, on reduction, yields a substance, $C_{19}H_{20}O_6Me_2$, m.p. 117°.

CH. ABS. (r) Pigmentation of the ripening gourd blossom. II.—See this vol., 651.

Constituents of Hydrangea paniculata. Hydragin.—See this vol., 651.

Condensation reactions of furfuraldehyde and its derivatives. N. O. CALLOWAY (Iowa State Coll. J. Sci., 1934, 9, 141—143).—The halides of elements in groups III, IV, and V, and org. compounds containing active halogen, resinify furfuraldehyde. For introducing alkyl groups the order of efficiency of catalysts is $AlCl_3 > FeCl_3 > SnCl_4$; for acylation the order is $SnCl_4 > FeCl_3 > AlCl_3 > TiCl_4$. The 5-alkyl-2-furoic acids have marked germicidal activity.

CH. ABS. (r) Synthesis of carlina oxide. R. PAUL (Compt. rend., 1936, 202, 854—856; cf. A., 1933, 1055).— European del Blocht Mergine 2 hadreen

Furfuraldehyde and Ch₂Ph·CH₂·MgBr give 2-hydroxya-phenyl- γ -2-furylpropane, b.p. 165—167°/10 mm., which, distilled in N₂, gives a-phenyl- γ -2-furyl- Δ^{β} propene, b.p. 138—140°/10 mm. The dibromide of this with KOH-EtOH in N₂ gives a little a-benzyl-3-2-furylacetylene, b.p. 164—166°/20 mm., which is probably identical with carlina oxide. J. N. A.

Occurrence of furan derivatives in volatile oils. III. β - and γ -Clausenan. B. S. Rao and K. S. SUBRAMANIAM (Proc. Indian Acad. Sci., 1936, 3. A, 31-37; cf. this vol., 429).-The leaves from Clausena Willdenovii, W. and A., collected in winter, yield oils closely resembling in physical properties those collected previously (A., 1935, 134) in a different place, but differed in that the first fraction consisted mainly of y- (I), C10H12O, b.p. 103-104°/50 mm., and little β-clausenan, b.p. 96-97°/50 mm. (Ac derivative, b.p. 105°/32 mm.), which are readily separated since (I) does not form a salt with ferro- and ferri-cyanic acid. (I) is unchanged by Ac, O etc., does not give a ketone with $KMnO_4$, and is reduced by Na-EtOH to a H_4 derivative, b.p. 105°/100 mm. Physical data are R. S. C. given.

Pyrone series. III. Influence of the phenyl group in the Kostanecki reaction. I. M. HEIL-BRON, D. H. HEY, and B. LYTHGOE (J.C.S., 1936, 295-300).-CH_Ph·CO_Na and PhOAc with 2-hydroxy-4methoxyacetophenone give 7-methoxy-3-phenyl-4methylcoumarin, hydrolysed (NaOH-MeOH) to 2:4dimethoxy-a-phenyl-B-methylcinnamic acid, m.p. 153.5°. 2:4-Dimethoxyacetophenone, CH₂Ph·CO₂Et, and Na yield 2: 4-dimethoxy-w-phenylacetylacetophenone, m.p. 91°, hydrolysed to 7-methoxy-2-benzylchromone, m.p. 192°. CH₂Ph·CO₂Na and PhOAc with 2-hydroxy-4-methoxypropiophenone afford 7-methoxy-2-phenyl-4-ethylcoumarin (I), m.p. 115° [hydrolysed (NaOH-McOH) to 2: 4-dimethoxy- α -phenyl- β -ethylcinnamic acid, m.p. 137°], and 7-methoxy-2-benzyl-3-methylchromone, m.p. 102.5°. Resorcinol and a-propionylphenylacetonitrile with H₂SO₄ yield 7-hydroxy-3phenyl-4-ethylcoumarin, methylated to (I). 2-Hydroxy-4-methoxyphenyl benzyl ketone, NaOAc, and Ac₂O afford 7-methoxy-3-phenyi-2-methylchromone (7-methoxy-3': 4'-methylenedioxy-3-phenyl-2-styrylchromone, m.p. 246°) and no coumarin, whilst the ketone and NaOPr and Pr2O give 7-methoxy-3-phenyl-2-ethylchromone, m.p. 119.5°. NaOPr, Pr2O, and 2-hydroxy-4-methoxyacetophenone yield 7-methoxy-3:4-dimethylcoumarin and 7-methoxy-2-ethylchromone; with EtOPr and Na the ketone forms 5-methoxy-2-propionoacetylphenol, m.p. 83.5° (cf. Heilbron et al., A., 1934, 1361). F. R. S.

Dipole moments of two oxonium salts. See this vol., 550.

Di-p-tolylene oxide of Sabatier. I. Y. SUGII and T. SENGOKU (J. Pharm. Soc. Japan, 1933, 53, 951—952).—The "di-p-tolylene oxide," m.p. 166°, of Sabatier and Mailhe (I) (A., 1910, i, 669) gives on oxidation a dicarboxylic acid, $C_{14}H_8O_5$, m.p. > 300° (Me_2 ester, m.p. 257°), whereas the di-p-tolylene oxide, m.p. 64°, of Sugii gives dibenzfuran-3 : 6-dicarboxylic acid, m.p. > 300° (Me_2 ester, m.p. 167°), independently synthesised from 3 : 6-dicacetyldibenzfuran. (I), therefore, has not the supposed structure. CH. ABS. (r)

Sabatier's products of catalytic oxidation of cresols by thorium oxide at high temperature. T. SENGOKU (J. Pharm. Soc. Japan, 1933, 53, 962-978; cf. preceding abstract) .- Oxidation of o-cresol with PbO gives a so-called "xanthone homologue" (I), m.p. 162-163°, which is oxidised (CrO₃-AcOH) to xanthone (II), and reduced (Na-EtOH) to xanthen (III); (I) is probably a mixture of (II) and (III). With PbO, m-cresol yields Sabatier's "di-m-tolylene oxide " (IV), m.p. 200° (A., 1910, i, 669), whilst p-cresol furnishes his "di-p-tolylene oxide" (V), m.p. 166°. Distillation of o-cresol with ThO₂ yields (II) and (III); hence Sabatier's "di-o-tolylene oxide " is a mixture of (II) and (III). p-Cresol with ThO₂ yields (V), which is oxidised $(K_2Cr_2O_7-AcOH)$ to a compound (VI), m.p. 143°, reduced (Na-EtOH) to (V). 2:5-Cresotic acid yields 2:7-dimethylxanthone, m.p. 143°, identical with (VI), reduced to 2:7dimethylxanthen, m.p. 166°, identical with (V). Oxidation (CrO₃-AcOH) of (V) or (VI) yields xanthone-2:7-dicarboxylic acid, m.p. > 300° (Me₂ ester, m.p. 257°). m-Cresol and ThO₂ afford 3:6-dimethyl-CH. ABS. (r)xanthen, m.p. 200°.

Steric configuration and the condition of some ring compounds.—See this vol., 550.

Thiophen series. XXX. Derivatives of 2:2'dithienyl and $\alpha\alpha\alpha$ -tetrathienyl. W. STEINKOPF and W. KÖHLER (Annalen, 1936, 522, 17—27).—The Grignard reagent (prep.: A., 1934, 1108) from 2:3:4tribromothiophen with anhyd. CuCl₂ gives 3:4:3':4'tetrabromo-2:2'-dithienyl, m.p. 110°. The tetrabromo-2:2'-dithienyl, m.p. 139—140°, of Auwers and Bredt (A., 1894, i, 444) is probably the 3:5:3':5'-derivative since it is converted by short treatment with H_2SO_4, H_2O into a hexabromo- $\alpha\alpha\alpha$ -tetrathienyl (I) (probably A), m.p. 256—258° (accompanied by a trace of



Br_s-derivative), and by 33% oleum into an octabromo- $\alpha\alpha\alpha$ -tetrathienyl (II), m.p. 297-299°. The formation of (II) probably involves a pentabromodithienyl, *i.e.*, a Jacobsen rearrangement. (1) and (II) are brominated to decabromo- $\alpha\alpha\alpha$ -tetrathienyl, m.p. 324-326°, also formed from hexabromo-2: 2'dithienyl and oleum. 2:2'-Dithienyl (III), HgCl₂, and NaOAc in aq. EtOH give the 5:5'-(ClHq)₂derivative, which is converted by dil. HCl into (III), by I-KI into 5:5'-di-iodo-2:2'-dithienyl, m.p. 164° [also obtained from (III), I, and yellow HgO in C_6H_6], and by NaI (4 mols.) in C_5H_5N into Hg_2 5:5:5':5'-di-(2:2'-dithienylene) (IV). (III) and HgO in AcOH afford the (OAc·Hg)₆-derivative, convertible into the (ClHg)₆-derivative, decomp. when heated, and thence into hexaiodo-2:2'-dithienyl, m.p. $284-285^\circ$. (III) and fuming HNO₃ in Ac₂O at 0-5° give 5-nitro-2:2'-dithienyl, m.p. 109°, which with Br affords hexabromo-2:2'-dithienyl, m.p. 257°. The hexabromodithienyl, m.p. 125°, of A., 1934, 1108 is wrongly described and should be deleted from the lit. Reaction between thiophen and pure CNBr does not always occur (cf. A., 1923, i, 124); a trace of Br is a catalyst. A Grignard reagent could not be prepared from 2:3-dibromothiophen. 2-Thienoyl chloride, 3:4-dibromothiophen, and AlCl₃ in light petroleum give 3:4-dibromo-2:2'-dithienyl ketone, m.p. $110-111^\circ$, brominated to the $3:4:5:4':5'-Br_5$ derivative, m.p. 143-144°. 5-Bromo-, b.p. 238-240°, m.p. 37-38°, 3:4-dibromo-, m.p. 84-85°, and 3:4:5-tribromo-, m.p. 83-85°, -2-thienoyl chlorides do not undergo the Friedel-Crafts reaction. Me 3:4:5-tribromo-2-thienoate has m.p. 113-116°.

H. B. Electrolytic reduction of N-methyl- and Nethyl-succinimide. B. SAKURAI (Bull. Chem. Soc. Japan, 1936, 11, 41–43).—The electrolytic reduction of N-methylsuccinimide can be carried beyond Nmethylpyrrolidone (Lukes, A., 1930, 1296) by using a Zn-Hg cathode in 50% H₂SO₄ at c.d. 100—125 amp. per sq. dm., at $< 30^{\circ}$. N-Ethylsuccinimide under the same conditions gives N-ethylpyrrolidine, and when a Pb cathode in 10% H₂SO₄ at 3 amp. per sq. dm. is used, gives N-ethylpyrrolidone. E. W. W.

Tetra-anisylpyrrole. F. E. KING and G. D. PATERSON (J.C.S., 1936, 400).—Deoxyanisoin (phenylhydrazone, m.p. 79°), prepared by reducing $(SnCl_2-$ HCl) anisoin, with N_2H_4 , H_2SO_4 and NaOAc gives anisyl p-methoxybenzyl ketazine, m.p. 155°, which is cyclised (HCl) to tetra-anisylpyrrole, m.p. 184°, demethylated to tetra-p-hydroxyphenylpyrrole (Ac derivative, m.p. 195°). F. R. S.

Fused "onium" salts as acids. Reactions in fused pyridinium hydrochloride.—See this vol., 574.

Neutral substances formed in Tschitschibabin's synthesis of β -collidine. W. HUNTENBURG (J. pr. Chem., 1936, [ii], 145, 23—30).—The following compounds are shown to be present in the neutral fraction, b.p. 60°/760 mm. to 100°/12 mm., formed from CHMe:CH·CHO (I) and NH₃ in presence of Al₂O₃ at 390° (cf. Tschitschibabin and Oparina, A., 1927, 1086) : C₆H₆, PhEt, o- and p-C₆H₄Me₂, CHPh:CH₂, C₁₀H₈, MeCN, PhCN, and o- and p-C₆H₄Me₂CN. The probable modes of formation from (I) or its decomp. product MeCHO are discussed. Generally, the C₆H₆ derivatives arise by aldol and similar condensations, whilst RCN result by dehydrogenation of CHR:NH. The main gaseous product is butadiene (probably formed by hydrogenation of *cyclo*butadiene).

H. B. s-Di-(a-picolyl)thiocarbamide. K. S. TOPT-SCHIEV (Compt. rend. Acad. Sci. U.R.S.S., 1936, 1, 77–78; cf. A., 1934, 1228).—Prolonged interaction of 6-amino- α -picoline with boiling CS₂ containing a little S affords s-di-(6-methyl-2-pyridyl)thiocarbamide, m.p. 158° (hydrochloride, m.p. 206°). J. L. D.

Colour reaction of isatin with pyridine and acetic anhydride. W. GRASSMANN and K. ARNIM (Annalen, 1936, 522, 66-74).—Isatin (I), 1-acetylisatin, and oxindolylideneacetic acid.

NH $\langle C_0H_4 \rangle$ C:CH·CO₂H, with C₅H₅N and Ac₂O give a compound (II), C₃₀H₂₅O₇N₃, red-violet with metallic reflex, which contains 1 mol. of C₅H₅N (eliminated by distillation with conc. NaOH) and 3 Ac groups; 1-methylisatin similarly affords a compound, C₂₈H₂₅O₅N₃. Tetrahydroisoquinoline, (I), and Ac₂O give an analogous compound (III), C₃₄H₃₁O₇N₃, converted by C₅H₅N-Ac₂O into (II). Di-(1-acetyloxindolylidene)acetone (IV), (NAc $\langle C_0H_4 \rangle$ C:CH·)₂CO

[tetrabromide; p-nitrophenylhydrazone, obtained from (II), (III), or (IV) and p-NO₂· \dot{C}_6H_4 ·NH·NH₂ in AcOH], prepared from (I), Ac₂O, and NaOAc, is spectroscopically identical with (II), which is, therefore, a compound of 1 mol. each of (IV), C₅H₅N, and AcOH. Reduction (Zn dust, AcOH; H₂, PtO₂, AcOH) of (II) or (IV) gives di-(1-acetyloxindolyl)acetone, m.p. 245°. H. B.

Polyhalogenated ketones. II. Indole. G. SANNA (Rend. Seminar. Fac. Sci. R. Univ. Cagliari, 1934, 4, 28—33; Chem. Zentr., 1935, ii, 367; cf. A., 1931, 630).—CHCl₂·COCl and Mg-indole (I) afford 1:3-bisdichloroacetylindole and 3-dichloroacetylindole, m.p. 202°, yielding indole-3-carboxylic acid (II) on KOH fusion and 3-dibromoacetylindole with aq. KBr; treatment with dil. KOH affords indolyl-3-glycollic acid, m.p. 174°, whilst aq. NH₃ yields 3-carbamylindole, m.p. 201°. Similarly, CCl₃·COCl and (I) yield 1:3bistrichloroacetylindole, m.p. 175°, and 3-trichloroacetylindole, m.p. 228°. The latter affords (II) with KOH, whilst, with K₂CO₃, it yields some indolyl-3-glyoxylic acid; it is unchanged by KBr or KI. H. N. R.

Synthesis of δ -3-indolylvaleric acid. Effects of indole acids on plants. R. H. F. MANSKE and L. C. LEITCH (Canad. J. Res., 1936, 14, B, 1-5).-The following are plant hormones : 3-indolylacetic > γ -3indolylbutyric (I) > β -3-indolylpropionic > δ -3indolylvaleric (II) $\gg \beta$ -3-(4-methylindolyl)propionic (II) > indylene-1: 3-diacetic acid. Root growth, particularly from stems, is increased most by (I). Et cycloheptanone-2-carboxylate (from suberone, Et₂C₂O₄, and NaOEt), b.p. 135-138°/22 mm., and PhN₂Cl in 20% KOH give a phenylhydrazone, which with hot EtOH-H₂SO₄ yields a small amount of a substance, $C_{29}H_{34}O_{-}N_{2}$, m.p. 170° (with $N_{2}H_{4}$ -MeOH gives a substance, $C_{25}H_{30}N_{2}$, m.p. 146°), and a product, which with hot KOH-aq. EtOH affords a little pimelic acid and much 8-3-(2-carboxyindolyl)valeric acid, m.p. 204° (decomp.), decarboxylated at 210° to (II), m.p. 105° (Me ester, b.p. 210°/2 mm., m.p. 57°). In the prep. of the indolyl-butyric and -propionic acids adipic and glutaric acid, respectively, are also obtained. (II), m.p. 137°, is obtained similarly, but in poor yield, from Et cyclopentanonecarboxylate and p-C₆H₄Me·N₂Cl. M.p. are corr. R. S. C.

αβ-Diarylethylamines and their transformation into tetrahydroisoquinolines. II. B. REI-CHERT and W. HOFFMANN (Arch. Pharm., 1936, 274, 217-221; cf. this vol., 483).-3:4:5-C₆H₂Me₃·CHO, CH₂Ph·NO₂, and a little NH₂Me in EtOH give α-nitroα-phenyl-β-3:4:5-trimethoxyphenylethylene (α-nitro-3':4':5'-trimethoxystilbene) (I), m.p. 147°, and a little αγ-dinitro - αγ - diphenyl-β-3:4:5-trimethoxyphenylpropane, m.p. about 217° (decomp.). (I) is hydrogenated (Pd-C) in C₅H₅N to 3':4':5'-trimethoxydeoxybenzoinoxime, m.p. 83-84°, reduced (Na-Hg in EtOH) to α-phenyl-β-3:4:5-trimethoxyphenylethylamine, b.p. about 240°/14·5 mm. (hydrochloride, m.p. 224°), converted by CH₂O and HCl into 6:7:8-trimethoxy-3-phenyl-1:2:3:4-tetrahydroisoquinoline, m.p. about 56-58° [hydrochloride, m.p. 258-261° (decomp.); NO-derivative, m.p. 127°]. R. S. C.

Ammonium salts containing the cetyl radical. E. MACOVSKI (Bull. Soc. chim., 1936, [v], 3, 498-500). —Trimethylcetylammonium iodide, m.p. 247° (lit. 222°), and chloride, m.p. 240°, cetyl-pyridinium iodide, m.p. 101°, and chloride, m.p. 110°, -quinolinium iodide, m.p. 99°, and chloride, m.p. 114°, and -isoquinolinium iodide, m.p. 75°, and chloride, m.p. 95°, are described. H. B.

Bis-8-hydroxyquinoline inner complex salt of bivalent silver. Y. NAKATSUKA (Bull. Chem. Soc. Japan, 1936, **11**, 45–48).—When 8-hydroxyquinoline in EtOH is added to AgOAc in hot instead of cold H_2O , the product is not the yellow complex,

 $[(C_9H_6N\cdot O)Ag(C_9H_6N\cdot OH)]$ of Ag', but the green complex $[(C_9H_6N\cdot O)_2Ag]$, of Ag''; both crystallise $+C_5H_5N$. The complex, $[(C_9H_6N\cdot O)_2Cu]$ is now obtained $+2H_2O$, $+0.5H_2O$, and $+C_5H_5N$.

E. W. W.

Thalleioquinine reaction. II. (SIGNA.) L. MONTI and (SIGNA.) V. CIRELLI (Gazzetta, 1936, 66, 38—41).—The authors' views (A., 1935, 500) are confirmed. Aminothymol condenses with $CH_2Ac\cdot CO_2Et$ to form *El* β -(4-*hydroxy-2-methyl-5-isopropylanilino)crolonate*, m.p. 102—104°, which when heated in CO_2 with paraffin oil at 320° gives 4 : 6-*dihydroxy-2* : 8-*dimethyl-5-isopropylquinoline*, m.p. \neq 300° [*picrate*, m.p. 216—218°; *platinichloride*, m.p. 266—268° (both decomp.)]. This, in which position 5 is not free, does not give the thalleioquinine reaction. 8-Hydroxy-5 methylquinoline also fails to give the similar reaction, which is positive with 8-hydroxyquinoline (cf. *loc. cil.*). E. W. W.

Benzoylation of quinaldine oxide. M. HENZE (Ber., 1936, 69, [B], 534-536).-2-Methylquinoline 1-oxide appears to react in the hydrate form towards NaOH and BzCl, giving an ester which is isomerised to the ψ -base, which loses H₂O with formation of 1benzoyloxy-2-methylene-1: 2-dihydroquinoline (I), m.p. 52° (picrate, m.p. 164°; platinichloride, m.p. 120°). (I) is transformed by HCl into BzOH and 1-hydroxy-2methylene-1: 2-dihydroquinoline, m.p. 66° (picrate, m.p. 144°), which strongly reduces Fehling's and Ag solution, gives a red colour with FeCl₃ in EtOH, and couples with p-SO₃H·C₆H₄·N₅Cl. H. W.

Acridine compounds and their antimalarial action. II. Compounds with cyano- and methylthiol groups. O. J. MAGIDSON and A. I.

TRAVIN (Ber., 1936, 69, [B], 537-544; cf. this vol., 484).-Replacement of the 7-Cl in 7-chloro-2-methoxyacridine derivatives by CN does not introduce sp. toxic properties, CN behaving biologically as a stable org. nitrile. Replacement of 2-OMe by 2-SMe has a negative influence on the antimalarial action and considerably increases the toxic effect. 3-Chloro-4methylbenzonitrile suspended in 70% H₂SO₄ at 55-70° is oxidised by $K_2Cr_2O_7$ to 2-chloro-4-cyanobenzoic acid (I), m.p. 170–171°, the relatively poor yield being due to enclosure of the nitrile by the insol. acid so that the product contains unchanged nitrile and also 3-chloro-p-toluamide; on one occasion when agitation was inefficient, 2-chloro-p-carbamidobenzoic acid, m.p. 220° (K salt; hydrolysed to chloroterephthalic acid), was produced. (I), p-OMe C₆H₄·NH₂, K₂CO₃, and mol. Cu in boiling isoamyl alcohol afford 4-cyano-2-pmethoxyanilinobenzoic acid, m.p. 195-196° (K salt), transformed by boiling POCL, into 5-chloro-7-cyano-2methoxyacridine (II), m.p. 228-230°. Condensation of (II) with S-amino-a-diethylaminopentane in PhOH at 120-130° gives 7-cyano-5-8-diethylamino-a-methylbutylamino-2-methoxyacridine (dihydrochloride, m.p. 240-245°; oxalate, decomp. 180-185°). 7-Cyano-5-y-diethylamino-propylamino-2-methoxyacridine, m.p. 85-87° [dihydrochloride, m.p. 235-245° (decomp.)], and -\beta-hydroxypropylamino-2-methoxyacridine [dihydrochloride $(+2H_2O)$, m.p. $220-225^{\circ}$ (decomp.)] are obtained similarly. (II), PhOH, and $NH_3-96\%$ EtOH afford 7-cyano-2-methoxyacridone, decomp. 370-375°, whereas in abs. EtOH 7-cyano-5-amino-2-methoxyacridine (hydrochloride) is produced. (II) is hydrolysed by conc. HCl at 140° to 2-methoxyacridone-7-carboxylic acid, decomp. 380-400° (Na salt). 2:4-C₆H₃Cl₂·CO₂H, thio-p-anisidine, K₂CO₃, and mol. Cu in boiling isoamyl alcohol give 4-chloro-2-p-methylthiolphenylaminobenzoic acid, m.p. 194-195°, converted by boiling POCl₃ into 5: 7-dichloro-2-methylthiolacridine (III), m.p. 182-183° (sulphate), from which 7-chloro-5 - 8- diethylamino - a - methylbutylamino - 2 - methylthiolacridine [dihydrochloride (+4H₂O), m.p. 210°] and 7 - chloro - 5 - y - diethylaminopropylamino - 2 - methylthiolacridine (dihydrochloride) are derived. (III) and boiling dil. HCl yield 7-chloro-2-methylthiolacridone, m.p. 335-337°. H. W.

[Acridine compounds and their antimalarial action.] H. MAUSS and F. MIETZSCH (Ber., 1936, 69, [B], 641).—A claim for priority against Magidson et al. (preceding abstract). H. W.

Synthesis of compounds with hypnotic properties. I. Alkoxymethylhydantoins. N. E. RIGLER [with H. R. HENZE] (J. Amer. Chem. Soc., 1936, 58, 474—477).—OAlk·CH₂·CN [from OAlk·CH₂Cl and Cu₂(CN)₂ in C₆H₆] and MgRBr give (cf. A., 1934, 871) OAlk·CH₂·COR (I), which with NH₄CN (Herbst and Johnson, A., 1932, 862) or (NH₄)₂SO₄, KCN, and aq. NH₃ in MeOH (cf. Zelinsky and Stadnikoff, A., 1906, i, 425) afford OAlk·CH₂·CR(CN)·NH₂. These with KNCO in 70% AcOH give OAlk·CH₂·CR(CN)·NH·CO·NH₂, converted by 20% HCl into 5-alkyl- (or aryl-)5-alkoxymethyl-hydantoins (II). Some of the (II) are also prepared directly from (I) by the method of Bucherer *et al.* (A. 1934 1231). The following are described :

ethoxy-, b.p. 134-135°/755 mm., and isoamyloxy-, b.p. 186-187°/753 mm., -acetonitriles; isoamyl methoxymethyl, b.p. 185-186°/752 mm., Et, b.p. 146-147°/752 mm., sec.-Bu, b.p. 172-173°/743 mm., isoamyl, b.p. 105-106°/35 mm., and Ph, b.p. 120-122°/15 mm., ethoxymethyl, and Et isoamyloxymethyl, b.p. 196-197°/752 mm., ketones; a-amino-a-methoxyand -a-ethoxy-methylisoheptonitrile (Bz derivatives, m.p. 103° and 66°, respectively; corresponding carbamides, m.p. 127-128° and 126.5°, respectively, and phenylcarbamides, m.p. 151-151.6° and 138°, respectively); α - amino - β - methyl - α - ethoxymethyl valeronitrile (carbamide, m.p. 113.5-114.5°, and phenylcarbamide, m.p. 119-119.5°); a-amino-aethoxy- and -a-isoamyloxy-methylbutyronitriles (carbamides, oils); a-amino-\beta-ethoxy-a-phenylpropionitrile (Ac, m. p. 164-165°, and Bz, m.p. 164°, derivatives; carbamide, m.p. 167°; phenylcarbamide, m.p. 167°); 5-isoamyl-5-methoxymethyl-, m.p. 195-196°, 5-ethyl-5-isoamyloxymethyl- (III), m.p. 107– 108°, and 5-ethyl-, m.p. 147–148°, 5-sec.-butyl-, m.p. 164·5–165°, 5-isoamyl-, m.p. 179–180°, and 5-phenyl- (IV), m.p. 191.5°, -5-ethoxymethyl-hydantoins. All b.p. and m.p. are corr. (III) and (IV) (as Na salts) H. B. are not satisfactory soporifics.

Oxidation of 1-phenyl-3-methyl-5-pyrazolone. G. PERRONCITO (Gazzetta, 1935, 65, 1254—1258).— This is oxidised by H_3AsO_4 in AcOH, or KMnO₄ in HCl, to 4-benzeneazo-1-phenyl-3-methyl-5-pyrazolone (cf. A., 1935, 1380). With H_2O_2 in NaOH, AcCO₂H phenylhydrazone is formed; with dry H_3AsO_4 at 190°, a substance, m.p. 180°, is also formed, with a product, m.p. > 300°, and 4-anilo-1-phenyl-3-methyl-5-pyrazolone, m.p. 198° (obtainable from the pyrazolone and PhNO in C_6H_6), by oxidation with PhNO₂. E. W. W.

Abnormal action of nitrons acid on hydrazides of organic acids. (SIGNA.) M. FRERI (Atti R. Accad. Lincei, 1935, [vi], 22, 264–267; cf. A., 1934, 1372).—Citracondihydrazide (I) with NaNO₂ and AcOH gives, with some azide, m.p. 114° (decomp.), 3:6-diketo-4-methyl-1:2:3:4-tetrahydropyrazine, m.p. 277° (synthesised from N_2H_4 , H_2O and Et_2 citraconate); (I) in conc. aq. solution with $NaNO_2$ and HCl yields 4-oximino-3-methyl-1:2:5-pyrazolone (II) (cf. A., 1904, i, 533). This with O3 yields 4-nitro-3-methyl-1: 2: 5-pyrazolone (III), m.p. 276° (NH_2Ph and $NHPh\cdot NH_2$ salts), which with CH₂N₂ yields 4-nitro-1: 3: 4-trimethylpyrazolone, m.p. 127°, also obtained by action of HNO₃-H₂SO₄ on trimethyl-pyrazolone. (II) [or (III)] is reduced (SnCl₂) to 4-amino-3-methylpyrazolone hydrochloride (IV), m.p. 225°, which condenses with aldehydes to form Schiff's bases : 4-(p-nitrobenzylidene-, m.p. 257° (decomp.), 4-(anisylidene-, m.p. 202°, and 4-(piperonylidene-, m.p. 245°, -amino)-3-methylpyrazolone. When (IV) is neutralised, it condenses to form the compound Me·C₃H₂ON₂·N:C₃HON₂·Me, which is reduced (SnCl₂) 4:4'-bis-(3-methylpyrazolyl)ammonium chloride, to E. W. W. m.p. 247°.

Indoles and isatogens. XXII. Benzodipyrroles. III. 2:6-Dimethyl-*lin-m*-benzodipyrrole. P. RUGGLI and O. STRAUB [with O. SCHMID] (Helv. Chim. Acta, 1936, 19, 326-330; cf. A., 1935, 759).—Hydrogenation (Ni or Pd-black) of 4:6dinitro-1:3-diacetylbenzene in EtOAc-EtOH-H₂O gives slowly poor yields of 2:6-dimethyl-lin-mbenzodipyrrole [2:2'-dimethylpyrrolo-4':5'-5:6-indole] (I), m.p. 232°, sublimes at 310-320°/vac., stable to short heating in Ac₂O, and 2:6-dimethyldihydrolin-m-benzodipyrrole [2:2-dimethyl- Δ^4 -pyrrolino-4':5'-5:6-indole] (II) (Ac derivative, m.p. 279°).



Ř. S. C. Determination of active hydrogen atoms in organic compounds by H-D isotope analysis. H. ERLENMEYER, A. EPPRECHT, H. LOBECK, and H. GÄRTNER (Helv. Chim. Acta, 1936, 19, 354—357).— Recrystallisation of BZOH from D_2O-H_2O (H : D = 1.007) gives a mixture, m.p. 118.5°, of BZOH : BZOD = 1.117. Crystallisation of barbituric acid from H_2O-D_2O gives a mixture, but from 99.6% D_2O nearly pure tetradeuterobarbituric acid. Phenacetin is converted by crystallisation from H_2O-D_2O into nearly pure OEt C_6H_4 ·NDAc. R. S. C.

Derivatives of piperazine. D. E. ADELSON and C. B. POLLARD (J. Amer. Chem. Soc., 1936, 58, 532).—Piperazinium di(dichloroacetate), m.p. 181° (corr.), and di-(o-acetoxybenzoate), m.p. 112—113° (corr.), 1:4-di-($\beta\gamma$ -dihydroxypropyl)piperazine, m.p. 176—177° (corr.) [tetrabenzoate, m.p. 150—150.5° (corr.)], and 1:4-di- β -carbethoxyethylpiperazine dihydrobromide (free base, decomp. < 100°), are described. H. B.

Pyrimidines. CXLIX. Reactions of 2-ethanesulphonylpyrimidines. J. M. SPRAGUE and T. B. JOHNSON (J. Amer. Chem. Soc., 1936, 58, 423-426).-The 2-EtSO₂ group reacts like Hal and is (generally) readily replaced by OH, OAlk, and NH₂. Thus, 4-chloro- (I) and 4-ethoxy- (II) -2-ethanesulphonyl-5-methylpyrimidines with EtOH-NaOEt at room temp. give $\hat{2}$: 4-diethoxy-5-methylpyrimidine; 4chloro-5-bromo- and 5-bromo-4-ethoxy- (III) -2ethanesulphonylpyrimidines similarly afford 5-bromo-2: 4-diethoxypyrimidine, whilst Et 4-amino-2-ethanesulphonylpyrimidine-5-carboxylate (IV) yields Et 4-amino-2-ethoxypyrimidine-5-carboxylate, m.p. 105-105.5°, hydrolysed (evaporation with conc. HCl) to the corresponding 2-OH-ester. Et 2:4-dichloro- (V) 4-chloro-2-ethanesulphonyl-pyrimidine-5-carband oxylates with EtOH-NaOEt give (probably) Et 4-hydroxy-2-ethoxypyrimidine-5-carboxylate, m.p. 186-186.5°; (V) also yields the $2:4-(OEt)_2$ -ester, m.p. 33.5—34°. 2-Ethanesulphonyl-4-ethoxypyrimidine, (II), and (III) with 10% NaOH afford 2-hydroxy-4-ethoxy-, 2-hydroxy-4-ethoxy-5-methyl-, m.p. 212-213°, and 5-bromo-2-hydroxy-4-ethoxy-, m.p. 234°, -pyrimidine, respectively. (I) and (IV) with EtOH-NH₃ at 100-110° give 4-amino-2-ethanesulphonyl-5pared.

methylpyrimidine, m.p. $135 \cdot 5 - 136 \cdot 5^{\circ}$ [hydrolysed (HCl) to 5-methylcytosine], and Et 2:4-diaminopyrimidine-5-carboxylate, m.p. $204 - 205^{\circ}$, respectively; (II) does not react at $100 - 130^{\circ}$. (II) and NH₂Ph at 100° (bath) or 130° in CO₂ afford 2-anilino-4-ethoxy-5methylpyrimidine, m.p. $120 \cdot 5 - 121^{\circ}$, hydrolysed (conc. HCl) to the 4-OH-derivative, m.p. $254 - 255^{\circ}$ (also obtained from 4-hydroxy-2-ethylthiol-5-methylpyrimidine and NH₂Ph at 100°). H. B.

Indigotin. cis-Indigotin. G. HELLER [with R. BARTHEL] (Ber., 1936, 69, [B], 563—565).—Indigotin (I), moistened with EtOH, is converted by AgOAc in H_2O at 100° into anhydroisatinanthranilide; reaction is not purely catalytic and is never complete owing to the formation of anti-catalysts. Other acetates under similar conditions have no marked action whereas $Pb(OAc)_4$ in cold AcOH transforms (I) into dehydro-indigotin diacetate with traces of isatin. References to the lit. prove that cis-indigotin is a stable material differing characteristically in properties from the transform. H. W.

Mechanism of the reaction of pyridine and its derivatives with alkali amides. M. KABATSOHNIK (Bull. Acad. Sci. U.R.S.S., 1935, No. 6—7, 971— 978).—The formation of dipyridyl and diquinolyl derivatives in the reaction between NaNH₂ and C_5H_3N derivatives in liquid NH₃ is explained on the basis of entry of Na into the nucleus or side-chain of one mol., which then condenses with a second mol. R. T.

Nitro- and amino-3-arylphthalaz-4-ones, and corresponding 1-methyl compounds. F. M. Rowe, G. M. HEATH, and C. V. PATEL (J.C.S., 1936, 311-315).-Nitro-3-arylphthalaz-4-ones and corresponding 1-Me compounds have been prepared by condensing nitroarylhydrazines with o-phthalaldehydic acid and acetophenone-o-carboxylic acid, respectively, followed by ring-closure of the resulting hydrazones. Amino-3-aryl-1-methylphthalaz-4-ones are obtained by reducing the corresponding NO₂compounds with Na₂S-EtOH-H₂O, but usually amino-3-arylphthalaz-4-ones are best prepared from the hydrazone and aq. Na₂S, which effects ring-closure and reduction. The following have been prepared : o-carboxyberzaldehyde-2'-nitro-, m.p. 229°, -4'-nitro-2'methyl-, -2'-chloro-, m.p. 229°, -2' : 6'-dichloro-, m.p. 225-226°, -2'-bromo-, m.p. 204°, and -2' : 6'-dibromo-4'-nitro-phenylhydrazone, m.p. 200°; 2'-nitro-, m.p. 201°, 2'-amino-, m.p. 184° (Ac derivative, m.p. 237°), 3-amino- (Ac derivative, m.p. 225°), 4'-amino-2'methyl-, m.p. 187--188° (Ac derivative, m.p. 214°), 2'-chloro-4'-nitro-, m.p. 171°, and -4'-amino-, m.p. 186° (Ac derivative, m.p. 247°), 2' : 6'-dichloro-4'-nitro-, m.p. 225--226°, and -4'-amino-, m.p. 226° (Ac derivative, m.p. 281°), 2'-bromo-4'-nitro-, m.p. 154°, and 2' : 6'-dibromo-4'-nitro-, m.p. 190°, and -amino-phenyl-3-phenylphthalaz-4-one, m.p. 255° (Ac derivative, m.p. 257°); o-carboxyacelophenone-2'-, -3'-, and -4'-nitro-, 4'-nitro-2'-methyl-, m.p. 145°, -2'-chloro-, m.p. 166°, -2' : 6'-dichloro-, m.p. 135°, -2'-bromo-, and -2' : 6'-dibromo-4'-nitro-phenylhydrazone, m.p. 237°; 2'-amino-, m.p. 239° (Ac derivative, m.p. 237°; 2'-amino-, m.p. 239° (Ac derivative, m.p. 237°; 2'-amino-, m.p. 239° (Ac derivative, m.p. 241°), 3'-amino-, m.p. 173° (Ac derivative, m.p. 220°), -4'-amino-, m.p. 206-207° (Ac derivative, m.p. 252°), 4'-nitro-, m.p. 178° and 4'-amino-2-methyl-, m.p. 191° (Ac derivative, m.p. 235°), 2'-chloro-4'-nitro-, m.p. 206° and -4'-amino-, m.p. 197° (Ac derivative, m.p. 247°), 2': 6'-dichloro-4'-nitro-, m.p. 235°, and -4'-amino-, m.p. 279° (Ac derivative, m.p. 320°), 2'-bromo-4'-amino-, m.p. 130° (decomp.) (Ac derivative, m.p. 255°), and 2': 6'-dibromo-4'-nitro-, m.p. 237°, and -amino-3-phenyl-1methylphthalaz-4-one, m.p. 274° (Ac derivative, m.p.

315°). The stabilities of the hydrazones are com-

Phenacylhydrazine. M. BUSCH and K. KUSPERT (J. pr. Chem., 1936, [ii], 144, 273-290),-Phenacylhydrazine (A., 1928, 997) [phenylhydrazone diacetate. m.p. 103° (decomp.), readily hydrolysed by ag, mineral acid; semicarbazone hydrochloride (I)] and PhCHO in EtOH-AcOH give benzaldehydephenacylhydrazone.m.p. 94° [Ac derivative (II), m.p. 163°], which reacts with NHPh·NH, at its CO group to form its phenulhudrazone (III), m.p. 190° (decomp.) (sinters at 187°) [Ac derivative, NHPh·N:CPh·CH₂·NAc·N:CHPh, m.p. 191°, formed with (II) by the action of Ac₂O]. (III) and EtOH-HCl at 50° give NH₃, PhCHO, and (probably) the unstable NPh.N·CPh.CH·NH₂. Short treatment of (I) with alkali affords the carbazinic acid, NH. NH. CH. CPh: N. NH. CO. H. sinters about 200° and then decomp.; prolonged treatment gives 4-amino-3-keto-6-phenyl-2:3:4:5-tetrahydro-1:2:4-tri-azine, m.p. 200° [(4-)CHPh: derivative (+EtOH), m.p. 203°], converted by HNO₂ into 3-keto-6-phenyl-tetrahydro-1:2:4-triazine, m.p. 228° (softens at 224°). (I) and PhCHO in EtOH at 40-50° give 4-benzylideneamino-3: 6-diphenyltetrahydro-1:2:4-triazine-2carboxylamide, m.p. $205-206^{\circ}$. (III) and PhCHO in $CHCl_3+a$ little EtOH-HCl afford 4-benzylideneamino-2:3:6-triphenyltetrahydro-1:2:4-triazine, m.p. 159°, converted by NHPh·NH₂ (2 mols.) in EtOH-AcOH into (III) and NHPh·N:CHPh, and by 12% EtOH-HCl into 2:3:6-triphenyl-2:3-dihydro-1:2:4-triazine, m.p. 164°, yellow (forming a red hydrochloride). Similarly, (III) and aq. CH_2O in EtOH-CHCl₃ give the (4-)benzylidene derivative (IV), m.p. 159-160°, of 4-amino-2 : 6-diphenyltetrahydro-1 : 2 : 4-triazine (V), m.p. 130° [from (IV) and NHPh·NH₂], converted by HNO₂ into the 4-NO-derivative (VI), m.p. 109-110° (decomp.), of 2:6-diphenyltetrahydro-1:2:4-triazine (VII), m.p. 160° [obtained by reduction (Zn dust, AcOH) of (VI)]. (IV) or (V) and aq. EtOH-HCl give 2:6-diphenyl-2:3-dihydro-1:2:4-triazine, m.p. 94°, yellow [red hydrochloride, m.p. 152° (darkens > 145°)], reduced (Zn dust, AcOH) to (VII). 4-Benzylideneamino-2: 6-diphenyl-3-methyl-, m.p. 126°, and -3: 3-dimethyl-, m.p. 176°, and -2: 3: 6-triphenyl-3-methyl-, m.p. 153—154°, -tetrahydro-1: 2: 4-triazine are similarly formed from (III) and MeCHO, COMe, and COPhMe, respectively. (III) and $COCl_2$ in C_6H_6 give 4-benzylideneamino-3-keto-2:6-diphenyltetrahydro-1:2:4-triazine, m.p. 199°. All the above tetrahydro-derivatives are 2:3:4:5. The production (loc. cit.) of 3-keto-2: 5-diphenyl-3: 4-dihydropyrazine from COPh·CH₂·NH·NH₂ is considered to involve loss of NH₂ and subsequent reaction of 2 mols. of phenylglyoxalimide (as OH·CPh.C.NH). H. B.

F. R. S.

 γ -Triazines. XXXII. Catalytic hydrogenations in the γ -triazine group. I. Conversion of dihydroxymethyltriazine into the so-called trigenic acid of Liebig and Wöhler. A. OSTRO-GOVICH and G. OSTROGOVICH (Gazzetta, 1936, 66, 48—57).—Dihydroxymethyltriazine is rapidly reduced catalytically (new type of vessel illustrated), or slowly by Al-Hg, Na-Hg, or Sn-HCl (but not by Zn), to dihydroxymethyltriazidine (cycloethylidenebiuret), m.p. 272—273° (decomp.) (acetate; semihydrochloride; semiaurichloride; semipicrate; Ac₂ derivative, m.p. 171— 172°), which is identical with the "trigenic acid" of Liebig and Wöhler (Annalen, 1846, 59, 296), but, apart from forming a Ag salt, has no acid properties. E. W. W.

1-Chloro-3: 4-dinitrobenzene series. IV. A. MANGINI (Gazzetta, 1935, 65, 1191-1200).-1:3:4-C₆H₃Cl(NO₂)₂ (I) reacts very slowly with p-nitrophenylhydrazine to give 5-chloro-2: 4'-dinitrohydrazobenzene, m.p. 190.5-192° (decomp.), which is converted by Ac₂O into 5-chloro-2-p-nitrophenyl-1:2:3-benztriazole 1-oxide, m.p. 143-144°. (I) with allylamine forms 5-chloro-2-nitro-N-allylaniline, m.p. $52-53^{\circ}$; with $p-C_6H_4Br\cdot NH_2$ forms 5-chloro-4'-bromo-2-nitrodiphenylamine, m.p. 161-162°, which with Sn and HCl, followed by HNO₂, yields 6-chloro-1-p-bromophenyl-1:2:3-benztriazole, m.p. 209-210°; and with p-C₆H₄Ph·NH₂ forms 5-chloro-2-nitro-N-p-diphenylyl-aniline, m.p. 138–139°, reduced and converted by HNO, into 6-chloro-1-p-diphenylyl-1:2:3-benztriazole, m.p. 175-176°. (I) reacts more slowly with 2-aminopyridine than with NH₂Ph etc., and gives 2-(5'-chloro-2'-nitroanilino)pyridine, m.p. 152.5-153.5°. (I) with p-toluidine forms 5-chloro-2-nitro-4'-methyldiphenylamine, m.p. 125-126° (cf. A., 1935, 1489), reduced to the hydrochloride, m.p. 187-189°, of the 2-NH₂compound, new m.p. 66.5-67.5° (Ac derivative, m.p. 126.5-127.5°), which is converted by AcOH and NaNO, into 6-chloro-1-p-tolyl-1: 2: 3-benztriazole, m.p. 239-241°. Colour reactions of various diphenylamines with HNO, and with HNO, are tabulated; NN'-bis-(5"-chloro-2"-nitrophenyl)benzidine gives a reddish-violet colour with 1/64,000 of the former, or 1/130,000 of the latter. E. W. W.

Pyrimidines. CLI. Constitution of dibarbituric acid. R. D. HOTCHKISS and T. B. JOHNSON (J. Amer. Chem. Soc., 1936, 58, 525-528).—Dibarbituric acid (I), now shown to be

 $CO < NH \cdot CO > C = C < NH \cdot CO > NH (cf. Conrad and Guthzeit, A., 1883, 314), formed when barbituric acid is heated at 150—170° in dry glycerol, is methylated (Me₂SO₄, aq. KOH, 25°) to the 1 : 1' : 3'-Me₃ (+H₂O) (II), m.p. (anhyd.) 286—287° (corr.), or 1 : 3 : 1' : 3'-Me₄ (III), m.p. 271·5—272·5° (corr.) (K salt), derivatives. Reduction [H₂ (130—140 atm.), Raney Ni, dioxan, 150°] of (II) results in fission at the C:C; 1 : 3-dimethylbarbituric acid and 1-methyl-4 : 5-dihydrouracil (IV), m.p. 129·5—131° (corr.), are isolated. (III) and an excess of Br-H₂O give 2 mols. of 5 : 5-dibromo-1 : 3-dimethylbarbituric acid. 4-Phenyl-1-methyl-4 : 5-dihydrouracil, m.p. 149—151° (corr.), and (IV) are synthesised (cf. Fischer and Leuchs, A., 1903, i, 12) from MeNCO and NH₂·CHPh·CH₂·CO₂H$

and NH_2 ·CH₂·CH₂·CO₂H, respectively. (I) is unaffected by boiling 6*N*-HCl or 2—20% KOH, or red P and AcOH–I. Contrary to von Baeyer (Annalen, 1864, 130, 145), the Br_2 -derivative of (I) and AcOH– conc. HBr give Br and a reduction product.

H. B.

Pyrazolone and indazole derivatives of diphenyl. E. VOTTA (Gazzetta, 1936, 66, 16—19).— 4:4'-Dihydrazinodiphenyl-3:3'-dicarboxylic acid (I) is converted by Ac₂O-NaOAc into the 1:2:1':2'- Ac_4 derivative, m.p. $< 300^\circ$, of 3:3'-diketotetrahydro-5:5'-di-indazolyl, m.p. $< 300^\circ$, also obtained (impure) by heating (I). POCl₃ and (I) at 120° yield 3:3'dichloro-5:5'-di-indazolyl, m.p. $< 330^\circ$, which is converted by EtI-KOH in EtOH into its 2:2'-Et₂ derivative, m.p. 149°, and into decomp. products. E. W. W.

Mechanism of the lumichrome degradation of flavins. P. KARRER, T. KÖBNER, and F. ZEHEN-DER (Helv. Chim. Acta, 1936, 19, 261–264).—That lumichrome degradation of flavins consists of oxidation of the side-chain is proved by synthesis of a typical reaction product. The β -position in the sidechain is particularly susceptible to this oxidation if it carries an OH. 9- γ -Hydroxy-*n*-propylisoalloxazine, when kept in MeOH in daylight for 14 days, gives $Me \gamma$ -9-isoalloxazinylpropionate, m.p. > 330°. β -o-Nitroanilinopropionic acid (prep. by condensation of NH₂·CHMe·CO₂Et and o-C₆H₄Cl·NO₂ in C₅H₅N, followed by hydrolysis), m.p. 152°, is hydrogenated (Ni; 90°/20–25 atm.) in EtOH to the (NH₂)₂compound, which with alloxan in EtOH gives γ -9isoalloxazinylpropionic acid. R. S. C.

Improved synthesis of lactoflavin and 6:7dimethyl-9-1'-arabitylisoalloxazine. P. KARRER and H. F. MEERWEIN (Helv. Chim. Acta, 1936, 19, 264—269).—The synthesis of lactoflavin (38% yield), m.p. 282°, and 6:7-dimethyl-9-1'-arabitylisoalloxazine, m.p. 294° (A., 1935, 1510), is improved by preparing the diazo-compounds with PhN₂Cl and using Na₂S₂O₄ for the reduction. The good yields in the last stages prove the uniformity of the diazo-compounds.

[With A. SEEBACH.] N-p-Tolylglycamine, m.p. 139.5°, and PhN₂Cl give the *benzenediazoamino*compound, decomp. about 146°, so that this method of synthesis of flavins is limited to those which start with 3: 4-dialkylanilines. R. S. C.

Magnetic properties and structure of the hæmochromogens and related substances. L. PAULING and C. D. CORYELL (Proc. Nat. Acad. Sci., 1936, 22, 159—163).—The results indicate four unpaired electrons in Fe^{••} protoporphyrin, and five in the corresponding Fe^{•••} compound, showing that the Fe is linked to the four N by ionic linkings. Hæmochromogens formed with globin, C_5H_5N , nicotine, cyanide, or Ni contain no unpaired electrons.

F. A. A.

Optical absorption of porphyrins.—See this vol., 545.

Oximinoacetophenone. F. ANGELICO and S. CUSMANO (Gazzetta, 1936, 66, 3-8).—This substance reacts with NH_2OH ,HCl to give not benzhydroxamic acid but aminophenylfurazan (I) (A., 1923, i, 857),

with phenylglyoxime and oximinophenylacetonitrile (II). HNO_2 and (I) in AcOH yield 3:3'-diphenyl-4:4'-azoiminofurazan (cf. A., 1923, i, 854), m.p. 157—158° (explosive K salt), and (II). With NH₂OH in alkaline solution, (II) yields (I). E. W. W.

Action of formaldehyde on hydroxyquinolines. (SIGNA.) L. MONTI and (SIGNA.) V. CIRELLI (Gazzetta, 1936, 66, 42-48).-4-Hydroxyquinaldine, its 8- and 6-Me derivatives, and 4-hydroxy-2-phenylquinoline are, respectively, converted by CH₂O in dil. H₂SO₄ at 20-25° into 4-hydroxy-2-methyl-, m.p. 100-102° [picrate, m.p. 178-180° (decomp.)], -2:8-dimethyl-, m.p. 139-140° [picrate, m.p. 195-196° (decomp.)], -2:6-dimethyl-, m.p. 154-156° [picrate, m.p. 195-200° (decomp.)], and -2-phenyl-3-quinolylcarbinol cyclomethylene ether, m.p. 124-126° [picrate, m.p. 186-190° (decomp.)]. E. W. W.

Action of nitric acid on unsaturated compounds. XII. Structure of products of the reaction of nitric acid with citraconic acid. A. QUILICO (Gazzetta, 1935, 65, 1203—1213).—Eulite, $C_6H_6O_7N_4$, m.p. 102°, obtained by action of HNO₃ on eitraconic acid, is now prepared, with mesaconic acid and AcOH, from citraconic anhydride and HNO₃. With NaOEt it yields a Na salt (of an aci-form), which couples with p-NO₂·C₆H₄·N₂Cl to a substance, decomp. 70°, and similarly with p-C₆H₄Cl·N₂Cl. With PhCHO, piperonal, anisaldehyde, and cimnamaldehyde it gives compounds, C₁₃H₁₀O₇N₄, m.p. 146°, C₁₄H₁₀O₉N₄, m.p. 187°, C₁₄H₁₂O₈N₄, m.p. 157°, and C₁₅H₁₂O₇N₄, m.p. 172°, respectively. The ·CH₂·NO₂ group is therefore present. Reduction (SnCl₂) of eulit yields two bases, C₆H₉O₂N₃ (Bz₂ derivative, m.p. 157°) and C₆H₁₁ON₃ (Bz₂ derivative, m.p. 177°). KMnO₄ oxidation of eulite gives AcOH. Eulite thus probablyc ontains the units, C:N O, Me°, H·, ·C(NO₂)₂·, and ·CH₂·NO₂.

Thiophen series. XXXI. Preparation of thiophen analogues of acridone and fluorenone. W. STEINKOPF and E. GÜNTHER (Annalen, 1936, 522, 28-34).—Thiophen (I), o-NO₂·C₆H₄·COCl, and AlCl₃ in CS₂ give 60% of o-nitrophenyl 2-thienyl ketone (II), m.p. 97—98°, reduced (Sn, conc. HCl) to C-2'-thienyl-anthranil [2-2'-thienyl-4-benzoxazole] (III), m.p. 77—78°, which resembles phenylanthranil (Bamberger and Lindberg, A., 1909, i, 511). Reduction (Zn dust, 20% NaOH, EtOH) of (II) and subsequent treatment with conc. HCl affords 3: 5-dichloroanthranilie acid, probably formed thus: (II) \rightarrow o-NO₂·C₆H₄·CHO \rightarrow o-NO·C₆H₄·CO₂H \rightarrow 2: 3: 5-NH₂·C₆H₂·CO₂H (cf. Bamberger et al., A., 1899, i, 341). (III) heated in paraffin oil passes into 2: 3-o-benzo-5: 6-2': 3'-thiopheno-4-pyridone (IV), m.p. about 320° (decomp.), which exhibits slight blue fluorescence in conc.



 H_2SO_4 or EtOH-alkali only. 2-*p*-Toluenesulphonamidobenzoyl chloride, (I), and AlCl₃ in CS₂ give the TT $p-C_6H_4Me\cdotSO_2$ derivative, m.p. 125°, of o-aminophenyl 2-thienyl ketone (V), m.p. 53—54° (hydrochloride, m.p. 188—189°). When the diazo-solution from (V) is heated varying yields of o-phenylene 2:3-thienylene ketone (VI), m.p. 109—110°, and o-hydroxyphenyl 2-thienyl ketone, m.p. 21°, result. Attempted reduction (P-HI; Clemmensen) of (VI) causes decomp.

HB

Isomerism of glycothiodiazolines. H. WUYTS and R. VERSTRAETEN (Bull. Soc. chim. Belg., 1936, 45, 65-75).-d- or l-Arabinose with β -phenylthioacet- α phenylhydrazine affords arabothiodiazolines, easily separable by fractional crystallisation. The more sol. have $[\alpha]_{5780}^{29}$ +650° and +708° for the l- and d-derivatives, respectively. The m.p. are: more sol. l-, 194·8-197·2°, d-, 194·8-197·2°; less sol. l-, 198°, d-, 197·6°. d-Galactothiodiazoline, $[\alpha]_{2003}^{29}$ +1109·6° \rightarrow +106·6° in several weeks, possibly as a result of mutarotation, is decomposed by light. Theoretical considerations are advanced to explain this isomerism. J. L. D.

Alkaloids of Senecio species. II. R. H. F. MANSKE (Canad. J. Res., 1936, 14, B, 6-11; cf. A., 1932, 286) .- 12 Senecio species contain fumaric acid. S. jacobæa contains quercitin. S. vulgaris, L., contains 0.15-0.17% of senecionine, m.p. 222°, hydrolysed to retronecine and a cryst. acid. S. mikanioides (Walp.), Otto, yields a substance, (C5H8O2), (n = ?2), m.p. 64°, and 0.02% of amorphous mikano-(h = 12), in.p. or , and or 27_0 or unterplaced view of 21 dihydro-retronecine), $C_8H_{15}O_2N$, an oil (*picrate*, m.p. 186°), and *mikanecic acid*, $C_{13}H_{16}O_5$, m.p. 240°. S. aureus, L., yields 0.006% of aureine, $C_{18}H_{25}O_5N$, m.p. 238° (decomp.). An alkaloid was isolated from Echium vulgare, L.; none was obtained from S. cineraria. clivorum, nemorensis, veitchianus, palmatus, or ledebouri. Retrorsine methiodide and Ag₂O in hot H₂O give a methohydroxide, decomposed by cautious heating to give a substance, $C_{13}H_{16}O_6$ (possibly lactaldehyde retronecate), m.p. 125° (with KOH gives retronecic acid), and a substance, C₉H₁₃O₃N, m.p. 256° (decomp.), probably a betaine. Benzoylretronecine behaves similarly. K retronecate, CH, Cl.COMe, and a trace of KI in MeOH gives hydroxyacetone retronecate, m.p. 137°. R. S. C.

Alkaloids of Anabasis aphylla. XII. Attempted synthesis of anabasine ; chemistry of 2: 3'-dipyridyl. G. MENSCHIKOV and A. GRIGORO-VITSCII (Ber., 1936, 69, [B], 496-499).-Addition of MeI to 2 : 3'-dipyridyl (I) in abs. EtOH at room temp. affords exclusively 2-pyridyl-3'-pyridinium methiodide, m.p. 167-168°, converted by Ag₂O into the quaternary hydroxide (II) which is oxidised by $KMnO_4$ to 2-C₅H₄N·CO₂H (III). Reduction of (II) with Sn and conc. HCl gives the base $C_{11}H_{16}N_2$, b.p. 120—122°/15 mm., oxidised to (III). 2-Pyridyl-3'-pyridinium hydriodide, m.p. 162—163°, and MeI in EtOH at 100° give a mixture of 2:3'-dipyridyl dimethiodide, m.p. 196-197°, and dihydriodide, m.p. 204-206°, also obtained directly from their components. Partial reduction of (I) in alkaline solution (Na-abs. EtOH) appears to affect both rings at approx. the same rate, the products being unchanged (I) and 2: 3'-dipiperidyl (IV), m.p. 68-69°. Partial dehydrogenation of (IV)

by AgOAc in AcOH at 180° affects both rings simultaneously, giving a mixture of unchanged (IV) and (I). H. W.

l-Ephedrine, a degradation product of the alkaloids in Aconitum napellus. W. FREUDEN-BERG and E. F. ROGERS (J. Amer. Chem. Soc., 1936, 58, 533—534).—Destructive distillation of the total alkaloids (as hydrochloride) over cryst. Ba(OH)₂ gives hydrocarbons, NH_2Me , and a basic oil containing *l*-ephedrine. H. B.

Preparation of quinine aurothiosulphate. Q. MINGOIA (Gazzetta, 1935, 65, 1258—1260).—A claim of prior prep. of this compound (cf. A., 1931, 1172), with different properties from the form described by Picon (A., 1935, 49, 366). E. W. W.

Structural analogue of cinchene and its behaviour towards acid. J. KENNER and B. K. NAND [with, in part, R. GRINDLEY] (Ber., 1936, 69, [B], 635-639; cf. A., 1935, 766).—Condensation of CH, Ph.CO, Et with the Et ester of N-benzovlmeroquinene (I) by NaOEt in C_6H_6 at 100° affords the corresponding β -CO ester, the Cu compound, $C_{26}H_{28}O_4NCu$, m.p. 226—227°, of which is converted by boiling 25% HCl into BzOH and 8-benzylidene-3vinylquinuclidine (II), m.p. 158° (methiodide, m.p. 199°; tetrabromide, m.p. 117—119°). Hydrogenation of (II) in 5% HCl (PdCl.) gives 8-benzylidene-3-ethylquinuclidine, m.p. 182-183° [dibromide, m.p. 105-106° (decomp.)], the constitution of which follows from the similar hydrogenation of cinchene to dihydrocinchene, m.p. $144-145^{\circ}$. Hydrolytic fission of (II) with HBr ($d \ 1.49$) at $180-190^{\circ}$ affords PhMe and meroquinene Et ester hydrochloride, m.p. 164-165°. With H₂SO₄ of varied concns. PhMe is similarly obtained with a product which after basification and distillation gives an alkaline distillate with an odour of piperidine. The basic, salt-forming quinoline nucleus is therefore responsible for the production of apocinchene from cinchene and conc. acids and it must be assumed that this is due to prevention of the lepidine-meroquinene fission which occurs with more dil. acid. If the intermediate production of a ketone X·CO·CH₂Ph be postulated the reaction is similar to the hydrolysis of substituted deoxybenzoins. Quinolyl-2-acetaldehyde (oxime, m.p. 201-202°, and the corresponding nitrile) is oxidised by KMnO4 in alkaline solution to quinolyl-2-acetic acid (picrate, m.p. 236-237°), the Et ester, m.p. 68-69°, of which could not be condensed with $Et_2C_2O_4$ or (I). Oxid-ation of 4-quinolyl Me ketone by SeO_2 in presence of PhMe affords cinchoninic acid, also obtained from 4-quinolyl CH_oBr ketone. H. W.

[Synthesis of benzyltetrahydroisoquinoline bases under "physiological" conditions.] G. HANN and O. SCHALES (Ber., 1936, 69, [B], 622-623; cf. A., 1935, 357).—A reply to Späth *et al.* (this vol., 489). H. W.

Alkaloids of Chinese gelsemium, Ta-ch'ayeh. T. Q. CHOU (Chinese J. Physiol., 1936, 10, 79–S4; cf. A., 1931, 871).—Koumine, kouminine, gelsemine, and *kounidine* (I), $C_{21}H_{24}O_5N_2$, m.p. 315° (*hydrochloride*, m.p. 31S°), have been isolated from the leaves and stems of Ta-ch'a-ych, which has been

identified as *G. elegans.* Tested on mice, (I) caused muscular weakness and had a marked inhibitory effect on the respiratory centre. J. N. A.

Alkaloids of Ungernia Severtzovii (Rgl.), Fedsch. S. NORKINA and A. OREKHOV (Ber., 1936, 69, [B], 500-503).—Percolation of the dried bulbs with $C_2H_4Cl_2$ affords ungernine (I), $C_{39}H_{41}O_{11}N_2$, m.p. 210-211°, $[\alpha]_{\rm p}$ +148.9° in CHCl₃, which is more freely present in the dark outer portions than in the white inner portions of the bulb. (I) contains 2 OH and 2 OMe and is a diacidic di-tert. base giving a dimethiodide (II), m.p. 220-223°, a picrate, m.p. 205-208° (decomp.), and a perchlorate, m.p. 105-108° (decomp.), $[\alpha]_{15}^{15}$ +109.6° in MeOH. The function of the remaining O atoms is undecided. Hydrogenation (PtO₂) of (I) affords tetrahydroungernine, m.p. 180-183°, $[\alpha]_{15}^{15}$ +106.6° in CHCl₃ [dihydriodide, m.p. 223-224° (decomp.); picrate, m.p. 190-193° (decomp.); methiodide, m.p. 170-172°]. Successive treatment of (II) with Ag₂O and boiling H₂O yields the substance (III), $C_{27}H_{24}O_6$ (or $C_{27}H_{22}O_6$), m.p. 113-115°, $[\alpha]_{\rm D} \pm 0°$, which contains 2 OH but is free from OMe; basic compounds could not be isolated. (I) is stable towards boiling KOH-MeOH but is slowly transformed by boiling KOH-H₂O into (III).

Punarnava or *Bærhaavia diffusa*, Linn. II. Isolation of punarnavine.—See this vol., 652.

Organic compounds of gold. VI. Heterocyclic compounds. A. BURAWOY and C. S. GIBSON (J.C.S., 1936, 324—327).—The Mg-CH₂(CH₂·CH₂Br)₂ reaction product and HAuBr₄ give *ethylenediamino*cyclopentamethylenegold bromide, decomp. 150° (*n*triacontane obtained in hydrocarbon by-products), which with HBr yields cyclopentamethylenemonobromogold, decomp. 80°. The Mg compound with pyridinetrichlorogold affords *ethylenediamino*cyclodecamethylenegold bromide. Evidence of the formation of analogous compounds containing larger heterocyclic rings has also been obtained.

F. R. S. Germanium, XVI. Germanium phenyl. R. SCHWARZ and M. SCHMEISSER (Ber., 1936, 69, [B], 579-585; cf. A., 1931, 1435).-GePhCl₃ is obtained in 75% yield by heating GePh₄ and GeCl₄ at 350° for 36 hr. Distillation of the product yields fractions, b.p. 105°/12 mm., 128°/12 mm., and 142°/12 mm., respectively; those of lower b.p. pass into those of higher b.p. when heated at appropriate temp. and polymeric forms appear to be indicated, but each fraction is unimol. in C₆H₆ (GePh₂Cl₂ and GePh₃Cl have b.p. 223°/12 mm. and b.p. 285°/12 mm., respectively). GePhCl₃ reacts unsatisfactorily with Na in boiling xylene. Better results are obtained when Na is replaced by K. In presence of O2 oxidation occurs but good yields are secured in CO₂ but not in N₂ or A. The course of the change is unexplained but the occurrence of intermediate reactions is established by the isolation of Ge and GePh₄. (GePh)₆ is little affected by air. (GePh)₆ adds 8 Br or 8 I in CCl_4 , thus indicating an open-chain structure. The view is supported by the production of a substance $Ge_6Ph_6O_3$ from $(GePh)_6$ and O_2 in boiling xylene since the mol. wt. (about 2900) would require the formation of a chain of about 18 Ge atoms from the ring, which is improbable. The reaction $XPhCl_3+3K=XPh+3KCl$ for the series C, Se, Ge, Sn occurs with increasing ease of removal of halogen. Under the chosen conditions it does not take place with $CPhCl_3$, is not quant. with SePhCl₃, occurs smoothly and relatively rapidly with GePhCl₃, and very easily with SnPhCl₃, but is then followed by disproportionation to SnPh₄ and Sn. H. W.

Mercurated derivatives of thymol and carvacrol. J. B. BURT (J. Amer. Pharm. Assoc., 1936, 25, 112—117).—Carvacrol with $Hg(OAc)_2$ in EtOH yields mainly mono- and some di-chloromercuricarvacrol; in presence of AcOH, acetoxymercuricarvacrol, decomp. 173—174°, is produced. The Me ethers of chloromercuri-thymol and -carvacrol are prepared similarly. F. O. H.

Thiophen series. XXXII. Mercuration of bromo- and iodo-thiophens. W. STEINKOPF, R. Rosler, and L. SETZER (Annalen, 1936, 522, 35-40). -Mercuration is effected with HgO in AcOH (unless stated otherwise). The following are then prepared by the usual methods : 2-bromo-3 : 4 : 5-tri(chloromercuri)- and -3:4:5-tri-iodo-, m.p. 170°; 2:3-dibromo-4:5-di(chloromercuri)- (I), m.p. 300° (with darkening), and -4:5-di-iodo-, m.p. 142°; 2:5-dibromo-3:4-di-(chloromercuri)-, m.p. 300-305° (darkens about 290°), and -3:4-di-iodo-, m.p. 147°; 3:4-dibromo-2:5-di-(chloromercuri)- (II), m.p. 317° (previous sintering), and -2:5-di-iodo-, m.p. 145°; 2:3:4-tribromo-5-chloromercuri- (III), m.p. 236° (formed using HgCl₂) in aq. EtOH-NaOAc); 2:3:5-tribromo-4-chloromercuri-, m.p. 270° (does not react with I-KI); 2-iodo-3:4:5-tri(chloromercuri)-, m.p. 290° (decomp.; darkens at 280°), and 2:5-di-iodo-3:4-di(chloromercuri)-thiophen. (I) and NaI in C_5H_5N give $Hg_2 4:5:4':5'$ tetrabromo-2:3:2':3'-dithienylene (cf. A., 1923, i, 125); (II) similarly affords Hg_2 3:4:3':4'-tetra-bromo-2:5:2':5'-dithienylene. (III) and NaI in COMe₂ give Hg 2:3:4:2':3':4'-hexabromo-5:5'dithienyl, m.p. 291°. H. B.

Constitution of glutokyrin. III. Collagen. W. GRASSMANN and K. RIEDERLE (Biochem. Z., 1936, 284, 177—188; cf. A., 1934, 271).—The basic NH_2 acid fraction (equiv. to 2/3 of the total N) from hydrolysates of glutokyrin is arginine and lysine (l:1); 1/3 of the $(NH_2)_1$ -acid fraction is proline or hydroxyproline (which form peptides by linking of the .NH group), the remainder being acyclic NH_2 acids. The structures of the parent peptide chains and their bearing on those of gelatin and collagen are discussed. F. O. H.

Chemical groups of proteins which possess affinity for polysaccharides. VIII. Hydroxyproline, histidine, and lysine. IX. Rôle of 'CO·NH· linking. S. J. VON PRZYŁĘCKI, J. CICHOCKA, and H. RAFAŁOWSKA (Biochem. Z., 1936, 284, 169—176; cf. this vol., 90).—Hydroxyproline, histidine, lysine, and creatinine do not form complexes with amylose (I) at $p_{\rm H}$ 4, 7, or 8 as indicated by changes in α ; arginine (II)+(I) at $p_{\rm H} > 7$, however, show vals. of $\alpha <$ the sum of the constituent vals. The group ·CO·NH· does not appear to participate in the phenomenon; glycyltyrosine, however, forms complexes. (II) and tyrosine appear to be the only constituent NH₂-acids concerned. F. O. H.

Substituted proteins. II. Iodination of hæmoglobin and globin. III. Iodination of nitroglobin. H. BAUER and E. STRAUSS (Biochem. Z., 1936, 284, 197—230, 231—237).—II. The coagulation of hæmoglobin (I) by heat, $COMe_2$, $CHCl_3$, or $CO(NH_2)_2$, together with the properties of derived products, indicate that both (I) and globin are complexes of six units each of mol. wt. approx. 11,680. Iodination of (I), globin, paraglobins, etc. under various conditions shows that the linking of the units is by the glyoxaline groups of constituent histidine (II). Thus dissociation produces an increase in I val. from 4.17 to 9.56%. Hæmatin-free globin is more sensitive to lytic agents than is (I); hence the hæmatin complex has a stabilising influence on the coherence of the constituent units of the complex. Physical denaturation of (I) is not attended by dissociation. The orientation, affinity, and characteristics of the units are discussed.

III. Iodination of nitroglobin (III) in neutral, acid, and alkaline media give I vals. of 3.88-6.29%, indicating that (II) and not tyrosine is the I-carrier. The effective (II) in (I), globin, and (III) forms respectively 1/3, 1/2, and 2/3 of the total (II).

F. O. H

Pattern of proteins. D. M. WRINCH (Nature, 1936, 137, 411–412).—Theoretical. L. S. T.

Method of introducing elementary arsenic, antimony, and bismuth into proteins. P. MA-SCHERPA and L. CALLEGARI (Arch. ital. Biol., 1934, 91, 107-122; Chem. Zentr., 1935, ii, 401-402).---The powdered element is shaken with the protein solution in the absence of O₂. H. N. R.

Influence of $p_{\rm H}$ on the formation of saltprotein compounds between arsenic, antimony, bismuth, and albumin. P. MASCHERPA and L. CALLEGARI (Arch. ital. Biol., 1934, **91**, 115—122; Chem. Zentr., 1935, ii, 402; cf. preceding abstract).— With falling $p_{\rm H}$ the solubility of As and Sb in gelatin solutions diminishes, whilst that of Co increases.

H. N. R.

Determination of organic nitrogen. H. A. SCHUETTE and F. C. OPPEN (Trans. Wis. Acad. Sci., 1935, 29, 355–380).—A review.

Identification of acids and esters. D. V. N. HARDY (J.C.S., 1936, 398).—The acidic component of an ester is readily identified by conversion by NHR·MgX into the anilide or substituted anilide. R. S. C.

Colour reaction of titanium with ascorbic acid and other molecules containing the group C(OH):C(OH).—See this vol., 580.

Application of copper salts of polyhydric alcohols to the detection and determination of reducing sugars. V. M. PLATKOVSKAJA and T. I. VECHOTKO (J. Appl. Chem. Russ., 1936, 9, 177-181).—Glycerol and mannitol may be substituted for Na K tartrate in Fehling's solution. R. T. **Phospho- and silico-tungstates.** E. KAHANE and M. KAHANE (Bull. Soc. chim., 1936, [v], **3**, 621— 625).—Attention is directed to the suitability of the phospho- and silico-tungstates of org. bases for determination of the mol. wt. of the base. Such complexes have a const. composition and are free from H₂O of crystallisation. E. S. H.

Ouantitative investigations of amino-acids and peptides. I. Quantitative formaldehyde titration using a glass electrode. M. S. DUNN and A. LOSHAKOV (J. Biol. Chem., 1936, 113, 359-369).-Details are given of a method for determination (error $\pm 0.1\%$) of NH₂-acids and peptides by titration in 37.5% aq. CH₂O (freed from HCO₂H by basic Mg carbonate) with 0.3N-NaOH (mechanical stirring) using a glass electrode. Determination of NH2-acids is unaffected by the presence of a foreign NH2-acid if there is a 104-fold difference between their apparent acid dissociation consts., but with peptides containing an NH2-acid the no. of equivs. of NaOH is that required for the sum of the two constituents. Numerous examples are given, and other methods are briefly discussed. J. W. B.

Some causes of error in the determination of α -amino-acids by the ninhydrin reaction. M. POLONOVSKI (Compt. rend. Soc. Biol., 1936, **121**, 1103—1105).—CO(NH₂)₂ and creatine in large quantities interfere with the reaction. Proteins are removed by phosphotungstic acid for determination of (NH₂)₁-acids, and by saturation with (NH₄)₂SO₄ for total NH₂-acids, (NH₂)₂-acids being calc. by difference. $p_{\rm H}$ must be made about 6.0 for the determination. R. N. C.

Separation of amino-acids.—See this vol., 561.

Displacement of oxidation-reduction potential on illumination of methylene-blue solutions containing iron.—See this vol., 566.

Determination of pyridine according to the "Erganzungsbuch 5." H. LEONHARDT and R. KLOCKMANN (Pharm. Ztg., 1936, 81, 345).—For the titration of C_5H_5N with HCl (the final conen. being approx. 0.5N), Me-violet 6B is a better indicator than Me-orange. With the latter, titration must be continued until a definite red colour is obtained.

W. O. K. Phloroglucinol and diphenylbarbituric acid methods for determination of furfuraldehyde. N. V. KOSCHKIN and V. P. TOKAREV (J. Appl. Chem. Russ., 1936, 9, 171–176).—NN'-Diphenylbarbituric acid (I) and furfuraldehyde (II) in aq. HCl afford practically insol. furfurylidene-NN'-diphenylbarbituric acid, $+H_2O$, decomp. at > 245°. (II) is determined by steam-distilling the material under analysis in presence of 12% HCl, and adding a 4-fold excess of a 0.5% solution of the K salt of (I). The ppt. is collected after 12 hr., washed with boiling 2.5% NaOAc and with H₂O, dried at 120°, and weighed. The accuracy is of the same order as with the phloroglucinol method. R. T.

Determination of alkaloids. M. I. SMIRNOVA and G. N. SERBINA (Bull. Appl. Bot. U.S.S.R., 1934, [iii], No. 5, 309—314).—A suitable modification of the nephelometric method is described. Ivanov's micro-method gave good results with fractions of a mg. CH. ABS(p)

Colorimetric determination of morphine and its derivatives.—See this vol., 536.

Micro-determination of morphine.—See this vol., 652.

Biochemistry.

Regulation of respiration with oxygen-poor air mixtures. A. J. ANTHONY (Pflüger's Archiv, 1935, 236, 435–439). R. N. C.

Gaseous exchange in growing ducks. A. K. DANILOVA and A. N. POSTNIKOVA (Bied. Zentr. [Tierernähr.], 1935, 7, B, 158–183).—Variations in catabolic rates with advancing age of ducks are examined. Max. vals. occur at approx. 10 days. A. G. P.

Effects of inhalation of carbon dioxide on the carbon dioxide capacity of arterial blood. H. E. HIMWICH, E. F. GILDEA, N. RAKIETEN, and D. DUBOIS (J. Biol. Chem., 1936, 113, 383–389).— Exposure to CO₂ (5—8%) for approx. 0.5 hr. caused a decrease of CO₂ capacity in all human subjects and in 3 out of 4 dogs examined. After ≤ 55 min. there was a rise of CO₂ capacity in all cases. The compensatory increase of CO₂ capacity which diminishes the fall in $p_{\rm H}$ is not the first response to inhalation of CO₂. The acid-base equilibrium of the serum showed no accumulation of unknown acid, neither was there a shift of fluid in the serum, which might have explained such changes. J. N. A.

Diffusion of carbonic acid through the skin K. KRAMER and H. SARRE (Arch. exp. Path. Pharm. 1936, 180, 545-556).—Changes in $[CO_2]$ of CO_2 -containing or -free H₂O in contact with skin indicate a purely physical diffusion of CO₂ dissolved (as in H₂O) in the cutancous tissue. The exchange depends on the blood supply. Exposure to an atm. of CO₂ (when the uptake of CO₂ averages 26 c.c. per 33 sq. cm. of skin) produces no change in the rate of subsequent diffusion, indicating a removal of penetrated CO₂ by blood. F. O. H.

Voluntary hyperpnœa and behaviour of alveolar carbon dioxide, alkaline reserve, and bloodproteins in man. W. JAROSZEWICZ (Compt. rend. Soc. Biol., 1936, **121**, 917—920).—Alveolar CO_2 and the alkaline reserve are always decreased. Bloodproteins decrease in all cases of pronounced, and in most cases of less pronounced, tetanic reflex action; in its absence they generally rise. R. N. C.

Measurement of red-cell volume : conductivity measurements. E. PONDER (J. Physiol., 1935, 85, 439-449). R. N. C. Permeability of erythrocytes. III. Cation content of erythrocytes of rabbit's blood in hyper- and hypo-tonic sera. H. DAVSON (Biochem. J., 1936, 30, 391-393).—The changes in vol. of rabbit's erythrocytes in hyper- and hypo-tonic solutions are < those to be expected on the basis of complete cationic impermeability, but the anomalies are < those described by Ponder and Saslow (J. Physiol, 1930, 70, 169; 1931, 73, 267) and are not to be correlated with the penetration of K^{*} and Na^{*} (cf. A., 1934, 673). P. W. C.

Hæmoglobin regeneration as influenced by diet and other factors. G. H. WHIPPLE (J. Amer. Med. Assoc., 1935, 104, 791-793).—A summary.

Сн. Авз. (р)

Rôle of inorganic substances and amino-acids in the regeneration of hæmoglobin in the rat. H. L. KEIL (Iowa State Coll. J. Sci., 1934, 9, 169— 170).—Attempted replacement of Cu by other elements and various NH_2 -acids as hæmotinics was unsuccessful. Intraperitoneal injection of Fe citrate or chloride or of dil. HCl gave temporary relief. Injection or feeding of sol. or insol. Cu compounds, with or without Fe, causes regeneration. CH. ABS. (p)

Isoelectric point of adsorbed hæmoglobin. H. L. WHITE and B. R. MONAGHAN (J. Biol. Chem., 1936, 113, 371-374).—As the purity of adsorbed hæmoglobin increases, the isoelectric point approaches 6.8, the val. obtained by the moving boundary method. Using the microscopical method, a protein must be pure to get correct vals. of mobilities and isoelectric point, but the electrical properties are not altered by adsorption on quartz or glass. J. N. A.

Localisation of hæmoglobin and its derivatives in some aphrodites. C. RAPHAËL (Compt. rend., 1936, 202, 588—590).—Hæmoglobin is present in the circulatory system and in the pigment of the pharyngeal sheath. Oxyhæmoglobin and hæmatin (I) occur in the papillæ which cover the edge of the sheath, and large quantities of (I), together with small amounts of bile pigments, in the cæcum. J. N. A.

Hepatic function. III. Effect of cholecystectomy. A. CANTEROW, E. GARTMAN, and G. RIC-CHIUTI (Arch. Surg., 1935, 30, 865-874).—Changes in serum-bilirubin are recorded and discussed.

Сн. Авз. (р)

Colloid osmotic pressure of the blood in normal and pathological conditions. XIV. Effect of blood transfusion on colloid osmotic pressure in normal and anæmic rabbits. N. ONOZAKI. XV. Effect of infusions of gum arabic. N. ONOZAKI and Y. SANADA. XVI. Effect of vegetative nerve poisons. N. ONOZAKI (Töhoku J. Exp. Med., 1935, 25, 1-13, 120-130, 131-147).-XIV. The colloid osmotic pressure (P) of blood after injection of physiological saline parallels the decreased protein (I) and hæmoglobin (II) content, the P per unit (I) remaining const. The increased P after transfusion is > that corresponding with the increased (I) content.

XV. Intravenous injection of 6-12% solutions of gum into rabbits decreased serum-(I) and blood-(II). The *P* increased by an amount > that of the gum introduced.

XVI. Ergotamine, pilocarpine, and choline produced significant changes. Atropine had no action. CII. ABS. (p)

Precipitation of serum-proteins by ammonium sulphate : [serum of] normal man. A. ROCHE, M. DORIER, and L. SAMUEL (Compt. rend. Soc. Biol., 1936, 121, 1019—1021).—Globulins (I) are pptd. between 30% and 60%, and albumins between 60% and 70% of saturation with $(NH_4)_2SO_4$. (I) are not pptd. fractionally, as in horse serum. The (II)/(I) ratio obtained by 50% saturation is 1; the true ratio at 60% saturation is 0.5. R. N. C.

Effect of fasting on the serum-protein concentration of the rat: existence of an immediately utilisable circulating protein fraction. H. C. TORBERT (J. Exp. Med., 1935, **62**, 1-10).—No evidence of a circulating, available plasma-protein was obtained. The decline in serum-protein after fasting involves principally the albumin fraction.

CII. ABS. (p)

[Electrical] conductivity of serum after administration of calcium and ultra-violet irradiation. A. DELL'AQUILA and F. JAIA (Arch. Farm. sperim., 1935, 60, 578—586).—Intravenous injection of aq. CaCl₂ has no effect on κ of blood or serum, but subsequent ultra-violet irradiation lowers κ . The phenomenon occurs *in vitro*, but to a smaller extent than *in vivo*. F. O. H.

Dispersion by blood-serum of a partly-flocculated serum-globulin fraction. C. MOBEL (Compt. rend. Soc. Biol., 1936, 121, 836-837).—The globulins are partly flocculated by dilution of the serum within a certain range of $p_{\rm H}$. The dispersive power of the serum falls with $p_{\rm H}$. It is increased by heating the serum at the upper limit of this $p_{\rm H}$ range, the effect of heating falling rapidly with $p_{\rm H}$ to zero at approx. the middle of the range, below which flocculation is increased by heat, the effect augmenting as $p_{\rm H}$ falls to the lower limit. R. N. C.

Stability of blood-serum. R. JONNARD (Compt. rend. Soc. Biol., 1936, 121, 841—843).—The ratio of the serum concn. to the [EtOH] necessary for flocculation is inversely ∞ the hydration of the serumcolloids, and increases with the serum concn., the curve being linear at acid reactions. The ratio increases with acidity for any fixed serum concn.

R. N. C.

Micro-determination of serum-albumins and -globulins. A. ROCHE (Compt. rend. Soc. Biol., 1936, **121**, 1022—1023).—Globulins are pptd. from the serum by half saturation with $(NH_4)_2SO_4$; albumins are determined in the filtrate and total proteins in the serum by the micro-Kjeldahl method after pptn. with tannin acetate or Hedin's reagent. R. N. C.

Determination of euglobulin. R. GILLE (Compt. rend. Soc. Biol., 1936, 121, 906—908).—Dialysis of globulins previously separated from serum by pptn. with MgSO₄ produces a euglobulin fraction > that from direct dialysis of the serum, and containing much pseudoglobulin. The $(NH_4)_2SO_4$ technique of Porges and Spiro gives high vals., but pptn. with excess of 1/3-saturated $(NH_4)_2SO_4$ solution or 14% of Na₂SO₄ produces trustworthy results. R. N. C. Volumetric micro-determination of phosphatides, free cholesterol, cholesteryl ester, neutral fat, and total lipins of blood, plasma, and corpuscles. S. KATSURA, T. HATAKEYAMA, and K. TAJIMA (Biochem. Z., 1936, 284, 312; cf. A., 1934, 673).—Some improvements in the method are given. F. O. H.

Micro-determination of blood-sugar with hypoiodite. E. GUBAREV and M. RUTES (Bull. Soc. Chim. biol., 1936, 18, 395–400).—The blood (0.2 c.c.) is freed from albumin with aq. AcOH and oxidised with NaOI. A. L.

Blood-sugar level after sectioning the pancreatic duct in rabbits. T. DEGCHI (Tôhoku J. Exp. Med., 1934, 24, 368—373).—Bilateral ligation of the duct caused neither hyper- nor hypo-glycamia in rabbits. CH. ABS. (p)

Determination of alcohol in blood by Widmark's method. C. HEGLER (Deut. med. Woch., 1935, 61, 288—291; Chem. Zentr., 1935, ii, 729).— The Widmark test is usually, but not decisively, an evidence of alcoholic influence. In chronic alcoholism, low vals. are frequently found. J. S. A.

Technique of Widmark blood-alcohol determination for serial investigations. H. R. KANITZ (Deut. Z. ges. gerichtl. Med., 1935, 24, 273—274; Chem. Zentr., 1935, ii, 729).—Improved procedure is described. J. S. A.

Chloropenic hyperazotæmia. S. MARINO (Arch. Farm. sperim., 1935, 60, 564—571).—The incidence of hyperazotæmia in chloropenia is discussed with reference to increased formation of urea and to changes in the re-absorption by the renal tubules. F. O. H.

Resection of the small intestine. P. BARCO and S. L. PASTORINO (Pathologica, 1935, 27, 285— 293).—Blood-Ca, -K, -P, -glucose, and -cholesterol increased immediately after resecton and subsequently decreased to normal in 30—60 days. CH. ABS. (p)

[Blood-]bromine problem. I. SCHMITT and H. KIRCHHOF (Deut. tierärtzl. Woch., 1935, 43, 227— 230; Chem. Zentr., 1935, ii, 1053).—The blood-Br vals. for a no. of animals are given. R. N. C.

Velocity of intra-hepatic blood circulation. I. ENESCO and C. ISAC (Bull. Acad. Med. Roumanie, 1936, 1, 168—178).—Following intravenous and oral administration of KI, I appears in the saliva within 1—2.5 and 7—15 min., respectively. With oral and rectal administration, the difference in time of appearance, 2—5 min., represents the time of intra-hepatic circulation. The influence of disease is discussed.

F. O. H.

Potassium and calcium in the blood of pigeons after resection and electrical excitation of the wing nerves. R. CERNATESCU and A. MEYER (Vol. Jubilaire C. I. Parhon, Sep., 8 pp.).—Excitation disturbed the equilibrium of K' and Ca'' in serum. The effect varied with the individual, the change in [K'] appearing first and being > that in [Ca''].

CH. ABS. (p)

Extraction of lead by means of diphenylthiocarbazone. L. ELLIS (Analyst, 1936, 61, 178—179). —For the determination of Pb in blood the "titrimetric extraction " method of Wilkins *et al.* (A., 1935, 531) is simpler and more convenient than that involving complete oxidation of the dithizone (I). The first Pb-(I) complex is extracted with 1% HNO₃ and, after removal of CHCl₃, the combined extracts are used directly for the colorimetric comparison. E. H. S.

Soap hæmolysis as a fatty acid hæmolysis. A. MEDVECZKY and L. VOTIN (Biochem. Z., 1936, 284, 244—246).—Hæmolysis by Na oleate is due to liberated oleic acid, the reaction for both not occurring at $p_{\rm fl}$ 8.5—9.0, but increasing as $p_{\rm fl}$ decreases from 8.0 to 4.5. F. O. H.

Venom of Lachesis (Bothrops) snakes. II. Preparation of bothropotoxin. D. VON KLOBU-SITZKY (Arch. exp. Path. Pharm., 1936, **180**, 479— 481).—The highly purified toxin (free from N, P, Fe, and halogens; min. lethal dose 0.055—0.060 mg.) (cf. A., 1935, 1394) is prepared from aq. NaCl extracts of the dried venom by acid-heat-coagulation of proteins, removal of impurities by dil. alkali, pptn. with EtOH, and dialysis. F. O. H.

Chemical aspects of immunity. A. SORDELLI (Anal. Asoc. Quím. Argentina, 1935, 23, 106—125).— A lecture.

Antigenic character of proteins heated in sucrose media. W. MUTSAARS and J. ALEXANDER (Compt. rend. Soc. Biol., 1936, 121, 898-899).---Sucrose in high concess. prevents the destruction of the antigenic power of serum-proteins by heating to 75°. R. N. C.

Influence of nutrition on the natural immunity reactions of the blood and on skin reactions to bacterial toxins. E. M. J. ANDERSON and A. H. H. FRASER (J. Immunol., 1934, 27, 1—16; Chem. Zentr., 1935, ii, 396).—Caloric dietary deficiency decreased the hamolytic activity of sheep serum to rabbit redcells but increased its agglutinating power with *Br. abortus.* Cod-liver oil and Ca had no effect on the natural immunity reactions. G. H. F.

Immunological study of the reduction of disulphide groups in proteins. D. BLUMENTHAL (J. Biol. Chem., 1936, **113**, 433—437).—The influence of reduction of serum- (I) and ov-albumin (II) by thioglycollic acid and cysteine, respectively, and re-oxidation by H_2O_2 on their antigenic properties is determined by injecting them into rabbits and measuring the N content of the ppts. formed with the antisera. Reduction and re-oxidation of (I) decreases the N pptd. in the cross reaction as compared with the homologous pptn., and prevents the usual inhibition of pptn. by excess of antigen. Similar treatment of (II) has no influence on its immunological behaviour.

H. D.

Effect of concentration of ammonia and of the time factor on the antigenic properties of a deformalinised anavaccine. A. A. KLIMENTOVA and E. S. AVTONOMOVA (Arch. Sci. biol. U.S.S.R., 1934, 35, B, 837—842).—Treatment of typhoid (formalinised) vaccine with aq. NH₃ to remove excess of CH₂O, followed by neutralisation to $p_{\rm H}$ 7·1 with HCl, did not lower the antigenic potency. Prolonged treatment (24 hr.) with NH₃ lowered the titre.

CH. ABS. (p)

Effect of phenol on the antigenic and immunising properties of formalinised vaccines. L. A. TSCHERNAJA and N. P. IVANOV (Arch. Sci. biol. U.S.S.R., 1934, 35, B, 821-823).—Neither CH₂O treatment nor the further addition of 0.5% PhOH affected the potency of typhoid vaccines.

Сн. Авз. (р)

Dynamics of the transformation of diphtheria toxins of various types into anatoxins. T. I. IVANOVA and V. N. KALNINA (Arch. Sci. biol. U.S.S.R., 1934, 35, B, 631-640).—The mechanism of the change is examined. CH. ABS. (p)

Purification of antidysenteric serum with sodium sulphate. O. GARCIA, R. VILLAAMIL, and C. PAÑGANIBAN (Philippine J. Sci., 1935, 58, 471—479).—To the dil. serum is added Na_2SO_4 to produce a final concn. of 20 g. per 100 c.c. The ppt. is washed and dissolved in H_2O , and the solution is dialysed.

A. G. P.

Rôle of the toxin in staphylococcal infection. F. C. O. VALENTINE (Lancet, 1936, 230, 526—531; cf. *ibid.*, 1932, 222, 506).—Methods of preparing the toxin and of determining the leucocidin (I) in toxin and the anti-(I) in serum are described. Fresh evidence that α -hæmolysin and (I) are distinct substances is provided. L. S. T.

Chemiovaccine producing in the rabbit immunity against tubercle infection. M. MACHE-BCUF and J. DIERYCK (Compt. rend., 1936, 202, 164— 166).—Tubercle bacilli, treated with H_2O and then with COMe₂ and Et₂O to remove toxic non-antigenic substances, possess high immunising activity.

W. O. K.

Crystal orientation in tooth-enamel. W. F. BALE and H. C. HODGE (Naturwiss., 1936, 24, 141— 142).—The cryst. substance of tooth-enamel is identical with that of the dentine, but differences in the X-ray diffraction diagrams arise owing to preferential crystal orientation in the enamel, which is seldom found in the dentine. A. J. M.

Dissolution rate of apatite in an average mouth. P. J. BREKHUS and W. D. ARMSTRONG (J. Dental Res., 1934, 14, 455-456).—Slow dissolution confirms that the inorg. matter of tooth enamel is apatite. CH. ABS. (p)

Histo-chemical localisation of chlorine in the gastric mucosa. L. LISON (Compt. rend. Soc. Biol., 1936, **121**, 900–902).—The lining cells of the mucosa of laboratory animals contain no Cl.

R. N. C.

Changes in potassium and calcium content in the gravid uterus. H. WINKLER (Monatsschr. Geburtsh. Gynakol., 1935, 100, 211).—The K content of the non-pregnant human uterus (mean 1.61% of dried musculature in 9 cases) is very variable. It rises slowly during the earlier part of pregnancy and very rapidly during the last few months (to 2.5%). Ca is much more uniform (0.5%), but drops below the non-pregnant val. near term. NUTR. ABS. (m)

Determination of α -amino-acids by the ninhydrin reaction.—See this vol., 620.

Biogenic amines in toxicological investigations. A. VERDINO (Deut. Z. ges. gerichtl. Mcd., 1935, 25, 74–78; Chem. Zentr., 1935, ii, 889). Tyramine and a base, probably $C_{10}H_{18}O_2N_2$, were isolated from a corpse 3 months after interment.

J. S. A. Total glutathione in tissue: determination and distribution in normal animals. L. BINET and G. WELLER (Bull. Soc. Chim. biol., 1936, 18, 358—378).—The author's method for the determination of glutathione (I) (A., 1935, 1153) is applied to the tissue of *Carassius auratus* and to various animal organs. Large variations in the oxidised (I) content of the individual tissues are observed; in the intestine there is none, but the val. rises to 20-50% of the total (I) in lung and brain. The total (I) content shows less individual variation, and is characteristic of each tissue. A. L.

Amino-acids of the mixed proteins of ox muscle. Basic amino-acids. H. G. REES (Analyst, 1936, 61, 160–164).—Arginine (6·18%), histidine (0·52%), and lysine (7·18%) have been determined in the mixed proteins [N 15·87% (amide, 7·2%; humin, 1·6%; basic, 24·3%; NH₂-, 66·6%; non-NH₂-, 0·8%)] of ox muscle by Vickery's modification of Kessel's procedure. E. H. S.

Determination of the fatty acids in monoaminophosphatides. M. FLATTER (Bull. Soc. Chim. biol., 1936, 18, 406-413).—Attempts are made to avoid low vals. in the determination of the fats resulting from hydrolysis of monoaminophosphatides. A modification of the method of Lemeland (A., 1922, ii, 666) and hydrolysis in AcOH solution with 3N-HCl were best, giving almost theoretical results with lecithin. A. L.

Seasonal differences in the fat and protein content of nerve tissue of the frog. J. ROSENBERG (Arch. internat. Physiol., 1935, 41, 429–433).—In the cerebrospinal tracts the N content was $14\cdot7$ — $16\cdot0$ mg. (mean 15·3 mg.) and in the sciatic nerves $18\cdot0$ — $20\cdot2$ mg. (mean 19·1 mg.) per g. of fresh material, being highest in May and June and lowest in Feb. and July. The corresponding fatty acid contents were $46\cdot9$ — $67\cdot6$ mg. (mean $61\cdot9$ mg.) and $88\cdot1$ — $130\cdot0$ mg. (mean $119\cdot2$ mg.), being highest in summer and autumn and lowest during hibernation. NUTR. ABS. (m)

Bio-organic chemistry of the proteins. V. SADIKOV (Arch. Sci. biol. U.S.S.R., 1934, 35, A, 297– 331).—A theoretical discussion of the structure of constituent groups which are components of living protein systems. Ch. Abs. (p)

Influence of method of preparation and of cations on the isoelectric point of ovalbumin. E. R. B. SMITH (J. Biol. Chem., 1936, 113, 473-478). —The isoelectric point of ovalbumin is independent of the salt used for recrystallisation; it decreases linearly with the ionic strength of the buffers used, and the slope of the ionic strength against isoelectric point varies with the ions in the OAe' buffer mixtures.

H. D.

Proteins of muscle in rigor. A. E. MIRSKY (J. Gen. Physiol., 1936, 19, 571—575).—No activation of •SH groups accompanies the formation of insol. protein in rigor, but occurs in subsequent denaturation. H. G. R. Thiol and disulphide groups of proteins. IV. Thiol groups of the proteins of muscle. A. E. MIRSKY (J. Gen. Physiol., 1936, 19, 559-570). Denaturation or increased $p_{\rm H}$ causes a rise in the no. of active 'SH groups in the proteins of minced muscle (halibut, *Rana catesbiana*, rabbit), except that of the cryst. lens. Little denatured protein is present in minced muscle. H. G. R.

Formation of myelin studied in polarised light. G. LEBOUCQ (Compt. rend. Soc. Biol., 1936, 121, 875-877).—Myelin appears very late in the embryonic life of the rat, but crystals of cholesterol or its esters are observed at earlier stages. R. N. C.

Proteins of hen egg-yolk. M. PIETTRE (Compt. rend., 1936, 202, 699—701).—An albumin and a myxoprotein are isolated and examined. The fatty matter contains cholesterol. Bilirubin is also present.

A. G. P.

Gravimetric determination of total body- and organ-protein. T. ADDIS, L. J. POO, W. LEW, and D. W. YUEN (J. Biol. Chem., 1936, 113, 497-504).— The general method is to drop the fresh tissue into boiling OAc' buffer at $p_{\rm H}$ 5 which prevents autolysis, ppts. the proteins, and removes H₂O-sol. compounds. Fats are removed by hot EtOH, and the residual protein is dried in a vac. and weighed. Detailed procedures for the different organs are given, together with data obtained on normal rats. F. A. A.

Iodination of hæmoglobin, globin, and nitroglobin.—See this vol., 619.

Visual cycle and protein denaturation. A. E. MIRSKY (Proc. Nat. Acad. Sci., 1936, 22, 147—149).— Visual purple is considered to consist of a protein conjugated with a carotenoid (retinene), and this complex is reversibly denatured by light. The denatured complex (visual yellow) is in equilibrium with its constituents. The energy requirements found approx. agree with those expected of such a reaction.

F. A. A.

New forms of visual purple found in sea fishes: visual cells of origin. L. E. BAYLISS, R. J. LYTHGOE, and K. TANSLEY (Proc. Roy. Soc., 1936, B, 120, 95—113).—A no. of new forms of visual purple, found in sea fishes, with max. of absorption between 505 and 545 m μ , are described. Absorption curves, obtained by a null-point photo-electric spectrophotometer, are given. The instrument gave accurate results using only 0.5 c.c. of solution and with a light intensity not high enough to bleach the visual purple. E. A. H. R.

Anomalies in the absorption spectrum and bleaching kinetics of visual purple. A. M. CHASE (J. Gen. Physiol., 1936, **19**, 577–599).—During bleaching of visual purple by light, winter extractions show an intermediate yellow colour not observed in summer extractions; these conditions can be simulated by variation in the $p_{\rm H}$, since an indicator (yellow in acid, colourless in alkali) is formed as an intermediate in the decomp. Temp. has no effect on the bleaching of alkaline solutions, but acid solutions at low temp. approximate to winter conditions and at higher temp. to summer. No variation of p_{π} is observed during bleaching or in summer or winter extractions.

H. G. R. Erythrocruorin (hæmoglobin) of the nervous system of Aphrodite. J. ROCHE and C. RAPHAËL (Compt. rend. Soc. Biol., 1936, 121, 1024—1026).— The pigment (I) shows bands at 576·4 and 539·5 mµ, whilst the reduced form shows one band at 557 mµ. CO forms a compound with bands at 570·6 and 538 mµ. C_5H_5N and $Na_2S_2O_4$ produce a hæmochromogen spectroscopically identical with protohæmatin. The isoelectric point of (I) is $p_{\rm H}$ 5·8, showing that (I) is related to both muscular hæmoglobins and erythroeruorins. R. N. C.

Muscular hæmoglobin and cytochrome. J. ROCHE (Compt. rend. Soc. Biol., 1936, 121, 1026– 1028).—N₂H₄ reduces muscular methæmoglobin to a hæmochromogen (bands at 525, 552–554, and 570– 572 m μ), and to hæmoglobin, which forms oxyhæmoglobin with atm. O₂. There is no evidence of a reversible transformation to cytochrome. R. N. C.

Nature and permeability of chitin. II. Permeability of the uncalcified chitin lining the foregut of Homarus. C. M. YONGE (Proc. Roy. Soc., 1936, B, 120, 15—41).—The bounding cuticle of the integument is removed by prolonged treatment with N-alkali. The permeabilities of fresh and treated membranes to fatty acids, mineral acids, alkalis, and Cl' are very different. Rigidity is conferred on chitin by impregnation with scleroproteins or Ca salts, and its high permeability is limited by the cuticle. E. A. H. R.

X-Ray investigations of chitin.—See this vol., 414.

"Adrenosterone."-See this vol., 605.

Separation of hæmatopoietic principles from liver. B. EISLER, E. HAMMARSTEN, and H. THEO-RELL (Naturwiss., 1936, 24, 142—143).—During cataphoresis of active liver extracts at $p_{\rm H}$ 4.5—6.6, substances R and E migrate to the anode and cathode, respectively. R increases reticulocytes but not erythrocytes and is stable to heat or changes in $p_{\rm H}$, whilst E does not change the blood picture; R+E, however, increase reticulocytes and subsequently erythrocytes. R can be replaced by substances such as Na₄ thymonucleate. F. O. H.

Dietary requirements for lactation. IV. Nature of factor L, a specific dietary factor for lactation. W. NAKAHARA, F. INUKAI, and S. UGAMI (Bull. Agric. Chem. Soc. Japan, 1936, 12, 1-8). —The factor is separated from liver extracts by making use of the facts that it is not adsorbed by fuller's earth, that it is pptd. from the non-adsorbable fraction by Ba(OH)₂ and MeOH, and from the decomposed Ba ppt. by phosphotungstic acid. The final ppt. was active in doses of < 50 mg. per rat. H. D.

Hæmocyanin in heavy water.-See this vol., 563.

Determination of diffusion constants of proteins by a refractometric method.—See this vol., 563.

Rôle of coacervation in the resorption of fats.— See this vol., 563. Blood-coagulation-accelerating properties of maternal milk. W. KRASZEWSKI and L. LINDEN-FELD (Klin. Woch., 1935, 14, 863-864).—The acceleration is due to a cytozyme. R. N. C.

Heating of human milk and its nutritional results : converging point for human milk. W. CATEL (Deut. med. Woch., 1935, 61, 985–988).

R. N. C.

Inhibition of coffee diuresis by milk and milk products. K. HITZENBERGER and D. ROLLER (Wien. Arch. inn. Med., 1935, 27, 133-141; Chem. Zentr., 1935, ii, 874).—The inhibition is probably due to lecithin. R. N. C.

Tyndall light of milk.—See this vol., 562.

Permeability of the mammary gland. M. PIETTRE (Compt. rend., 1936, 202, 166-169).—Low secretory activity of the mammary gland associated with low lactose content of the milk results in high [Cl] in consequence of a more complete equilibrium with serum-Cl being established. Thus the apparent compensation of osmotic pressure frequently observed is accidental and not essential. W. O. K.

Colloid osmotic pressure of the hæmolymphs of some terrestrial invertebrates. P. MEYER (Nature, 1936, 137, 401—402; cf. A., 1935, 1516, 1524). —The colloid osmotic pressure of the body fluids of marine and terrestrial gastropod molluscs is practically identical, but rises steadily from crustaceans to arachnids and insects. L. S. T.

Composition of saliva from the separate glands in children. A. I. MACHTINGER and A. J. FEDOROV (Arch. Sci. biol. U.S.S.R., 1934, 34, 587— 590).—Parotid saliva in children of 12—14 years is richer in amylase and org. matter than that of the submaxillary. The parotid is the chief digestive gland in children. Cn. Abs. (p)

Human saliva. II. Procedure for calcium analysis. W. W. WAINWRIGHT (J. Dental Res., 1934, 14, 425–434).—The centrifuged sample is treated with $CCl_3 \cdot CO_2H$ and again centrifuged. Ca is determined by pptn. as CaC_2O_4 and titration with $KMnO_4$. CH. ABS. (p)

Bile pigments. I. Ehrlich's test for urobilinogen and Schlesinger's reaction for urobilin. H. N. NAUMANN (Biochem. J., 1936, 30, 347-351).— The Ehrlich test for urobilinogen with

 $p\text{-NMe}_2\cdot C_6H_4\cdot CHO$ in HCl is most satisfactory when carried out at 20° with a final [HCl] of $2\cdot 5\%$; the more important interfering substances in urine are detailed. The Jaffé-Schlesinger test for urobilin is quite sp. H. D.

Role of coacervation in the formation of biliary calculi. A. DE KUTHY (J. Chim. phys., 1936, 33, 180—182; cf. A., 1935, 580, 1006).—The pptn. of cholesterol in the gall-bladder is attributed to coacervation by protein. R. S.

Effect of jejunal feeding on gastric acidity. A. A. APPELL (Arch. Surg., 1935, 30, 875–880).— Gastric contents had a lower $p_{\rm H}$ and more acid after a milk-syrup diet given by jejunum than when given by mouth. The jejunal content was slightly more alkaline after jejunal than after oral feeding. Gastric secretion was increased by food constituents in the (ascending) order, sucrose, peptone, butter, glucose, cream, meat extract, glycine, cottonseed oil, casein. CH. ABS. (p)

Hydrochloric acid and gastric motility. C. C. DIMITRIU and T. TANASOKA (Bull. Acad. Med. Roumanie, 1936, 1, 212—218).—The motility and HCl secretion of the human stomach are independent. F. O. H.

Therapeutics of [gastric] hyperacidity. G. WALLBACH (Arch. Farm. sperim., 1935, 60, 587— 594). F. O. H.

Composition of the gastric mucosa. M. BEREND and E. FARKAS (Magyar orvosi Arch., 1935, 36, 72—74; Chem. Zentr., 1935, ii, 65).—Neither esters of HCl nor enzymes which can hydrolyse them occur in the gastric juice. Commercial popsin preps. contain bound sugar, whilst cryst. pepsin is sugar-free. A powerful reducing substance can be extracted by EtOH from the gastric mucosa of the horse, after previous extraction with COMe₂ and Et₂O; its purification and properties are described. R. N. C.

Osmotic pressure of the contents of the stomach compartments of the sheep. D. G. DAVEY (J. Agric. Sci., 1936, 26, 328-330).—Vals. for the abomasum were almost identical with those for blood. A. G. P.

Oxygen and nitrogen content of the urine. A. SIMON (Pfluger's Archiv, 1935, 236, 705-709).— Urinary O_2 and N_2 are dependent on the concn. and ∞ the *d* of the urine. The O_2 tension is independent of the concn. and is of the order of those of arterial and pre-capillary blood. O_2 and N_2 are increased in urine excreted at high atm. pressure; the O_2 tension is then > that of 100% saturated hæmoglobin, but < the alveolar O_2 tension. R. N. C.

Paths of excretion and mineral balance in animals drinking saline and alkaline waters. V. G. HELLER and M. HADDAD (J. Biol. Chem., 1936, 113, 439-447; cf. A., 1934, 1020).-90% of injected Cl' was excreted in the urine of rats; increasing the S and P intake increased the retention and urinary excretion. CaCl₂ is better absorbed than other Ca salts; 3% of ingested CaCl₂ is eliminated in the urine as compared with 10% of MgCl₂. H. D.

Urinary excretion of silica in non-silicotic humans. L. J. GOLDWATER (J. Ind. Hyg., 1936, 18, 163—166).—In non-silicotic humans, even on a const. diet, the urinary [SiO₂] shows very wide fluctuations, correlated with the urinary d. Caution is therefore required in the interpretation of urinary SiO₂ findings. W. O. K.

Knoop's histidine reaction in urine. P. E. SIMOLA and V. MANTYLÄ (Suomen Kem., 1936, B, 9, 4-5).—The test is modified by adjusting the acidity of the urine to $p_{\rm H}$ 4.5—5.5, by heating the reaction mixture for a short time only, and by adding amyl alcohol which extracts the coloured product. A positive reaction was obtained with 62% of the pregnancy urines examined. The reaction is not due to histidine. A. G. P.

Simplified detection of defence enzymes in urine. E. ABDERHALDEN (Fermentforsch., 1936, 15, 93—120; cf. A., 1935, 1268).—Further simplification is attained by heating the sample (0.5 c.c.) at 100° in an oven instead of boiling. 7.5—25 c.c. (usually 10 c.c.) of urine are required. W. McC.

Chemical detection of pregnancy. W. HECK-STEDEN (Deut. Z. gcs. gerichtl. Med., 1935, 24, 253— 257; Chem. Zentr., 1935, ii, 889).—The Kapeller-Adler detection of histidine in urine is untrustworthy. J. S. A.

Liver injury by chloroform, nitrogen metabolism, and conservation. Liver function and hæmoglobin production in anæmia. F. S. DAFT, F. S. ROBSCHEIT-ROBBINS, and G. H. WHIPPLE (J. Biol. Chem., 1936, **113**, 391-404).—The fasting anæmic dog when given Fe by vein forms new hæmoglobin, whether the liver is normal or injured by CHCl₃ anæsthesia, except in the final stages of liver injury. The liver still forms urea, and there is an increase in the amount of uric acid, urinary N, and creatine. The creatine is probably derived from muscle-tissue injured by toxic products from dead and autolysing liver cells. J. N. A.

Blood-sugar content and blood pressure during anaphylactic shock in non-anæsthetised and non-fastened dogs. M. OHGURI (Tôhoku J. Exp. Med., 1935, 25, 437—444).—A transitory decrease in blood-sugar was followed by hyperglycæmia with a return to normal in 1.0—1.5 hr. CH. ABS. (p)

Adrenaline discharge, blood-sugar, and blood pressure during anaphylactic shock in nonanæsthetised and non-fastened dogs. H. SATO, M. OHGURI, and M. WADA (Tôhoku J. Exp. Med., 1935, 25, 504—519).—Adrenaline output increased during shock and preceded hyperglycæmia by 2—10 min. CH. ABS. (p)

Gas protection. I. Treatment of phosphorus burns. O. MUNTSCH (Gasschutz u. Luftschutz, 1935, 5, 103—104; Chem. Zentr., 1935, ii, 880).— Repeated immersion in 5% aq. NaHCO₃ is recommended. H. N. R.

Chemistry and cancer. Chemical carcinogenic agents. R. LEROUX (Chim. et Ind., 1936, 35, 520-524).—A lecture.

Effect of hormones on the development of tumours. W. JEZIERSKI (Endokrinol., 1935, 15, 250-253; Chem. Zentr., 1935, ii, 65). R. N. C.

Carcinogenic activity and substantivity. W. BRADLEY (Nature, 1936, 137, 404—405).—An analogy between the dyeing properties and the carcinogenic activity of certain anthracene derivatives is discussed. L. S. T.

Role of ultra-violet rays in the development of cancer provoked by the sun. A. H. Roffo (Lancet, 1936, 230, 472–474).—The sun's rays can produce malignant tumours in man and in rats without the intervention of other agents. Irradiation produces a local excess of cholesterol before histological changes are observed. L. S. T.

Differentiation between the principle of the urine of cancer active on the adrenal cortex, and the principle active on the ovary. M. ARON (Compt. rend. Soc. Biol., 1936, 121, 973—975).— Theoretical. R. N. C.

Absence of bile salts from blood-serum in cancer. D. ABRAGAM (Compt. rend. Soc. Biol., 1936, 121, 950-951).—The vanillin-H₃PO₄ reaction is negative. R. N. C.

Blood colouring matter of cancerous subjects. E. SEHRT (Münch. med. Woch., 1935, 82, 624—625; Chem. Zentr., 1935, ii, 866—867).—A confirmatory blood-test for cancer is described. H. N. R.

Total sulphur and iodine in normal and malignant tissues. H. TOYODA, S. KISHI, and W. NAKAHARA (Gann, 1935, 29, 29–39).—The total S content of Fujinawa rat sarcoma, Bashford mouse carcinoma, or Rous chicken sarcoma was > that of normal kidney or spleen but > that of skeletal muscle, blood, heart, or liver. Tumour tissue contains more I than does normal liver or muscle. In sarcomabearing rats the total S of various tissues was >normal and generally paralleled by increased I contents. The I content of the thyroid was < normal. CH. ABS. (p)

Metabolism of malignant tumour. I. Influence of amino-acids on the tissue respiration of tumour. S. MIYAO (Gann, 1935, 29, 10–28).— Effects of a no. of NH_2 -acids on tumour tissue are compared with those on normal spleen and liver tissues. CH. ABS. (p)

Production of carcinoma of the liver by feeding o-aminoazotoluene. T. SASAKI and T. YOSHIDA (Virchows Arch., 1935, 295, 175-200).

NUTR. ABS. (m) Formation of sarcoma by repeated injections of highly concentrated glucose solutions in rats fed with o-aminoazotoluene. Y. NISHIYAMA (Gann, 1935, 29, 1—9). CH. ABS. (p)

Soluble organo-metallic complexes of dehydroascorbic acid. Increase of their effects on cancers by variation of the metal. F. ARLOINO, A. MOREL, and A. JOSSERAND (Compt. rend., 1936, 202, 598—600; cf. A., 1935, 1526).—Fe^{III}—Pb–Na and Fe^{III}—Ba–Na complexes of dehydroascorbic acid can be used for the treatment of gastric cancer, but with buccopharyngeal cancers they are less active than the Fe^{III}—Na complex. Cu–Na, Cu–Pb–Na, and Cu–Ba–Na complexes have actions < those of the Fe^{III} complexes. The effect of a complex decreases after a time, but is renewed by using another complex containing the same fundamental metal. J. N. A.

Aqueous extracts of enamel and dentine in relation to dental caries. M. KARSHAN, R. WEINER, and N. STOFSKY (J. Dental Res., 1934, 14, 445–454). —Aq. extracts contained Ca, Mg, P, and a substance reacting with lactic acid to give CO_2 . First extractions contained Na and Cl. After 5 extractions only apatite dissolved. Extracts of enamel reacted positively to Folin's PhOH reagent and gave a negative biuret test. Dentine contains a sol. protein which was relatively smaller in amount in carious teeth.

CH. ABS. (p)

Effect of vitamin-C on the causative agent of diphtheria. P. POLÓNYI (Wien. med. Woch., 1935,

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85, 685-686).—Vitamin-C has a favourable action in diphtheria, and reduces the virulence of the bacilli. R. N. C.

Di-iodotyrosine and Lugol's solution in the treatment of hyperthyroidism. H. Gotta (Z. klin. Med., 1935, 128, 1-11; Chem. Zentr., 1935, ii, 72-73).—The therapeutic effects are the same. R. N. C.

Jaundice due to phenobarbital. C. A. BIRCH (Lancet, 1936, 230, 478-479). L. S. T.

Reduced glutathione in leprosy. R. O. PRUD-HOMME (Compt. rend. Soc. Biol., 1936, 121, 1167— 1169).—Reduced glutathione of the liver and spleen is normal if the organs themselves are not affected. The val. is reduced when there is considerable penetration of leprous tissue. H. G. R.

Six-day treatment with atebrine, atebrine+ plasmoquine-simplex, plasmoquine-compositum, quinoplasmine, and quinine. A. KIRLOV-DRENOVSKI (Arch. Schiffs- u. Tropen-Hyg., 1935, 39, 243-252; Chem. Zentr., 1935, ii, 1058).—The atebrine-plasmoquine is most effective. H. N. R.

Rôle of the liver in the mechanism of uranium glycosuria. R. WEEKERS (Compt. rend. Soc. Biol., 1936, 121, 868—870).—Liver-glycogen is reduced in acute and sub-acute U nephritis in the rat. Glycogen storage of the liver is reduced only in sub-acute nephritis with intermittent glycosuria, which is hence not due to liver disorder. R. N. C.

Composition of plasma and red blood-cells in nephropathy. A. FIESCHI and P. LARIZZA (Minerva Med., 1935, I, 629-630).—In renal sclerosis the Na, K, inorg. S, and P of red cells increases and protein-S decreases. Similar conditions occur in acute nephritis and there is an accompanying hypochloramia.

CH. ABS. (p)

Calcium and phosphorus metabolism in osteomalacia. IV. Acute parathyroid hormone poisoning. H. I. CHU, S. K. CHOU, K. C. CHEN, S. H. WANG, S. H. LIU, and R. R. HANNON (Chinese Med. J., 1936, 50, 1-16).—In a male showing marked skeletal deformities indicative of osteomalacia, serum-Ca and -inorg. P were normal and relatively insensitive to treatment with vitamin-D and ultra-violet irradiation. 80 units daily of parathyroid hormone for four days resulted in marked hypercalcæmia, vomiting, collapse, and death. F. A. A.

Tyrosine index of polypeptidæmia in malaria therapy [of paralysis]. P. TOMESCO, N. G. IONESCO, and P. CONSTANTINESCO (Compt. rend. Soc. Biol., 1936, 121, 1209—1211).—The val. decreases at first and then rises, generally to > the original.

H. G. R.

Pregnancy tests. S. ASCHHEIM (J. Amer. Med. Assoc., 1935, 104, 1324—1329).—The mouse test and Friedman's method are described. CH. ABS. (p)

Inorganic composition of blood serum in schizophrenics. E. T. MINKER-BOGDANOVA, S. A. POVORINSKAJA, and J. A. POVORINSKI (Arch. Sci. biol. U.S.S.R., 1934, 36, B, 339–343).—Variations in serum-Na, -K, -Ca, -Mg, -inorg. P, and -Cl in schizophrenics were > in normal individuals. In general vals. for Ca were > and for Na and Cl < normal. The K/Ca and Na/Ca ratios were markedly < normal. CH. ABS. (p)

Impregnation of the organism by dust. IV. Laboratory animals. R. FABRE and E. KAHANE (J. Pharm. Chim., 1936, [viii], 23, 217-232).—Examination of various organs of rabbits, guinea-pigs, and rats exposed to dust-laden (coal, sandstone) air indicates that the particles (even when 0.1-0.2 mm. diameter) are transported (at least partly by the blood) to various tissues, where they remain chemically unchanged. F. O. H.

Mechanism of the protective action of bismuth in experimental syphilis. C. LEVADITI, G. HORNUS, A. VAISMAN, and Y. MANIN (Bull. Acad. Méd., 1934, 112, 306—317; Chem. Zentr., 1935, ii, 1059; cf. A., 1935, 1159).—Bivatol is more effective than trépol against experimental syphilis in rabbits.

H. N. R.

Nitrogen and mineral metabolism in T. congolense disease. M. H. FRENCH (Ann. Rep. Dept. Vet. Sci. Tanganyika, 1934, (1935), 59-64).—Infected oxen and sheep show an increased rate of excretion of N, Ca, K, and P. Mg balances appear not to be disturbed. The effect on Na and Cl metabolism appears to depend on the level of intake.

NUTR. ABS. (m)

Variations in the catalase content of human blood. D. DERIBAS and J. KORNMANN (Bull. Soc. Chim. biol., 1936, 18, 418—423).—The blood-catalase in tuberculosis varies with the nature of the therapeutic treatment, the temp., and the mental state of the individuals. A. L.

Effect of prolonged muscular exercise on metabolism. F. C. COURTICE and C. G. DOUGLAS (Proc. Roy. Soc., 1936, B, 119, 381-439).—Confirmatory evidence is obtained that a high-carbohydrate diet taken on the day preceding the exercise may have an effect on some aspects of metabolism > that of an ingestion of easily assimilable carbohydrate shortly before exercise. During rest after exercise, very little conversion of fat into carbohydrate occurs. The principal factor causing low R.Q. and ketosis is the low ratio of carbohydrate to fat oxidised. Bloodsugar level remains normal but evidence of a reduced sugar-tolerance is obtained. A. G. P.

Metabolism of nerve-tissue of the frog during (A) rest and (B) stimulation. J. ROSENBERG (Arch. internat. Physiol., 1935, 41, 434–445, 446–455).— (A) In resting isolated tissues in Ringer's solution the cerebrospinal (white) tracts consume more O_2 and lose more nitrogenous (I) and fatty substances (II) than do the sciatic nerves. The loss of (II) is > and about = that of (I) in the cerebrospinal tracts and sciatic nerves, respectively. Hibernation causes an increase in N and fat metabolism and a decrease in O_2 consumption. Possibly the disappearance of (I) and (II) from nerve-tissue occurs without the intervention of free O_2 .

(B) Electrical stimulation causes an increase, which ∞ the strength and frequency of the current, in the metabolism of nerve-tissue. NUTR. ABS. (m)

Changes in living substance involved in the reversible transition into the dead state. D. NASONOV and V. ALEXANDROV (Arch. Sci. biol. U.S.S.R., 1934, 36, A, 95-112).-The authors' work on adsorption phenomena at cell surfaces as influenced by chemical agents is reviewed. CII. ABS. (p)

Adsorption and bioelectric potential in frog skin. K. MOTOKAWA (Japan. J. Mcd. Sci., III, 1935, 3, 177-201).—The e.m.f. across frog skin is measured by bathing one side in Ringer's and the other in test solutions. With low [NaCl] non-electrolytes in the test solution lowered the c.m.f. in the order glucose > sucrose > urea. The order is reversed when the [NaCl] is higher. The NaCl in the adsorption layer of the skin causes the e.m.f. and is displaced by added non-electrolytes. CH. ABS. (p)

Influence of valency and concentration of ions on the potential difference of frog skin. K. Мотокаwa (Japan. J. Med. Sci., III, 1935, 3, 203-209).-Frog skin has an inner asymmetry which is increased by anions and decreased by cations (cf. preceding abstract). Сп. Abs. (p)

Membranes as models of physiological objects. (Permeability and salt absorption.) R. HOBER (Naturwiss., 1936, 24, 196-202).-A lecture.

Nutrition question. R. HUTCHISON (Lancet, 1936, 230, 583-585).-A discussion. L. S. T.

Problems of animal nutrition and animal husbandry in Northern Nigeria. A. W. ANDER-SON and O. T. FAULKNER (Imp. Bur. Animal Nutrition Tech. Comm., 1933, No. 4, 52 pp.).—Nigerian pasture contains less N, Ca, P, and K than does European pasture. Supplements of steamed bone flour and NaCl had no beneficial action. Pica (controlled by Na₂CO₂) was not associated with shortage of Ca or P in the diet. Сн. Авз. (р)

Diet and colour of birds. H. L. RATCLIFFE (Nature, 1936, 137, 402).-Inclusion in the diet of a greater variety of proteins, more fat-sol. vitamins, and more mineral salts, especially of Ca and P, restores much of the natural colouring lost in captivity.

L. S. T.

Effect of alkali and vegetable feeding on blooduric acid and urate excretion. W. MORACZEWSKI, S. GRZYCKI, T. SADOWSKI, and W. GUCWA (Klin. Woch., 1935, 14, 557-562).-Feeding with purinerich substances together with apples lowers blood- and urinary urates, whereas potatoes or alkali instead of apples increase them. H_2O lowers blood-urate by accelerating its renal excretion. R. N. C.

Increase in weight due to [feeding of] wheat, oats, and barley to rats on a vitamin-A-free diet. M. MALMBERG and H. VON EULER (Biochem. Z., 1936, 284, 238-243).-The three cereals have a growth-promoting action possibly due to xanthophyll and other carotenoids present. F. O. H.

(A) Influence of acid- or base-forming diet on metabolism of rabbits at work and rest. J. M. HEFTER and E. L. GLINKA-TSCHERNORUTZKAJA. (B) Influence of myolysate on metabolism of rabbits kept on an acid- or base-forming diet. (C) Action of myolysate on blood-sugar content on an acid- or base-forming diet, at rest or at work. E. L. GLINKA-TSCHERNORUTZKAJA (J. Physiol.

U.S.S.R., 1935, 18, 78-83, 84-88, 89-92).-(A) The alkali reserve decreased on acid-forming and increased on base-forming diets. Work had no effect on metabolism with either diet.

(B) Injection of myolysate (I) increased the total N excretion, urinary NH₃, and the total and reduced glutathione, and decreased the alkali reserve. Effects were more marked with a base-forming than with an acid-forming diet.

(c) Injection of 0.1 c.c. of standard (I) caused an increase in blood-sugar which was greater with a baseforming than with an acid-forming diet and greater at rest than at work. 0.01 c.c. of (I) produces the opposite effect. CH. ABS. (p)

Comparative influence of hay and grass, ensiled without mineral acid, on the acid-base equilibrium of cattle. E. BROUWER and N. D. DIJKSTRA (Bied. Zentr. [Tierernahr.], 1935, 7, B, 361-371).—The $p_{\rm H}$ of urine and the total CO, were somewhat lower when silage was fed, but the corresponding vals. for blood-plasma were the same as when hay was used. Org. acids in silage were utilised and showed no tendency to accumulate at any stage of metabolism. A. G. P.

Effect of progressive ripening of fodders on the mineral nutrition of cattle. I. Mineral composition and mineral balance. A. V. IYER. II. Urine characteristics. N. K. AYYAR. III. Blood characteristics. N. C. DAS GUPTA (Indian J. Vet. Sci., 1935, 5, 129-139, 140-147, 148-157).--I. The mineral composition of various types of hay was determined. In bullocks the stage of maturity had a marked effect on mineral assimilation. The digestibility of the protein apparently bore no relationship to the P2O5 content of the fodder.

II. Feeding early cut fodders resulted in the elimination of large vols. of urine because of the high alkali content. With more mature fodder, the vol. of the urine and the total fixed bases fell and the $p_{\rm H}$ tended to decrease. As the urine became more acid there was an increased deflexion of CaO and MgO to this path of excretion.

III. The serum-Ca level was unrelated to the Ca content or the Ca : P ratio of the fodder. It was most influenced by the stage of maturity. The serum-P level was affected by the nature of the fodder and the dietary P level. NUTR. ABS. (m)

Effect of yeast on malnutrition of rats caused by a high sucrose diet. H. ARIYAMA (J. Agric. Chem. Soc. Japan, 1936, 12, 1-10).-The factor in yeast which enables rats to thrive on high-sucrose diets containing all the known vitamins is extracted by dil. aq. EtOH, adsorbed on acid clay, and is completely destroyed by autoclaving at $p_{\rm H}$ 8; EtOH extracts of ox liver or green vegetables have a smaller potency H. D. than the yeast extracts.

Effects of uncomplicated phosphorus deficiency on œstrus cycle, reproduction, and composition of tissues of mature dairy cows. C. H. ECKLES, L. S. PALMER, T. W. GULLICKSON, C. P. FITCH, W. L. BOYD, L. BISHOP, and J. W. NELSON (Cornell Vegetarian, 1935, 25, 22-43).-Over a period of 2-3 years. P deficiency did not cause abnormal

cestrus, but breeding efficiency declined somewhat. In muscle-tissue Ca increased, and P and Mg decreased. Ill effects observed in cattle in P-deficient areas cannot be attributed to P deficiency alone (cf. B., 1934, 859). CH. Abs. (p)

Carbohydrate feeding. E. BAUER (Z. Kinderheilk., 1935, 57, 116—123; Chem. Zentr., 1935, ii, 1054).—The result of a sugar-charging test depends on the carbohydrate (I) uptake as well as the time. The depression of the blood-sugar curve increases to a limiting val. of (I) uptake; an increase of insulin secretion to the max. capacity of the pancreas is responsible. R. N. C.

Relation of rate of absorption of glucose to body-weight and surface, intestinal weight, and content of intestinal phosphatase in rats. Influence of diet on the phosphatase content of the intestine. H. G. K. WESTENBRINK (Arch. Neerl. Physiol., 1936, 21, 18-37).-The rate of absorption of glucose is independent of the wt. and surface of the body and the phosphatase (I) content of the small intestine; its relation to the wt. of the small intestine (which is independent of the body-wt.) is indefinite. Starting from the stomach, after a slight increase the (I) content of the small intestine decreases to 1 of the max. Variations in protein, carbohydrate, and fat in the dict do not alter the (I) content of the small intestine. E. P.

Gaseous metabolism of small animals. G. HUNERFELD (Arch. exp. Path. Pharm., 1936, 180, 509-517).—The application of the apparatus of Hecht (*ibid.*, 1932, 166, 5) and its testing by combustion of EtOH are described. F. O. H.

Anoxia and experimental catatonia. J. JONG-BLOED (Arch. Néerl. Physiol., 1936, 21, 144—161).— Diminution of the atm. pressure, dilution of the atm. with indifferent gases, inhibition of the O_2 transport in the blood by respiration of CO or injection of methylene-blue or Na₂S₂O₃, and poisoning of the respiratory enzymes by injection of KCN or HgCl₂ produce catatonia, possibly due to anoxia of the central nervous system. The restriction of the O₂ supply of the brain following obstruction of the capillaries by injection of lycopodium produces similar phenomena. E. P.

Metabolism of isolated fat-tissue. III. Respiratory quotient and the influence of nutrients in vitro and in vivo. W. HENLE and G. SZPINGIER (Arch. exp. Path. Pharm., 1936, 180, 672-689).--Isolated surviving fat from rat's testis has Q_0 , 0.06-0.07 [measured by a modified Dickens and Simer technique (A., 1932, 644)] and R.Q. approx. 0.75, the latter being increased by addition of 0.2%, and decreased by that of 0.01%, of glucose; the increase due to AcCO₂H is > that due to glucose. The fat of carbohydrate-fed rats has a high initial R.Q. of approx. 1.25 which rapidly sinks to vals. found in starving animals. The bearing of the data on sugar-fat metabolism is discussed. F. O. H.

Metabolism of normal and tumour tissue. XIV. Metabolism of medulla of kidney. F. DICKENS and H. WEIL-MALHERBE. XV. Respiratory quotient of brain cortex. F. DICKENS (Biochem. J., 1936, 30, 659-660, 661-664).-XIV. The general vals. for aërobic and anaërobic glycolysis of medulla of kidney of György (A., 1928, 1396) are confirmed, showing the tissue to be very strongly glycolysing. That aërobic glycolysis disappears in serum was not confirmed, the vals. in serum and Ringer's solution being the same. The R.Q. was approx. I and kidney, like retina, has an anaërobic type of metabolism due probably to disparity between blood (O_2) supply and energy requirements of the tissue *in vivo*.

XV. The R.Q. vals. of rat-brain cortex were those expected on statistical grounds for a tissue of R.Q. 1. The lower vals. of Elliot and Baker (A., 1935, 1529) are probably due not to prolonged action of salt solution but to inadequate gas equilibrium resulting from the large amount of tissue used. P.W.C.

Co-operation of plant and animal proteins in active and general metabolism. A. BICKEL (Biochem. Z., 1936, 284, 297–307).—Determinations of C: N and "vacate"- O_2 : N ratios in the urine of rats fed on various proteins indicate that, in addition to each protein having a more or less characteristic metabolic action, modifications occur on admixture. A balance of animal and plant proteins in diets is therefore of importance. F. O. H.

Growth and development. XXXVII. Interrelations between protein intake, endogenous nitrogen excretion, and biological value of protein. U. S. ASHWORTH (Missouri Agric. Exp. Sta. Res. Bull., 1935, No. 228, 14 pp.).—Endogenous N excretion was not appreciably affected by the nature of the protein fed, unless the reserve body-protein was considerably depleted by a prolonged preliminary period on a N-free diet. A. G. P.

Parenteral administration of nitrogenous substances in artificial feeding. K. TSUDA (Tôhoku J. Exp. Med., 1934, 24, 380—404).—Parenteral administration of mixed NH_2 -acids or protein degradation products partly prevents autogenous protein catabolism in fasting dogs. Intraperitoneal injection of milk has the same effect. A positive N balance may be set up by such injections. CH. Abs. (p)

Constituents of mulberry leaves. IX. K. KISHI (J. Agric. Chem. Soc. Japan, 1935, 11, 232— 241).—The principal protein of the leaves is sol. in alkaline EtOH. The ratio of sol. to total protein increases with maturation. The quantities of silkprotein and of body-protein are influenced by the quality and quantity of protein and sol. carbohydrates in leaves (cf. A., 1935, 1146). CH. ABS. (p)

Physiology of sulphur in exogenous protein metabolism. R. RAZAFIMAHERY (Ann. Physiol. Physicochim. biol., 1935, 11, 327—353).—In the pig sudden changes from a strict carbohydrate diet to a diet rich in protein or in the reverse direction are accompanied first by the anabolism or catabolism of reserve protein having S content < that of tissueprotein. During growth the N : S ratio of the material retained on a mixed diet is ≤ 20 . The coeff. of utilisation of protein, calc. on the basis of S, is < that of N. The corresponding changes in neutral and ethereal S are discussed. NUTR. ABS. (m)

Cystine deficiency of lucerne proteins. Effect of heat and incubation on their growth-promoting value. J. H. KELLERMANN (Onderstepoort J. Vet. Sci., 1935, 4, 437-452).—The deficiency from which young rats suffer when fed on a ration with lucerne meal as the sole source of protein is made good by the addition of 0.1% of *l*-cystine. A combination of yellow maize and lucerne or of maize and teff gave a protein adequate for growth. Incubation of lucerne meal with the "ruminal juice" of a sheep at 37° for 2 days or heating with H₂O at 120° for 1 hr. did not improve the growth-promoting val. of lucerne meal proteins. NUTR. ABS. (m)

Mechanism of the synthesis of thymonucleic acid during the development of the sea-urchin's egg. J. BRACHET (Bull. Soc. Chim. biol., 1936, 18, 305—317).—The unfertilised eggs contain a pentosenucleic acid similar to zymonucleic acid. This supports the view that there is a partial synthesis of thymonucleic acid, which appears as the eggs develop.

Ā. L.

Effect of food phosphatides on the chemical composition of the body. A. K. PICKAT, O. I. KURTZINA, and N. S. SJENIN (Problems of Nutrition, Moscow, 1935, 4, 68—77).—In white rats receiving a mixed or a fat-free diet additions of 50 mg. of lecithin (I) per 100 g. of body-wt. to either diet led to a storage of lipin chiefly as neutral fat in the whole body and in the individual organs, and to increased glycogen in liver and muscle. The (I) and cholesterol were >those of control animals. NUTR. ABS. (m)

Fat metabolism. P. E. VERKADE and J. VAN DER LEE (Chem. Weekblad, 1936, 33, 163-172).—A review. S. C.

Fat metabolism in fishes. IX. Fats of some aquatic plants. J. A. LOVERN (Biochem. J., 1936, 30, 387-390).-The compositions of the mixed fatty acids of several fresh-H₂O and marine algæ, a pondweed, and a marine diatom are tabulated. The plant fats do not show the difference previously noted (A., 1935, 653) for fats of fish, plankton crustacea, etc. (viz., that the fat of fresh-H₂O species contains more C_{16} — C_{18} and less C_{20} — C_{22} acids). Algal fats fall into groups agreeing with their botanical relationships and no difference between salt- and fresh-H_oO forms was detected. The diatom and the pondweed had fats similar to those of green algæ. Whilst fresh-H₂O plankton crustacea deposit ingested fat unchanged in type, the corresponding marine species appear to modify it considerably. P. W. C.

Absorption of fat through the large intestine. R. KITAGAWA (Tôhoku J. Exp. Med., 1934, 24, 329– 349).—Finely dispersed fat is absorbed through the large, and the lower part of the small, intestine of dogs without preliminary lipolysis. CH. ABS. (p)

Deuterium as an indicator in the study of intermediary metabolism. V. Desaturation of fatty acids in the organism. R. SCHOENHEIMER and D. RITTENBERG (J. Biol. Chem., 1936, **113**, 505— 510).—Unsaturated D-containing fatty acids are found in the body-fatty acids of mice fed with a Dcontaining saturated acid; thus desaturation takes place in the organism. F. A. A.

Rendering liver completely free from glycogen. Y. OTOMO and S. NAGAO (Tohoku J. Exp. Med., 1935, 25, 63—79).—Intravenous injection of an emulsion of cod-liver oil and lecithin causes complete disappearance of hepatic glycogen. Сн. Abs. (p)

Conversion of glycogen into lactic acid by muscle extracts of normal and diabetic dogs. T. CAHN and J. HOUGET (Compt. rend., 1936, 202, 354—356).—Muscle extracts of normal dogs when incubated with glycogen (I) at 37° and $p_{\rm II}$ 8·14 show rapid glycogenesis at first; the rate then decreases rapidly. 60—65% of the (I) which disappears is converted into lactic acid; MeCHO, AcCHO, and AcCO₂H are present only in traces. Extracts of the muscles of pancreatectomised dogs behave similarly, but have a feebler glycogenic power. J. L. D.

Rôle of glucose in muscle biochemistry. M. CAMIS (Arch. ital. Biol., 1934, 91, 35—59; Chem. Zentr., 1935, ii, 550).—CH₂I·CO₂H (I) inhibits lactic acid (II) formation from glycogen (III) in the isolated perfused rabbit's heart, but not from glucose (IV) in the perfusion liquid. The cat's heart untreated with (I) can form (II) from (III), but not from (IV).

R. N. C.

Initial transformations of glycogenolysis: function of hexosemonophosphoric ester. P. OSTERN, J. A. GUTHKE, and J. TERSZAKOWEC (Compt. rend. Soc. Biol., 1936, **121**, 1133—1136).—Previous conclusions (this vol., 370) are confirmed. H. G. R.

Glycolysis in the retina. G. POSSENTI (Riv. Patol. sper., 1935, 15, 183—194).—The lactic acid (I) production from glucose (II) by the retina is much > that from hexosediphosphoric acid (III). From α glycerophosphoric (IV) and phosphoglyceric acid (V), although they are actively attacked, the (I) production is very small and is not increased by mixing (IV) and (V) or by addition of AcCO₂H to (IV). (III), (IV), and (V) show an induction period for (I) production, due probably to dephosphorylation. There is no liberation of H₃PO₄ from the retina during (II) fermentation. NUTR. ABS. (m)

Fructose metabolism in the intact animal. J. N. DAVIDSON, W. O. KERMACK, D. M. MOWAT, and C. P. STEWART (Biochem. J., 1936, **30**, 433-441).— After ingestion or injection of fructose (I) in rabbits, there is a disappearance of (I) and an increase in the secretion of insulin (II). (II) has no effect on the rate of removal of (I) from blood, and it is concluded that (I) is converted into glucose, which is then metabolised under the influence of (II). Two methods for the determination of (I) in blood are described.

J. N. A.

Metabolism of *d*-xylose. N. R. BLATHERWICK, P. J. BRADSHAW, O. S. CULLIMORE, M. E. EWING, H. W. LARSON, and S. D. SAWYER (J. Biol. Chem., 1936, **113**, 405—410; cf. Miller and Lewis, A., 1932, 1282).—Feeding of xylose to white rats increased the content of non-fermentable reducing substances in the liver, muscles, blood, and kidneys. There were no changes in the glycogen or lactic acid content of liver and muscles, nor in blood-lactic acid. Bloodglucose was increased. The availability of xylose to the animal is probably low. J. N. A.

Destruction of 1:2:5:6-dibenzanthracene in the mouse. I. BERENBLUM and L. P. KENDAL (Biochem. J., 1936, **30**, 429–432; cf. A., 1934, 1127). —A method for determination of 1:2:5:6-dibenzanthracene (I) in the mouse is described. 2 mg. of (I) given intraperitoneally in lard or in colloidal solution had nearly all disappeared after 3 weeks. (I) was not found in the excreta. Hence the mouse can metabolise (I). J. N. A.

Effect of inspiration of oxygen and of air rich in carbon dioxide or poor in oxygen on the energy level and intermediate carbohydrate metabolism. V. Changes in lactic acid resynthesis in nephrectomised animals. K. KODERA (Töhoku J. Exp. Mcd., 1934, 24, 21—36; cf. A., 1935, 520).—Blood-lactic acid (I) in rabbits increases after nephrectomy without change in blood-CO₂ (II) but with slight decrease in O₂ consumption. These effects are unchanged by inhalation of O₂: air containing 5-10% of CO₂ intensifies the change in (II), whereas air containing < 10% of O₂ increases and accelerates the change in (I). The return of (I), (II), and O₂ consumption to normal is delayed by nephrectomy whatever the composition of the air inhaled.

CH. ABS. (p)

Metabolism of pyruvic acid in the retina. G. POSSENTI (Riv. Patol. sper., 1935, 15, 229—234).— Anaërobically the retina produces little or no CO₂ from $AcCO_2H$, but aërobically the O₂ consumption is markedly increased, the R.Q., normally 0.8—0.9, being > 1. NUTR. ABS. (m)

Metal catalysts in biological oxidations. I. The simple system : thioglycollic acid, buffer, metal, dithioglycollic acid. II. Tissue inhibitors. M. S. KHARASCH, R. R. LEGAULT, A. B. WILDER, and R. W. GERARD (J. Biol. Chem., 1936, 13, 537-555, 557-569).—I. The results of varying the O_2 tension, temp., and $p_{\rm fl}$ on the rate of oxidation of SH·CH₂·CO₂H by O_2 , and of the catalytic influence of Mn", Cu", and Fe" on this reaction, are given. Catalysis by the metal ions depends on $p_{\rm fl}$ and on the nature of the buffer ions present. In CO₃" buffers the activity of Fe" with Cu" or Mn" is additive, but Cu" and Mn" together show greatly increased activity. Phosphate ions inhibit catalysis by Fe" and Mn" but accelerate that by Cu"; org. phosphates do not affect catalysis by Fe" and Mn". Catalysis by Cu" in phosphate buffers is decreased by Mn" and increased by Fe". The reaction product, dithioglycollic acid, accelerates the reaction in all buffers and by all three metals.

II. A no. of substances, tested for their action on the catalytic activity of metals on the oxidation of $SH \cdot CH_2 \cdot CO_2H$, show inhibitory action approx. ∞ the stability of complexes formed with the metals. No influence attributable to the colloidal state appears. Beef and chicken muscle extracts inhibit catalysis by Fe^{*} but slightly accelerate that by Cu^{**} and Mn^{**}. Sarcoma extracts behave similarly, but less powerfully. Chicken liver extracts are inactive to Fe^{**}, accelerate Mn^{**}, and inhibit Cu^{**}. This latter inhibition is approx. parallel to the efficacy of the extracts in pernicious anæmia. F. A. A.

Brain metabolism. I. Glutamic acid. H. WEIL-MALHERBE (Biochem. J., 1936, 30, 665–676).—l(+)-Glutamic acid (I) is the only NH₂-acid oxidised

by brain and yields a-ketoglutaric acid (II) (2:4dinitrophenylhydrazone, m.p. 224°) and NH, and later gives H₂O+CO₂. d-(-)-Glutamic acid (III) is not attacked so long as it is bound in the cell or to some constituent of the cell, but in solution only (III) is oxidised. The NH₃ derived from (I) disappears in secondary reactions leading to and beyond glutamine (IV). The reaction $(I) \rightleftharpoons (II)$ is reversible. An increased amount of NH_2 -N is found in presence of glucose, AcCO, H, and (II). It appears that (II) is intermediate in the oxidation of AcCO.H. and the same reactions which lead to the disappearance of NH2 and formation of (IV) in presence of (I) can be arrived at from (II), AcCO, H, or glucose. In vivo the glutamic acid deaminase is probably concerned rather with synthesis than breakdown of (I). P. W. C.

Neo-formation of ethyl alcohol in the human corpse during putrefaction. M. NICLOUX (Compt. rend. Soc. Biol., 1936, 121, 975—978).—EtOH is present in all the tissues 17 days after death.

R. N. C.

Metabolism of organic sulphur in infants. J. SURANYI (Nourrisson, 1934, 22, 377–383).—Human or cow's milk does not contain enough free cysteine (1) to be determined colorimetrically. Very small quantities are detected in colostrum. Neutral S (0·02– 0·03 mg. per 100 ml.) occurs in colostrum and increases later. Human milk contains 8—120 mg. per 100 ml. and cow's milk 60—80 mg. of (I) after acid hydrolysis. Fæces of normal infants do not contain significant amounts of (I). Diarrhœal fæces contain > 100 mg. per 100 g., so that the loss is not sufficient to cause a negative (I) balance. (I) is frequently found in urine, in amounts < 25 mg. per 100 ml. in breast-fed and < 10 mg. in artificially fed infants. The excretion is higher in marasmus, acute infections, and toxicosis.

NUTR. ABS. (m)Sulphur metabolism in inanition. E. F. TER-ROINE and R. RAZAFIMAHERY (Ann. Physiol. Physicochim. biol., 1935, **11**, 354—387).—When complete fasting replaced a period of protein starvation during which excretion of endogenous N had reached a min., a sharp rise in N excretion first occurred, followed by a rapid fall. The rise in S excretion was slight compared with that of N. Later, N and S excretions rose slightly with slow fall in N:S ratio. In the premortal period there was a sudden and marked rise in N and S excretion and further fall in the N:S ratio, due to preferential catabolism of muscle and/or to degradation of S-containing NH₂-acids. Changes in neutral and ethereal S are also described. NUTR. ABS. (m)

Iodine metabolism of the adult rat in relation to trauma, thyroid activity, and diet. V. V. COLE and G. M. CURTIS (J. Pharm. Exp. Ther., 1936, 56, 351—358).—The I balance, thyroid- and body-I of rats were uninfluenced by injected thyrotropic hormone or by the myxœdema following thyroidectomy; increasing the I intake from 3×10^{-6} to 5×10^{-5} g. per day left the thyroid-I unchanged but doubled the body-I. H. D.

Chlorine requirements of farm animals, with especial reference to the effect of chlorine on the metabolism of the pig. G. A. MOIR (Diss. Aberdeen, 1934—1935).—In pigs an increased intake of Cl tends to improve N retention, possibly because of better digestion. There was a tendency to better live-wt. increase and a better return per lb. of food consumed when NaCl was added to the diet than when Na citrate and $CaCl_2$ were added. The effect of these salts on blood constituents was negligible.

NUTR. ABS. (m)

Assimilation of iron during the development of the chick embryo. A. SZEJIMAN-ROZENBERG (Acta Biol. exp., 1933—1934, 8, 3244).—Fe assimilation appeared to be retarded during the periods of max. wt. increase around the 12th and 18th days of development. The amount of Fe in the liver was relatively \Rightarrow in the entire embryo. The developing embryo assimilated 96% of the available Fe in the egg. NUTR. ABS. (m)

Sodium metabolism. Influence of sodium deficiency on blood-urea and -amino-acid in pigs. P. SOHOORL (Arch. Neerl. Physiol., 1936, 21, 130-143; cf. A., 1934, 803).—Blood-urea and -NH₂-acid increase, the rise in NH₂-acid being due to restricted synthesis of protein. E. P.

Sodium requirement of chicks : results of an almost sodium-free diet. B. SJOLLEMA (Bied. Zentr. [Tierernähr.], 1935, 7, B, 184–197).—Deficiency of Na in the ration (< 0.013%) retards the growth of chicks by restricting the formation of body-fluids. The Na requirement is met by approx. 0.4-0.5% of Na in the diet. A. G. P.

Total electrolyte content of animals and its probable relation to the distribution of bodywater. H. E. HARRISON, D. C. DARROW, and H. YANNET (J. Biol. Chem., 1936, **113**, 515-529).--Whole bodies, and various organs, of dogs, monkeys, and rabbits were analysed for H₂O, Na, K, Cl, P, N, and fat. Assuming that the extra-cellular H₂O contains all the Cl', and that its electrolyte content is similar to that of the serum, the relative vols. of intraand extra-cellular H₂O in the body and tissues, and the conen. of solutes in them, are calc. Extra-cellular H₂O comprises about 27% of the body-wt., intracellular H₂O varying from 29 to 45%, being lower in the fat animals. The proportion varies in different tissues, but analogous tissues of different animals show similar vals. 25% of the Na in the body exists in bone and cartilage in an insol. or non-ionised form.

F. A. A.

Aluminium. II. Storage of intravenously injected aluminium in the dog. D. F. EVELETH and V. V. MYERS (J. Biol. Chem., 1936, 113, 467— 471; cf. this vol., 652).—Al is stored primarily in the liver, spleen, and kidney, and appears immediately in the bile and urine. H. D.

Dependence of the change in irradiated case inogen on the intensity of irradiation. W. OLBRICH (Biochem. Z., 1936, 284, 308–311).—Data for urinary C, N, and "vacate"- O_2 of rats fed on case inogen exposed to two different intensities of γ -irradiation from meso-Th indicate a parallel difference in the action on metabolism. F. O. H.

Physico-chemical action of X-rays on the organism. V. G. D. LIEBER (Strahlenther., 1935,

52, 497-511; Chem. Zentr., 1935, ii, 387).—The influence of X-rays on bone growth is discussed. H. N. R.

Biological action of neutron rays. J. H. LAW-RENCE and E. O. LAWRENCE (Proc. Nat. Acad. Sci., 1936, 22, 124—133).—Irradiation of rats by highspeed neutrons, obtained by deuteron bombardment of a Be target, lowers the lymphocyte count and finally produces death. The effectiveness, per Roentgen unit of ionisation produced in air, is 10 times that of X-irradiation; per ion produced in the rat, the ratio is probably about 5. F. A. A.

Relative effectiveness of X-rays and fast neutrons in retarding growth. R. E. ZIRKLE and P. C. AEBERSOLD (Proc. Nat. Acad. Sci., 1936, 22, 134—138; cf. preceding abstract).—The effectiveness of fast neutrons in retarding the growth of wheat seedlings is 20 times that of X-rays. F. A. A.

Excitation and accommodation in nerve. A. V. HILL (Proc. Roy. Soc., 1936, **B**, **119**, **305**—**354**).— A theory of the electrical stimulation of nerves is advanced, and equations and curves for currents of various forms, applied in different ways, are deduced. The time const. of accommodation, λ , decreases with rising temp., and is affected by [Ca"].

Measurement of accommodation in nerve. D. Y. SOLANDT (Proc. Roy. Soc., 1936, B, 119, 355—379).—Increase of [Ca"] or [K"] lowers λ (cf. preceding abstract); Mg", Sr", and Ba" produce similar but smaller effects. Decrease of [Ca"] increases λ , its val. tending to ∞ at [Ca"]=0. The effect of varying [Ca"] on the time const. of excitation, k, is much < that on λ , showing that these consts. are independent of each other.

Redistribution of calcium and potassium in blood and muscles. I. R. BACHROMEEV and L. N. PAVLOVA (J. Physiol. U.S.S.R., 1935, 18, 69-77).-Irritation of the central end of the sciatic nerve increases the ionised and total Ca and P in blood, plasma, and erythrocytes, and decreases the vals. in muscle. Irritation after removal of the thyroid increases the total K in plasma and erythrocytes, but Ca vals. are unchanged. Irritation of the upper laryngeal nerve increases blood- and plasma-Ca and decreases that in muscles. Changes in K vary with time. CH. ABS. (p)

Action of heavy water on isolated organs. F. VERZAR and C. HAFFTER (Pflüger's Archiv, 1935, 236, 714-716). R. N. C.

Are free gases in thermal waters absorbed by the skin during bathing? A. MOUGEOT and AUBERTOT (Arch. med. Hydrol., 1934, 12, 292– 293).—The CO_2 content of the exhaled air in man is increased during bathing in a carbonated thermal bath, and in the case of a radioactive bath the exhaled air becomes radioactive. R. N. C.

Action of Lurisia waters on uric acid and on uric urinary calculi. L. FRANCESCONI and R. BRUNA (Annali Chim. Appl., 1936, 26, 34-38).--Various mineral waters from the Lurisia district of Italy are analysed, and their solvent action on uric acid and on urinary calculi, both before and after the removal of the radioactive emanation which they contain, is examined. E. W. W.

Fluorine and mottled enamel. M. C. SMITH, E. M. LANTZ, and H. V. SMITH (J. Amer. Dent. Assoc., 1935, 22, 817-829).-In Arizona, in communities with mottled enamel the H₂O supply contained 1-6 p.p.m. of F, whereas in non-endemic communities the val. was < 1. If F was present in toxic amounts in the food or H₂O, mottling could not be prevented by increased intakes of Ca, P, or vitamin-D. F intake interferes with the calcification of the teeth, causing a decrease in size, wt., and ash content, and an increase in the Ca : P ratio. In young rats F feeding impaired ability to metabolise Ca and P, interfered with body growth, and retarded the rate of eruption of incisors. Girls with mottled teeth (4 p.p.m. of F in the H₂O) showed no significant variation from normal in the retention of Ca or P, but the amount excreted in the urine was greater.

NUTR. ABS. (m)

Clinical manifestations of high and low plasma-magnesium. Danger of Epsom salt purgation. A. D. HIRSCHFELDER and V. G. HAURY (J. Amer. Med. Assoc., 1934, 102, 1138—1141).— Normally 40% of ingested Mg is excreted in the urine in 24 hr. A clinical syndrome of high plasma-Mg may be induced in patients with renal insufficiency by doses of MgSO₄. CH. ABS. (p)

Possible lipotropic action of alkylammonium compounds. E. H. MAWSON and A. DEM. WELCH (Biochem. J., 1936, 30, 417–418).—NHMe₃Cl had no lipotropic action, and increased the amount of fat in rat liver, whilst NMe₃EtCl, NMe₄Cl, and NMe₃PhCl were inactive, but exerted a powerful toxic effect of the curare type. J. N. A.

Effect of sodium glutamate on digestion. P. C. Hsü and W. H. ADOLPH (J. Chinese Chem. Soc., 1936, 4, 42—44).—Na *d*-glutamate does not affect the rate of digestion of carbohydrates, fed as steamed rice to rats. R. S. C.

Action of benzene in leucæmia. I. KALAPOS (Klin. Woch., 1935, 14, 864-867; Chem. Zentr., 1935, ii, 1057).—C $_{6}H_{6}$ may be useful, alone or in conjunction with X-rays. H. N. R.

Mode of action of picrotoxin. H. SCHRIEVER and G. PERSCHMANN (Pflüger's Archiv, 1935, 236, 497-514). R. N. C.

Experimental influencing of liver-lipase. G. DELL'ACQUA (Z. klin. Med., 1935, 128, 95-97; Chem. Zentr., 1935, ii, 62-63).—Liver-lipase in mice is depressed by feeding with lard or sugar, by insulin, adrenaline, and particularly by P poisoning. R. N. C.

(A) Fraxin, a fraction of *Fraxinus borealis*, Nakai. (B) Effect of fraxin on uric acid excretion. (C) Mechanism of diuresis caused by fraxin. G. IIDA (Tôhoku J. Exp. Med., 1935, 25, 454-470, 471-475, 26, 1-8).-(A) The glucoside is obtained from the cortex of the tree. Physiological activities are described.

(B) Increased urinary excretion of uric acid caused by fraxin is > that effected by atophan. CH. ABS. (p)UU Methylene-blue therapy and its scientific foundation. O. EICHLER (Fortschr. Ther., 1935, 11, 336-344; Chem. Zentr., 1935, ii, 880).—The use of methylene-blue is based on its capacity for reversible reduction, although certain conclusions based on this are not borne out in practice. H. N. R.

Effect of creatine on muscle tonus. F. M. CHIANCONE (Arch. ital. Biol., 1933, 90, 22-25; Chem. Zentr., 1935, ii, 550). R. N. C.

[Pharmacology of] choline and certain analogues. II. Cationic exchange as a means of reaction of choline, acetylcholine, and their analogues with cells. M. H. ROEPKE and A. D. WELCH (J. Pharm. Exp. Ther., 1936, 56, 319—326; ef. A., 1935, 1411).—The rate of esterase hydrolysis of acetylcholine (I) is identical with those of its P and As analogues. The exchange adsorption of choline with Na and Ca zcolites is > that of arsenocholine and equal to that of (I). H. D.

Peripheral circulatory activity of histamine. D. MATEEFF and M. SCHNEIDER (Pflüger's Archiv, 1935, 236, 606-635). R. N. C.

Mechanism of the action of di-iodotyrosine. M. WACHSTEIN (Wien. klin. Woch., 1934, 47, 1579-1580).—Di-iodotyrosine in large quantities increases the resistance of the mouse to McCN, and does not antagonise the similar action of thyroxine.

R. N. C.

Action of di-iodotyrosine in thyrotoxicosis. M. YRIAT, A. DAONINO, and A. E. BIANCHI (Rev. assoc. med. Argentina, 1935, 49, 309–318).—Basal metabolism was decreased. Effects observed were identical with those produced by an equiv. dosage of inorg. I. CH. ABS. (p)

Pharmacodynamics of bile acids. Influence of active groups. I. Cardio-vascular and respiratory action. I. MANTA and P. VANCEA (Arch. exp. Path. Pharm.; 1936, 180, 631-638).—The action of cholic and deoxycholic acids and their Ac derivatives, and of dehydro- and dehydrodeoxy-cholic acids and their oximes and semicarbazones on the dog's carotid blood pressure was determined. Introduction of \cdot OH or, to a greater extent, of \cdot OAc produces vascular activity in cholanic acid. Oxidation of \cdot CH₂·OH to \cdot CO \cdot diminishes the action, which is further modified (to different degrees) by formation of oxime or semicarbazone. F. O. H.

Action of low-molecular autoclave hydrolysates. I. N. KASAKOV (Arch. exp. Path. Pharm., 1936, 180, 482–497).—Injection of extensively hydrolysed liver, kidney, adrenal, etc. into normal and diseased rats produces increases in oxidation processes and absorptive power of the reticuloendothelial system, and changes in the dispersivity of colloid systems, metabolism, and tonus of the nervous system. Therapeutic applications are indicated. F. O. H.

Physiological and pathological actions of some fresh and autolysed organ extracts, especially pancreas extracts. L. MICHELAZZI (Arch. ital. Biol., 1934, 90, 157-164; Chem. Zentr., 1935, ii, 393). G. H. F. Action of the vagus on the frog's heart maintained in absence of potash. W. HERZ (Pflüger's Archiv, 1935, 236, 298–300). R. N. C.

Life-saving action of ovarian preparations in severe bleeding from hæmophilia. K. FRANKE and S. LITZNER (Med. Klinik, 1935, 31, 520—521; Chem. Zentr., 1935, ii, 872). R. N. C.

Effects of sodium ethyl-*n*-hexylbarbiturate (ortal sodium) and of sodium ethylisoamylbarbiturate (sodium amytal) on excised smooth muscle. C. M. GRUBER, R. SCHOLTEN, A. DENOTE, and J. F. WILSON (J. Pharm. Exp. Ther., 1936, 56, 341-350).—Na amytal and, to a greater extent, ortal decrease the tonus and the amplitude of the rhythmic contraction of excised intestine and uterus. Both lower the $p_{\rm H}$ of Locke's solution. H. D.

Alkoxymethylhydantoins.-See this vol., 613.

Influence of the combined acid on the anæsthetic power of various salts of novocaine. J. RÉGNIER, R. DELANGE, and R. DAVID (Compt. rend., 1936, 202, 591—592).—Phthalic, hippuric, and nicotinic acids completely annul the anæsthetic activity (rabbit's cornea), whilst phenylbutyric, undecoic, and α -phenylvaleric acids increase the activity 50, 55, and 63 times, respectively. In general the activity of the salt increases with the no. of C in the acid, and decreases if the latter is substituted with \cdot CO₂H, \cdot OH, \cdot NH₂, or \cdot Br. The phenylpropionate and *iso*butyrate are most suitable for clinical use. J. N. A.

Relation between constitution and anæsthetic activity of 2-alkoxyquinoline derivatives.—See this vol., 482.

Changes of blood-proteins in salyrgan diuresis. A. O. SCHALLY (Deuts. Arch. klin. Med., 1935, 177, 368-376; Chem. Zentr., 1935, ii, 79). H. J. E.

[Pharmacognosy of] Lacinaria species. B. V. CHRISTENSEN and G. M. HOCKING (J. Amer. Pharm. Assoc., 1936, 25, 15—18).—Constituents of L. spicata and tenuifolia include a sterol, m.p. 116°, and possibly coumarin. Extracts have a stimulant and cardiac action in man, but no distinct diuretic effect.

F. O. H.

Mydriatics and myotics from the Brazilian flora. F. W. FREISE (Süddeut. Apoth.-Ztg., 1935, 75, 333–335; Chem. Zentr., 1935, ii, 719–720).— Various preps. are described. A substance, $C_{15}H_{22}ON$, m.p. 112—114°, b.p. 172°, is the active principle of "itua," a Gnetum species, whilst the active principle of Moringa aptera, Gaertn., is a substance, $C_{15}H_{23}O_3N_2$. H. N. R.

Pharmacological action of Erythrina corallodendron. I. SIMON (Arch. Farm. sperim., 1935, 59, 193-209). R. N. C.

Identity of the sympathomimetic action of broom and adrenaline : effects on the yohimbinised rabbit. H. BUSQUET and C. VISCHNIAC (Compt. rend. Soc. Biol., 1936, **121**, 1151—1152).

H. G. R.

Acridine compounds and their antimalarial action.—See this vol., 613.

Importance of the kidneys in standardisation of digitalis [in cats]. B. BOUCĚK (J. Amer. Pharm. Assoc., 1936, 25, 97—99).— $UO_2(NO_3)_2$ -induced or naturally-occurring inflammation of the kidneys increases the resistance of cats to lethal doses of digitalis extracts. F. O. H.

Rate of elimination and accumulation of digitalis glucosides and strophanthin. L.LENDLE (Arch. exp. Path. Pharm., 1936, 180, 518-538).--Crit. infusion velocities in cats and rabbits indicate a rapid detoxication of digitoxin (I) in the body; thus 20% of the lethal dose of (I) or strophanthin (II) is destroyed by rabbits in ≥ 1 hr. With cats, the action is not so marked [6% of (II) and 2% of (I)]. The basic accumulative doses [shown by the response to g-(II)] are digitoxin 3, k-strophanthin 7.5-10, and digilanid 6.5% of the min. lethal dose. F. O. H.

Influence of ergotamine on thermal regulation in the organism. S. FORSTER (Med. Doswiacz. Spol., 1935, 19, 152—175).—Ergotamine depresses gaseous exchange by inhibiting O_2 consumption, and counteracts the increased exchange induced by thyroxine and 2:4-dinitronaphthol in rats, pigeons, and rabbits. Urinary and faceal N diminishes on the 1st and 2nd days after administration. Blood-sugar is decreased in rabbits and pigeons and increased in guinea-pigs. CH. ABS. (p)

Antagonism between curarine and prostigmine, and its relation to the myasthenia problem. G. BRISCOE (Lancet, 1936, 230, 469-472).--Either prostigmine or curarine can produce acute depressant effects (not identical). Their mutual antagonism is such that normal muscular action can be maintained when poisonous doses are administered together. A theory of chemical transmission of excitation explains the results. L.S.T.

Bulbocapnine. RAYMOND-HAMET (Compt. rend., 1936, 202, 357—359).—The hypotensive effect of small doses of β -3:4-dihydroxyphenylethyl- β -hydroxyethylamine (I) is accentuated by true sympathicolytic substances, but is diminished by bulbocapnine (II), which, however, paralyses the renal vasoconstrictors, a reaction used hitherto as a criterion of sympathicolytic activity. (II) has only a slight effect in diminishing hypertension due to adrenaline. Hypotension due to (I), which stimulates the vasodilators > does adrenaline, is abolished by (II). J. L. D.

[Pharmacology of] morphine, codeine, and their derivatives. IX. Methyl ethers of the morphine and codeine series. N. B. EDDY (J Pharm. Exp. Ther., 1935, 55, 127—135; cf. A., 1933, 965).—Methylation of the alcoholic OH in morphine, dihydromorphine, codeine, dihydro- and ψ -codeine increases the toxicity to mice; analgesic and stimulatory effects are increased in the cat and the depressant action in the rat. H. D.

Local irritant action of quinine preparations. G. JOACHIMOGLU and N. KLISSIUNIS (Praktika, 1934, 9, 127—130; Chem. Zentr., 1935, ii, 1057).—Injection of quinine causes disturbance of the gastro-intestinal tract. H. N. R.

Diabetogenic action of some derivatives of phloridzin. A. LAMBRECHTS (Compt. rend. Soc. Biol., 1936, **121**, 870—872).—Phloretin, phlorin, and phloridzin hepta-acctate all produce glycosuria in the dog, but the Me ethers of phloridzin are devoid of action. Free phenolic ·OH, but not a glucose residue, is apparently necessary for the activity. R. N. C.

Antioxidant properties of medicaments used as antipyretics. A. BOUTARIO and J. A. GAUTIER (Compt. rend., 1936, 202, 596—598).—The effect of phenols, arylamines, semicarbazide, pyrazolone, and some alkaloids on the oxidation of PhCHO and FeSO₄ and the reduction of methylene-blue by hepatic tissue has been studied. Antipyretics behave generally as negative catalysts towards oxidation and oxidationreduction, the intensity of their action varying with the conditions and amount used. J. N. A.

Increase in the hæmolytic power of lecithin by saponin: detection of small quantities of saponin. B. S. LEVIN (Compt. rend. Soc. Biol., 1936, 121, 1181—1183).—The reaction will detect saponin at a concn. of 1 in 25×10^6 . H. G. R.

Snake poisons. F. MICHEEL and K. KRAFT (Nachr. Ges. Wiss. Gottingen, Math.-phys. Kl., III, 1935, 1, 85—93; Chem. Zentr., 1935, ii, 545).—The venom of the cobra, *Naja flava*, ultra-filtration of which is compared with that of peptone and albumin, loses its activity in $\frac{1}{2}$ hr. at 95° and $p_{\rm H}$ 13, but is more stable in acid media. Acid hydrolysates are inactive, but activity is restored to the filterable portion by adding proteins of high mol. wt. (e.g., albumose or gelatin); peptones of low mol. wt., or non-protein colloids, e.g., starch or agar, are ineffective. The poison is apparently active only when adsorbed on a colloidal protein mol. H. J. E.

Selenium in proteins from toxic foodstuffs.— See B., 1936, 344.

Toxicity of organ lipins. Poisoning by polypeptides. P. ÉTIENNE-MARTIN (Presse méd., 1935, 43, 361—363; Chem. Zentr., 1935, ii, 880).—Both lipins and polypeptides may show some toxicity.

H. N. R.

Toxicity of perchlorates. E. KAHANE (Bull. Soc. Chim. biol., 1936, 18, 352—357).—Intravenous injection of 0.5 g. and intramuscular injection of 1.0 g. of NaClO₄ have little toxic effect on the rabbit. The min. toxic dose for *Carassius auratus* is 1% in the H₂O. ClO₄' is therefore only feebly toxic.

A. L. Chronic carbon monoxide poisoning. H. GER-BIS (Deut. med. Woch., 61, 991—994; Chem. Zentr., 1935, ii, 1059).—Polemical against Süpfle (A., 1935, 530); chronic CO poisoning can occur. H. N. R.

Changes in carbohydrate metabolism due to carbon monoxide poisoning. E. SCHULZE (Arch. exp. Path. Pharm., 1936, 180, 649-655).—The changes (normally diminutions) in blood-sugar and liver-glycogen (I) are abnormal [e.g., initial hyperglycæmia and, with small doses, subsequent (I) formation] in CO-poisoned mice : these changes and the parallelism between the increased resistance to MeCN poisoning and fall in (I) indicate a rapid initial adrenal, and a slow subsequent thyroid, action. F. O. H.

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Lead content of duodenal juice in cases of saturnism. N. ALIAVDIN and E. PEREGOOD (J. Ind. Hyg., 1936, 18, 139).—In a considerable proportion of patients suffering from Pb poisoning, the duodenal juice contains Pb (up to 1.8 mg. per 100 c.c.). W. O. K.

Normal absorption and excretion of lead. A. A. KEHOE, F. THAMANN, and J. CHOLAK (J. Amer. Med. Assoc., 1935, 104, 90-92).—Spectrographic data for the Pb content of urine, fæces, and blood are given. Chemical methods give low vals. CH. ABS. (p)

Comparison of histological and quantitative spectrographic investigations of mercury poisoning. R. MÜLLEE and K. SCHEINER (Arch. exp. Path. Pharm., 1936, 180, 718-730).—There was no parallelism between extent of tissue injury and Hg content in the large intestine and kidney of Hg-poisoned guinea-pigs. F. O. H.

Urinary excretion of phosphorus during experimental poisoning by uranium nitrate. R. WEEKERS (Compt. rend. Soc. Biol., 1936, 121, 866—868).— $UO_2(NO_3)_2$ increases urinary excretion of $PO_4^{\prime\prime\prime}$ in the dog. The action does not affect blood-P, but is a direct one on the kidney. R. N. C.

Effect of various therapeutic agents in animals with hepatic damage caused by phosphorus. S. NAGAO (Tohoku J. Exp. Med., 1934, 24, 529– 554).—Rabbits poisoned by P can synthesise glycogen (I) from carbohydrates if large amounts are administered. Fructose (II) is more effective in this respect than glucose or sucrose. Synthesis of (I) is accompanied by a decrease in hepatic fat deposition. Insulin and lecithin are of no val. Adrenaline, in clinical doses, is ineffective and may inhibit the action of (II). CH. ABS. (p)

Enzymes in yellow tobacco. T. NITO and E. KITAMURA (J. Agric. Chem. Soc. Japan, 1936, 12, 87—95).—The distribution of enzymes in the fresh, fermented, flue-dried, and unfermented leaves of yellow tobacco was determined. H. D.

Properties of glyoxalase. Effect of $p_{\rm fl}$, temperature, and amino-acids on dried glyoxalase. J. GIRŠAVIČIUS, P. H. EFENDI, and A. P. RYZHOVA (Fermentforsch., 1936, 15, 32-43; cf. A., 1935, 1026).—The activity of dried glyoxalase (I) preps. is measured by titrating the acid produced from the substrate. The rate of the reaction, which is of zero order, ∞ the amount of (I). Glutamic acid, tryptophan, and, to a smaller extent, histidine, arginine, tyrosine, aspartic acid, and indicators retard the reaction, whilst glycine, alanine, leucine, and PO₄^{'''} have no effect. The temp. coeff. at 10° is 2-2.5 and decreases as temp. rises. At > 50° the rate of reaction decreases with time whilst increasing inactivation of (I) with time occurs as the temp. is raised. W. McC.

Effect of ascorbic acid on the action of tyrosinase on *l*-tyrosine, *l*-3:4-dihydroxyphenylalanine, and *l*-adrenaline. E. ABDEBHALDEN (Fermentforsch., 1936, 15, 24—31; cf. A., 1934, 1138).— The production of 3:4-dihydroxyphenylalanine (I) from tyrosine (II) by tyrosinase (III) and the action of (III) on (I) and adrenaline (IV) are not inhibited by ascorbic acid (V), (V) with O_2 , cysteine (VI) (but not cystine), and reduced glutathione. (V) produces (I) from (II), the action being accelerated by (III), but no (I) is produced by (VI) if (III) is absent. Fe^{...} inhibits the action of (III). The spontaneous colouring of (I) and (IV) is inhibited by glycine (VII), (VI), and aspartic and glutamic acids and retarded by asparagine, histidine, and alanine. (VII) retards the colouring when (III) is present. W. McC.

Oxidising enzyme. M. GHIRON (J. Trop. Med. Hyg., 1935, 38, 108—109).—Aq. extracts of dried liver contain an enzyme which oxidises fatty acids to CO_2 and H_2O . Its activity is weakened at 60° and is destroyed at 70°. CH. ABS. (p)

Oxidation of neutral salicylates in alkaline medium, and particularly sodium salicylate in presence of sodium hydrogen carbonate. U. B. MARTINS (Tribuna farm., 1934, 8, 8—10, 30—31).— Moulding and blackening of Na salicylate-NaHCO₃ solutions is prevented by addition of KI, KCN, CH_2O , or $CuSO_4$. An oxidase is probably responsible for the formation of the black substances.

Сн. Авз. (р)

Peroxidase reaction. LIV. Prolongation of the rapid peroxidase reaction of blood-leucocytes as a sign of avitaminosis-B. LV. Prolongation of minimum peroxidase staining time as an early sign of avitaminosis-B: mechanism of the prolongation. T. SUZUKI. LVI. Constancy of the Arakawa reaction in milk of a lactating woman during a year. Y. UGA. LVII. Effect of urine of lactating women on leucocyte peroxidase : relationship with avitaminotic urine. T. SUZUKI. LVIII. Effect of urine extract on leucocyte peroxidase : early laboratory finding of avitaminosis-B. T. SUZUKI and A. TAKAMATSU (Tôhoku J. Exp. Med., 1935, 25, 186-200, 201-217, 564-574, 575-587, 588-595; cf. A., 1935, 1266).—LIV. The retardation of the reaction is due to an Et₂O-sol. substance in blood.

LVII. Urine of women secreting milk showing a negative Arakawa test retards the peroxidase staining time of normal blood neutrophiles.

LVIII. The urinary constituent which retards peroxidase staining is removed by Et_2O -extraction and resembles AcCHO. CH. Abs. (p)

Mechanism of the action of peroxidase. M. PADOA and D. GARILLI (G. Biol. appl. Ind. chim., 1935, 5, 1—16; Chem. Zentr., 1935, ii, 704).—Beetand castor-peroxidase (I) are activated by Ca^{**} in the $p_{\rm II}$ range 6.5—7.2. Mg^{**} has a smaller effect on castor-(I). Activation by α -alanine occurs in the same $p_{\rm II}$ range. An e.m.f. is set up by interposing a collodion membrane between a (I)-CaSO₄ solution and a CaSO₄ solution of similar concn. Oxidase preps. are activated by Mn^{**}. A. G. P.

Determination of catalase. D. DERIBAS and J. KORNMANN (Bull. Soc. Chim. biol., 1936, 18, 414– 417).—The method, a modification of that of Bach and Zonkowa (A., 1922, i, 392), gives the "potential activity" of the blood-catalase, and involves the

determination of the H_2O_2 decomposed in 24 hr. at 25°. A. L.

Action of dyes and other substances on milk dehydrogenase. Identity of Schardinger enzyme with xanthine oxidase. K. P. BASU and S. P. MUKHERJEE (J. Indian Chem. Soc., 1936, 13, 11— 18).—Oxidation of xanthine, MeCHO, and o-OH·C₆H₄·CHO by xanthine oxidase (cf. Dixon et al., A., 1924, i, 1380) is inhibited to the same extent for each compound by 12 out of 14 basic dyes, pyrogallol, and gallic acid, and by 10 out of 12 acidic dyes. CO(NHEt)₂ and CO(NHPh)₂, ethyl- and phenyl-urethane, and Na₂S₂O₄ are without effect. Only one enzyme is involved. F. R. G.

Effect of enzymic dephosphorylation of cozymase on its action in the dehydrogenase system of peas. N. LICHTENSTEIN (Fermentforsch., 1936, 15, 44—48; cf. A., 1935, 1277).—The action of cozymase is not inhibited by veronal-NaOAc, borate, and NH_3 - NH_4Cl buffers but is considerably diminished when H_3PO_4 is liberated from cozymase by phosphatase. W. McC.

α-Glycerophosphate dehydrogenase. D. E. GREEN (Biochem. J., 1936, 30, 629-644).—The enzyme (occurring in rabbit's tissues, especially brain) oxidises only (-)α-glycerophosphate (I) (cf. Meyerhof and Kiessling, A., 1933, 1080), the natural muscle isomeride, the products being mainly glyceraldehyde phosphate and possibly some dihydroxyacctone phosphate; AcCHO is a decomp. product. The enzyme, which is not involved in the reaction between (I) and AcCO₂H, is inhibited by octyl alcohol and ethylurethane but not by KCN, NaN₃, NaF, or CH₂I-CO₂Na. The reaction between the dehydrogenase system and mol. O₂ is catalysed by cytochrome c (which is reduced and oxidised approx. 300 times per min.) but not by flavoprotein, flavin, ascorbic acid, or adrenaline. F. O. H.

Conditions of determination of the reducing activity of tissues. A. CHEVALLIER and H. ROUX (Compt. rend. Soc. Biol., 1936, 121, 1017—1019).— The time of reduction of methylene-blue by sections of guinea-pig liver tissue is inversely ∞ the surface area if thin sections are used; with thick sections the relation does not hold. The reducing power of the sections is decreased by prolonged washing in Ringer's solution. R. N. C.

Liver glycogenase. T. H. HODGSON (Biochem. J., 1936, 30, 542—548).—The prep. of rabbit liver glycogenase (I) is described. (I) converts glycogen and maltose quantitatively into glucose, the action, unlike that of amylase, being unaffected by NaCl. The activity of (I) is optimal on the alkaline side of neutrality and is but little altered over a range of $p_{\rm ff}$ encountered under physiological conditions. No significant decrease in the (I) content of liver results from administration of convulsive doses of insulin. (I) is destroyed by dialysis. The bearing of the results on the problem of glycogenolysis is discussed. P. W. C.

Mechanism of degradation of starch by amylases. I. Nature of the early fission products. II. Kinetics of action of α - and β -amylases on starch, its components and partial degradation products. G. G. FREEMAN and R. H. HOPKINS (Biochem. J., 1936, 30, 442-445, 446-450).---I. α -Malt- and -pancreatic amylase produce some maltose (I) in the early stages of hydrolysis of sol. starch (II), but most of the reducing material consists of dextrins. β -Malt-amylase and the amylase of ungerminated barley produce (I) in the early stages, the remaining material resembling (II). It is confirmed that α -amylases hydrolyse (II) into dextrins whilst β -amylases remove successive mols. of (I).

II. The rates of hydrolysis of sol. (II), amyloamylose (III), erythroamylose (IV), α -amylodextrin (V), achroodextrin (VI), and glycogen (VII) by α malt-amylase and β -malt- or barley-amylase have been determined. A mixture of the α - and β -enzymes in low conen. acts additively in the hydrolysis of sol. (II), whilst a high conen. of β - promotes hydrolysis at rates > the sum of the component rates. Mixtures of α - and β - behave similarly towards (V) and (VII). (VI) is hydrolysed by β - more rapidly than by α -amylase, (III) yields nearly 100% of (I) by the action of β -, whilst (IV) is hydrolysed with greater difficulty than sol. (II). Both amylases hydrolyse the same non-(V) portion of sol. (II), whilst only the α can attack (V). J. N. A.

Degradation of starch by amylases. III. Mutarotation of fission products. G. G. FREEMAN and R. H. HOPKINS (Biochem. J., 1936, 30, 451-456).— The sense of the mutarotation is characteristic of the enzyme and independent of the substrate. In the early stages, α -amylase produces reducing dextrins and a little α -maltose, the latter increasing later, whereas β -amylase produces β -maltose only.

H. G. R.

Influence of alcohol on maltase. R. J. VUAR-AMBON (Arch. Sci. phys. nat., 1935, [v], 17, Suppl., 209-214).—The inactivation of maltase by EtOH increases with the time of contact. Variations in the $p_{\rm H}$ of the EtOH from 5.2 to 8.4 have no effect on this inactivation. Invertase is but little affected by EtOH. E. A. H. R.

β-Glucosidase action.—See this vol., 593.

Specificity of galactosidases. R. WEIDENHAGEN and A. RENNER (Z. Wirts. Zuckerind., 1936, 86, 22-56).-The non-identity of the maltose- and melibiosesplitting enzymes of bottom-fermentation yeast is confirmed; each enzyme can be obtained free from the other. The ratio of the rates of hydrolysis of melibiose and α -phenylgalactoside by the α -galactosidase of bottom-fermentation yeast is practically unaffected by adsorption and elution of the enzyme, but different ratios apply to the a-galactosidases of malt, taka-diastase, and sweet and bitter almonds. A study of the relative rates of hydrolysis of salicin and lactose by the emulsin of almonds at different stages of purification throws doubt on the identity of β -glucosidase with β -galactosidase. J. H. L.

Action of esterase in presence of organic solvents. E. A. SYM (Biochem. J., 1936, 30, 609–617).—Esterification (determined in the solvent phase by decrease in acidity and alcohol concn.) by pig's pancreatic esterase of Bu^aOH-PrCO₂H (and other acids) in presence of $COMe_2$, C_6H_6 , and CCl_4

of substrates between H_2O and org. solvent. F. O. H.

Lipolytic enzyme of Galleria mellonella. N. FIESSINGER and A. GAJDOS (Compt. rend. Soc. Biol., 1936, 121, 1152—1154).—A glycerol extract of the larvæ contains an enzyme which hydrolyses tributyrin. H. G. R.

following which it decreases, of alcohol; this pheno-

menon is partly explained by the partition coeffs.

Proteinase in the milky juice of Calotropis gigantea. Its purification and activation by ascorbic acid and glutathione. K. P. BASU and M. C. NATH (J. Indian Chem. Soc., 1936, 13, 34— 39).—The juice contains glutathione 2.094 mg., ascorbic acid 0.211 mg., and cysteine 0.180 mg. per c.c., all of which activate the enzyme previously isolated (A., 1933, 876). F. R. G.

Proteolytic enzymes of sprouted wheat. J. D. MOUNFIELD (Biochem. J., 1936, 30, 549-557).-Aq. extracts of sprouted wheat contain a protease (I) having an optimum $p_{\rm II}$ of 4·1 for decomp. of edestin. The substrate concn. for half the max. velocity (which occurs in > 2% solution at 40°) is 0·5%. The course of the early stages of the reaction appeared to follow the Schutz-Arrhenius rule but no const. val. for K_m was attained. (I) shows a crit. inactivation temp. of 54° at $p_{\rm II}$ 6 and is spontaneously inactivated on keeping at 18° for 4-5 weeks with PhMe. The activity of (I) is considerably reduced by citrate or Cl'. The extract also contains a dipeptidase which attacks leucylglycine optimally at $p_{\rm II}$ 7·3 and glycylglycine at $p_{\rm II}$ 7·9 and is completely inactivated by keeping for 5 days at 18° in presence of PhMe. P. W. C.

Specific defence proteases in the study of inheritance. I. Tests with pure breeds [of guinea-pigs]. E. ABDERHALDEN (Fermentforsch., 1936, 15, 49—92).—The high degree of breed specificity (usually also sex specificity) observed when the defence enzyme test is applied to pure breeds indicates that the blood and tissues of the separate breeds contain proteins which are distinguishable by means of the test. W. McC.

Manganese salts as activators of arginase. G. KLEIN and W. ZIESE (Klin. Woch., 1935, 14, 205– 206; Chem. Zentr., 1935, ii, 704).—MnSO₄ activates arginase (purified or otherwise) in cell suspensions, tissue sections, sarcoma cells, and tumours. This action occurs *in vitro* in the presence of CO or HCN and is unrelated to the redox potential. A. G. P.

Occurrence of prolinase.—See this vol., 596.

Urease in the mucous membrane of the intestine of the foetus. A. CARDIN (Arch. ital. Biol., 1934, 91, 96—100; Chem. Zentr., 1933, ii, 869).— Urease occurs in the foetal intestine after 4 months and is probably concerned in the mechanism of HCl secretion. None occurs in cats and dogs. A. G. P.

Activators of glycolysis. H. VON EULER and G. GÜNTHER (Z. physiol. Chem., 1936, 239, 83-88; cf. A., 1935, 1278).—Comparison of the activating effects of animal adenylic acid (I) and cozymase (II) on the production of lactic acid from glycogen in presence of hexose diphosphate proves the greater efficiency of (II) in the natural state or after inactivation by heat. The rate of elimination of adenine is approx. the same with (I) and (II) whereas (II) loses $PO_4^{\prime\prime\prime\prime}$ more rapidly than does (I). This is attributed to loss of $PO_4^{\prime\prime\prime\prime}$ from (II) by two concurrent reactions. H. W.

Lipochromes and glycolysis. C. FRISOH, E. LEDERER, and R. WILLHEIM (Bull. Soc. Chim. biol., 1936, 18, 401-405).—Like carotene, lutein and zeaxanthin increase glycolysis by muscle extract.

A. L. Specificity of the adenylpyrophosphatase of liver extract. A. HAASE (Z. physiol. Chem., 1936, 239, 1-14).-Extracts of rabbit and swine liver liberate H_3PO_4 from adenylpyrophosphoric acid (I), adenylic acid (II), lactacidogen (III), and Na₄P₂O₇. The optimum condition for the dephosphorylation of (I) and (II) is p_{π} 9 and for the fission of $Na_4P_2O_7$ is p_{II} 7.0. At p_{II} 7.0 fission of (III) is scarcely appreciable, but attains about 20% after 4 hr. at 38° and $p_{\rm H}$ 9. Dephosphorylation of (II) is more rapid than that of (I). Selective damage to adenyl-pyrophosphatase (IV) does not occur when the liver extract is warmed with NH₄Cl, the fission of (I) and (II) being decreased in the same proportion; the action of phosphatase on Na4P2O7 is, however, very much weakened. (IV) probably affects all three phosphoric groups of (I). By treatment of liver extracts with NH₄Cl (IV) loses so much activity that the process is unsuitable for the establishment of small displacements between free and combined pyrophosphate.

Fission of natural lævorotatory phosphoglyceric acid by muscle extract. T. ROHLEDER (Z. physiol. Chem., 1936, 239, 15–29).—An enzyme can be extracted from muscle by physiological NaCl solution or by 2% NaHCO₃ which hydrolyses phosphoglyceric acid (I) to H₃PO₄ and AcCO₂H (usually in equiv. quantities). A large difference in the velocities of isomerisation of (I) to phosphopyruvic acid and of fission of the latter is unlikely. Fission of (I) proceeds most rapidly between $p_{\rm H}$ 6.8 and 8.0. Isomerisation and fission of (I) is very slight in acid solution. H. W.

Mechanism of lysozyme action. K. MEYER, J. W. PALMER, R. THOMPSON, and D. KHORAZO (J. Biol. Chem., 1936, 113, 479-486).—Lysozyme, prepared from Sarcina, had no protease, kinase, amylase, lipase, or phosphatase activity; it liberated reducing sugars from the mucins or polysaccharides from Sarcina, and also one from a mucin from eggwhite. No action was observed with a variety of naturally occurring mucins and polysaccharides.

Lacto-mannitic enzymes. II. Lactic acid in the mannitic fermentation of fructose. V. BOL-CATO (Annali Chim. Appl., 1936, 26, 24—30).—The proportion of lactic acid (I) to AcOH in the mannitic fermentation of fructose (cf. A., 1933, 1333) after different intervals shows no regularity, and on addition of (I) to the system the quantity produced is reduced only slightly. Formation of (I) is regarded as an independent enzymic activity. E. W. W.

Hydrogenlyases. IV. Synthesis of formic acid by bacteria. D. D. WOODS (Biochem. J., 1936, 30, 515-527),-When washed suspensions of B. coli and other organisms are shaken in $H_2 + CO_2$, HCO₂H is produced. The distribution of the enzyme effecting this reaction is identical with that of formic hydrogenlyase (I). The presence of the enzyme in the washed cells is conditioned, as with (I), by the presence of HCO₂' in the culture medium, and both systems are sensitive to the same poisons. The same enzyme therefore probably catalyses both synthesis and breakdown of HCO.H. the action of (I) being reversible. This view is confirmed by the free energy and heat cale. for the reaction. P. W. C.

Galactozymase as an adaptive enzyme. M. STEPHENSON and J. YUDKIN (Biochem. J., 1936, 30, 506—514).—Galactozymase (I) of S. cerevisiæ is an adaptive enzyme, adaptation occurring in aq. solutions of galactose (II) and without cell multiplication. A study of total and viable counts suggests that it is not only viable cells which are capable of adaptation. The activity of (I) and of glucozymase is independent of cell viability. Adapted cells lose their (I) completely after fermenting glucose and regain it in presence of (II). P. W. C.

Preparation of intermediary enzyme from yeast. E. NEGELEIN and W. GERISCHER (Biochem. Z., 1936, 284, 289–296).—The enzyme (this vol., 380) (isoelectric point, $p_{\rm H}$ 4·82) in yeast press-juice is purified by successively removing protein at $p_{\rm H}$ 4·6, adding NaOH to $p_{\rm H}$ 9 (which ppts, inert matter and stabilises the solution), fractionally pptg. with (NH₄)₂SO₄, pptg. by EtOH, and finally isoelectrically pptg. from H₂O. The product (102 mg. from 5 litres of press-juice) contains 8·5% of the initial activity. F. O. H.

Influence of monochromatic light on (A) proteolytic enzymes in yeast, (B) oxidation-reduction enzymes of yeast, (C) yeast amylase. I, II. R. MURAKAMI (J. Agric. Chem. Soc. Japan, 1936, 12, 19-20, 20, 21-22).-(A) Proteolysis is most marked in red light.

(B) The λ of illumination has but little effect on oxidation-reduction processes in yeasts; the reactions are possibly faster in red light.

(c) I. Amylase activity is most marked in red light.

(c) π . The extent of reaction increases with increasing intensity of a monochromatic source of light.

E. A. H. R.

Respiration-increasing action of potassium cyanide. P. E. LINDAHL and Å. ÖRSTRÖM (Naturwiss., 1936, 24, 142).—The gaseous metabolism of top yeast in presence of dihydroxyacetone (I) is increased by 40% by 0.0015*M*-KCN; 0.002*M*- and 0.005*M*-KCN produce no effect and a decrease, respectively. Fermentation of (I) is accelerated by 0.001*M*-KCN; CO has a similar effect. The phenomenon is due to the dual action of KCN or CO, viz., acceleration of an anaërobic reaction common to respiration and fermentation and inhibition of the Fe-containing respiratory enzyme. F. O. H.

H. W.

H. D.

Stimulation of yeast proliferation by pantothenic acid. O. W. RICHARDS (J. Biol. Chem., 1936, 113, 531—536).—The stimulation of the growth of yeast by pantothenic acid (I) is more marked with old (7-day) than with fresh, rapidly growing cultures. The effect is most marked 18—24 hr. after seeding, and there is little effect on the final yield. The observations suggest that the effect of (I) is in stimulating the recovery of the budding rate of older, differentiated, yeast cells. F. A. A.

Preservation and rate of respiration of yeasts in the presence of glucose. F. CHODAT and A. MIRIMANOFF (Arch. Sci. phys. nat., 1935, [v], 17, Suppl., 189—194; cf. A., 1935, 1538).—The addition of glucose (I) to the culture medium inhibits the ageing effect shown by *Endomyces anomalus* at low temp. (6°), the respiration rate remaining almost unaltered for days. The normal decrease in rate of respiration cannot be attributed to toxic products formed in the medium. Addition of (I) to the medium by increasing the osmotic pressure decreases the ease of extraction of diffusible substances from the cells. Diffusion of cozymase would thus be inhibited, and the maintenance of the respiratory powers of the yeast be explained. E. A. H. R.

Effect of aëration on alcoholic fermentation. Y. TOMODA (J. Soc. Chem. Ind. Japan, 1936, 39, 56B).—Aëration depresses the formation of EtOH but increases considerably the amounts of MeCHO and glycerol (10% on sugar converted). S. C.

Succinic acid and glycerol in alcoholic fermentation. L. GENEVOIS (Bull. Soc. Chim. biol., 1936, 18, 295–300).—A study of the glycerol (I), succinic acid (II), and AcOH (III) content of various Italian, German, French, and Swiss wines shows that g-(5s+2a), where g, s, and a are the no. of mols. of (I), (II), and (III), respectively, is always positive. A. L.

Detection of adenosinetriphosphoric acid in bottom yeast. N. DAS (Svensk Kem. Tidskr., 1936, 48, 22-24).—This acid was obtained as the Ba salt from a $CCl_3 \cdot CO_2H$ extract of fresh, pressed brewers' yeast. Its identity with that obtained from top yeast and from muscle (cf. A., 1931, 418) was established. J. N. A.

Squalene as a constituent of yeast fat.—See B., 1936, 378.

Hydrogenation of conjugated double linkings by fermenting yeast.—See this vol., 588.

Nickel nitroprusside reaction for reduced glutathione.—See this vol., 597.

Biochemistry of moulds. P. W. CLUTTERBUCK (J.S.C.I., 1936, 55, 55—61T).—A summary of recent work.

Sporulation of *Helminthosporium avenæ* and Alternaria solani in artificial culture. W. A. R. D. WESTON (Trans. Brit. Mycol. Soc., 1936, 20, 112–114).—Sporulation of these moulds occurs only after exposure to visible light of high intensity for 10–15 min. E. B. H.

Some root fungi. S. RENNER (Phytopath. Z., 1935, 8, 457-487).—Fungi developing on roots of Salix repens and Acer pseudoplatanus do not provide a factor necessary for the germination of seeds. No evidence of N fixation by the organism was obtained. A. G. P.

Thermogenesis in hay-inhabiting fungi. J. W. HARRISON (Iowa State Coll. J. Sci., 1934, 9, 37-59).—Increased temp. produced by various species of fungi is most marked during active germination, and is not paralleled by the rate of evolution of CO_2 . CH. ABS. (p)

Mechanism of fermentation of arabinose by Aspergillus oryzæ. I. T. TADOKORO (J. Agric. Chem. Soc. Japan, 1935, 11, 167—173).—The products of fermentation included citric, formic, glycollic, and kojic acids, but not malic or lactic acid, EtOH, MeCHO, AcOH, or COMe₂. The mechanism of the changes is discussed. CH. ABS. (p)

Degradation of fatty acids by mould fungi.— See B., 1936, 284.

Production of hydroxylamine from ammonia by Aspergillus niger. M. LEMOIGNE, P. MON-GUILLON, and R. DESVEAUX (Compt. rend., 1936, 202, 696-698).—Small amounts of NH_2OH occur when NO_3' or NH_4^+ provide the N source. NH_2OH probably represents a definite stage in the N metabolism of the mould. A. G. P.

Structure of the chitin of fungi. K. H. MEYER and W. LOTMAR (Arch. Sci. phys. nat., 1935, [v], 17, Suppl., 287—288).—Chitin from *Phycomyces blakesleeanus* possesses the same structure as that from animal sources. R. S.

Incorporation of deuterium into living organisms. III. K. H. GEIB and K. F. BONHOEFFER (Z. physikal. Chem., 1936, **175**, 459–468; cf. this vol., 256).—In solutions of glucose in 95% D₂O *Aspergillus niger* and *Penicillium glaucum* grow only about half as rapidly as in solutions in H₂O. About 30% of the H content of the mould is rapidly exchangeable for D from D₂O, and the proportion of D in the hydrogen incorporated into the mould and not removable by washing with H₂O is about half that in the water of the solution. The proportion of D in the hydrogen of moulds grown in AcCO₂H solution is > this. There is no growth in solutions of deuteropyruvic acid in D₂O. R. C.

Concentration of foodstuff as the quantitative factor in the growth of a population of infusoria. J. MONOD and G. TESSIER (Compt. rend., 1936, 202, 162—164).—The rate of multiplication of *Glaucoma piriformis* \propto the conen. of the nutrient when this is small, but asymptotically approaches an upper limit when the conen. is large. W. O. K.

Mechanism of chemotherapeutic action. XII. Comparison of the binding of some chemotherapeutic agents by normal and resistant trypanosomes. J. T. PEDLOW and L. REINER (J. Pharm. Exp. Ther., 1935, 55, 179—199).—The binding of As by normal and As-resistant strains of *Trypanosoma* equiperdum in vitro from solutions of neoarsphenamine and Mapharsen solutions in concns. such that they would kill both strains in the same time was the same; factors influencing the killing time were without effect on the binding. In vivo normal trypanosomes bind more As than As-resistant strains, whilst the latter bind less acriflavine (I) than do normal strains, the difference in vivo being > in vitro. Previous treatment of the rats with (I) was without influence on the binding of As by trypanosomes. Hence the theory that acquired resistance to As compounds is due to a loss of binding groups is incorrect. H. D.

Changes in acidity during biological processes. F. SANDER (Biochem. Z., 1936, 284, 189—196).— The resulting changes in [H'] of the systems SiO₂, starch, C, humic acid, NH₄ and Na zeolites, and AlCl₃ with H₂O and various concess. of aq. KCl, NaOAc, $(NH_4)_2SO_4$, NaCl, Na₂SO₄, and NaOH were determined. The data and their correlation with natural or artificial culture media and with bacterial $(NO_2'$ -, NO_3' and N-forming) systems are discussed. F. O. H.

Biochemistry of bacteria. T. K. WALKER (J.S.C.I., 1936, 55, 61-66T).—A review of recent developments.

Deamination of alanine. E. AUBEL and F. EGAMI (Compt. rend., 1936, 202, 675-676).—The action of various narcotics shows that the bacterial system effecting the deamination of *l*-alanine (I) differs from that acting on *d*-alanine but resembles that producing $AcCO_2H$ from lactic acid (II) (in presence of NO_3 '). The latter system is not identical with that effecting the same transformation in presence of methylene-blue as H-acceptor. Hence dehydrogenation of (I) cannot proceed by way of (II) (cf. A., 1935, 1282). A. G. P.

Soil microbiology. VIII. Nodule bacteria of Leguminoseæ. S. VINOGRADSKY [with H. VINO-GRADSKY] (Ann. Inst. Pasteur., 1936, 56, 221–250: cf. A., 1933, 537, 989).—In N-free cultures growth of the nodule organisms is poor. Addition of N as NH₄', amides, or amines improves development, sugar consumption increasing with the amount of N supplied. Fixation of N is, however, very small. Org. sources of N (extracts of yeast, leaves, roots, etc.) further increase development and initiate N fixation. Elimination of NH₃ by the organisms occurs only during N fixation. Evolution of NH₃ by nodules is not prevented by CHCl₃ or PhMe, or by drying (50°) and prolonged storage. The NH₃ produced is derived from atm. sources. A. G. P.

Root nodule bacteria of leguminous plants. XVIII. Breakdown of proteins by the root nodule bacteria. A. I. VIRTANEN and T. LAINE (Biochem. J., 1936, 30, 377—381).—Incubation of strains of *Rhizobium* with milk-proteins (I), gelatin (II), and the cell-proteins of the bacteria produced a very slow hydrolysis. Small amounts of NH₃ were produced from (I) and (II) in the absence of PhMe.

H. D.

Biology of Azotobacter. I. Filterability of Azotobacter. II. Nitrogen content of filtrates from Azotobacter cultures. M. ROBERG (Jahrb. wiss. Bot., 1935, 82, 1-27, 65-98).-I. No form of the organism passed a bacterial filter.

II. Filtrates from cultures contained N compounds. No NH_3 was formed until the energy source was exhausted. The amount of sol. N produced varied

with the species. Aspergillus niger and B. mesentericus utilised these N compounds. A. G. P.

Origin and significance of ammonia formed by Azotobacter. D. BURK and C. K. HORNER (Soil Sci., 1936, 41, 81–122).—Extracellular NH₃ produced by A. vinelandii and A. chroococcum is derived from normal cell constituents and not by direct synthesis from atm. N₂. Under suitable conditions (optima, $p_{\rm H}$ 7.8–8.0 and 30–40°) 50% of the cellular N may appear as NH₃. The influence of O₂ on oxidation of cell material is independent of the pressure (0.01–1.0 atm.). Aërobic production of NH₃ is closely related to the oxidation of cellprotein. Anaërobically, NH₃ is formed by hydrolytic processes not involving production of CO₂. The mechanism of these changes is discussed.

A. G. P.

Oxidation of mannose to mannonic acid by **B.** gluconicum (Hermann). S. HERMANN and P. NEUSCHUL (Bull. Soc. Chim. biol., 1936, **18**, 390–394).—Yields of 60—70% are obtained, the mannonic acid being identified as the Ca salt $(C_6H_{11}O_7)_2Ca, H_2O$. A. L.

Mechanism of glucose dissimilation by propionic acid bacteria. H. G. WOOD and C. H. WERKMAN (Biochem. J., 1936, 30, 618-623).--Quant. data of the products of $EtCO_2H$ fermentation indicate the formation (possibly from 2 mols. of AcOH) of succinic acid, which is decarboxylated to $EtCO_2H$. The possibility of formation of $EtCO_2H$ from a 3-C intermediate or by 4- and 2-C cleavage of glucose (cf. Virtanen, B., 1924, 687; 1925, 1007) is discussed. F. O. H.

Activation of lower fatty acids by propionic acid bacteria. R. W. STONE, H. G. WOOD, and C. H. WERKMAN (Biochem. J., 1936, 30, 624– 628).—Determinations of E_h of systems of lower fatty acids and resting bacteria indicate that AcOH, EtCO₂H, and, to a smaller extent, HCO₂H are caused to donate H₂ to methylene-blue (and, with AcOH, to nitrates and o-chlorophenol-indophenol) at $p_{\rm H}$ 5—7; PrCO₂H and BuCO₂H are not thus activated. The bearing of the data on EtCO₂H fermentation is discussed. F. O. H.

Optical properties of the fermentation lactic acids. II. Behaviour of lactic acid bacteria on addition of inactive and active lactic acids to the fermentation liquids. H. KATAGIRI and K. KITAHARA (J. Agric. Chem. Soc. Japan, 1936, 12, 96-100).—S. lactis bulgaricus produces more dlactic acid (I) than normally when dl-(I) is added to the incubation mixture (aq. glucose); L. pentoaceticus gives a final product of dl-(I) even when dor l-(I) is added during fermentation. H. D.

Fermentation of cellulose by thermophilic bacteria. V. Colloidal substances produced. VI. Formation of lactic acid. Y. TOMODA (J. Soc. Chem. Ind. Japan, 1936, **39**, 57B).—V. Colloidal substances reported by Scott *et al.* (A., 1930, 1218) are proteins, and not formed directly from the cellulose (I); only very small amounts of colloidal substances are real degradation products of (I).

VI. The yield of lactic acid (II) is > 10% of the

(I). In analysing the products AcOH and $PrCO_2H$ are removed by steam-distillation, and (II) and H_2SO_4 in the residue are partly separated by extraction with amyl alcohol. AcOH and $PrCO_2H$ are partly separated by extraction with Et_2O .

A. G.

Action of 2:4-dinitrophenol on respiration and oxidation of *Aerobacter cloace*. F. H. JOHNSON (J. Tenn. Acad. Sci., 1934, 9, 288—291).— In concess. of 4—6 mg. per 100 c.c., 2:4-dinitrophenol is toxic and effects some oxidation of the cell. Smaller proportions are stimulative. CH. ABS. (p)

Nucleoproteins from B. anthracis. R. FERRA-MOLA (Anal. Asoc. Quim. Argentina, 1935, 23, 93-105).—B. anthracis gives at p_{π} 3·8-4 an insol. nucleoprotein, separated by AcOH into an insol. protein (elementary analysis) and a sol. nucleic acid which with 15% H₂SO₄ yields guanine and adenine. The biological activity (immunised horse serum) resides in the protein fraction. F. R. G.

Biochemical and serological differentiation of the Brucella group: its significance for epidemiology. P. A. VERSCHILOVA (Arch. Sci. biol. U.S.S.R., 35, B, 513—541).—Bovine and porcine but not melitensis forms produce H_2S under conditions in which CO_2 accumulation is prevented, porcine types yielding the greater quantity. The bacteriostatic dye technique gives better differentiation. CH. ABS. (p)

Comparative value of the method of Koser, the Voges-Proskauer test, and the methyl-red reaction to differentiate *B. coli* of fæcal and telluric origin. F. VAN DEN BRANDEN and J. GEENS (Compt. rend. Soc. Biol., 1936, 121, 893-895). R. N. C.

Nature of diphtheria toxin. Purified, powdered toxin. S. HOSOYA, A. MOMMA, T. TANAKA, and K. KAGABE (Compt. rend. Soc. Biol., 1936, 121, 1191-1192). H. G. R.

Meningococcus infection. VIII. Type I specific substance. H. W. SCHERF and G. RAKE (J. Exp. Med., 1935, 61, 753—769).—Isolation of the type-sp. substance is described. It is probably the Na salt of a polysaccharide acid, yields 45% of reducing sugars on hydrolysis, is unaffected by tryptic digestion, and does not give a biuret test.

Сн. Авз. (р)

Use of sodium deoxycholate for the identification of pneumococci. E. LEIFSON (J. Amer. Med. Assoc., 1935, 104, 213).—In media of $p_{\rm ff} < 6.5$ pneumococcus but not streptococcus cultures are cleared by the reagent. Cfl. ABS. (p)

Existence of a staphylococcal paratoxin. P. NÉLIS (Compt. rend. Soc. Biol., 1936, 121, 808-810). R. N. C.

Cellular reactions to acetone-soluble fat from mycobacteria and streptococci. Effect of neutralisation on the biological activity of the tuberculolipin and of the phthioic acid derived from it. K. C. SMITHBURN and F. R. SABIN (J. Exp. Med., 1935, 61, 771-782).—The reaction induced by COMe₂-sol. fat of the tubercle bacillus is simpler and less extensive if the material is neutralised. Neutralisation of the fat or of phthioic acid does not lower the tuberculogenic potency. The fat from streptococci is similarly irritating but does not produce tuberculous tissue. CH. ABS. (p)

Diacetyl as tubercle-bactericidal constituent of Finnish wood-tar. Y. W. JALANDER (Arch. exp. Path. Pharm., 1936, 180, 628-630).—Ac₂ (synthetic or from wood-tar), especially as vapour, has a bactericidal action on tubercle bacilli.

F. O. H.

Effect of concentration of glycerol and asparagine on the weight-yields of *B. tuberculosis* and on the $p_{\rm H}$ of cultures in Sauton's medium. R. K. GOYAL (Compt. rend. Soc. Biol., 1936, 121, 1165—1167).—Optimum yields are obtained with 1·2% asparagine and 6% (vol.) glycerol.

H. G. R.

Sterilising action of acids. VI. Sterilising action of halogenated fatty acids on putrefactive bacteria, B. typhosus, and V. choleræ. S. TET-SUMOTO (J. Agric. Chem. Soc. Japan, 1936, 12, 22-26). E. A. H. R.

Mechanism of bactericidal action of radioactive radiations. I. Theoretical. II. Experimental; α - and β -particles. D. R. LEA, R. B. HAINES, and C. A. COULSON (Proc. Roy. Soc., 1936. B, 120, 47-63, 63-76).—I. Possible mechanisms of the bactericidal action of α - and β -radiations are discussed. The "target" hypothesis seems best to fit the facts.

II. Bacteria in thin gelatin films are exposed to radiations of small penetrating power. The fraction surviving is an exponentially diminishing function of the time of irradiation. The rate of disinfection is independent of temp. and ∞ the intensity of radiation. The results are expressed in terms of mean ionisation dosage required to produce death, and by "target areas." E. A. H. R.

Antiseptic action of certain 2-furyl mercurials. N. M. PHATAK and C. D. LEAKE (J. Pharm. Exp. Ther., 1936, 56, 265–268).—Furyl Hg salts have antiseptic powers < those of Ph Hg^{II} salts, and substitution of halogens or alkyl in the Ph or furan nuclei lowers the toxicity of the compounds. H. D.

Bactericidal action of mercury. M. LISBONNE and R. SEIGNEURIN (Compt. rend., 1936, 202, 169– 171).—The addition of Hg to H₂O renders the latter bactericidal. W. O. K.

Adsorption of foot and mouth disease virus on alumina. A. HANSEN and S. SCHMIDT (Compt. rend. Soc. Biol., 1936, **121**, 1239—1242).—The virus is completely adsorbed and may be eluted to a small extent with dil. $PO_4^{\prime\prime\prime}$ buffer at $p_{\rm H}$ 7.6. H. G. R.

Complex of foot and mouth disease virus with alumina and its pathogenic and immunising properties. S. SCHMIDT and A. HANSEN (Compt. rend. Soc. Biol., 1936, 121, 1236—1239).—Guineapigs, which show no signs of fever, are rapidly immunised by intracutaneous introduction of the complex. H. G. R. Determination of the dimensions of ultraviruses by ultrafiltration: virus of herpes. C. LEVADITI, M. PAĪC, and D. KRASSNOFF (Compt. rend. Soc. Biol., 1936, 121, 805—808).—The virulence of the ultravirus is inversely \propto the size of the particles. R. N. C.

Physicochemical characterisation of the filterable viruses of mosaic. K. S. SUCHOV (Virus Dis. Plants, Crimea and Ukraine, 1934, 31-38).—The virus of tomato fern-leaf is not killed by COMe₂ or EtOH or destroyed by pepsin. Tomato "streak" tissues exerted a mitogenetic action on yeast.

CH. ABS. (p)

Action of hormones on the plumage of birds. G. MONTALENTI (Rass. Clin. Terap., 1934, 33, 6— 21; Chem. Zentr., 1935, ii, 711). R. N. C.

Influence of different hormones on the hydrogen-ion concentration of blood-plasma. II. Relation between thyroid and insulin. III. Influence of adrenals. IV. Relation between adrenaline and thyroid and between adrenaline and insulin. V. Influence of the gonads. N. NAKATSUGAWA (Folia Endocrinol. Japon., 1933, 8, 105-106; 9, 24-25, 43-44, 45-46; cf. A., 1934, 1409).-II. Injection of insulin (I) in rabbits with slight hyperthyroidism causes an increased acidotic and a decreased alkalotic phase. In severe hyperthyroidism both phases decrease. Thyroidectomised animals show increased acidosis but no alkalosis after injection. When glucose is given with (I) acidosis was insignificant but alkalosis increased.

III. Injection of adrenaline (II) lowers the plasma $p_{\rm H}$. Cortex extract causes slightly increased vals. Ingested thyroid and adrenals are antagonistic. Insulin is synergistic with adrenals.

IV. Acidosis following injection of (II) is decreased by feeding thyroid powder and by insulin, and augmented by thyroidectomy. Initial acidosis after (I) was diminished by injecting (II), but the following acidosis was unchanged.

V. Plasma- $p_{\rm ff}$ of female animals is lowered by feeding interstitial tissue from cow ovaries and raised by feeding corpus luteum and by cophorectomy.

CH. ABS. (p)

Lipæmia caused by absorption of the products of intestinal putrefaction of proteins and effects of the various hormones on this condition. III. Effect of extirpation of adrenals. IV. Effect of insulin and of insulin plus glucose. M. MITANI (Folia Endocrinol. Japon., 1933, 8, 94; cf. A., 1934, 1398).—III. Extirpation of adrenals in rabbits results in an increase in blood-fat, -lipin, and (notably) -cholesterol. Lipæmia produced by assimilation of products of protein decomp. in the intestine is more marked in adrenalectomised than in normal animals.

IV. Lipamia following the feeding of decomp. products of proteins is reduced by insulin (I) and further reduced by (I) + glucose. CH. Abs. (p)

Passage of hormones (choline, adrenaline, posterior pituitary hormone) from the mother through the placenta to the fœtus. L. CATTANEO (Arch. ital. Biol., 90, 100—110; Chem. Zentr., 1935, ii, 71). R. N. C. Action of adrenaline in the monkey. C. J. STORM (Acta Brev. neerl. Physiol., 1935, 5, 57-60). R. N. C.

Use of adrenaline in intravenous injections of atebrin. C. J. STORM (Acta Brev. neerl. Physiol., 1935, 5, 60-63). R. N. C.

Intra-vascular injection of adrenaline into dogs. Hyperglycæmia and dosage by different methods of administration. A. BAUDOUIN, H. BÉNARD, J. LEWIN, and J. SALLET (Compt. rend. Soc. Biol., 1936, **121**, 1157—1159).—Hyperglycæmia is more readily produced when adrenaline is administered through the portal system. H. G. R.

Sensitisation by cocaine of the hypertonic effects of adrenaline. H. HERRMANN, G. MORIN, and J. VIAL (Compt. rend. Soc. Biol., 1936, 121, 998-1000). R. N. C.

Sparteine, an antagonist of yohimbine in adrenaline hyperglycæmia. R. HAZARD (Compt. rend., 1936, 202, 345—347).—Sparteine (10—20 mg. per kg.) largely antagonises the effect of 7 mg. of yohimbine chloride in suppressing the hyperglycæmic effect of adrenaline (0·1 mg. per kg.) in young rabbits. J. L. D.

Effect of endocrine gland secretions on the adrenaline formation and content of the adrenals. O. RICHTER (Endokrinol., 1935, 15, 305-320; Chem. Zentr., 1935, ii, 1052).—Adrenaline (I) discharge from the adrenals in the rat is increased by feeding with thyroid or thymus, or injection of insulin or posterior pituitary hormone, (I) formation showing a preliminary increase, which is soon negatived by the discharge, the medulla exhausting itself. Thyroidectomy increases (I) formation without affecting discharge, splanchnicotomy prevents (I) discharge, whilst ovariectomy increases both formation and discharge of (I). R. N. C.

Does administration of adrenaline alter the adrenaline content of the adrenals in rabbits? J. KANOWOKA (Tôhoku J. Exp. Med., 1934, 24, 572-579).-No change results from intravenous injection. CH. ABS. (p)

Adrenaline content of adrenal glands of dogs. J. Каноwока (Tôhoku J. Exp. Med., 1934, 24, 463—467).—Various methods of assay are compared. Сн. Abs. (p)

Adrenaline content of the adrenal capsules after destruction of the dorso-lumbo-sacral marrow in the dog. H. HERRMANN, J. DECHAUME, and G. MORIN (Compt. rend. Soc. Biol., 1936, 121, 1000—1002).—Adrenaline is depressed by destruction of the marrow, but tends to recover during the survival period. R. N. C.

Anaphylactic shock and adrenaline content of adrenal glands. J. KANOWOKA and S. KANOWOKA (Tôhoku J. Exp. Med., 1935, 25, 249—257).—In sensitised rabbits shock induced by injection of horse serum caused a decrease in adrenaline (I) content of the glands, unaffected by sectioning the splanchnic nerve, and probably due to destruction, rather than increased liberation, of (I).

CH. ABS. (p)

Adrenaline content of adrenal glands of rabbits in peptone poisoning. J. KANOWOKA (Tohoku J. Exp. Med., 1935, 25, 244—248).—Vals. decreased slightly in animals showing signs of peptone poisoning except when death immediately followed the injection.

Сп. Авз. (р)

Identification of the muscle-active adrenal cortex hormone. K. LANG and B. STUBER (Biochem. Z., 1936, 284, 256-269).—Adrenal cortex contains a hormone [not identical with that of Swingle et al. (A., 1933, 320)] characterised by its ability in suitable doses to delay fatigue in active muscle; large doses, however, accelerate fatigue. The isolated principle is mainly a fatty acid ester (Me stearate?) and its action is typical of esters of higher fatty acids which, like adrenal cortex extracts, enhance phosphagen synthesis in muscle.

F. O. H.

Adrenal cortex. II. Factors diminishing blood-lipins. K. LANG and B. STUBER (Biochem. Z., 1936, 284, 270-278).—The principles contained in adrenal cortex extracts responsible for the lowering of blood-phosphatides and -cholesterol in rabbits are esters of fatty acids with low and high no. of C atoms, respectively; thus the effects are produced by Me undecoate and oleate, respectively. Injection of Me oleate increases sterol excretion. The factors of Schmitz and Kühnau (A., 1933, 642) are probably similar substances. F. O. H.

Adrenal cortex. IV. Effect of sodium salts in sustaining the adrenalectomised dog. G. A. HARROP, L. J. SOFFER, W. M. NICHOLSON, and M. STRAUSS (J. Exp. Med., 1935, 61, 839—860).— Bilaterally adrenalectomised dogs are maintained in apparently normal condition by administration of NaCl and NaHCO₃. Adrenal hormone is concerned in regulating renal excretion of Na. CH. ABS. (p)

Action of cortical hormone on choline metabolism. G. MARANON and S. A. COLLAZO (Rev. franç. Endocrinol., 1935, 13, 1—23; Chem. Zentr., 1935, ii, 71).—Blood-cholesterol (I) oc the activity of the adrenal cortex. Cortical hormone in man increases (I) and also bile-cholesterol, and is probably associated with the increased excretion of cholesterol in the bile. R. N. C.

Action of cortical hormone on blood-cholesterol. C. V. MEDVEI (Z. klin. Mcd., 1935, 128, 58-67; Chem. Zentr., 1935, ii, 71-72).—Bloodcholesterol in healthy men is depressed by the cortical extract of Swingle and Pfiffner, is high in Addison's disease, and low in cases of cortical hyperfunction.

R. N. C. Secretion of the pituitary. E. KYLIN (Acta med. Scand., 1935, 85, 457-472). R. N. C.

Diabetogenic, thyrotropic, adrenotropic, and parathyrotropic factors of the pituitary. J. B. COLLIP (J. Amer. Med. Assoc., 1935, 104, 827-832, 916-921).—A review. CH. ABS. (p)

Growth hormone of the anterior pituitary. M. Evans (J. Amer. Med. Assoc., 1935, 104, 1232-1237).—A review. CH. Abs. (p)

Anterior pituitary and carbohydrate metabolism. F. Högler and F. ZELL (Wien. Arch. inn. Med., 1935, 27, 141—159; Chem. Zentr., 1935, ii, 872—873).—Tonephin (I) causes an increase of bloodsugar in rabbits which reaches a max. in 20—60 min.; temp. rises slightly. Pharmacological or operative exclusion of the cerebrum and brain-stem does not affect the action of (I), which is probably one of glycogen mobilisation. R. N. C.

Chromatophorotropic principle (intermedin) of the pars intermedia of the pituitary. B. ZONDER (J. Amer. Med. Assoc., 1935, 104, 637— 638).—Intermedin is thermo- and psycho-stable but easily destroyed by proteolytic enzymes and ultra-violet rays. Distribution of the hormone in cattle pituitaries is examined. CH. ABS. (p)

Purification of the pressor and oxytocic hormones of the pituitary gland : chemistry of the products. R. L. STEHLE and A. M. FRASER (J. Pharm. Exp. Ther., 1935, 55, 136—151).—The crude hormone prep. was purified by the method of Stehle (A., 1934, 117) and fractionated with MeOH and AcOEt. The activities of the pressor and oxytocic preps. were 100 and 125 times those of standard pituitary powders; both appeared to be polypeptides containing tyrosine, cystine, and arginine. Phenylalanine, glutamic and aspartic acids, and leucine appeared to be absent from the pressor prep.

H. D.

Physiological variations in the internal secretion of the pancreas. XIV. Action of posterior pituitary extract and of its hypertensive and oxytocic fractions on secretion of adrenaline E. ZUNZ and J. LA BARRE (Arch. and insulin. internat. Physiol., 1935, 41, 538-568).-Pitressin (but not pitocin) in doses of 3 units per kg. cause hyperglycæmia in chloralised dogs with and without ligature of the adrenal veins, by stimulating adrenaline secretion. Later, both substances increased insulin secretion shown by hypoglycamia. These effects persisted after thyroidectomy. Pituitrin caused hyperglycæmia not so marked as that produced by the pressor factor alone. Chloretone produced slight hypoglycæmia. NUTR. ABS. (m)

Hormones and external sex organs. O. O. FELLNER (Endokrinol., 1935, 15, 232-243; Chem. Zentr., 1935, ii, 67). R. N. C.

Gonadotropic hormones in the treatment of sterility in man. V. E. LLOYD (Lancet, 1936, 230, 474–475).—Administration of antuitrin-S effected a cure. L. S. T.

Effect of progestin on the mammary gland of the rat. J. FREUD and S. E. DE JONGH (Acta Brev. neerl. Physiol., 1935, 5, 47–48). R. N. C.

Effect of sex and adrenal cortex hormones on serum-lipase. J. BAUER and F. FEIL (Z. klin. Med., 1935, 128, 90—94; Chem. Zentr., 1935, ii, 62).—Follicular hormone causes a fall of serum-lipase (I) in rabbits of both sexes, followed occasionally by a rise to > normal. The male hormone does not depress (I) in male animals and can even increase it. Cortical hormone depresses (I) in male animals after an interval of some weeks, but does not affect it in females. R. N. C. Spectrographic detection of the cestrogenic hormone in human pregnancy urine. H. BIERRY and B. GOUZON (Compt. rend., 1936, 202, 686— 687).—The hormone, separated from acid-hydrolysed urine by adsorption and elution, is dissolved in $CHCl_3$ and shaken with H_2SO_4 . The brownishgreen, fluorescent colour obtained shows on spectrographic examination the band characteristic of folliculin or dihydrofolliculin. Urine from males or non-pregnant females yields the fluorescence but not the characteristic band. A. G. P.

Corpus luteum hormone and its purification. E. FELS (Arch. Gynākol., 1934, 158, 364—391; Chem. Zentr., 1935, ii, 67—68). R. N. C.

Ovarian hormones and carbohydrate metabolism. I. Ovarian hormones and blood-sugar. E. DE AMILIBIA, M. M. MENDIZÁBAL, and J. BOTELLA-LLUSIÁ. II. Effect of ovarian hormones on liver-glycogen. J. BOTELLA-LLUSIÁ, E. DE AMI-LIBIA, and M. M. MENDIZÁBAL (Arch. Gynäkol., 1935, 159, 453-460, 461-464).-I. In fasting immature guinea-pigs folliculin (I) raised and corpus luteum hormone (II) lowered the blood-sugar level during the 6 hr. following injection. Thyroidectomy abolished these effects.

II. In male albino rats, daily injections of (I) and (II) produced, respectively, a 50% decrease and increase in the glycogen content of the liver.

NUTR. ABS. (m)

Gonadotropic factors of climacteric urine. A. LIPSCHUTZ (Klin. Woch., 1935, 14, 532-533; Chem. Zentr., 1935, ii, 391).—The gonadotropic complex contains ≤ 3 factors: estrogenic (I), luteinising (II), and a third (III) which sensitises the follicles to (II). Anterior pituitary of male rats contains (II) and (III), and causes luteinisation of ovaries of infantile rats but (III) is absent from pituitary of female rats. Climacteric urine contains (III), and therefore, administered in combination with anterior pituitary from female rats, causes luteinisation.

G. H. F.

Effectiveness of theelol by oral administration. L. W. Rowe and A. E. SIMOND (J. Amer. Pharm. Assoc., 1936, 25, 201-205).—When orally administered, theelol (from human urine) is 5 times as active as theelin (from mare's urine of pregnancy). Oral dosage to rats of cestrogenic substances in amounts sufficient to produce cestrus in spayed rats reduces by 75% the time necessary for attainment of sexual maturity. Discrepancies between international standard and experimental rat units are discussed.

F. O. H.

Effect of follicular hormone on ossification in castrated dogs. M. TAUSK and P. DE FREMERY (Acta Brev. neerl. Physiol., 1935, 5, 19-22; Chem. Zentr., 1935, ii, 390).—Administration of folliculin to castrated fox terriers caused precocious ossification of the epiphysis. G. H. F.

Relation between creatine metabolism and the function of the sex glands. R. USUI, T. MIWA, and K. AOKI (Klin. Woch., 1935, 14, 720—721).— Administration of male sex hormone to old men and patients with Addison's disease lowers urinary creatine. CH. ABS. (p) Male sex hormone. IV. Hormone from testis of swine. II. A. OGATA and S. HIRANO (J. Pharm. Soc. Japan, 1933, 53, 869–890).—The hormone (I) is sparingly sol. in hexane, is not oxidised by cold KMnO₄, and is partly adsorbed by C. 70% EtOH separates a cholesterol-free fraction. Cock's comb tests are described. CH. ABS. (p)

Testis hormone. C. R. MOORE (J. Amer. Mcd. Assoc., 1935, **104**, 1405—1411).—The hormone is probably a keto-alcohol. Only animal tests are serviceable for its detection. CH. ABS. (p)

Assay and effect of testosterone on rats compared with those of other sexual hormones. V. KORENCHEVSKY, M. DENNISON, and I. BROVSIN (Biochem. J., 1936, 30, 558-575).-The biological properties of artificial testosterone (I) and the combined effect of (I) with œstrone (II) or œstradiol (III) are investigated. With castrated male rats, the relationship between dose of (I) and the effect on the genital organs is investigated statistically. The sexual glands, atrophied during 51 days after castration, were not completely restored by injections for 23 days (except in the case of the preputial glands). The wts. of somatic glands and organs were, however, generally restored to normal vals. Injection of (II) or (III) caused considerable increase in the seminal vesicles, small increases in the prostate and preputial glands, but no change in the penis. (II) or (III) injected with (I) showed only slight co-operative effect on the wts. of the atrophied seminal vesicles and prostate. With ovariectomised female rats, (I) produced enlargement of the atrophied sexual organs but not to normal wt. (except for the preputial glands) and decrease in wt. of the thymus. There was marked co-operative effect between (I) and (II) in restoring atrophied organs. Audrosteronediol (IV) and (I), unlike androsterone, bring about normal development of the male organs; both (IV) and (I) produce changes similar to those after injection of progesterone, and if injected along with (II), produce changes resembling those in pregnancy. P. W. C.

Action of testicular hormone on development of the hen's comb. E. RAMIREZ and M. D. RIVERO (J. Amer. Pharm. Assoc., 1936, 25, 99–102).— Enlargement of the comb following administration of testicular hormone occurs in normal hens, which could therefore be substituted for Leghorn capons for standardisation purposes. F. O. H.

Sterols as precursors of hormones, vitamins, and other physiologically important compounds. A. WINDAUS (Nachr. Ges. Wiss. Gottingen, Math.physik. Kl., III, 1935, [ii], 1, 59-83; Chem. Zentr., 1935, ii, 702).—A lecture. H. N. R.

Preparation of 17-ethyltestosterone and 3trans-17-cis-diols of androstane and androstene. Specificity of the sex hormones.—See this vol., 606.

Effect of zinc salts on the action of insulin. D. A. SCOTT and A. M. FISHER (J. Pharm. Exp. Ther., 1935, 55, 206—221; cf. A., 1934, 1267).— Addition of 0.01% of Zn to insulin (I) solutions decreases the activity by 60%. 0.1% of Zn delays the hypoglycæmic action of (I) in rabbits although
the quantity of glucose metabolised is unchanged. CoCl₂ and K alum are without influence on the activity of (I), whilst Ni has a similar effect to that of Zn. H. D.

Microscopic observation of the absorption of insulin and protamine insulinate. H. K. BEECHER and A. KROGH (Nature, 1936, 137, 458).—The rate of absorption and the distribution of particles of insulin and protamine insulinate dyed with methylene-blue in the lymphatics and tissue spaces of rabbits' ears are recorded. L. S. T.

Has insulin thrombokinase-like properties or is it contaminated with the latter? G. SANT (Pharm. Tijdschr. Nederl.-Indië, 1934, 11, 335—337; Chem. Zentr., 1935, ii, 545).—One of the above alternatives is probably the case. R. N. C.

Has insulin an important effect on serumalbumins? G. SANT (Pharm. Tijdschr. Nederl.-Indië, 1934, 11, 274—276; Chem. Zentr., 1935, ii, 545).—Insulin decreases α and η of serum and increases the turbidity produced by EtOH. The NaCl present in commercial insulin is only slightly responsible. R. N. C.

Individuality of vegetable insulinoids and vitamin-B. H. LABBÉ and E. DONARD (Bull. Acad. Méd., 1935, 113, 625—626).—The insulin-like extract exhibits neither a preventive nor a curative effect on avitaminosis-B in rats. The insulin-like action is hence not due to -B. R. N. C.

Physiology of the thyro-activator in amphibia. I. Acceleration of metamorphosis in the larvæ of salamanders. E. UHLENHUTH and S. S. SCHWARTZBACH (Endokrinol., 1935, 15, 329-341; Chem. Zentr., 1935, ii, 1050-1051).—Metamorphosis in normal and thyroidectomised salamanders is accelerated by thytropic hormone. R. N. C.

Effect of hormones on the dynamics of cardiac stimulants. I. Action of thyroxine. R. AGNOLI and G. MARAGLIANO (Arch. Sci. biol., 1934, 20, 498— 514; Chem. Zentr., 1935, ii, 711). R. N. C.

Relationship between the iodine content of the diet and the thyroxine content of blood. U. G. BIJLSMA, J. W. LE HEUX, and M. A. B. TOXOPEUS (Nederland. Tijdschr. Geneesk., 1935, 79, 3159).—In dogs on a diet poor in I the thyroxine (I) content decreased; on giving 0.000025 mg. of I it returned to the normal level: 100 mg. did not produce any further rise. With diet rich in I the (I) content was slightly > normal and 0.025 mg. of I per day lowered it. NUTR. ABS. (m)

Effect of thyroid and thyroxine on the chloride content of muscle. M. CAHANE (Bull. Soc. Chim. biol., 1936, 18, 424-427).—The Cl' content of the muscle-tissue of rats receiving thyroid powder and thyroxine daily was > that of normal animals.

A. L.

Depression of serum-lipase by thyroxine and its inhibition. IV. J. BAUER and L. FEIL (Z. klin. Med., 1935, 128, 77-89; Chem. Zentr., 1935, ii, 62).—Repeated injection of lipoid extract of the pancreas in rabbits inhibits the depression of serumlipase (I) by thyroxine (II) and also its toxic action. The extract alone causes an increase of (I) in rabbits, and a temporary fall, followed by a rise, in healthy and hyperthyroidian men of (I). R. N. C.

Effect of the thyroid on body-weight and nitrogen excretion. A. FIORI (Rass. Clin. Terap., 1934, 33, 40-46; Chem. Zentr., 1935, ii, 711).— There is no correlation between the amount of thyroid fed to animals and the loss of body-wt. Thyroid preps. cannot be evaluated by determination of N excretion by guinea-pigs. R. N. C.

Detoxicating hormone of the liver. LV. Antithyroid action of yakriton. I. HORIUCHI and F. OHSAKO. LVI. Effect of yakriton on blood-calcium. Y. UGA. LVII. Inhibiting effect of yakriton on the hypoglycæmic action of insulin. A. TAKAMATSU and Y. UGA. LVIII. Effect of yakriton in one-fifth R.A.U. on blood picture including nuclear shift. R. SHIBATA. LIX. Inhibiting effect of yakriton on the hyperglycæmic [?] action of insulin. A. TAKAMATSU. LX. Correlation between sedimentation rate of blood and detoxicating power of liver. M. Yoshida (Töhoku J. Exp. Med., 1934, 24, 505-515, 516-520, 521-528; 1935, 26, 31-45, 46-51, 52-59).-LV. Yakriton (I) antagonises the effect of dried thyroid and thyroxine on tadpoles.

LVI. (I) inhibits hypercalcamia caused by injection of Ca gluconate in rabbits.

LX. Intraperitoneal injection of NH₄Cl has no effect on the sedimentation rate in rabbits having actively detoxicating livers (cf. A., 1935, 538).

Stimulating action of pig's stomach powder on secretion of vagotonin by the pancreas. D. SANTENOISE, P. L. DROUET, C. FRANCK, and M. VIDACOVITCH (Compt. rend. Soc. Biol., 1936, 121, 927-928).—The powder is effective when given orally to the dog. R. N. C.

Stimulating action of secretin on the secretion of vagotonin by the pancreas. L. MERKLEN, C. FRANCK, and R. GRANDPIERRE (Compt. rend. Soc. Biol., 1936, 121, 925—926). R. N. C.

Absorption-spectral analysis especially as applied to vitamins and hormones. L. FUCHS (Oesterr. Chem.-Ztg., 1936, 39, 43-47).—A lecture.

Vitamin content of different forms of diet. H. SCHROEDER and V. WITTMANN (Münch. med. Woch., 1935, 82, 988—990).—The vitamin contents of a no. of diets are given; many are deficient in $-B_1$ and $-B_2$, and to a lesser extent in -C, but -A and -D are seldom low. R. N. C.

Storage of vitamin-A in the guinea-pig. A. CHEVALLIER and Y. CHORON (Compt. rend. Soc. Biol., 1936, 121, 1015—1016).—Guinea-pigs cannot store vitamin-A (I) when fed with carotene (II) or with livers of (I)-deficient rats, but (I) is stored in the liver on feeding with the livers of rats fed with green vegetables. The factor transforming (II) into (I) either is not present in rat liver or cannot be utilised by the guinea-pig. R. N. C.

Vitamin-A content of pasture plants.—See B., 1936, 346.

CH. ABS. (p)

Determination of vitamin-A. J. F. WARD and R. T. M. HAINES (Nature, 1936, 137, 402–403; cf. this vol., 390). L. S. T.

Determination of vitamin-A. ANON. (Nature, 1936, 137, 383-384; cf. this vol., 390).—A summary of the Medical Research Council's report. L.S.T.

Determination of vitamin-A in body-fluids. M. VAN EEKELEN (Klin. Woch., 1934, 14, 829–830; cf. Rosenthal, this vol., 253).—The SbCl₃ colour reaction is sufficiently accurate to be used for vitamin-Adetermination. The Rosenthal reaction is only feebly sensitive and is also given by cholesterol, so that it cannot be used for determination of -A in blood.

R. N. C. Nature of the sugar in diet and the onset of avitaminosis-A. L. RANDOIN and S. QUEUILLE (Compt. rend. Soc. Biol., 1936, 121, 1172—1177).— No difference was noted when the sugar was varied.

Relation of the vitamin-B complex to the metabolism of keto-acids. P. E. SIMOLA (Suomen Kem., 1936, 9, B, 4).—Urine of vitamin-B-deficient rats contained an acid resembling α -ketoglutaric acid. The blood also contained increased proportions of carbonyl compounds. A. G. P.

Efficacy of fats in decreasing vitamin-B requirements. W. D. SALMON and J. G. GOODMAN (44th Ann. Rept. Alabama Agric. Exp. Sta., 1933, 22).—The effect of various fats in delaying the onset of beri-beri is examined. CH. ABS. (p)

Ability of vitamin-B-deficient rats to utilise d-glucose. G. A. SCHRADER (44th Ann. Rept. Alabama Agric. Exp. Sta., 1933, 20—22).—Rats suffering from beri-beri utilise d-glucose for both heat production and glycogen formation. Comparison is made with animals receiving adequate and insufficient supplies of vitamin-B. CH. ABS. (p)

Use of various rat assay methods in comparing crystalline vitamin- B_1 preparations. F. F. HEYROTH (Biochem. J., 1936, 30, 645-650).—The potency of three cryst. vitamin- B_1 preps. assayed by the rat method are, in order of decreasing activity; Peters', Ohdake (rice), and Ohdake (yeast), the differences being only slightly > the limits of accuracy. The min. curative dose for the rat is 1.2 times the pigeon day dose and 6.6 times the day dose required for prevention of severe symptoms. Different vals. are obtained for curative dose adopting different criteria for marking the return of symptoms but the order of activity of the different preps. is the same with any particular criterion. P. W. C.

Chemical nature of vitamin- B_1 deduced from ultra-violet absorption spectra. F. F. HEYROTH and J. R. LOOFBOUROW (Biochem. J., 1936, 30, 651-658).—The diversity of the ultra-violet absorption spectra of vitamin- B_1 is attributed to reversible dissociation of $-B_1$ into an aminopyrimidine (I) derivative and a thiazole derivative and to deamination of the (I), the two processes occurring independently and to varied extents according to the conditions used. The curves of Peters and Philpot for acid EtOH solutions most nearly represent $-B_1$, those of Holliday in neutral EtOH the result of the breaking of the quaternary linkages of the thiazole, whilst other curves represent intermediate stages accompanied by some deamination of the pyrimidine (II). The (II) component of $-B_1$ has one NH₂, one OH, and two Me (or one Et) groups and spectroscopic evidence suggests that the OH group is probably not in the 2-position. P. W. C.

Action of vitamin- B_1 on carbohydrate metabolism. S. LAJOS (Biochem. Z., 1936, 284, 279— 288).—Intraperitoneal injection of glucose+vitamin- B_1 into fasting rats increases liver- and muscleglycogen, an action resembling, but more prolonged than, that of insulin. The concomitant hypoglycæmia is not so marked as that due to insulin.

F. O. H. Vitamin- B_1 and $-B_2$ in growth and lactation of rats. Effects of extracts of vitamin- B_1 and $-B_2$. Distribution of vitamin- B_2 . J. F. FEASTER (Iowa State Coll. J. Sci., 1934, 9, 147–149).—The $-B_1$ and $-B_2$ requirements for lactation were 3—5 times those for the young growing animals. Extracts of grain, liver, and yeast were less effective than the materials themselves. CH. ABS. (p)

Growth-promoting action of flavinphosphoric acids. R. KUHN and H. RUDY (Z. physiol. Chem., 1936, 239, 47–48).—The growth-promoting action of synthetic vitamin- B_2 -phosphoric acid (I) (A., 1935, 545) is approx. equal to that of the natural material (II). Differences in the rates of hydrolysis of (I), (II), and flavinphosphoric acid from yeast could not be detected. H. W.

Correlation between avitaminosis- B_4 and the composition of the diet. C. Y. CHEN and H. ARIYAMA (J. Agric. Chem. Soc. Japan, 1935, 11, 250—254).—The extraction of vitamin- B_4 from yeast is described. Lack of dietary fat is unrelated to avitaminosis- B_4 . CH. ABS. (p)

Synthesis of vitamin-C in the organism of the suckling infant. II. P. ROHMER, N. BEZSSONOFF, and E. STOERR (Bull. Acad. Méd., 1935, 113, 669–674).—Synthesis of vitamin-C in the infant is rendered insufficient by various pathogenic factors; the cessation of excretion of -C in the urine indicates the need for its oral administration. R. N. C.

Synthesis of ascorbic acid in young organisms. G. MOURIQUAND, A. COEUR, and P. VIENNOIS (Compt. rend. Soc. Biol., 1936, 121, 1005—1006).—Ascorbic acid is not synthesised in the guinea-pig fœtus or the young animal. R. N. C.

Incapacity of the animal to store reserves of vitamin-C. P. ROHMER, N. BEZSSONOFF, and E. STOERR (Compt. rend. Soc. Biol., 1936, 121, 988— 991).—Ascorbic acid (I) is fixed in an unstable condition in certain tissues in the young guinea-pig, and is rapidly eliminated in avitaminosis. (I) in the cerebrospinal fluid of suckling infants is raised by feeding with (I), but falls rapidly in avitaminosis to the level at which it is maintained by synthesis.

R. N. C.

Storage of ascorbic acid in the intestinal wall of the guinea-pig. E. JACOBSEN (Acta med. Scand., 1935, 85, 419-424).—The intestinal vitamin-C in guinea-pigs on a diet deficient in -C falls rapidly and

H. G. R.

parallel with -C of the liver and adrenals. Storage of -C is independent of the route of administration, and the deposition is almost ∞ the dose given if this is not large. -C when given in large doses is deposited first in the intestinal wall, and is removed in about 3 hr. to the other -C depots; intraperitoneal administration supplies the liver more rapidly than oral administration. R. N. C.

Effect of ascorbic acid on the vegetative system and on acid-alkaline equilibrium. R. TISLOWITZ (Compt. rend. Soc. Biol., 1936, 121, 916-917).—The alkaline reserve in the dog is increased. R. N. C.

Vitamins and water metabolism : effect of ascorbic acid on diuresis. R. TISLOWITZ (Compt. rend. Soc. Biol., 1936, 121, 914—916).—Diuresis in the dog is increased, possibly as a result of dehydration of the tissues and increased hydrophilia of the blood. R. N. C.

Diphtheria anatoxin and vitamin-C. M. PHI-LIPPE and E. HARDE (Compt. rend. Soc. Biol., 1936, 121, 940-942).—The anatoxin does not affect liveror adrenal-ascorbic acid in the guinea-pig.

R. N. C.

Vitamin-C and blood-sugar. W. STEPP, H. SCHROEDER, and E. ALTENBURGER (Klin. Woch., 1935, 14, 933—934).—Injection of ascorbic acid causes a fall of blood-sugar (I) and the action of simultaneously-injected insulin is strengthened. In many cases, particularly in diabetes, (I) is not depressed.

R. N. C.

Vitamin-C and blood.A. BÖGER and W. MARTIN(Münch. med. Woch., 1935, 82, 899—901).—Vitamin-Cin large quantities increases the thrombocyte countin thrombopenia.R. N. C.

Alleged presence of dehydroascorbic acid in blood. A. E. KELLIE and S. S. ZILVA (Biochem. J., 1936, 30, 361–368).—The view that blood converts ascorbic acid (I) into its dehydro-derivative is investigated. After treatment with H_2S , the plasma of normal, scorbutic, and (I)-injected guinea-pigs acquires the property of reducing indophenol to the same extent. CCl₃·CO₂H extracts of plasma, crythrocytes, and whole blood behave similarly but to a smaller degree. The ultra-violet absorption spectra of normal and H_2S -treated plasma are the same. It is concluded that the increased reduction of the plasma on treatment with H_2S is an artefact, and that blood with its erythrocytes intact is incapable of dehydrogenating (I) in vivo. H. D.

Particularly high vitamin-C content of the cerebrospinal fluid in the prematurely and normally new-born. P. ROHMER, N. BEZSONOFF, and E. STOERR (Compt. rend. Soc. Biol., 1936, 121, 987— 988).—The normal val. is doubled in normally, and quadrupled in prematurely, new-born children, indicating that the foetus has an ascorbic acid-synthesising power that is lost at birth. R. N. C.

Vitamin-C in the urine of healthy and diseased men. E. GABBE (Klin. Woch., 1935, 14, 613; cf. von Drigalski, this vol., 120).—The -C val. of Drigalski is due largely to thioneine, -C being present in the non-reactive oxidised form. R. N. C. Vitamin-C content of the liver of new-born infants. K. U. TOVERUD (Arch. Dis. Childhood, 1935, 10, 313-318).—The average amounts were 7.01 mg. per 100 g. (full term infants) and 6.05 mg. (premature infants). The extreme variations were 2.7—10.4 mg. NUTR. ABS. (m)

Histochemistry. VI. Quantitative distribution of vitamin-C in the small intestine. D. GLICK and G. R. BISKIND (J. Biol. Chem., 1936, 113, 427-432; cf. this vol., 530).—The amounts of vitamin-C expressed as mg. per g. of tissue in the duodenum of the cow are : mucosa 0.20, Brunner's glands 0.24, submucosa 0.10, muscle 0.06; and in the jejunum : mucosa 0.26, submucosa 0.10, and muscle 0.03. J. N. A.

Effect of oxidases on determination of ascorbic acid. M. VAN EEKELEN (Acta brev. neerl. Physiol., 1935, 5, 78-80).—McHenry and Graham's observation (A., 1935, 1287) that there was more titratable vitamin-C (I) in cooked than in raw vegetables is attributed to the conversion of (I) into dehydroascorbic acid in the fresh food by an oxidase which, however, is destroyed by cooking. This is avoided by preliminary pptn. of the sample with Hg(OAc)₂ and treatment with H₂S. An analogous phenomenon occurs in blood extracts due to unavoidable oxidation of (I) by the erythrocytes. NUTR. ABS. (m)

Determination of vitamin-C in foodstuffs.— See B., 1936, 391.

Avitaminosis-A in presence of variable amounts of vitamin-D. L. ÉMERIQUE (Bull. Soc. Chim. biol., 1936, 18, 384—389).—Whilst small quantities (> the necessary min.) of vitamin-D increase the growth and survival of rats under avitaminosis-A, larger quantities do not further improve the growth, and the period of survival is shorter. A. L.

Total metabolism trials with rats. Influence of vitamin-D. W. SCHOCH (Bied. Zentr. [Ticrernähr.], 1935, 7, B, 382-443).—Vitamin-D has no influence on energy metabolism or protein digestibility. A method of determining the net energy val. of foods is described. A. G. P.

Dermal absorption of vitamin-D. P. S. AST-ROWE and R. A. MORGEN (Amer. J. Dis. Children, 1935, 49, 912-922).—Viosterol is absorbed in effective amounts through the skin of rats.

Сн. Авз. (р)

Antirachitic cow's milk. Antirachitic value of irradiated cow's milk and milk produced by cows fed with irradiated yeast. H. J. GERSTEN-BERGER, A. J. HORESH, A. L. VAN HORN, W. E. KRAUSE, and R. M. BETHKE (J. Amer. Med. Assoc., 1935, 104, 816—826).—No difference in efficiency was observed when fed to infants at the same vitamin-D level. CH. ABS. (p)

Antirachitic value of hay. Vitamin-D sparing action of magnesium.—See B., 1936, 346.

Antirachitic action of irradiated cholesterol for chicks. B. SJOLLEMA and W. C. BARBAS (Bied. Zentr. [Tierernähr.], 1935, 7, B, 235-263).--Calcification in rachitic chicks (examined radiographically) became normal within 10 days of administration of irradiated cholesterol (I) with a sufficiency of Ca. Little improvement resulted from use of (I) without Ca; with cod-liver oil (II) recovery was slower. Changes in serum-Ca and -inorg. P were similar after treatment with (I) and (II). Mineral metabolism remained disturbed until calcification of the pituitary was complete. A. G. P.

Antirachitic action of phosphorus and of inorganic and organic phosphorus compounds. R. LECOQ (Bull. Acad. Mcd., 1935, **113**, 760—767).— A review. R. N. C.

Constitution of dihydrovitamin- D_2 .—See this vol., 603.

Vitamin-E unit. A. J. PACINI and D. R. LINN (J. Amer. Pharm. Assoc., 1936, 25, 206—207).—A convenient expression of the val. of a vitamin-E prep. is given by dividing 10^3 by the no. of mg. of the prep. required daily by pregnant rats on an -E-free diet to produce a normal litter. F. O. H.

Carbonic anhydrase and photosynthesis. G. O. BURR (Proc. Roy. Soc., 1936, B, 120, 42–47).—The observed rate of photosynthesis by green plants is far > the rate of uncatalysed CO₂ hydration. As, in addition, carbonic anhydrase cannot be detected in ground leaf tissues, it seems doubtful that CO₂ must be hydrated before reacting with chlorophyll.

È. A. H. R.

Determination of rates of photosynthesis [in plants] under natural conditions. E. BAZUIRINA and V. TSCHESNOKOV (Trav. Soc. natural. Leningrad, Sect. bot., 61, 221–247).—Investigations carried out in a current of air give the most satisfactory results. CH. ABS. (p)

Carbon dioxide factor in photosynthesis. V. TSCHESNOKOV and E. BAZUIRINA (Trav. Soc. natural. Leningrad, Sect. bot., 61, 323—376).—Reported increases in photosynthesis due to artificially increased $[CO_2]$ are attributed to experimental error.

CH. ABS. (p)

Causes of liberation of large quantities of carbon dioxide in light by leaves of green plants. V. TSCHESNOKOV, O. GRETSCHUTSCHINA, and I. JERMOLAJEVA (Trans. Soc. natural. Leningrad, Sect. bot., **61**, 377–400).—Respiration intensity of leaves of *Fragaria vesca* varies from 1.0 to 20.0 mg. of CO_2 per sq. dm. per hr. CH. ABS. (p)

Factors determining winter hardiness in lucerne. C. R. MEGEE (J. Amer. Soc. Agron., 1935, 27, 685-698).—No direct relationship was apparent between winter hardiness and the heat of wetting, swelling, H_2O equiv., f.p., composition, respiration, or rate of loss of H_2O from roots of lucerne. Inheritable factors are probably concerned.

A. G. P.

Photosynthesis of carbohydrates. F. N. KRA-SCHENINIKOV (Uspek. Chim., 1935, 4, 138—164).— The structure of chlorophyll and the mechanism of carbohydrate synthesis are discussed.

CH. ABS. (p)Winter hardiness of clover. I. Effect of cutting on carbohydrate reserves in red clover roots. A. I. VIRTANEN and M. NURMIA (J. Agric. Sci., 1936, 26, 288—295).—Cutting causes a rapid decrease in the insol. sugar content of roots, min. vals. being reached in 12—15 days irrespective of the time of cutting. Recovery of the initial carbohydrate level is attained more quickly in autumn than in June–July. Sol. sugars are not greatly affected by cutting. A. G. P.

Physico-chemical properties of plastid stroma and imbibition. A. MAIGE (Compt. rend., 1936, 202, 677-679).—The mechanism of formation of starch grains in plant cells is examined. A. G. P.

Changes in the osmotic value of the expressed sap of leaves and small twigs of *Larrea tridentata* as influenced by environmental conditions. T. D. MALLERY (Ecol. Monog., 1935, 5, 1-35).—Changes in the osmotic pressure of leaf saps are regulated by external and not by internal factors. Seasonal, climatic, and soil factors are examined.

Сн. Авз. (р)

Cell size and structure in plants as affected by various inorganic elements. B. F. LUTMAN (Vermont Agric. Exp. Sta. Bull., 1934, No. 383, 54 pp.).—Tissue examination of various species of plants grown in mineral-deficient cultures is described. A. G. P.

Pathological changes in plant cells caused by the action of potassium iodide : nature of the X-bodies. K. S. SUCHOV and M. N. LANSHINA (Virus Dis. Plants, Crimea and Ukraine, 1934, 122— 124).—Watering beet seedlings with 0.01% aq. KI caused necrosis and formation of intracellular inclusions resembling X-bodies found in cells of virusinfected plants. CH. ABS. (p)

Physiological importance of mineral elements in plants. VII. Effects of potassium and chloride ions on diastase of broad bean leaves. W. O. JAMES and M. CATTLE. VIII. Variation in potassium content of potato leaves during the day. N. L. PENSTON (New Phytol., 1935, 34, 283—295, 296—309; cf. A., 1934, 217).—VII. The presence of K in the nutrient effects an increase in the diastatic activity of broad bean leaves but is probably without action on the extracted enzyme. Cl' has no action when supplied in the nutrient but markedly activates the enzyme extract. Within the plant K^{*} possesses greater mobility than other cations except H^{*} but has no appreciable influence on the distribution of Cl'. Colloidal ppts. from extracts of plant materials usually contain diastase but frequently no K^{*}.

quently no K^{*}. VIII. The K content of potato leaves showed daily variations with a max. at 3-4 p.m., variations being smaller when transpiration was low. Max. K vals. correspond with max. dry wt., H₂O content, and residual ash wt. A. G. P.

Plasmolysis. Influence of alkali salts on deplasmolysis of plant cells. H. KAHO (Acta Comment. Univ. Tartu., 1934, A, 26, No. 4, 61 pp.).— The effect of ions on the rate of diffusion of H_2O through protoplasm was in the order, Rb>Cs> NH_4 ; K>Na>Li, and $SCN'>AcO'>Br'>NO_3'>$ Cl; tartrate>citrate>SO_4''. Salts penetrate as ions and all plasmolytes effect reversible changes in the colloid condition of the protoplasm.

CH. ABS. (p)Sulphur in biology: action on cell evolution. G. ZIRPOLO (Pontif. acad. Sci. Nov. Lyncaei, Sci. Nunc. Radiophon., 1935, No. 36, 9–10).—Treatment of seed with 1% aq. Na₂S₂O₃ and Na₂S increased the growth of *Brassica oleracea*. Eggs of *Paracentrotus lividus* showed a negative effect. CH. ABS. (p)

Action of glycerol on Saprolegnia. F. MOREAU (Compt. rend., 1936, 202, 152—154).—Achyla colorata is unaffected by the presence of 3-4% of glycerol in the medium; higher concess. exert inhibitory and toxic effects, 10—20% preventing development though not causing death. W. O. K.

Formation of nicotine in Nicotiana after feeding with proline. A. GORTER (Proc. K. Akad. Wetensch. Amsterdam, 1936, 39, 87—90).—Klein and Linser's results (A., 1933, 1344) are incorrectly interpreted. Feeding with proline causes a decrease in the nicotine content of the plants. A. G. P.

Effect of gonadotropic hormones on plants. C. SERONO and A. CRUTO (Arch. ital. Biol., 1934, 91, 93-95; Chem. Zentr., 1935, ii, 391).—The growth and flowering of beans (*Vicia faba*) was not affected by manuring with gonadotropic hormone. Treated plants fruited but the controls did not. G. H. F.

Action of sodium nitrate on infection of lucerne root-hairs by nodule bacteria. H. G. THORNTON (Proc. Roy. Soc., 1936, 119, B, 474-492).—Secretions of nodule bacteria increase the no. of root hairs in lucerne, and stimulate and produce irregular growth of the hairs. Solutions of NaNO₃ (0·1%) inhibit these effects and prevent infection of roots by bacteria. The action of NaNO₃ is mitigated by addition of glueose to media. A. G. P.

Root nodule bacteria of leguminous plants. XVII. Effect of air content of the medium on the development and function of the nodule (continued). A. I. VIRTANEN and S. VON HAUSEN (J. Agric. Sci., 1936, 26, 281–287; cf. A., 1935, 787).—Growth and nodulation of peas in a N-free medium were improved by aëration. Nodulation is prevented by passing a stream of N₂ through the medium. No excretion of N compounds into the medium was observed in aërated H₂O-cultures of peas. In aërated sand-cultures considerable amounts of N were excreted. A. G. P.

Fixation of nitrogen in root nodules. A. I. VIRTANEN and T. LAINE (Suomen Kem., 1936, 9, B, 5).—Extracts of (initially) N-free media after growth of inoculated pea seedlings contain, in addition to aspartic acid (I) and lysine, small amounts of NO_3' probably derived from NH_2OH (II). (I) may be formed from (II) and oxalacetic acid. A. G. P.

Excretion of nitrogenous compounds from the root nodules of leguminous plants inoculated with different strains of the nodule organism. A. I. VIRTANEN, S. VON HAUSEN, and T. LAINE (Suomen Kem., 1936, 9, B, 5).—The amount of N excreted varies widely with the strain of the organism concerned. A. G. P. Carbohydrate-nitrogen relation in symbiotic nitrogen fixation. P. W. WILSON (Wisconsin Agric. Exp. Sta. Res. Bull., 1935, No. 129, 40 pp.).—The carbohydrate-N balance in plants effects a more or less sp. response in the no., size, and distribution of nodules, the amount of N fixed, the onset and duration of the N-hunger stage, and the influence of light, fixed N, and environmental conditions. Plants are classified into five groups on the basis of differences in carbohydrate-N balance. A. G. P.

Changes in composition of sprouting mungo seeds. P. ROCHANAPURANANDA (Univ. Philippines Nat. Appl. Sci. Bull., 1934, 4, 127—147).—As germination proceeds the % of H₂O, ash, fat, and protein (I) increases and that of carbohydrates (II) declines. Reducing sugars appear at the second day and increase gradually accompanied by a decrease in the amount of starch. Absence of light lowers the (I) : (II) ratio. CH. ABS. (p)

Transformation of higher fatty acids into carbohydrate during germination of pumpkin seed. I. A. ZELLER. II. Determination of carbohydrates. K. ENSER (Jahrb. wiss. Bot., 1935, 82, 123-157, 158-169).-I. During the early stage of germination (4-6 days) the fatty acid content of seeds decreases and additional carbohydrates appear. Infiltration of K sorbate also increases starch formation in the seedlings. The normal decomp. of starch in seedling autolysates is retarded by β -hydroxybutyric, succinic, or lactic acid, and is reversed to a starch-forming process by AcOH, MeCHO, H₂C₂O₄, sorbic acid, or AcCO₂H. The bearing of these results on the fatty acid \rightarrow carbohydrate change is discussed.

II. Detailed carbohydrate data from the above experiments are recorded and discussed. A. G. P.

Plant respiration. VI. Relation of respiration of potatoes to the concentration of sugars and to the accumulation of a depressant at low temperatures. [iii]. Relation of respiration to concentration of sucrose. J. BARKER. [iv]. Relation between respiration in air and in nitrogen of certain seeds in which carbohydrates constitute the chief food reserve. W. LEACH (Proc. Roy. Soc., 1936, B, 119, 453-473, 507-521).-VI. [iii]. The forms of the respiration/glucose, respiration/ fructose, and respiration/total sugar relations vary widely with the sucrose (I)/hexose (II) quotient during sweetening and desweetening. On the other hand the respiration /(I) relation in these stages and also while the (I)/(II) quotient was changing conformed closely with the enzymic rectangular hyperbola for the rate of reaction/substrate relation for an enzyme reaction in vitro. These results are interpreted as showing that (I) is closely related to the substrate supply for respiration and that neither glucose nor fructose is associated with this function. In samples of low sugar content the (I)/(II) quotient is markedly affected by changes of temp. (cf. A., 1933, 435).

VI. [iv]. During anaerobiosis carbohydrate-storing seeds (like oil seeds) accumulate an easily oxidisable substance, which is rapidly respired during subsequent exposure of the seeds to O_2 . Transference of seeds from air to an atm. of N_2 decreases CO_2 production to 33% as is to be anticipated if (II) is then only partially oxidised to CO_2 and EtOH. The mechanism of respiration is discussed (cf. A., 1934, 1271).

A. G. P.

Influence of heteroauxin on growth of root hairs and roots of Agrostemma githago, L. A. MEESTERS (Proc. K. Akad. Wetensch. Amsterdam, 1936, 39, 91—97).—Root hairs are less sensitive than roots to the growth-inhibiting action of heteroauxin (I). Solutions of AcOH having the same p_{π} as that of (I) show no inhibitory action. (I) does not produce chemotropic curvature in root hairs. A. G. P.

Synthesis of δ -3-indolylvaleric acid. Effects of indole acids on plants.—See this vol., 612.

Factors affecting the formation of local lesions by tobacco mosaic virus. J. CALDWELL (Proc. Roy. Soc., 1936, B, 119, 493—507).—The action of trypsin in preventing virus infection is due to its effect on the virus rather than on the plant. Horse serum and $AgNO_3$ produce similar effects.

A. G. P.

Mineral matter of certain leguminous crops. I. Inorganic constituents of underground parts. II. Nodule formation and titanium supply. K. KONISHI and T. TSUGE (Mem. Coll. Agric. Kyoto, 1936, No. 37, 1-24, 24-35).-I. Spectrographic detection of traces of Li, Sr, Cr, Zn, Ni, Cu, Co, V, Mo, Bb, and B is recorded. Ba, Mn, and Ti were present in somewhat larger amounts. The Ti content of nodules was > that of roots. In acid-tolerant species (lupins, serradella, and soya bean) the P content of nodules was > that of roots, but in lucerne, clover, and other acid-sensitive species the nodules contained more Na and Ca. No differences in the % of other secondary elements in roots and nodules were apparent. K, TiO₃ and Ti(SO₄)₂ increased nodulation and crop yields, the effective range of concn. of the latter being < that of the former. A. G. P.

Variations in the contents of some of the constituents of the ash of potatoes. H. STEUDEL (Deut. med. Woch., 1935, 61, 872).— P_2O_5 and SO_3 show considerable oscillations. R. N. C.

Comparative boron contents of plants grown in the same soil. G. BERTRAND and H. L. DE WAAL (Compt. rend., 1936, 202, 605-609).—The B contents of several plant species varied considerably. A general relationship is probable between the capacity of a species to accumulate B and its position in the botanical classification. A. G. P.

Comparative sulphur and nitrogen contents of plants grown in the same soil. G. BERTRAND and L. SILBERSTEIN (Compt. rend., 1936, 202, 261— 264; cf. this vol., 395).—The N content of a wide variety of plants ranges from 2.04 to 5.32%. The S/N ratio is probably closely related to the quantities of SO₄" used as fertiliser. J. L. D.

Nitrogen distribution in tea. W. S. SHAW (United Planters Assoc. S. India, Bull. 7, 1934, 3 pp.). —No H₂O-sol. protein is present, 50—75% of the sol. N occurring as caffeine. The insol. N (40—47% of the total) occurs mainly as glutelin. P. G. M.

Determination of sugars in the leaf of the mangold (Beta rulgaris). I. Fructose, glucose, and sucrose. II. Use of basic lead acetate, charcoal, and yeast to avoid interference by substances other than sugars. III. Application of copper reagents to unclarified extracts. IV. Tests for raffinose, maltose, galactose, and pentose. J. E. VAN DER PLANK (Biochem. J., 1936, **30**, 457–483).—I. The method of Harding and Downs (A., 1933, 964) has been modified to give reproducible results. Fructose (I) is determined, after oxidation of glucose (II) by alkaline I and removal of excess of I, by Cu or $Fe(CN)_6^{\prime\prime\prime}$ reagents. For determining sucrose (III), the sugar is inverted by invertase in conc. solution and the actual determination carried out after dilution, to minimise the reducing effect of the invertase.

II. In unclarified extracts, (III) is determined without interference; with the Cu reagent the error occurs in the determination of (II) and with the $Fe(CN)_{6}$ ^{'''} reagent in that of (I) and (II). Clarification is best carried out with dibasic Pb acetate after concn. and without neutralisation to avoid loss of (II), avoiding washing of the ppt.; Na₂HPO₄ is used for removing excess of Pb. Yeast in conjunction with the Cu reagent may be used to allow for interfering matter in unclarified extracts and an empirical correction factor for this is given. The use of C for clarification is not recommended.

III. With a high concn. of impurities, the solution must be diluted before analysis.

IV. Raffinose, maltose, galactose, or pentoses could not be detected in extracts by selective fermentation. H. G. R.

Determination of reducing sugars and sucrose in plant materials. W. Z. HASSID (Ind. Eng. Chem. [Anal.], 1936, 8, 138—140).—Small amounts of sugars are determined in plant extracts by treating the clarified and decolorised solution with excess of alkaline $K_3Fe(CN)_6$ solution and titrating the excess, after oxidation, with $Ce(SO_4)_2$ (o-phenanthroline-FeSO₄ as indicator). The method is rapid and accurate over a wide range and gives slightly higher results than the Munson–Walker Cu method. Sucrose, if present, is hydrolysed by invertase before oxidation. S. C.

Crystalline *d*-galacturonic acid from tobacco. —See this vol., 591.

Occurrence of amygdonitrileglucoside in the genus Cotoneaster, and in the leaves of Cydonia vulgaris, Pers. V. PLOUVIER (Compt. rend., 1936, 202, 352—354; cf. A., 1935, 1181).—Determinations of the glucose/HCN ratio in many species of Cotoneaster show that the HCN is usually, although not always, present as amygdonitrileglucoside (I). Amygdaloside probably occurs in some species. The prulaurasoside isolated by Herissey (A., 1906, i, 31) is probably formed during its isolation. Leaves of Cydonia vulgaris also afford (I). J. L. D.

Comparative velocities of hydrolysis of certain glucosides under the influence of ultra-violet rays, acids, and enzymes.—See this vol., 572.

Determination of starch in plant tissues. G. W. PUCHER and H. B. VICKERY (Ind. Eng. Chem. [Anal.], 1936, 8, 92—97).—The sample is dried rapidly at 70–80°, extracted completely with 75% EtOH, redried, and finely milled. Starch (I) is then extracted with either 21% HCl at 20–22°, or with 46% aq. CaCl₂ at 100°. After adjusting the acidity, (I) is pptd. with KI-I solution, the ppt. separated, decomposed with NaOH-EtOH, and (I) isolated by centrifuging. (I) is finally converted into starch-I and the colour measured in a Pulfrich spectrophotometer, calibrated with potato starch standards. The HCl method of extraction is preferred since aq. CaCl₂ may destroy (I) especially at higher temp. in presence of traces of acid. CaCl₂-extracts will not keep but HCl-extracts are stable for long periods at 0°. Results are < those obtained by hydrolysis-sugar-reduction methods, but more trustworthy. The method is very sp. and results are accurate to 3% with 1–3 mg. of (I) and to < 10% with 0·1 mg. S. C.

Fruit of Lagenaria vulgaris, Seringe (bitter variety). I. Constituents of the oil from the seeds. R. R. AGARWAL and S. DUTT (Proc. Acad. Sci. Agra and Oudh, 1934—1935, 5, 227—233).— $C_{g}H_{6}$ extracts an oil (19·1%) which when hydrolysed (EtOH-KOH) affords, in nearly equal proportions, saturated (palmitic, stearic, and arachidic) and unsaturated (oleic and linoleic) acids. The unsaponifable material (2%) is sitosterol. J. L. D.

Seeds of Hygrophyla spinosa. N. L. PHAL-NIKAR, K. S. NARGUND, and D. D. KANGA (J. Univ. Bombay, 1935, 4, Part II, 146—152).—The seeds contain an oil giving, when hydrolysed, 25% of solid (myristic 5.5, palmitic 73, and stearic 21.4%) and 75% of liquid acids (di- and mono-unsaturated), and containing 7.5% of unsaponifiable matter, including a little of a substance, m.p. 114—115°. R. S. C.

Crystalline constituent of essential oil of matsubasa (Shizandra nigra, Maxim.). I. T. SEN-GOKU (J. Pharm. Soc. Japan, 1933, 53, 947–951).— The substance $C_{13}H_{26}O$, m.p. 28°, is *Me undecyl ketone*, which is also prepared by dry distillation of Ba laurate and Ba(OAc)₂. CH. ABS. (p)

Chemistry of slash-pine (*Pinus caribæa*, Morelet). II. Fats, waxes, and resins of the growing tips. J. A. HALL and O. GISVOLD (J. Biol. Chem., 1936, 113, 487—496; cf. A., 1935, 864).— A light petroleum extract of the young growing tips yielded paraffins (C_6-C_9) , α -pinene, melissic, palmitic, behenic, oleic, linoleic, and abietic acids, melissyl alcohol, *n*-nonacosan- κ -ol, a sitosterol, and a sitosterolin. H. D.

Isolation of carotene and sterols from the unsaponifiable matter of cocksfoot. A. POLLARD (Biochem. J., 1936, 30, 382–386).—The unsaponifiable fraction of the light petroleum extract of dried cocksfoot contains carotene (only the β -isomeride), xanthophyll, and sterols consisting chiefly of sitosterol; ergosterol was separated as ergopinacol (acetate, m.p. 204°). H. D.

Pigmentation of the ripening gourd blossom. II. L. ZECHMEISTER, T. BÉRES, and E. UJHELYI (Ber., 1936, 69, [B], 573-574; cf. A., 1935, 1180).---The isolation of *petaloxanthin* (I), C₄₀H₅₈₍₅₆₁₎O₃, m.p. 211-212° (corr.) in oil-bath, m.p. 202° (Berl), from the portion of the crude carotenoids most sparingly sol. in CS_2 is described. In m.p., spectroscopic behaviour, solubility, colour, and cryst. form (I) is nearly identical with antheraxanthin (Karrer *et al.*, this vol., 239) but chromatographic analysis with $Ca(OH)_2$ in C_6H_6 shows the pigments to be distinct from one another. H. W.

Flower colouring by a membrane pigment in Leonotis. L. GETTLER (Oesterr. bot. Z., 1934, 83, 284—287; Chem. Zentr., 1935, ii, 871).—The orangered colour of the flower crown of *L. leonurus* is conditioned exclusively by a membrane pigment which is neither anthocyanin nor carotenoid. A. G. P.

Extraction and separation of the chlorophyll pigments. H. M. JENNISON and L. M. COOLEY (J. Tennessee Acad. Sci., 1934, 9, 273-277).—Details of the separation of carotene, xanthophyll, and α -and β -chlorophyll are given. CH. ABS. (p)

Distribution of pigments in the testa of some varieties of soya beans. V. G. ALEXANDROV and O. G. ALEXANDROVA (Bull. appl. Bot. U.S.S.R., 1934, Ser. 3, No. 4, 3-47).—The basic type of pigmentation consists of an anthocyanin (I) blue pigment in the cell juice and chlorophyll in plastids. Yellow cell walls contain phlobaphen. Absence of colour in the cell may result from total absence of the chromogene or the presence of a colourless isomeride of the (I) pigment. Ch. Abs. (p)

Fukugetin, the colouring matter of the bark of "Fukugi."—See this vol., 610.

Constituents of Hydrangea paniculata. Hydragin. A. HASHIMOTO and T. KAWANA (J. Pharm. Soc. Japan, 1935, 55, 183–186).—Extraction of the dried flowers with C_6H_6 affords hydragin (I), $C_9H_6O_3$, m.p. 224° (Me ether, m.p. 114°). A compound apparently identical with (I) is obtained from malic acid, resorcinol, and conc. HCl. CH, ABS, (r)

Occurrence of furan derivatives in volatile oils. III. β - and γ -Clausenan.—See this vol., 611. Talfairic acid. See this vol. 500

Telfairic acid.—See this vol., 590.

Existence of *d*-catechin in the bark of the peach tree. A. M. Collor and J. RABATÉ (Compt. rend., 1936, 202, 1208—1210).—EtOH or Et₂O extracts about 2% of *d*-catechin [Ac₅, m.p. 131°, and Bz₅ derivatives, m.p. 165° (cf. A., 1921, i, 576)].

J. L. D.

Aroma of tea. W. S. SHAW (United Planters Assoc. S. India, Bull. 8, 1934, 12 pp.).—Evidence is given in support of the theory that oxytheotannin is largely responsible for the aroma of tea. P. G. M.

Pectic substances in tea. W. S. SHAW (United Planters Assoc. S. India, Bull. 6, 1934, 20 pp.).— The green leaf contains a smaller amount of H₂Osol. pectin (I) (1.65% as Ca pectate) than most other leaves, but the H₂C₂O₄-sol. (I) content (4.91%) is > that of any except the potato leaf. Black tea contains a greater % (31.0) of the total as H₂O-sol. (I) than does the green leaf (25.3). (I) protects the theotannin from pptn. by salts of heavy metals during infusion and allows the formation of the caffeine salt. P. G. M.

Constituents of Dicranopterus glauca, Nakai.— See this vol., 610. Umbauba ("imbauba"), Cecropia peltata. E. T. DA FONSECA (Rev. flora med., 1935, 1, 289-296).—The active principle of the leaves is a toxic saponin resembling ambain. No alkaloid is present. CH. ABS. (p)

Artemisia rigida (Nutt.), Gray. H. C. VINCENT and R. L. MCMURRAY (Amer. J. Pharm., 1936, 108, 107-109).—The flowering plants and leaves of this shrub give with ligroin $5 \cdot 02$, $Et_2 O \cdot 3 \cdot 51$, dry EtOH 17 \cdot 78, and 1% HCl $3 \cdot 63\%$ of extract (cale. on dry wt.), and yield $14 \cdot 4\%$ of ash (sand $10 \cdot 55$, $SiO_2 \cdot 11 \cdot 59$, P_2O_5 $4 \cdot 57$, $Fe_2O_3 + Al_2O_3 \cdot 3 \cdot 95$, CaO $17 \cdot 55$, MgO $6 \cdot 38$, Cl $2 \cdot 09$, and $SO_3 \cdot 8 \cdot 67\%$). The roots contain inulin. Santonin is absent. R. S. C.

Action of Nuphar luteum on the heart. M. BULAJEWSKI (Wiadom. farm., 1935, 62, 15–18, 29–32, 43–47, 52–62; Chem. Zentr., 1935, ii, 552).—Nymphalin (I) is present in N. luteum, and is obtained pure by crystallisation of an EtOH extract at -10° to -15° , dissolving in org. media, and freezing out. It is pptd. by NaCl from the EtOH extract together with wax, which is removed by saponification. The cryst. (I), m.p. approx. 40°, gives a violet colour with α -C₁₀H₇·OH and H₂SO₄ and reduces Fehling's solution after hydrolysis. It occurs in the flowers and sap, but not roots, of N. luteum. R. N. C.

Mexican poppy, Argemone mexicana, L. O. DE ALMEIDA (Rev. flora med., 1935, 1, 271–282).— The poppy contains protopine and berberine, but no morphine. CH. ABS. (p)

Punarnava or Bærhuavia diffusa, Linn. II. Isolation of punarnavine. R. R. AGARWAL and S. DUTT (Proc. Acad. Sci. Agra and Oudh, 1934—35, 5, 240—242; cf. this vol., 533).—Boiling EtOH extracts bærhaavic acid and punarnavine (0.01%), m.p. 235° (decomp.) after sintering at 187° (hydrochloride, m.p. 135°), which exhibits many colour reactions of alkaloids. J. L. D.

Toxic principle of ragwort (Senecio Jacabara, L.). I. J. R. HOSKING and C. W. BRANDT (New Zealand J. Sci. Tech., 1936, 14, 638-644).—An alkaloid $C_{18}H_{25}O_6N$ is isolated. It is probably jacobine (A., 1932, 286) and is considered to be the cause of Winton disease. No saponins are present.

A. G. P. Alkaloids of Chinese gelsemium, Ta-Ch'a-Yeh.

-See this vol., 618. Alkaloids of *Senecio* species.—See this vol., 617.

Alkaloids of Sinomenium and Cocculus.—Sce this vol., 491.

Fractionation of barley and malt proteins. R. C. ROSE and J. A. ANDERSON (Canad. J. Res., 1936, 14, C, 109–116).—The suitability of 5% aq. K_2SO_4 for the separation of albumin and globulin from the less sol. proteins is confirmed. The insol. protein is probably a complex, only a portion of which is sol. in 70% EtOH. Use of the latter for fractionation of the complex is purely arbitrary. Malting produces no appreciable change in the proteins of hulls. In the kernel there is a general breakdown of protein. In the acrospire, non-protein-N, salt-sol. protein, and glutelin increase, the hordein remaining practically unchanged. The glutelin of the acrospire and that of the kernel differ in amide- and arginine-N. A. G. P.

Micro-determination of morphine in urine, blood, and other biological fluids. W. DECKERT (Arch. exp. Path. Pharm., 1936, 180, 656-671).— The method depends on determining the turbidity produced by aq. morphine (I) with $(NH_4)_2MoO_4 (NH_4)_3VO_4$ and is applicable to 1—10 c.c. of urine or blood. After addition of NaHCO₃, (I) is extracted from tissue-fluids etc. by EtOAc or HCO₂Et. The urine of men receiving daily 0.015 g. of (I) contains determinable (accuracy $\pm 10\%$) amounts of (I). F. O. H.

Chemical composition of Aconitum napellus and physiological evaluation of standardised dry extracts. R. FREUDWELLER (Pharm. Acta Helv., 1935, 10, 51-58; Chem. Zentr., 1935, ii, 883).—A physiological method, based on toxicity to guineapigs, is preferred to chemical methods. H. N. R.

Pharmacological evaluation of Allium preparations. U. HINTZELMANN (Fortschr. Ther., 1935, 11, 359—361; Chem. Zentr., 1935, ii, 883).—The method is based on the observation that garlic preps. prolong the life of mice given a lethal dose of vigantol. H. N. R.

Self-sealing vessels for storage of solutions used in the Van Slyke gasometric methods. F. E. HOLMES (J. Biol. Chem., 1936, 113, 411-415).--The two vessels described eliminate the glass stopcock in the alkaline stream of the vessel used by Van Slyke, et al. (A., 1933, 1314) and the modified Hempel pipette, and also provide an automatic Hg seal for the tip of the delivery tube of the Guest-Holmes vessel (A., 1935, 1218). J. N. A.

Determination of ethyl alcohol in body-fluids. H. NEWMAN (J. Pharm. Exp. Ther., 1936, 56, 278–283).—1 mg. of EtOH may be determined in body-fluids with an error of 1.5% by vac. distillation into $K_2Cr_2O_7$ -H₂SO₄ and titration of the unoxidised $K_2Cr_2O_7$ with KI and $Na_2S_2O_3$. H. D.

Aluminium. I. Colorimetric determination of aluminium in biological material. D. F. EVELETH and V. V. MYERS (J. Biol. Chem., 1936, 113, 449—465).—Al is determined in tissues by dry ashing, pptn. of the Al and Fe as phosphates, separation of these by means of NaOH, NH₄CNS, or cupferron, and then colorimetrically with alizarin or aurin. Alizarin gave higher vals. in tissue digests than aurin due to the presence of Ca and interfering substances. H. D.

Micro-determination of titanium in the organism by extraction and photometry. L. MAILLARD and J. ETTORI (Compt. rend., 1936, 202, 594—596).— The ashed tissue, dissolved in 5% H₂SO₄, is treated in presence of Fe with nitrosophenylhydroxylamine (I). The ppt. is dissolved in H₂SO₄, Fe removed by H₂S, and the solution re-pptd. by (I) in presence of Zr, Ti being determined in the ppt. by oxidation with H₂O₂ and photometric examination of the TiO₃ formed. Muscle and blood contain approx. 8 and 3×10^{-6} g. per 100 g., respectively. J. N. A.