

BRITISH CHEMICAL ABSTRACTS

A.—PURE CHEMISTRY

AUGUST, 1935.

General, Physical, and Inorganic Chemistry.

Intensity measurements in the fine structure of the Balmer line H_{α} . L. S. ORNSTEIN, H. LINDEMAN, and J. A. VREESWIJK, jun. (*Physica*, 1935, 2, 541—550). M. S. B.

(A) After-effect of a glow discharge in lowering the striking potential in nitrogen, hydrogen, and air. (B) Cause of lowering of striking potential at low pressures. G. MACIUC (*Bul. Fac. Stiintę Cernauti*, 1933, 7, 59—75, 250—294; *Chem. Zentr.*, 1935, i, 527).—(A) The lowering observed by Badareu in N_2 is due to charging of the glass walls by the first discharge.

(B) Data for the effect of wall charges in lowering the striking potential are recorded. The effect disappears when the walls are rendered conducting and earthed. H. J. E.

New nitrogen afterglow spectrum. J. KAPLAN (*Nature*, 1935, 135, 1034—1035; cf. A., 1934, 1051).—A new afterglow spectrum obtained by passing a current of low density through N_2 is reproduced. The relative intensity of the Vegard-Kaplan bands, emitted by the $4^3\Sigma$ metastable mol., is markedly enhanced. The new spectrum supports the view that radiations from the night sky agree closely with these bands. L. S. T.

Excitation and emission in the nitrogen band spectrum. G. O. LANGSTROTH (*Proc. Roy. Soc.*, 1935, A, 150, 371—381).—The results of measurements of the intensities of 9 additional second positive N bands for various exciting electron energies between 14 and 160 e.v. are discussed (cf. A., 1934, 1150). No dependence of the relative intensities on the energy of the exciting electrons was found except at low energies, and it is concluded that interaction between the exciting electron and the vibrating nuclei is improbable. The agreement of the observed intensities with those calc. from the excitation and emission probabilities is only approx. The discrepancies are ascribed to neglect of anharmonicity in the theoretical model. L. L. B.

Oxygen afterglow. (LORD) RAYLEIGH (*Proc. Roy. Soc.*, 1935, A, 150, 34—36).—Stoddart's failure to obtain the afterglow in moist O_2 is ascribed to the use of an unstable type of discharge. The electrodeless ring discharge should be employed. L. L. B.

Intensity distribution and half-value width of neon lines. I. W. SCHÜTZ. II. W. SCHÜTZ, H. SCHILLBACH, and K. KRÄMER (*Physikal. Z.*, 1935, 36, 403—406, 406—409).—I. The intensity distribution of the Ne lines for different vals. of the ratio of the

dispersion width to Doppler width, and the relation between the total width and both these, are calc. A. J. M.

Absolute output of the Na D line by excitation by electron collision. W. CHRISTOPH (*Ann. Physik*, 1935, [v], 23, 51—60).—A photo-electric process, using the opposing-field method of Haft (A., 1933, 439) with lowest possible pressure to avoid absorption losses, was employed. The val. obtained is $>$ that of Ornstein. A. J. M.

Emission spectro-photographic determinations of aluminium in the ash of biological material. R. LINDEMANN (*Z. Physik*, 1935, 95, 6—29).—A low-voltage arc was used to determine the Al content of organs, bones, and gall-stones. A. B. D. C.

Spectrum of Cu III. L. BLOCH and E. BLOCH (*Compt. rend.*, 1935, 200, 2017—2019).—Data are classified. H. J. E.

Emission bands of selenium. R. K. ASUNDI and Y. P. PARTI (*Current Sci.*, 1935, 3, 548). A. B. D. C.

Multiplets and terms in the first two spectra of niobium. W. F. MEGGERS and B. F. SCRIBNER (*J. Res. Nat. Bur. Stand.*, 1935, 14, 629—647).—Results are reported for the principal multiplets in the Nb I and Nb II spectra. Sextet and quadruplet terms occur in the Nb I and quintet and triplet terms in the Nb II spectra. The normal states of neutral and singly ionised Nb atoms are $(4d^45s)^6D$ and $(4d^4)^5D$, respectively. J. W. S.

Higher terms in the spectrum of Ag II. W. P. GILBERT (*Physical Rev.*, 1935, [ii], 47, 847—850).—Complete measurements and classifications, extending available data, are tabulated for the range 500—11,000 Å. The ionisation potential is 21.4 volts. N. M. B.

Atomic energy states of tellurium, Te III. S. G. KRISHNAMURTI (*Current Sci.*, 1935, 3, 547). A. B. D. C.

Emission spectrum of Te_2 . E. OLSSON (*Z. Physik*, 1935, 95, 215—220).—Isotope displacements are used to improve the vibration level formula. A. B. D. C.

Absorption of light in caesium vapour in the presence of helium. H. J. J. BRADDICK and R. W. DITCHBURN (*Proc. Roy. Soc.*, 1935, A, 150, 478—486).—The absorption of light in Cs vapour is progressively reduced by the addition of He, for He pressures up to 20 cm. About 3 cm. of He reduces it to half-val. at 3150 Å., and about 2 cm. to half-val. at

2250 Å. The mol. absorption of Cs in the region 3430—3530 Å. is completely suppressed by the addition of a small amount of He. L. L. B.

Broadening and displacement of end lines of caesium series by krypton. C. FÜCHTBAUER and H. J. REIMERS (Z. Physik, 1935, 95, 1—5).—Displacement is towards the red, and from its limit the cross-section of Kr for slow electrons is calculated. A. B. D. C.

Stark effect for mercury. R. N. H. HASLAM (Proc. Roy. Soc., 1935, A, 150, 338—347).—The Stark effect for Hg has been examined over the range 2200—3000 Å., using a modified form of the Lo Surdo source. The displacements are in agreement with a simplified theory. L. L. B.

Spectral characteristics of electrically exploded mercury. H. P. KNAUSS and A. L. BRYAN (Physical Rev., 1935, [ii], 47, 842—844).—The spectrum of the region 2537—1950 Å., obtained by sending 300 amp. from a 150-volt generator through a small stream of Hg, gave continuous emission strong and clear enough for use in absorption experiments, and showed great broadening of many lines, due to strong electric fields of ions near the emitting atom, and a strong continuous background due to recombinations in which the kinetic energy plays a part. N. M. B.

Hyperfine structure of the mercury hydride bands. S. MROZOWSKI (Bull. Acad. Polonaise, 1935, A, 24—29; cf. A., 1932, 104).—Observations on various HgH bands show each to have a no. of components. The intensity relations are different from those attributable to an isotope effect. A type of hyperfine structure occurs, analogous to that in line spectra. H. J. E.

Extreme infra-red spectrum of the sun. V. G. VAFIADI, S. S. KRIVICH, and G. V. POKROVSKI (Nature, 1935, 135, 1035).—No radiation in the extreme infra-red has been detected from the sun. L. S. T.

Stark effect of hydrogen in first type stellar spectra. A. PANNEKOEK and S. VERWEY (Proc. K. Akad. Wetensch. Amsterdam, 1935, 38, 479—489).—Mathematical. N. M. B.

Stark intensities in a canal-ray source at different pressures. R. L. THORNTON (Proc. Roy. Soc., 1935, A, 150, 259—266).—A new canal-ray tube is applied to the measurement of the relative intensities of the Stark components of H₂ and of the He group 2P—4Q. It is shown that the differences between Stark intensities observed by the canal-ray and Lo Surdo methods are mainly due to the great differences in gas pressures commonly selected. L. L. B.

Long and short spectral lines. S. DATTA and K. CHATTERJEE (Indian J. Physics, 1935, 9, 357—368).—The long and short lines obtained in the arc spectrum when an image of the arc in the transverse position is thrown on the slit of a spectrocope have been examined for a Cu arc working at pressures ≥ 1 atm. A. J. M.

Magnetic and electric spectra in high frequency. V. K. ARKADIEV (Compt. rend. Acad. Sci. U.R.S.S., 1935, 2, 204—208). W. R. A.

Quantum theory of metallic reflexion. L. I. SCHIFF and L. H. THOMAS (Physical Rev., 1935, [ii], 47, 860—869).—The classical Drude theory, with Kronig's modifications, gives the electromagnetic field except within a transition layer over a few electron wave-lengths from the surface. In this layer the electric intensity perpendicular to the surface shows considerable fluctuations depending on the nature of the surface potential barrier. This fluctuating field can be used to correct the calc. surface photo-electric effect. N. M. B.

Electromagnetic fields due to variable electric charges and the intensities of spectrum lines according to the quantum theory. H. R. HULME (Proc. Roy. Soc., 1935, A, 150, 416—421).—Schott's treatment of the radiation emitted by an atom (A., 1933, 206) is equiv. to the strict quantum-mechanical treatment, but the latter affords a simpler method of calculating the intensities. L. L. B.

Photometric measurements of X-ray reflexion. III. Atomic factors of sulphur and lead. P. DE LA CIERVA and J. PALACIOS (Anal. Fís. Quím., 1934, 32, 391—395).—The diagram for the scattering power of S exhibits undulations at vals. of $\sin \theta/\lambda$ between 0.2 and 0.4 which correspond with those predicted by Hartree but are more pronounced. The Pb diagram contains a horizontal portion at about 0.3, whereas the curve of Pauling and Sherman is continuous. The mean error of the measurements is $\geq 6\%$. H. F. G.

Effect of temperature on the scattering of X-rays by solids according to quantum mechanics. H. OTT (Ann. Physik, 1935, [v], 23, 169—196).—Theoretical. A. J. M.

Deviations from the Sommerfeld formula for the K levels. M. I. KORSUNSKI (Compt. rend. Acad. Sci. U.R.S.S., 1935, 2, 114—117).—A modification of Sommerfeld's equation yielding better vals. of the electronic charge is discussed. W. R. A.

K-Absorption edges of cobalt and its compounds. K. KOJIMA (Mem. Coll. Sci. Kyoto, 1935, A, 17, 189—190).—Data for Co, Co(OH)₂, CoS, CoSiO₃, CoF₂, CoSO₄, CoCO₃, and Co₂O₃ are recorded. The bivalent compounds show a displacement in the direction of shorter λ . E. S. H.

Secondary cathode rays expelled from metals by molybdenum K α radiations. H. R. ROBINSON and C. J. B. CLEWS (Proc. Roy. Soc., 1935, A, 149, 587—595).—The energies of the electrons expelled by Mo K α_1 rays from Au, Pt, Ag, and Cu targets, using the magnetic spectrometer, are slightly $>$ those obtained by Kretschmar for the same elements. The results are discussed in relation to the abs. vals. of X-ray λ and the principal at. const. L. L. B.

Influence of chemical combination on the K $\alpha_{1,2}$ doublet of silicon. N. G. JOHNSON (Z. Physik, 1935, 95, 93—96).—O compounds show displacement of approx. 2.4 X, and K₂SiF₆ shows 3.8 X. A. B. D. C.

Spectroscopy of ultra-soft X-rays. IV. M. SIEGBAHN and T. MAGNUSSON (*Z. Physik*, 1935, 95, 133—157; cf. A., 1934, 232).—Measurements are given for the *L* series of elements between 27, Co, and 17, Cl. Displacement with chemical combination is recorded for NaCl, AlCl₃, KCl, RbCl, CsCl, and BaCl₂. A. B. D. C.

Electronic energy bands of solid copper, nickel, cobalt, and iron. F. C. CHALKIN (*Nature*, 1935, 135, 998).—Measurements of the intensity of soft X-rays from Cu, Ni, Co, and Fe and the deduced distribution of electronic energy indicate that the electrons in these metals are not completely free and cannot normally occupy the whole of the space lattice of the crystal. L. S. T.

Photo-effect with alkali metal films of atomic thickness on platinum. H. MAYER (*Physikal. Z.*, 1935, 36, 463—464).—With K on Pt, a max. photo-effect is obtained when the K film is unimol., but this is probably due to the presence of O₂. The secondary emission due to primary electrons of 50—1500 volts was also determined as a function of the thickness of the film. The curve was almost identical with that obtained for the photo-effect in its earlier stages, and showed no max. A. J. M.

Mobility of sodium on tungsten. R. C. L. BOSWORTH (*Proc. Roy. Soc.*, 1935, A, 150, 58—76).—The mobility of Na on a W filament has been studied by a photo-electric method. A clean strip absorbs Na, but a portion of this reappears on the surface and evaporates when the strip is heated above 1300° abs. The capacity of the strip to absorb Na is limited, but when that limit has been attained, any excess of Na is stable on the surface, and if deposited as an active patch migrates over the surface at such a rate that the strip is approx. uniformly active after 1—2 hr. at 300° abs. or 5—10 sec. at 800° abs. The migration has an active energy of 0.25 volt, and the same energy is associated with the absorption process, from which it is concluded that the latter consists of migration into slip planes and intercryst. cracks. L. L. B.

Influence of impurities in the core-metal on the thermionic emission from oxide-coated nickel. M. BENJAMIN (*Phil. Mag.*, 1935, [vii], 20, 1—24).—The effect of metallic impurities in Ni on the emission of BaO- and SrO-coated Ni filaments and on the crit. temp. of their emission is attributed to variation in the Ba metal content in the coating with the reducing power of the impurities. The phenomena are discussed with reference to modern theories of the mechanism of emission. J. W. S.

Variation of the mobility of gaseous ions with temperature. I. Positive ions in their own gas. A. M. TYNDALL and A. F. PEARCE (*Proc. Roy. Soc.*, 1935, A, 149, 426—434).—The variation of mobility with temp. of the positive ions of He in He and of N in N₂ has been measured, over the range 20—480° abs. in He and 65—590° abs. in N₂. Expressing the results at normal density instead of at normal pressure, the mobility in He is found to be practically independent of temp. from 480° abs. to room temp., below which there is a marked decrease.

In N₂ the decrease of mobility with fall of temp. is continuous. L. L. B.

Velocities of positive ions in the corona discharge. H. F. BOULIND (*Phil. Mag.*, 1935, [vii], 20, 68—75).—The velocities of positive ions in gases at low pressure can be measured accurately by the corona discharge method provided that X/p is < a certain val. The velocities are > anticipated from mobility measurements at higher pressures, indicating that the positive ions in the corona discharge are single particles and not clusters. Above the crit. val. of X/p the method is inaccurate, but results show that the velocity increases rapidly with X/p , this being attributed to increase in the mean free path of the ions. These observations confirm that positive ions may produce appreciable nos. of new ion pairs by collision with gas mols. (X =electric field strength.) J. W. S.

Fifth Report of the Atomic Weights commission of the International Union for Chemistry. G. P. BAXTER, O. HÖNIGSCHMID, P. LEBEAU, and R. J. MEYER (*Ber.*, 1935, 68, [A], 73—84).—The only alteration is the substitution of 93.3 for 92.91 as at. wt. of Nb. H. W.

Isotope regularities. A. CARRELLI (*Nuovo Cim.*, 1934, [ii], 11, 542—546; *Chem. Zentr.*, 1935, i, 657).—A discussion of nuclear structure. H. J. E.

Volumetric determination of the at. wt. of terbium. J. K. MARSH (*J.C.S.*, 1935, 772—773).—The ratio Tb₂O₃ : 3C₂O₃ in the Tb material previously reported (cf. this vol., 180), determined by ignition of the oxalate and by titration with standard KMnO₄, gave the val. 158.9 for the at. wt. of Tb. N. M. B.

Relative frequency of isotopes of potassium and rubidium. H. BONDY, G. JOHANNSEN, and K. POPPER (*Z. Physik*, 1935, 95, 46—52).—Mass-spectrographic measurements give the relative abundance of K³⁹ : K⁴¹ as 16.2 : 1, and of Rb⁸⁵ : Rb⁸⁷ as 2.68 : 1. A. B. D. C.

Isotope effect with copper hydride (CuH/CuD). T. HEIMER (*Naturwiss.*, 1935, 23, 372).—The band spectrum of CuD has been investigated and the nuclear vibration consts. have been calc. The isotope effect is considerable. A. J. M.

Isotopes of platinum. B. FUCHS and H. KOPFERMANN (*Naturwiss.*, 1935, 23, 372).—Examination of the hyperfine structure of the Pt γ lines shows that all lines arising from the lowest state have a definite isotope displacement. Three isotopes, of masses 194, 195, and 196, occur, the abundance ratio being 5 : 8 : 8. The mechanical moment of Pt¹⁹⁵ is 1/2. A. J. M.

Isotopic constitution of platinum and rhodium. A. J. DEMPSTER (*Nature*, 1935, 135, 993).—The analysis of Pt ions from a high-frequency spark (this vol., 677) shows isotopes 192, 194, 195, 196, and 198. The middle three form a triplet of approx. equal strength, whilst the heaviest is weaker and the lightest faint. Using as electrode an alloy of Pt containing 10% Rh direct comparison of the doubly-charged Pt ions with Rh¹⁰³ gave an at. wt. of 102.92 ± 0.03 for Rh. L. S. T.

Isotopes of the radioactive elements and their disintegration. H. J. WALKER (Phil. Mag., 1935, [vii], 20, 25—32).—The absence of certain isotopes which would be expected for some elements is attributed to the β -radioactivity of these isotopes, leading to their disintegration. This theory is supported by the observed disintegration of the spontaneously radioactive elements. J. W. S.

The actinium problem. V. G. EISEN (Chem. Weekblad, 1935, 32, 343—344).—A review. The probable at. wt. is 231 ± 0.5 . S. C.

Tracks of α -particles and protons in photographic emulsions. H. J. TAYLOR (Proc. Roy. Soc., 1935, A, 150, 382—394).—A study has been made of the tracks of α -particles and protons in specially prepared photographic emulsions. Exposure of a plate to a neutron source gives rise to well-defined tracks due to the protons ejected by the neutrons in their passage through the gelatin of the emulsion. The experimental errors are discussed, and it is concluded that the method is unsuitable for determining the detailed distribution of neutron energies. L. L. B.

Specific ionisation of single α -particles. G. STETTER and W. JENTSCHKE (Physikal. Z., 1935, 36, 441—445).—A double ionisation chamber is used to determine the ionisation curve of single α -particles. The max. ionisation at n.t.p. occurs at a distance of 4.4 ± 0.3 mm. from the commencement of the curve. A. J. M.

Energies of α - and β -rays. H. A. WILSON (Proc. Roy. Soc., 1935, A, 150, 1—8).—Theoretical. Reasons are given for believing that α - and γ -ray energies, contrary to Gamow's view (A., 1930, 1339), involve electronic energies. The proposed modification in Gamow's theory, viz., that the observed α - and γ -rays have energies equal to a nuclear energy change plus or minus an energy change of the electronic system, is not necessarily in conflict with ideas based on quantum mechanics. L. L. B.

Rapid registration of small Hoffmann collisions. J. BEGGILD (Naturwiss., 1935, 23, 372).—The apparatus consists of an air ionisation chamber (effective vol. 35 litres, pressure 7 atm.), the ionisation current being compensated by a second chamber and a β -ray source. Differences in electrometer readings are registered photographically. A. J. M.

Wave-length of secondary γ -radiation accompanying anomalous absorption of hard γ -rays. K. TSU-TUNG (Sci. Rep. Nat. Tsing Hua Univ., 1935, 3, 85—93).—In view of divergent theories, the absorption coeff. of the secondary γ -radiation associated with the anomalous absorption of Th-C'' γ -rays was determined for the scattering angle 120° for Al, Zn, Sb, and Pb, using a Geiger-Müller counter. λ deduced from the absorption coeff. is 25.4 X for Al and Zn; for Sb and Pb there appears, in addition, a harder component 13.8 X . The ratio of the no. of hard to soft component quanta is 1 : 23 for Sb and 1 : 9 for Pb. Results indicate that the Rayleigh scattering of Th-C'' γ -rays cannot be present appreciably; the component 25.4 X is attributed to positron and electron annihilation. The hard component is interpreted as continuous X-rays produced by scattered electrons and positrons. N. M. B.

Nuclear chemistry. S. FLÜGGE and A. KREBS (Physikal. Z., 1935, 36, 466—480).—A summary of recent work on nuclear transformations, including artificial radioactivity. A. J. M.

Collisions of α -particles in deuterium. E. POLLARD and H. MARGENAU (Physical Rev., 1935, [ii], 47, 833—842).—Using three different but complementary methods, an investigation of the yields of deuterons emitted from D_2 under Po α -particle bombardment is reported and discussed. N. M. B.

Disintegration of the deuteron by impact. J. R. OPPENHEIMER (Physical Rev., 1935, [ii], 47, 845—846).—The probability and neutron yield of the disintegration of deuterons of energy $> 2 \times 10^6$ e.v. by impact with at. nuclei in passage through matter are calc. N. M. B.

Soft γ -radiation produced on disintegration of lithium by protons. A. ECKARDT, R. GEBAUER, and H. R. VON TRAUBENBERG (Z. Physik, 1935, 95, 210—214). A. B. D. C.

Excitation of the nitrogen nucleus to H -emission by polonium α -rays. H. STEGMANN (Z. Physik, 1935, 95, 72—83). A. B. D. C.

Nuclear transformations of beryllium and boron and the masses of the light elements. M. L. E. OLIPHANT, A. E. KEMPTON, and (LORD) RUTHERFORD (Proc. Roy. Soc., 1935, A, 150, 241—258).—It is not possible to interpret the results of experiments on the transformation of Be and B by protons and by ions of H^2 on the mass data at present available, but the assumption of a small error in the mass-spectrographic val. for the mass of He^4 brings all the data into agreement. Evidence is found of the existence of two new isotopes, Be^8 and Be^{10} . L. L. B.

Artificial radioactivity produced by neutron bombardment. II. E. AMALDI, O. D'AGOSTINO, E. FERMI, B. PONTECOEVO, F. RASETTI, and E. SEGRÈ (Proc. Roy. Soc., 1935, A, 149, 522—558).—The activation of several elements by neutron bombardment is increased by surrounding the source and activated substance by H_2O or paraffin wax; the suggested explanation is that the neutrons are slowed down by impacts with H nuclei, and that slow neutrons are more easily captured by some nuclei than fast ones. Some anomalously large absorption cross-sections for slow neutrons are observed, probably connected with the emission of γ -rays. Scattering experiments on slow neutrons, and the production of slow neutrons through the action of non-hydrogenated substances, are described. The results of a systematic investigation of the elements, both as regards the induced activities and the properties with respect to slow neutrons, are tabulated. L. L. B.

Absorption of slow neutrons. W. EHRENBURG and H. C. SHAN (Nature, 1935, 135, 993—994).—Under the experimental conditions described, slow neutrons are absorbed exponentially by Cd and Ag (see above). This suggests that either the active

neutrons are of approx. homogeneous speed, or in the region of their velocity the nuclear cross-section is practically independent of this velocity. L. S. T.

Transformation of aluminium by neutrons. H. KLARMANN (Z. Physik, 1935, 95, 221—226).—Protons of 9 cm. range and a small no. of α -particles are found. A. B. D. C.

Number and range of nuclear protons ejected from aluminium and nitrogen by α -rays. H. POSE (Z. Physik, 1935, 95, 84—92). A. B. D. C.

Artificial production of elements of an unknown radioactive family by irradiating thorium with neutrons. (MME.) I. CURIE, H. VON HALBAN, jun., and P. PREISWERK (Compt. rend., 1935, 200, 1841—1843).—Irradiation of Th with neutrons gave four radio-elements with half-life approx. 3.5 hr., and 25, 15, and 1 min. The first and third behave chemically as isotopes of Ac, and the second and fourth as isotopes of Th and Ra, respectively. The existence of the radioactive family ${}_{92}\text{Ac}^{237} \xrightarrow{\alpha} {}_{90}\text{Ac}^{233} \xrightarrow{\beta} {}_{91}\text{Ac}^{233} \xrightarrow{\beta} {}_{92}\text{Ac}^{233} \xrightarrow{\alpha} {}_{90}\text{Ac}^{229} \xrightarrow{\alpha} {}_{88}\text{Ac}^{225} \rightarrow \dots$ is suggested. H. J. E.

Artificial transformation of thorium by neutrons. Production of the missing $4n + 1$ radioactive series. O. HAHN and L. MEITNER (Naturwiss., 1935, 23, 320).—As a result of the bombardment of Th by neutrons, two different processes occur: (1) a non-reinforced process, to which the substance with half-life 1 min. discovered by Amaldi *et al.* (this vol., 910) belongs. This breaks down into a substance radiating β -rays, with half-life 11—12 min. (2) A reinforced process giving an element of half-life 30 min. These substances are isotopes of Th, and the changes are probably to be represented by
 (1) ${}_{90}\text{Th}^{232} + n \longrightarrow {}_{88}\text{A}^{229} + \alpha \xrightarrow[1 \text{ min.}]{\beta} {}_{89}\text{B}^{229} \xrightarrow[11 \text{ min.}]{\beta} {}_{90}\text{C}^{229}$;
 (2) ${}_{90}\text{Th}^{232} + n \longrightarrow {}_{90}\text{Th}^{233} \xrightarrow[30 \text{ min.}]{\beta} {}_{91}\text{A}^{233}$. These series are of the new type $4n + 1$. A. J. M.

Artificial transformation of thorium by neutrons. E. FÖYN, E. KARA-MICHAILOVA, and E. RONA (Naturwiss., 1935, 23, 391).—Th in aq. solution was bombarded with neutrons from Be + Rn, a method of chemical separation being employed to detect the products. After a series of separations with La (for Ac), Ba (for Ra), and Ta (for Pa) there was no increase in the natural β -ray emission of the sample. A. J. M.

Apparent effect of galactic rotation on the intensity of cosmic rays. A. H. COMPTON and I. A. GETTING (Physical Rev., 1935, [ii], 47, 817—821). N. M. B.

Diurnal variation of cosmic rays. J. CLAY and H. R. WOLTJER (Physica, 1935, 2, 582—584).—In equatorial regions there is no diurnal variation of cosmic rays $> 0.1\%$ of the total, and, therefore, no variation with sidereal time, confirming that cosmic rays are not due to novæ. M. S. B.

Transformations of cosmic radiation in matter. J. CLAY and P. H. CLAY (Physica, 1935, 2, 551—556).—No definite relation has been found between the primary cosmic corpuscular radiation

and the secondary radiation produced in Pb. The shower-producing radiations are probably photons. The absorption coeff. of the final corpuscular radiation in Pb is 4 cm.⁻¹ There appear to be two photon radiations between the primary and final corpuscular radiations. M. S. B.

Secondary effects of cosmic rays on the Hafelekar (2300 m. above sea level). J. A. PRIEBSCHE (Z. Physik, 1935, 95, 102—114). A. B. D. C.

Application of liquid dielectrics to the study of ionisation "jumps" produced by cosmic radiation. C. BIAŁOBRZESKI and I. ADAMZEWSKI (Bull. Acad. Polonaise, 1935, A, 120—128).—Using 1 litre of C_6H_{14} in an ionisation chamber the frequency of ionisation jumps due to cosmic radiation reaches 37 in 13 hr., about 12% of the jumps being double or more complex. The advantages of liquid dielectric of low mobility are discussed. The surroundings have a considerable influence on the frequency of the jumps, presence of Al being particularly effective. J. W. S.

Theory of calcium chromosphere. M. KURIHARA (Mem. Coll. Sci. Kyoto, 1934, A, 17, 51—58).—Mathematical. E. S. H.

Neutron-proton interaction. I. Binding energies of the hydrogen and helium isotopes. II. Scattering of neutrons by protons. E. FEENBERG (Physical Rev., 1935, [ii], 47, 850—856, 857—859).—Mathematical. N. M. B.

Mass defect in the heavy elements. M. I. KORSUNSKI (Compt. rend. Acad. Sci. U.R.S.S., 1935, 2, 112—114).—Light nuclei (up to Ca) are formed of groups of two protons and two neutrons. If each particle moves in the field of all the remaining particles the mass defect \propto the square of the no. of particles. The curve shows breaks at nuclei formed from an even no. of protons and neutrons. W. R. A.

General relation between the molecular spectrum and the electrons and electron orbits of the constituent atoms. H. DESLANDRES (Compt. rend., 1935, 200, 1997—2001; cf. this vol., 561).—A review and discussion of the correlation between electron arrangements in molecules and their Raman and infra-red spectra. H. J. E.

Electronic charge from de Broglie wavelengths of electrons. S. VON FRIESEN (Nature, 1935, 135, 1035).—A new method of calculating e from the electronic diffraction produced by a crystal of galena combines de Broglie's equation with the formula for the Rydberg const. Preliminary measurements give $e = (4.796 \pm 0.010) \times 10^{-10}$ e.s.u. L. S. T.

Effective cross-section of the neutrino. M. WOLFFKE (Bull. Acad. Polonaise, 1935, A, 107—109).—From the no. of ions produced by neutrinos in an ionisation chamber, the max. possible effective cross-sectional area of the neutrino is 6.6×10^{-33} sq. cm., corresponding with a mean free path of 3.9×10^6 km. in ordinary air. J. W. S.

Detection of neutrinos. M. WOLFFKE (Bull. Acad. Polonaise, 1935, A, 19—23).—It is shown theoretically that if a strong β -ray source (e.g., Ra-E)

be surrounded by sufficient Pb to absorb all primary β -rays and soft γ -rays, electrons produced by neutrinos should be detectable at the outer surface of the Pb with a counter or Wilson chamber. H. J. E.

Equation of the photon. G. PETIAU (Compt. rend., 1935, 200, 1829—1832).—Mathematical.

H. J. E.

Production of electron pairs and the theory of stellar structure. S. CHANDRASEKHAR and L. ROSENFELD (Nature, 1935, 135, 999).—Deviations from the gas laws may arise from the existence of a definite distribution of positrons and electrons in equilibrium with temp. radiation. L. S. T.

Ratio of the mass of the proton to that of the electron. H. ERTEL (Physikal. Z., 1935, 36, 464—465).—Mathematical. A. J. M.

Dependence of probability of the ionisation $H_2 \rightarrow H + H^+ + e$ + kinetic energy, on the orientation of the molecules with respect to the colliding electrons. N. SASAKI and T. NAKAO (Proc. Imp. Acad. Tokyo, 1935, 11, 138—140).—The probability of the above type of ionisation is found to depend on the mol. orientation. A. J. M.

Energy exchange between neon, argon, and mercury atoms and a solid wall. A. A. ZAITZEV and G. V. SPIVAK (Compt. rend. Acad. Sci. U.R.S.S., 1935, 2, 118—125).—Accommodation coeffs. for these gases on a metallic surface have been investigated, and the following vals. obtained: Ne 0.05, Ar 0.1, Hg 0.58. Substantial increase in these vals. is obtained by adding O_2 or CO_2 . W. R. A.

Statistical error in counting experiments. R. PEIERLS (Proc. Roy. Soc., 1935, A, 149, 467—486).—Mathematical. L. L. B.

Calculations of atomic wave functions. III. Results for beryllium, calcium, and mercury. D. R. HARTREE and W. HARTREE (Proc. Roy. Soc., 1935, A, 149, 210—231).—At. wave functions have been calc. by the method of the self-consistent field (A., 1928, 216) for the normal states of Be, Ca, and Hg, both neutral and doubly ionised. In the case of the neutral atoms, the perturbation of the core by the two valency electrons is not large for Be and Ca, but is considerable for Hg. The differences between the self-consistent field and the Thomas-Fermi field for neutral Hg are discussed. L. L. B.

Self-consistent field, with exchange, for beryllium. D. R. HARTREE and W. HARTREE (Proc. Roy. Soc., 1935, A, 150, 9—33).—Fock's equations for the self-consistent field of an atom, including exchange effect (Z. Physik, 1930, 62, 795), have been solved numerically for the normal state of neutral Be. The inclusion of the exchange terms has a small effect on the (1s) wave function, and a considerable effect on the (2s) wave function. L. L. B.

Annihilation radiation of positrons. H. A. BETHE (Proc. Roy. Soc., 1935, A, 150, 129—141).—Mathematical. A fast positron has a large probability of being annihilated during its motion, usually with emission of two quanta. The hard annihilation radiation is practically isotropic if emitted in substances

with high at. wt. and it is contended that it is identical with the hard component in the "scattered γ -rays" found by several authors. L. L. B.

Quantisation of the new field theory. II. M. BORN and L. INFELD (Proc. Roy. Soc., 1935, A, 150, 141—166; cf. *ibid.*, 1934, A, 147, 522).—Mathematical. A proof that the quantum mechanics of a particle can be derived from the new field theory. L. L. B.

Commutating co-ordinates in the new field theory. M. H. L. PRYCE (Proc. Roy. Soc., 1935, A, 150, 166—172).—Mathematical. A co-ordinate vector and an inner angular momentum which obey the simple commutation rules are defined. L. L. B.

Contributions to Born's new theory of the electromagnetic field. E. SCHRÖDINGER (Proc. Roy. Soc., 1935, A, 150, 465—477).—Mathematical. L. L. B.

Relativistic quantum mechanics. K. NIKOLSKY (Proc. Roy. Soc., 1935, A, 150, 411—415).—The connexion between Dirac's theory of electrons and the Eddington-Born-Infeld theory is obtained. L. L. B.

Relativistic basis of the quantum theory. III. H. T. FLINT (Proc. Roy. Soc., 1935, A, 150, 421—441).—Mathematical. Quantum phenomena are shown to correspond with geometrical conceptions which underlie those of the theory of relativity. L. L. B.

Infra-red photography and the spectroscopic determination of [chemical] constitution. R. MECKE (Angew. Chem., 1933, 48, 320—327).—A review of the application of observations on infra-red spectra to constitutional problems, with special reference to the C-H linking. H. J. E.

Filter for obtaining light at wave-length 560 mu. K. S. GIBSON (J. Res. Nat. Bur. Stand., 1935, 14, 545—552).—A combination of 4.55 mm. Corning 351, 5.82 mm. Corning didymium, 1.99 mm. Jena V.G. 3, and 1.94 mm. Jena B.G. 18 glass filters isolates and transmits light of 5600 Å. better than other filters. The characteristics of the filter are detailed. J. W. S.

Ozone in the Arctic night. E. TÖNSBERG and F. W. P. GÖTZ (Naturwiss., 1935, 23, 354; cf. A., 1929, 419, 624, 1263).— O_3 absorption in mid-winter at Tromsø is not exceptionally large (cf. Dauvillier, A., 1934, 1326); max. val. occurs in spring. A. J. M.

Band spectrum of NH. R. W. LUNT, R. W. B. PEARSE, and E. C. W. SMITH (Nature, 1935, 136, 32).—The 2530 Å. band of NH and four weaker bands at 2730, 2835, 2885, and 2980, apparently due to NH^+ , have been observed in the spectrum of discharges through streaming NH_3 . L. S. T.

Ultra-violet absorption spectrum of ammonia. A. B. F. DUNCAN (Physical Rev., 1935, [ii], 47, 822—827).—Data for bands and intensities in the range 2300—850 Å. are tabulated. The bands down to 1665 Å. are diffuse through predissociation, and below this all are very sharp and show partly resolved rotational fine structure. Continuous absorption, as opposed to that due to pressure broadening, begins at approx. 1200 Å. and is so strong below 1150 Å. that no more bands could be measured accurately,

although sharp bands exist down to 1085 Å., leading to a val. of 11.3 volts for the first ionisation potential. Classification in four progressions is given.

N. M. B.

Absorption of light by carbon monoxide-hæmochromogens.—See this vol., 999.

Intensities of vibration rotation bands. (Miss) J. E. ROSENTHAL (Proc. Nat. Acad. Sci., 1935, 21, 281—285; cf. Dunham, A., 1929, 1126).—The exact expression for the probability of any transition $v' \leftarrow v''$ is derived by a simple method for the case of a Morse potential function between the nuclei. Explicit expressions for the ratio of the integrated absorption coeffs. and numerical vals. for HCl, HBr, and HF are given.

N. M. B.

Band spectra of ionised hydrogen halides. I. F. NORLING (Z. Physik, 1935, 95, 179—188).—A band spectrum between 3000 and 4000 Å. is ascribed to HBr^+ .

A. B. D. C.

Band spectrum of aluminium bromide. P. C. MAHANTY (Indian J. Physics, 1935, 9, 369—382; cf. this vol., 562).—The band spectrum of AlBr is excited in AlBr_3 vapour. The bands have sharp heads degraded towards the red. A classification is given. The isotopic displacements of the bands due to AlBr^{81} , AlBr^{79} are calc. and agree well with experiment. It is probable that the predissociation which sets in above $v'=3$ is due to a strong interaction with an unstable and strongly repelling Heitler-London level, thus preventing excitation of higher vibrational states.

A. J. M.

Interpretation of the spectra of the mono- and di-chlorides of tin. H. TRIVEDI (Indian J. Physics, 1935, 9, 331—345).—The absorption of SnCl_2 vapour was investigated between 6000 and 2000 Å. There are no bands, but three regions of continuous absorption starting at λ 4129, 3759, and 2883. There is optical dissociation of SnCl_2 into SnCl and Cl , both products existing in various states of excitation. Only faint fluorescence patches could be obtained after long exposure to 2535 Å. (Hg). The binding in both SnCl and SnCl_2 is ionic.

A. J. M.

Absorption spectrum of carbon disulphide. R. K. ASUNDI and R. SAMUEL (Proc. Acad. Sci. Agra and Oudh, 1934—1935, 4, 203—206).—The first predissociation limit of CS_2 is at 2965 Å., corresponding with decomp. into CS and S in the $^1\Sigma$ and 3P states, respectively. The predissociation limit at 2160 Å. is interpreted as a decomp. into CS (ground $^1\Sigma$) and S (excited 1D).

J. G. A. G.

Far ultra-violet absorption spectra and ionisation potentials of the ethyl halides. W. C. PRICE (J. Chem. Physics, 1935, 3, 365—366).—The spectra of EtI , EtBr , and EtCl (1500—1700 Å.) are described. The extrapolated ionisation potentials are: EtI , 9.295 and 9.885 ± 0.005 , EtBr , 10.24 and 10.56 ± 0.1 . Results support the theory that the dipoles of Me and Et groups have a strong influence in reducing the ionisation potentials in adjacent linkings.

N. M. B.

Halochromism of ketones. II. L. C. ANDERSON and C. M. GOODING (J. Amer. Chem. Soc., 1935, 57, 999—1007; cf. A., 1933, 661).—Solutions of

COME_2 , hexan- γ -one, cyclohexanone, dicyclohexyl ketone, cyclohexyl Ph ketone, COPh_2 , Ph diphenyl ketone, and didiphenyl ketone in H_2SO_4 show increased light absorption in the region associated with the CO group. They retain their ketonic structure. Xanthone and fluorenone show a similar change and also possess new bands, which appear to be associated with the stabilisation of the quinonoid structure for these compounds. SnCl_4 produces the same changes as H_2SO_4 on the absorption of xanthone; the production of colour is not due to ether O. The colour of ketone chlorides and H_2SO_4 or SnCl_4 is different from that of ketones and resembles that of triarylcabinols and their salts. In such solutions the ketone chlorides probably exist in a quinonoid modification.

E. S. H.

Absorption spectrum of some organic vapours. C. M. B. RAO and R. SAMUEL (Current Sci., 1935, 3, 549).—Measurements are given to λ 1510 Å. for AcCl , AcBr , and $\text{CCl}_3\text{-COCl}$.

A. B. D. C.

Optical absorption of substituted benzenes. VI. Methylbenzenes and xylonitriles. H. CONRAD-BILLROTH (Z. physikal. Chem., 1935, B, 29, 170—177; cf. A., 1934, 715).—The absorption spectra of methylbenzenes accord with the calculation rule previously described, allowing for the *ortho*-error, and the variation of the intensity of the absorption max. from one compound to another is similar to what it is for the chlorobenzenes (A., 1932, 1188). Xylonitriles do not obey the rule, although those groups of bands which should have the same frequency lie close together.

R. C.

Ultra-violet absorption spectra of some organic compounds (acetylene, anthracene, phenanthrene). H. GÖPFERT (Z. wiss. Phot., 1935, 34, 156—173).—Anthracene (I) and phenanthrene (II) were heated to vaporise them. The diffuseness of the (I) spectrum is ascribed to pre-dissociation. The (II) spectrum is different, two sharp-edge systems appearing amongst diffuse bands. The data for C_2H_2 agree mainly with those of Kistiakowsky (A., 1931, 409), but are more detailed.

J. L.

Absorption of ultra-violet light by some organic substances. L. MARCHLEWSKI and J. SKULMOWSKI (Bull. Acad. Polonaise, 1935, A, 137—145).—Hydrocellulose (I) dissolved in NaOH shows no selective absorption initially, but an absorption band with max. at 3170 Å. gradually appears and shifts towards shorter λ , the max. after 22 hr. being at 2900 Å. The filtrates from the alkaline solutions after acidification with AcOH also show the development of an absorption band at 2600 Å. This change is also accompanied by increases in the Cu and I vals. of the cellulose. The extinction curve of (I) acetate in CHCl_3 solution is similar to that of cellulose acetate, whilst that of (I) benzoate shows a max. at 2758 Å. and a min. at 2622 Å. attributed to the C_6H_6 nucleus.

J. W. S.

Absorption spectra of mixed nitrogen-containing compounds and of their isomerides. T. UÉMURA and Y. INAMURA (Bull. Chem. Soc. Japan, 1935, 10, 169—182).—The absorption spectra of the following compounds have been investigated: NPh:NPh ; NPh:NMe ; NPh:NEt ; NPh:NPr ;

NPh:NBu; NPh:N·CH₂Ph; (CH₂Ph·N·)₂; NPhPh·N·CH₂; NPhPh·N·CHMe; NPhPh·N·CHEt; NPhPh·N·CHPr; NPhPh·N·CMe₂; NPhPh·N·CMeEt; NPhPh·N·CHPh; CH₂Ph·NH·N·CHPh; NPh·N·NHPh; NPhMe·N·N·NPhMe; (NHPh)₂; CHPh·N·N·CHPh; NHPh₂, and CHPh·NPh. When the N-containing radical is a strong chromophore, forming a conjugated double linking with the aromatic nucleus (e.g., NPh:NPh), two very strong absorption bands are obtained, the centres of which are independent of alkyls present. Hydrazones have only one absorption band, the position of which is almost independent of the alkyl group. The absorption is reduced by introduction of Ph into an alkyl. The effects of ·NH· and ·CH·N· groups are discussed. J. W. S.

Electronic spectra of polyatomic molecules. I. Saturated aldehydes. II. Acraldehyde. E. EASTWOOD and C. P. SNOW (Proc. Roy. Soc., 1935, A, 149, 434—446, 446—466).—I. The absorption spectra of the vapours of MeCHO, EtCHO, PrⁿCHO, PrⁱCHO, BuⁿCHO, C₆H₁₃·CHO, COMe₂, and COMeEt have been studied. The results of the vibrational analysis suggest that the electronic transition is effectively the same in all the mols. considered. The electronic structure of the ·CO group in these mols. is essentially similar to that of ·CO in CH₂O, both in the ground and upper states. The transition is not localised in the double linking.

II. The absorption spectrum of CH₂:CH·CHO (I) vapour has been measured under high dispersion. The frequencies of the upper state are 1270 and 500 cm.⁻¹, the latter being allotted to a vibration of the CH₂ about the C:C linking. This is supported by observations on the spectrum of CHMe:CH·CHO. The upper state of (I) is different in kind from that of the saturated aldehydes. Nine bands have been resolved into series of rotational lines; each series can be expressed by a single parabolic formula as though it were an isolated *R* branch. A possible explanation is suggested for the non-appearance of a related *P* branch, but not for the failure of the various formulæ to yield the same val. for the moment of inertia of the ground state. L. L. B.

Infra-red absorption spectrum of silane. W. B. STEWARD and H. H. NIELSEN (Physical Rev., 1935, [ii], 47, 828—832; cf. A., 1934, 1288).—In the range 13·0—1·0 μ data and partial resolution are given for bands at 11·0, 4·6, 3·17, 3·23, 5·5, and 2·3 μ, in decreasing order of intensity. Identifications by analogy with CH₄ are made. The calc. mol. moment of inertia gives *I*₀ = 8·9 × 10⁻⁴⁰ g.-cm.² N. M. B.

Infra-red absorption spectra of nitriles. F. K. BELL (J. Amer. Chem. Soc., 1935, 57, 1023—1025).—The infra-red absorption spectra of aceto-, *n*-butyro-, *n*-valero-, isohexo-, phenylaceto-, benzo-, α-naphtho-, and succino-nitriles have been examined between 1·0 and 12·0 mμ. A characteristic, well-defined absorption band occurs at 4·4 μ in alkyl nitriles and at 4·5 μ in aryl nitriles. This band is traced to the CN linking. A region of characteristic absorption possibly occurs at 7·0 μ. E. S. H.

Light scattering and Raman effect. S. BHAGAVANTAM (Current Sci., 1935, 3, 526—531).—A summary.

Phenomenon of "wings" as a vibrational Raman effect: a correction. E. GROSS and M. VUKS (Nature, 1935, 135, 998; cf. this vol., 564).

L. S. T.

Raman spectrum of orthophosphoric acid. M. A. JEPPESEN and R. M. BELL (J. Chem. Physics, 1935, 3, 363; cf. Nisi, A., 1930, 662).—Data are given for the concn. range 50—10 mols.-%. A strong line, showing a frequency change with concn. of about 14 cm.⁻¹, appears at all concns. N. M. B.

Rotational Raman scattering in benzene at different temperatures. S. C. SIRKAR and B. B. MAITI (Indian J. Physics, 1935, 9, 323—330).—A re-investigation of the rotational Raman scattering of liquid C₆H₆ at 30° and 210° has been carried out to explain the discrepancy between the observed and calc. distribution of intensity in the rotational wing accompanying the Rayleigh line. The intensity of the wing is not a max. at the centre of the Rayleigh line, as previously reported, but is zero and attains a max. at 18 and 25 cm.⁻¹ from the centre at 30° and 210°, respectively. The intensity decreases and the wing extends up to 120 cm.⁻¹ at 30° and 100 cm.⁻¹ at 210°.

A. J. M.

Raman spectra of amides and anilides in the fused state. I. V. N. THATTE and M. S. JOGLEKAR (Phil. Mag., 1935, [vii], 19, 1116—1121).—Data for HCO·NH₂, NH₂Ac, NH₂Bz, CPh₂, CO(NH₂)₂, and NHPhAc are tabulated. N. M. B.

Raman spectra of decahydro- and tetrahydronaphthalene. S. K. MUKERJI (Phil. Mag., 1935, [vii], 19, 1079—1097).—Using solutions of quinine sulphate and *m*-C₆H₄(NO₂)₂ in C₆H₆ separately as light filters, 17 new lines for dekaline and 12 for tetraline were measured. Each gave three new anti-Stokes lines at 596, 494, 407, and 162, 265, 1433 cm.⁻¹, respectively. Corrections and extensions of assignments of weak frequencies previously reported (cf. Bonino, A., 1932, 7, 1076) are given. N. M. B.

Raman effect. XLII. Raman spectra of naphthalene and its mono-derivatives. H. GÖCKEL (Z. physikal. Chem., 1935, B, 29, 79—87; cf. this vol., 681).—The Raman spectra of C₁₀H₈ and C₁₀H₇X (X=OH, Me, CN, SH, Cl, Br in 1- and 2-position and F in 1-position) and of some aliphatic bromides have been determined. R. C.

Raman spectrum of gaseous CD₄. A. DADIEU and W. ENGLER (Naturwiss., 1935, 23, 355).—CD₄ obtained from Al₄C₃ by the action of 99·2% D₂O, and subsequent purification, shows two Raman lines of frequency 2108 and 2141 cm.⁻¹ The first is stronger, intensity ratio 5 : 2. A. J. M.

Raman spectra of deuterobenzenes and the structure of benzene. W. R. ANGUS, C. R. BAILEY, J. L. GLEAVE, A. H. LECKIE, C. G. RAISIN, C. L. WILSON, and C. K. INGOLD (Nature, 1935, 135, 1033—1034).—Raman frequencies obtained for C₆D₆ and C₆H₅D are compared with those previously recorded (this vol., 806). The C₆D₆ frequencies are consistent with a *D_{6h}* symmetry for C₆H₆. L. S. T.

Phosphorescence process as revealed by the luminescence from solid nitrogen. L. VEGARD (Nature, 1935, 135, 1073).—The Vegard bands in the

afterglow of solid N are due to a recombination of N atoms produced from mols. dissociated by the bombarding rays. Phosphorescence and chemi-luminescence appear to be closely related. L. S. T.

Colour distribution in fluorite in relation to crystal structure. H. HABERLANDT and A. SCHIENER (Z. Krist., 1935, 90, 193—214).—Although great variations occur, there is usually an excess or a lack of colour in fluorite crystals in the diagonal planes. There are also colour regularities in zones parallel to (100) and in filaments perpendicular to (100). Microscopic colour periodicities about 1μ apart can be seen, corresponding with "mosaic" structure. The colour striations show many apparently homogeneous crystals as in reality an assemblage of smaller units. The presence of impurities is definitely associated with the colour variations. B. W. R.

Electron conduction and colour centres in fluorspar. E. MOLLWO (Nachr. Ges. Wiss. Göttingen, Math.-phys. Kl., 1934, [ii], 1, 79—89; Chem. Zentr., 1935, i, 670—671).—The absorption spectrum of fluorspar, coloured either electrically or thermally, shows max. at 3750, 5200 Å., the separation of the max. improving with cooling. The colour is due to excess of the cation metal, which can be detected by changes in d , and by direct analysis. A blue coloration was observed in SrCl_2 , colloidal particles being formed on cooling to room temp. H. J. E.

Colour centres of alkali halide crystals. R. W. POHL (Kolloid-Z., 1935, 71, 257—261).—A summary of published work. E. S. H.

Measurement of number of colour centres in crystals. E. MOLLWO and W. ROOS (Nachr. Ges. Wiss. Göttingen, Math.-phys. Kl., 1934, [ii], 1, 107—113; Chem. Zentr., 1935, i, 525).—A discussion. H. J. E.

Impurities and electrically excited phosphorescence of thin Al_2O_3 layers. H. BETZ (Z. Physik, 1935, 95, 189—197).—An electrolytically formed oxide layer on Al shows phosphorescence in a field of 10^7 volts per cm. The presence of Cr, Cu, Fe, or Mg leaves the intensity of phosphorescence unchanged; Zn decreases it, whilst Mn increases it to an extent dependent on the voltage of formation of the layer. A. B. D. C.

Influence of unequal distribution of phosphorescence centres on Lenard phosphors. V. V. ANTONOV-ROMANOVSKI (Compt. rend. Acad. Sci. U.R.S.S., 1935, 2, 105—111).—Theoretical. W. R. A.

Phosphorescence of calcite. V. LEVSHIN and M. ALENTZEV (Compt. rend. Acad. Sci. U.R.S.S., 1935, 2, 54—57).—A spectroscopic investigation of phosphorescence excited by the 365 m μ Hg line in calcite, aragonite, and stalactites is described. A. B. D. C.

Cathodic phosphorescence phenomena. M. SERVIGNE (Compt. rend., 1935, 200, 2015—2017).—Pptd. CaWO_4 gave feeble blue cathodic phosphorescence compared with natural scheelite. The effect in the pptd. material was much enhanced by heating for 10 min. at 800° and cooling quickly. The blue phosphorescence was intensified by addition of Ag

(optimum 0.1%). Addition of 1% of Sm and Er produced orange-red and green phosphorescences, respectively. H. J. E.

Influence of potassium iodide concentration on the time of decay of the uranine fluorescent radiation. W. SZYMANOWSKI (Bull. Acad. Polonaise, 1935, A, 34—37).—Data are recorded. The applicability of Vavilov's theory is discussed (cf. A., 1929, 489). H. J. E.

Variability of the fluorescence spectrum of a glycerol solution of tryptaflavine. MILE. A. WRZESIŃSKA (Bull. Acad. Polonaise, 1935, A, 38—41).—A band in the fluorescence spectrum at approx. 5000 Å. has been shown by measurements at -180° to 100° to consist of two components, the max. of which vary in position and relative intensity with temp. H. J. E.

Time decrement of light due to polarised fluorescence of dye solutions. A. JABŁOŃSKI (Z. Physik, 1935, 95, 53—65).—Perrin's theory of depolarisation is applied to time decrement of fluorescence; this does not generally follow the exponential law. Fluorometer measurements are discussed. A. B. D. C.

Negative polarisation of the phosphorescence of adsorbed dye molecules. A. JABŁOŃSKI (Bull. Acad. Polonaise, 1935, A, 30—33; cf. A., 1934, 584).—Measurements of polarisation in the low-temp. phosphorescence spectrum of tryptaflavine adsorbed on Cellophane are recorded and discussed. H. J. E.

Photomagnetism. D. M. BOSE and P. K. RAHA (Phil. Mag., 1935, [vii], 20, 145—166).— $\text{NiSO}_4 \cdot 7\text{H}_2\text{O}$ crystals and solutions containing V^{+++} or V^{++} ions show an increase in magnetic susceptibility on absorption of radiation. The photo-magnetic effect of aq. solutions containing various paramagnetic ions follows the order $\text{Ni}^{++} > \text{Cr}^{+++} > \text{Co}^{++}$ and approx. \propto the quenching of the orbital moment of the ions in their ground states. Solutions containing Cr^{+++} or Ni^{++} in dil. HCl give very small photo-magnetic effects, probably owing to the presence of undissociated paramagnetic mols. in these solutions which absorb the light and in which the orbital moment is equally quenched in the initial and final states. Quant. relations between the light absorption and change in susceptibility are deduced for CrCl_3 solutions. J. W. S.

Surface-force theory of rectification in ionic crystals. S. R. KHASTGIR (Indian J. Physics, 1935, 9, 347—355; cf. this vol., 282). A. J. M.

Dielectric loss of liquid insulators. H. RIECHE (Z. Physik, 1935, 95, 158—178).—Dielectric loss and const. have been measured for transformer oil, PhNO_2 , and C_6H_6 in the frequency range of 50 to 150×10^6 hertz, and from -80° to 100° ; the results agree with Debye's dipole theory rather than Wagner's theory of inhomogeneity. A. B. D. C.

Conductivity-temperature studies on paraffin waxes. W. JACKSON (Trans. Faraday Soc., 1935, 31, 827—835; A., 1934, 585).—Different samples of paraffin wax have a negative coeff. of electrical conductivity over a small temp. range 10 — 15° below their m.p. The behaviour is apparently due to a

change of cryst. form. The instantaneous absorption current passes through a max. with temp. F. L. U.

Mechanism of dielectric loss in paraffin wax solutions at high radio frequencies. W. JACKSON (Proc. Roy. Soc., 1935, A, 150, 197—220).—An attempt to correlate the dielectric properties of solid insulating materials with their chemical and physical constitution. The results of measurements of the variations of power loss and dielectric const. for solutions of cetyl palmitate (I) in a paraffin wax medium over the temp. range 0—80° and at frequencies of 1.80×10^5 — 1.42×10^7 cycles per sec. are discussed. The variation of power loss is in good quant. agreement with Debye's theory of dipole orientation. Experimental results point to the conclusion that only a portion of the polar (I) mol. oscillates in the alternating electric field. L. L. B.

Conductivity of anisotropic liquids. V. FREDERIKS, G. MICHAÏLOV, and D. BENESCHEVITSCH (Compt. rend. Acad. Sci. U.R.S.S., 1935, 2, 208—212).—The dependence of conductivity on field strength has been investigated for *p*-azoxyanisole and PhCl. W. R. A.

Dipole moment and molecular properties. O. GRABOWSKY (Pharm. Ztg., 1935, 80, 643—646).—A summary.

Constancy of two dipole moments in the vapour state and their apparent variation in solution. C. P. SMYTH and K. B. McALPINE (J. Chem. Physics, 1935, 3, 347—350).—The validity of the solution method for determining dipole moment is considered with reference to possible variation of moment with temp. The moments of heptyl bromide and BuCl in the vapour state are 2.07 ± 0.05 and 2.04 ± 0.01 , respectively, showing the absence of appreciable increase in moment with increase in C chain length. Estimated moment vals. for the vapour state are: PrⁿBr and BuⁿBr, 2.04 ± 0.03 ; PrⁿI and BuⁿI, 1.93 ± 0.04 . N. M. B.

Dielectric constants of gases and vapours. II. M. KUBO (Sci. Papers Inst. Phys. Chem. Res. Tokyo, 1935, 27, 65—73; cf. this vol., 567).—The electric moments and at. polarisation of PrⁿOH, BuⁿOH, and allyl alcohol have been calc. from the dielectric consts. of their vapours. W. R. A.

Moments and internal potential energies of two molecules containing movable dipoles. C. P. SMYTH and K. B. McALPINE (J. Amer. Chem. Soc., 1935, 57, 979—983).—The dielectric consts. of the vapours of trimethylene chloride and (CHCl₂)₂ have been determined. The calc. dipole moments (2.10×10^{-18} and 1.36×10^{-18}) do not vary over the temp range studied (374—485° abs. and 401—436° abs., respectively). E. S. H.

Dipole moments of ethyl- and phenyl-carbimides. J. R. PARTINGTON and E. G. COWLEY (Nature, 1935, 135, 1038).—Ethyl- and phenyl-carbimide in C₆H₆ at 20° give P_{29} 185 and 144 c.c., P_E 18.3 and 33.9 c.c., and μ 2.81 and 2.28D, respectively. The results, like the Raman spectra, indicate that N:C:O in the carbimides is linear. L. S. T.

New formula for molecular polarisation and refraction. P. C. HENRIQUEZ (Rec. trav. chim., 1935, 54, 574—575).—The Clausius-Mosotti expression is regarded as invalid for liquids. From Fairbrother's results (this vol., 13) the mol. polarisation (P) of PhNO₂ in *p*-xylene is given by $P = (\epsilon - 1)(\epsilon + 4)M / \{ (8\epsilon + 7)d \}$. For 12 "non-associated" substances this relation holds well if ϵ is < 20 , and the concn. is < 30 mol.-%. For liquids of $\epsilon > 20$, $P = (\epsilon - 1)(\epsilon + 4)M / \{ [8\epsilon + 7 + (\epsilon - 1)^3 \times 1.7 \times 10^{-3}]d \}$. Even for pure liquids the deviation is small, dipole moments calc. from data for pure liquids differing by $> 10\%$ from vals. calc. from data for dil. solution. For $\epsilon < 6$, $P = 0.60(\epsilon^2 - 1)M/d$, and the mol. refraction = $0.60(n - 1)M/d$. R. S. B.

cis-Cinnamic acids. F. EISENLOHR and W. HASS (Z. physikal. Chem., 1935, 173, 249—264).—The forms of m.p. 42°, 58°, and 68° have in C₆H₆ solution the same dipole moment, 1.12×10^{-18} e.s.u. In solution in C₆H₆, Et₂O, and dioxan the forms of m.p. 68° and 42° have the normal mol. wt. The heat of combustion of the acid of m.p. 42° is 1042.7 kg.-cal. per mol. Each form with *trans*-cinnamic acid has the f.-p. diagram of a typical binary system with eutectic. It is suggested that the relation between the three forms is some special kind of rotation isomerism; it is certainly not polymorphism (cf. A., 1930, 471). R. C.

Molecular volume of water in sodium salts. A. ESCRIBANO and E. MOLES (Anal. Fis. Quim., 1934, 32, 494—508).—Na₂B₄O₇ yields hydrates with 10, 4, 3(?), 2, and 1 H₂O, Na₂S₂O₃ with 5 and 2 H₂O, and Na₂S₄O₆ with 2 H₂O. Density determinations on all the hydrates yield the normal val. for the mol. vol. of the H₂O, except in the case of Na₂S₂O₃.2H₂O (10.3) and Na₂S₄O₆.2H₂O (9.6). H. F. G.

Refractive index of the alkaline chlorides at low concentrations. H. J. WATKES (Phil. Mag., 1935, [vii], 20, 32—44).—At concns. $< 0.0005N$ the refractive index of NaCl, KCl, and LiCl solutions varies linearly with concn., this being interpreted as evidence for complete dissociation below this concn. Between 0.0005 and 0.002N it varies linearly with $\sqrt{\text{concn.}}$, suggesting that undissociated mols. may be present in these solutions. J. W. S.

New determination of atomic refractions. I. L. J. N. VAN DER HULST (Rec. trav. chim., 1935, 54, 518—522).—The at. refractions (r) calc. by Eisenlohr (A., 1911, ii, 81) are criticised on the grounds of incorrect mathematical derivation. From the paraffin hydrocarbons and aliphatic nitriles the mol. refraction of CH₂ has been calc. as 4.640 at 20° for 589 m μ , whence r for C and H = 2.590 and 1.025, respectively. Using these vals. the mol. refractions of the paraffin hydrocarbons have been calc., and no "exaltation" appears with higher members, contrary to the results of Eisenlohr. R. S. B.

Molecular refraction, molecular volume, and b.p. in molecular lattices. W. KLEMM (J. pr. Chem., 1935, [ii], 143, 106—114).—The relation between the ratio mol. refraction/mol. vol. and the abs. b.p. of a no. of elements and compounds has been examined. It is a smooth curve for inert gas elements

which becomes displaced towards higher b.p. in the case of polyat. mols. without dipole moment. Hydrides of this class (CH_4 , PH_3 , HI) lie on the inert gas curve, indicating an inert gas electronic structure. The presence of a dipole moment displaces the relation in the direction of higher b.p. This effect is explained with reference to interat. and interionic forces. In homologous series of saturated hydrocarbons, alcohols, and carboxylic acids, it tends to a const. with increasing b.p. R. S.

Factors modifying the polarisation of liquids. F. R. GOSS (J.C.S., 1935, 727—731; cf. this vol., 683).—The previously assumed equality of the mol. anisotropy factors arising from the local asymmetry of the optical and the electrical polarisation field is established for CCl_4 . The "false" orientation polarisation of C_6H_6 , attributed to the presence of co-ordinate links, is measured for the temp. range 10—50°. Several expressions for mol. refraction are compared with reference to temp. independence. N. M. B.

Theory of optical activity. I. General theory of a system of coupled isotropic oscillators. II. Molecules with a binary axis of symmetry. M. BORN (Proc. Roy. Soc., 1935, A, 150, 84—97, 97—105).—I. A development of the theory of rotatory power given previously (A., 1915, ii, 659). The mol. is considered as a set of isotropic oscillators coupled by Coulomb forces, and the interaction is calc. by the perturbation method.

II. A mol. consisting of 2 equal pairs of oscillators perpendicular to each other and to their central line is considered. The theory gives an angle of rotation of the expected order of magnitude. L. L. B.

Electrical birefringence of liquid oxygen and nitrogen. R. GUILLIEN (Compt. rend., 1935, 200, 1840—1841).—Data for O (64.05—90.15° abs.) and N (63.29—77.40° abs.) are recorded for λ 5461 Å. The vals. $\propto 1/\text{abs. temp.}$, confirming the absence of a permanent electrical moment in the mols. H. J. E.

Rule for calculating the formulæ of acids and bases. M. CARRANZA (Bol. Soc. Quim. Peru, 1935, 1, No. 3, 58—61).—Methods for calculating the formulæ of acids and bases derivable from any given element are deduced from the no. of electrons which can be given or received by the outer electron shell. E. L.

Transition from metallic to heteropolar linking. U. DEHLINGER (Z. Elektrochem., 1935, 41, 344—346).—Theoretical. An explanation of the fluorspar-lattice structure of AuAl_2 . F. L. U.

The I—I linking in diphenyliodonium iodide. W. V. MEDLIN (J. Amer. Chem. Soc., 1935, 57, 1026—1027).—X-Ray investigation shows that the distance between the I atoms is 3.55 Å., which is compatible with an ionic, but not a covalent, structure. E. S. H.

Linking of HCl. R. SAMUEL (Current Sci., 1935, 3, 549—550).—The covalent nature of this linking is affirmed. A. B. D. C.

Problem of valency. R. F. HUNTER and R. SAMUEL (Chem. and Ind., 1935, 635—637; cf. A.,

1934, 1058).—Difficulties arising in the translation of the theory of co-ordination into wave-mechanical terms are discussed. The limitations of the method of mol. orbitals are considered, and it is maintained that the method should be interpreted as giving, in higher approximations, a pair-bond theory of valency, with strong interaction of electrons within the pair, and weak interaction between adjacent pairs. New band spectroscopic evidence confirms the non-bonding power of the s^2 group. The relation between bond and Raman frequency is discussed. The only method of treating co-ordination by wave-mechanics is to use the method of mol. orbitals as a single electron bond theory. A. J. M.

Number of canonical structures of each degree of excitation for an unsaturated or aromatic hydrocarbon. G. W. WHELAND (J. Chem. Physics, 1935, 3, 356—361).—Results are calc. and illustrated for mols. consisting of a straight chain, a ring, several rings, and an unpaired electron, respectively. N. M. B.

Formation and stability of complex ammines. B. N. SEN (J. Gen. Chem. Russ., 1935, 5, 169—172).—Ammines are formed only by those elements for which the distance D of closest approach of the central atoms is > 2.48 Å. The dissociation temp. T of hexammines is given by $k = \log(TDV)^3$, where V is the ionisation potential. R. T.

Class of perturbations of molecular levels. G. H. DIEKE (Physical Rev., 1935, [ii], 47, 870—876).—The conditions under which perturbations can occur, when the perturbing force is caused by the rotation of the mol., are examined. N. M. B.

Formation of mercury molecules. F. L. ARNOT and J. C. MILLIGAN (Nature, 1935, 135, 999—1000).—Magnetic analysis of ions in Hg vapour at various pressures and voltages shows that diat. mol. ions result from electron impact. The mol. ions are formed by the union of two atoms one of which at least must be excited, a view which reconciles the non-existence of Hg mols. chemically with the band spectra evidence of their presence. L. S. T.

Moles of vibration of butane and pentane. "Free rotation" about carbon-carbon linkings and a new type of stereoisomerism. L. S. KASSEL (J. Chem. Physics, 1935, 3, 326—335).—Mathematical. Rotational investigation of a chain of four C atoms indicates two isomeric forms of C_4H_{10} with plane C skeletons, and a third form in which the two Et are rotating about the central C—C linking. Vibration frequencies for a five-C chain are calc. Results are in fair agreement with observed Raman and infra-red lines. N. M. B.

Spectrum of the normal frequencies of a polar crystal lattice. I. General theory. J. H. C. THOMPSON (Proc. Roy. Soc., 1935, A, 149, 487—505).—Mathematical. The dynamical theory of the vibrations of the particles in a polar crystal lattice is worked out. A determinantal frequency equation, for the determination of a typical set of points of the "frequency spectrum," is obtained in a form in which the coeffs. can be calc. L. L. B.

Characteristic vibrations of mechanical models of molecules. II. Four-mass systems. F. TREMKER (Physikal. Z., 1935, 36, 423—432; cf. this vol., 432).—The form of vibrations and characteristic frequencies of mols. of the types COCl_2 , CO_3^{--} , *trans*- and *cis*-(CHCl)₂, $(\text{CN})_2$, and C_2H_2 have been investigated with mechanical models. The results are in agreement with theory except in the case of the slow deformation vibrations, for which models are inadequate. A. J. M.

Dynamics of molecular crystal lattices. III. Models of vibrating crystals. V. DEITZ and D. H. ANDREWS (J. Franklin Inst., 1935, 219, 703—715; cf. this vol., 811).—The frequencies of vibrating mols. have been studied by mechanical vibration of an appropriate model, and an extension of the method to a complete crystal lattice is described. Models of solid Ne and N_2 (both face-centred cubic) were constructed, containing 15 and 36 unit cells, respectively. Elastic bands represented the forces between each atom and its nearest neighbours, also its next-to-nearest neighbours; thus in Ne lattice each "atom" was acted on by eighteen "forces." The model was vibrated mechanically at increasing frequencies. The effect of introducing a heavy "isotope" was studied. B. W. R.

Thermochemistry and physical properties of bromides and hydrosulphides. C. D. WEST (J. Physical Chem., 1935, 39, 493—507).—The lattice energies of alkali bromides and hydrosulphides have been calc. and shown to be similar. The proton affinities of Br' and SH' differ by about 23 kg.-cal. Calc. free energy changes indicate that MSH (M = alkali metal) is increasingly stable as the at. no. of the cation increases, and that the hypothetical LiHS must be thermodynamically unstable. The calc. heats of reaction of M with MSH are in accordance with the observation that MSH is readily decomposed by M , in contrast to the behaviour of M towards MOH . Various thermochemical data for MSH have been calc. from lattice energies. Physical properties of corresponding covalent bromides and hydrosulphides have been compared. Some cyanides have been considered. M. S. B.

Energy constants of a gas in the region of dissociation. F. A. F. SCHMIDT (Forsch. Ingenieurwes., 1934, A, 5, 60—66; Chem. Zentr., 1935, i, 677).—Formulae are derived for the heat content of a dissociating gas mixture. Data for CO_2 , H_2O , and NH_3 are discussed. H. J. E.

Parachor. V. DESREUX (Bull. Soc. chim. Belg., 1935, 44, 249—287).—The surface tensions and densities of many halogen-substituted hydrocarbons have been determined and the parachors deduced. The increase in parachor obtained by substitution of H by halogen is not const. and is always < calc., the greatest effects being observed with F. The physical significance of the parachor is discussed, and it is concluded that the anomalies may be due to the compounds not being in strictly comparable states. J. W. S.

Optical reciprocal law applied to X-ray interference. M. VON LAUE (Naturwiss., 1935, 23, 373).

—The Maxwell reciprocal law may be applied to radiation proceeding from atoms in a wave field. The two possible cases of the radiation proceeding into and out of the crystal are considered. Similar considerations apply to electron diffraction.

A. J. M.

"Quadratic form" of inverted polar crystalline space-lattices. V. LINITZKI (Ukrain. Chem. J., 1935, 10, 22—26).—Mathematical. R. T.

Rate of polymorphic transformations. III. Influence of mechanical deformation on rate of transformation. E. COHEN, W. A. T. COHEN-DE MEESTER, and A. K. W. A. VAN LIESHOUT (Z. physikal. Chem., 1935, 173, 169—177; cf. this vol., 688).—The observations accord with the view that a nucleus in a polymorphic metal is to be regarded as a local strain in the lattice. R. C.

Vitreous state. G. HÄGG (J. Chem. Physics, 1935, 3, 363—364).—A discussion of a paper by Zachariassen (cf. this vol., 572). N. M. B.

X-Ray investigations on the thermal expansion of solids. II. G. SHINODA (Mem. Coll. Sci. Kyoto, 1934, A, 17, 27—30; cf. B., 1933, 672).—The following thermal expansion coeffs., parallel and perpendicular to the hexagonal axis, respectively, are recorded: Mg 23.8×10^{-6} , 23.5×10^{-6} ; Cd 50.0×10^{-6} , 17.9×10^{-6} ; Zr 2.5×10^{-6} , 14.3×10^{-6} ; Co 16.1×10^{-6} , 12.6×10^{-6} . E. S. H.

Determination of the thickness of the [oxide film] on the surface of metallic lead. S. SHIMADZU (Mem. Coll. Sci. Kyoto, 1934, A, 17, 79—84).—X-Ray examination shows that the film consists of tetragonal PbO and is 50—200 m μ thick. E. S. H.

Interpretation of Weissenberg photographs in relation to crystal symmetry. D. CROWFOOT (Z. Krist., 1935, 90, 215—236).—Detailed technique is described for interpreting Weissenberg photographs to give the point-group symmetry of the crystal. Charts are reproduced for a special camera size, and particular attention is given to triclinic and monoclinic (*a* or *c* axis) photographs. B. W. R.

Interference phenomena in two-dimensional crystals. F. LAVES and W. NIEUWENKAMP (Z. Krist., 1935, 90, 273—278).—A theoretical discussion of the X-ray diffraction to be expected from a two-dimensional lattice. B. W. R.

Two-dimensional over-structures. F. LAVES (Z. Krist., 1935, 90, 279—282).—Certain rotation photographs of maucherite, Ni_3As_2 , are interpreted as indicating the existence of a two-dimensional lattice. B. W. R.

Derivatives of ferric oxide ($\text{FeO} \cdot \text{OH}$, FeO_2Na , FeOCl): determination of their structures. S. GOLDSZTAUB (Bull. Soc. franç. Min., 1935, 58, 6—76).—X-Ray analysis of the natural hydrates of Fe_2O_3 gives, except in the case of turgite (I), diagrams corresponding with that of either goethite (II) or lepidocrocite (III). (I) gives the hæmatite diagram (cf. A., 1929, 988). Hence in nature there is only one hydrate of Fe_2O_3 , viz., $\text{Fe}_2\text{O}_3 \cdot \text{H}_2\text{O}$, which has two different cryst. structures, that of (II) or (III). Thermomagnetic analysis shows that on dehydration

(III) gives an unstable Fe_2O_3 which is strongly magnetic, and this has enabled small quantities of (III) to be detected in minerals giving only the X-ray diagram for (II). Larger crystals (2–3 mm.) of Na ferrite (IV) have been prepared by a modification of the method of van Bemmelen and Klobbie (A., 1893, ii, 169). The at. structure of (IV) is discussed (cf. A., 1933, 215). The X-ray diagram of the product of hydrolysis at room temp. is different from that of (II) or of (III).

Goethite from the Restormel mine at Lanlivery, Cornwall, has a 4.64, b 10.0, c 3.03 Å.; space-group $V_1^{18} bnm$. The crystal is built up from units of $\text{FeO}\cdot\text{OH}$ and the formula should be written $\text{FeO}\cdot\text{OH}$, since there are no H_2O groups in the cryst. structure. Infra-red absorption spectra confirm this by showing only the presence of OH (A., 1933, 13). On dehydration (II) gives, without change of cryst. form, a stable Fe_2O_3 which is composed of an assemblage of crystallites of hæmatite oriented at 180° to each other.

By heating a mixture of FeCl_3 and Fe_2O_3 at 350° in a sealed tube for 2–3 weeks larger crystals (d 3.55) of FeOCl are formed. They readily show perfect parallel cleavage and are flexible but not elastic. Their at. structure is discussed (cf. A., 1934, 351). On hydrolysis with warm H_2O , Cl^- is replaced by OH^- , and (III) is formed without loss of external form or of transparency, indicating that the structure of (III) resembles that of FeOCl . X-Ray examination of (III) confirms this. As in the case of (II) the structural unit is $\text{FeO}\cdot\text{OH}$, but the at. arrangement is different.

Lepidocrocite from Siegen has a 3.87, b 12.4, c 3.06 Å., d 3.95, with 4Fe, 4O, and 4OH in the unit cell. The at. arrangement is discussed. Rapid dehydration gives a product with a Debye-Scherrer diagram similar to that of magnetite, whilst that from slow dehydration gives the hæmatite diagram. Both products are magnetic.

L. S. T.

Growth of crystals. V. (Supplement.) T. YAMAMOTO (Bull. Inst. Phys. Chem. Res. Japan, 1935, 14, 497–498).— Sn^{++} ions promote the growth of NaCl crystals in presence of > 0.004 mol. ion per 1 mol. NaCl. Large, clear cubes grow in its presence.

W. R. A.

Growth of crystals. VII. Influence of cations in the solution on the crystal growth of potassium salts. T. YAMAMOTO (Bull. Inst. Phys. Chem. Res. Japan, 1935, 14, 499–506).—Influence of cations on the crystal growth of KI, K_2SO_4 , KNO_3 , and KClO_3 was studied under the microscope. Except for KClO_3 , cations which promoted crystal growth were found and are discussed.

W. R. A.

Lattice parameters of solid solutions in silver. W. HUME-ROTHERY (Nature, 1935, 135, 1038).—In dil. solid solutions of Cd, In, Sn, or Sb in Ag, alloys of the same equiv. composition (at.-% of solute element \times valency) have identical lattice parameters. The initial expansion of the Ag lattice produced by an atom of the above elements \propto the valency. The relation is of the same type as that found for the depression of the f.p. of Ag, and may indicate an effect

which \propto the repulsion between a solute and a solvent ion.

L. S. T.

Effect of temperature on cathode-ray interference. H. KAKESITA (Mem. Coll. Sci. Kyoto, 1934, A, 17, 31–35).—With a single crystal of FeS_2 , the interference max. are more diffused at 220° than at 25° . With Au foil at 28° , 150° , and 320° the intensity effect increases with the angle of reflexion and with rising temp.

E. S. H.

Melting of metal crystals at their boundaries and a theory of recrystallisation of metals. U. YOSHIDA and K. KOYANAGI (Mem. Coll. Sci. Kyoto, 1935, A, 18, 9–16).—When heated to a temp. just below its normal m.p., a metal begins to melt at the crystal boundaries, which become grooved. This is probably due to more rapid evaporation at the crystal boundaries than elsewhere. A crystal also appears to melt more easily where it comes into contact with its melt, and when distorted. A theory of recrystallisation of metals is based on these facts.

A. J. M.

Lattice distortion in nickel-iron. W. G. BURGERS (Nature, 1935, 135, 1037–1038).—X-Ray diffraction photographs of a Ni-Fe alloy (53 at.-% Fe) distorted by cold working show that compression and stretching change the shape and possibly the size of the unit cell.

L. S. T.

Mechanism of the transition in ammonium salts at -40° . J. A. A. KETELAAR (Chem. Weekblad, 1935, 32, 349–350).—Differences observed in the X-ray diagrams of NH_4Br and NH_4I are due to change of oscillation in the NH_4 group into rotation.

S. C.

Atomic distribution in red and black phosphorus and the crystal structure of black phosphorus. R. HULTGREN, N. S. GINGRICH, and B. E. WARREN (J. Chem. Physics, 1935, 3, 351–355).—Five samples of black P of widely varying age gave identical powder patterns. A sample prepared at room temp. and 35,000 atm. gave the diffuse rings of an “amorphous” X-ray pattern. Another sample, prepared at 300° and 8000 atm., is a new form of P, having the same density as black. At. distribution curves of cryst. and “amorphous” black and red P were practically identical, showing three neighbours of 2.28 Å. and about 12 at 3.6 Å. The structure of black P shows double layers; the cell is side-centred orthorhombic, a 3.31, b 4.38, c 10.50 Å.; 8 atoms per unit cell; $d_{\text{calc.}}$ 2.69, $d_{\text{obs.}}$ 2.70; space-group $V_1^{18} Bmab$.

N. M. B.

Orientation of the crystallites in cast nickel and the changes produced by rolling and recrystallisation. G. TAMMANN and F. LAASS (Z. Metallk., 1935, 27, 86–88).—The crystal orientation in cast Ni and in recryst. rolled Ni sheet is similar to that of Al, in that octahedral planes lie against the cooling surfaces of the casting and in the rolling plane of the annealed sheet.

A. R. P.

Molecular arrangement in amorphous antimony. J. A. PRINS (Chem. Weekblad, 1935, 32, 348–349).—Amorphous Sb prepared by electrolysis of SbCl_3 contains occluded SbCl_3 , which keeps the metal in a “dispersed” form. It can be produced in thin layers by distillation in a high vac., but thick layers ($< 1000 \mu$) crystallise immediately. The electron

diffraction pattern corresponds with an at. arrangement similar to that in cryst. Sb, of co-ordination no. 6.

S. C.

Crystalline structure of electrolytic white tin. H. HIRATA and Y. TANAKA (Mem. Coll. Sci. Kyoto, 1934, A, 17, 143—152).—X-Ray examination. Sn deposited from a solution of SnSO_4 , H_2SO_4 , and Na_2SO_4 consists of micro-crystals arranged with the normals to their (111) planes in a common direction, perpendicular to the direction of max. growth of the deposited Sn. Patterns corresponding with two crystals, with one of the (101) planes in common, were detected.

E. S. H.

Copper amalgam CuHg with the γ -brass structure. F. SCHOSZBERGER (Z. physikal. Chem., 1935, B, 29, 65—78).—The cubic crystals have a 9.406 ± 0.004 Å. Hume-Rothery's rule does not hold. If it is attempted to assign to the Cu and Hg atoms a similar arrangement to that in $\gamma\text{-Cu}_5\text{Cd}_8$ there appear discrepancies between observed and calc. intensities which are present, although less pronounced, in the γ -structures of Cu-Zn and Cu-Cd.

R. C.

Structure of the intermetallic compound Au_2Pb . H. PERLITZ (Acta Comm. Univ. Tartuensis, 1934, 27, No. 11, 12 pp.; Chem. Zentr., 1935, i, 783).—The lattice is face-centred cubic (a 7.91 Å.; 24 atoms in unit cell). Au_2Pb is related to MgCu_2 and KBi_2 .

H. J. E.

X-Ray examination of selenium crystals. K. TANAKA (Mem. Coll. Sci. Kyoto, 1934, A, 17, 59—78).—"Metallic" Se has a 4.360 Å. and c/a 1.138; 3 atoms in unit cell; growth occurs most prominently along the trigonal axis. Vitreous and amorphous Se give the same diffraction band and are transformed into the metallic form when annealed at suitable temp. The transition temp., about 74° , has been determined by X-ray examination and confirmed by determinations of d .

E. S. H.

Phosphides and arsenides with modified nickel arsenide structure. K. E. FYLKING (Arkiv Kemi, Min., Geol., 1935, 11, B, No. 18, 6 pp.).—Mn, Fe, and Co phosphides and arsenides, prepared by heating the elements in equal mol. proportions for \leq a day at 610° (for P) or 730° (for As), have lattice structures closely related to that of NiAs, but the metal atoms form zig-zag chains instead of straight rows. MnAs differs less from NiAs than FeAs and CoAs. The lattice dimensions of these compounds and parameter vals. for MnP and FeAs are recorded.

J. W. S.

Crystal structure of magnetic ferric oxide, $\gamma\text{-Fe}_2\text{O}_3$. G. HÄGG (Z. physikal. Chem., 1935, B, 29, 95—103).—If Fe_3O_4 is oxidised to $\gamma\text{-Fe}_2\text{O}_3$ at 300° without losing the spinel structure, the length of the edge of the unit cube of the lattice changes continuously from 8.380 for Fe_3O_4 to 8.322 Å. for Fe_2O_3 . The increase in O concn. during oxidation is caused by the appearance of unoccupied positions in the Fe atom lattice of the spinel phase; in $\gamma\text{-Fe}_2\text{O}_3$ one ninth of the original Fe atom positions are empty. Thewlis' lattice structure for $\gamma\text{-Fe}_2\text{O}_3$ (A., 1932, 113) is rejected. The belief that $\gamma\text{-Fe}_2\text{O}_3$ can be reduced to Fe_3O_4 by heating at 250° in a vac. (A., 1932, 29) is erroneous.

R. C.

Crystal structure of the aluminium halides. II. **Crystal structure of AlCl_3 .** J. A. A. KETELAAR (Z. Krist., 1935, 90, 237—255).— AlCl_3 is monoclinic pseudohexagonal, a_0 5.91, b_0 10.24, c_0 6.16 Å., β $71^\circ 21'$, space-group C_2^2 . The lattice is essentially of layer type, Al_2Cl_6 being the mol. unit. The structure found from detailed intensity measurement does not agree with previous results (cf. A., 1930, 1503).

B. W. R.

Crystal structure of bismuth oxyhalides. F. A. BANNISTER [with M. H. HEY] (Min. Mag., 1935, 24, 49—58).—Minute crystals of BiOCl , BiOBr , and BiOI were prepared by diffusion of solutions $\text{BiCl}_3 + \text{HCl}$ etc. into water. They are tetragonal with the same structure as matlockite, BiFCl (A., 1934, 1197). The unit cell contains 2 mols. and has dimensions: for BiOCl , a 3.89, c 7.37 (d 7.717); BiOBr , a 3.92, c 8.11 (d 8.082); BiOI , a 4.01, c 9.14 (d 7.922). The minerals bismoclite (BiOCl) and daubreelite ($\text{BiO}[\text{OH}, \text{Cl}]$) have a 3.89, c 7.37, and a 3.85, c 7.40 Å., respectively.

L. J. S.

Crystal structure of some amines of the type $\text{M}(\text{NH}_3)_2\text{Cl}_2$. C. A. MACGILLAVRY (Chem. Weekblad, 1935, 32, 346—347).—Compounds like $\text{MX}_2 \cdot 2\text{NH}_3$ ($\text{M} = \text{Hg}, \text{Zn}, \text{Cd}$; $\text{X} = \text{Cl}, \text{Br}$) and $\text{CuCl}_2 \cdot 2\text{H}_2\text{O}$ are all of centred lattice type of halogens and NH_3 (unit cell $4 \times 4 \times 4$ Å.); $\text{Hg}(\text{NH}_3)_2\text{Cl}_2$ is peculiar in that its X-ray diagram is practically identical with that of Ag. The Cd compounds have a tetragonal twin structure, giving rhombic X-ray diagrams.

S. C.

X-Ray study of the caesium salts of certain 12-heteropoly acids. J. A. SANTOS (Proc. Roy. Soc., 1935, A, 150, 309—322).—The structures of the Cs salts of 12-phospho-, 12-silico-, 12-boro-, and tungstic acids ($\text{H}_3\text{PW}_{12}\text{O}_{40} \cdot 5\text{H}_2\text{O}$, $\text{H}_3\text{SiW}_{12}\text{O}_{40} \cdot 5\text{H}_2\text{O}$, $\text{H}_5\text{BW}_{12}\text{O}_{40} \cdot 5\text{H}_2\text{O}$, and $\text{H}_6\text{W}_{12}\text{O}_{40} \cdot 5\text{H}_2\text{O}$) have been studied (cf. A., 1934, 479, 1296). In each case, the Cs salts contained only 3 Cs atoms per mol., and all attempts to prepare salts with > 3 Cs atoms failed. The formulæ deduced are: $\text{Cs}_3\text{PW}_{12}\text{O}_{40} \cdot n\text{H}_2\text{O}$, $\text{Cs}_3\text{HSiW}_{12}\text{O}_{40} \cdot n\text{H}_2\text{O}$, $\text{Cs}_3\text{H}_2\text{BW}_{12}\text{O}_{40} \cdot n\text{H}_2\text{O}$, and $\text{Cs}_3\text{H}_3\text{W}_{12}\text{O}_{40} \cdot n\text{H}_2\text{O}$, where $n = 2$ or 0. Corresponding Rb and Tl salts have been prepared, and found to have similar structures.

L. L. B.

Planar structure of quadricovalent cupric compounds. E. G. COX and K. C. WEBSTER (J.C.S., 1935, 731—733).—*Cu disalicylaldoxime* has been prepared, and analogy with previously reported compounds (cf. this vol., 684) suggests a planar structure. X-Ray investigation of the cryst. Cu salts of CH_2Ac_2 , CH_2BzAc , $\text{CH}_2(\text{COEt})_2$, and γ -chloroacetylacetone established their planar configuration by means of space-group considerations, cell dimensions, and optical properties.

N. M. B.

Crystal structures of magnesium-aluminium spinels with alumina in excess and of γ -alumina. G. HÄGG and G. SÖDERHOLM (Z. physikal. Chem., 1935, B, 29, 88—94).—The d of these spinels indicate that the excess of O is caused by the appearance of unoccupied positions in the metal lattices, the ratio $\text{Al} : \text{Mg}$ increasing parallel with the excess of O. The edge of the unit cube of $\text{MgO} \cdot \text{Al}_2\text{O}_3$ is 8.056 Å. The upper limit of Al_2O_3 in the stable solid solutions is

about 67 mol.-%, whilst the unstable limit is to be regarded as γ - Al_2O_3 . This latter crystallises in the spinel lattice, cube edge 7.843 Å., but one ninth of the metal atom positions are empty. R. C.

Non-silicates with cristobalite-like structure. T. F. W. BARTH (J. Chem. Physics, 1935, 3, 323—325).—The cristobalite type of structure is shown to occur in $\text{K}_2\text{O}, \text{Al}_2\text{O}_3$, $\text{K}_2\text{O}, \text{Fe}_2\text{O}_3$, and $\text{Na}_2\text{O}, \text{Al}_2\text{O}_3$. N. M. B.

Crystal structure of the guanidonium halides. III. Structure of guanidonium bromide $\text{C}(\text{NH}_2)_3\text{Br}$. W. THEILACKER (Z. Krist., 1935, 90, 256—272).— $\text{C}(\text{NH}_2)_3\text{Br}$ is rhombic bipyramidal, a_0 6.77, b_0 8.64, c_0 8.30 Å.; 4 mols. in cell; space-group V_{16}^h . The double refraction of the substance is considered and a set of at. parameters is obtained; the guanidonium ions have their planes parallel to the a axis and mutually perpendicular. B. W. R.

X-Ray diffraction in some long-chain aliphatic liquids. J. A. PRINS and R. FONTEYNE (Physica, 1935, 2, 573—574).—The strongly polar mols., alcohols and aliphatic acids, show a more conspicuous "inner ring" than other normal long-chain aliphatic compounds. The spacing in the diffraction pattern of cork is 4.4 Å. and not 4.1 Å., as given previously (A., 1934, 948). M. S. B.

The odd-membered n -primary alcohols (the $\alpha \rightarrow \beta$ transition). T. MALKIN (J.C.S., 1935, 726).—The β -forms of the C_{15} , C_{17} , and C_{19} n -primary alcohols give two main side spacings (3.7 and 4.2 Å.), whereas the α -forms give only one (4.2 Å.). Further, the α -forms are uniaxial, the β -forms are biaxial. These results accord with the view of Wilson *et al.* (A., 1934, 720) that the $\alpha \rightarrow \beta$ change is due to a change from a vertical rotating (α) form to a vertical non-rotating (β) form. The conclusion of Phillips and Mumford (cf. this vol., 20) that the odd alcohols above C_{14} exist in a β -tilted form is not valid. H. G. M.

Molecular structure and crystal symmetry. Fine structure of triethyl 1:3:5-benzenetricarboxylate. E. HERTEL and E. DUMONT (Z. physikal. Chem., 1935, B, 29, 112—116).—The hexagonal unit cell has I_a 11.3, I_c 20.1 Å. and contains 6 mols. Some crystals have the space-group C_6^2 , others C_6^3 , the two species differing in the sense of the twist of the helicohexagynes determining the crystal structure. Although the symmetry of the mol. is C_1 its triangular shape is probably responsible for the mol. arrangement in the crystal. R. C.

Difference in X-ray diffraction patterns of some isomerides. Z. MURO (Mem. Coll. Sci. Kyoto, 1935, A, 18, 79—82).—X-ray diffraction patterns of d - and l -pinene and limonene, and of isomerides of the mol. formula $\text{C}_{10}\text{H}_{16}$, $\text{C}_{10}\text{H}_{16}\text{O}$, $\text{C}_{10}\text{H}_{18}\text{O}$, $\text{C}_{10}\text{H}_{12}\text{O}_2$, and $\text{C}_{10}\text{H}_{10}\text{O}_2$ were examined. With optical isomerides there is no difference in the form of the pattern, nor in the val. of the distance (d) between the planes. With ordinary isomerides there is a diminution of d accompanied by an increase of diffuseness of the pattern on passing from the normal to the *iso*-compound. In all cases, rise of temp. results in diminution of d and increase of diffuseness. A. J. M.

Crystal structure of p -toluidine. J. WYART (Compt. rend., 1935, 200, 1862—1864).—The crystals are orthorhombic (a 5.98, b 9.05, c 23.3 Å.; 8 mols. in unit cell; space-group D_{2h}^{16}). The 6 atoms in the nucleus form a regular hexagon of side 1.40 Å. The NH_2 is 1.18 Å. from the C, the C-N linking making an angle of 15° with the plane of the nucleus. This angle for the C-Me linking is 16° , the C-Me distance being 1.48 Å. H. J. E.

Structure of benzoquinone. Quantitative X-ray investigation. J. M. ROBERTSON (Proc. Roy. Soc., 1935, A, 150, 106—128).—The crystal is monoclinic, space-group $P2_1/a$ with 2 centro-symmetrical mols. per unit cell. The planar mols. are nearly parallel and lie almost in the (201) plane. The ring is not a regular hexagon; the C-C distance is about 1.5 Å., C=C about 1.32 Å., and C=O about 1.14 Å. The internal ring angle between single C linkings is 109° , and between double and single linkings 125° . The min. intermol. distance between O atoms is 3.62 Å. between O and C 3.36 Å., and between C and C 3.44 Å. L. L. B.

X-Ray analysis of the structure of dibenzyl. II. Fourier analysis. J. M. ROBERTSON (Proc. Roy. Soc., 1935, A, 150, 348—362; cf. A., 1934, 1297).—The experimentally determined structure factors for three zones of reflexions have been subjected to a double Fourier analysis. The results indicate that the regular three-dimensional model must be slightly modified, the planes of the C_6 rings being apparently turned 13 – 16° out of the symmetrical position. The C_6 rings are regular plane hexagon structures. The distance between aromatic C atoms is 1.41 Å., between aromatic C and aliphatic CH_2 1.47 Å., between the two CH_2 groups 1.58 Å. The angle between the linkings of the CH_2 group is 109.2 – 112° . The min. intermol. distance between aromatic and aliphatic C atoms is 4.10 Å., between aromatic C atoms 3.68 Å. L. L. B.

X-Ray investigation of the crystal structure of m -azotoluene. M. PRASAD and P. H. DALAL (Indian J. Physics, 1935, 9, 319—321).— $a:b:c=0.8581:1:0.5469$; 4 mols. in unit cell. A. J. M.

Unidimensional change of the crystal lattice in passing from veronal to dial. E. HERTEL (Z. physikal. Chem., 1935, B, 29, 117—120).—The monoclinic crystals of dial have I_a 14.5, I_b 7.1, I_c 21 Å., β 100° , 8 mols. in unit cell, translation group Γ'_m . The monoclinic pseudorhombic crystals of veronal have I_a 14.4, I_b 7.1, I_c 9.7 Å., β 90° , 4 mols. in unit cell, translation group Γ'_m . In the change from veronal to dial the lattice alters in one direction. R. C.

X-Ray crystallography of the toad poisons, bufagin and cinobufagin, and of strophanthidin. (Miss) D. CROWFOOT (Chem. and Ind., 1935, 568—569).—Data are recorded for bufagin, +EtOH (I), cinobufagin (II), and the A (III) and B (IV) forms of strophanthidin. These confirm the accepted formula for (I), if the b axis is the α optical direction (the reversal compared with the sterol group probably being due to the *tert*.-OH) and the EtOH of crystallisation lies between the ends of the mols. Data for (II) are inconclusive, but suggest a formula $\text{C}_{26}\text{H}_{34}\text{O}_6$.

Results for (III) cannot be interpreted owing to decomp., but for (IV) confirm the formula $C_{23}H_{30}O_6 + 0.5H_2O$. R. S. C.

X-Ray study of the hydration and denaturation of proteins. W. T. ASTBURY and R. LOMAX (J.C.S., 1935, 846—851).—X-Ray photographs of ordinary and boiled egg-white, serum-albumin, pepsin, trypsin, zein, casein, tobacco-seed and squash-seed globulin, and edestin from hemp seed, both dry and after adsorption of H_2O or $EtOH$, show inner and outer rings associated, respectively, with side-chain and backbone spacing of polypeptide chains; where spacing changes occur, due to adsorption, the side-chain spacing increases most, and the backbone spacing is almost unchanged. Denaturation by heat results in a sharpening of the backbone reflexion and the appearance of at least one other outer ring indicating a development of a common structural scheme. Results, in general, point to a scheme of crystallites built of parallel, fully-extended polypeptide chains, between which are the principal cross-linkings. N. M. B.

X-Ray diffraction pattern of native cellulose. U. YOSHIDA and C. PARK (Mem. Coll. Sci. Kyoto, 1934, A, 17, 443—447).—The unit cell is monoclinic and contains 4 $C_6H_{10}O_5$ groups. E. S. H.

Application of X-rays in the investigation of cellulose and its derivatives, with special reference to reaction mechanism. K. HESS and C. TROGUS (Ergebn. tech. Röntgenk., 1934, 4, 21—68; Chem. Zentr., 1935, i, 707—708).—A lecture. H. N. R.

Structure of liquid and solid mercury studied by cathode-ray diffraction. III. Temperature effect. H. KAKESITA (Mem. Coll. Sci. Kyoto, 1934, A, 17, 241—248; cf. this vol., 919).—The patterns of solid and liquid Hg show a face-centred rhombohedral structure. The rings for solid Hg are 10% > those for liquid Hg. E. S. H.

Preparation of thin single crystals of silver and their investigation with electron beams. L. ROYER (Ann. Physik, 1935, [v], 23, 16—17).—The orientation of Ag single crystals formed on a rock-salt base given by Lassen and Brück (this vol., 286) is questioned. The data there given do not agree with the fact that parallel planes in the two crystal lattices should possess approx. equal parameters. A. J. M.

Preparation of thin single crystals of silver and their investigation with electron beams. H. LASSEN and L. BRÜCK (Ann. Physik, 1935, [v], 23, 18—20).—The results of Royer (preceding abstract) are based on the deposition of crystals from solution, the conditions being therefore not comparable with those obtaining in the authors' previous work (this vol., 286). The orientation there described is re-affirmed. A. J. M.

Investigation of effect of oxygen on graphite at high temperatures by means of electron diffraction. H. BOERSCH and L. MEYER (Z. physikal. Chem., 1935, B, 29, 59—64).—Measurements with C filaments coated with graphite show that in the dissolution of O in graphite at high temp. the layer lattice stretches along the c axis like a concertina (cf. A., 1932, 816). R. C.

Heat effects in the transformations of cobalt. H. VON STEINWEHR and A. SCHULZE (Z. Metallk., 1935, 27, 90—92).—From measurements made on a 20-kg. cylinder of Co containing Cu 0.24, Fe 1.6, and C 0.007% the heat evolution in the α - β transformation, which extends from 380° to 420°, has been determined as 0.1 ± 0.03 g.-cal. per g. The magnetic change occurs in the range 1070—1125° with heat evolution of 1.2 g.-cal. per g. A. R. P.

Gyromagnetic effect of some ferromagnetic compounds. D. P. R. CHAUDHURI (Indian J. Physics, 1935, 9, 383—414).—The ratio of angular momentum to magnetic moment (g -ratio) of the elementary carriers of ferromagnetism has been determined by the resonance method for Fe_3O_4 , Fe_2O_3 , NiO , Fe_2O_3 , CuO , Fe_2O_3 , MnO , Fe_2O_3 , and $2ZnO \cdot 3Fe_2O_3$. g is in each case < 2, the theoretical val. for the spinning electron, and this is probably due to the fact that the l -moment (orbital moment) also enters into ferromagnetic phenomena. A. J. M.

Chemielectric Curie point effect analogous to magnetochemical. J. A. HEDVALL and R. W. PAULY (Z. physikal. Chem., 1935, B, 29, 225—230).—A Curie temp. of 22.0—22.3° is deduced for Na K tartrate from observations on the dissolution relations in $EtOH$, which change abruptly at this temp. (cf. this vol., 153). R. C.

Influence of mechanical vibrations on the subsequent manifestations of magnetic viscosity. A. V. MITKEVITSCH (Compt. rend. Acad. Sci. U.R.S.S., 1935, 2, 25—29).—The effect of mechanical vibration favours the hypothesis that magnetic viscosity is due to an unstable magnetic state rather than to eddy current effect. A. B. D. C.

Temperature variation of conical indentation hardness of metals. I. J. ENGL and G. HEIDTKAMP (Z. Physik, 1935, 95, 30—41).—The hardness of mono- and poly-cryst. Cu was determined to 1900° using cones of synthetic corundum crystals. A. B. D. C.

Young's modulus of aluminium rod composed of large crystal grains. M. SUGIHARA (Mem. Coll. Sci., Kyoto, 1935, 17, 389—396).—Young's modulus of Al rods composed of crystal grains of various sizes has been measured by elongation and by acoustical vibration methods. Whilst the limit of elasticity decreased with size of crystal grain, the modulus remained almost const. W. R. A.

Heat evolved in metallic transformations. III. Iron. H. VON STEINWEHR and A. SCHULZE (Physikal. Z., 1935, 36, 419—423; cf. A., 1934, 725; this vol., 704).—The heat evolved in the magnetic (A2) transformation of Fe (99.97%) is 4.8 ± 0.2 g.-cal. per g. It takes place over the range 710—790°. The heat evolved in the allotropic (A3) change is 6.2 ± 0.08 g.-cal. per g. A. J. M.

Twinning in α -iron. H. O'NEILL (Nature, 1935, 135, 1076—1077).—Attention is directed to prior reports of twinning in α -Fe (cf. this vol., 811). The greater ductility of mild steel tinplate when cold-rolled and annealed over that which has been hot-rolled and normalised may be due to the more highly

twinned structure probably produced by the former process.

L. S. T.

"Recovery" of metals and recrystallisation phenomena in aluminium single crystals. N. J. SELJAKOV and E. I. SOVZ (Compt. rend. Acad. Sci. U.R.S.S., 1935, 2, 125—133).—The "recovery" process produces in single crystals marked changes in the intensity distribution of certain spots on the X-ray plate accompanied with an enhanced definition of the spots. The deformation of the crystals is discussed.

W. R. A.

Rotational dispersion of sound in hydrogen. A. S. ROY and M. E. ROSE (Proc. Roy. Soc., 1935, A, 149, 511—522).—No variation of the velocity of sound in H_2 is found below frequencies of the order of 10^6 cycles per sec., as predicted by the classical kinetic theory of Jeans, and by the quantum treatment of the inelastic collision between two H_2 mols.

L. L. B.

Thermo-electric power of the alkali metals in the solid and liquid state, with respect to platinum. E. HEIBER (Ann. Physik, 1935, [v], 23, 111—136).—The thermo-electric power of Li, Na, K, Rb, and Cs was determined for the solid and liquid elements (Li, solid only). Li and Cs are thermo-electrically positive, the others negative, with respect to Pt. dE/dT shows a jump at the m.p. which is greatest for Cs and Rb, but is within the limit of experimental error for Na and Li.

A. J. M.

Effect of a magnetic field on thermal conductivity and viscosity of paramagnetic gases. M. VON LAUE (Ann. Physik, 1935, [v], 23, 1—15).—Theoretical. There is no simple connexion between the effect of a magnetic field on these properties of paramagnetic gases.

A. J. M.

Influence of an electric field on the thermal conductivity of a solid. G. GROETZINGER (Nature, 1935, 135, 1001).—After solidification in an electric field bees-wax permanently shows a greater thermal conductivity in the direction of the field. Application of an alternating field of 50 cycles produces no such effect.

L. S. T.

Thermal conductivity of polyatomic gases. Erratum. A. R. UBBELOHDE (J. Chem. Physics, 1935, 3, 362; cf. this vol., 691).—A correction.

N. M. B.

Direct influence of light on the electrical resistance of metals. A. ETZRODT (Physikal. Z., 1935, 36, 433—441).—The increase in resistance of metals on illumination, reported by Majorana (A., 1932, 898, 1189; 1933, 353, 584; 1934, 114, 555) and assumed to be due to a thermal effect and an inner photo-electric effect, was investigated. It is not possible completely to separate these effects by cooling and increasing the frequency of the incident radiation, but if the temp. coeff. of the resistance is zero, thermal effects should disappear. The effect of temp. on the sp. resistance of wires composed of single crystals of Bi, and of constantan, and the temp. for which temp. coeff. is zero were determined. Parallel determinations of resistance and the Majorana effect showed that the total effect completely disappeared at temp.

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at which the temp. coeff. is zero; the Majorana effect is thus a thermal effect.

A. J. M.

Electrical conductivity of mixed metallic phases at low temperatures (Cu-Pt alloys). H. J. SEEMANN (Z. Physik, 1935, 95, 97—101).—Sp. resistances were measured for Cu-Pt alloys of 70 and 75 at.-% Pt; that at room temp. decreases on tempering at 400—550° due to formation of an ordered cubic structure. Sp. resistance-temp. curves for the 75% alloy are similar to those for Cu_3Pt , but those for the 70% alloy show anomalies probably due to ferromagnetism.

A. B. D. C.

Magnetic properties and critical currents of superconducting alloys. G. N. RJABININ and L. V. SHUBNIKOV (Nature, 1935, 135, 581—582).—Pb-Tl and Pb-Bi alloys lose their superconductivity at low temp. when the magnetic field strength is above a certain val.

W. P. R.

Magnetic susceptibility of water and the influence of dissolved salts. B. CABRERA and H. FAHLENBRACH (Anal. Fis. Quim., 1934, 32, 525—537).—The magnetic susceptibility (χ) of H_2O above 100° is const. at 0.727×10^{-3} . The variation with temp. below 100° is discussed. The variation of χ for KI solutions is due to depolymerisation of the H_2O and to the deformation of the K^+ and I^- ions under the dipolar action of the H_2O (hydration effect).

J. W. S.

Diamagnetism of heavy water in the liquid and solid states. B. CABRERA and H. FAHLENBRACH (Anal. Fis. Quim., 1934, 32, 538—542).—The general magneto-thermal behaviour of heavy water (> 99% D_2O) is similar to that of ordinary H_2O , but the mol. susceptibility, its temp. coeff., and its change with change of state differ in the two cases.

J. W. S.

Cobalt, nickel, and copper complexes of the amides and imides: magneto-chemical studies. L. CAMBI and E. TREMOLADA (Gazzetta, 1935, 65, 322—338).—The structure of many complex compounds of Co^{II} , Ni^{II} , and Cu^{II} containing amide and imide groups is discussed. Magnetic susceptibility data are recorded.

O. J. W.

Diamagnetism of primary alcohols and other organic compounds. B. CABRERA and H. FAHLENBRACH (Anal. Fis. Quim., 1934, 32, 543—566).—The magnetic susceptibilities (χ) of primary alcohols to $C_{16}H_{33}OH$, C_6H_{14} , C_6H_6 , $PhNO_2$, $AcOH$, *sec.*- $BuOH$, *o*-, *m*-, and *p*-cresol, $C_6H_4Me \cdot NO_2$, and *p*- $C_6H_4Cl \cdot OH$ have been measured at various temp. in a "Uviol" glass tube. Like H_2O , alcohols show an abrupt change of χ at the m.p., and on each side of the m.p. there is a temp. range over which χ varies considerably with temp. The change in χ at the m.p. is related to the electric moment of the mol. The results are discussed with reference to Pascal's additivity theory.

J. W. S.

Magnetic properties of the phenanthroline ferric complexes. G. H. WALDEN, L. P. HAMMETT, and A. GAINES, jun. (J. Chem. Physics, 1935, 3, 364).—The at. susceptibility of the Fe atom in the blue complex $Fe(C_{12}H_8N_2)_3^{+++}$ obtained only by oxidation of the Fe^{II} complex, and in the solid brown salt,

$[\text{Fe}(\text{C}_{12}\text{H}_8\text{N}_2)_2(\text{H}_2\text{O})(\text{OH})]\text{Cl}_2$ obtained by direct interaction of Fe^{III} salts and phenanthroline, is 2446×10^{-6} and 826×10^{-6} , respectively. The low val., 1.4 Bohr magnetons, for the magnetic moment in the latter case is attributed to the existence in the single mol. grouping of two or more Fe atoms so oriented that their moments partly neutralise each other. N. M. B.

Determination of the difference of the principal susceptibilities of some rare-earth ethyl sulphates. R. A. FEREDAY and E. C. WIERSMA (*Physica*, 1935, 2, 575—581).—The differences between the two principal susceptibilities (χ) of the hexagonal crystals of the Et sulphates of Ce, Nd, Pr, and Er have been determined. For Ce, Nd, and Er, which have an odd no. of electrons in the ion, the higher val. of χ is along the principal axis and the difference increases rapidly as the temp. falls. Pr has an even no. of electrons in the ion and, at room temp., χ is still the higher along the principal axis. The difference diminishes with fall of temp., and equality is reached at 130° abs.; at lower temp. χ along the binary axis becomes the higher. M. S. B.

Magne-crystallic action. III. Organic crystals. K. S. KRISHNAN and S. BANERJEE (*Phil. Trans.*, 1935, A, 234, 265—298; cf. A., 1933, 340).—Using a new method of measuring magnetic anisotropies adaptable to crystals < 1 mg., the principal susceptibilities of 29 org. crystals are tabulated. Mol. orientations in the crystal lattice deduced from the magne-crystallic data agree, in general, with X-ray determinations. The principal susceptibilities of 28 individual mols. are tabulated. N. M. B.

Magnetic susceptibilities of very small crystals. K. S. KRISHNAN and S. BANERJEE (*Current Sci.*, 1935, 3, 548).—The susceptibility of crystals > 0.1 mg. can be determined from their behaviour in a mixture of dia- and para-magnetic solutions. A. B. D. C.

Magnetochemical investigations. XIV. Magnetic behaviour of some heavy metal compounds of the phthalocyanines. L. KLEMM and W. KLEMM (*J. pr. Chem.*, 1935, [ii], 143, 82—89; cf. this vol., 436).—The magnetic susceptibilities of Ni, Co, Fe, Cu, Zn, Mn, and Mg phthalocyanines have been determined and compared with vals. calc. for at. and ionic linkings. At. linkings can be identified in the case of the Ni, Co, and Fe compounds. The chemical stability of the Cu and Zn compounds indicates a similar structure. Specimens of the Mn and Mg compounds were not sufficiently pure to yield decisive magnetic data, but the replacement of the metal by treatment with H_2SO_4 indicates ionic linkings. R. S.

Rotational heat of ortho-deuterium. K. CLU-SIUS and E. BARTHOLOMÉ (*Z. physikal. Chem.*, 1935, B, 29, 162—169; cf. this vol., 573).—An apparatus for the prep. of *o*- D_2 is described. The rotational heat at 35 — 106° abs. has been measured. R. C.

Specific heat of liquid helium. W. H. KEESOM and (Miss) A. P. KEESOM (*Physica*, 1935, 2, 557—569, and *Proc. K. Akad. Wetensch. Amsterdam*, 1935, 38, 490).—Sp. heat measurements of He, including measurements under the saturated v.p., have been made (cf. A., 1933, 16). The large change in sp. heat at

the λ -point occurs abruptly or in a temp. interval probably $< 0.0002^\circ$. The absence of latent heat at λ -point is confirmed, but it is difficult to determine here the exact val. of the sp. heat jump; it is probably $>$ is shown by experiment. It is suggested that the λ -transition depends on the interaction between neighbouring atoms. The heat conductivity of He also appears to change abruptly at λ -point. M. S. B.

Atomic heat of nickel from 1.1° to 19.0° abs. W. H. KEESOM and C. W. CLARK (*Proc. K. Akad. Wetensch. Amsterdam*, 1935, 38, 490—491, and *Physica*, 1935, 2, 513—520; cf. this vol., 574).—The at. heat $>$ the heat capacity due to the at. lattice as calc. from Debye's law, is $>$ the contribution due to the interaction energy of the ferromagnetism electrons, and is probably connected with the energy of the conduction electrons. N. M. B.

Exact measurement of the specific heats of solid substances at higher temperatures. XVIII. Use of Dewar vacuum vessels in the metal block calorimeter for the control of the cooling rate. F. M. JAEGER, R. FONTEYNE, and E. ROSENBOHM. **XIX. Specific heats of zinc, magnesium, and their binary alloy MgZn_2 .** T. J. POPPEMA and F. M. JAEGER (*Proc. K. Akad. Wetensch. Amsterdam*, 1935, 38, 502—509, 510—520).—XVIII. Difficulties arising from the use of Dewar vessels and precautions necessary for their elimination are discussed.

XIX. Sp. heat data are tabulated for Zn, 100 — 360° , Mg, 100 — 550° , and MgZn_2 , 100 — 500° . Mol. heats of MgZn_2 are in fair agreement with the additive law, but divergences increase with rise of temp. N. M. B.

Low-temperature specific heats. V. Heat capacity of tricalcium phosphate between 15° and 298° abs. J. C. SOUTHARD and R. T. MILNER (*J. Amer. Chem. Soc.*, 1935, 57, 983—984; cf. A., 1934, 135).—Data are recorded for the α and β forms of $\text{Ca}_3(\text{PO}_4)_2$. E. S. H.

Purification and physical properties of organic compounds. VI. Applications and limitations of the specific heat method as a "non-comparative criterion of purity." E. L. SKAU (*J. Physical Chem.*, 1935, 39, 541—544).—Although it is probable that a given compound is pure if the val. of $(C_p)_{\text{solid}}$ increases almost linearly with rise of temp., and is $>$ that of $(C_p)_{\text{liquid}}$ at the f.p. (cf. A., 1934, 836, 1085), both true and apparent exceptions exist. The former include all the cases of impure samples where the change from the liquid to the solid state takes place completely at const. temp., e.g., a eutectic mixture. The latter are the cases in which the change from the liquid to the solid state takes place over a temp. range which lies completely above the highest temp. for which sp. heat data have been determined. M. S. B.

Heat capacity and v.p. of solid and liquid nitrous oxide. Entropy from its band spectrum. R. W. BLUE and W. F. GIAUQUE (*J. Amer. Chem. Soc.*, 1935, 57, 991—997).—The heat capacity of N_2O has been determined between 14° abs. and the b.p. Data are m.p. 182.26° abs., b.p. 184.59° abs., heat of fusion 1563 g.-cal. per mol., heat of vaporisation at b.p. 3958 g.-cal. per mol., v.p. of solid (148.48 —

182.26° abs.) $\log_{10} P = -(1286/T) + 9.13061 - 0.0014038T$, v.p. of liquid (182.26—185.85° abs.) $\log_{10} P = -(893.56/T) + 6.72158$. The calc. mol. entropy of the gas at the b.p. is 47.36 ± 0.1 e.u., which is 1.14 units < the val. calc. from spectroscopic data. The mol. entropy of N_2O at 298.1° abs. and 1 atm., based on band spectra data, is 52.581 e.u. (without nuclear spin entropy), and the abs. entropy 56.947 e.u. E. S. H.

M.p. of calcium, strontium, and barium. F. HOFFMANN and A. SCHULZE (Physikal. Z., 1935, 36, 453—458).—Ca, Sr, and Ba have m.p. 851°, 771°, and 704° ($\pm 1^\circ$), respectively. A. J. M.

Speed of sublimation and condensation. K. F. HERZFELD (J. Chem. Physics, 1935, 3, 319—323).—For the system crystal-saturated vapour, the equilibrium pressure is changed, in the case of atoms, if the electron wt. in the gaseous state differs from that in the solid state; hence for true metals the speed of sublimation is probably increased, and for non-metals a reflexion coeff. exists. For mols. the equilibrium pressure is higher than for atoms, resulting probably in an increased speed of sublimation. N. M. B.

Dissociation energy of the carbon monoxide molecule and the sublimation heat of carbon. (A) P. GOLDFINGER and W. LASAREFF. (B) B. ROSEN (Nature, 1935, 135, 1077).—(A) The energy of dissociation of CO into normal atoms calc. from thermochemical and spectroscopic data is 11 ± 0.1 v.e. This gives 167 kg.-cal. for the sublimation heat of C.

(B) Schmid and Gero's results (this vol., 555) may provide an independent check of the above val.

L. S. T.

Thermal expansion of mono- and poly-crystalline antimony. P. HIDNERT (J. Res. Nat. Bur. Stand., 1935, 14, 523—544).—The average coeff. of linear expansion of monocryst. Sb at 0—100° is 17.2×10^{-6} along the trigonal axis and 8.0×10^{-6} at right angles to this axis. The linear expansion of polycryst. Sb indicates that there is no polymorphic transition between 20° and 560°, and differences observed for different samples are attributed to variations in the average orientation of the crystals.

J. W. S.

Difference in vapour pressure between ortho and para forms of hydrogen isotopes. K. CLUSIUS (Z. physikal. Chem., 1935, B, 29, 159—161).—The v.p. of *o*- and *p*-D₂ at 20.38° are 262 and 247 mm., whilst those of *p*- and *o*-H₂ at 17.13° abs. are 262.0 and 247.1 mm., respectively. It is concluded that in the one-quantum rotational state there is superimposed on the dispersion effect, which is solely responsible for mol. attraction in the zero-quantum state, the interaction of rigid rotating multipoles. Thus the difference in v. p. between *o*- and *p*-forms is primarily due to the quadrupole moment of the mol.

R. C.

Thermodynamic properties of hydrogen and deuterium. H. C. UREY (Angew. Chem., 1935, 48, 315—320).—Nobel lecture. A review and discussion of data. H. J. E.

Vapour pressure and condensation of radon at low temperatures. L. WERTENSTEIN (Proc.

Roy. Soc., 1935, A, 150, 395—410).—Results of measurements of the v.p. of radon at low temp. indicate that the condensation of Rn under usual conditions is not an equilibrium between gas and solid, but is a secondary effect, due to the presence of condensable impurities such as Hg, H₂O vapour, etc.

L. L. B.

Law of Thomson and Gibbs : vapour pressure of small particles. M. VOLMER (Ann. Physik, 1935, [v], 23, 44—46, 49—50).—The method employed by Kossel in deducing the energetics of surfaces (this vol., 161) is criticised. A. J. M.

[Law of Thomson and Gibbs : vapour pressure of small particles.] W. KOSSEL (Ann. Physik, 1935, [v], 23, 47—48, 50).—A reply to the above.

A. J. M.

(A) "Near" and "far" action in the thermodynamic equation of state. (B) Principle of the "dominant action" in the thermodynamic equation of state. W. JACYNA (Bull. Acad. Polonaise, 1935, A, 4—13, 14—19; cf. A., 1934, 1300).—Theoretical. H. J. E.

ψ_0 -value according to the new equation of state. W. JACYNA (Z. Physik, 1935, 95, 252).—This is calc. to be 273.22°. A. B. D. C.

Properties of real gases according to the thermodynamic equation of state. V. Compressibility of helium below the critical state in the range 4.34—2.59° abs. VI. Critical region of helium. W. JACYNA (Z. Physik, 1935, 95, 246—251, 253—261; cf. A., 1934, 1300).—The crit. coeff. for He is 3.18, and the crit. vol. 0.0151 cu. m. per kg.

A. B. D. C.

Measurement of absolute viscosity coefficient by the pendulum viscosimeter method. B. V. ILJIN and V. N. IVANOV (Kolloid-Z., 1935, 71, 265—267).—Vals. of η for a no. of liquids are in satisfactory agreement with those obtained with the Ostwald viscosimeter. E. S. H.

Temperature coefficient of viscosity of inorganic acid chlorides. G. P. LUTSCHINSKY (Z. anorg. Chem., 1935, 223, 210—212).— η for POCl₃ and SbCl₃ varies with temp. according to Batschinsky's formula, $\eta = C/(v - \omega)$, where v = sp. vol., and C and ω are consts. C and ω/M (M = mol. wt.) increase regularly with the at. wt. of the central atom in the chlorides of Si, P, and S, and decrease with rise of at. wt. within one group of the periodic table.

J. S. A.

Viscosity measurements on alicyclic ketones and alcohols [and their acetates]. W. HÜCKEL and H. W. WUNSCH (J. pr. Chem., 1935, [ii], 142, 225—231).—Data for 24 compounds over a range of temp. are given. D. R. D.

Critical state. V. Viscosity in critical state. E. SCHRÖER and G. BECKER (Z. physikal. Chem., 1935, 173, 178—197).—A falling-sphere viscosimeter is described permitting determination of the relative viscosity of small amounts of gas or liquid at high pressures and temp. with a precision of 0.5—1% (cf. A., 1934, 750). Measurements have been made with Et₂O in the crit. region and above at 184.5—235° under pressures, p , of 25—75 kg. per sq. cm. The

dynamic viscosity (η)- p isotherms resemble d - p isotherms, but intersect when the gas is still liquid, so that even before liquefaction the mechanism of viscosity is predominantly that of liquid viscosity, rather than of gaseous viscosity. The kinematic viscosity (ν)- p isotherms in the gaseous region fall rapidly with rising p , whilst those of liquid Et_2O run parallel to the p axis. η depends on temp. and p , although to a much smaller extent than on d ; the higher is d the larger is the (negative) temp. coeff. Measurements with CO_2 at 20° at pressures up to 101 kg. per sq. cm. give ν - p isotherms for the liquid which, unlike those of Phillips (A., 1912, ii, 832), are parallel to the p axis. R. C.

Influence of an electric field on the viscosity of liquids. S. DOBINSKI (Bull. Acad. Polonaise, 1935, A, 42—52).—The effect of an electric field on η , observed by various authors, is shown by measurements on 13 liquids (e.g., CHCl_3 , PhNO_2 , C_6H_6) to be due to ionic impurities. It disappears with progressive purification, and is observed only in polar solvents. Impurities increase η in aliphatic and decrease η in aromatic solvents. H. J. E.

Inner friction of gases in a magnetic field. H. SACK (Helv. phys. Acta, 1934, 7, 639—641; Chem. Zentr., 1935, i, 675).—Data are recorded for O_2 , N_2 , and their mixtures. H. J. E.

Structure of intermetallic compounds of beryllium with copper, nickel, and iron. L. MISCH (Z. physikal. Chem., 1935, B, 29, 42—58; cf. this vol., 816).—The system Cu-Be shows the compounds CuBe and CuBe_3 , the latter being stable only in presence of excess of Be. CuBe_2 has the cubic face-centred lattice of MgCu_2 , with 24 atoms in the unit cell. The compounds NiBe, cubic body-centred, and $\text{Ni}_5\text{Be}_{21}$, apparently with a deformed γ -brass structure, are reported (cf. B., 1929, 724; A., 1929, 996). R. C.

Crystal structure and crystalline configuration of the normal and modified Si-Al alloys. H. KOTÔ (Mem. Coll. Sci. Kyoto, 1935, A, 18, 17—33).—The modification of Si-Al alloys by the addition of Na and substances of similar properties has been investigated. Examination of the micro-structures of the normal and modified alloys shows that Na, K, and Li are very effective as modifying agents, the next most effective being Mg and Ca. The theory that modification is brought about by volatile elements is disproved by the fact that P, S, Se, Te, and As give no appreciable effect. Bi and Sb, which are immiscible with both Si and Al, produce no modification. Hence the ternary constituents theory which attributes modification to the separation of the agent from the Si-Al alloy on cooling cannot be correct. Thermal analysis of the normal and modified alloys indicates that supercooling is more marked with the former than the latter. X-Ray examination of the alloys shows that the actual cryst. structure does not always agree with that deduced from photomicrographs. Although Na and Li both modify Si-Al alloys, X-ray analysis shows that Na is not miscible with Si and Al, but that Li forms solid solutions and compounds with these elements. A. J. M.

Systematic studies in combination. LXIV. Combining power of platinum and phosphorus. W. BILTZ, F. WEIBKE, and E. MAY [with K. MEISEL] (Z. anorg. Chem., 1935, 223, 129—143).—The phase diagram confirms the existence of PtP_2 . There is also a *subphosphide*, Pt_{20}P_7 . Its existence is confirmed by X-ray examination and it is the compound responsible for the destruction of Pt apparatus by heating in contact with P compounds, since the eutectic mixture of Pt with Pt_{20}P_7 , containing 3.8 at.-% P, melts at 588° . M. S. B.

Crystallisation of binary eutectic systems. E. RAUB (Z. Metallk., 1935, 27, 77—83).—The grain structure of a cast eutectic alloy resembles that of a pure metal, the type and size of the grains being determined chiefly by those of the predominating constituent, other conditions being equal. The structure has little effect on the mechanical properties when there are great differences between the workability of the constituents, but has a determining effect when both constituents have similar mechanical properties, the eutectic in this case behaving like a pure metal and the distribution of the phases having little effect on the properties. In cold-working and recrystallisation on annealing the structure is deformed and re-formed in a similar manner to that of a metal and solid solution alloys, the recrystallisation grains being formed about the predominating constituent in such a way that the annealed sheet shows characteristic anisotropic phenomena which are ascribed to the setting up of an ordered recrystallisation position of that constituent. These phenomena are illustrated by photomicrographs and tables showing the properties of the Ag-Cu eutectic after various thermal and mechanical treatments. A. R. P.

Constitution of magnesium-zinc-silicon alloys rich in magnesium. E. ELCHARDUS and P. LAFITTE (Compt. rend., 1935, 200, 1938—1940; cf. A., 1934, 22).—The unstable compound Mg_4Si (m.p. 932°) forms a labile system (Mg - MgZn_2 - Mg_4Si) which gives a ternary eutectic (m.p. 314° ; Mg 51.85, Zn 47.7, Si 0.45%). In the binary system Mg-Si, Mg_4Si forms a eutectic (m.p. 575° ; 2.7% Si). H. J. E.

Iron-nickel-copper alloys of high initial permeability. O. VON AUWERS and H. NEUMANN (Wiss. Veröff. Siemens-Werken, 1935, 14, 93—108).—Examination has shown a zone of high initial magnetic permeability comprised by the region Ni 80, Fe 20% to Ni 40, Cu 50, Fe 10%. Over the greater part of this region the sign of magnetostriction is reversed. E. S. H.

System cobalt-iron-titanium. W. KÖSTER and W. GELLER (Arch. Eisenhüttenw., 1934—1935, 8, 471—472).—The system up to 22% Ti has been examined by micrographic and pptn.-hardening methods. The two compounds Co_3Ti and Fe_3Ti form a continuous series of solid solutions (I) and the solubility of these compounds in the α - and γ -Fe-Co phases decreases with fall in temp. to a val. corresponding with 2% Ti at room temp. The eutectic equilibrium liquid $\rightleftharpoons \alpha + \text{Fe}_3\text{Ti}$ in the Fe-Ti system and the peritectic reaction liquid $+\alpha=\gamma$ in the Fe-Co system are displaced to lower temp. by the addition

of Co and Ti, respectively, and merge at 1150° into a plane of 4-phase equilibrium: liquid + α -solid solution \rightleftharpoons (I) + γ -solid solution. From this plane as the temp. falls there extends a field of 3-phase equilibrium: liquid \rightleftharpoons γ + (I), which terminates in the Co-Ti eutectic.

A. R. P.

Equilibrium diagram for quaternary alloys. V. FISCHER (Z. Metallk., 1935, 27, 88—89).—A method of representing the equilibria on a plane orthogonal co-ordinate system is illustrated graphically with reference to the Mn-Cu-Fe-Ni system.

A. R. P.

Viscosity of mixtures of hexane and nitrobenzene in the neighbourhood of the critical point of dissolution. (MLLE.) Z. SZAFRAŃSKA (Bull. Acad. Polonaise, 1935, A, 110—119; cf. Drapier, A., 1911, ii, 968).—Anomalies in the viscosity-concn. curves for C_6H_{14} - $PhNO_2$ mixtures are observed only in concn. regions where opalescence is observed. The irregularities observed by Drapier are attributed to turbulent motion.

J. W. S.

Internal friction of fused metals and alloys. VI. Internal friction of Pb, Cd, Zn, Ag, Sn, K, Na; structure viscosity of amalgams. K. GERING and F. SAUERWALD (Z. anorg. Chem., 1935, 223, 204—208).—A pressure viscosimeter for determining η for molten metals is described. The dependence of η on pressure in the case of amalgams at low pressure (Köhler, A., 1933, 895) has been confirmed, and also observed in pure Hg at very low pressures. In the case of amalgams the effect is explained by the existence of small crystals in suspension, whilst the effect in Hg is due to the large rôle played by surface tension and similar phenomena when the pressure is very low.

M. S. B.

Calorimetric analysis of a binary mixture. R. N. M. A. MALOTAUX (Chem. Weekblad, 1932, 32, 348; cf. A., 1933, 465; 1934, 951; B., 1934, 354).

S. C.

Magnetic measurements on molecular compounds in solution with a modified form of Decker's balance. S. S. BHATNAGAR, M. B. NEVGI, and G. TULI (Indian J. Physics, 1935, 9, 311—317).—The stability of mol. compounds in solution has been investigated by determining the diamagnetic susceptibility (χ) of the picrates of anthracene, $C_{10}H_8$, 1- $C_{10}H_7$ -Me, and phenanthrene in the solid state and in solution in C_6H_6 . In the latter case, χ does not vary appreciably with concn., but is < the val. for the solid substances, being nearer that given by the mixture law, thus indicating dissociation in solution.

A. J. M.

Simultaneous formation of double and triple complexes in dipole association. I. SAKURADA (Z. physikal. Chem., 1935, B, 29, 104—111; cf. A., 1934, 475).—Assuming that in dipole association dipole-free double and triple complexes are formed simultaneously and that the mass law is valid, a method of calculating the equilibrium const. of the two kinds of association from dielectric data is described. The formation of such complexes in various binary mixtures is deduced. From the temp. coeff. of the association const. the heat of association

is calc. Hertel and Dumont's criticism (this vol., 430) is discussed.

R. C.

Calculation of molar polarisation of solutes at infinite dilution with Hedestrand's formula. M. M. ORTO (J. Amer. Chem. Soc., 1935, 57, 1147).—The formula is applicable even to certain substances for which the dielectric const. and d are not linear functions of concn.

E. S. H.

Relation between molecular polarisation in solution and the dielectric constant of the solvent. R. J. W. LE FÈVRE (J.C.S., 1935, 773—776).—Vals. of d^{25} and of the dielectric const., ϵ , at 25° for NH_2Ph , $NHPhMe$, $NPhMe_2$, quinoline, isoquinoline, and C_5H_5N are recorded. The expression ${}_0P_1/{}_0P_2 = K(\epsilon_2 + 2)/(\epsilon_1 + 2)$, in which ${}_0P_1$ and ${}_0P_2$ are the orientation polarisations of a solute mol. in two media of dielectric const. ϵ_1 and ϵ_2 respectively, has been applied to: (a) pairs of solutions, (b) solutions and the corresponding solutes in the vapour states, and (c) solutions and the (liquid) solutes in bulk. In case (a), published data for polar and non-polar solvents afford vals. of K between 0.92 and 1.09 (cf. this vol., 240), in case (b), K lies between 1.17 and 1.36, and in case (c), K is generally between 1 and 1.7, but H_2O and $EtOH$ afford vals. between 3.3 and 4.3. The theoretical basis of the expression is discussed and leads to $K=1$.

J. G. A. G.

Conductivity and density in the system fused KCl - $MgCl_2$. S. KARPATSCHEV, A. STROMBERG, and O. POLTORATZKAJA (J. Gen. Chem. Russ., 1935, 5, 189—196).—The relations indicate the compound $2KCl, MgCl_2$.

R. T.

Vapour pressures and activities of completely and incompletely miscible binary and ternary alloys with one and two volatile components. K. JELLINEK and H. A. WANNOW (Z. Elektrochem., 1935, 41, 346—362; cf. this vol., 168).—V.p. for the following liquid alloys have been measured and the activities of the respective volatile components calc.: Sn-Zn, Sn-Cd, Sb-Zn, Pb-Zn, Cd-Zn, Sn-Sb-Zn, Sn-Pb-Zn, Sn-Cd-Zn.

F. L. U.

Distillation of azeotropic mixtures. W. SWIENTOSLAWSKI (J. Chim. phys., 1935, 32, 293—299).—The b.p. of a mixture of two binary homoazeotropes, AC and BC , e.g., C_6H_6 - $EtOH$ and $PhMe$ - $EtOH$, is always < that of the azeotropic agent C , and lies between the b.p. of AC and BC . With insufficient C , the proportion of AC and BC distilling depends on $[C]$ as well as on $[A]$ and $[B]$. The difference between the b.p. of the homoazeotropes is < that between the b.p. of A and B . Small quantities of C_6H_6 and $PhMe$ can be removed from xylene by distilling with the appropriate quantity of $MeOH$. A method has been devised for determining whether four substances forming two ternary azeotropes also form a quaternary azeotrope. A mixture of the ternary azeotropes C_6H_6 - $EtOH$ - H_2O (I), b.p. 64.676° , and $PhMe$ - $EtOH$ - H_2O behaves as a binary mixture of two chemical individuals. The mixture of azeotropes (I) and C_6H_6 - Pr^iOH - H_2O , b.p. 66.141° , does not form a quaternary azeotrope although it shows a positive deviation from Raoult's law. The degree

of dehydration achieved by azeotropic agents depends on the nature of the substances involved.

J. G. A. G.

Polymorphism in FeS-S solid solutions. I. Thermal study. H. S. ROBERTS (J. Amer. Chem. Soc., 1935, 57, 1034—1038).—The solid solutions extending from FeS to approx. $\text{FeS}_{1.14}$ appear in 6 different forms between room temp. and 575°. A reversible transformation occurs between 315° and 318°, and there is evidence that the form *b*, stable just above 318°, is not the form *a*, which is synthesised at 550—575°. In the compound FeS the form *c*, stable just below 315°, is transformed between 144° and 139° into a form *d*, which appears to be the stable form of all the solid solutions at room temp. This transformation temp. falls with increasing S content. From FeS to approx. $\text{FeS}_{1.05}$ the transformation is between *d* and *c*; at the latter point an intermediate form *e* appears, and beyond approx. $\text{FeS}_{1.07}$ the transformation is between *d* and *f*. The transformation temp. $c \rightleftharpoons e$ and $e \rightleftharpoons f$ are raised by increasing S content, reaching the limit of solid solution a few degrees below the $b \rightleftharpoons c$ transformation.

E. S. H.

(A) Position of the region of non-miscibility of binary systems in the surface tension-concentration diagrams. (B) Physico-chemical nature of binary liquid mixtures at the lower critical temperature. R. V. MERTZLIN (J. Gen. Chem. Russ., 1935, 5, 155—160, 161—168).—(A) The anomaly at the upper crit. temp. is ascribed to increase in the activity of capillary-active solutes with falling temp., in conjunction with a low temp. coeff. of solubility.

(B) Systems at the lower crit. temp. are of the irrational type; the principle of corresponding states is applicable to them.

R. T.

Influence of a current of hot water on air and radon dissolved in cold water. M. GESLIN (Compt. rend., 1935, 200, 2204—2206).—Dissolved gases are partly extracted from cold H_2O by the passage of a stream of hot H_2O containing CO_2 .

H. J. E.

Anomalous diffusion in true solution. H. FREUNDLICH and D. KRÜGER (Trans. Faraday Soc., 1935, 31, 906—913).—Concn. gradients may cause diffusion of uniformly distributed substance, owing to mutual change in solubility of the solutes. A thin layer of liquid on the border of the solution may therefore become less dense than the solution above it and lead to convection currents which disturb normal diffusion. It is found that diffusion anomalies disappear when the upper layer is sufficiently lighter than the lower.

J. W. S.

Variation of the permeability of palladium to hydrogen just below 200°. V. LOMBARD and C. EICHNER (Compt. rend., 1935, 200, 1846—1848; cf. A., 1934, 1302).—A rapid increase in permeability is observed at approx. 180°.

H. J. E.

Nitrates of lanthanum, and their solubilities in water. J. N. FRIEND (J.C.S., 1935, 824—826).— $\text{La}(\text{NO}_3)_3 \cdot 6\text{H}_2\text{O}$ exists in two forms, and the transition point is 43° approx. Solubilities have been determined between 0° and the m.p. of the β -form, 65.4°.

J. G. A. G.

Solubility of sodium bromide in acetone. L. E. SWEARINGEN and R. T. FLORENCE (J. Physical Chem., 1935, 39, 701—707).—The solubility of NaBr in COME_2 is markedly increased by the presence of LiClO_4 or $\text{Ca}(\text{ClO}_4)_2$, and is much > that predicted by the interionic attraction theory of Debye and Hückel.

F. L. U.

Titration of *p*-hydroxybenzoic acid. A. OSOL and M. KILPATRICK (J. Amer. Chem. Soc., 1935, 57, 1053).—Revised vals. for the solubility of $p\text{-OH} \cdot \text{C}_6\text{H}_4 \cdot \text{CO}_2\text{H}$ are given (A., 1934, 29), based on an improved method of titration.

E. S. H.

Solubility of gold in ferric sulphate and its geological applications. R. L. MILNER (Proc. Nova Scotian Inst. Sci., 1934, 18, 267—271).—Au is slightly sol. in $\text{Fe}_2(\text{SO}_4)_3$ solution and readily sol. in the presence of H_2SO_4 .

C. W. G.

Solubility of lead in mercury. H. E. THOMPSON, jun. (J. Physical Chem., 1935, 39, 655—664).—The solubility of Pb in Hg has been determined over the range 20—70°. The at. fraction of Pb in the saturated solution at T° abs. is given by $0.5893 - 0.004115T + 0.000007354T^2$.

F. L. U.

Solubility of sodium in aluminium. E. SCHEUER (Z. Metallk., 1935, 27, 83—85).—The solubility of Na in Al (Si 0.1, Fe 0.2%) rises linearly from 0.10 to 0.12% between 700° and 800°, whereas that in silumin rises from 0.08% at 600° to 0.13% at 750°, then decreases to 0.11% at 800°. In the 5% Mg-Al alloy it is 0.17% at 700° and 0.21% at 800°, and in the 8% Cu-Al alloy 0.15% at 700° and 0.18% at 800°. The presence of Fe and Si has no effect on the solubility. In the solid alloys the Na appears as a new phase; no evidence of solid solubility of Na in Al could be obtained.

A. R. P.

Solubility of potassium fluorotantalate in aqueous hydrogen fluoride. A. V. BABAeva and T. A. ARTSCHAKOVA (J. Gen. Chem. Russ., 1935, 5, 220—223).—The solubility of K_2TaF_7 increases with increasing $[\text{HF}]$, to a greater extent at higher than at lower temp.

R. T.

Solubility of sucrose and lime in their concentrated solution at 30°. K. SUZUKI (J. Soc. Chem. Ind. Japan, 1935, 38, 177—178B).—Data are given for the solubility of sucrose + CaO in H_2O , and in presence of Na phosphate.

J. S. A.

(A) Solubility of sodium sulphate in aqueous ammonium carbonate at 32.5°. (B) Mutual system $\text{Na}_2\text{SO}_4\text{--NH}_4\text{HCO}_3\text{--H}_2\text{O}$ at low temperatures. A. P. BELOPOLSKI (J. Appl. Chem. Russ., 1935, 8, 193—194, 195—211).—(A) [with V. V. URUSOV]. The solid phase is Na_2SO_4 at $[(\text{NH}_4)_2\text{CO}_3] < 33.6$ g. per 100 g. of H_2O .

(B) [with S. J. SCHPUNT]. Equilibrium data at -5° and -10° are recorded.

R. T.

Mutual solubility of aluminium, sodium, potassium, and iron nitrates in water in presence of nitric acid. I. A. J. SASLAVSKY, J. L. ETTINGER, and E. A. ESEROVA (Z. anorg. Chem., 1935, 223, 277—287).—Isotherms in the system $\text{Al}(\text{NO}_3)_3\text{--KNO}_3\text{--NaNO}_3\text{--H}_2\text{O}$ and its partial ternary systems have been studied at 0°, 20°, 40°, and 60°.

Solid phases are KNO_3 , NaNO_3 , and $\text{Al}(\text{NO}_3)_3 \cdot 9\text{H}_2\text{O}$, with no formation of double compounds or mixed crystals. J. S. A.

Relation between separate and common solubility of the components of a ternary system. E. I. AKUMOV (J. Gen. Chem. Russ., 1935, 5, 131—142).—Relationships between the solubility of the individual components of a ternary system, separately and together, have been derived. R. T.

(A) **Theory of L_p [solubility product].** (B) **Influence of hydrolysis on solubility.** N. A. TANANAEV (J. Appl. Chem. Russ., 1935, 8, 346—351, 352—355).—(A) For any sparingly sol. salt, $M_m A_n$, $L_i = (L_p/m^n n^n)^{1/(m+n)}$, where L_i is the ionic solubility, and L_p the product of the concns. of the ions.

(B) The concn. of M' in solutions of the sparingly sol. salt MA is given by $[M'] = \sqrt{[L_i/(1-\alpha)]}$, where α is the fraction of salt hydrolysed. R. T.

Influence of salt or acid hydrophilic colloids on the solubility of sparingly soluble acids and bases. II. Gelatin. H. BRINTZINGER and A. SCHALL (Kolloid-Z., 1935, 71, 302—307; cf. A., 1934, 1066).—The influence of gelatin (I) and acid on the solubility of salicylic, benzoic, and anthranilic acids, *o*-, *m*-, and *p*- $\text{NO}_2 \cdot \text{C}_6\text{H}_4 \cdot \text{NH}_2$, and strychnine has been determined. In all cases an increase of solubility is observed; this is traced to the presence of CO_2H and NH_2 in the mol. of (I). The different results obtained with gum arabic are explained by the absence of NH_2 . E. S. H.

Solubility of sparingly soluble substances in colloid solutions. H. BRINTZINGER and A. SCHALL (Kolloid-Z., 1935, 71, 300—302).—A discussion of the factors involved. E. S. H.

Distribution of (A) phenylacetic acid between two contiguous liquid phases, (B) chloroacetic acids between water and halides of saturated hydrocarbons, (C) malonic and ethylenelactic acid between water and saturated monobasic aliphatic alcohols. N. A. DE KOLOSOVSKI (J. Gen. Chem. Russ., 1935, 5, 60—62, 63—68, 69—72).—(A) [with A. BEKTUROV]. Data are given for $\text{CH}_2\text{Ph} \cdot \text{CO}_2\text{H} \cdot \text{H}_2\text{O}$, $-\text{PhMe}$, $-\text{PhNO}_2$, and $-\text{iso-C}_5\text{H}_{11} \cdot \text{OH}$, at 25° .

(B) [with F. S. KULIKOV]. Data are given for $\text{CH}_2\text{Cl} \cdot \text{CO}_2\text{H}$ - and $\text{CHCl}_2 \cdot \text{CO}_2\text{H} \cdot \text{H}_2\text{O} \cdot \text{CCl}_4$, $-\text{EtBr}$, and $-\text{MeI}$, and for $\text{CCl}_3 \cdot \text{CO}_2\text{H} \cdot \text{H}_2\text{O} \cdot \text{MeI}$, at 25° .

(C) [with A. BEKTUROV]. Data are recorded for $\text{CH}_2(\text{CO}_2\text{H})_2 \cdot \text{H}_2\text{O} \cdot \text{Bu}^n\text{OH}$, $-n$ - and $-\text{iso-C}_5\text{H}_{11} \cdot \text{OH}$, and for ethylenelactic acid $-\text{H}_2\text{O} \cdot \text{iso-C}_5\text{H}_{11} \cdot \text{OH}$, at 25° . R. T.

Passage of helium through compact solids. (LORD) RAYLEIGH (Nature, 1935, 135, 993).—He passes through vitreous B_2O_3 but not vitreous borax at room temp. Single crystals of various substances are impervious to He at room temp. The provisional positive result reported for a crystal of beryl (this vol., 159) is withdrawn. L. S. T.

Adsorption. A. GANGULI (Kolloid-Z., 1935, 71, 275—279).—A discussion of published work. E. S. H.

Adsorption of alkali metals on metal surfaces. IV. Adsorption of atoms next to ions. V. In-

fluence of temperature on the normal photo-electric effect. J. H. DE BOER and C. F. VEENEMANS (Physica, 1935, 2, 521—528, 539).—IV (cf. A., 1934, 1066; this vol., 27). The metal is adsorbed as ions only until a certain val. of the covering fraction θ is reached. Above this val. adsorption takes place in the form of atoms. The arrangement of adsorbed atoms is such that photo-electric emission is diminished. At still higher vals. of θ the emission is increased, hence the at. dipoles are reversed in the later stages. The possible position of the atoms in relation to the ions, and the direction and magnitude of the dipoles are discussed. A more exact calculation is made of the val. of θ at which at. adsorption sets in for Cs on W.

V. At low vals. of θ for adsorbed ions photo-electric emission increases exponentially with θ in white light. At higher vals., for adsorbed atoms, emission increases more slowly and reaches a max. Rise of temp. increases the dipole moment of adsorbed ions and diminishes the induced dipole of adsorbed atoms; the emission changes in the corresponding direction in each case. This is demonstrated by the behaviour of Na on W. The effect is reproducible, but in the first heating a surface migration effect is observed. M. S. B.

Adsorption of vapours of ketones and esters by activated charcoal. J. N. PEARCE and A. C. HANSON (J. Physical Chem., 1935, 39, 679—691; cf. A., 1934, 593).—The adsorption of vapours of three ketones and four esters by activated C, measured at several temp. between 0° and 182° , conforms to Langmuir's equation for adsorption at plane surfaces for pressures > 200 mm. For both series of compounds the amount of vapour adsorbed at pressures > 0.8 mm. increases with increase of the b.p. or of the van der Waals const. α . At higher pressures the order is reversed. Dipole moment is without influence. F. L. U.

Essential structural discontinuities in certain adsorbed films. J. K. ROBERTS (Nature, 1935, 135, 1037).—The adsorption of diat. gas mols. on solid surfaces is discussed. The adsorbed films are not continuous: certain single atoms remain bare and may show catalytic activity. Confirmatory experimental evidence of these views in the case of O_2 on W has been obtained. L. S. T.

Alteration of the adsorption of dyes on nickel wires on transition of the wire from the hard to the soft state. G. TAMMANN (Z. anorg. Chem., 1935, 223, 222—224).—A rapid decrease in the adsorptive power of Ni wires for dyes (cf. A., 1934, 956) occurs over the same temp. range (500 — 600°) as the recovery of cold-worked Ni, the magnetic crit. temp., and the first perceptible recrystallisation, with which the effect is correlated. J. S. A.

Surface behaviour of zeolites. V. R. DAMERELL and R. CADLE (J. Physical Chem., 1935, 39, 693—694; cf. A., 1932, 680).—Experiments on the dehydration of scolecite and analcite indicate that H_2O is lost only from the surface portions of the zeolite lattice. F. L. U.

Active oxides. XC. Enhanced sorptive power of nascent zinc chromite. J. HAMPEL (Z. anorg. Chem., 1935, 223, 297—304).—The sorptive power towards Congo-red, acid fuchsin, and eosin of equimol. mixtures of ZnO and Cr₂O₃, heated at different temp., is much > that of either component, and passes through a max. in the neighbourhood of the max. in catalytic properties and magnetic susceptibility. The low sorptive power of cryst. ZnCr₂O₄ increases at high temp., probably due to volatilisation of ZnO from the surface. J. S. A.

Liberation of bromine and iodine from adsorption on active charcoal. V. A. PIANKOV (J. Appl. Chem. Russ., 1935, 8, 238—245).—Active C may adsorb 40% of its wt. of I from EtOH, and 65% from aq. solution. Most of the I is recovered by heating at 300°, but the last traces are obtainable only by burning the C. The desorption curves present certain differences according to whether the I was adsorbed from aq. or EtOH solution. C adsorbs 25% of its wt. of Br from aq. solutions; 50—60% is liberated at 100°, and the remainder at 400°. HBr behaves similarly to Br in the above respects. R. T.

Heat of adsorption of vapours from a current of air by active charcoal at 24°. P. K. MIGAL (J. Gen. Chem. Russ., 1935, 5, 197—210).—The heat (*q*)-time curves, after a short induction period, are rectilinear for MeCl, CHCl₃, CCl₄, MeI, CS₂, and MeOH corresponding with $q = kcv(t - t_0)$, where *c* is the concn. of vapour, *v* its rate of flow, and *t*₀ is the time at the end of the induction period. R. T.

Porosity of charcoal. A. KING (Trans. Faraday Soc., 1935, 31, 935—937).—It is suggested that the porosity of a charcoal depends partly on the extent of inhibition of crystal growth during its prep., and that charcoals (e.g., sugar) which evolve only small amounts of gas after they are solidified are less porous and less active than wood charcoals where transformation occurs in the solid state throughout. Molasses charcoal is much more active than sugar charcoal, in accord with this theory. Activation of charcoal probably consists essentially in the removal by oxidation of hydrocarbons from the surface, yielding free valencies, as well as increasing the surface area of the charcoal. J. W. S.

Sorption of propyl and butyl alcohols by silica gel. A. FOSTER (Proc. Roy. Soc., 1935, A, 150, 77—83).—The isothermals for the adsorption of PrⁿOH, PrⁱOH, and BuⁿOH by SiO₂ gel at 25° are similar to those for MeOH and EtOH (A., 1934, 1169). A small hysteresis area is found just before saturation, the extent of which shows little variation. The relative pressure at which the hysteresis occurs diminishes from MeOH to BuOH, but the capillary radius calc. from these pressures by means of the Kelvin equation remains const. at about 15 Å. L. L. B.

Spectro-photometric study of the adsorption of copper in ammoniacal solutions by precipitated ferric hydroxide. (MME.) L. S. MATHIEU-LÉVY (Compt. rend., 1935, 200, 1934—1936; cf. this vol., 819).—Data are recorded for the variation of the extinction coeff. with [NH₃] and with the Cu adsorbed.

Cu is adsorbed both as [Cu(NH₃)₄]²⁺ and as colloidal Cu(OH)₂. H. J. E.

Change in the capacity for [ionic] exchange of colloidal clay. II. A. L. S. BAR and H. J. C. TENDELOO (Rec. trav. chim., 1935, 54, 566—569; cf. this vol., 32).—The capacity for ionic exchange of 4 colloidal clays agrees with the formula of Verwey, $dy/d \log c = \text{const.}$, where *y* = adsorbed OH' and *c* = [OH']. The precise mechanism of the exchange is uncertain. R. S. B.

Heat of wetting. I. Influence of adsorbed ions. A. DUMANSKI and M. TSCHAPEK (Kolloid-Z., 1935, 71, 279—282).—The influence of adsorbed Fe³⁺, Ca²⁺, Mg²⁺, NH₄⁺, K⁺, Na⁺, and H⁺ on the heat of wetting of activated C, SiO₂ gel, and permutite by H₂O has been determined. Part of the apparent heat of wetting is due to heat of hydration of the ions. The ratio of heat of hydration to heat of wetting is the greater, the more hydrophobic is the adsorbent. The influence of a given cation on heat of wetting varies with the adsorbent. E. S. H.

Determination of surface of powders in the light of heat of wetting; apparatus for determination of heat of wetting of polished metal surfaces by oil. H. HERBST (Kolloid-Z., 1935, 71, 282—290).—Sources of error in the determination of the surface of a powdered metal by means of adsorption measurements are pointed out. Such errors invalidate measurements of heat of wetting of metal powders by oil as a guide to lubricating efficiency. An apparatus for the direct determination of heat of wetting, using a polished metal surface of known area, is described. E. S. H.

Wetting power of metals of low m.p. for metals of high m.p. G. TAMMANN and A. RÜHENBECK (Z. anorg. Chem., 1935, 223, 192—196).—It is shown that, of two metals miscible in the solid state, the more easily fusible one in the molten state will wet the other (solid) metal at temp. above that at which a change of structure takes place in the latter. This is illustrated by the behaviour of Sn, Pb, and Bi towards electrolytic Fe, Ni, W, Mo, Ta, and Cu, and also of Ag towards electrolytic Fe. Wetting by a fused drop is usually preceded by dome formation (cf. A., 1930, 1365). M. S. B.

Surface tensions and partial vapour pressures of aqueous aniline solutions. J. C. SPEAKMAN (J.C.S., 1935, 776—779).—The data refer to 0—0.356*M* solutions at 20°, and correspond with an area per mol. of 23.4 (±0.3) sq. Å. This is consistent with the formation of a unimol. film composed entirely of NH₂Ph mols. at the surface. J. G. A. G.

Surface tension of system sulphuric acid-water. L. SABININA and L. TERPUGOV (Z. physikal. Chem., 1935, 173, 237—241).—Measurements have been made at 10—50°. The temp. coeff. of the surface tension is a min. and the deviation from additivity at all temp. reaches a max. at H₂SO₄.2H₂O. There is no indication of the existence of any other compound. R. C.

Dimensions of the sodium palmitate molecule from a study of surface tensions in dilute aqueous solutions. E. R. WASHBURN and G. W. BERRY

(J. Amer. Chem. Soc., 1935, **57**, 975—977).—The equilibrium surface tension-concn. curve for aq. Na palmitate has been determined by the capillary-rise method. The dimensions of the Na palmitate mol. calc. from the min. of this curve are 23×10^{-8} cm. \times 62×10^{-8} cm. \times 3.7×10^{-8} cm. E. S. H.

Films built by depositing successive uni-molecular layers on a solid surface. K. B. BLODGETT (J. Amer. Chem. Soc., 1935, **57**, 1007—1021).—The building of films of palmitic, stearic, and arachidic acids and their Ca, Mg, Sr, Ba, Pb, and Zn soaps on surfaces of glass, Cr, Ni, brass, steel, cast Fe, Ag, and Pt, by transferring unimol. layers from a H_2O surface, is described. Two different types of layers of Ca stearate were observed, depending on the p_H and temp. of the H_2O from which the films were transferred. Films built in steps of odd-numbered layers showed interference colours when viewed in white light; a single layer could be seen on polished Cr by means of polarised light. The thickness of step-films was measured by the interference of reflected monochromatic light; n was determined from the polarising angle, measured by a new method. The results show the thickness to be slightly $>$ the long spacings of the corresponding fatty acids as determined by the X-ray method. The m.p. of Ba stearate films show that those taken from H_2O of p_H 8.5 probably consist of neutral stearate, whilst those taken from H_2O of p_H 6.9 are acid stearate.

E. S. H.

Theory of flotation. I. W. WARK (Z. physikal. Chem., 1935, **173**, 265—283).—Polemical against Ostwald (A., 1934, 958). R. C.

Dielectric potentials at the solution-air interface. B. KAMIENSKI (Bull. Acad. Polonaise, 1935, A, 129—136).—A dynamical jet method is described, particularly suitable for measuring the dielectric potentials at the solution-air interface of solutions of very active substances. The potential for 0.01M-quinine hydrochloride changes from 0.055 volt at p_H 2.2 to 0.464 volt at p_H 7, the curve showing inflexions at p_H 4.15, 5.6, and 6.8. 0.001M-Quinine hydrochloride has a potential of 0.175 volt at the p_H of blood. J. W. S.

Arrangement for studying the conditions within diffusion layers. T. TEORELL (Science, 1935, **81**, 491).—Experiments with a "multi-membrane" arrangement of Cellophane or collodion sheets show that the relation of the ionic concns. is qualitatively, at least, in accord with the Planck-Plettig predictions. The method has also been applied to diffusion systems associated with chemical reaction. L. S. T.

Metal membranes. N. V. KULTASHEV and F. A. SANTALOV (Z. anorg. Chem., 1935, **223**, 177—184).—Cu membranes have been prepared by heating a Cu-Zn alloy until the Zn has volatilised. Such membranes are permeable to Cl^- , SO_4^{2-} , and $CO(NH_2)_2$, but not to glucose. The permeability is greatly increased by the action of 25% aq. HNO_3 . H_2O can be forced through at a pressure of 1 atm. For cells in which the electrode solutions were separated by a Cu membrane, evidence of the existence of a

membrane potential could be obtained. A Ag membrane, similarly prepared, showed similar properties. Having a larger pore vol. it was permeable to glucose also, but not to methylene-blue.

M. S. B.

Condition of substances dissociated in concentrated sulphuric acid. C. R. DE ROBLES and E. MOLES (Anal. Fis. Quím., 1934, **32**, 474—493).—The cryoscopic const. of H_2SO_4 , m.p. 10.52° , determined by measurements with solutions of $PhNO_2$, picric acid, $CCl_3 \cdot CO_2H$, and trinitrotoluene, is 65.4 . $HClO_4$ yields normal results. When an excess of SO_3 is present I forms a compound I_2SO_3 . HNO_3 yields HSO_4NO , H_2O and O, the observed mol. wt. being 23. With S_2Cl_2 low vals. (105) are obtained, and decomp. occurs. Tetralite (2:4:6-trinitrophenylmethyl nitroamine) forms a salt which yields 3 ions. H. F. G.

Association of water and deuterium oxide in dioxan solution. R. P. BELL and J. H. WOLFENDEN (J.C.S., 1935, 822—824).—The f.p. of 0.1—1.8M- H_2O , $-D_2O$, and $-PhCl$ in dioxan show that H_2O and D_2O depart considerably from the laws of ideal solutions. The vals. of the osmotic coeffs. are consistent with Fuoss' treatment of dipole interaction (A., 1934, 728), and the assumption of a small difference of effective radius due to difference of zero-point energy accounts for the association factor for D_2O being approx. 3% $>$ for H_2O at the same mol. concn. J. G. A. G.

F.-p. depression and constitution. W. HÜCKEL, K. KUMETAT, and H. SEVERIN (Annalen, 1935, **518**, 184—203).—Determination of the cryoscopic const. of cyclohexane (I), C_6H_6 , $C_2H_4Br_2$, and $CHBr_3$ for a variety of solutes shows that it often deviates considerably from the theoretical val. and also frequently varies with concn. Such variation is not observed (with any one solute) in all solvents, and the above anomalies are due mainly to the formation of solid solutions and different partition vals. between the liquid and solid phases. In (I) the *trans*-forms of dicyclic ring systems give higher vals. for cryoscopic const. than do the *cis*-forms, but *trans*-decahydronaphthalene gives an almost normal (const.) val. The implications of these results are discussed, so-called "association" anomalies being due frequently not to dipole association but to solid solution formation. Abnormal vals. of cryoscopic const. may also arise from vol. changes on dissolution. J. W. B.

Molecular arrangement and X-ray diffraction in ionic solutions. Errata. J. A. PRINS (J. Chem. Physics, 1935, **3**, 362; cf. this vol., 443).—A correction. N. M. B.

X-Ray evidence on the ionic arrangement in thorium nitrate solutions. J. A. PRINS and R. FONTEYNE (Physica, 1935, **2**, 570—572).—Measurements have been made of the diffraction halo of aq. $Th(NO_3)_4$ of different concn. The results may be accounted for by assuming that each Th^{4+} is heavily hydrated so as to form a close-packed arrangement, NO_3^- finding a place somewhere between. M. S. B.

Variation with concentration of equivalent refraction of some salts and acids in aqueous solu-

tion. R. LÜHDEMANN (Z. physikal. Chem., 1935, B, 29, 133—149).—The variation of apparent equiv. refraction, R , with concn., c , in g.-equiv. per 1000 g. H_2O has been examined at 25° at concns. from N to saturation at 10° . For HI R falls with rising c more rapidly than for any strong electrolyte hitherto examined. With HCO_2Na R is const. for $c=1-2.5$. For HIO_3 and $LiIO_3$ R is a max. at concns. of ~ 7 and 2.75 , respectively. With HNO_3 the equiv. dispersion in the visible falls rapidly with increasing c .

R. C.

Non-additivity of equivalent refraction of strong electrolytes at large concentrations. K. FAJANS and R. LÜHDEMANN (Z. physikal. Chem., 1935, B, 29, 150—157).—Extrapolation to zero concn. of available data for the rate of change with concn. of the apparent equiv. refraction, R , at concns. above 1.5 g.-equiv. per 1000 g. of H_2O has shown for 29 electrolytes additivity of R at zero concn., thus justifying the extrapolation. Examples are, however, given showing that in general R and its variation with concn. are not additive at higher concns.

R. C.

What is a colloid? J. W. MCBAIN (Nature, 1935, 135, 1033).—Association is regarded as the characteristic factor in the colloidal state. The case of long-chain mols. is discussed. In concns. $> 0.1N$ association is predominant in the simple sulphonic acids and is responsible for an increase in conductivity, f.p. lowering, and e.m.f. with concn.

L. S. T.

Preparation of colloidal metals. A. M. THOMAS and E. B. WEDMORE (Nature, 1935, 135, 1001).—A method for the prep. of colloidal suspensions of liquid metals and alloys in semi-conducting media is described.

L. S. T.

Preparation of colloid solutions by the silent electrical discharge. III. S. MIYAMOTO (Kolloid-Z., 1935, 71, 297—300; cf. A., 1934, 841, 1305).—Sols of Se and Te in H_2O and EtOH, and hydrosols of MnO_2 have been prepared by the action of the silent electric discharge. The stability of the sols and the influence of protective colloids have been studied.

E. S. H.

Validity of Rayleigh's formula for colloid systems. L. V. SMIRNOV (Kolloid-Z., 1935, 71, 261—265).—For white, non-metallic colloid systems the power to which λ is raised in the Rayleigh formula falls from 3.8 to 1.3 as the radius of particle is increased from 60 to 200 $m\mu$.

E. S. H.

Cryolysis, diffusion, and particle size. I. Experiments with sodium oleate, ovalbumin, and polyacrylic acid. F. E. M. LANGE and F. F. NORD (Biochem. Z., 1935, 278, 173—190; cf. A., 1931, 389).—The changes produced by freezing (to -79° or lower) and subsequent thawing in the rates of diffusion of these substances (in biological concns.) indicate that, with high concns., the state of aggregation is increased by freezing, whilst with low concns. it is decreased. A partial explanation is thus provided of the behaviour of colloidal materials (enzymes, soil).

W. McC.

Structure of the gelatinous ortho-ferric hydroxide obtained by oxidising ferrous carbonate. A. KRAUSE and L. SKORUPSKA (Rocz. Chem., 1935,

15, 114—121).—The gel obtained by adding H_2O_2 to an aq. suspension of freshly pptd. $FeCO_3$ is probably $Fe(OH)_2 \cdot O \cdot [FeO \cdot OH]_4 \cdot FeO$.

R. T.

Changes in the refractive index of mixed alumina and silica gels under the influence of water and alkali. J. H. HELLMERS and R. KOHLER (Z. Pflanz. Düng., 1935, 39, 38—44; cf. B., 1934, 1074).—A microscopically uniform mixture of Al_2O_3 (I) and SiO_2 (II) gels is obtained by shaking the two components in $N-NaOH$. The n of the product varies with the composition of the mixture and with the proportion of adsorbed Na. No evidence was obtained of the formation of compounds of (I) and (II) on mixing Na silicate with $AlCl_3$ solution. The n of naturally occurring compounds of similar composition is discussed.

A. G. P.

Combination of iodine with starch. S. V. NEDZVETSKI (Bull. Acad. Sci. U.R.S.S., 1934, 7, 1561—1569).—On adding I in KI to starch solution η remains const. up to a definite % of I and then rises rapidly. The point of change depends on the ratio starch/I and not on the concns. of the components. The stability of starch iodide towards electrolytic coagulants falls rapidly as soon as η increases. After coagulation the I is entirely retained by the starch. It is inferred that combination is at first "chemical," and is followed by adsorption of I.

R. S. B.

Viscosity and plasticity of disperse systems. V. Plastic-viscous properties of peat. M. P. VOLAROVITSCH, N. N. KULAKOV, and A. N. ROMANSKI (Kolloid-Z., 1935, 71, 267—274; cf. this vol., 701).—A capillary viscosimeter for use with systems composed of peat and H_2O is described. Determinations of plasticity const., flow resistance, and η have been made, and their dependence on the H_2O content of the system has been investigated. Bingham's theory of plastic streaming is applicable.

E. S. H.

Ionic exchange in relation to stability of colloidal systems. H. JENNY and R. F. REITEMEIER (J. Physical Chem., 1935, 39, 593—604; cf. A., 1932, 992).—For Putnam clays the ζ -potential is the higher, the smaller are the adsorbed cations, when the latter are of the rare gas type and of equal valency. The extent of the ionic exchange occurring when clays stabilised by different types of ions are brought in contact with various electrolytes, and its relation to the coagulation val. of the latter, are discussed.

F. L. U.

Lyophilic colloids. VII. Fractionation of agar and physico-chemical properties of the fractions. S. M. LIEPATOV and A. A. MOROSOV (Kolloid-Z., 1935, 71, 317—324; cf. this vol., 701).—Agar has been fractionated by progressive dialysis. The ash content, pH , osmotic pressure, swelling, solubility, and heats of swelling and hydration of the fractions have been determined. The fractions differ in degree of association; the more highly associated fractions contain less Ca^{++} . The heat of chemical hydration of agar is $>$ that of gelatin, cellulose, or starch, although the heat of total solvation is less.

E. S. H.

Influence of hydrophilic colloids on structure formation in ferric hydroxide sols. G. FUCHS

(Kolloid-Z., 1935, 71, 307—316).—Viscosity-pressure curves show that albumin causes coagulation structure formation in $\text{Fe}(\text{OH})_3$ sols, which is followed after a time by spontaneous peptisation. The former is due to the fixing of Fe^{+++} by the albumin, thus involving desorption of the stabilising ions. The subsequent peptisation is due to the formation of NH_2 -acids from the albumin. Independent experiments show that α -alanine destroys the $\text{Fe}(\text{OH})_3$ structures. Starch causes similar structure formation in $\text{Fe}(\text{OH})_3$ sols, through the binding of H^+ in the intermicellar liquid.

E. S. H.

Action of electrolytes on hydrophobic colloids. H. R. KRUYT (Proc. K. Akad. Wetensch. Amsterdam, 1935, 38, 464—470).—The distinction between potential- and non-potential-determining ions is discussed and illustrated by data for the flocculation of negatively-charged AgI sol, flocculated by $\text{Al}(\text{NO}_3)_3$ and K_2SO_4 . The antagonistic effect of the K_2SO_4 causes a high concn. of the Al ion, the activity of which, however, decreases along the flocculation curve.

N. M. B.

Thixotropy, influenced by the orientation of anisometric particles in sols and suspensions. H. FREUNDLICH and F. JULIUSBURGER (Trans. Faraday Soc., 1935, 31, 920—921).—Thixotropic sols (e.g., V_2O_5 sol) or suspensions (e.g., $\text{CaSO}_4 \cdot 2\text{H}_2\text{O} + \text{H}_2\text{O}$) containing anisometric particles solidify in a few sec. when the particles are oriented by gentle movement, whereas up to 1 hr. is required for spontaneous solidification. The term "rheopexy" is suggested for the phenomenon.

J. W. S.

Refractive index of hydrosols of pectin substances. T. K. GAPONENKOV (J. Gen. Chem. Russ., 1935, 5, 185—188).

R. T.

Physical chemistry of proteins in non-aqueous and mixed solvents. II. Electrochemical properties of protein solutions in glacial organic acids. D. M. GREENBERG and C. E. LARSON (J. Physical Chem., 1935, 39, 665—677; cf. A., 1930, 1118).—Casein, edestin, gelatin, and deaminised gelatin do not increase the electrical conductivity of anhyd. lactic acid, and the increase of that of AcOH is too small to permit the assumption of salt formation. The large increase observed with HCO_2H is due to formation of protein formates, the conductivities and transport nos. of which have been measured. The solvent action of the three acids is not primarily dependent on their ability to form charged protein ions.

F. L. U.

Isoelectric point of isinglass. H. FREUNDLICH and P. S. GORDON (Trans. Faraday Soc., 1935, 31, 915—919).—The isoelectric point of isinglass (I) in aq. solution, as measured by the cataphoretic velocity of quartz particles coated with (I) in buffer solutions, is p_H 5.9. The sedimentation vol. of quartz particles in buffer solutions containing (I) is a max. at p_H 5.8—6.0, but the abs. vol. is dependent on the presence of air, decreasing to half on evacuation. This decrease is only about 10% in absence of (I). The vol. of the sediment formed in a vac. increases only slightly on shaking with air. Similar results were obtained with gelatin, ovalbumin, and haemoglobin.

J. W. S.

Polysaccharoprotein sols. S. J. VON PRZYLECKI, H. ANDRZEJEWSKI, and E. MYSTKOWSKI (Kolloid-Z., 1935, 71, 325—333).—Measurements of turbidity and η have been made for solutions of several proteins, polysaccharides, and their mixtures. Departures from additivity on mixing several of the pairs are noted. These observations are discussed in relation to the mode of combination of the components.

E. S. H.

Rhythmic reactions in silicic acid gels. F. TABOURY and G. JAUNEAU (Bull. Soc. chim., 1935, [v], 2, 971—982).—The period of gelatinisation of SiO_2 by the addition of HNO_3 or H_2CrO_4 to Na_2SiO_3 increases with the dilution and becomes a min. with increasing [neutral salt]. The rate of penetration of CuSO_4 into gels containing K_2CrO_4 , and the formation of CuCrO_4 rings has been studied in relation to the $[\text{K}_2\text{CrO}_4]$ and [neutral salt]. Rhythmic pptn. of Ag_2CrO_4 , which has been similarly studied, is favoured by an impurity (e.g., NaBr) which produces a ppt. more insol. than Ag_2CrO_4 . The distances of successive rings from the origin are in agreement with the equations previously applied (A., 1932, 225).

R. S.

Electrokinetics. XIV. Critical comparison of electrophoresis, streaming potential, and electro-osmosis. H. B. BULL (J. Physical Chem., 1935, 39, 577—583; cf. A., 1934, 143).—The three methods give the same val. for the ζ -potential of surfaces covered with gelatin or ovalbumin, but not for surfaces of quartz or cellulose. A cell for electrophoresis is described.

F. L. U.

Comparison of electrophoretic, electro-osmotic, and stream potential isoelectric points at glass and gelatin surfaces. B. MONAGHAN, H. L. WHITE, and F. URBAN (J. Physical Chem., 1935, 39, 585—591).—The isoelectric concns. of Th^{+++} , Fe^{+++} , and Al^{+++} for Pyrex glass given by electro-osmosis and electrophoresis are several times > those given by streaming potential measurements. All three methods give the same isoelectric $[\text{H}^+]$ for gelatin. It is inferred that only the diffuse component of the double layer is moved by hydrostatic forces, whilst both the diffuse and the outer Helmholtz layers move in an electric field.

F. L. U.

Influence of electrolyte concentration on the ratio of electro-osmotic to electrophoretic mobilities. H. L. WHITE, B. MONAGHAN, and F. URBAN (J. Physical Chem., 1935, 39, 611—622; cf. preceding abstract).—The ratio (R) of electro-osmotic velocity to the electrophoretic velocity of glass and of gelatin-covered particles of 1—3 μ diam. is > 3 in distilled H_2O , but decreases with increasing $[\text{KCl}]$ to 1 for concns. 10^{-3} — $10^{-2}M$ and higher. The causes are discussed.

F. L. U.

Electrical charges of activated carbons. H. L. OLIN, J. D. LYKINS, and W. F. MUNRO (Ind. Eng. Chem., 1935, 27, 690—693).—Cataphoretic velocities have been measured for Brownian particles of various types of activated C suspended in solutions of p_H 1.5—12.0. At each p_H val. many results are averaged and the resulting curves show two isoelectric points for each sample. There is a remarkable similarity between relative adsorptive capacities and drift

velocities, especially with high p_H vals. For this reason the method offers promise of usefulness in evaluating adsorptive C. C. I.

Derivation of thermodynamical relations for a simple system. A. N. SHAW (Phil. Trans., 1935, A, 234, 299—328).—A new procedure is developed whereby thermodynamic relations for a system which requires only three related variables for its description may be rapidly deduced. Compact tables are given which contain data for a great variety of transformations and illustrations of the use of the tables are provided by transformations connected with the theory of perfect gases, radiation in an enclosure, and saturated vapour. R. S. B.

Parachor and entropy of metallic elements. B. N. SEN (J. Chim. phys., 1935, 32, 300—302; cf. A., 1934, 719).—A formula is deduced whereby vals. for the entropy of metals calc. from the parachors are, in general, in good agreement with accepted vals. J. G. A. G.

Ethane-ethylene-hydrogen equilibrium. H. A. SMITH and W. E. VAUGHAN (J. Chem. Physics, 1935, 3, 341—343).—A statistical calculation of the equilibrium consts. over the temp. range 400—700° gives vals. < experiment by the factor 2. The discrepancy probably lies in the calc. entropy of free rotation in C_2H_4 . N. M. B.

Interpretation of reaction between allylthiocarbimide and piperidine. W. HEROLD (Z. physikal. Chem., 1935, B, 29, 121—126).—The equilibrium const. has been derived from Kremann and Riebl's absorption data (A., 1933, 885) and shows reaction to go almost to completion. The results suggest that the product of reaction is a substituted thiocarbamide. R. C.

Dissociation constants of some polybasic acids. W. R. MAXWELL and J. R. PARTINGTON (Trans. Faraday Soc., 1935, 31, 922—935).—The dissociation consts. of $C_6(CO_2H)_6$, $C_6H(CO_2H)_5$, 1:2:3- $C_6H_3(CO_2H)_3$, *o*- and *m*- $C_6H_4(CO_2H)_2$, and BzOH are in the ratio 500:250:25:15:3:1, indicating the tendency of one CO_2H to promote ionisation of another and the effect of inter-group distance. The tendency of an ionised CO_2H to hinder ionisation of a further CO_2H is shown by the fact that dissociation consts. of the last CO_2H of the above compounds are in the ratio 10:35:120:500:2500:6000. J. W. S.

Hydrolysis of the aluminium benzenesulphonates. V. ČUPR and B. SLIVA (Publ. Fac. Sci. Univ. Masaryk, 1935, No. 200, 3—13; cf. A., 1931, 910).—The p_H of 0.01—0.5*N* solutions of $(PhSO_3)_3Al.9H_2O$, *p*-($OH.C_6H_4.SO_3$) $_2Al.9H_2O$, $Al_2(SO_4)_3$, and $AlCl_3$ during hydrolysis is $-0.54 \log [Al^{+++}] + 2.65$. The following salts have been prepared from $Al_2(SO_4)_3$ and the appropriate Ba salts: *p*-($C_6H_4Me.SO_3$) $_2Al.9H_2O$; *p*-($C_6H_4Cl.SO_3$) $_2Al.9H_2O$; *p*-($C_6H_4Br.SO_3$) $_2Al.9H_2O$; 2:1:4-($NO_2.C_6H_3Me.SO_3$) $_3Al.12H_2O$; 3:6:1-($NO_2.C_6H_3Cl.SO_3$) $_3Al.9H_2O$; *m*-($NO_2.C_6H_4.SO_3$) $_3Al.9H_2O$. F. R. G.

Nature of the ceric sulphates. E. G. JONES and F. G. SOPER (J.C.S., 1935, 802—805).— $Ce(SO_4)_2$ and $Ce(SO_4)_2.4H_2O$ coexist in contact with a solution con-

taining 57—62% of SO_3 . $Ce(SO_4)_2$ forms metastable solutions in H_2O , which, on mixing with conc. H_2SO_4 , give two salts, $H_4Ce(SO_4)_4$ (English red) and $H_2Ce(SO_4)_3$ (orange), which gradually change to $Ce(SO_4)_2$. There is no evidence of migration of Ce to the cathode in solutions 0.5—20*N* with respect to H_2SO_4 and 0.01—0.13*M* with respect to $Ce(SO_4)_2$, either alone or with added K, Na, and Li sulphates. The coloured Ce ions migrate to the anode. In *N*- H_2SO_4 , the Ce is present chiefly as $H_3Ce(OH)(SO_4)_3$, and the colour of the solution decreases rapidly in <0.4*N*- H_2SO_4 . This is probably correlated with hydrolysis of the sulphato-cerate anion and the ultimate pptn. of the basic salt $HCe(OH)_3SO_4$. J. G. A. G.

Cryoscopy of mixtures of nitrogen peroxide and bromine. A. PERRET and R. PERROT (Compt. rend., 1935, 200, 2166—2168).—The f.-p. curve given affords no evidence for the existence of NO_2Br . H. J. E.

Equilibrium in the system $Be(NO_3)_2-HNO_3-H_2O$. A. V. NOVOSSELOVA and N. D. NAGORSKAJA (Bull. Soc. chim., 1935, [v], 2, 967—971).—The solubility of $Be(NO_3)_2$ in aq. HNO_3 at 0° and 20° has been determined. Hydrates with 4, 3, 2, and 1 H_2O have been identified. The last three give metastable forms. R. S.

System water-sodium pentaborate. A. P. ROLLET and P. CHUNG-MING (Bull. Soc. chim., 1935, [v], 2, 982—985).—The solubility of $Na_2O.5B_2O_3$ in H_2O has been determined. There is an ice-salt eutectic at -1.7° and the transition $Na_2O.5B_2O_3.10H_2O \rightarrow Na_2O.5B_2O_3.2H_2O$ occurs at 100° . R. S.

System water-sodium pentaborate-sodium chloride. P. CHUNG-MING (Bull. Soc. chim., 1935, [v], 2, 985—993; cf. preceding abstract).—The saturated solution is in equilibrium with the solid phases $NaCl$, $Na_2O.5B_2O_3.10H_2O$ (I), and $Na_2O.5B_2O_3.2H_2O$ at $55^\circ \pm 3^\circ$, and with $NaCl$, $NaCl.2H_2O$, and (I) at -1.3° . (I) is metastable above 55° . There is a ternary eutectic ice- $NaCl.2H_2O$ -(I) at -22.7° . A saturated solution of $NaCl$ and $Na_2O.5B_2O_3$ deposits only pentaborate on cooling between 100° and -1.3° . R. S.

Vapour pressure and dehydration of unstable salt hydrates. Sodium perborate. T. I. TAYLOR and G. G. TAYLOR (Ind. Eng. Chem., 1935, 27, 672—680).—Commercial Na perborate (I) is represented by $NaBO_3.4H_2O$ or more correctly $NaBO_2.H_2O_2.3H_2O$. The H_2O v.p. of a mixture of (I) with $NaBO_2.H_2O_2$ at temp. up to 50° is given by $\log p = 12.19 - 3286/T$. Rate of dehydration at a given temp. is governed by (1) rate of nucleus formation, (2) rate of linear propagation of interface, (3) size and shape of reactant particles, (4) rate of removal of H_2O vapour. In dehydration at atm. pressure the rate of removal of H_2O is the controlling factor until about 70% of the H_2O is removed. On heating to 90° the available O in (I) increases from 10% to 16%, but at higher temp. diminishes rapidly with O evolution. The solubility rises continually with heating. C. I.

Ammines of thorium bromide. R. C. YOUNG (J. Amer. Chem. Soc., 1935, 57, 997—999).—The

system has been studied by the tensimetric method at 0° and 25°. The equilibrium $\text{ThBr}_4 \cdot 20\text{NH}_3 \rightleftharpoons \text{ThBr}_4 \cdot 14\text{NH}_3 + 6\text{NH}_3$ has been established. The decomp. pressures of the amines have been measured.

E. S. H.

Thermal analysis of binary systems of antipyrine and resorcinol with certain organic compounds.—See this vol., 971.

Thermal equilibrium in ternary systems. IV. Antipyrine-phenacetin-salol. Thermal equilibrium in the system β -naphthol- β -naphthylamine.—See this vol., 970.

Equilibria in the system $\text{NiCl}_2\text{-H}_2\text{O-HCl}$. A. V. BABAIEVA and T. A. ARTSCHAKOVA (J. Gen. Chem. Russ., 1935, 5, 216—219).—The solid phase at 20°, for $[\text{HCl}]$ from 0 to 21.2%, is $\text{NiCl}_2 \cdot 6\text{H}_2\text{O}$, and $\text{NiCl}_2 \cdot 4\text{H}_2\text{O}$ (I) at higher $[\text{HCl}]$; at 80° only (I) is formed.

R. T.

Equilibria in the system $\text{Na}_2\text{O-HF-H}_2\text{O}$. N. D. NAGORSKAJA and A. V. NOVOSELOVA (J. Gen. Chem. Russ., 1935, 5, 182—184).—The solubility of NaF falls rapidly with rising $[\text{NaOH}]$; the relations show little change between 0° and 94°.

R. T.

System $\text{Na}_2\text{SO}_4\text{-Al}_2(\text{SO}_4)_3\text{-H}_2\text{O}$. J. T. DOBINS and J. A. ADDLESTON (J. Physical Chem., 1935, 39, 637—642; cf. A., 1932, 341).—Isotherms for 0°, 30°, and 42° are given. Na alum is formed as a solid phase at 30° and 42°, but not at 0°.

F. L. U.

System $\text{CaO-SiO}_2\text{-H}_2\text{O}$. R. NACKEN and R. MOSEBACH (Z. anorg. Chem., 1935, 223, 161—173).— Ca_2SiO_5 is gradually decomposed by H_2O forming successively, with increasing quantities of H_2O , $2\text{CaO} \cdot \text{SiO}_2 \cdot \text{H}_2\text{O}$, $3\text{CaO} \cdot 2\text{SiO}_2 \cdot 3\text{H}_2\text{O}$, and $\text{CaO} \cdot \text{SiO}_2 \cdot 2\text{H}_2\text{O}$. No appreciable dissolution of SiO_2 is indicated. Marked variation in solubility of CaO with fineness of division was observed. The most probable val. for the solubility at 20° is 1.2100 g. per litre. By grinding in contact with H_2O a supersaturation of 23% may be obtained.

M. S. B.

Felspar system and the weathering of felspar to kaolin. M. HOLLENWEGER and H. RUMPELT (Z. techn. Physik, 1934, 15, 318—323; Chem. Zentr., 1935, i, 539).—M.-p. data are recorded for the system $\text{K}_2\text{O-Al}_2\text{O}_3\text{-SiO}_2$. The free alkali formed on heating felspar samples for 24 hr. at 80° with H_2O is correlated with the equilibrium diagram. Weathering is discussed.

H. J. E.

Ternary systems water, allyl alcohol, and salts at 25°. P. M. GINNINGS and M. DEES (J. Amer. Chem. Soc., 1935, 57, 1038—1040).—Data for systems of H_2O and allyl alcohol (I) with $(\text{NH}_4)_2\text{HPO}_4$, $\text{Na}_2\text{S}_2\text{O}_3$, MgSO_4 , NaNO_3 , K_2CO_3 , NaCl , SrCl_2 , NH_4NO_3 , $(\text{NH}_4)_2\text{SO}_4$, and CdSO_4 , respectively, are recorded. (I) is more difficult to salt out than Pr^oOH or Pr^sOH .

E. S. H.

System aniline-formic acid-water. J. R. POUND and A. M. WILSON (J. Physical Chem., 1935, 39, 709—719).—Equilibria at 15° have been determined. The only solid phase is aniline formate (I). The transformation of the liquid mixtures and of solid crystals of (I) into formanilide has been studied.

F. L. U.

System alkali oxide- $\text{CaO-Al}_2\text{O}_3\text{-SiO}_2\text{-CO}_2$. III. Action of CO_2 and K_2CO_3 on potassium di- and tetra-silicate. C. KRÖGER and E. FINGAS (Z. anorg. Chem., 1935, 223, 257—276).—Equilibria on the SiO_2 -rich side of the $\text{K}_2\text{O-CO}_2\text{-SiO}_2$ system have been investigated between 200° and 900° by measurement of the equilibrium pressure of CO_2 . The phase-rule diagram (cf. A., 1933, 916) is completed by the equilibria in the system $\text{K}_2\text{Si}_4\text{O}_9 + \text{K}_2\text{CO}_3 = \text{CO}_2 + \text{mixed crystals of } \text{K}_2\text{CO}_3 \text{ with } \text{K}_2\text{Si}_2\text{O}_5$. Heats of formation of K_2SiO_3 , $\text{K}_2\text{Si}_2\text{O}_5$, and $\text{K}_2\text{Si}_4\text{O}_9$ are calc. from the tensimetric data.

J. S. A.

Heats of dilution and heats of vaporisation of $\text{D}_2\text{O-H}_2\text{O}$ mixtures. E. DOEHLEMAN and E. LANGE (Z. physikal. Chem., 1935, 173, 295—312; cf. A., 1934, 1071).—There is no heat effect on mixing COMe_2 and $\text{CO}(\text{CD}_3)_2$. The integral heat of dilution on mixing H_2O and D_2O is considerable and increases linearly with the D content of the mixture. The partial mol. heats of dilution of H_2O and D_2O and the partial mol. heats of vaporisation have been calc. All these data agree with the assumption that the cause of the heat of mixing is not van der Waals forces, but $\text{H}_2\text{O} + \text{D}_2\text{O} \rightarrow 2\text{HDO} - 32 \text{ g.-cal.}$ If the heat of this reaction in the gaseous state is -156 g.-cal. the van der Waals part of the partial mol. heat of evaporation of HDO is not the mean of the corresponding vals. for D_2O and H_2O . If it is the mean, the heat of the above reaction must be the same in both gaseous and liquid states. The mol. heats of vaporisation of the solution have been calc.

R. C.

Heat of dissolution of magnesium oxide in nitric acid, and of zinc oxide and silver oxide in hydrofluoric acid as dependent on the concentration of acid. Specific heat of hydrofluoric acid solutions. A. PRANSCHKE and H. E. SCHWIETE (Z. anorg. Chem., 1935, 223, 225—233).—The heats of dissolution of MgO in 2N-, 4N-, 5N-, and 9N- HNO_3 , and of ZnO and Ag_2O in 5N-, 10N-, 18N-, and 23N- HF , at 18° have been measured, and the sp. heat of aq. HF (9.8—40.7%) at 18° has been determined.

J. S. A.

Salt effect in concentrated solutions. Change in the heat of dissolution of potassium chloride by other electrolytes. C. DRUCKER (Arkiv Kemi, Min., Geol., 1935, 11, A. No. 18, 27 pp.).—The effect of HCl , HNO_3 , H_2SO_4 , LiCl , NaCl , KCl , NH_4Cl , KI , MgCl_2 , CaCl_2 , BaCl_2 , CdCl_2 , LiNO_3 , NaNO_3 , KNO_3 , NH_4NO_3 , $\text{Be}(\text{NO}_3)_2$, $\text{Mg}(\text{NO}_3)_2$, $\text{Ca}(\text{NO}_3)_2$, $\text{Ba}(\text{NO}_3)_2$, $\text{Cd}(\text{NO}_3)_2$, $\text{La}(\text{NO}_3)_3$, NaOAc , KOAc , Na_2SO_4 , K_2SO_4 , $(\text{NH}_4)_2\text{SO}_4$, and MgSO_4 on the heat of dissolution of KCl has been investigated. The greatest decrease occurs in presence of NO_3' and SO_4'' , and much less decrease with Cl' and especially OAc' . In general, bivalent cations have a greater effect than univalent cations.

J. W. S.

Thermodynamics of system sulphur dioxide-water. W. A. ROTH (Z. physikal. Chem., 1935, 173, 313—318).—The heat of dissolution of SO_2 in H_2O consists of heat of dissolution without hydration (=heat of condensation), heat of hydration, and heats of first and second dissociation. Since the second dissociation is negligible, if hydration is complete the heat of dissociation should be a linear

function of the degree of first dissociation. From the deviation from linearity observed at higher concns. the hydration const. has been calc., permitting the derivation of a formula for heat of dissolution valid for solutions containing 37.5—7500 mols. of H_2O per mol. of SO_2 with an average error of 0.3%. Component parts of the heat of dissolution derived by the reaction isochore (this vol., 25) are less trustworthy than the calorimetric vals. R. C.

Thermochemistry of ammonium arsenates. A. DE PASSILLÉ (Compt. rend., 1935, 200, 1852—1854).—Data for heats of neutralisation of H_3AsO_4 by aq. NH_3 and for heats of dissolution of the products at 15° are recorded, and vals. for the heats of formation of $\text{NH}_4\text{H}_2\text{AsO}_4$, $(\text{NH}_4)_2\text{HAsO}_4$, $(\text{NH}_4)_3\text{AsO}_4$, and $(\text{NH}_4)_3\text{AsO}_4 \cdot 3\text{H}_2\text{O}$ are calc. H. J. E.

Electrical conductivity of extremely dilute solutions. M. HŁASKO and A. SALIT (Bull. Acad. Polonaise, 1935, A, 189—200).—A method is developed for the measurement to $\pm 2\%$ of the electrical conductivity of solutions of concn. down to $10^{-7}N$, and for the direct determination of the limiting mol. conductivity of strong electrolytes. The Kohlrausch extrapolation formula is applicable to the calculation of the limiting mol. conductivity of both strong and weak electrolytes. Data are given for solutions of KOH , H_2SO_4 , AcOH , and NH_3 . J. W. S.

Conductivity of alkali hydroxides in very dilute aqueous solutions. M. HŁASKO and A. SALITÓWNA (Rocz. Chem., 1935, 15, 153—162).—Direct measurements show that λ_∞ is attained at the following concns.: LiOH $2 \times 10^{-6}N$, NaOH $4 \times 10^{-6}N$, KOH $5 \times 10^{-6}N$, RbOH $8 \times 10^{-6}N$, CsOH $10^{-5}N$; these results differ by 0.2% from those calc. from Kohlrausch's formula. The transport nos. of the ions are K^+ 74.7, Li^+ 40.0, Na^+ 50.9, Rb^+ 77.6, and Cs^+ 78.4. R. T.

A.c. and d.c. surface conductivity measurements in Pyrex slits. F. URBAN, S. FELDMAN, and H. L. WHITE (J. Physical Chem., 1935, 39, 605—609; cf. A., 1932, 699).—The surface conductivities of dil. aq. KCl in slits formed by cracking Pyrex flasks agree with those previously found for capillaries. There is thus no difference in the surface conductivities of fused and fractured glass. The apparent sp. conductivity is lower with d.c. than with a.c.; this is due to membrane potentials. F. L. U.

Electrolysis of solid alloys. W. JOST and R. LINKE (Z. physikal. Chem., 1935, B, 29, 127—132).—When a current is passed through a glowing wire of a Au-Pd alloy Au accumulates at the anode and Pd at the cathode end. The transport no. of Pd at 900° is $\sim 10^{-11}$ (cf. this vol., 158). R. C.

Electrochemical investigation of solid cadmium-antimony alloys. A. ÖLANDER (Z. physikal. Chem., 1935, 173, 284—294).—Electrode potentials of alloys in contact with molten mixtures of NaOAc , KOAc , and Cd(OAc)_2 at 240—290° have been measured. The stable intermediate phase CdSb exhibits a region of homogeneity extending from 50.0 to 50.5 at.-% Cd . The degree of disorder of the

lattice of this compound is calc. to be 0.00005 at 250°, but must rise continuously with the temp. R. C.

Diffusion potentials. II. V. ČUPR (Publ. Fac. Sci. Univ. Masaryk, 1934, No. 197, 1—14; cf. A., 1934, 149).—Theoretical. Planck's equation satisfies the relation formerly deduced when (a) the solutions in contact have the same concn. and cation (anion), or cations (anions) of the same mobility, (b) the solutions contain the same electrolyte in different concns., or (c) the diffusion potential between both solutions is zero. E. S. H.

Current-producing processes in concentration gradients in solid electrolytes. W. SCHOTTKY (Wiss. Veröff. Siemens-Werken, 1935, 14, 1—19).—Theoretical. The conditions under which an e.m.f. is produced by concn. differences in solid solutions, such as Na in NaCl etc., are discussed. E. S. H.

Electrometric studies of the precipitation of hydroxides. XIII. Constitution of aqueous solutions of silver oxide in ammonia, mono-, di-, and tri-methylamine and -ethylamine, pyridine, and ethylenediamine; dissociation constants of amines. H. T. S. BRITTON and W. G. WILLIAMS (J.C.S., 1935, 796—801).—The dissociation consts., K , of the amines determined potentiometrically at 18° are of the same order as recorded vals. K_{b1} and K_{b2} of $(\text{CH}_2\text{NH}_2)_2$ are 1.14×10^{-4} and 1.13×10^{-7} , respectively. The solubilities were determined at 15° in 0.04—3.1*N*-aq. solutions of the bases, and from the e.m.f. of the cell $\text{Ag}|\text{complex solution}|\text{sat. KNO}_3|\text{N-calomel}$, the instability consts. $K_1 = [\text{Ag}^+][\text{B}]/[\text{AgB}_2]$ were calc. These vals. show that the order of the co-ordinating tendencies of amines (except NH_2Ph) with respect to Ag is primary > sec. > tert. Electrometric and conductometric titrations show the presence of bases, $\text{Ag(B)}_2\text{OH}$, similar in strength to NaOH . The strength of these complex bases is independent of the strength of the NH_3 base in the complex cation. J. G. A. G.

Polarographic studies with the dropping mercury cathode. XLVII. Passivation of small mercury anodes. V. MAJER (Coll. Czech. Chem. Comm., 1935, 7, 215—227).—In the polarographic investigation of aq. solutions of KCl and of KBr with small anodes, new passivity phenomena have been observed, which are due to the formation of anodic films of Hg_2Cl_2 and Hg_2Br_2 , respectively. These surface films of thickness $146 \pm 20 \text{ \AA}$. act like a resistance of 10^6 — 10^7 ohms. The theory of the passivation of small Hg anodes is discussed. O. J. W.

Polarographic studies with the dropping mercury electrode. II. Absolute determination of reduction and depolarisation potentials. J. HEYROVSKY and D. ILKOVIC (Coll. Czech. Chem. Comm., 1935, 7, 198—214).—In analytical applications of the polarographic method some uncertainty occurs in fixing the position of the characteristic bend in the current-potential curve. This uncertainty is eliminated and a const. val. of the electrode potential obtained by taking the potential at the point where the current is equal to half the limiting current (diffusion current). This potential is charac-

teristic of the electrolytic process and is independent of the concn. of the solution, sensitivity of galvanometer, rate of dropping of Hg, scale of co-ordinates, and height of diffusion current. O. J. W.

Intensity of the diffusion current in relation to the size and period of renewal of the cathode surface. G. SEMERANO (*Gazzetta*, 1935, 65, 289—298).—The dependence of the intensity of the diffusion current on the size of the dropping Hg cathode and on the rate of dropping has been studied for the deposition of Cd and of Ba. With increasing size of drops or rate of dropping the waves of the diffusion current are increased in height and the deposition potentials of the metallic ions become more positive. The thickness of the diffusion layer around the cathode is calc. to be 36—65 μ . The weight of the Hg drops is probably const. Means for increasing the precision of the polarographic method are described. O. J. W.

Reduction of deoxybenzoin and of benzoin at the dropping Hg cathode. G. SEMERANO (*Gazzetta*, 1935, 65, 273—288).—The reduction potentials of deoxybenzoin and of benzoin dissolved in 0.1*N*. NH_4Cl in 50% EtOH are -1.129 and -1.061 volts, respectively (referred to *N*-calomel cell). From the form of the polarisation curve and the displacement of the reduction potential with concn. of reducible substance and of H^+ , it is concluded that the reduction process is univalent and leads to the corresponding pinacols. A method is proposed for determining the constitution of isomeric benzoin. The solubility of benzoin in H_2O is 1.75×10^{-4} mol. per litre. O. J. W.

Simultaneous discharge of hydrogen ion and metal ions from solutions of complex cyanides. O. ESSIN, A. BALABAJ, and A. MATANZEV (*Z. physikal. Chem.*, 1935, 173, 216—222).—The equation previously derived (this vol., 450) has been confirmed by measurements of the simultaneous discharge of H^+ and Zn^{++} from solutions of $\text{K}_2\text{Zn}(\text{CN})_4$ and published data for the simultaneous discharge of H^+ and metal ions from solutions of other complex cyanides. The results permit calculation of γ coeffs. of Volmer's equation (A., 1930, 1376) for several ions. R. C.

Influence of light on the anodic polarisation of tungsten. J. P. E. DUCLAUX (*Compt. rend.*, 1935, 200, 1838—1840).—Ultra-violet light produces depolarisation of a W electrode, polarised in conc. aq. H_2SO_4 , the increase in current depending on the applied voltage. The max. sensitivity is at 3650 Å. The effect of light falls to approx. 10% of its initial val. after 24—48 hr. H. J. E.

Anodic behaviour of alcohols in alkaline solutions. S. KOLDZUMI (*Mem. Coll. Sci. Kyoto*, 1934, A, 17, 329—379).—Current-potential curves for anodes of Pt, Pd, Au, Rh, Ag, Ni, Cu, Ir, and C in solutions containing H_2O , NaOH, and MeOH or EtOH have been determined and the products of electrolysis analysed. The evolution of H_2 and hydrocarbons has been observed at the anode; the mechanism is discussed on the basis of the electronic theory, assuming adsorption and splitting of org. ions at the anode. Periodic variations of c.d. and p.d., accompanied by

the intermittent formation of a yellow film (possibly an aldehyde resin), were observed under certain conditions. E. S. H.

Kinetics of exothermal reactions. III. Rôle of the walls in chain reactions. N. N. SEMENOV (*Acta Physicochim. U.R.S.S.*, 1934, 1, 525—534).—There is a large class of gas reactions which are at the same time homogeneous and heterogeneous. They are particularly sensitive to the state of the surface, on which not only chain breaking, but also branching, occurs. The oxidation of hydrocarbons, which is a reaction of this class, is discussed. O. J. W.

Theory of termolecular reactions. H. GERSHINOWITZ and H. EYRING (*J. Amer. Chem. Soc.*, 1935, 57, 985—991).—Theoretical. Assuming that the rate of termol. homogeneous gas reactions is determined by the concn. of an activated complex of the three mols. involved, in which the individual mols. cannot rotate, the calc. rates for the reactions of NO with O_2 , Cl_2 , and Br are in good agreement with experiment. The negative temp. dependence of the NO- O_2 reaction follows from the theory. E. S. H.

Attempt to follow the course of a reaction by potentiometric measurements. J. A. REUTER-SKIÖLD (*Svensk Kem. Tidskr.*, 1935, 47, 121—141).—A potentiometric method using glass electrodes for following the cleavage of $(\cdot\text{CH}_2\cdot\text{CO}_2\cdot\text{CH}_2\cdot\text{CO}_2\text{H})_2$ in alkaline solution is described. Correction formulæ are derived. The method is specially applicable in solutions with low $[\text{OH}^-]$. M. S.

Ignition of hydrogen and oxygen by electric sparks in different reaction vessels. M. MIYANISHI (*Sci. Papers Inst. Phys. Chem. Tokyo*, 1935, 27, 52—58).—The lower crit. ignition pressures p_c of $2\text{H}_2 + \text{O}_2$ for different igniting currents in vessels of glass, quartz, and Al are given. p_c was lowest in the glass vessel, in which the pressure decrease was > theoretical. This is accounted for by the interaction of reaction chains with the Na of the glass, which can be detected in the flame spectrum. The no. of such chains $\propto p_c^2$. R. S.

Critical phenomena in the oxidation and self-inflammation of hydrocarbons. A. EGERTON and A. R. UBBELOHDE (*Nature*, 1935, 135, 997—998). L. S. T.

Initial stages of combustion of hydrocarbon fuels. K. I. IVANOV and V. K. SAVINOVA (*J. Appl. Chem. Russ.*, 1935, 8, 64—92).—The products of heating mixtures of air and PhMe, methylcyclohexane (I), and *n*-heptane at 250—650° have been identified and determined. PhMe ignites at 633°, after an initial stage (> 590°) of production of aldehydes (chiefly CH_2O), alcohols, and acids; peroxides are not formed. The ignition temp. falls with increasing relative concn. of PhMe in the mixture. Production of 1- and 2-C oxy-compounds commences at 315°, is at a max. at 350—450°, and falls from 450° to the ignition point (530°), with corresponding increase in CO and CO_2 production. In the case of *n*- C_6H_{16} , the initial stage of oxidation commences at 252°, passes through a max. at 370°, and falls with approach to the flash point (515—580°); per-

oxide (including H_2O_2 and $\text{OH}\cdot\text{CH}_2\text{O}_2\text{R}$) formation varies similarly. The peroxides decompose at 110–115°, with formation of ketones, aldehydes, alcohols, acids, CO, and CO_2 ; the view is expressed that the initial stage consists chiefly in the formation and thermal decomp. of the peroxides. R. T.

Induction period in the oxidation of propane. W. P. MUNRO (J. Amer. Chem. Soc., 1935, 57, 1053–1054).—The effect of composition and total pressure on the lowest temp. of reaction and on the temp. coeff. has been investigated. The mechanism is discussed. E. S. H.

Relative rates of combination of light and heavy hydrogen with ethylene. R. N. PEASE and A. WHEELER (J. Amer. Chem. Soc., 1935, 57, 1144–1145).—The ratio of the rates for H_2 and D_2 , using a Cu catalyst, is 1.59 at 0° and 1.04 at 306°; in the homogeneous reaction the ratio is 2.10 at 524° and 2.0 at 560°. The influence of exchange is being investigated. E. S. H.

Chain process in the reaction between SO_2 and O_3 . I. Oxidation of aqueous SO_2 by ozone. S. S. VASILIEV, M. V. FROLOV, L. I. KASHTANOV, and T. L. KASTORSKAJA (J. Gen. Chem. Russ., 1935, 5, 149–154).—The no. of mols. of SO_2 oxidised per mol. of O_3 rises from 1 to 5 as the $[\text{SO}_2]$ rises from 0.02 to 0.5N. An optimum $[\text{O}_3]$ in the gas exists for each $[\text{SO}_2]$ in the solution; the most efficient oxidation (13 mols. of SO_2 per mol. of O_3) was obtained with 0.067% O_3 and 0.1N- H_2SO_3 . The results point to inductance of the reaction $2\text{SO}_2 + \text{O}_2 \rightarrow 2\text{SO}_3$ by the reaction $3\text{SO}_2 + \text{O}_3 \rightarrow 3\text{SO}_3$. R. T.

Homogeneous unimolecular decomposition of gaseous alkyl nitrites. III. Decomposition of *n*-propyl nitrite. E. W. R. STEACIE and G. T. SHAW (J. Chem. Physics, 1935, 3, 344–347; cf. A., 1934, 847).—The thermal decomp. is homogeneous and of the first order in the temp. range 170–210°. The reaction is $\text{PrONO} = \text{NO} + 0.5\text{EtCHO} + 0.5\text{PrOH}$. The reaction rate is given by $k = 2.75 \times 10^{14} e^{-37,650/RT}$ sec.⁻¹. Comparison shows that $k_{\text{Me, Et, Pr}} = 1 : 1.95 : 4.07$; the increased rate for higher members of the series is probably due to participation of extra vibrational degrees of freedom. N. M. B.

Relation between explosiveness and chemical structure. V. PLETZ (J. Gen. Chem. Russ., 1935, 5, 173–178).—8 groups of explosives are distinguished, containing “explosophores” ($\cdot\text{NO}_2$, $\cdot\text{ONO}_2$, $\cdot\text{N}\cdot\text{N}\cdot$, $\cdot\text{NCl}_2$, $\text{C}\cdot\text{N}\cdot$, etc.) and “auxexplos.” R. T.

Explosion of ethyl azide. H. C. CAMPBELL and O. K. RICE (J. Amer. Chem. Soc., 1935, 57, 1044–1050).—The pressure limit for explosion has been determined as a function of temp. The crit. pressure is raised by decreasing the size of the reaction vessel, and by the addition of He; addition of CO_2 has no effect. The Semenov theory is in satisfactory agreement with the data. The reaction is compared with the explosion of azomethane. E. S. H.

Mechanism of additions to double linkings. I. Thermochemistry and kinetics of a diene synthesis. A. WASSERMANN (J.C.S., 1935, 828–839).—The heats of the 1:4-addition of benzoquinone (I) to cyclopentadiene (II) and of the hypothetical

1:2-addition have been calc. Both reactions are exothermic and there is no thermodynamic reason for the preferential 1:4-addition. The kinetics of the (I)–(II) reaction have been investigated. A second-order association is involved, which is relatively insensitive to catalysts, light, or a magnetic field. The activation energy in EtOH or in C_6H_6 is 13–14 kg.-cal. The dipole-induction energy for different mutual orientations of the two reacting mols. has been calc. For orientations which might lead to 1:4-addition the induction energy is > for those suitable for 1:2-addition. Heats of combustion are recorded. O. J. W.

Benzoin reaction. I. Reaction between pure benzaldehyde and pure potassium cyanide. D. R. NADKARNI, S. M. MEHTA, and T. S. WHEELER (J. Physical Chem., 1935, 39, 727–739).—Pure dry PhCHO and KCN yield benzoin at 100° and, more slowly, at 30°, provided that a certain min. quantity of KCN is used. A rapid homogeneous autocatalytic reaction and a slow heterogeneous reaction occur simultaneously. The results are treated mathematically and the mechanism of the reaction is discussed. F. L. U.

Rate of hydrolysis of chlorine. E. A. SCHILOV and G. V. KUPINSKAJA (Compt. rend. Acad. Sci., U.R.S.S., 1935, 2, 222–224).—Electrical conductivities of Cl_2 solutions show that Cl_2 is hydrolysed rapidly at 0°. W. R. A.

Rate of absorption of carbon dioxide. Effect of concentration and viscosity of normal carbonate solutions. L. B. HITCHCOCK and H. M. CADOT (Ind. Eng. Chem., 1935, 27, 728–732).—The initial rate of absorption of pure CO_2 by stirred solutions of Na_2CO_3 and K_2CO_3 follows an equation of the type $dV/Adt = K(C_i + C_b)^{1/2}$, where C_i , C_b are interfacial and main-body concns. Max. occur at 1.5N for Na_2CO_3 and 2.9N for K_2CO_3 , after which increasing viscosity (η) causes a decrease. Consts. obtained experimentally are about 10% lower for Na_2CO_3 than for K_2CO_3 . Except at very low concns. the rate of absorption is only a fraction of that with NaOH or KOH, but it is much > with pure H_2O . Very discordant statements on these matters in the lit. are due to varying absorption conditions. The rate measured by the authors is not the true initial rate, but the “steady initial rate” attained in > 1 sec. C. I.

Ester hydrolysis in pure water. W. POETHKE (Ber., 1935, 68, [B], 1031–1037).—In pure H_2O the rate of hydrolysis of $\text{HCO}_2\text{Et} \propto [\text{H}^+]$. Addition of HCO_2Na retards the change. Hydrolysis of EtOAc in pure H_2O is not appreciable until after some days, its incidence appearing to depend on unidentified impurities. CO_2 hastens the incidence, but is without further effect. The absence of non-catalysed change is further established by the stability of H_2O in pure EtOAc. H. W.

Influence of temperature on the velocity of ionic reactions. II. A. VON KISS and R. KUKAI (Z. anorg. Chem., 1935, 223, 149–160; cf. A., 1934, 603).—The velocity of the reaction between OH^- and the acetylglucollate ion has been measured at 5–45° without addition of salt and also in aq. NaCl, NaNO_3 ,

NaClO_3 , Na_2SO_4 , KCl , KNO_3 , K_2SO_4 , BaCl_2 , and $\text{Ba}(\text{NO}_3)_2$ of different concn. The Brönsted-Debye-Hückel relation is followed throughout the temp. range in presence of Na^+ for ionic strength 0.0014–0.03, and, under the same conditions, the van 't Hoff temp. coeff. is independent of the ionic strength. The coeff. is lowered by Li^+ and raised by Ca^{++} ; addition of neutral salts in dil. solution depresses it, but when the salts are more conc. their action is sp. It decreases also with rise of temp., and for the Brönsted kinetic activity coeff. is approx. 1. In N-NaNO_3 the relation between $\log k$ and the salt concn. is linear. For const. salt concn. $\log k \propto 1/T$. Without addition of neutral salt the activation energy of the reaction for the whole temp. range is 12,660 g.-cal. in presence of K^+ and Na^+ . Ca^{++} gives a val. 8.6% higher. Addition of neutral salts lowers the activation energy in dil. solution. In conc. solutions the action is sp. In general, activation energy diminishes with rise of temp. The effect of neutral salts on the collision no. is $>$ on the activation energy, but there is no simple connexion between the two.

M. S. B.

Kinetics of keto-enol transformations. I. P. KRIVOBABKO and I. A. SCHTSCHERBAKOV (Ukrain. Chem. J., 1935, 10, 1–3).—The kinetics of the reaction $\text{COPhMe} \rightleftharpoons \text{OH} \cdot \text{CPh} \cdot \text{CH}_2$ are conveniently studied cryoscopically, by measuring the f.p. of the products obtained when a freshly-distilled sample of COPhMe is maintained at 20° and 25° for 0–168 hr. The temp. coeff. is 2.48, and the heat of activation is 31,496 g.-cal.

R. T.

Reaction kinetics of sulphonation by sulphuric acid containing water.—See this vol., 863.

Relative rates of formation of some organo-magnesium and -lithium compounds. H. GILMAN, E. A. ZOELLNER, J. B. DICKEY, and W. M. SELBY (J. Amer. Chem. Soc., 1935, 57, 1061–1063).—Formation of simple Mg alkyl bromides is more rapid than that of the simple aryl compounds. The rate of formation of MgBu^nHal increases in the order $\text{Hal} = \text{Cl} < \text{I} < \text{Br}$, of MgRBr ($\text{R} = n\text{-alkyl}$) as the chain length decreases, and in the order $\text{Bu}^\beta < \text{CH}_2\text{Pr}^\beta < \text{Bu}^\alpha$ and $\beta < \alpha$. C_{10}H_7 < other aryl groups. *o*-, *m*-, and *p*-Tolyl compounds are equally readily formed. The rate of formation of LiR follows in general the reactivity of the RHal , but complications may be caused by a Wurtz reaction with excessively active compounds. Li aryl compounds are formed in lower yields than are the alkyl compounds. In general, Li compounds are more rapidly formed than are Mg compounds, although the final yield may be lower.

R. S. C.

Removal of hydrogen and acid radicals from organic compounds by means of bases. I. Removal of hydrogen chloride from aldchloroimines by sodium hydroxide. Rates of reaction in alcoholic solution. C. R. HAUSER, J. W. LE MAISTRE, and A. E. RAINSFORD (J. Amer. Chem. Soc., 1935, 57, 1056–1059).—The rate of loss of HCl from aldchloroimines is bimol., being \propto the amount of base and also affected by the strength of the base. It bears no relation to the temp. of instantaneous decomp., but is roughly parallel to the k of the corre-

sponding acid, except for *o*-compounds, where steric factors may interfere. Reaction thus probably proceeds by removal of H^+ by the base and subsequent ejection of Cl^- . k is determined for 17 aldchloroimines in 92.5% EtOH , for 4 in dioxan at 0° , and for 5 in 92.5% EtOH at 35° . Heats of activation for the last-mentioned 5 compounds are calc.

R. S. C.

Kinetics of polymorphic transformation of quartz. A. H. SCHTSCHUKAREV, N. S. KASJAN, and V. D. TZIGLER (Ukrain. Chem. J., 1935, 10, 35–43).—The velocity coeffs. of the reaction of transformation of quartz into cristobalite correspond equally well with a uni- and bi-molecular reaction. The reaction is catalysed by a no. of “mineralisers” (CaO , Fe_2O_3 , MnO_2 , NaCl).

R. T.

Corrosion of zinc in water in presence of oxidising agents. I. F. KROCHMAL (Rocz. Chem., 1935, 15, 122–135).—Corrosion of Zn immersed in H_2O saturated with O_2 varies with the cryst. structure of the samples; reproducible results are obtained more readily with coarsely than with finely cryst. samples.

R. T.

Reaction in ethylene-hydrogen mixtures induced by oxygen. R. N. PEASE and A. WHEELER (J. Amer. Chem. Soc., 1935, 57, 1147).—Small amounts of O_2 cause greatly increased initial reaction rates in the homogeneous reaction at 538° .

E. S. H.

Iodine ion catalysis of deuterium peroxide. E. ABEL, O. REDLICH, and W. STRICKS (Monatsh., 1935, 65, 380–385; cf. A., 1934, 1075).—The velocity of decomp., k , of H_2O_2 in 60–90% D_2O solution in presence of I^- was measured interferometrically at 25° and 8.3° . k for $\text{H}_2\text{O}_2 > k$ (HDO_2) $> k$ (D_2O_2), but the energies of activation are identical in spite of the difference of zero point energy. An explanation is advanced.

J. S. A.

Action of arsenic acid and arsenates on hydrogen peroxide. G. R. LEVI and D. GHIRON (Atti R. Accad. Lincei, 1935, [vi], 21, 454–460).— H_3AsO_4 , unlike H_3PO_4 , accelerates the decomp. of aq. H_2O_2 . NaH_2AsO_4 has a similar action to H_3AsO_4 ; decomp. by Na_2HASO_4 is not as great as that caused by Na_2HPO_4 . Decomp. is more rapid with increasing concn. of As compound. The formation of per-arsenates was not observed.

E. W. W.

Oxidation of sulphites. E. SERNAGIOTTO DE CASAVECCHIA (Chim. e l'Ind., 1935, 17, 220–223).—Experiments on the oxidation of sulphites, with and without the presence of catalysts, are described. The oxidation by O_2 follows the mass-action law.

O. J. W.

Catalytic action of silver ions on the velocity of oxidation of acetone by persulphates. E. BEKIER and S. W. KIJOWSKI (Rocz. Chem., 1935, 15, 136–152).—The process consists of the slow reaction $\text{S}_2\text{O}_8^{--} + \text{Ag}^+ \rightarrow 2\text{SO}_4^{\cdot-} + \text{Ag}^{++}$, and of the instantaneous one $\text{COMe}_2 + 4\text{Ag}^{++} + 3\text{H}_2\text{O} \rightarrow \text{OAc}^{\cdot-} + 4\text{Ag}^+ + 9\text{H}^+ + \text{CO}_2$. The reaction is within wide limits $\propto [\text{Ag}^+]$ and $[\text{S}_2\text{O}_8^{--}]$, but not $\propto [\text{COMe}_2]$; the velocity coeff. is expressed by the Brönsted-Debye-Hückel equation.

R. T.

Specificity of iron as a catalyst for the reaction between hydrogen peroxide and pyrogallol. A. WASSERMANN (J.C.S., 1935, 826—828).—The reaction between H_2O_2 and pyrogallol as catalysed by FeCl_3 has been followed spectrophotometrically under various conditions. The FeCl_3 is about 3000 times as effective as a catalyst for this reaction as for the decomp. of H_2O_2 . The main product of the reaction is a brownish dye, the max. colour being developed after 8—10 min. The dependence of the dye formation on $[\text{H}^+]$ and $[\text{H}_2\text{O}_2]$ and on the temp. has been investigated. O. J. W.

Specificity of enzyme catalysis. A. E. BRAUNSTEIN (Acta Physicochim. U.R.S.S., 1934, 1, 535—550).—A general survey. O. J. W.

Adsorption and catalysis. J. E. NYROP (J. Physical Chem., 1935, 39, 643—653; cf. A., 1932, 553).—Theoretical. The influence of ionisation potential on adsorption and catalysis by metals is discussed. F. L. U.

Formation of acetone from acetaldehyde and water.—See this vol., 963.

Rôle of adsorbed atoms in heterogeneous catalysis. S. ROGINSKI (Acta Physicochim. U.R.S.S., 1934, 1, 473—482).—The adsorption of mol. and at. H at various metallic and non-metallic surfaces is discussed. The assumption that in catalytic hydrogenation H_2 is split up into H atoms in the adsorption stage appears to be unnecessary. O. J. W.

Ageing of thin layers of catalysts. D. DOBITSCHIN and A. V. FROST (Acta Physicochim. U.R.S.S., 1934, 1, 503—510).—The gradual decrease in the catalytic activity of thin Pd layers for the hydrogenation of C_2H_4 is accompanied by a sintering process in which the Pd crystals increase in size from $< 40 \text{ \AA}$. to 250—1000 \AA . With increase in size of the crystals there is no appreciable change in the amount of H_2 that can be adsorbed by a given surface, but the rates of adsorption and of desorption of the H_2 are decreased. The sintering process is retarded by H_2 and other gases, but is accelerated by rise in temp. O. J. W.

Variable activity of catalytic surfaces. H. S. TAYLOR (Acta Physicochim. U.R.S.S., 1934, 1, 397—406).—Evidence for the non-uniformity of catalytic surfaces and the theory of activated adsorption are discussed. O. J. W.

Mechanism of adsorption catalysis. S. ROGINSKI (Acta Physicochim. U.R.S.S., 1934, 1, 651—684).—A general discussion of surface reactions (energy exchanges, activation energies, kinetics). O. J. W.

Heterogeneous catalysis. I. Activated adsorption of hydrogen by carbon. R. KLAR (Z. Elektrochem., 1935, 41, 457—458).—A criticism of recent work (cf. this vol., 696). E. S. H.

Activated adsorption of hydrogen on charcoal and its influence on the catalytic activity of charcoal. R. BURSTEIN and P. KASHTANOV (Acta Physicochim. U.R.S.S., 1934, 1, 465—472).—The rate of *ortho-para*- H_2 conversion on charcoal "poisoned" by activated adsorption of H at temp.

of 300°, 500°, and 700° is considerably decreased. The conversion at high temp. does not take place through an intermediate stage of activated adsorption, and the above-mentioned decrease in the rate is not due to a change in the van der Waals adsorption. The H atoms formed in the activated adsorption process are so tightly bound by the charcoal surface that they do not hydrogenate adsorbed C_2H_4 . O. J. W.

Catalysts for destructive hydrogenation. II. Kinetics of the hydrogenation of aromatic hydrocarbons on MoS_2 . L. ALTMANN and M. NEMTZOY (Acta Physicochim. U.R.S.S., 1934, 1, 429—448; cf. A., 1934, 609).—The hydrogenation of PhMe on MoS_2 at high pressures and temp. $> 460^\circ$ is of the first order with respect to H_2 and of zero order with respect to PhMe. For pressures of H_2 of 50—250 atm., $\log K = 6.87 + \log (\bar{P}_{\text{H}_2} \times 273/T) - 5058/T$, where K = quantity of PhMe hydrogenated per min. for 1 kg. of MoS_2 . The apparent activation energy at 400—460° is 23—100 g.-cal. The advantages of non-metallic catalysts for destructive hydrogenation are indicated. The velocity of hydrogenation for different hydrocarbons at 420° increases in the order $\text{C}_3\text{H}_6 < \text{C}_6\text{H}_3\text{Me}_3 < \text{C}_6\text{H}_4\text{Me}_2 < \text{PhMe} < \text{C}_{10}\text{H}_8$. O. J. W.

Mechanism of catalytic hydrogenation. O. SCHMIDT (Ber., 1935, 68, [B], 1098—1107).—In the hydrogenation of C_2H_4 in presence of Rb, Cs, Ca, Sr, or Ba, activation of H occurs through H^- at the surface, whereas in presence of Cr, Mn, Re, Fe, Co, Ni, Cu, Pd, or Pt it takes place through H^+ within the metal, in the metallic solution as a typically electrolytic process for which the energy of solvation of H^+ can be determined. The processes in this metallic solution depend on the heat of solvation of H^+ , the work of recession, and the ease of transition, $\text{R}^{++} \rightleftharpoons \text{R}^+$. The electrolytic dissociation process within the metal has no relationship to the nature of the surface or the presence of edges or points. The conceptions of "outer" and "inner" surfaces are here inapplicable by reason of the wide differences of the external and internal forces. Both H^- and H^+ can pass into H, for which the heat of solvation and, particularly, the differences in the heat of solvation at the outer surface and in the interior, are appreciably smaller. It depends on individual conditions whether hydrogenation occurs at the place where H ions are formed or where H atoms are produced.

In the reduction of PhNO_2 at Ag, Au, Pb, or Cu the primary action is the formation of PhNO^\bullet or PhN^\bullet and metallic oxide which is reduced by H. The mechanism of the change PhNO^\bullet or $\text{PhN}^\bullet \rightarrow \text{NH}_2\text{Ph}$ is unknown. A similar initial stage is probably found in the conversion of CO_2 or CO into CH_4 in presence of Ni or Co. H. W.

Dehydrogenation of succinic acid by charcoal. Model of the mode of reaction of succinodihydrase. B. TAMAMUSHI and H. UMEZAWA (Acta Phytochim., 1935, 8, 221—230).—The transformation of $(\cdot\text{CH}_2\text{-CO}_2\text{H})_2$ (I) into fumaric acid (II) by O_2 or methylene-blue (III) is accelerated by animal charcoal or carboraffin, the ash and Fe in which appear responsible for the change. The reversibility of the change, $(\text{I}) + (\text{III}) \rightleftharpoons (\text{II}) + \text{leucomethylene-blue}$ is

established by the Thunberg-Quastel method, although equilibrium is only slowly attained and its position greatly displaced in the direction of oxidation. Charcoal behaves like an enfeebled succinodehydrase. The restrictive action of KCN, amyl alcohol, and $O:C_6H_4:O$ is similar in the model and biological reactions.

H. W.

Finely-divided metals [as catalysts and adsorbents] and a method for their preparation. E. G. INSLEY (J. Physical Chem., 1935, 33, 623—636).—A method of preparing finely-divided Cu, Co, Ni, and Fe from their amalgams is described. The adsorptive capacity for H_2 , C_2H_4 , and C_2H_6 , and the ability to promote hydrogenation of C_2H_4 shown by specimens prepared from amalgams are comparable with those shown by the same metals prepared by reduction of their oxides by H_2 at a low temp. The adsorption of H_2 by Ni between -80° and 150° has been measured.

F. L. U.

Reactivity of gaseous nickel carbonyl. S. S. URAZOWSKI and N. A. JAKIMKIN (Ukrain. Chem. J., 1935, 10, 44—50).—The reactions $CO + 3H_2 \rightarrow CH_4 + H_2O$ and $2CO \rightarrow CO_2 + C$ are more powerfully catalysed by $Ni(CO)_4$ at its decomp. temp. (150°) than by other Ni catalysts. The reaction $CO + CH_4 \rightarrow MeCHO$ is not catalysed by $Ni(CO)_4$.

R. T.

Rôle of rhodium in increasing the resistance of platinum gauze. I. E. ADADUROV (Ukrain. Chem. J., 1935, 10, 106—117).—Corrosion of Pt used as catalyst in the reaction $NH_3 + O_2 \rightarrow NO + H_2O$ is associated with adsorption of H_2 , followed by its entrance into the space lattice. In general, metals with an edge-centred cubic lattice for which $a > 3.903 \text{ \AA}$. absorb H_2 , whilst those with $a < 4.070 \text{ \AA}$. do not. Abolition of absorption of H_2 without loss of catalytic power can be effected by using alloys of Pt with Rh or Ag, but not with Au.

R. T.

Preparation of platinum oxide catalyst from spent material. E. L. BALDESCHWIELER and L. A. MIKESKA (J. Amer. Chem. Soc., 1935, 57, 977—978).—A satisfactory Pt hydrogenation catalyst can be prepared from spent material by a modification of Wichers' purification method (A., 1921, ii, 648).

E. S. H.

Influence of the solvent on the velocity of decomposition of hydrogen peroxide by means of platinum. II. T. S. GLIKMAN (Bull. Acad. Sci. U.R.S.S., 1934, 7, 1593—1598).—The velocity of decomp., v , of H_2O_2 in $H_2O-COME_2$ by platinised Pt is given by $v = 1/(k_1 + k_2c)$, where k_1 and k_2 are consts. and c = concn. of H_2O , vals. of v being observed under comparable conditions. v is negligible with 10—15% of H_2O and then increases with c . The reaction differs from that in H_2O-Et_2O in the absence of a max. val. of v , and in the smaller influence of changes in c on v . Rotating the Pt plate does not influence v .

R. S. B.

Catalytic action of platinum and manganese dioxide on benzoyl peroxide and perbenzoic acid. F. I. BERESOVSKAJA and O. SEMICHATOVA (Bull. Acad. Sci. U.R.S.S., 1934, 7, 1583—1592).—Platinised and spongy Pt catalyse the decomp. of Bz_2O_2 and Bz_2O_2H in Et_2O , but MnO_2 has no action on Bz_2O_2 and

is less effective than Pt with Bz_2O_2H . It follows that reaction with Bz_2O_2 does not proceed by way of Bz_2O_2H produced from Bz_2O_2 by hydrolysis, since no reaction occurs with MnO_2 and Bz_2O_2 even in presence of a little H_2O . The inability of MnO_2 to decompose Bz_2O_2 is discussed.

R. S. B.

Velocity of oxidation of ammonia at a platinum gauze. V. I. ATROSCHTSCHENKO (J. Appl. Chem. Russ., 1935, 8, 25—34).—Formulae connecting the time of contact with the Pt surface, temp., pressure, concn. of NH_3 , etc. are derived.

R. T.

Surface reactions at very low pressures. I. Platinum-chlorine. B. Reactions at the surface of the finely-divided metal. C. NOGAREDA (Anal. Fis. Quím., 1934, 32, 396—431).—Sublimed Pt at 0° adsorbs a unimol. layer of Cl_2 , which is stable up to 150° . When the film, at 0° , is brought in contact with Cl_2 activated by contact with Pt at temp. $> 200^\circ$, reaction occurs with formation of $PtCl_4$, in accordance with the equation $-dp/dt = ap(p_0 - p)^n$, where p_0 is the initial pressure (0.02 mm.), and n varies between 0 and 1 according to the area of the film and its degree of saturation. The activation energy is 14—15 kg.-cal. The reaction does not progress beyond the surface layer. If the $PtCl_4$ film is reduced at 400° , the product requires an activation energy of about 18 kg.-cal., and the adsorptive power is about one half that of the sublimed Pt.

H. F. G.

Surface reactions at very low pressures. II. Platinum-bromine. C. NOGAREDA (Anal. Fis. Quím., 1934, 32, 567—589).— Br_2 mols. are dissociated by a Pt wire at $950-1250^\circ$, the energy of activation being 43,000 g.-cal. per mol. of dissociated Br. The results are in accord with a limiting adsorption mechanism. Above 1200° Br atoms attack the Pt yielding $PtBr_2$ and $PtBr_4$, which condense on the walls of the vessel. A sublimed layer of Pt adsorbs a limiting unimol. Br_2 film at 0° , stable to 150° , but a wall coated with Pt and maintained at 0° is attacked superficially by Br_2 mols. when a wire in the reaction vessel is heated to 250° and yields a surface film of $PtBr_4$ which protects against further attack. The energy of activation of the reaction with sublimed Pt at $250-500^\circ$ is 14,000—16,000 g.-cal. Reduced Pt possesses about half the adsorptive power and reactivity of the same surface of a sublimed layer. The behaviour with such layers is attributed to a sintering of the sublimed Pt.

J. W. S.

Contact sulphuric acid manufacture. IV. Platinum catalyst on magnesium sulphate.—See B., 1935, 589.

Mechanism of the catalytic oxidation of CO on MnO_2 . J. ZELDOVITSCH (Acta Physicochim. U.R.S.S., 1934, 1, 449—464).—The adsorption of CO, of O_2 , and of CO_2 on finely-divided MnO_2 has been studied. All three gases show an instantaneous mol. adsorption, which for CO and O_2 is appreciable only below 0° . The heats of adsorption for this stage are 2600, 2300, and 5500 g.-cal. per mol. for CO, O_2 , and CO_2 , respectively. With CO there is a further slow activated or chemical adsorption, and for this stage the heat of adsorption agrees with the heat of

the reaction: $\text{MnO}_2 + \text{CO} = \text{MnO} + \text{CO}_2 + 41,000 \text{ g.-cal.}$ The heat of activation for the adsorption of CO on MnO_2 is 8000 g.-cal. The mechanism of the oxidation reaction is discussed. O. J. W.

Catalytic oxidation of carbon monoxide on manganese dioxide. S. ROGINSKI and J. ZELDOVITSCH (*Acta Physicochim. U.R.S.S.*, 1934, 1, 554—594; cf. preceding abstract).—More detailed data are given regarding the mol. adsorption of O_2 , CO, and CO_2 on MnO_2 , and of the activated adsorption of O_2 and CO. O. J. W.

Mechanism of catalytic oxidation of carbon monoxide. II. S. ROGINSKI and J. ZELDOVITSCH (*Acta Physicochim. U.R.S.S.*, 1934, 1, 595—610; cf. preceding abstracts).—The kinetics of the activated adsorption of CO on MnO_2 are described in more detail. The CO may be oxidised either by MnO_2 or by gaseous O_2 and both mechanisms are discussed. O. J. W.

Action of chlorine on [a mixture of coal and] titanium dioxide. A. V. PAMFILOV, A. S. CHUDJAKOV, and E. G. STANDEL (*J. pr. Chem.*, 1935, [ii], 142, 232—236).—The action proceeds most rapidly at 400—420°, using MnO_2 as catalyst. Approx. 80% of the Cl_2 is converted into TiCl_4 and 15% into COCl_2 . D. R. D.

Catalysts for oxidation of ammonia to oxides of nitrogen.—See B., 1935, 590.

Alumina as catalyst of hydrocyanic acid formation [from carbon monoxide and ammonia].—See B., 1935, 589.

Zinc oxide-chromium oxide catalysts for methyl alcohol synthesis.—See B., 1935, 583.

Catalytic oxidation of ethyl alcohol.—See B., 1935, 584.

Influence of crystalline addenda on the decomposition temperature of carbonates. B. SREBROW (*Kolloid-Z.*, 1935, 71, 293—297).—The decomp. temp. of MnCO_3 , NiCO_3 , CoCO_3 , ZnCO_3 , CdCO_3 , and PbCO_3 are lowered by addition of the oxides of Mn, Fe, Co, Ni, Mg, etc. The observations are similar to those of Balarev and Lukova (*A.*, 1930, 1110) for the decomp. of CaCO_3 . E. S. H.

Comparison of the polymerising and adsorptive powers of silicates. J. M. SLOBODIN (*J. Appl. Chem. Russ.*, 1935, 8, 35—43).— SiO_2 gel and silicates (floridin, kaolin, and various clays) activated at < 200° or at > 600° do not catalyse polymerisation of isobutylene. The adsorptive properties of the silicates are unaffected by temp. > 650°. R. T.

Electrolytic reduction of oxygen to hydrogen peroxide. E. MÜLLER and K. MEHLHORN (*Z. anorg. Chem.*, 1935, 223, 199—203).—An apparatus for the electrolytic reduction of O_2 to H_2O_2 is described. A 3% solution of H_2O_2 was obtained with a 50% efficiency. M. S. B.

Anodic behaviour of tin in electrolysis in sodium stannate solution. G. HANSEL [with A. GREVEL] (*Z. Elektrochem.*, 1935, 41, 314—321).—Measurements of the anode potential of Sn during electrolysis of Na stannate solutions are recorded.

The c.d., temp., [Na stannate], and [NaOH] were varied. A compact and satisfactory cathode deposit is obtained when a film of SnO_2 is preformed on the anode, and when the latter dissolves directly as Sn^{+++} . Procedure for realising these conditions is described. F. L. U.

Electrolysis of aqueous solutions of ammonium chloride. F. JIRSA (*Z. Elektrochem.*, 1935, 41, 321—330).—Over a wide range of concn. and of c.d. the end-product in the anolyte is NHCl_2 , formed by the action of Cl_2 on the NH_2Cl produced at first. The order of increasing efficiency of the anode material is graphite < Fe_3O_4 < Pt. Solutions containing NH_3 give a lower yield. Very little NHCl_2 is formed unless a diaphragm is used. NCl_3 is produced only in conc. solutions at 35—40° and at low c.d., when the liquid is unstirred. F. L. U.

Titanium alum. J. MEYER and H. MEISSNER (*J. pr. Chem.*, 1935, [ii], 143, 70—81).—The prep. and electrolytic reduction of $\text{Ti}(\text{SO}_4)_2$ are described. A Hg or Pb cathode gives the best result. Pt catalyses the change $\text{Ti}^{+++} \rightarrow \text{Ti}^{++++}$. The influence of different $[\text{H}_2\text{SO}_4]$ on the stability of $\text{Ti}_2(\text{SO}_4)_3$ has been studied. Autoxidation occurs when $[\text{H}_2\text{SO}_4]$ is small. $\text{CsTi}(\text{SO}_4)_2 \cdot 12\text{H}_2\text{O}$ has been prepared by addition of aq. $\text{Ti}_2(\text{SO}_4)_3 + \text{H}_2\text{SO}_4$ to aq. Cs_2SO_4 in an atm. of CO_2 . Pure $\text{RbTi}(\text{SO}_4)_2 \cdot 12\text{H}_2\text{O}$ could not be obtained, and attempts to prepare K Ti, NH_4 Ti, and Tl Ti alums (I) failed. It is suggested that in stable alums the ratio M'/M^{+++} lies between 2 and 3, whereas in (I) M'/M^{+++} is < 2. R. S.

Anode effect in the electrolysis of melts. II. H. VON WARTENBURG and G. WEHNER (*Z. Elektrochem.*, 1935, 41, 448—450; cf. A., 1926, 912; 1928, 371).—The anode effect previously described is not electrical in origin, but is due to alteration of the interfacial tension at the electrode-melt boundary by the presence of oxide. E. S. H.

Preparation of cerium by electrolysis of its fused salts. S. I. SKLJARENKO and J. P. VIRSKI (*J. Appl. Chem. Russ.*, 1935, 8, 44—48).—Ce is obtained by a modification of Billy and Trombe's method (A., 1933, 1253). R. T.

Electrochemical preparation of aluminium oxide from aqueous aluminium sulphate. V. PLOTNIKOV, D. ZOSIMOVITSCH, O. KUDRA, and I. PODORVAN (*Mem. Inst. Chem. All-Ukrain. Acad. Sci.*, 1935, 1, 251—267).— $\text{Al}(\text{OH})_3$ containing 2% of SO_3 is obtained in 108% yield (on current) by electrolysis 10% aq. $\text{Al}_2(\text{SO}_4)_3 \cdot 18\text{H}_2\text{O}$ containing 1% of $(\text{NH}_4)_2\text{SO}_4$ (150 min.; 30°; 0.5 amp., 5.5 volts), when the vol. of anolyte is 6 times that of the cathode. The final $[\text{H}_2\text{SO}_4]$ of the anolyte is raised to 23% by interposing two diaphragms between the electrodes. R. T.

Electrochemical study of the system $\text{AlBr}_3\text{--KBr}$ in ethyl bromide. V. A. PLOTNIKOV and S. I. JAKUBSON (*J. Gen. Chem. Russ.*, 1935, 5, 224—226).—Cryst. Al is deposited at the cathode, and Br is liberated at the anode; the decomp. potential is 2.02 volts. R. T.

Effect of chemical reactions on the cathode and anode in an arc discharge. A. VON ENGEL (*Naturwiss.*, 1935, 23, 305—306).—The calculation

of the temp. of a metal anode in an arc discharge is outlined. The effect of chemical reaction between the anode and the gas in which the arc is struck on the heat-resistance of the anode is discussed.

A. J. M.

Heterogeneous chemical reactions in the silent electric discharge. XIII. Reactions between hydrogen and solid inorganic compounds. S. MIYAMOTO (Bull. Chem. Soc. Japan, 1935, 10, 199—204).— H_2SeO_3 yields Se; H_2SeO_4 yields H_2SeO_3 and Se; $\text{Na}_2\text{SeO}_4 \cdot 10\text{H}_2\text{O}$ yields Na_2SeO_3 and Se; H_2TeO_3 yields Te; Na_2TeO_3 yields Te and NaOH; $\text{H}_2\text{TeO}_4 \cdot 2\text{H}_2\text{O}$ yields Te and H_2TeO_3 ; $\text{K}_2\text{S}_2\text{O}_3$ yields K_2SO_3 , H_2S , and S; Ag_2CO_3 yields Ag and CO_2 ; $\text{LiClO}_3 \cdot 0.5\text{H}_2\text{O}$ yields LiCl; and NaBrO_2 yields NaBr.

J. W. S.

Catalytic influence of mercury vapour on the cracking of methane by the glow discharge. N. I. KOBOZEV, S. S. VASILIEV, and E. E. GALBRAICH (Compt. rend. Acad. Sci. U.S.S.R., 1935, 2, 235—243).—With electrodes of Al, Cu, Zn, Pb, or Fe about 1.5% of CH_4 is transformed by the glow discharge into ethylenic and acetylenic compounds. Under the same conditions but with Hg electrodes the conversion is 5.2%, increased to 14% by use of intermediate Hg electrodes or by warming the latter. Dissolution of Na in the Hg annihilates the change. The effect is ascribed to activation of the Hg vapour from which the energy is transferred to the CH_4 mols.

H. W.

Photochemical effect of nitrogen dioxide on the combination of hydrogen and oxygen. M. MIYANISHI (Sci. Papers Inst. Phys. Chem. Res. Tokyo, 1935, 27, 47—51).— H_2O is produced when the mixture $2\text{H}_2 + \text{O}_2 + \text{NO}_2$ is illuminated with monochromatic light in the region 2000—4000 Å. R. S.

Decomposition of hydrogen peroxide by the irradiation of its aqueous solution with X-rays. H. FRICKE (J. Chem. Physics, 1935, 3, 364—365).—The reaction is $2\text{H}_2\text{O}_2 = 2\text{H}_2\text{O} + \text{O}_2$; no detectable H_2 is formed. For the concn. range 0.0001—0.1 mols. per litre and X-ray intensities 3—15r per sec., the no. of mols. decomposed per unit dosage $\propto \sqrt{(\text{concn.}/\text{X-ray intensity})}$. The temp. coeff. rises with temp. Data are compared with results for the decomp. of H_2O_2 by light, and indicate that the primary process is the activation of H_2O mols. followed by the transfer of energy to the H_2O_2 .

N. M. B.

Photosynthesis of hydrogen chloride. J. C. POTTS and G. K. ROLLEFSON (J. Amer. Chem. Soc., 1935, 57, 1027—1032).—Experiments over the range 140—300° abs. show that at room temp. the rate law of Bodenstein and Unger (A., 1931, 319) is valid, save for a small correction for an inhibiting action by the HCl formed. At temp. below 172° abs. the rate depends on the $\sqrt{(\text{light absorbed})}$. The temp. coeff. of the reaction has been determined at room temp. and at lower temp.

E. S. H.

Photochemical reactions of adsorbed iodine molecules. A. TERENIN (Acta Physicochim. U.R.S.S., 1934, 1, 407—428).—The discoloration by the action of light of a layer of I_2 adsorbed on TlI is attributed to the photodissociation of the adsorbed

I_2 mols. The liberated I atoms are then bound by Tl^+ ions. The max. discoloration is produced by light of about 5600 Å. The presence of adsorbed H_2 or O_2 mols. on the surface causes marked shifts of the active wave-lengths, but N_2 has no effect. This is ascribed to photochemical reactions between adsorbed I_2 and H_2 or O_2 , with the formation of HI and of I oxide, respectively. The absorption spectrum and potential energy diagram of I_2 in the adsorbed state are discussed.

O. J. W.

Oxidation of the nitrite to the nitrate ion by the irradiation of its aqueous solutions with X-rays. H. FRICKE and E. J. HART (J. Chem. Physics, 1935, 3, 365).—The amount of NO_2^- oxidised is independent of the concn. and of the p_{H} . The transformation is due to H_2O mols. activated by X-rays, according to $\text{NO}_2^- + (\text{H}_2\text{O})_{\text{act.}} = \text{NO}_3^- + \text{H}_2$.

N. M. B.

Mercury-photosensitised polymerisation of acetylene and acetylene- d_2 . J. C. JUNGERS and H. S. TAYLOR (J. Chem. Physics, 1935, 3, 338—340).—The rate of reaction is 30% greater with C_2H_2 than with C_2D_2 for the pressure range 0.1—4 cm. At low pressures the rate \propto pressure, but in the range 0.7—4 cm. is independent of the pressure and is determined by the intensity of the absorbed resonance radiation. The quantum yield is approx. 6.5 for C_2H_2 and 5 for C_2D_2 < the yield for C_2H_2 at the same temp. in the photochemical reaction.

N. M. B.

Discoloration of silver iodide by aqueous ammonia. W. LANGE (Z. anorg. Chem., 1935, 223, 174—176).—By treatment with 5.34—30.7% aq. NH_3 , AgI forms a white compound $\text{AgI} \cdot 0.5\text{NH}_3$. It turns deep violet on exposure to light, evolves NH_3 on keeping, and has the same composition as the ammine obtained by the action of gaseous NH_3 on AgI.

M. S. B.

Action of aqueous solutions on photographic latent images of varying ages. C. JAUSSEAN (Compt. rend., 1935, 200, 2076—2078).—Data are recorded for changes in density of the image with varying times between exposure and development. Immersion in H_2O , aq. Na_2CO_3 , aq. Na_2SO_3 , or a desensitising solution between exposure and development arrests development of the latent image if the time is not too long.

H. J. E.

Density surface of [a solid diagram representing] the Villard effect. III. H. ARENS (Z. wiss. Phot., 1935, 34, 125—135; cf. A., 1934, 374).—The density surfaces have been determined, and are illustrated, for a fine-grain and a large-grain unsensitised normal emulsion. The results produced by pre-exposure to X-rays, followed by various white light exposures, are compared with the theoretical "additive" results. At low intensities of the white light the actual densities, with the fine-grain emulsion, are > the additive figure, whereas at high intensities they are lower; the positions of the solarisations are also abnormal.

J. L.

Polymerisation of deuterio-acetylene by alpha-rays. S. C. LIND, J. C. JUNGERS, and C. H. SCHIFFLETT (J. Amer. Chem. Soc., 1935, 57, 1032—1034).—The no. of mols. polymerised per ion pair is the same for C_2H_2 and C_2D_2 .

E. S. H.

Chemical action produced by alpha-particles : combination of deuterium and oxygen. S. C. LIND and C. H. SCHIFFLETT (J. Amer. Chem. Soc., 1935, 57, 1051—1052).—The rate of combination of O_2 with D_2 is 25—30% < with H_2 . E. S. H.

Increase of chemical reactivity during phase changes in solid substances. J. A. HEDVALL (Z. Elektrochem., 1935, 41, 445—448).—Mainly a discussion of published work (cf. this vol., 589). E. S. H.

Recombination of hydrogen atoms in presence of hydrogen chloride. W. H. RODEBUSH and M. L. SPEALMAN (J. Amer. Chem. Soc., 1935, 57, 1040—1043).—The recombination appears to be due to the reaction $H + HCl = H_2 + Cl$ (i) followed by the rapid reaction $H + Cl = HCl$ (ii). (i) probably takes place in the gas phase and on the walls, whilst (ii) occurs on the walls only. E. S. H.

Concentration of the heavier isotope in carbohydrates. T. TITANI and M. HARADA (Bull. Chem. Soc. Japan, 1935, 10, 205; cf. this vol., 458).— H_2O obtained by combustion of cane- and of beet-sugar is respectively 7.4 and 6.5 p.p.m. heavier than normal H_2O . H_2O from the combustion of substances consisting principally of glucose, lactose, starch, dextrin, galactose, mannose, or cellulose averages 6 p.p.m. heavier than normal H_2O . J. W. S.

Stability of hydrogen peroxide solution.—See B., 1935, 628.

Action of water on anhydrous sodium metaphosphates. A. BOULLÉ (Compt. rend., 1935, 200, 1403—1405; cf. this vol., 571, 591).—Action of H_2O on metaphosphate A' yields a solution of trimetaphosphate A (I) and a residue of an insol. product (metaphosphate B_1) which has X-ray structure identical with that of metaphosphate B (II), but passes slowly into colloidal solution, whereas (II) slowly yields a solution of (I). Evaporation of aq. (I), after boiling under reflux for several days, yields NaH_2PO_4 . A solution of metaphosphate C redeposits the same amorphous form. J. W. S.

Purification and preservation of sodium and potassium in the silvery state. I. I. PRUNDEANU (Bul. Chim. Soc. Române, 1934, 37, 141—142).—The metal is melted under pure light petroleum, stirred to remove surface crusts and produce bright globules, cooled, and transferred to melted paraffin wax for preservation. A. R. P.

Silver-mercuric complex. J. BOUGAULT and E. CATTELAÏN (Bull. Soc. chim., 1935, [v], 2, 996—1000).—The prep., properties, and analysis of $Hg(CN)_2 \cdot AgNO_3 \cdot 2H_2O$ are described. It loses $2H_2O$ above 100° . CN' was determined by oxidation to CNO' with $KMnO_4$ and the N liberated as NH_3 by H_2SO_4 , whilst the NO_3' was obtained as NH_3 by reduction with Devarda's alloy. R. S.

Active oxides. LXXXV. Intermediate steps in the transformation of a mixture of magnesium oxide and chromic oxide into magnesium chromite. T. MEYER and G. F. HÜTTIG [with O. HNEVKOVSKY and H. KITTEL] (Z. Elektrochem., 1935, 41, 429—435; cf. this vol., 440).—Measurements

of d , the catalytic influence on the decomp. of N_2O , and magnetic susceptibility, and X-ray examination confirm the existence of active, intermediate states. E. S. H.

Formation of hydrogen carbonates in the system $CaCO_3-H_2O-CO_2-K_2SO_4$. A. P. BUNTIN and M. M. BIKOV (J. Appl. Chem. Russ., 1935, 8, 19—24).—The formation of H carbonates in the system $CaCO_3-H_2O-CO_2$ is augmented by adding K_2SO_4 , as a result of the reaction $Ca(HCO_3)_2 + K_2SO_4 \rightarrow 2KHCO_3 + CaSO_4$, which shifts the equilibrium of the reaction $CaCO_3 + H_2O + CO_2 \rightleftharpoons Ca(HCO_3)_2$. R. T.

Preparation of phosphorescent zinc sulphide. N. Z. ANDREEV (J. Appl. Chem. Russ., 1935, 8, 49—51).—ZnS is pptd. from aq. $ZnSO_4$ containing KOAc and AcOH, at 75° , the suspension is boiled, an equal vol. of cold 1.5% NaCl is added, the ppt. is collected, dried, and heated at 900° with traces of $CaCl_2$, $BaCl_2$, $MgCl_2$, Na_2WO_4 , and In (or Cs, Rb, Os, Tl, U, or Th). R. T.

Reactions in the solid state at high temperatures. XII. W. JANDER and K. F. WEITENDORF (Z. Elektrochem., 1935, 41, 435—444; cf. A., 1934, 741).—The reaction between ZnO and Cr_2O_3 has been studied by measurements of the sp. vol., catalytic effect on the decomp. of CH_4 , solubility in HCl and H_2SO_4 , sorption of methylene-blue and fuchsin, electrical conductivity, and X-ray structure. The existence of intermediate stages before the formation of $ZnCr_2O_4$ has been established. E. S. H.

Complex compounds of 2:4:6-triamino-toluene. F. HEIN and F. WAGNER (Ber., 1935, 68, [B], 1116—1122).—By treatment of the requisite salt with a slight excess of 2:4:6- $C_6H_2Me(NH_2)_3$ (=R) in absence of H_2O the following complex salts are obtained: $CdI_2 \cdot R \cdot 0.5COMe_2$; $ZnCl_2 \cdot 2R$; $CdBr_2 \cdot 2\frac{1}{2}R \cdot 0.5COMe_2$; $HgCl_2 \cdot R \cdot 0.25COMe_2$; $2ZnCl_2 \cdot 2\frac{1}{2}R \cdot 2COMe_2$; $SbCl_3 \cdot 2\frac{1}{2}R \cdot 0.5EtOH$; $SbCl_3 \cdot 2\frac{1}{2}R \cdot \frac{1}{3}CHCl_3$; $3HgCl_2 \cdot 3\frac{1}{2}R$; $CoCl_2 \cdot 5R \cdot COMe_2$; $FeCl_2 \cdot FeCl_3 \cdot 5\frac{1}{2}R \cdot 2COMe_2$; $2[(CrCl_2OEt)_3 \cdot CrCl(OEt)_2 \cdot 2COMe_2] \cdot 5R$. The presence of fractions of a mol. of base is simply explained by the assumption that all three NH_2 groups of an individual mol. are involved in the complex union. H. W.

Dry purification of mercury. ZIENER (Glas u. App., 1934, 15, 187—189; Chem. Zentr., 1935, i, 540).—The Hg is treated in a 1—1.5-litre flask first at room temp. and then at $100—105^\circ$ with an airstream. Hg vapour is subsequently removed from the cooled air stream by active C containing I. H. J. E.

Behaviour of mercuric cyanide towards bases. F. REIFF, P. PÖHLS, and W. OVERBECK (Z. anorg. Chem., 1935, 223, 113—120).— $Hg(CN)_2$ dissolves in conc. aq. KOH; transport measurements indicate the existence of a complex anion containing Hg and confirm Hofmann's formula for the hydroxy-salt $[Hg(CN)_2OH]K \cdot H_2O$. The free acid is not present in aq. $Hg(CN)_2$ and there is no salt formation with insol. or slightly sol. metal hydroxides or with aq. NH_3 . Salts of NMe_4OH , C_5H_5N , and dioxan, corresponding with the K salt, have been prepared. Transport measurements also show that $CN \cdot Hg \cdot OH$ is not a hydroxy-salt of the composition $[Hg(CN)_2(OH)_2]Hg$,

but it forms the ions $(\text{HgCN})^+$ and OH^- . The formation of the compound $[\text{Cr}(\text{SCN})_4(\text{NH}_3)_2]\text{HgCN}$ with Reinecke's salt confirms the existence of the complex cation. M. S. B.

Preparation, analysis, and qualitative study of $\text{HgSO}_4 \cdot 2\text{HgS}$. G. L. CHABORSKI and E. POTAMIAN (Bul. Chim. Soc. Române, 1934, 37, 153—164).—Digestion of HgS with conc. H_2SO_4 at 145° affords white $\text{HgSO}_4 \cdot 2\text{HgS}$ after washing and drying at 130° . Alkalis extract the SO_4^{2-} , halogen acids convert it into yellow compounds which redden on heating, and BaCl_2 gives a mixture of HgS and BaSO_4 . Methods of analysis are described.

A. R. P.

Complex compounds of mercuric cyanide. R. UZEL (Coll. Czech. Chem. Comm., 1935, 7, 159—182).—The prep. of compounds $\text{M}(\text{NH}_3)_4[\text{Hg}(\text{CN})_2\text{X}]_2$ ($\text{M}=\text{Cu, Zn, Cd, Ni}$, and $\text{X}=\text{Br, I, CNS, N}_3$), of $\text{Cu en}_2[\text{Hg}(\text{CN})_2\text{X}]_2$, and of $\text{Men}_3[\text{Hg}(\text{CN})_2\text{I}_2]$ ($\text{M}=\text{Zn, Cd, Ni}$) is described. The formation of the sparingly sol. salts of the last type is characteristic of iodides. Zn can be determined gravimetrically as $\text{Zn}(\text{NH}_3)_4[\text{Hg}(\text{CN})_2\text{I}_2]$.

O. J. W.

Thermal decomposition of aluminium nitrate. A. A. JAKOVKIN, S. S. MARKOV, and E. A. KREMLEVA (J. Appl. Chem. Russ., 1935, 8, 212—220).—The non-fusible salt, $\text{Al}_2\text{O}_3 \cdot \text{N}_2\text{O}_5 \cdot 6\text{H}_2\text{O}$, crystallises from aq. basic Al nitrate (I) at 140° ; the salt $3\text{Al}_2\text{O}_3 \cdot \text{N}_2\text{O}_5 \cdot 6\text{H}_2\text{O}$ is obtained by heating (I) in a current of air at 200° , or in presence of HNO_3 vapours at 225° . (I), when heated, evolves H_2O and HNO_3 vapours in the proportion 6:1 at $<225^\circ$, and chiefly the latter at higher temp. At 318° decomp. is complete after 6 hr., the residue corresponding with $\text{AlO}(\text{OH})$, and containing 15% of H_2O , whilst at 340° it contains 9.41% H_2O and 1.29% of N_2O_5 .

R. T.

Surface chemistry of tin. A. KUTZELNIGG (Z. Elektrochem., 1935, 41, 450—453).—Sn containing Sb is coloured black by aq. FeCl_3 ; a residue is obtained after dissolution in conc. HCl . 0.1% Sb in Sn can be detected by this method. The presence of 0.01% Sb accelerates the dissolution of Sn in hot, conc. HCl , whilst Bi retards it. Sn is readily dissolved by alcoholic I. Evidence for the existence of an oxide film on Sn is adduced.

E. S. H.

Decomposition of tin dioxide, insoluble sulphates, and the corresponding minerals. G. L. CHABORSKI and D. PIRTEA (Bul. Chim. Soc. Române, 1934, 37, 129—132).— SnO_2 is reduced to Sn and PbSO_4 to PbS by heating in NH_3 at $700\text{--}800^\circ$. CaSO_4 , SrSO_4 , and BaSO_4 may be similarly reduced to the corresponding sulphides at $>1000^\circ$, the ease of reduction decreasing in the order given.

A. R. P.

Chemical reactions with active nitrogen (formation of mercurous nitride, gallium nitride, and reactions with amalgams). E. TIEDE and H. G. KNOBLAUCH (Ber., 1935, 68, [B], 1149—1154).— Hg^{I} nitride is produced by the action of active N on cold, well-agitated Hg. Unless special precautions are taken, the trace of O necessary for activation of N gives rise to O_3 , causing production of HgO . Molten Ga also yields a nitride which differs from Ga_3N_2 , since

it is attacked by H_2O and loses N at $150^\circ/1$ atm. Amalgams of K, Na, Pb, Zn, Sn, or Cd (1%) yield exclusively nitride, only the Hg entering into reaction. With Na-Hg (85% = Na) production of azide in addition to nitride is observed. Li-Hg with mol. or active N gives only nitride. K-Na (5:1) gives azide and nitride.

H. W.

Red ammonium chloride. F. PAVELKA (Kolloid-Z., 1935, 71, 291—292).—The red crystals of NH_4Cl , obtained by crystallisation of solutions containing NH_4Cl and FeCl_3 , contain FeCl_3 , which is taken up in accordance with the adsorption isotherm. The colour varies more with the size of the crystals than with the FeCl_3 content.

E. S. H.

Mechanism of the action of liquid ammonia on phosphorus pentachloride. H. MOUREU and P. ROCQUET (Compt. rend., 1935, 200, 1407—1410; cf. A., 1934, 158).—Action of excess of liquid NH_3 on PCl_5 in a vac. yields a product with a dissociation pressure at 0° of 1036 mm., equal to that of $\text{NH}_4\text{Cl} \cdot 3\text{NH}_3$. After the removal of this NH_3 the pressure falls to 300 mm. From the vols. of NH_3 removed under the two conditions it is concluded that the primary reaction is $\text{PCl}_5 + 10\text{NH}_3 = 5\text{NH}_4\text{Cl} + \text{P}(\text{NH}_2)_5$, and that below 300 mm. at 0° the $\text{P}(\text{NH}_2)_5$ decomposes irreversibly yielding PN_3H_4 , which polymerises as produced and at 400° and 0.1 mm. yields PN_2H .

J. W. S.

Hydrogen diarsenide: As_2H_2 . E. MONTIGNIE (Bull. Soc. chim., 1935, [v], 2, 1020—1024).—The prep. and properties of As_2H_2 are described and the rate of decomp. has been investigated. Decomp. is complete after 15 days' exposure to the air in the dark.

R. S.

Precipitation of protoactinium with titanium. (MILE.) H. ZAVIZZIANO (Compt. rend., 1935, 200, 1843—1845).—Pa is pptd. almost quantitatively with Ti by hydrolysis of slightly acid $\text{Ti}(\text{SO}_4)_2$ solution. Details are given for the separation of Pa from a mineral by this method.

H. J. E.

Technical extraction of protoactinium.—See B., 1935, 590.

Complexity of the reaction between ozone and potassium iodide. J. GUÉRON and M. PRETTE (Compt. rend., 1935, 200, 2084—2086).—Action of O_3 on aq. KI, buffered to p_H 7, forms I and KIO_3 , the latter liberating equiv. I on acidification before titrating with $\text{Na}_2\text{S}_2\text{O}_3$. When 5% ozonised O_2 is passed into conc. aq. KI through a sintered glass plate, only KIO_3 is formed.

H. J. E.

[Formula of] hydrofluoric acid. H. MULLER (Compt. rend., 1935, 200, 2080—2082; cf. A., 1932, 691; this vol., 824).—From the lowering of the eutectic temp. for the ice- KNO_3 system, the formula is HF and not H_2F_2 . With KF, HF, the complex ion HF_2^- is formed in conc. solution. Cornec's method (A., 1913, ii, 840) was applied in studying the neutralisation of HF by KOH.

H. J. E.

Origin of polyhalides and polysulphides. M. M. PLATONOV (Ukrain. Chem. J., 1935, 10, 51—56).—Poly-halides and -sulphides are represented as anhydrides in which O is replaced by S or by X_2 .

R. T.

Oxides of manganese. Structure of mixed crystals. P. DUBOIS (Diss., Paris, 1935).—All methods of prep. yield the same form of MnO , identical with manganosite. Mn_3O_4 , prepared by thermal decomp. of Mn^{II} salts, has a crystal structure identical with that of hausmannite. $\text{Mn}_2\text{O}_3 \cdot \text{H}_2\text{O}$, identical in structure with manganite, can be obtained by oxidation of MnSO_4 with H_2O_2 in alkaline solution. At 300° in air it yields MnO_2 and in a vac. $\alpha\text{-Mn}_2\text{O}_3$, which is converted into the normal form, $\beta\text{-Mn}_2\text{O}_3$, at 600° . $\beta\text{-Mn}_2\text{O}_3$ has the same structure as braunite. Thermal decomp. of $\text{Mn}(\text{NO}_3)_2$ or oxidation of $\alpha\text{-Mn}_2\text{O}_3$ in warm air yields the anhyd. $\beta\text{-MnO}_2$, identical with pyrolusite. It decomposes at $550\text{--}600^\circ$, yielding $\beta\text{-Mn}_2\text{O}_3$. The spontaneous decomp. of HMnO_4 , and reduction of KMnO_4 by MnSO_4 or H_2O_2 , yield highly hydrated $\alpha\text{-MnO}_2$, which is always associated with $\alpha\text{-Mn}_2\text{O}_3$ or $\text{Mn}_2\text{O}_3 \cdot \text{H}_2\text{O}$ and which loses H_2O progressively up to 500° and O_2 from 250° . No individual hydrate could be identified. At 500° it gives impure $\beta\text{-MnO}_2$. Thermal decomp. of Mn^{II} salts gives a mixture of $\beta\text{-MnO}_2$ and $\alpha\text{-Mn}_2\text{O}_3$. On addition of KMnO_4 to MnSO_4 under certain conditions a product is obtained of composition $\text{MnO}_{1.87}$, of distinct crystal structure similar to that of the product of decomp. of $\alpha\text{-MnO}_2$ in a sealed tube at 400° , suggesting the existence of an oxide between Mn_2O_3 and MnO_2 . Other products intermediate in composition are mixtures or adsorption complexes. The irreversibility of the reaction $4\text{MnO}_2 = 2\text{Mn}_2\text{O}_3 + \text{O}_2$ above 500° is attributed to transition into the β -forms which are non-reactive.

J. W. S.

New complex compound. N. A. TANANAEV (Ukrain. Chem. J., 1935, 10, 19—21).—A reddish-brown ppt. of $\text{Mn}(\text{AgHgC}_2\text{O}_4)_3$ (I) is obtained when an acid solution of Mn, Ag, and Hg nitrates is added to aq. $\text{H}_2\text{C}_2\text{O}_4$. (I) yields Mn^{++} , Hg^{++} , AgCl , and Hg-Ag with HCl , and Mn^{++} , MnO_3^{--} , Hg^{++} , $\text{Ag}(\text{NH}_3)_2^+$, and Hg-Ag with aq. NH_3 .

R. T.

Double salts of rhenium trichloride with rubidium and caesium chloride. W. GEILMANN and W. WRIGGE (Z. anorg. Chem., 1935, 223, 144—148).—The prep. of the insol. salts RbReCl_4 and CsReCl_4 , formed in the microchemical detection of Re, is described. Their composition (cf. Noddack, A., 1934, 44) has been confirmed. They are decomposed by heat into M_2ReCl_6 , Re, and ReCl_3 . K forms a sol. salt of corresponding formula.

M. S. B.

Amorphous and crystallised hydrated oxides and oxides. XXI. $\alpha\text{-Fe}_2\text{O}_3 \cdot \text{H}_2\text{O}$, goethite or needle ironstone, and the conversion of $\alpha\text{-Fe}_2\text{O}_3 \cdot \text{H}_2\text{O}$ into $\alpha\text{-Fe}_2\text{O}_3$. A. KRAUSE (Z. Elektrochem., 1935, 41, 337—339; cf. A., 1934, 1083).—The name goethite should be retained for $\alpha\text{-Fe}_2\text{O}_3 \cdot \text{H}_2\text{O}$ whether natural or artificial. Needle ironstone is also suitable for the former, but not for the latter. When goethite prepared from orthoferriic hydroxide (I) is heated at 300° it becomes almost completely sol. in $1.4N\text{-H}_2\text{SO}_4$. Further heating either of this product or of (I) at 800° greatly reduces the solubility. It is inferred that a sol. amorphous product is formed as an intermediate stage in the conversion of $\alpha\text{-Fe}_2\text{O}_3 \cdot \text{H}_2\text{O}$ into $\alpha\text{-Fe}_2\text{O}_3$.

F. L. U.

[$\alpha\text{-Fe}_2\text{O}_3 \cdot \text{H}_2\text{O}$, goethite or needle ironstone, and the conversion of $\alpha\text{-Fe}_2\text{O}_3 \cdot \text{H}_2\text{O}$ into $\alpha\text{-Fe}_2\text{O}_3$.] R. FRICKE (Z. Elektrochem., 1935, 41, 340; cf. A., 1934, 1083, and preceding abstract).—X-Ray examination of partly converted $\alpha\text{-Fe}_2\text{O}_3 \cdot \text{H}_2\text{O}$ indicates, not a mixture of amorphous and cryst. oxide, but a broken lattice with normal distance between the lattice planes.

F. L. U.

Complex iron thiocyanates with pyridine. O. BINDER and P. SPACU (Compt. rend., 1935, 200, 1405—1407).— $[\text{Fe}(\text{C}_5\text{H}_5\text{N})_3(\text{CNS})_3]$ (I) and the black and yellow forms of $[\text{Fe}(\text{C}_5\text{H}_5\text{N})_4(\text{CNS})_2]$ (II) all have characteristic X-ray spectra. It is suggested that the yellow form of (II) is the *trans*- and the black form the *cis*-modification. Rosenheim's salt (A., 1932, 1009) is a mixture of (I) and small quantities of (II).

J. W. S.

Cobalto-complexes. J. V. DUBSKÝ (Z. anorg. Chem., 1935, 223, 197—198).—The action of piperazine on CoCl_2 affords a blue cryst. compound which is not a tetrahalogen salt, as previously supposed, but is $[\text{CoCl}_6]\text{H}_4\text{piperazine}$. The compound with piperazinodiethyleneamine is similar.

M. S. B.

Complex amines of fluoboric acid. G. SPACU and L. DRMA (Z. anorg. Chem., 1935, 223, 185—191).—The following cryst. compounds have been prepared: $[\text{Co en}_3]\text{BF}_4$, $[\text{Co en}_2(\text{NO}_2)_2]\text{BF}_4$, $[\text{Cd en}_3](\text{BF}_4)_2$, $[\text{Ni en}_3](\text{BF}_4)_2$, $[\text{Hg en}_2](\text{BF}_4)_2$, $[\text{Zn en}_3](\text{BF}_4)_2$, $[\text{Mn en}_3](\text{BF}_4)_2$, $[\text{Cd}(\text{C}_5\text{H}_5\text{N})_4](\text{BF}_4)_2$, $[\text{Ni}(\text{C}_5\text{H}_5\text{N})_4](\text{BF}_4)_2 \cdot 2\text{H}_2\text{O}$, $[\text{Hg}(\text{C}_5\text{H}_5\text{N})_2](\text{BF}_4)_2$, $[\text{Co}(\text{C}_5\text{H}_5\text{N})_4](\text{BF}_4)_2 \cdot 2\text{H}_2\text{O}$, $[\text{Zn}(\text{C}_5\text{H}_5\text{N})_2](\text{BF}_4)_2 \cdot 2\text{H}_2\text{O}$, $[\text{Mn}(\text{C}_5\text{H}_5\text{N})_2](\text{BF}_4)_2$, $[\text{Cd bzd}_3](\text{BF}_4)_3$. $[\text{en} = (\text{CH}_2\text{NH}_2)_2$; $\text{bzd} = (\text{C}_6\text{H}_4\text{NH}_2)_2]$. All but the last are sol. in H_2O .

M. S. B.

Triethylenediaminecobaltic salts with mixed anions. K. HOEHNE (J. pr. Chem., 1935, [ii], 143, 90—93).—The following compounds have been prepared: $[\text{Co en}_3]\text{Cl}_3$, $\text{CoCl}_2 \cdot \text{H}_2\text{O}$, green crystals; $[\text{Co en}_3]\text{NO}_2\text{Cl}_2$, $\text{CoCl}_2 \cdot \text{H}_2\text{O}$, reddish grey-brown plates, which give the dihydrate on exposure to the atm.; $[\text{Co en}_3]\text{NO}_2\text{Cl}_2 \cdot \text{H}_2\text{O}$, reddish-yellow crystals. R. S.

Rhodium hydroxopentammines. B. E. DIXON (J.C.S., 1935, 779—781).—Rh forms the complex salts $[\text{Rh}(\text{NH}_3)_5\text{OH}]\text{Br}_2 \cdot \text{H}_2\text{O}$, $[\text{Rh}(\text{NH}_3)_5\text{OH}](\text{NO}_3)_2$, and $[\text{Rh}(\text{NH}_3)_5\text{OH}]\text{SO}_4 \cdot 2\text{H}_2\text{O}$, which strongly resemble the corresponding Ir compounds (cf. A., 1934, 267). They resemble the pentammine rather than the hexammine type in their behaviour towards sp. ammine reagents.

O. J. W.

Trichlorides of iridium^{III}-aquo-dipyridines. M. DELÉPINE (Compt. rend., 1935, 200, 1373—1375).—On heating an aq. solution of *cis*-pyridino- $[\text{Ir}(\text{C}_5\text{H}_5\text{N})_2\text{Cl}_4]\text{M}$ (M=metal) at 130° for 1 hr. considerable decomp. occurs into the compound $[\text{Ir}(\text{H}_2\text{O})(\text{C}_5\text{H}_5\text{N})_2\text{Cl}_3] \cdot 1.5\text{H}_2\text{O}$ (I). *trans*- $[\text{Ir}(\text{C}_5\text{H}_5\text{N})_2\text{Cl}_4]\text{M}$ gives the compounds $[\text{Ir}(\text{C}_5\text{H}_5\text{N})_2\text{Cl}_3]$ and $[\text{Ir}(\text{H}_2\text{O})(\text{C}_5\text{H}_5\text{N})_2\text{Cl}_3] \cdot \text{H}_2\text{O}$ (II), forming an orange-red aq. solution. (I) and (II) dissolve easily in NH_3 . NaOH and KOH solutions containing excess of alkali deposit salts of $[\text{Ir}(\text{C}_5\text{H}_5\text{N})_2(\text{OH})\text{Cl}_3]\text{H}$, but addition of acid reproduces the original complexes. On dehydration at $140\text{--}145^\circ$, (I) and (II) lose their H_2O of crystallisation and composition and are no longer sol.

in alkali. They combine with AgNO_3 in neutral or alkaline solution to form the sparingly sol. compounds $[\text{Ir}(\text{C}_5\text{H}_5\text{N})_2(\text{OH})\text{Cl}_3]_2\text{HAg}$, and in acid solution to form the compounds $[\text{Ir}(\text{C}_5\text{H}_5\text{N})_2\text{Cl}_3\text{NO}_3]\text{Ag}\cdot\text{H}_2\text{O}$, of which the product from (I) loses its H_2O on drying at $105\text{--}110^\circ$. The product from (II), on treatment with KCl , yields (II) and KNO_3 . (II) on oxidation with HCl-HNO_3 gives $\text{Ir}^{\text{IV}}(\text{C}_5\text{H}_5\text{N})_2\text{Cl}_4$, which on reduction regenerates $[\text{Ir}(\text{C}_5\text{H}_5\text{N})_2\text{Cl}_4]\text{C}_5\text{H}_5\text{NH}$.

J. W. S.

Constitution of the heteropoly-acids. G. ELSTNER (Angew. Chem., 1935, 48, 343—347).—A review.

E. S. H.

Identification of artificial radioactive elements produced by neutron bombardment, and their application in chemistry as indicators. O. ERBACHER and K. PHILIPP (Angew. Chem., 1935, 48, 409—414).—Chemical and physical methods of identifying artificial radioactive elements are summarised.

A. J. M.

Rapid spectroscopic determination of metals. II. Comparator for the intensity of spectrum lines. A. P. SNESSAREV, N. N. ROSANOV, and P. J. ASSOSKOV (J. pr. Chem., 1935, [ii], 142, 237—242).—The background is illuminated by means of a separate source, the intensity of which is varied until the line becomes invisible. Data with NaF and BaCl_2 indicate that the concn. of metal can be determined to within a few %.

D. R. D.

Quantitative flame spectrum analysis. F. WAIBEL (Wiss. Veröff. Siemens-Werken, 1935, 14, 32—40).—The applications are discussed and technique is recommended. Two solution sprays are described.

E. S. H.

Microchemical spectral analysis in the high-frequency spark. A. SCHLEICHER and N. BRECHTBERGEN (Z. anal. Chem., 1935, 101, 321—338).—The spectra are excited by a high-frequency Tesla discharge between a Cu , Ag , or Au wire and a tilted glass plate carrying the specimen, and resting on the lower (plate) electrode. The ppt., or 1—2 microdrops of the solution under analysis, is applied to a 1-cm. filter, which is then embedded in a thin layer of hot agar-gelatin jelly (electrodialysed until spectrally pure). For detection of constituents of glass (Na , K , Si) Au foil is interposed between the specimen and the glass plate. Spectra are taken progressively during the ashing of the gelatin carrier. For complete qual. analysis, a group separation is made into (I) oxides insol. in HCl (Si , Ta , W , Ti , + AgCl); (II) metals pptd. by H_2S ; (III) metals pptd. by aq. NH_3 or by $(\text{NH}_4)_2\text{CO}_3$; (IV) remaining elements. Ppts. are best purified by electrodialysis before sparking.

J. S. A.

Sampling analyses and sample size.—See B., 1935, 609.

Recent development of colorimetric technique and allied processes of measurement. A. THIEL (Ber., 1935, 68, [B], 1015—1023).—A lecture.

H. W.

Personal error in colorimetry. R. A. HOUSTOUN and A. J. YOUNGER (Phil. Mag., 1935, [vii], 19, 1107—1115).—A discussion, based on statistical data, of anomalies in visual observations.

N. M. B.

Conductometry. W. BÖTTGER and J. PIEPER (Z. Elektrochem., 1935, 41, 453—457).—Polemical (cf. this vol., 598).

E. S. H.

Conductometry. G. JANDER, J. HARMS, and K. F. JAHR (Z. Elektrochem., 1935, 41, 457).—A reply (cf. preceding abstract).

E. S. H.

p_H determination (indicator papers). K. HÖLL (Chem. Fabr., 1935, 8, 218—219).—Colorimetric p_H determination may be carried out by a drop method on indicator papers covering the full p_H range. The method is advantageous for viscous or turbid solutions.

J. S. A.

Use of brilliant-yellow and Poirrier-blue C_4B as indicators of p_H . M. B. DE LA ROCHE (Bull. Soc. chim., 1935, [v], 2, 1148—1151).—With brilliant-yellow (I) the limit of transmission on the red side occurs at 7500 Å. for all vals. of p_H , but on the violet side at $5025\text{--}5800\text{ Å.}$ for $p_H\text{ }4.5\text{--}13$. p_H may be determined by the transmission limit of (I) in the violet, or by the use of a series of standard papers, the colour changes being: $p_H\text{ }3.5\text{--}6$ citron-yellow, $6.2\text{--}6.8$ Cd-yellow, $7\text{--}8$ orange-yellow, $8.2\text{--}9.5$ appearance of carmine, $9.7\text{--}10.1$ carmine-orange, $10.4\text{--}13$ carmine. With blue C_4B (II) the transmission spectrum occurs at $4100\text{--}5150\text{ Å.}$ for $p_H < 10$. At $p_H\text{ }10.4$ (p_H of dil. Na_3PO_4) the absorption increases considerably, and a feeble red band is transmitted at $6000\text{--}7500\text{ Å.}$, becoming intense at $p_H\text{ }13$. (II) may be used for titration of H_3PO_4 , the neutral point being given by the appearance in a spectroscope of the red band, but visual observation is inexact.

R. S. B.

Volumetric determination of free acid in solutions of iron salts.—See B., 1935, 628.

Extraction method for the determination of acids and its application to p -hydroxybenzoic acid. V. K. LAMER and J. GREENSPAN (J. Amer. Chem. Soc., 1935, 57, 969—973).—The principle of the procedure is to determine an acid (HA) in aq. solution by adding a measured, excess vol. of standard alkali, and determine the excess alkali by adding a measured, excess vol. of a second acid (HE), extracting the excess of HE with a solvent in which HA is insol., and subsequently determining the extracted excess of HE by the usual methods.

E. S. H.

Spectrographic determination of minor chemical constituents in water supplies.—See B., 1935, 608.

Rapid potentiometric determination of minute quantities of chlorides. S. V. BRUEVITSCH and F. E. VARFOLOMEEVA (J. Appl. Chem. Russ., 1935, 8, 366—373).—0.5 mg. of Cl per litre can be determined by electro-titration (AgCl electrode), with a max. error of 4%, and 2.5 mg. with a max. error of 1.2%. The method is applicable to direct Cl determination in natural waters.

R. T.

Theory of potentiometric precipitation titrations using electrodes of the second kind. A. RINGBOM (Z. physikal. Chem., 1935, 173, 198—206).—Expressions for the concn. of the pptg. ion at the equiv. point and the turning point of the potential curve have been derived. The concn. and excess or

deficiency of this ion at the latter point when the two solid phases are binary or ternary electrolytes are tabulated for various solubility products. R. C.

Potentiometric titrations with electrodes of the second kind. A. RINGBOM (Z. physikal. Chem., 1935, 173, 207—215).—The titration of IO_3^- with $\text{Pb}(\text{NO}_3)_2$, using a $\text{K}_3\text{Fe}(\text{CN})_6$ - $\text{Pb}_2\text{Fe}(\text{CN})_6$ electrode, and of Ca^{++} with $\text{Na}_2\text{C}_2\text{O}_4$, using a $\text{Ag-Ag}_2\text{C}_2\text{O}_4$ electrode, are described and the results compared with the theory (cf. preceding abstract). The former titration is of little practical significance, whilst the second is practicable, but not very exact, at not too high dilutions and salt content. R. C.

Rapid determination of hydrogen sulphide in gaseous mixtures. P. WOOG, R. SIGWALT, and J. DE SAINT-MARS (Bull. Soc. chim., 1935, [v], 2, 1214—1216).—Paper dipped in aq. $\text{Pb}(\text{OAc})_2$ containing glycerol is pressed between filter-paper and placed in a tube which is evacuated and opened in the gaseous sample. Colorimetric examination of the stain permits the determination of as little as 1 in 80,000. R. S. B.

Nephelometric determination of sulphur dioxide in air. I. I. PLETNIK, A. V. VELITSCHKOVSKI, and I. O. FRIDMAN (Ukrain. Chem. J., 1935, 10, 7—14).—30 litres of air are bubbled through 50 c.c. of 0.1N-NaOH, 2 c.c. of 25% HCl and 5 c.c. of 0.1N- KMnO_4 are added, the solution is decolorised with 5% NaNO_2 , BaCl_2 is added, and SO_4^{--} is determined nephelometrically. 0.1 mg. of SO_2 can be determined with a mean error of 10—15%. R. T.

Determination of small quantities of sulphur dioxide and hydrogen sulphide. L. E. KARLSON (Ukrain. Chem. J., 1934, 9, 312—316).—Gorodetzki's method, consisting in leaving a known vol. of air containing SO_2 or H_2S in contact with aq. NH_3 containing H_2O_2 , and determining $(\text{NH}_4)_2\text{SO}_4$ after 24 hr., is untrustworthy when < 0.5 mg. of SO_2 is present; satisfactory results are obtained when the bottle is paraffin-coated, and when the solution, after evaporation, is heated for 15 min. at 100° , and not 135° , as suggested by Gorodetzki. Gurevitsch's method, depending on oxidation with aq. KClO_3 and determination of SO_4^{--} colorimetrically (as PbCrO_4), gives high results; substitution, in the case of SO_2 of aq. NH_3 , and in that of H_2S of ammoniacal H_2O_2 , for aq. KClO_3 gives good results. R. T.

Use of lead nitrate for precipitation-titration of anions. I. Potentiometric titrations. II. Hydrolytic precipitation titrations. A. RINGBOM (Acta Acad. Aboensis, 1934, 8, No. 5, 142 pp.; Chem. Zentr., 1935, i, 754—755).— I. SO_4^{--} , WO_4^{--} , MoO_4^{--} , and SO_3^{--} at $p_H > 6$ may be titrated potentiometrically with $\text{Pb}(\text{NO}_3)_2$ using a $\text{K}_3\text{Fe}(\text{CN})_6$ - $\text{Pb}_2\text{Fe}(\text{CN})_6$ electrode. CO_3^{--} , HCO_3^- , and $\text{C}_2\text{O}_4^{--}$ may be determined in hot solution, or by back titration.

II. $\text{Pb}(\text{NO}_3)_2$ may be titrated in dil. solution with Na_2CO_3 , using phenol-red (I) as indicator. The following anions may be determined similarly: $\text{C}_2\text{O}_4^{--}$ at p_H 8, with (I); SO_4^{--} at p_H 9, with bromocresol-purple (II); CrO_4^{--} at p_H 9, with (II); WO_4^{--} with (II) or bromothymol-blue; MoO_4^{--} , with (I).

J. S. A.

"Depolarimetry" by thermo-electricity. J. GUZMÁN and A. RANCAÑO (Anal. Fis. Quím., 1934, 32, 590—601).—A modified form of dead-stop endpoint electrometric titration which employs a single Cu-constantan thermocouple heated by a Bunsen burner, and uses a small titration vessel mechanically stirred, is described. The method has been applied to the determination of $\text{Na}_2\text{S}_2\text{O}_3$ with I, CuSO_4 , KMnO_4 , $\text{K}_2\text{Cr}_2\text{O}_7$, KIO_3 , $\text{Ce}(\text{SO}_4)_2$, and ZnCl_2 , and KIO_3 of Fe^{II} salts with $\text{K}_2\text{Cr}_2\text{O}_7$, and of KMnO_4 with $\text{H}_2\text{C}_2\text{O}_4$. J. W. S.

Separation of selenium from cadmium, lead, bismuth, antimony, molybdenum, tungsten, and vanadium. V. HOVORKA (Coll. Czech. Chem. Comm., 1935, 7, 182—197).—The determination of Se in a solution of H_2SeO_3 by reduction with N_2H_4 has been studied. In presence of the above metals a direct separation of Se by this method is possible only under certain conditions, which depend on the particular metals present. O. J. W.

Measurement of small volumes of nitrogen obtained by micro-Dumas method. H. C. GULL (Analyst, 1935, 60, 401—403).—The vol. of N_2 is calc. from the wt. of H_2O displaced from a flask of special construction. E. C. S.

Physiological arsenic and the use of the Kjeldahl flask in its detection. W. DECKERT (Z. anal. Chem., 1935, 101, 338—339).—Dissolution of As from the glass of the flask (cf. this vol., 554) is appreciable only on the first occasion a flask is used. J. S. A.

Physiological arsenic and the use of the Kjeldahl flask in its detection. G. LOCKEMANN (Z. anal. Chem., 1935, 101, 340—341).—A reply to Deckert (see preceding abstract). J. S. A.

Detection of nitrate ions. P. G. POPOV (Ukrain. Chem. J., 1934, 9, 310—311).—1 c.c. of solution and 1 c.c. of saturated aq. $\alpha\text{-C}_{10}\text{H}_7\text{NH}_2$ are stratified on conc. H_2SO_4 , when a violet-red ring indicates < 0.025 mg. of KNO_3 . Other oxidising agents do not interfere. R. T.

Potentiometric determination of hypophosphoric acid in presence of phosphoric acid and phosphorous acid. W. GRUNDMANN and R. HELLMICH (J. pr. Chem., 1935, [ii], 143, 100—105).—The determination of H_2PO_3 as Ag salt is unsatisfactory in presence of H_3PO_4 . H_2PO_3 can be determined in presence of H_3PO_4 and H_3PO_3 by potentiometric titration of a NaOAc-buffered solution with AgNO_3 , using a AgI indicator electrode. Cl^- , Br^- , I^- , CN^- , and CNS^- can be separately determined in presence of H_2PO_3 . R. S.

Colorimetric determination of arsenic. D. B. JOCHELSON (Ukrain. Chem. J., 1934, 9, 344—347).— Na_2S is added to the acid solution, the As_2S_3 is washed and dissolved in 2% aq. NH_3 , aq. AgNO_3 is added to the solution, and the brown coloration is compared with that given by standard As solution under the same conditions. The method is rapid and accurate, and may be applied to the determination of As in concns. of $< 0.0001\%$, in presence of org. substances. R. T.

Volumetric determination of minimal amounts of arsenic. J. H. KŘEPELKA and B. RAKUŠAN (Lékárn., 1934, 14, 290—301; Chem. Zentr., 1935, i, 757).—AsH₃ is passed through 0.1N-I and the excess titrated back. J. S. A.

Boric acid-alcohol flame reaction. W. STAHL (Z. anal. Chem., 1935, 101, 342—347; cf. A., 1931, 587).—The optimum amount of H₂SO₄ is 3 c.c. in 15 c.c. of MeOH. For detection of small amounts of B, the substance is mixed in a Rosenbladt apparatus with 0.5 c.c. of fresh MeOH+H₂SO₄, and kept for 15 min. The tube is warmed to 65°, and a current of air passed through it into a non-luminous gas flame. 0.00076 mg. of B may be detected. J. S. A.

Rapid determination of small amounts of boron through the intensity of the flame coloration. W. STAHL (Z. anal. Chem., 1935, 101, 348—356; cf. A., 1931, 587).—Equal currents of air are passed simultaneously through an unknown and a standard B solution in apparatus of identical dimensions into non-luminous gas flames, and the flame colorations compared. The concn. of the standard solution is varied to give the same intensity of flame coloration. Suitable apparatus is described. J. S. A.

Photo-colorimetric determination of silicic acid in presence of phosphoric acid. M. ČERNÝ (Chem. Obzor, 1934, 9, 121—122, 138—140; Chem. Zentr., 1935, i, 600).—SiO₂ is converted by HCl+(NH₄)₂MoO₄ into silicomolybdate, which is reduced with Na₂S₂O₄ and examined in a colorimeter. Interference by P₂O₅ is inhibited by addition of KMnO₄ and then NH₄ citrate. J. S. A.

Organic carbon in sea-water. L. ESPIL (Bull. Soc. chim., 1935, [v], 2, 1007—1012).—A method for the determination of org. C in sea-water is described. The org. C, which is partly due to the dissolution of marine algæ, is greatest in coastal waters, and is subject to seasonal variation. R. S.

Determination of carbon monoxide with various cuprous chloride solutions.—See B., 1935, 509.

Gas-analytical methods for determination of carbon suboxide in presence of carbon dioxide, carbon monoxide, and oxygen. A. KLEMENC, R. WECHSBERG, and G. WAGNER (Monatsh., 1935, 65, 405—410).—Mixtures of C₃O₂+CO₂ are treated with H₂O, and the CO₂ is pumped off. The CH₂(CO₂H)₂ formed is titrated with 0.01N-Ba(OH)₂, and CO₂ is determined nephelometrically (or in larger amounts by titration) with Ba(OH)₂. C₃O₂ and CO₂ are separated from CO and O₂ by condensation at -180°. O₂ is absorbed by P, and C₃O₂ and CO₂ in the non-volatile portion are determined as above. Very small amounts of CO₂ are better determined manometrically by pumping off at -40°. When recovery of C₃O₂ is desired, CO₂ may be fractionally pumped off from solid (but not liquid) mixtures at -125° to -130°. A suitable semi-micro gas analysis apparatus for 1 c.c. of gas is described. J. S. A.

Determination of traces of cyanides in water.—See B., 1935, 656.

Determination of small concentrations. IX. Hydrogen cyanide. E. M. JOFINOVA-GOLDFEIN and S. S. GURVITZ. **X. Microalkalimetry.** S. L. KAGAN (J. Gen. Chem. Russ., 1935, 5, 34—38, 179—181).—IX. The methods of Kolthoff (A., 1918, ii, 138), Smith (A., 1929, 686), and Anderson (A., 1916, ii, 585) serve for determining < 0.003 mg. of HCN.

X. The most uniform results in the microtitration of aq. Ba(OH)₂ are given by 0.01—0.02N-HCl.

R. T.

Determination of anions with benzdine. Oxalates and selenates. A. DEL CAMPO and F. SIERRA (Anal. Fis. Quím., 1934, 32, 451—473).—The solubility of benzdine (I) salts increases with decrease of *p_H*, whilst the salts have a marked power of adsorption. Means of obviating errors arising from these factors have been studied. The best reagent for determination of oxalate contains 2.7 g. of (I) and 130 c.c. of 0.1N-HCl per litre; the sample should contain 0.1—0.15 g. of oxalate, and 150—200 c.c. of reagent should be employed. With a more conc. reagent [0.5% (I)], and under the conditions described, selenate may be determined to within 1%; the error of published methods is 5—6%.

H. F. G.

Determination of potassium in oilfield water.—See B., 1935, 608.

Characterisation of metallic ions by micro-chemical tests with picric acid. C. FRANGOPOL (Bul. Chim. Soc. Române, 1934, 37, 259—261).—Addition of 1% picric acid to salts of Na, K, NH₄, Be, Ag, Ba, Ca, Fe⁺⁺⁺, Mg, Mn, and Pb on a microscope slides affords characteristic crystals of the picrates: K, NH₄, and Pb triclinic prisms, Ba slender prisms with an inclined base, Ca stout triclinic prisms, Mg and Mn Y-shaped crystals, Ag sheaves of fine needles, Al aborescent growths, Na radiating clusters of fine needles. A. R. P.

Determination of sodium in potassium salts by the uranyl acetate method.—See B., 1935, 627.

Electro-analysis of silver with three electrodes. J. GUZMÁN and L. QUINTERO (Anal. Fis. Quím., 1934, 32, 602—610; cf. A., 1916, ii, 114).—The Pt cathodes normally used in the Guzmán method have been replaced successfully by Ag wire nets, Ag foil, and in some cases by Ag-plated brass, and the Pt anodes by stainless steel for acid solutions and by Fe (in some cases passified) for alkaline solutions. Data are given for solutions containing (NH₄)₂SO₄ and NH₃, (NH₄)₂SO₄ and NaOH, KCN and NaOH, NH₄OAc and AcOH in presence of EtOH, and HNO₃ and EtOH. The process is also applied to the large-scale determination of Ag. J. W. S.

Detection of barium, strontium, and calcium present together. N. A. TANANAIEV (Ukrain. Chem. J., 1935, 10, 15—18).—10 drops of saturated aq. K₄Fe(CN)₆ are added to 1 drop of the solution, the mixture is evaporated to dryness, and the residue warmed with 40 drops of H₂O, when an opalescent solution is obtained in presence of < 0.07 mg. Ca; Mg interferes, Ba and Sr do not. Sr is detected by adding HNO₃ to the solution, evaporating to dryness,

and warming, when $\text{Sr}(\text{NO}_3)_2$, sputtering into the flame, gives a red coloration. Ba is detected as BaCrO_4 . R. T.

Enrichment process for the detection of small quantities of chemical constituents in minerals. H. ROSE and R. BÖSE (*Naturwiss.*, 1935, 23, 354—355).—For the detection of small quantities of substances in beryl and other minerals the arc method of Mannkopff and Peters (*A.*, 1931, 991) is used. For the detection of small quantities of volatile substances, the mineral is heated in vac. to 1200° in a quartz tube open at one side. Ring-like deposits of metals are formed on the cooler parts of the tubes, which can be separated by cutting the tube. The deposits are separately dissolved, and the solutions examined by the spark spectrum. Elements not indicated by the arc method can thus be detected. A. J. M.

Reaction for cadmium. P. G. POPOV (*Ukrain. Chem. J.*, 1934, 9, 307—309).—1 c.c. of solution is heated with 0.5 g. of NH_4Br and 1.5 c.c. of conc. H_2SO_4 to evolution of SO_3 , H_2O is added to 8 c.c., 0.5 g. of Fe powder is added, the suspension is filtered after 30 sec., an equal vol. of H_3PO_4 added to the filtrate, and H_2S is passed, when a yellow ppt. is obtained with ≤ 0.9 mg. of Cd. Other metals do not interfere. R. T.

Determination of small amounts of lead. K. SEELKOPF and H. TAEGER (*Z. ges. exp. Med.*, 1933, 94, 539—548; *Chem. Zentr.*, 1935, i, 757).—The electrolytic method of Schmidt does not give quant. results. A colorimetric method using dithizone is described. J. S. A.

Determination of small amounts of lead. P. SCHMIDT, F. WEYRAUCH, A. NECKE, and H. MÜLLER (*Z. ges. exp. Med.*, 1934, 94, 1—6; *Chem. Zentr.*, 1935, i, 757).—A reply to Seelkopf and Taeger (cf. preceding abstract). J. S. A.

Application of diphenylcarbazone to determination of metals. E. S. VASSERMAN and I. B. SUPRUKOVITSCH (*Ukrain. Chem. J.*, 1934, 9, 330—340).—Many cations are quantitatively pptd. as complexes (I) insol. in H_2O , but sol. in org. solvents; the application of such solutions to the colorimetric determination of the metals gives untrustworthy results. Pb, Hg, and Zn may be determined gravimetrically as (I). R. T.

Determination of traces of thallium in presence of other metals. A. L. HADDOCK (*Analyst*, 1935, 60, 394—399).—Tl, together with Pb and Bi, is separated from other metals by extraction with dithizone in CHCl_3 , and determined in the form of TlCl_3 by liberation of I from KI. 0.005—0.200 mg. of Tl may be determined in presence of 1 g. of many metals and their salts, but 0.5 mg. of Bi and Pb or 0.1 g. of Hg, Ni, and Zn interfere. E. C. S.

Alkaloidal reagents. VII. Detection of thallium. J. C. MUNCH and J. C. WARD (*J. Amer. Pharm. Assoc.*, 1935, 24, 351—358).—Numerous pptn. reactions for the detection of Tl have been tested and their sensitivities recorded. M. T.

Sensitive detection of metals with "thionalid" [thioglycol- β -naphthylamide]. II. R. BERG and

W. ROEBLING (*Angew. Chem.*, 1935, 48, 430—432).—"Thionalid" gives ppts. with the following metals in EtOH or AcOH solution (limiting dilution $\times 10^6$ given in parentheses) Cu (10), Ag (5), Au (2.5), Hg (15), Sn (12.5), As (100), Sb (40), Bi (10), Pt (10), Pd (10). In alkaline tartrate solution the series is Cu (2), Au (0.2), Hg (1), Cd (2.5), Tl (10); Ag is reduced, Mn gives MnO_2 , and Fe^{3+} is not sensitive. In tartrate solution containing KCN, it is Au (0.2), Tl (10), Sn (0.25), Pb (10), Sb (2), Bi (2.5) and in presence of NaOH-KCN it is reduced to Tl (10), Hg, Pb, Bi (not sensitive), which allows the reagent to be used for the detection of very small amounts of Tl (details given). S. C.

Fractional reaction for mercury. M. SCHTSCHIGOL (*J. Appl. Chem. Russ.*, 1935, 8, 158—159).—An equal vol. of 10% KI is added to the solution, followed by 30% aq. KOH, and the mixture is heated and filtered. 1 ml. of glycerol and 2—3 ml. of aq. NaOH are added to the filtrate, and the mixture is boiled for several min., when a black ppt. of Hg forms, or, in presence of very small amounts of Hg, the liquid darkens. ≤ 0.35 — 3.25 mg. of Hg can be detected in presence of other ions. R. T.

Volumetric determination of mercury. M. SCHTSCHIGOL (*J. Appl. Chem. Russ.*, 1935, 8, 160—164).—0.2—0.4 g. of substance is dissolved in H_2O , 20—30 ml. of 30% aq. NaOH and 5—10 ml. of glycerol are added, the mixture is boiled for 5 min., diluted to 100 ml., and filtered. The washed ppt. (Hg) is dissolved in 10—15 ml. of HNO_3 , the solution is diluted, oxides of N are removed by KMnO_4 , excess of which is removed by FeSO_4 , and Hg is titrated with 0.1N- NH_4CNS . The reactions involved are: $\text{HgX}_2 + 2\text{NaOH} \rightarrow \text{HgO} + 2\text{NaX}$; $\text{HgO} + \text{OH} \cdot \text{CH}(\text{CH}_2 \cdot \text{OH})_2 \rightarrow \text{Hg} + \text{OH} \cdot \text{CH}_2 \cdot \text{CH}(\text{OH}) \cdot \text{CHO}$. R. T.

Fractional detection of mercury. (A) N. A. TANANAEV. (B) N. A. TANANAEV and N. V. JUNITZKAJA (*J. Appl. Chem. Russ.*, 1935, 8, 356—358, 359—360).—(A) Br is added to 1—2 ml. of neutral solution to appearance of a yellow coloration, the solution is boiled and added to 5 ml. of a solution of 10 g. of KI in 100 ml. of 10% NaOH, the mixture is boiled and filtered, and SnCl_2 added to the filtrate, when a black ppt. indicates Hg ($\leq 0.001N$ in absence of other cations, and $\leq 0.005N$ in their presence).

(B) Wet Ag_2S is added to a few ml. of the neutral solution, the suspension is heated for 10—20 sec., allowed to settle, and the sediment is treated with boiling 50% HNO_3 , when HgS, if present, remains undissolved. Other cations do not interfere. R. T.

Rapid determination of mercury. F. I. TRISCHIN (*Ukrain. Chem. J.*, 1934, 9, 341—343).—Ag, KI, NaOH, and Br- H_2O are added to the solution, which is shaken, Na_2S is added, and the filtrate is made acid with HCl, when a black ppt. indicates the presence of Hg. Other cations do not interfere. R. T.

Volumetric determination of mercuric chloride with lead sulphide.—See B., 1935, 628.

Separation of rare earths. P. W. SELWOOD (*J. Amer. Chem. Soc.*, 1935, 57, 1145).—Separation of

Eu is facilitated by co-pptn. with BaSO_4 , which is then washed repeatedly with hot, conc. HNO_3 . Partial separation of Nd and Sm is effected by treating the anhyd. chlorides with H_2 at 700° , and treating the product with H_2O . E. S. H.

Precipitation of aluminium with ammonium hydrogen carbonate. T. KÖZU (Mem. Coll. Sci. Kyoto, 1934, A, 17, 17—26).—The pptn. is quant.; procedure for the determination of Al is given. The ppt. is $4\text{Al}(\text{OH})\text{CO}_3 \cdot 6\text{Al}(\text{OH})_3 \cdot 9\text{H}_2\text{O}$, which is fairly stable in a solution at p_{H} 7.6 and has a solubility in H_2O of 0.00242 g. per 1000 c.c. at 20° . E. S. H.

Colour reaction between manganese and formaldoxime. E. KAHANE (Ann. Chim. Analyt., 1935, [iii], 17, 175—178; cf. A., 1932, 491).—The reaction is sensitive, is positive whatever the state of oxidation of Mn, and is suitable for colorimetry. Fe, which interferes, is removed with $\text{Zn}(\text{OH})_2$. E. C. S.

Determination of cobalt as a new complex compound. A. TAURINS (Z. anal. Chem., 1935, 101, 357—359).—Co is pptd. by an excess of 10% aq. K_2HgI_4 from strongly ammoniacal solution as $[\text{Co}(\text{NH}_3)_6][\text{HgI}_3]_2$ (I). The ppt. is washed with EtOH and Et₂O, and dried at room temp. (I) is decomposed by H_2O , and must be pptd. in a CO_2 atm. to avoid oxidation. J. S. A.

Quantitative separation of nickel and cobalt. E. RAYMOND (Compt. rend., 1935, 200, 1850—1852).—To the solution of Ni and Co salts is added excess of 20% $\text{N}(\text{CH}_2\text{CH}_2\text{OH})_3$ and then excess of aq. NaOH. Both metals form complex salts, that of Ni being decomposed quantitatively by boiling, with pptn. of $\text{Ni}(\text{OH})_2$. The ppt. is washed with 0.01N-NaOH, dissolved in H_2SO_4 , and Ni determined electrolytically. The filtrate containing Co is neutralised with H_2SO_4 , excess of $\text{CO}(\text{NH}_2)_2$ is added, and the Co determined electrolytically. Fe must be absent. The method may be used in qual. analysis. H. J. E.

Detection and determination of nickel by means of dimethylglyoxime in presence of copper. J. RANEDO (Anal. Fís. Quím., 1934, 32, 611—613).—Ni can be determined in presence of Cu by means of dimethylglyoxime (I) if excess of $\text{Na}_2\text{S}_2\text{O}_4$ is added before addition of (I). The method is particularly applicable to the analysis of Ni-Cu alloys. J. W. S.

Rapid determination of tungsten. C. RAJCHIN-SCHTEIN and N. KOROBV (J. Appl. Chem. Russ., 1935, 8, 154—157).— WO_4^{2-} is determined by titration with standard aq. $\text{Pb}(\text{OAc})_2$, with diamine-scarlet 6BS as adsorption indicator. The method is also applicable to the determination of Pb. R. T.

Iodometric determination of titanium, uranium, molybdenum, and vanadium in presence of iron by the method of liquid amalgams. G. N. PANTSCHENKO (J. Appl. Chem. Russ., 1935, 8, 361—365).— Ti^{IV} , U^{VI} , Mo^{VI} , and V^{V} are reduced by Zn-Hg in HCl and H_2SO_4 to Ti^{III} , U^{III} , Mo^{II} , and V^{II} , and the solution is titrated with 0.1N-I. The method is suitable for determination of these elements in presence of Fe, as Fe^{II} is not oxidised by I. R. T.

Organic compounds as analytical reagents.
III. Pyrocatechol as reagent for the identification of titanium. N. R. PIKE, J. B. FICKLEN, and I. L. NEWELL (Ber., 1935, 68, [B], 1023—1026).—The pyrocatechol test is not sp. for Ti and can scarcely be used for the detection of the latter when unknown substances are present. Its sensitiveness (1 in 5×10^6) makes it very serviceable for the identification of Ti which has been separated by a standard process. H. W.

Sources of errors in the assaying of gold and platinum.—See B., 1935, 595.

Separation of metals of the platinum group by hydrogen under pressure. V. V. IPATIEV and V. G. TRONEV (Compt. rend. Acad. Sci. U.R.S.S., 1935, 2, 29—35).—Separation of metals in the Pt group from binary mixtures depends on the oxidation-reduction potentials of the components. Pd is separated from a mixture of PdCl_2 and CuCl_2 , leaving the CuCl_2 unchanged; replacement of the CuCl_2 by FeCl_3 gives reduction of the FeCl_3 before deposition of the Pd-black. A mixture of PdCl_2 and H_2PtCl_6 gives reduction of Pt^{IV} to Pt^{II} , separation of Pd, and finally Pt-black from Pt^{II} ; by adjustment of this mixture rapid separation of Pd from Pt may be effected. Similar methods may be applied to Ir and Rh. A. B. D. C.

High-temperature hydrogen furnace. J. A. V. FAIRBROTHER (J. Sci. Instr., 1935, 12, 200—201).—The furnace consists of concentric SiO_2 tubes, the inner one being wound with W or Mo wire. A temp. of 1300° may be maintained for many hrs., and may be raised if the inner tube is of Al_2O_3 . C. W. G.

Production of high temperatures. A. N. SISIOEV (Ukrain. Chem. J., 1934, 9, 405—409).—Temp. of 2000° can be obtained using a laboratory furnace in which the resistance consists of tubes of refractory material (Al_2O_3 , Fe_3O_4 , etc.) coated with graphite. The material is practically non-conductive at lower temp., but its resistance falls rapidly at $>500^\circ$. The furnace is economical (12,000 volts, 0.03 amp.), and can be used in an oxidising atm. R. T.

Laboratory furnace working at 1550° . K. KUMANTIN (J. Appl. Chem. Russ., 1935, 8, 177—183).—An electrically heated oven is described. R. T.

Union calorimeter. Optimum volume of gas. W. C. MOSS (J. Sci. Instr., 1935, 12, 188—191).—Graphs of optimum vol. of gas against calorific val. are given. C. W. G.

Exact measurement of isotherms. J. J. M. VAN SANTEN (Comm. Kamerlingh Onnes Lab., 1934, No. 227, 1—10; Chem. Zentr., 1935, i, 677).—The calibration of a closed manometer, the construction of an electric thermostat, and the measurement of the expansion coeff. of glass are described. H. J. E.

Recording microphotometer. N. B. BHATT and S. K. K. JATKAR (J. Sci. Instr., 1935, 12, 185—188).—A photo-electric cell, a bridge amplifier, and a directly coupled recording camera are used. C. W. G.

Magnesium oxychloride for photometer screens and test plates. J. S. PRESTON (J. Sci.

Instr., 1935, 12, 197—198).—MgO is added to an equal wt. of $\text{MgCl}_2 \cdot 6\text{H}_2\text{O}$ dissolved in the min. quantity of H_2O , to the consistency of plaster. The cement is translucent in thicknesses of a few mm. and does not shrink or expand appreciably on setting.

C. W. G.

Measuring the optical constants of small crystals. R. G. WOOD and S. H. AYLIFFE (J. Sci. Instr., 1935, 12, 194—196).—A single-circle goniometer is mounted on a microscope stage with its axis of rotation horizontal. The crystal is immersed in a very shallow cell and the interference figure observed through the microscope.

C. W. G.

Method of taking stereoscopic radio-micrographs. U. YOSHIDA and H. TANAKA (Mem. Coll. Sci. Kyoto, 1934, A, 17, 401—404).—X-Ray apparatus, provided with two separate targets, is described.

E. S. H.

Photo-electric cell in the study of phosphorescence. W. H. BYLER and A. C. KRUEGER (J. Physical Chem., 1935, 39, 695—699).—The use of a photo-electric cell for the measurement of luminous intensity of phosphorescence is recommended in preference to the usual photometric method.

F. L. U.

Valve voltmeter. H. POLLATSCHEK (Z. Elektrochem., 1935, 41, 340—344).—The instrument described works without zero drift, with a grid current of $< 10^{-11}$ amp., and is accurate to ± 1 mv. F. L. U.

Measurements with the glass electrode. G. KILDE (Dansk Tidsskr. Farm., 1935, 9, 129—152).—Chiefly a summary of the theory and use of the glass electrode. Data are given for the deviation of this from the H electrode at p_{H} 2—9. Above p_{H} 9, the glass electrode does not behave reproducibly, but is dependent on the presence of neutral salts. Its resistance increases greatly in alkaline solutions containing Na, owing to the transport of Na^+ through the glass.

J. S. A.

Moving mercury cathode apparatus. B. S. EVANS (Analyst, 1935, 60, 389—393).—The cathode consists of a thread of Hg issuing from a jet. The Hg is kept in continuous circulation by means of an air-lift, and the metal dissolved in it is partly removed by washing before again issuing from the jet.

E. C. S.

Measurements of dielectric constants. P. C. HENRIQUEZ (Physica, 1935, 2, 434—437).—A precision variable condenser and a small liquid condenser suitable for use in determination of the dielectric consts. of liquids are described. The vol. of liquid required is 0.5 c.c.

J. W. S.

General system of bimetallic electrodes for potentiometric analysis. I. A. ATANASTIU and A. K. VELCOULESCU (Bul. Chim. Soc. Române, 1934, 37, 165—172).—The electrode system Pt—Ni can be used advantageously in all potentiometric titrations, in which it behaves as a completely polarised system; the potential jump at the end-point is usually $>$ with the Pt— Hg_2Cl_2 system. Examples of its use in the titration of Pb^{++} with $\text{K}_4\text{Fe}(\text{CN})_6$, benzidine with KNO_3 , and 8-hydroxyquinoline with KBrO_3 are given.

A. R. P.

Micro-burette with a changeable tip. J. KHOURI (J. Pharm. Chim., 1935, [viii], 21, 607).

M. T.

Apparatus for determination of carbon dioxide. M. H. HEY (Min. Mag., 1935, 24, 76—83).—An apparatus for the absorption of CO_2 in $\text{Ba}(\text{OH})_2$ solution, and the filtration and washing of the BaCO_3 with exclusion of atm. CO_2 is described. L. J. S.

Automatic device for recording drop numbers in interfacial tension measurements. C. W. GIBBY and C. C. ADDISON (J. Sci. Instr., 1935, 12, 198—199).—Rising drops of the lighter liquid strike a vane on a balanced arm and actuate a relay which is coupled directly to the escapement of a clock. The dial is altered to read directly in drops. C. W. G.

Lead jointing of metals. H. G. JONES, G. E. ROWLAND, and A. WILLIAMS (J. Sci. Instr., 1935, 12, 201).—Pb is cast around the joint in a cardboard mould.

C. W. G.

Measurement of thickness of thin transparent crystalline plates. K. S. SUNDARARAJAN (Phil. Mag., 1935, [vii], 19, 1076—1079).—For measurements with plates of small area ($> 1.0 \times 0.5$ mm.) a modified form of Darbyshire's method is described (cf. Proc. Physical Soc., 1934, 46, 626). Results for chrysene are given.

N. M. B.

Vacuum filter for drop analysis. L. KULBERG (J. Appl. Chem. Russ., 1935, 8, 387—388). R. T.

Silver absorber for gaseous halogen compounds. A. D. PELSCH (J. Appl. Chem. Russ., 1935, 8, 184—185).—AgCl is reduced with Zn, the powder is washed, dried, and heated at the sintering point of AgCl, when Ag is obtained in grains. The product is a satisfactory absorbent of Cl compounds formed during microanalytical combustions. R. T.

Micropyknometric method for the determination of the specific gravities of minerals. F. V. SYROMYATNIKOV (Amer. Min., 1935, 20, 364—370).

L. S. T.

Acoustic interferometer for a wide temperature range. H. L. ANDREWS (Rev. Sci. Instr., 1935, [ii], 6, 167—168).—The Pierce acoustic interferometer is modified to measure velocities at a frequency of 4 megacycles from -63° to 150° to about 2%.

C. W. G.

Improved absolute manometer for pressures from 0.001 micron to one atmosphere. E. B. BAKER and H. A. BOLTZ (Rev. Sci. Instr., 1935, [ii], 6, 173—174).—Two McLeod gauges with bulbs of different sizes are connected together. C. W. G.

Liebig condenser [modification]. H. SCHANZ (Chem.-Ztg., 1935, 59, 458).—A Liebig condenser having two right-angle bends 10—15 cm. apart between the inlet end and the condenser jacket is described. Increased turbulence of the vapours causes more efficient condensation and fewer fractures occur.

G. M.

Linear mineralogical arithmetic. A. L. PARSONS (Amer. Min., 1935, 20, 388—392).—A graphic

method of determining mol. proportions and the calculation of mineral percentages is illustrated.

L. S. T.

History of chemical catalysis. A. PASSAGEZ (Bull. Soc. chim., 1935, [v], 2, 1000—1002).—The dis-

covery of the catalysis of org. reactions has been erroneously attributed to Kirchoff (1811). C_2H_4 was prepared by Bondt, Deimann, Van Troostwyck, and Lauwerenburg (1795) by passing EtOH or Et_2O over Al_2O_3 etc. R. S.

Geochemistry.

Composition of air from the stratosphere. A. LEPAPE and G. COLANGE (Compt. rend., 1935, 200, 1871—1873).—Analytical data (O_2 , N_2 , total rare gases) are recorded for samples from altitudes up to 16.8 km. The proportions are the same as in ordinary air, indicating complete mixing. He was detected spectroscopically. H. J. E.

Water vapour and carbon dioxide in the air of the stratosphere. A. LEPAPE and G. COLANGE (Compt. rend., 1935, 200, 2108—2110; cf. preceding abstract).—The quantities of H_2O vapour found were many times $>$ the saturation pressure at -50° , the approx. stratosphere temp. The CO_2 was also abnormally high. H. J. E.

Origin of combined nitrogen in the atmosphere. Analysis of tropical rain and its importance in agriculture. A. RAM (Proc. Acad. Sci. Agra and Oudh, 1934—1935, 4, 147—158).—The mean NH_3-N (I) and NO_3-N (II) in freshly collected rain-water at Allahabad is 0.469 and 0.881 mg. per litre, respectively. The NH_3 is derived chiefly from the soil and the decomp. of org. matter. There is no correlation between the incidence of thunderstorms and the (II) in the atm., and these oxides are possibly produced by photochemical oxidation of NH_3 and N_2 . In general, the (II) and the ratio (II)/(I) in the tropics are $>$ in other regions. J. G. A. G.

Partition coefficient of radon between gases and water from springs. M. GESLIN (Compt. rend., 1935, 200, 1423—1425).—The partition coeff. of Rn between H_2O and air at various temp. is compared with the ratio of the radioactivities of the H_2O and natural gases. The relatively high amounts found in the gases of hotter springs are attributed to the liberation of gas from cooler water on meeting hotter water. In cooler springs the dissolved gases liberated are $<$ the amounts corresponding with equilibrium. J. W. S.

Ionic ratios in sea-water. L. ESPIL (Bull. Soc. chim., 1935, [v], 2, 1012—1015).—The concns. of common anions and cations in the water of the Arcachon basin have been determined and compared with the vals. for ocean water. The variations are attributed to the presence of marine organisms. R. S.

Concentration of D_2O in natural ice. E. BARONI and A. FINK (Monatsh., 1935, 65, 386—390).—The concn. of D_2O in high-altitude ice from Alpine glaciers and ice caves was derived from pycnometric determination of d . All samples deviated from the normal [D_2O], most showing an increase of 50—100%. J. S. A.

Heavy water in Czechoslovakian mineral waters. J. Z. SCHNEIDER and J. SLEZÁK (Chem.

Obzor, 1934, 9, 160—161; Chem. Zentr., 1935, i, 510).—No enrichment in D_2O was detected in 4 springs. H. J. E.

Isotopic composition of rain-water and snow. M. HARADA and T. TITANI (Bull. Chem. Soc. Japan, 1935, 10, 206).—During a rainfall the H_2O was initially slightly heavier than normal H_2O , and subsequently slightly lighter. This may be due to fractional condensation or vaporisation. H_2O from melted snow is 0.5—3.3 p.p.m. lighter than normal H_2O . This is attributed to the action of gravity on atm. H_2O . J. W. S.

Radioactivity of spring water from Hot Springs, Arkansas. H. SCHLUNDT (Amer. J. Sci., 1935, [v], 30, 45—50).—Radioactivity varies for the water and tufa of different springs. The mixed water contains 0.46 millimicrogram of Rn, corresponding with 0.46×10^{-9} g. Ra, whilst the amount of Ra found is only 1.38×10^{-12} g. per litre. L. J. S.

Isothermic evaporation at 25° of Lake Kutschuk water, with determination of the vapour pressure in relation to the concentration. M. N. JAKIMOV and E. I. KUMINOVA (J. Appl. Chem. Russ., 1935, 8, 221—226).—The v.p. and composition of the summer and the winter brines, at various concns., have been determined. The solid phases are $NaCl$ and $MgSO_4 \cdot 6H_2O$ in winter, and $NaCl$, $MgSO_4 \cdot 7H_2O$, $Na_2SO_4 \cdot 10H_2O$, and astrakhanite in summer brine. The mother-liquors contain 2.3—3 kg. of Br per cu.m., and may be used for the prep. of $MgCl_2 \cdot 6H_2O$, for the cement industry, and for Br production. R. T.

Hydrogeology of the springs of the Ilmen district and of Lake Turgoyak (South Urals). M. O. KLER (Compt. rend. Acad. Sci. U.R.S.S., 1935, 2, 52—54).—Conditions at the Lake are not favourable for radioactivity. Rare-earth elements and U compounds give the springs high activity, but the deposits are unlikely to be of industrial val. A. B. D. C.

Radioactivity of the springs of the Ilmen district and of Lake Turgoyak (South Urals). P. R. BORODIN and M. G. GADD (Compt. rend. Acad. Sci. U.R.S.S., 1935, 2, 47—51).—The highest radioactivity was shown by a spring located in the Ilmen mineralogical preserve. A. B. D. C.

Size of crystals. C. FRONDEL (Amer. Min., 1935, 20, 469—473).—Factors which influence the size of crystals are discussed. Large crystals of numerous minerals with their localities are cited. L. S. T.

Rational classification of silicates. A. J. MIKEI (Ukrain. Chem. J., 1934, 9, 472—474).—A classification is proposed. R. T.

Dilatometric study of natural silicates. I. J. MIKEI and I. A. BRODSKA (Ukrain. Chem. J., 1935,

10, 66—75).—The temp.-vol. diagrams of serpentine, tremolite, pelicanite, chloropal, and obsidian have been constructed.

R. T.

Celadonite from Koktebel (Crimea). S. D. TSCHEVVERIKOV and A. F. FIOLETOVA (Compt. rend. Acad. Sci. U.R.S.S., 1935, 2, 269—272).— V_2O_5 is reported in the celadonite which otherwise closely approximates to the composition of celadonite from Beskid.

W. R. A.

Greenalite. F. JOLLIFFE (Amer. Min., 1935, 20, 405—425).—The typical greenalite (I) from the Mesabi iron range, Minnesota, is a green hydrated Fe^{II} silicate, probably $3FeO \cdot 4SiO_2 \cdot 2H_2O$, occurring in rounded granules, d 2.85—3.15, n_x 1.686 ± 0.001 , n_y 1.674 ± 0.001 , n_z 1.670 ± 0.002 , which are moderately magnetic. On heating, it loses H_2O readily and becomes black in colour and strongly magnetic. (I) is probably a definite mineral varying only slightly in composition and properties because of its colloidal origin. It has probably been deposited as a ppt. from H_2O which received Fe and SiO_2 directly from igneous sources. Alteration yields (i) Fe oxides and hydroxides by the action of surface waters, (ii) an aggregate of minute green crystals associated with small, opaque green masses (metagreenalite) by crystallisation, (iii) a light-coloured fibrous mineral, a hydrated metasilicate of Fe^{II} , Fe^{III} , and Mg, by the action of Mg-bearing H_2O not of surface origin, and (iv) an intergrowth of magnetite and amphiboles in the neighbourhood of heated igneous bodies. The greenalite rock has SiO_2 49.43, Fe_2O_3 8.16, FeO 30.52, MgO 4.77, CaO 0.18, MnO 0.17, H_2O + 6.24, H_2O — 0.51, CO_2 0.43, and Cl, S, SO_3 trace, total 100.41%.

L. S. T.

Crystallography of herderite from Topsham, Maine. G. M. YATSEVITCH (Amer. Min., 1935, 20, 426—437).—Novelties exhibited by crystals of herderite (I), $CaBe(OH,F)PO_4$, are described. (I) is abundant in this locality and is attached to quartz, cleavelandite, lepidolite, topaz, and sericite. The crystallography of the species is revised and referred to new parameters, $a:b:c=0.6307:1:1.2822$, β $90^\circ 6'$.

L. S. T.

Dickite from Pennsylvania. A. P. HONESS and F. J. WILLIAMS (Amer. Min., 1935, 20, 462—466).—Dickite has been discovered in two new localities, at the Pine Knot Colliery, Schuylkill Co., and at Natalie, Pennsylvania. Optical, chemical, and X-ray data are summarised.

L. S. T.

U-Galena and uraninite in Bedford, New York, cyrtolite. P. F. KERR (Amer. Min., 1935, 20, 443—450).—An unusual occurrence of galena (I) in the Bedford cyrtolite (II) which contains Pb 0.33 and S 0.05% is described. (I) must be made up essentially of Pb isotopes derived from U and is named "U-galena." Radiograms of (II) show a lack of uniformity in the distribution of the strongly radioactive areas. Microscopic and X-ray data indicate that much of the U is present as finely-divided uraninite (III) scattered throughout (II). The uneven distribution of (III) makes it doubtful that different specimens of (II) would give the same U content, and this may affect age determinations of the mineral.

L. S. T.

Origin of cyanite. J. L. STUCKEY (Econ. Geol., 1935, 30, 444—450).—The cyanite deposits of N. Carolina appear to have been formed by metasomatic replacement by hot solutions given off by the quartz veins, pegmatite dykes, and their parent magmas.

L. S. T.

Structure of the schönites. A. GARRIDO and E. MOLES (Anal. Fis. Quim., 1934, 32, 432—445).—The dehydration of compounds of the type $M^{II}SO_4 \cdot M^I SO_4 \cdot 6H_2O$, where M^{II} and M^I are respectively Zn and K, Cu and K, Mn and NH_4 , Fe and NH_4 , and Mn and K, has been studied. Dihydrates, but no tetra- or penta-hydrates, are formed in each case (except that of the Mn salts, which yield mono- and tri-hydrates), whilst when K is present a hemihydrate is also formed. Corresponding hydrates have approx. the same v.p. There is no evidence that 1 mol. of H_2O is associated with the anions and 5 mols. with the cations. The results accord with Werner's formula for schönites, viz., $[M^{II}(H_2O)_6]SO_4 \cdot SO_4 M^I_2$.

H. F. G.

Petrology of Barnavave, Carlingford, Irish Free State. I. The junction hybrids. S. R. NOCKOLDS (Geol. Mag., 1935, 72, 289—315).—The basic hybrids and xenoliths, and the contaminated granites are described. Reciprocal reaction is discussed on the basis of the chemical analyses given, and the mineral transformations which have occurred are discussed.

L. S. T.

Origin of basic xenoliths in plutonic rocks, with special reference to their grain-size. G. A. JOPLIN (Geol. Mag., 1935, 72, 227—234).—The formation of a fine-grained xenolith from a coarse- or medium-grained basic plutonic rock is discussed. Grain-size may be reduced (i) if the temp. of the invading magma be sufficient, by the formation of a granoblastic structure, (ii) by the development of highly poikilitic crystals of hornblende or biotite and their final disruption, and (iii) by the formation of granular masses of pyroxene or by criss-cross flakes of biotite during hybridisation.

L. S. T.

Petrography of the Blea Wyke Series. R. H. RASTALL and J. E. HEMINGWAY (Geol. Mag., 1935, 72, 125—138).

L. S. T.

Diorite-limestone reaction at Ben Bullen, New South Wales. G. A. JOPLIN (Geol. Mag., 1935, 72, 97—116).—Diorite tongues invading limestone are shown to have given rise to a series of contaminated rocks in which definite mineral assemblages are recognised. The petrography of the parent rocks and the contaminated zones are discussed and chemical analyses are given. The mineralogical changes brought about by assimilation of CaO are illustrated. A reciprocal reaction is shown to have occurred. Concn. is concluded to be the most important factor in contamination, and assimilation has occurred at a low temp. in presence of abundant volatiles, of which H_2O is the most important.

L. S. T.

Structural relations of southern Appalachian zinc deposits. L. W. CURRIER (Econ. Geol., 1935, 30, 260—286).—The general geology of the various districts is described. The Zn deposits were accumulated in breccias of tectonic origin by ascending hypogene solutions.

L. S. T.

Primary silver mineralisation at Sabinal, Chihuahua, Mexico. P. KRIEGER (Econ. Geol., 1935, 30, 242—259).—Mineralisation in the Florencia-Magda vein is described. Barite, SiO_2 , calcite, and siderite are abundant gangue minerals of the vein, and some fluorite and Fe oxide are present. Ag occurs chiefly as masses of nodular grains intimately associated with Co and Ni arsenides. The presence and mode of occurrence of the arsenides provide strong evidence for the primary origin of the Ag, which is supported by the galena, sphalerite, barite, calcite, and small amounts of chalcopryrite and tetrahedrite with which the Ag is also associated. Pyrargyrite and polybasite occur most abundantly along the contact of the vein material and the wall rock, and argentite forms fine intergrowths with many of the metallic minerals. The mineralisation in the Florencia-Magda vein is of a low-temp., epithermal character and the apparent source of mineralising solutions is an alaskite intrusive. Some supergene mineralisation has also occurred, and wires and plates of Ag of such origin are occasionally found.

L. S. T.

Revision of structure and stratigraphy of the Aspen district, Colorado, and its bearing on the ore deposits. J. W. VANDERWILT (Econ. Geol., 1935, 30, 223—241).—The general geology, structure, breccia, dolomitisation, and silicification are discussed.

L. S. T.

High-temperature mineral associations at shallow to moderate depths. A. F. BUDDINGTON (Econ. Geol., 1935, 30, 205—222).—Mineral associations formed at 300—500° and at depths >2000—3000 ft. are termed xenothermal, and the xenothermal deposits of Pt, magnetite (martite)-apatite-pyroxene, cassiterite and cassiterite-wolframite, molybdenite-orthoclase-quartz, scheelite, tourmaline-cherty quartz or jasperoid, and tourmaline-chalcopryrite of different localities are discussed.

L. S.

Differentiation in traps and ore deposition. T. M. BRODERICK and C. D. HOHL (Econ. Geol., 1935, 30, 301—312).—Differentiation in Keweenaw lava flows of the Michigan Cu district has been investigated. The Cu and S contents of twelve basaltic rocks, three quartz porphyries, and three phases of the Mt. Bohemia gabbro are recorded. The average Cu content selected for the Keweenaw traps is 0.01%, and the Cu is mainly in the form of Cu Fe sulphides. The distribution of the Cu, volatile transfer of elements, and ore deposition are discussed. The ascending magmatic H_2O theory best explains the occurrence of Cu in the Michigan deposits.

L. S. T.

Dumortierite-andalusite mineralisation at Oreana, Nevada. P. F. KERR and P. JENNEY (Econ. Geol., 1935, 30, 287—300).—Considerable quantities of andalusite (I) are associated with the dumortierite (II). Quartz (III), albite, and sericite also occur, together with minor amounts of titanite, rutile, leucoxene, zircon, magnetite, limonite, tourmaline, biotite, and vein carbonate in various parts of the mineralised zone. The history of the deposit appears to be (i) deposition of a series of rhyolitic and trachytic tuffs with intercalated flows, (ii) intrusion of an adjacent igneous mass accompanied by

shearing, devitrification and alteration of the tuff series, (iii) invasion of volcanics by quartz-albite end-stage material from the igneous source, accompanied or followed by a concn. of (I) and (III) along restricted zones in the tuffs, and (iv) hydrothermal mineralisation involving replacement of (I) by (II), resulting in the formation in three stages of coarse euhedral crystals of blue (I), matted lavender or pink masses, and fibrous veins or isolated crystals.

L. S. T.

Marginal and contact phenomena of the Dor-back granite. F. WALKER and C. F. DAVIDSON (Geol. Mag., 1935, 72, 49—63).

L. S. T.

"Limonite" of molybdenite derivation. R. BLANCHARD and P. F. BOSWELL (Econ. Geol., 1935, 30, 313—319).—When massive, molybdenite (I) normally oxidises to molybdic ochre, but when disseminated, Mo compounds frequently undergo complete leaching yielding an indigenous limonite (II) which, on account of its colour and frequent occurrence in Cu areas, may be confused with that of chalcocite origin. Two (II) products of (I) derivation, foliated boxwork and granular structure, have been identified, and serve as a means of differentiation from limonite of Cu derivation. (II) of (I) derivation occurs at many places in the South-western States, Mexico, and Australia.

L. S. T.

Comparison of three Scottish magmas. S. ELDER (Geol. Mag., 1935, 72, 80—85).—The percentages of $\text{FeO} + \text{Fe}_2\text{O}_3$, MgO , CaO , and $\text{Na}_2\text{O} + \text{K}_2\text{O}$ are each plotted against those of SiO_2 for the Devonian, Carboniferous, and Tertiary igneous rocks of Scotland. The curves show the calc-alkali character of the Devonian and Tertiary as compared with the Carboniferous magma, and indicate a magnesian tendency in the Devonian and a ferriferous in the Tertiary magma.

L. S. T.

Spectrographic examination of smoky and ordinary quartz from Rincon, California. T. G. KENNARD (Amer. Min., 1935, 20, 392—399).—The colourless and the pale smoky quartz samples contain more Li than the dark smoky quartz. Al, V, Ti, Ca, and Mg are also present, but there is no significant difference in content between the various samples examined.

L. S. T.

Sericite of unusual composition. D. B. MEYER (Amer. Min., 1935, 20, 384—388).—Sericite (I) from Pilot Knob, Iron-ton, Missouri, SiO_2 47.30, Al_2O_3 36.31, Fe_2O_3 2.17, Na_2O 5.27, K_2O 2.70, H_2O 5.80, total 99.55%, has d 2.69 and μ 1.580 \pm 0.003. The dehydration curve of (I) is so distinctive that it should be used in determinations of the mineral. There is a slight loss of H_2O between 85° and 450° and between 600° and 1080° and a rapid loss at 450—600°. A mixture of albite and orthoclase may have been the original source of the mineral.

L. S. T.

Minerals of the White Raven Mine, Ward, Colorado. E. E. WAHLSTROM (Amer. Min., 1935, 20, 377—383).—The occurrence and origin of these minerals are described. Horn quartz, massive galena with small amounts of pyrite and sphalerite, manganese siderite, and native wire Ag, formed probably in this order, occur in important amounts

in the ore shoots of the Pb-Ag vein. Secondary minerals are calcite, and hydrated Fe and Mn oxides.

L. S. T.

Adamite from Gold Hill, Tooele Co., Utah. L. W. STAPLES (Amer. Min., 1935, 20, 371—376).—This adamite occurs as individual pale yellow crystals and as colourless rosettes; $a : b : c = 0.9742 : 1 : 0.7095$; $n_a 1.711 \pm 0.003$, $n_b 1.732 \pm 0.003$, $n_v 1.756 \pm 0.003$.

L. S. T.

Topaz from Devil's Head, Colorado. M. A. PEACOCK [with A. MONTGOMERY and E. OVER, jun.] (Amer. Min., 1935, 20, 354—363).—Topaz crystals of unusual size and regular development and smaller crystals of unusually distorted habits are described. The topaz is associated with quartz, microcline, albite, muscovite, fluorite, and cassiterite in pegmatite.

L. S. T.

Distribution of the heavy minerals in the clays of Middlesex County, New Jersey. A. C. HAWKINS (Amer. Min., 1935, 20, 334—353).—The residues obtained by elutriation of Cretaceous clays have been studied in detail. The percentages of ilmenite, tourmaline, and zircon have been used for the correlation of the clay beds. Total org. C has also been determined. The areal distribution of the heavy minerals and C has been plotted. Ilmenite is plentiful and rutile scarce.

L. S. T.

Tetradymite from Inyo Mountains, California. R. W. WEBB (Amer. Min., 1935, 20, 399—400).—Tetradymite occurs as numerous brilliant tabular crystals embedded in bismutite in a brecciated quartz vein in the quartz monzonite of the Inyo Mountains. A trace of S, but no Se, is present.

L. S. T.

Plasticity of crystals of sylvine. E. W. ZEHNOWITZER (Nature, 1935, 135, 1076).—Crystals of sylvine (I) become plastic after treatment with H_2O . At $700-780^\circ$, (I) possesses considerable plasticity. Crystals removed from their mother-liquor and wiped with filter-paper are at first very plastic, but become fragile on keeping in air for a few hr. The plasticity of crystals of (I) when formed from a melt or a solution may explain the frequent occurrence of bent and twisted crystals.

L. S. T.

Amphibolites from Zlatibor (West Serbia). S. PAVLOVITCH (Compt. rend., 1935, 200, 2094—2096).—Analytical data are recorded and discussed.

H. J. E.

Recrystallisation of diorites and quartzite diorites in the Manson plateau (Puy-de-Dôme) under the influence of granitic contact metamorphism. J. JUNG (Compt. rend., 1935, 200, 2091—2093).—A review and discussion of the minerals of the region.

H. J. E.

Petrographical study of Zlatibor peridotites (W. Serbia). S. PAVLOVITCH (Compt. rend., 1935, 200, 1864—1866).—Petrographical and analytical data are recorded.

H. J. E.

Hydroclastic elements of the Czeremosz district. H. TOKARSKI (Bull. Acad. Polonaise, 1935, A, 79—84).—Petrographical and analytical data for a no. of specimens are recorded and discussed.

H. J. E.

Mylonites from the San Andreas fault zone. A. C. WALTERS and C. D. CAMPBELL (Amer. J. Sci.,

1935, [v], 29, 473—503).—Description of crushed rocks from California are given. Analysis of an ultramylonite suggests that the original rock was an arkose.

L. J. S.

Rôle of kyanite in the "hornfels zone" of the Carn Chuinneag granite (Ross-shire). C. E. TILLEY (Min. Mag., 1935, 24, 92—97).—The hornfelses in the metamorphic zone surrounding the granite contain almandine (FeO 32.40, MnO 0.72%) and kyanite. The latter occurs as replacements of chiasolite and cordierite, as fine needles associated with biotite, and as larger crystals in quartz-kyanite veinlets. Kyanite is typically a stress mineral, and its occurrence as a transient mineral phase in the formation of cryst. schists is unusual.

L. J. S.

Chondrodite in the Glenelg limestone, Inverness-shire. H. H. READ and I. S. DOBLE (Min. Mag., 1935, 24, 84—89).—Small grains of chondrodite (previously mistaken for fosterite) occur in the cryst. limestone, usually forming rims around crystals of fosterite. It has probably been formed by the introduction of F-bearing solutions.

L. J. S.

Ankerites from the Northumberland coal-field. L. HAWKES and J. A. SMYTHE (Min. Mag., 1935, 24, 65—75).—Several analyses, with determinations of d and n , are given of ankerite and calcite occurring as veinlets in the coal. The ankerites are members of an isomorphous series consisting of dolomite $MgCO_3$, $CaCO_3$ and ferrodolomite $FeCO_3$, $CaCO_3$, with small amounts of mangandolomite $MnCO_3$, $CaCO_3$, and they may hold up to 20% $CaCO_3$ in solid solution. $n(\omega)$ for $FeCO_3$, $CaCO_3$ is deduced as 1.765. The calcite is of later deposition.

L. J. S.

Two new bismuth minerals from South Africa. E. D. MOUNTAIN (Min. Mag., 1935, 24, 59—64).—Bismoclite was found as a pale grey nodule with Bi ores in pegmatite at Steinkopf in Namaqualand. Analysis corresponds closely with $BiOCl$; d 7.36. It differs from daubreelite ($BiO[OH, Cl]$) from Bolivia in containing more Cl (13%). Bokspuite from pegmatite at Bokspuit in Gordonia is pale yellow to greyish-brown and massive. Analysis corresponds with $6PbO, Bi_2O_3, 3CO_2$; d 7.29.

L. J. S.

Chironomide tufa. J. WALLNER (Bot. Arch., 1935, 37, 128—134).—The tufa result from an association of $CaCO_3$ -depositing fresh-water algæ and incrustated larva tubes of *Chironomidae*.

A. G. P.

Differentiation of Hawaiian lavas. H. A. POWERS (Amer. J. Sci., 1935, [v], 30, 57—71).—A field study of the crystallisation of basalt suggests conditions other than those obtained in the laboratory.

L. J. S.

Occurrence of petroleum, natural gas, iodised and sulphurated waters in South Bavaria. K. A. WEITHOFER (Petroleum, 1935, 31, No. 22, 1—8; No. 27, 5—8).—A survey is given of recorded observations of the occurrence of the above products.

C. C.

Radioactivity of Kuznietzk basin coals. E. S. BURKSER, V. V. KONDOGURI, N. P. KAPUSTIN, and P. P. POTAPOV (Ukrain. Chem. J., 1934, 9, 441—445).—The mean Ra content of 20 samples is $0.5 \times 10^{-12}\%$, and of Th $0.17 \times 10^{-3}\%$, as compared with $28 \times 10^{-12}\%$

and $0.37 \times 10^{-3}\%$ for Donetz basin coals. It is concluded that concn. of radioactive substances is not involved in the growth of plants. R. T.

Classification of coals. M. C. STOPES (Nature, 1935, 136, 33).—A reply to criticism (this vol., 843). L. S. T.

Organic Chemistry.

Internal energy relationships of organic compounds. VII. Laws of coupling of paired and unpaired *B* electrons. O. SCHMIDT (Ber., 1935, 68, [B], 1026—1028; cf. this vol., 480).—The double linking rule is qualitatively deduced from the course of the potential curve between paired *B* electrons and *A* electrons. Considerations of unpaired *B* electrons lead directly to Criegee's rule that when 2 atoms or groups in the $\alpha\delta$ position in a mol. are removed the remainder becomes ruptured between the β and γ atoms. H. W.

Catalytic influence of mercury vapour on the cracking of methane by the glow discharge.—See this vol., 943.

Straight-chain- and the many-membered CH_2 ring-molecule. A. MÜLLER (Nature, 1935, 135, 994).—At low-temp. X-ray data show that the vols. occupied by a CH_2 group in $n\text{-C}_{12}\text{H}_{26}$ and in the corresponding cyclohydrocarbon are identical. As the temp. rises the CH_2 in the straight-chain compound occupies more space than that of the ring compound, probably owing to its greater mobility. L. S. T.

Mechanism of catalytic hydrogenation.—See this vol., 940.

Action of hydrogen peroxide on olefines. A. P. BARCHASCH (J. Gen. Chem. Russ., 1935, 5, 254—255).— H_2O_2 does not react with C_2H_4 and amylene at room temp. In presence of FeSO_4 amylene and H_2O_2 yielded a mixture of products, amongst which COMe_2 , CO_2 , HCO_2H , and AcOH were identified; aldehydes, homologues of COMe_2 , EtCO_2H , and glycols were absent. R. T.

Absorption of ethylene by solid cuprous chloride. H. TROPSCH and W. J. MATTON (J. Amer. Chem. Soc., 1935, 57, 1102—1103).— CuCl_2 absorbs 1 mol. of C_2H_4 at 60—62 atm. The dissociation pressure at 0°, 16.8°, 30°, and 40° is 2.14, 5.95, 11.7, and 19.49 atm., respectively. The rate of absorption is increased by previous use of the CuCl_2 or addition of < 10% of infusorial earth or a little H_2O . No polymerisation occurs at 100—200°/65—80 atm. C_3H_6 is not absorbed, but $\text{C}_3\text{H}_6\text{--C}_2\text{H}_4$ mixtures cannot be quantitatively separated by CuCl_2 . Aq. CuCl_2 does not absorb C_2H_4 . R. S. C.

Isomerisation of allene hydrocarbons by silicates. II. Isomerisation of $\Delta^{\alpha\beta}$ -butadiene in presence of floridin. J. M. SLOBODIN (J. Gen. Chem. Russ., 1935, 5, 48—52).—The light hydrocarbon fraction obtained when CHMe:C:CH_2 (I) is passed over floridin at 245° contains (I) 96.6, Cet:CH 3.4%, divinyl traces; at 330° the corresponding yields are 75.5, 3.9, and 20.6%. The % of (I) converted into polymerides [the dimerides of (I) and (II) are absent] is 22 and 25. (I) is conveniently prepared from crotyl alcohol (a by-product of the synthetic

rubber industry) by conversion into $\text{CHMeBr:CHBr:CH}_2\text{Br}$, from which HBr is eliminated (KOH at 120°) to yield CHMeBr:CBr:CH_2 , and this gives (I) when boiled with Zn in EtOH . R. T.

Raman effect and organic chemistry. *cis-trans*-Isomerism of ethylenic compounds CHMe:CHR . Classification of the radicals *R*. (MLLE.) B. GREDY (Bull. Soc. chim., 1935, [v], 2, 1029—1037).—The Raman spectra of the following substances are given: *cis*- CHR:CHMe [*R* = Et, Pr, Bu^a (I), $n\text{-C}_5\text{H}_{11}$, $n\text{-C}_6\text{H}_{13}$, Ph (II)], *cis*- δ -cyclopentyl- Δ^{β} -butene, b.p. 156—158°, *cis*- ζ -cyclohexyl- Δ^{β} -hexene, *trans*-crotyl chloride (III), *trans*- δ -methyl- Δ^{β} -pentene, and the *trans*-isomerides of (I) and (II). The *cis*-compounds were prepared by hydrogenation (colloidal Pd) of the corresponding acetylenic compounds (cf. A., 1928, 28; 1930, 79). Some were converted into mixtures (IV) of the *cis*- and *trans*-isomerides by successive treatment with Br and Zn, or by the dehydration of the appropriate alcohol. The Raman spectra of (IV) have also been examined. The frequency (near 1600 cm^{-1}) characteristic of the ethylenic linking is higher for the *trans*- than for the corresponding *cis*-compounds (cf. A., 1932, 897). Radicals *R* are classified according to their effect on this line. A close parallelism exists between this classification and that based on the compounds CHR:CH_2 (cf. A., 1932, 676). (III) and MgPrBr do not give Δ^{β} -heptene. H. G. M.

Raman effect and organic chemistry. Tri-substituted ethylenes. (MLLE.) B. GREDY (Bull. Soc. chim., 1935, [v], 2, 1038—1044).—The Raman spectra of the following compounds have been measured: γ -methyl- Δ^{β} -nonene, b.p. 64.5—65°/14 mm., CMeBr:CHMe , CHMe:CMc:CHO , CHEt:CMc:CHO , CHMe:Cet:CHO , β -methyl- Δ^{β} -octene, b.p. 145—146°, n_D^{20} 1.4240, and $\text{CHMe:CBr:CH}_2\text{Br}$. Only one line (near 1600 cm^{-1}) characteristic of the ethylenic linking has been observed. The classification of *R* and *R'* in CHMe:CRR' according to their effect on this line resembles that for the compounds CHMe:CHR (see preceding abstract). The effects on this line of conjugation (cf. A., 1932, 897) and of changes in the relative positions of Me, *R*, and *R'* in CHMe:CRR' are discussed. α -Methoxy- β -methyl-*n*-octane, b.p. 76°/16 mm., and *HBr* afford β -methyl-*n*-octyl bromide, b.p. 92°/16 mm., which with quinoline gives a mixture of β -methyl- Δ^{α} - and Δ^{β} -octene. Dehydration of γ -methylnonan- γ -ol, b.p. 91°/13 mm. (prepared by the Grignard reaction from Me hexyl ketone), affords mainly $\text{C}_5\text{H}_{11}\text{:CH:CMeEt}$. H. G. M.

New trimeric compound of acetylene. Acetylenyldivinyl. A. L. KLEBANSKI, C. A. DRANITZINA, and I. M. DOBROMILSKAJA (Compt. rend. Acad. Sci. U.R.S.S., 1935, 2, 229—236).— $\Delta^{\alpha\gamma\epsilon}$ -Hexadieneinene

(acetylenyldivinyl), b.p. 32°/100 mm. (*Cu* derivative), is isolated from the products of the polymerisation of C_2H_2 in presence of $CuCl-NH_4Cl-H_2O$. It is very sensitive towards air, yields (?) β -chloro- $\Delta^{\alpha\alpha}$ -hexatriene with HCl , gives a ketone (semicarbazone) with $dil. H_2SO_4$, and slowly affords non-cryst. substances with $p-C_6H_4Me-SH$. H. W.

Reaction for differentiating chloroform and carbon tetrachloride. J. ROZEBOOM (Pharm. Weekblad, 1935, 72, 689).—1 c.c. (free from $EtOH$) containing a crystal of I is treated with papaverine hydrochloride (10 mg.) or other alkaloid salt insol. in $CHCl_3$ but sol. in CCl_4 . The violet colour disappears in $CHCl_3$ but not in CCl_4 . S. C.

Differentiation of chloroform and carbon tetrachloride. N. SCHOORL (Pharm. Weekblad, 1935, 72, 751).— $CHCl_3$ reduces boiling Fehling's solution. CCl_4 gives $COCl_2$ and Cl_2 (detected with starch-KI) when one drop is heated in a loosely corked test-tube (flameless combustion). The tests are sp. S. C.

Reactions of bromo- and dibromo-olefines. G. B. BACHMAN (J. Amer. Chem. Soc., 1935, 57, 1088—1090).— $\alpha\alpha$ -Dibromo-olefines do not react with hot aq. Na_2CO_3 , anhyd. C_5H_5N , or NH_2Ph . $Me-[CH_2]_4-CH:CHBr_2$ and $NaOEt-EtOH$ give a 70% yield of heptinene and some $AcOH$. $CHMe:CHBr_2$ and $NaEtS$ give Et_2S_2 and $CMe:CH$. $CHMe:CHBr$, $Me-[CH_2]_5-CH:CHBr$, $CHMe:CHBr_2$, and $Me-[CH_2]_5-CH:CHBr_2$ with Na in liquid NH_3 give acetylenes and olefines, the ratio of these products formed being 0.012, 0.45, 0.71, and 1.8, respectively; the Br_2 -compounds give also some polymeric compounds. By addition of Cl_2 or Br in CCl_4 at -5° are obtained $\alpha\beta$ -dichloro- α -bromo-, b.p. 154.5°, $\alpha\beta$ -dichloro- $\alpha\alpha$ -dibromo-, b.p. 84°/16 mm., and $\alpha\alpha\alpha\beta$ -tetrabromo-propane (I), b.p. 122°/15 mm. $CHMe:CHBr_2$ does not react with O_2 in $EtOH$ or NH_2Ph , but when homogeneous or in hydrocarbon solvents (best dry) affords $CHMeBr-COBr$, and, by partial hydrolysis and reaction of the liberated HBr , some (I). CH_2N_2 , $NOCl$, CH_2Ph-SH , and H_2-Pt do not react.

R. S. C.

***o*-Nitro-, *m*-nitro-, and 3:5-dinitro-phenylcarbimides as reagents for alcohols.** F. HÖRKE (Rec. trav. chim., 1935, 54, 505—517).—The carbimide and alcohol are heated in light petroleum. Reaction occurs readily except with benzoin derivatives. *m*-Nitro- and 3:5-dinitro-phenylcarbimides fulfil all conditions required for a reagent for identification of alcohols. The following are described. *m*-Nitrophenylcarbimates: Pr^a , m.p. 76°; Bu^a , m.p. 51°; *n*-amyl, m.p. 62°; *n*-hexyl, m.p. 52°; *n*-heptyl, m.p. 57°; *n*-octyl, m.p. 63°; *n*-nonyl, m.p. 66°; *n*-decyl, m.p. 67°; *n*-undecyl, m.p. 56°; *n*-dodecyl, m.p. 76°; *cetyl*, m.p. 78°; *n*-octadecyl, m.p. 77°; Pr^b , m.p. 91°; Bu^b , m.p. 62°; Bu^r , m.p. 95°; *sec*-butyl, m.p. 86°; *benzyl*, m.p. 118°; β -phenylethyl, m.p. 80°; γ -phenyl-*n*-propyl, m.p. 57°; *benzoin*, m.p. 112°; *allyl*, m.p. 51°; *cholesteryl*, m.p. 184°. *o*-Nitrophenylcarbimates: Pr^a , m.p. 15°; Bu^a , m.p. -10° and $+7^\circ$; *n*-hexyl, m.p. 33°; *n*-heptyl, m.p. 17°; *n*-octyl, m.p. 44°; *n*-nonyl, m.p. 34°; *n*-decyl, m.p. 52°; *n*-undecyl, m.p. 37°; *n*-dodecyl, m.p. 60°; *cetyl*, m.p.

64°; *sec*-butyl, m.p. 26°; Bu^r , m.p. 90°; *benzyl*, m.p. 65°; β -phenylethyl, m.p. 58°; *benzoin*, m.p. 161°; *allyl*, m.p. 20°; *cholesteryl*, m.p. 169°. 3:5-Dinitrophenylcarbimates: Pr^a , m.p. 97°; Bu^a , m.p. 70°; *n*-amyl, m.p. 58°; *n*-hexyl, m.p. 75°; *n*-heptyl, m.p. 61°; *n*-octyl, m.p. 69°; *n*-nonyl, m.p. 66°; *n*-decyl, m.p. 70°; *n*-undecyl, m.p. 62°; *n*-dodecyl, m.p. 81°; *cetyl*, m.p. 86°; *n*-octadecyl, m.p. 88°; Pr^b , m.p. 112°; Bu^b , m.p. 119°; *sec*-butyl, m.p. 120°; Bu^r , m.p. 166° (decomp.); *benzyl*, m.p. 181°; β -phenylethyl, m.p. 139°; γ -phenyl-*n*-propyl, m.p. 71°; *benzoin*, m.p. 220° (decomp.); *allyl*, m.p. 114°; *cholesteryl*, m.p. 198°. *n*-Dodecyl phenylcarbimate, m.p. 74°. *p*-Nitrophenylcarbimates: β -phenylethyl, m.p. 135°; γ -phenyl-*n*-propyl, m.p. 104°; *allyl*, m.p. 108°. P. G. C.

Odd-membered *n*-primary alcohols. ($\alpha \rightarrow \beta$ -transition).—See this vol., 921.

Catalytic dehydration of butyl alcohol by alumina. I. Isomerisation of butenes. II. Determination and preparation of butenes. C. MATIGNON, H. MOUREU, and M. DODÉ (Bull. Soc. chim., 1935, [v], 2, 1169—1181, 1181—1187).—I. Bu^aOH and pure Al_2O_3 (from the sulphate or nitrate) at 380° gives Δ^a -*n*-butene, but presence of a trace of acid, e.g., $SO_4^{''}$, causes complete or partial isomerisation to Δ^b -*n*-butene, increased slightly by previous heating of the Al_2O_3 to 450° or by details of its prep. which could not be precisely defined. Al_2O_3 prepared from the carbonate is less liable to cause isomerisation.

II. Details are given for the prep. (above method) of pure Δ^a - or Δ^b -*n*-butene; the proportions of each in a mixture may be determined either by the b.p. curve of the mixed dibromides or by transformation thereof into the diacetates, hydrolysis to the glycols, oxidation of the $\beta\gamma$ -glycol in the mixture to Ac_2 , and determination of the Ac_2 by NH_2OH . R. S. C.

Action of calcium hypochlorite on organic compounds with hydroxyl and carbonyl groups.

I. Calcium hypochlorite and the higher primary alcohols. J. ŠUKNEVITSCH and A. TSCHILINGARJAN (Ber., 1935, 68, [B], 1210—1216).—The hypothesis that $EtOCl$ is the primary product in the action of OCl' on $EtOH$ is strengthened by the observation that much less $CHCl_3$ is formed by the action of $NaOCl$ on $EtOH$ in presence of Na oleate, undecenoate, or cinnamate than in control experiments. The presence of OEt and Cl in the fatty acid layer establishes the addition to oleic acid. $CHPh:CH-CO_2Na$ in absence of $EtOH$ is oxidised to $BzOH$, whereas $CHPh:CHCl$ is produced in its presence. The following schemes: $MeCHO \rightleftharpoons CH_2:CH-OH \rightarrow (+EtOCl) CH_2Cl-CH(OH)-OEt$ etc. and $CH_2:CH-OH \rightarrow CH_2:CH-OCl \rightarrow CH_2Cl-CHO \rightarrow CHCl:CH-OH$ are suggested, the former being regarded as the more probable, since $EtCHO$ and Pr^bCHO do not give $CHCl_3$, but only the corresponding acids, and $MeOH$ yields only HCO_2H , CO_2 , and $MeOCl$. If reaction between one of these aldehydes and $Ca(OCl)_2$ takes place in presence of $MeOH$, $CHCl_3$ is formed in good yield: $Pr^bCHO \rightleftharpoons CMe_2:CH-OH \rightarrow (+MeOCl) CMe_2Cl-CH(OH)-OMe \rightarrow CMe_2Cl-CHO \rightarrow CMe_2Cl-CO_2H$. Salts of CMe_2Cl-CO_2H and $CH_2Cl-CH(OH)-OEt$ readily afford $CHCl_3$, whereas $CH_2Cl-CH(OEt)_2$ does not. The yield of $CHCl_3$

from MeCHO and $\text{Ca}(\text{OCl})_2$ is increased by the presence of EtOH; the impossibility of isolation of intermediates is probably due to the fact that $\text{CH}_2\text{Cl}\cdot\text{CHO}$ is more readily enolised than MeCHO. $\text{CCl}_3\cdot\text{CHO}$ is readily oxidised by $\text{Ca}(\text{OCl})_2$ to $\text{CCl}_3\cdot\text{CO}_2\text{H}$ and CaCO_3 formed during the usual prep. of CHCl_3 is due to the decomp. of $(\text{CCl}_3\cdot\text{CO}_2)_2\text{Ca}$ as well as to the oxidation of $(\text{HCO}_2)_2\text{Ca}$. Higher alcohols $\text{R}\cdot\text{CH}_2\cdot\text{OH}$ react thus: $\text{CH}_2\text{R}\cdot\text{CH}_2\cdot\text{OH} \rightarrow \text{CH}_2\text{R}\cdot\text{CHO} \rightarrow \text{CRCl}_2\cdot\text{CHO} \rightarrow \text{CRCl}_2\cdot\text{CO}_2\text{H} \rightarrow \text{R}\cdot\text{CO}\cdot\text{CO}_2\text{H}$. Thus Pr^nOH affords AcCO_2H and thence by oxidation or enolisation AcOH , CO_2 , $\text{H}_2\text{C}_2\text{O}_4$, and CHCl_3 . Bu^nOH gives EtCO_2H and CO_2 with little CHCl_3 . Alcohols $\text{CHRR}'\cdot\text{CH}_2\cdot\text{OH}$ react: $\text{CHRR}'\cdot\text{CH}_2\cdot\text{OH} \rightarrow \text{CHRR}'\cdot\text{CHO} \rightarrow \text{CClRR}'\cdot\text{CHO} \rightarrow \text{CClRR}'\cdot\text{CO}_2\text{H} \rightarrow \text{OH}\cdot\text{CRR}'\cdot\text{CO}_2\text{H} \rightarrow \text{CORR}' + \text{CO}_2 + \text{H}_2\text{O}$, and therefore yield the same products as obtained from the ketone CORR' with, in addition, the acid produced by direct oxidation. Thus Bu^nOH yields $\text{Pr}^n\text{CO}_2\text{H}$, AcOH , CO_2 , and CHCl_3 , whilst COMe_2 gives AcOH and CHCl_3 . $\text{CHMeEt}\cdot\text{OH}$ affords $\text{CHMeEt}\cdot\text{CO}_2\text{H}$, EtCO_2H , AcOH (very little), CO_2 , and CHCl_3 ; the same products, except $\text{CHMeEt}\cdot\text{CO}_2\text{H}$, are derived from COMeEt . Aldehydes, in which all H atoms attached to C united with CHO are replaced, are oxidised by OCl' to acids ($\text{CCl}_3\cdot\text{CHO}$; Bu^nCHO). *sec.*-Alcohols are transformed by $\text{Ca}(\text{OCl})_2$ into ketones, whereas *tert.*-alcohols yield only small amounts of the corresponding alkyl hypochlorite. The lengthening of the C chain of a primary alcohol is accompanied by an increase in the amount of acid with the same no. of C atoms; this is ascribed to increasing difficulty of enolisation of the corresponding aldehyde.

H. W.

Preparation of glycerol trichlorohydrin from propylene chloride. A. L. KLEBANSKI and A. S. VOLKENSCHTEIN (J. Appl. Chem. Russ., 1935, 8, 106—116).— $\text{CHMeCl}\cdot\text{CH}_2\text{Cl}$ (I) is obtained in 80% yield from Cl_2 and $\text{CHMe}\cdot\text{CH}_2$; the further chlorination of (I) to $\text{CHCl}(\text{CH}_2\text{Cl})_2$ (II), in presence or absence of catalysts, yields a mixture of products, chiefly $\text{CHMeCl}\cdot\text{CHCl}_2$, with very small yields of (II). (I), when heated with CaCl_2 , BaCl_2 , CaO , $\text{Ca}(\text{OH})_2$, MgO , or soda-lime, affords α -chloropropene and allene, but no allyl chloride. The synthesis of glycerol from (I) is not commercially realisable.

R. T.

Existence of carbon monoxide acetals. II. F. ADICKES and P. P. PECKELHOFF (Ber., 1935, 68, [B], 1138—1140).—If, in accordance with Scheibler, the ppt. obtained by the action of HCO_2Et on CNaPh_3 contains $\text{ONa}\cdot\text{C}\cdot\text{OEt}$ in addition to HCO_2Na addition of anhyd. EtOH must produce NaOEt and HCO_2Et and the amount of HCO_2H in the filtrate must exceed that due to the solubility of HCO_2Na . Since this is not the case, the existence of $\text{ONa}\cdot\text{C}\cdot\text{OEt}$ is denied. The only possible cause of formation of HCO_2Na appears to be in fission of HCO_2Et by CNaPh_3 into C_2H_4 and HCO_2Na .

H. W.

Rotational contribution of chromophoric groups in compounds of analogous structure. W. KUHN and H. BILLER (Z. physikal. Chem., 1935, B, 29, 1—41).—The validity of the vicinal rule (A., 1933, 211) has been examined. The optical absorp-

tion, rotatory dispersion, and circular dichroism of the nitrites of methyl-*n*-hexyl-, methylcyclohexyl-, and phenylmethyl-carbinol show that ring closure at the *n*-hexyl group and the replacement of hexyl by Ph are to be regarded as small chemical changes in the sense of the vicinal rule. With rotatory dispersion and circular dichroism the absorption region is divided into discrete bands, which are absent or only faintly indicated in optical absorption. The replacement of cyclohexyl by Ph in hexahydromandelic acid is a small change, whilst the replacement of CO_2Et in $\text{OH}\cdot\text{CHPh}\cdot\text{CO}_2\text{Et}$ by CN or Me is a large change. Replacement by Me of the H attached to the asymmetric C of $\text{OH}\cdot\text{CHPh}\cdot\text{CO}_2\text{H}$ is a large change in relation to the rotational contribution of the Ph absorption band, but only a small change for the contributions of the other substituents. This leads to the formulation of the rule that if a chemical change occurs in a mol., then of absorption bands with chromophoric centres equidistant from the point of change strong bands undergo less change in their active properties than weaker bands. The rule is valid even when there are large chemical changes lying outside the scope of the vicinal rule. Both rules are related to physical considerations.

R. C.

Thermal analysis of binary mixtures of organic nitrates. III. T. URBANSKI (Rocz. Chem., 1935, 15, 191—197).—The m.-p. diagrams do not suggest formation of compounds in the systems mannitol hexanitrate (I)—camphor; pentaerythritol tetranitrate—phthalide, $-\text{NHPh}\cdot\text{CO}_2\text{Et}$, and $-\text{dinitrodimethylloxamide}$; erythritol tetranitrate (II)—1:2:4- $\text{C}_6\text{H}_3\text{Me}(\text{NO}_2)_2$, $-1:3:5\text{-C}_6\text{H}_3(\text{NO}_2)_3$, $-\text{CO}(\text{NPhEt})_2$. 1:2-Compounds are found in the systems (I)—*m*- $\text{C}_6\text{H}_4\text{Me}\cdot\text{NO}_2$, transition point 58.1° , and (II)—trinitroanisole, m.p. 61.6° .

R. T.

Mannitol-dimolybdic acid. (MME.) Z. SOUBAREV-CHATELAIN (Compt. rend., 1935, 200, 1942—1944).—The conclusions of Honnelaitre (A., 1925, i, 509) have been confirmed by the isolation of the substance $\text{C}_6\text{H}_{14}\text{O}_6\cdot\text{H}_2\text{Mo}_2\text{O}_7\cdot\text{H}_2\text{O}$ (I) by cooling an aq. solution of $\text{H}_2\text{Mo}_2\text{O}_7$ and mannitol (1:1). (I) loses $1\text{H}_2\text{O}$ above 120° giving a product freely sol. in H_2O . (I) gives no coloration with $\text{K}_4\text{Fe}(\text{CN})_6$, and with AgNO_3 gives a yellow ppt. only after some time or when the solution is heated.

H. G. M.

Simple alkaneseleninic acids. H. J. BACKER and W. VAN DAM (Rec. trav. chim., 1935, 54, 531—538).—Simple alkaneseleninic acids (I) are obtained by oxidation of dialkyl diselenides with the theoretical quantity of dil. HNO_3 . They are weaker than the corresponding carboxylic acids (dissociation consts. are given) and form mol. compounds (II) with strong acids. The m.p. of (I) and (II) show the same regularities. *Me}_2\text{diselenide}*, b.p. $155\text{—}157^\circ$, $57/21\text{ mm.}$, and *Me}_2\text{Se}*, b.p. 58° , are obtained from Me_2SO_4 and K_2Se_2 . *Pr}_2\text{diselenide}*, b.p. $103\text{—}104^\circ/15\text{ mm.}$, from Pr^nBr and K_2Se_2 , and *Bu}_2\text{diselenide}*, b.p. $129\text{—}130^\circ/13\text{ mm.}$, are described. *Methaneseleninic acid* (III), m.p. 134° (decomp.) (*Pb* and *Ba* salts), *ethaneseleninic acid* (IV), *n-propaneseleninic acid* (V), m.p. 75° (*Pb* and *Ba* salts), and *n-buthaneseleninic acid* (VI), m.p. 68° (*Pb* salt), are described.

The following *mol. compounds* were obtained. Of (III): *hydrochloride*, decomp. 100°; *nitrate*, m.p. 103° (decomp.); *sulphate*, m.p. 130° (decomp.); *methanesulphonate*, m.p. 142°; *ethanesulphonate*, m.p. 105°; *benzenesulphonate*, m.p. 150° (decomp.); *methionate*. Of (IV): *hydrochloride*, m.p. 106° (decomp.; contracts at 103°); *nitrate*, m.p. 73°; *sulphate*, m.p. 98°; *methanesulphonate*, m.p. 115°; *ethanesulphonate*, m.p. 86°; *benzenesulphonate*, m.p. 130° (decomp.); *methionate*, m.p. 113°. Of (V): *hydrochloride*, decomp. 101—102°; *nitrate*, m.p. 101°; *sulphate*, m.p. 119°; *methanesulphonate*, m.p. 122°; *ethanesulphonate*, m.p. 103°; *benzenesulphonate*, m.p. 136° (decomp.); *methionate*, m.p. 115°. Of (VI): *hydrochloride*, decomp. 99°; *nitrate*, m.p. 96°; *sulphate*, m.p. 117°; *methanesulphonate*, m.p. 99°; *ethanesulphonate*, m.p. 98°; *benzenesulphonate*, m.p. 121°; *methionate*, m.p. 111°.

P. G. C.

Ester hydrolysis in pure water.—See this vol., 938.

Highly unsaturated acids in sardine oil. II. Constitution of hiragonic acid, $C_{16}H_{26}O_2$. Y. TOYAMA and T. TSUCHIYA (Bull. Chem. Soc. Japan, 1935, 10, 192—199).—Oxidation of Me hiragonate with $KMnO_4$ gives AcOH, $(CH_2 \cdot CO_2H)_2$, and Me H adipate, whilst ozonolysis affords also MeCHO, $CHO \cdot [CH_2]_4 \cdot CO_2Me$, $CHO \cdot [CH_2]_2 \cdot CO_2H$, and $(\cdot CH_2 \cdot CHO)_2$. Hiragonic acid is Δ^{w} -hexadecatrienoic acid.

F. R. S.

Preparation of pure elaidic acid and the elaidin reaction. C. LUTENBERG (Fettechem. Umschau, 1935, 42, 89—91).—The yield of elaidic acid (I) obtained by the Holde and Rietz-Rankoff method (cf. B., 1924, 264; A., 1931, 1271) depends on the time and temp. of the reaction and on the mount of $NaNO_2$ used. (I), prepared by a modified method (details given) from the "liquid" fatty acids separated from arachis oil fatty acids by Twitchell's method and recryst. from Et_2O and EtOH, had m.p. 44.4—44.6°, I val. 89.95, SCN val. 89, mol. wt. 278, and contained 0.5% of saturated acids. HCN is demonstrable in the volatile products of the elaidinisation reaction.

E. L.

New stereoisomeride of elæostearic acid in pomegranate seed oil. Y. TOYAMA and T. TSUCHIYA (J. Soc. Chem. Ind. Japan, 1935, 38, 182—185B).—*Punicic acid* (I), m.p. 43.5—44°, has been obtained from the oil extracted by Et_2O from pomegranate seeds. When dissolved in light petroleum and kept during a week under CO_2 (but not H_2) (I) is converted into β -elæostearic acid (II), m.p. 70.5—71°. (I) with Br in light petroleum affords a tetrabromide, m.p. 113.5—114°, identical with that obtained from (II). (I) is regarded as a stereoisomeride of (II) of the structure, $Me \cdot [CH_2]_3 \cdot [CH:CH]_3 \cdot [CH_2]_2 \cdot CO_2H$. This has been confirmed by ozonolysis of (I) and its Me ester.

H. G. M.

Another new stereoisomeride of elæostearic acid in the seed oil of karasu-uri, *Trichosanthes cucumeroides*. Y. TOMAYA and T. TSUCHIYA (J. Soc. Chem. Ind. Japan, 1935, 38, 185—187B).—*Trichosaninic acid* (I), m.p. 35—35.5°, has been isolated from the seed oil of karasu-uri. In petroleum under CO_2 or with a trace of I it passes readily into its iso-

meride, β -elæostearic acid (II). (I) with Br in light petroleum affords a tetrabromide, m.p. 113—113.5°, identical with that obtained from (II). H. G. M.

Synthetic fats. I. Preparation of trinonadecylin. D. W. WOOLLEY and R. B. SANDIN (J. Amer. Chem. Soc., 1935, 57, 1078—1079).—*Trinonadecylin*, α -, m.p. 66.5—67°, β -, m.p. 70.5°, and γ - (a glass), m.p. 60°, forms, is prepared. A form of $Me \cdot [CH_2]_{17} \cdot CN$ (modified prep. and hydrolysis) has m.p. 34—34.5°.

R. S. C.

Anodic reactions during the electrolysis of α -hydroxy-acids. E. TOMMILA (Suomen Kem., 1935, 8, B, 25; cf. A., 1934, 739).—Electrolysis of lactic acid in 5N-NaOH (conditions described) gives at the anode a mixture of O_2 , CO, H_2 , CH_4 , C_2H_6 , AcOH, HCO_2H , MeCHO, and CO_2 . The reaction mechanisms are described.

J. L. D.

Acetone [isopropylidene] compounds of α -hydroxy-acids and their Raman spectra. H. ŌEDA (Bull. Chem. Soc. Japan, 1935, 10, 187—192).—Lactic acid and $COMe_2$ give $(H_2SO_4$ under anhyd. conditions) the ether-anhydride $\begin{array}{c} CO-O \\ | \quad | \\ CHMe \cdot O \end{array} > CMe_2$ (I), b.p. 49—49.5°/11 mm.; the anhydrides $\begin{array}{c} CO-O \\ | \quad | \\ CHBu^a \cdot O \end{array} > CMe_2$ (II), b.p. 84.5—85.5°/13 mm., and $\begin{array}{c} CO-O \\ | \quad | \\ CH(CH_2Ph) \cdot O \end{array} > CMe_2$, m.p. 63—64°, are similarly obtained. The Raman spectra of (I) and (II) correspond with those of a 5-membered saturated ring.

Kinetic studies of the cyclisation problem, with regard to the preparation of lactones with musk and amber odours. M. STOLL and A. ROUVÉ (Rev. Marques Parfum. Savonn., 1934, 12, 328—334; Chem. Zentr., 1935, i, 810).—The influence of the catalyst on the lactonisation of ω -OH-acids is limited, since the frequency of cyclising collisions is independent of the catalyst. ξ -Hydroxypentadecioic acid is best lactonised by means of $PhSO_3H$ in C_6H_6 . Higher lactones, such as "exaltolide" (94% yield by the above process), are valuable in perfumery.

H. N. R.

Pyrolysis. II. Pyrolysis of derivatives of α -acetoxyisobutyric acid, and related substances. R. BURNS, D. T. JONES, and P. D. RITCHIE (J.C.S., 1935, 714—717; cf. this vol., 607).—*Me α -acetoxyisobutyrate*, b.p. 76—77°/18 mm. [obtained from *Me α -hydroxyisobutyrate* (I)], affords on pyrolysis AcOH and *Me α -methylacrylate* (II). Similarly *β -methoxyethyl α -acetoxyisobutyrate*, b.p. 105°/12 mm. [obtained from acetone cyanohydrin (III)], *β -methoxyethyl alcohol*, and H_2SO_4 , followed by acetylation], affords AcOH and *β -methoxyethyl α -methylacrylate*, b.p. 88—89°/20 mm.; and *β -phenoxyethyl α -acetoxyisobutyrate*, b.p. 166°/4 mm. (obtained similarly through *β -phenoxyethyl α -hydroxyisobutyrate*, b.p. 156—157°/5 mm.), affords *β -phenoxyethyl α -methylacrylate*, b.p. 138°/7 mm. The polymerisation of the methylacrylic esters is described.

(III) with Ac_2O and AcCl (or H_2SO_4) gives *α -acetoxyisobutyronitrile* (IV), but with $HClO_4$ as catalyst (IV) and *N-acetyl- α -acetoxyisobutyramide* (V), m.p. 81—82°, b.p. 120—130°/13 mm., are formed.

On pyrolysis (IV) gives α -methylacrylonitrile (VI) and some COMe_2 and HCN (the proportion of these two products increases with rise in temp.), whilst (V) gives AcOH and (VI). *Me* α -benzoyloxyisobutyrate, b.p. $156^\circ/19$ mm., is pyrolysed to (II) and BzOH , whilst *Me* α -chloroisobutyrate, b.p. $133\text{--}135^\circ/760$ mm., gives some HCl and (II). On pyrolysis (III) gives COMe_2 and HCN , and (I) gives some COMe_2 and (II). H. G. M.

Preparation of oxalic acid from sodium formate. V. M. SEMENOV, A. J. SCHAGALOV, and P. I. ASTRACHANTZEV (J. Appl. Chem. Russ., 1935, 8, 99—105).—The method of Merz and Weitz (A., 1881, 18) gives 83%, and that of Koepp (A., 1906, i, 4) 95%, yields. The latter method is studied in detail. R. T.

Reaction between sodium sulphate and oxalic acid. K. TANEMURA and S. MIYOSHI (J. Soc. Chem. Ind. Japan, 1935, 38, 188b).— $\text{H}_2\text{C}_2\text{O}_4$ reacts with conc. aq. Na_2SO_4 solutions containing H_2SO_4 , giving $\text{NaHC}_2\text{O}_4 \cdot \text{H}_2\text{O}$ as solid phase. MgSO_4 or $(\text{NH}_4)_2\text{SO}_4$ remains in solution, but ZnSO_4 interferes. J. S. A.

Condensation of aldehydes with malonic acid in presence of organic bases. III. Condensation of salicylaldehyde with ethyl malonate. P. N. KURIEN, C. J. PETER, and K. C. PANDYA (Proc. Indian Acad. Sci., 1935, 1, A, 775—779).—Using $\text{C}_5\text{H}_5\text{N}$ as catalyst, the max. yield (55%) of Et coumarincarboxylate is secured when equimol. proportions of $\text{CH}_2(\text{CO}_2\text{Et})_2$ and *o*-OH- $\text{C}_6\text{H}_4\cdot\text{CHO}$ are treated with 0.15 mol. of $\text{C}_5\text{H}_5\text{N}$ at 100° for 18 hr. and then kept at room temp. for 3 days. Quinoline, isoquinoline, lutidine, α -naphthaquinoline, and quinaldine are somewhat less efficient, whereas cinchonidine (0.14 mol.) gives equally good results. H. W.

Reactivity of alkylmalonic esters. M. GRUNFELD (Bull. Soc. chim., 1935, [v], 2, 994—996).—The velocity of reaction between $\text{CR}'\text{R}''(\text{CO}_2\text{Et})_2$ (I) ($\text{R}'\text{R}''=\text{H}_2$, PrH , Pr_2 , BuH , and Bu_2) and *n*-octylamine in EtOH under seal at 100° has been studied. The reactivity of (I) decreases as its absorption in the ultra-violet diminishes (cf. A., 1930, 452; 1932, 365). H. G. M.

Structure of glutaryl chloride. S. G. P. PLANT and (Miss) M. E. TOMLINSON (J.C.S., 1935, 856).—Both forms of glutaryl chloride (I) are involved in its interaction with AlCl_3 and anisole, since a mixture of $\alpha\gamma$ -dianisoylpropane, m.p. 99° , and $\delta\delta$ -di-*p*-anisylvalerolactone, m.p. $111\text{--}113^\circ$, is obtained. Similarly, (I) with AlCl_3 and phenetole gives a mixture of $\alpha\gamma$ -diphenetoylpropane, m.p. 133° , and $\delta\delta$ -di-*p*-phenetoylvalerolactone, m.p. 82° . Glutaric anhydride and AlCl_3 with anisole gives γ -anisoylbutyric acid, m.p. 137° , and with phenetole γ -phenetoylbutyric acid, m.p. 114° , is obtained. P. G. C.

New reaction of tartaric acid. M. PESEZ (J. Pharm. Chim., 1935, [viii], 21, 542—546).—Addition of 0.1 c.c. of a solution containing 2 g. of resorcinol (I) and 10 g. of KBr in 100 c.c. of $\text{H}_2\text{O} + 1$ c.c. of H_2SO_4 to 0.1 c.c. of a tartrate solution in 2 c.c. of H_2SO_4 (d 1.84) and warming to 100° (2—5 min.) affords an intense blue colour, changed to currant-red by addition of 1 c.c. of H_2O , and giving a fugitive violet coloration

when neutralised. The reaction is sp. for tartaric acid (sensitivity 0.1 mg.) and for (I) (other phenols give different colours), is unaffected by BrO_3' , NO_2' , or Fe''' , but is negative in presence of OCl' , ClO_3' , NO_3' , MnO_4'' (all eliminated by Zn-Cu couple), I' , IO_3' , or CrO_4'' . $\text{CCl}_3\cdot\text{CHO}$ gives the same blue colour, but is easily removed by previous alkaline hydrolysis. J. W. B.

Complex formation between manganese or aluminium with tartaric acid in alkaline medium. S. P. GOVEL and B. L. VAISHYA (J. Indian Chem. Soc., 1935, 12, 193—196; cf. A., 1934, 615).—From polarimetric and potentiometric measurements of solutions of K tartrate (I), alkali, and MnCl_2 or $\text{Al}_2(\text{SO}_4)_3$ it is inferred that complexes containing Mn and (I) in the mol. ratio 1 : 1, and Al and (I) in the ratio 2 : 3 (cf. A., 1933, 240), are formed. H. G. M.

Cyclisation of $\alpha\beta$ -ethanedimalonic esters by sodium ethoxide. E. R. MEINCKE, R. F. B. COX, and S. M. McELVAIN (J. Amer. Chem. Soc., 1935, 57, 1133—1135).— $(\text{CH}_2\text{Br})_2$ and Et_2 magnesiomalonnate give $[\text{CH}_2\text{CH}(\text{CO}_2\text{Et})_2]_2$ and Et_4 1 : 1 : 4 : 4-cyclohexanetetra-carboxylate, b.p. $195\text{--}207^\circ/15$ mm., m.p. $76\text{--}77^\circ$ [giving the acid, m.p. $249\text{--}250^\circ$ (decomp.)], and thence hexahydroterephthalic acid, m.p. $172\text{--}173^\circ$. The former ester with NaOEt , first at $85^\circ/760$ mm. and then at $120^\circ/200$ mm., gives Et_2 cyclopentanone-2 : 5-dicarboxylate (31%), Et cyclopentanone-2-carboxylate (15%), Et_2CO_3 , and a trace of EtOH. Et_4 *n*-hexane- $\alpha\delta\delta$ -tetra-carboxylate [from NaOEt , $\text{CH}_2(\text{CO}_2\text{Et})_2$, and $(\text{CO}_2\text{Et})_2\text{C}(\text{Et})\cdot\text{CH}_2\cdot\text{CH}_2\text{Br}$], b.p. $192\text{--}195^\circ/8$ mm., with NaOEt at 115° gives 74.3% of Et_2 2-ethylcyclopentanone-2 : 5-dicarboxylate, m.p. $147\text{--}154^\circ/8$ mm. (hydrolysed to 2-ethylcyclopentanone), Et_2CO_3 , and a little EtOH. Et_4 *n*-octane- $\gamma\gamma\zeta\zeta$ -tetra-carboxylate is largely unchanged by NaOEt even at 250° (gives a little Et_2CO_3 and EtOH). Cyclisation, therefore, requires presence of an α -H and probably proceeds by way of $\text{CH}_2\text{--C}(\text{CO}_2\text{Et})_2 > \text{C}(\text{OH})\cdot\text{OEt}$ ($\text{R}=\text{H}$ or Et) with subsequent elimination of CO_2Et and the ketal OEt to form Et_2CO_3 . R. S. C.

The two β -sulphoacrylic acids. H. J. BACKER and A. E. BEUTE (Rec. trav. chim., 1935, 54, 523—530).— $(\text{NH}_4)_2\text{SO}_3$ converts *cis*- β -chloroacrylic acid into *trans*- β -sulphoacrylic acid (I), also obtained from propiolic acid. The *Ba*, *K*, *Tl*, and NH_3Ph , m.p. $117\text{--}118^\circ$ (decomp.), salts are described. Similarly, *trans*- β -chloroacrylic acid affords *cis*- β -sulphoacrylic acid (II) ($+1\text{H}_2\text{O}$), m.p. $82\text{--}84^\circ$, ($+2\text{H}_2\text{O}$) m.p. about $87\text{--}88^\circ$ (*Ba* and NH_3Ph , decomp. $155\text{--}158^\circ$ after becoming discoloured at $120\text{--}130^\circ$, salts). Hydrogenation of (I) or (II) gives β -sulphopropionic acid. P. G. C.

β -Sulphocrotonic acid. H. J. BACKER and A. E. BEUTE (Rec. trav. chim., 1935, 54, 551—560).—The action of HSO_3' on salts of α -bromo- (I), α -bromois- (II), β -chloro-, or β -chlorois-*crotonic* acid gives the same β -sulphocrotonic acid (III), m.p. $94\text{--}95^\circ$ [*Ba*, *K*, and NH_3Ph , m.p. $191\text{--}192^\circ$ (decomp.)], salts, hydrogenated to β -sulphobutyric acid, which can be resolved into its optical antipodes by

brucine. Treatment of (III) with the requisite halogen affords α -bromo- β -sulphocrotonic acid (*Ba* and *quinine*, m.p. 157—158°, salts) and α -chloro- β -sulphocrotonic acid [*quinine* salt, m.p. 176° (decomp.)]. (I) or (II) yield *Et* α -bromocrotonate, b.p. 192°/760 mm., when esterified with EtOH and H₂SO₄ or when their Ag salts are treated with EtI. P. G. C.

$\beta\beta$ -Disulphoglutaric acid. J. M. VAN DER ZANDEN (Rec. trav. chim., 1935, 54, 561—565).— $\beta\beta$ -Disulphoglutaric acid, m.p. 162° (decomp.), has been obtained from H sulphite and sulphoglutaconic acid, β -chloroglutaconic acid, or glutinic acid. The *Ba*, *K*, *Pb*, *Tl*, *Sr*, *Ca*, *Ag*, *tri-aniline*, and *di*- and *tri*-strychnine salts are described. The Na salts from either of the strychnine salts were optically inactive. P. G. C.

Disproportionation reaction of diselenides. A. FREDGA (Arkiv Kemi, Min., Geol., 1935, 11, B, No. 46, 1—6).—An aq. solution of $\alpha\alpha$ -diselenodipropionic acid (I) with Ag₂SO₄ and H₂SO₄, Ag₂O and NaOH, or AgCl and NaOH (but not Ag metal) undergoes disproportionation and affords a mixture of AgSe·CHMe·CO₂H and AgSe·CHMe·CO₂Ag, whilst the solution contains α -seleninopropionic acid. Hg salts and (I) give a complex white ppt. It is possible that the following equilibrium obtains: $2(\text{SeR})_2 + 2\text{H}_2\text{O} \rightleftharpoons 3\text{R} \cdot \text{SeH} + \text{R} \cdot \text{SeO}_3\text{H}$ ($\text{R} = \cdot\text{CHMe} \cdot \text{CO}_2\text{H}$); the equilibrium lies to the left, but on the addition of a Ag salt, one of the products is removed as an insol. Ag salt. An alternative mechanism involving oxidation of (I) by Ag⁺ is not, however, excluded.

H. G. M.

Configurative relationship between optically active selenodipropionic acid and α -thiodipropionic acid. A. FREDGA (Arkiv Kemi, Min., Geol., 1935, 11, B, No. 43, 1—6).—Se(CHMe·CO₂H)₂, m.p. 147°, has been resolved into its optical antipodes (I), m.p. 124°, [α]_D +234.5°, and (II) [α]_D -235° in 0.4*N*-HCl. The fusion diagrams of (I) and (II), (I) and (+)-thiodipropionic acid (III), (I) and (-)-thiodipropionic acid (IV), and (III) and (IV) are given. (I) and (III) form a continuous series of mixed crystals, whilst (I) and (IV) form a 1:1 mol. compound [optically active racemate (cf. A., 1921, ii, 598)]. It is concluded that (I) and (III) have the same configuration. The respective S and Se acids are regarded as isomorphous. H. G. M.

Interaction of diselenodicarboxylic acids with mercury. A. FREDGA (Arkiv Kemi, Min., Geol., 1935, 11, B, No. 44, 1—4).—The compound Hg(Se·CH₂·CO₂H)₂ (I), decomp. 120°, or its alkali salts, is obtained when a solution of (Se·CH₂·CO₂H)₂ (II) (A., 1929, 1285), or its alkali salts, respectively, is shaken with Hg. Hg(S·CH₂·CO₂H)₂ could not be prepared in a similar way. (I) suspended in dil. H₂SO₄ may be titrated: $\text{Hg}(\text{Se} \cdot \text{CH}_2 \cdot \text{CO}_2\text{H})_2 + 2\text{I}^- + 2\text{KI} = (\text{Se} \cdot \text{CH}_2 \cdot \text{CO}_2\text{H})_2 + \text{K}_2\text{HgI}_4$. Homologues of (II) also react readily with Hg. Neutralised solutions of (II) dissolve Cu (but not Ag) and the resulting *Cu* compound is pptd. by addition of H₂SO₄ as an amorphous yellow ppt. The Hg in (I) is not pptd. by alkali or KI, or by H₂S except after a long time. The salts of (I) give a black ppt. with (NH₄)₂S. (I) is sol. in aq. KCN and is repptd. unchanged by the

addition of HCl. The *alkali*, *Pb*, *Ba*, *Ca*, *Sr*, *Mn*, *Zn*, *Cu*, *Cr*, *Ag*, *Fe*^{II}, *Te*^{III}, *Ni*, *Co*, *Bi*, and *Hg* salts are described. H. G. M.

Schiff colour reaction of aldehydes. P. RUMPF (Ann. Chim., 1935, [xi], 3, 327—442).—An historical account of the application and theory of the Schiff colour reaction is given. Reagents other than fuchsin, H₂O, and SO₂ fail to give the colour, whilst O does not enter into the reaction. The influence of different concns. of SO₂, aldehydes, etc. has been studied spectrographically. The reaction is not due to fuchsin or Schiff's bases, and is produced only by the combined action of SO₂ and a substance containing free CHO on aq. fuchsin. Aldoses liberate fuchsin. The absorption max. (5600—5850 Å.) is sp. for a given aldehyde only under strictly defined conditions. In buffer experiments, reaction is independent of the type of buffer used and is governed only by the *p*_H. The spectrographic data indicate that the no. of acid substituents in the NH₂ groups of the coloured complex (I) is variable. The rate of formation of (I), determined by a photo-electric cell, is initially $\propto t^2$ and approx. $\propto [\text{SO}_2]^2$, but decreases with increasing [H⁺]. Electrometric titrations with the glass electrode indicate the formation of strong monobasic acids in solutions containing SO₂ and aldehydes, but the titration curve of H₂SeO₃ is unaffected. Compounds of the type NHR·SO₂H could not be detected in dil. solutions of amines and SO₂. Addition of an aldehyde to SO₃^{''} solutions of aromatic amines produces strong complex acids containing one mol. of each constituent. Dissociation consts. of NH₂-derivatives of C₆H₆ and CHPh₃ indicate that (I) is a carbonium ion (II), basicity being conferred on the central C by the *p*-NH₂ groups. The decolorisation of various CHPh₃ dyes has been studied. The concn. of colourless -NH₃⁺ relative to coloured (II) $\propto [\text{H}^+]^n$, where *n* is the no. of *p*-NH₃⁺ groups. In the Schiff reagent, the H₂SO₃ may combine further with (II) itself. It is suggested that (I) consists of a univalent (II) containing a variable no. of ionisable CHR·SO₃H substituents in the NH₂ groups. R. S.

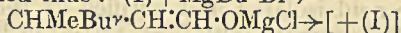
Separation of formaldehyde from hexamethylenetetramine at different hydrogen-ion concentrations and constant temperature. E. PHILIPPI and J. LOBERING (Biochem. Z., 1935, 277, 365—375).—The kinetics of the breakdown of (CH₂)₆N₄ into CH₂O and NH₃ in various buffer solutions of different *p*_H are investigated and a series of curves and velocity coeffs. summarise the results. P. W. C.

Limits of aldol condensation of acetaldehyde. E. A. SCHILOV (J. Appl. Chem. Russ., 1935, 8, 93—98).—Aldol and MeCHO afford a readily dissociable additive compound, $\text{CHMe} \begin{smallmatrix} \text{O} \\ \diagup \quad \diagdown \\ \text{CH}_2 \cdot \text{CH}(\text{OH}) \end{smallmatrix} \text{CHMe}$, to the formation of which is ascribed the spurious equilibrium found in the aldol condensation. R. T.

Constitution of aldols. M. BACKES (Compt. rend., 1935, 200, 1669—1671; cf. A., 1933, 1050).—Acetaldo (I) in H₂O or aq. HCl (but not in C₅H₅N) shows a strong absorption band at 2800 Å., characteristic of CO⁺, which shows that the cyclic structure for (I) is favoured in non-aq. solutions. The ring is

opened easily by many aldehydic reagents, but its presence explains the thermal decomp. of (I) mainly to give 2 mols. of MeCHO, and not predominantly an unsaturated aldehyde. Propion-, iso- and *n*-butan-, and heptan-aldol, when heated, also decompose to give 30–60% of saturated and some unsaturated aldehyde, also polymerides. In presence of H₂O, the open-chain decomp. occurs almost exclusively. J. L. D.

Action of organomagnesium halides on $\alpha\beta$ -unsaturated aldehydes. P. G. STEVENS (J. Amer. Chem. Soc., 1935, 57, 1112–1117).—Only traces of 1:4-addition of MgRCl to CHMe:CH:CHO (I) occur when R=Ph, Et, Pr^a, allyl, or Pr ^{β} , but considerable amounts (> 20%) when R=Bu ^{γ} or *tert*-amyl. MgBu ^{γ} Br gives 11% of 1:4-addition. MgBu ^{γ} Cl gives also a substance, C₁₆H₃₀O, b.p. 96.3–97.9°/1 mm., unstable, and ? $\alpha\alpha$ -dimethyl- δ -($\alpha'\beta'\beta'$ -trimethylpropyl)- Δ^2 -octene- γ -diol (II), m.p. 128–129°, probably formed thus: (I) + MgBu ^{γ} Br \rightarrow



CHO:CH:EtBu ^{γ} :CH(OMgCl):CH:CHMe \rightarrow (+ MgBu ^{γ} Cl; + H₂O) (II). The amount of 1:4-addition may thus be considerably > estimated for MgBu ^{γ} Cl and also for Mg *tert*-amyl chloride (which gives substances, b.p. 84–89°/3 mm. and 120–121°/2 mm., respectively) and MgPr ^{β} Cl, which all give > 34% of complex products. Mesityl oxide and MgBu ^{γ} Cl give no 1:4-addition, but this occurs to the extent of 41.4 and 54% with CHMe:CH:COMe and MgEtCl and MgBu ^{γ} Cl, respectively. The results are inexplicable. The following are described. $\beta\gamma\gamma$ -Trimethylvaleraldehyde, b.p. 56–57°/19 mm. (semicarbazone, m.p. 166°), oxidised by Ag₂O to the acid, b.p. 124–124.5°/19 mm. (amide, m.p. 163–164°), which yields (P, Br, MeOH) *Me* α -bromo- $\beta\gamma\gamma$ -trimethylvalerate, b.p. 90.5–91°/8 mm., converted by NPhEt₂ at 190–200° into *Me* $\beta\gamma\gamma$ -trimethyl- Δ^2 -pentenoate, b.p. 184–186°/765 mm., which with O₃ in AcOH affords CHO:CO₂Me and COMeBu ^{γ} . $\alpha\alpha$ -Dimethyl- Δ^8 -hexen- γ -ol, b.p. 75–76°/36 mm., the *H* phthalate of which with strychnine affords the *d*-form, [α]_D²⁵ +15°. $\beta\gamma\gamma$ -Trimethylhexaldehyde semicarbazone, m.p. 172°. β -Methyl- and $\beta\gamma$ -dimethyl-valeraldehyde semicarbazones, m.p. 128–129° and 136–137°, respectively. α -Phenyl- Δ^2 -buten- α -ol, b.p. 91–92°/0.5 mm., m.p. 33–35°. $\delta\epsilon\epsilon$ -Trimethylhexan- β -one, b.p. 72°/20 mm. [semicarbazone, m.p. 200–201° (decomp.)]. $\alpha\alpha\beta\epsilon$ -Tetramethyl- Δ^8 - γ -ol, b.p. 66.5–68°/11 mm., 178–180°/760 mm. (unchanged), dehydrated by I to a? *hexadiene*, b.p. 146–153°. R. S. C.

Hydrogenation of a mixture of two α -ethylenic aldehydes. General method of synthesis of glycols, OH:CHR:CHR':OH. J. WIEMANN (Bull. Soc. chim., 1935, [v], 2, 1209–1214).—Reduction of a mixture of two $\alpha\beta$ -unsaturated aldehydes by a Zn–Cu couple gives most mixed glycol if the rate of reduction of the two aldehydes is similar and if the nature of the aldehydes is diverse. Reduction proceeds by formation of :CHR:OH and coupling of two such residues. It leads to both stereoisomerides. Citral, which alone gives an *oxide*, C₂₀H₃₂O, b.p. 181–182°/9 mm., with CH₂:CH:CHO (I) or CHMe:CH:CHO (II) in aq. EtOH gives the products previously described (this vol.,

608) as formed in AcOH. A mixture of (I) and (II) gives Griner's [CH₂:CH:CH(OH):]₂ (III), Charon's [CHMe:CH:CH(OH):]₂ (IV), and a mixture of isomeric $\gamma\delta$ -dihydroxy- $\Delta^{\alpha\epsilon}$ -heptadienes, b.p. 111°/12 mm., hydrogenated (colloidal Pd) to heptane- $\gamma\delta$ -diol, b.p. 109°/15 mm., m.p. 103–104° (lit., 98–99°). (I) (4 mols.) and furfuraldehyde (V) (3 mols.) give (III) (15%) and a mixture of 2- $\alpha\beta$ -dihydroxy- $\Delta\gamma$ -butenylfurans (40%), b.p. 115–116°/3 mm. (stereoisomeric phenylurethanes, m.p. 189° and 116–118°, respectively). (II) and (V) yield (IV) (10%) and mixed 2- $\alpha\beta$ -dihydroxy- $\Delta\gamma$ -pentenylfurans [stereoisomeric phenylurethanes, m.p. 222–223° (block) and > 220°, respectively]. (I) and PhCHO give stereoisomeric α -phenyl- $\Delta\gamma$ -butene- $\alpha\beta$ -diols (cf. this vol., 750). R. S. C.

Successive reactions in heterogenous catalysis. III. Mechanism of the formation of acetone from acetaldehyde and water. M. J. KAGAN, I. A. SOBOLEV, and G. D. LUBARSKI (Ber., 1935, 68, [B], 1140–1146).—When the vapours of anhyd. EtOH or MeCHO are passed over Cu, Cu+Cr₂O₃, ZnO, or ZnO+Cr₂O₃ at 300–350° ester is produced in definite amount. If the reactants are previously mixed with steam the content of ester decreases, whilst that of AcOH increases. At temp. > 400° COMe₂ is obtained in place of AcOH. The intermediate production of EtOAc in the prep. of COMe₂ from MeCHO and H₂O is therefore regarded as established. At 300–600° MeCHO yields CO and CH₄; formation of H and keten is not observed. Anhyd. EtOAc is converted at 400° in presence of ZnO+Cr₂O₃ into COMe₂, EtOH, C₂H₄, and CO₂. Anhyd. EtOH similarly affords COMe₂ through decomp. of the intermediate EtOAc. Aq. EtOAc at 450° also affords COMe₂, but the process involves hydrolysis of the ester. H. W.

Influence of hydrogen sulphite solutions on mono- and di-hydroxyacetone at raised temperature. G. MENZINSKY (Ber., 1935, 68, [B], 1154–1159).—Acetol is partly resinified and partly oxidised to HCO₂H and AcOH when heated with aq. NaHSO₃ at 130°. Since it is little affected when heated with H₂O or H₂SO₄ the change is not due to H⁺, but is a sp. action of NaHSO₃. Under similar conditions CO(CH₂:OH)₂ affords HCO₂H and OH:CH₂:CO₂H. H. W.

Hydrazone and osazone reactions. E. G. R. ARDAGH and F. C. RUTHERFORD (J. Amer. Chem. Soc., 1935, 57, 1085–1088; cf. A., 1932, 377).—The formation of *d*-glucose-, fructose-, and *d*-galactose-phenylhydrazone is very slow in unbuffered solutions, increases tenfold as the buffer concn. rises to 0.3M, is much greater with PO₄^{'''} than with OAc['] buffers, and rises with change of *p*_H from 7.5 to 4.0. The reaction is bimol. (cf. lit.). Osazone formation is similar. Only that portion of the NHPh:NH₂ present as salt reacts (cf. lit.). R. S. C.

Transformation of glucose into galactose and gulose by simple optical inversion. J. W. H. OLDHAM and G. J. ROBERTSON (J.C.S., 1935, 685–689).—The following experiments support the view (cf. A., 1934, 871) that anhydro-formation is the necessary precursor of the inversion of glucose into gulose and galactose (this vol., 329). Diisopropylideneglucose 3-*p*-toluenesulphonate affords diisopropyl-

ideneglucose, m.p. 107—108°, on boiling with KOH-EtOH. 6-Triphenylmethyl-2:3-dimethyl- α -methylglucoside 4-*p*-toluenesulphonate, m.p. 146—147°, $[\alpha]_D^{20} +66.3^\circ$ in CHCl_3 , is hydrolysed by NaOMe to (I), and after removal of CPh_3 is hydrolysed (NaOMe-MeOH- H_2O) to 2:3-dimethyl- α -methylglucoside and a trace of an unsaturated substance (probably a derivative of glucose). 6-Triphenylmethyl- α -methylglucoside 2:3-dibenzoate 4-*p*-toluenesulphonate, m.p. 163—164°, $[\alpha]_D^{20} +66.3^\circ$ in CHCl_3 , is converted by NaOH, H_2O , and COMe_2 , and then Ac_2O and $\text{C}_5\text{H}_5\text{N}$, into an amorphous compound considered to be 6-triphenylmethyl-3:4-anhydro- α -methylgalactoside 2-acetate. This with HCl and COMe_2 gives a mixture containing isopropylidene- α -methylglucoside acetate (II), m.p. 176—178°, $[\alpha]_D^{20} +76.8^\circ$ in CHCl_3 , and isopropylidene- α -methylgalactoside acetate (III), m.p. 101—102°, $[\alpha]_D^{20} +127.3^\circ$ in CHCl_3 . (II) is deacetylated to isopropylidene- α -methylglucoside (IV), m.p. 132—133°, $[\alpha]_D^{20} +88.5^\circ$ in CHCl_3 , hydrolysed by 0.02*N*- H_2SO_4 to the free sugar. (IV) with 0.002*N*- H_2SO_4 affords α -methylglucoside, m.p. 77—79°, $[\alpha]_D^{20} +109.7^\circ$ in H_2O . (III) is deacetylated to isopropylidene- α -methylgalactoside, m.p. 102—104° (cf. this vol., 329), $[\alpha]_D^{20} +147.9^\circ$ in CHCl_3 , $+168.6^\circ$ in H_2O , hydrolysed (dil. AcOH) to α -methylgalactoside. Further 4:6-benzylidene- α -methylglucoside 3-benzoate 2-*p*-toluenesulphonate affords on alkaline hydrolysis a 4:6-benzylidene-2:3-anhydro- α -methylhexoside, converted by NaOMe into a methyl-4:6-benzylidene- α -methylhexoside, which is not a derivative of glucose.

H. G. M.

Walden inversion in the sugar group. I. Fission of 3:4-anhydro- β -methylhexoside. A. MÜLLER (Ber., 1935, 68, [B], 1094—1097).—Treatment of the anhydro- β -methylhexoside (I) (obtained by hydrolysis of β -methylglucoside triacetate 4-*p*-toluenesulphonate (A., 1930, 1411; 1934, 513) with *N*- H_2SO_4 leads to a non-cryst. mixture of sugars from which *d*-glucosazone and *d*-gulosazone are isolated. (I) is either an anhydroglucoside or, if Walden inversion occurs during elimination of *p*- $\text{C}_6\text{H}_4\text{MeSO}_2$, an anhydrogalactoside. The balance of evidence favours the latter supposition, since the product does not appear to contain the oxide ring in the *trans* position, as it is stable towards boiling Ac_2O . The formation of galactosazone could not be established. The presence of gulose among the products of hydrolysis confirms the 3:4-position of the ring and its (*ll*)-*cis* configuration.

H. W.

Reagent for eliminating interference due to calcium in volumetric Fehling's titration for invert sugar. J. G. N. GASKIN (Analyst, 1935, 60, 318—319).— Ca^{++} is rendered inert by addition of Na hexametaphosphate (Calgon).

E. C. S.

Additive compounds of the carbohydrates. II. Potassium hydroxide-sucrose. E. G. V. PERCIVAL (J.C.S., 1935, 648—653; cf. A., 1934, 1092).—Sucrose (I) (or its octa-acetate), EtOH, and KOH afford the compound (II), $\text{C}_{12}\text{H}_{22}\text{O}_{11} \cdot 3\text{KOH}$, which with dry Me_2SO_4 yields much (I) and a trimethylsucrose, acetylated to a penta-acetate which is hydrolysed to 6-methylglucopyranose and 1:6-dimethylfructofuranose. In (II), therefore, one KOH is associated

(by co-ordination) with each of the three primary alcohol groups of (I). H. G. M.

Disaccharides in "hydrol." G. H. COLEMAN, (Miss) M. A. BUCHANAN, and P. T. PAUL (J. Amer. Chem. Soc., 1935, 57, 1119—1121).—Methylation (Me_2SO_4 -NaOH and Ag_2O -MeI) of the non-fermentable portion of "hydrol" (I) (the residue from the commercial hydrolysis of maize-starch) gives 20% of heptamethyl- β -methylgentiobioside and 80% of an oily octamethyl-disaccharide, $[\alpha]_D^{20} +80^\circ$ in EtOH, hydrolysed to 2:3:4-trimethyl- and 2:3:4:6-tetramethyl-glucose. (I) may, therefore, contain 6- α -glucosidoglucose.

R. S. C.

Polysaccharides. IX. Hydrolysis of "xyloglucuronide" and the isolation of the new disaccharide "barium xyloglucuronate." K. NISHIDA and H. HASHIMA (Bull. Agric. Chem. Soc. Japan, 1935, 11, 66—69).—Hydrolysis of xyloglucuronide yields xylose, glucuronic acid, and xyloglucuronic acid isolated and purified as the Ba salt $\text{C}_{22}\text{H}_{34}\text{O}_{22}\text{Ba}$, decomp. 180°, $[\alpha]_D^{20} +54.8^\circ$ in H_2O . No other hexoses or pentoses could be detected.

J. N. A.

Emulsin. XXI. Influence of substitution in the benzene nucleus of phenol- β -*d*-glucosides on their ease of fission with enzymes. B. HELFERICH, H. E. SCHEIBER, R. STREECK, and F. VORSATZ (Annalen, 1935, 518, 211—225).—With aq. EtOH-KCN *o*-bromo-*o*- and -*p*-cresol- β -*d*-glucoside tetra-acetate afford, respectively, the Ac_4 derivative, m.p. 143—145°, $[\alpha]_D^{20} -15.17^\circ$ in CHCl_3 , of *o*-(I), m.p. 170—175° (corr.), $[\alpha]_D^{20} -86.6^\circ$ in H_2O (deacetylation by NH_3 -MeOH), and *p*-cyanomethylphenol- β -*d*-glucoside (II), m.p. 159.5—161.5° (corr.), $[\alpha]_D^{20} -71.4^\circ$ in H_2O (Ac_4 derivative, m.p. 134—136°, $[\alpha]_D^{20} -19^\circ$ in CHCl_3). Hydrolysis of (I) and (II) with 2*N*-NaOH affords, respectively, *o*- (only as its Na salt, decomp. above 207°, $[\alpha]_D^{20} -52^\circ$ in H_2O) and *p*-carboxymethylphenol- β -*d*-glucoside, m.p. 190—193° (corr.), $[\alpha]_D^{20} -63^\circ$ in H_2O {Na salt, $[\alpha]_D^{20} -54.9^\circ$ in H_2O ; Me ester, sinters 106°, m.p. 121—124° (corr.)}. By heating the appropriate phenol with β -glucose penta-acetate and a dehydrating agent (ZnCl_2 , *p*- $\text{C}_6\text{H}_4\text{MeSO}_3\text{H}$) at 100°, or with tetra-acetylglucosidyl bromide and NaOH-aq. COMe_2 , and subsequent deacetylation are obtained 2:4-dimethylphenol-, m.p. 181—183.5° (corr.), $[\alpha]_D^{20} -65^\circ$ in H_2O (Ac_4 derivative, m.p. 171—173°, $[\alpha]_D^{20} -24^\circ$ in CHCl_3), *o*-, m.p. 157—158° (corr.), $[\alpha]_D^{20} -65^\circ$ in H_2O [Ac_4 derivative, m.p. 152—154° (corr.), $[\alpha]_D^{20} -28^\circ$ in CHCl_3], and *p*-ethylphenol-, m.p. 164—166° (corr.), $[\alpha]_D^{20} -65.4^\circ$ in H_2O [Ac_4 derivative, m.p. 146—147° (corr.) $[\alpha]_D^{20} -16^\circ$ in CHCl_3]; *o*-hydroxyacetophenone-, m.p. 152—154° (corr.), $[\alpha]_D^{20} -66.5^\circ$ in H_2O ; protocatechualdehyde-, m.p. 172—174°, $[\alpha]_D^{20} -93^\circ$ in H_2O (Glaser *et al.*, A., 1923, i, 820, give m.p. 73—74°, $[\alpha]_D^{20} -36.2^\circ$ in H_2O) [Ac_4 derivative, m.p. 180° (corr.), $[\alpha]_D^{20} -53^\circ$ in EtOH] (glucose residue is in the 4-position, since methylation gives the vanillin compound); iso-vanillin-, m.p. 174—175° (corr.), $[\alpha]_D^{20} -108.4^\circ$ in H_2O [Ac_4 derivative, m.p. 141—142° (corr.), $[\alpha]_D^{20} -28^\circ$ in CHCl_3]; 3-hydroxy-4-ethoxyphenol-, m.p. 169.5° (corr.), $[\alpha]_D^{20} -90^\circ$ in H_2O buffered to $p_H 5.0$ [Ac_4 derivative, m.p. 164° (corr.), $[\alpha]_D^{20} -33^\circ$ in

CHCl_3], β -*D*-glucoside; *protocatechualdehyde*- β -*D*-glucoside, m.p. 202–203° (corr.), $[\alpha]_D^{20}$ –109.4° in H_2O [Ac_8 derivative, dimorphous, m.p. 180° (corr.) and 168.5°, $[\alpha]_D^{20}$ –72° in CHCl_3], *o*-cresol- α -*D*-, + H_2O and anhyd., polymorphous, m.p. varies between 75° and 121°, $[\alpha]_D^{20}$ +188° in H_2O (Ac_4 derivative, m.p. 86–88.5°, $[\alpha]_D^{20}$ +173° in CHCl_3), and *vanillin*- β -*D*-galactoside, m.p. 203–205° (corr.), $[\alpha]_D^{20}$ –65° in H_2O [Ac_4 derivative, m.p. 126–127° (corr.), $[\alpha]_D^{20}$ –28° in CHCl_3], are similarly prepared. Ease of fission of the above with emulsin at p_{H} 5.0 does not run parallel to HCl-hydrolysis. Fission is promoted by *o*-Me or -Et (Me \gg Et), and retarded by *p*-Me or -Et. Unlike NH_2 a *p*- CO_2H (or CO_2Et) has no retarding action. The most effective substituents for accelerating fission are $\text{CH}_2\text{CN} < \text{COMe} < \text{CHO}$. Parallel results are obtained with β -*D*-glucosides and β -*D*-galactosides. J. W. B.

Hydrolysis and oxidation of salicoside.—See this vol., 1042.

Amyloses. Corn α -amylose and retrograded β -amylose. T. C. TAYLOR and S. G. MORRIS (J. Amer. Chem. Soc., 1935, 57, 1070–1072).—When a 3% clear dispersion of maize β -amylose (I) (the sol. portion of the whole starch) is frozen, then warmed to room temp., and finally boiled for 10 min., retrograded β -amylose (II) remains insol. Prolonged boiling of (II) in H_2O gives some material in solution indistinguishable from (I). (II) is readily dissolved by cold 2.5% NaOH and is not pptd. by cold dil. HCl. α -Amylose (III) (the portion of the whole starch originally insol.) is also dissolved by 2.5% NaOH, but is pptd. nearly quantitatively by HCl. Mixtures of (III) and (II) may be thus determined. The reprecipitated (III) contains the same amount (4.8%) of combined fatty acid as did the original (III). (III) is thus different from (II), and maize contains very little, if any, (II). (I) consists probably of single chains of glucose units, hydrated in solution, which are converted by freezing into partly dehydrated "bundles" of these chains. R. S. C.

Sakurada's publications [on cellulose]. H. STAUDINGER (Ber., 1935, 68, [B], 1234–1238).—Mainly a refutation of criticisms of the author's work. H. W.

Highly-polymerised compounds. CXIII. Cellulose in Schweitzer's reagent. H. STAUDINGER and B. RITZENTHALER [with, in part, S. KAUTZ] (Ber., 1935, 68, [B], 1225–1233).—When, under usual conditions, various types of cellulose are dissolved in Schweitzer's reagent and pptd. from the solution, the properties of the ppts. differ from those of the original material. If air and light are completely excluded during dissolution and pptn. is effected by dil. AcOH or in completely neutral Na K tartrate solution, the properties of the original and reprecipitated materials are identical. Since, however, the apparent mean degree of polymerisation of ramie cellulose decreases from 1300 to about 900 and then remains const., this is true only for cellulose mols. of mean degree of polymerisation about 900. Since cellulose thus behaves like a substance of low mol. wt., there is no reason to doubt its macro-mol. structure. H. W.

Osmometric investigations of dilute solutions of polymeric carbohydrates. VIII. State of technical cellulose acetate (cellit) in solution. M. ULMANN (Ber., 1935, 68, [B], 1217–1224; cf. this vol., 231).—The solution relationships of the highly viscous fraction I of technical cellit are more complicated than those of fractions II and III (*loc. cit.*). The observed mol. wts. are not integral multiples of $(\text{C}_6)_2$, vals. intermediate between $(\text{C}_6)_2$, $(\text{C}_6)_4$, $(\text{C}_6)_8$, $(\text{C}_6)_{16}$, and $(\text{C}_6)_{32}$ being obtained. Further dilution of the solution after reaching approx. the $(\text{C}_6)_2$ stage causes appearance of mols. $(\text{C}_6)_8$. The magnitude of the change in osmotic pressure during the transitions of the different types of mol. is explained by the hypothesis that the fraction contains two components one of which undergoes stepwise degradation on dilution, whereas the mols. of the other component remain stable. The most probable ratio of the two types is 1 : 1. H. W.

Compounds of high mol. wt. IV. Mol. wts. of esters of cellulose with higher aliphatic acids. A. NOWAKOWSKI (Rocz. Chem., 1935, 15, 234–248).—The HOI, cryoscopic, and viscosimetric methods of determining the mol. wt. of esters of cellulose with EtCO_2H , PrCO_2H , and $\text{C}_5\text{H}_{11}\text{CO}_2\text{H}$ yield comparable results. R. T.

Interaction of amines with heavy water. P. GOLDFINGER and V. LASAREV (Compt. rend., 1935, 200, 1671–1673).—The hydrochlorides of NH_2Me and NHMe_2 react with D_2O in H_2O at room temp., the N functioning as ter- (cf. A., 1933, 1020; this vol., 563) and not quinqué-valent as in the form $\text{CH}_2\text{:NH}_3$ which is present only in minute amounts. NaOAc reacts with D_2O after 6 months (cf. A., 1934, 497).

J. L. D.

Quaternary ammonium salts from bromopropylalkylamines. V. Conversion of cyclic ammonium salts into linear polymerides. C. F. GIBBS and C. S. MARVEL (J. Amer. Chem. Soc., 1935, 57, 1137–1139; cf. A., 1934, 515).—When $\text{Br}[\text{CH}_2]_3\text{NMe}_2$ is kept in much EtOH at room temp. for 40 hr., it gives NN-dimethyltrimethyleneammonium bromide, cryst., which at room temp. (2 weeks) or 200° (3 min.) gives the linear polymeride, decomp. 240–250°, probably owing to dissociation to the Br-amine. Cyclic salts with radicals other than Me do not thus polymerise. The following are described. NN-Diisobutyl-, b.p. 149–150°/5 mm. (platinichloride, m.p. 119–120°), -isoamyl-, b.p. 159–160°/5 mm., -allyl-, b.p. 129–130°/5 mm., and -benzyl- γ -phenoxypropylamine, b.p. 215–217°/2 mm. (hydrobromide, m.p. 163–164°); NN-diethyl-, b.p. 165–167°/1 mm., and -n-butyl- γ -phenoxydecylamine, b.p. 171–173°/0.5 mm.; diisoamyl- γ -bromopropylamine, b.p. 109–111°/3 mm. (platinichloride, m.p. 159–160°); diisoamyl-trimethyleneammonium bromide, m.p. 71–73°. Other γ -OPh-bases were not cleaved by HI. R. S. C.

Synthesis of *D*-arginine anhydride and *D*-lysine anhydride and their ring fission by pepsin. Y. TAZAWA (Acta Phytochim., 1935, 8, 331–336).—Treatment of arginine Me ester dihydrochloride with MeOH-NH_3 at 30° gives *D*-arginine anhydride tetrahydrochloride (I), decomp. 240°, $[\alpha]_D +6.28^\circ$, which is stable towards boiling H_2O , whereas the corresponding

base undergoes auto-hydrolysis due to its proper alkalinity. *d*-Lysine anhydride dihydrochloride (II), decomp. 225°, $[\alpha]_D^{25} + 8.25^\circ$, is obtained similarly. (I) and (II) are smoothly hydrolysed by pepsin, but are indifferent towards trypsin and papain. H. W.

Combination of certain fatty acids with lysine, arginine, and salmine. T. H. JUKES and C. L. A. SCHMIDT (J. Biol. Chem., 1935, 110, 9—16).—The p_K of 10 straight-chain fatty acids in EtOH–H₂O mixtures were determined and vals. of p_K between 4.9 and 5.0 were deduced for them all in H₂O. Lysine and arginine combine with lauric and oleic acids in 72% EtOH giving salts hydrolysed to < 1%. Salmine combines with HCl, octoic and lauric acids. Lysine and arginine laurate and stearate, arginine and lysine erucate were prepared. p_K of salmine is 11.1 in H₂O and 12.3 in 72% EtOH. H. D.

Canavanine. J. M. GULLAND and C. J. O. R. MORRIS (J.C.S., 1935, 763—766).—The structure $\text{NH}_2\cdot\text{C}(\text{NH})\cdot\text{NH}\cdot\text{O}\cdot\text{CH}_2\cdot\text{CH}_2\cdot\text{CH}(\text{NH}_2)\cdot\text{CO}_2\text{H}$ (cf. Kitawaga, A., 1930, 121) is established for canavanine by its conversion by chloramine-*T* into a mixture of (CHO)₂ and tartronic semialdehyde (isolated as *p*-nitrophenylhydrazones), and by hot conc. HBr into a mixture of α -amino- γ -butyrolactone hydrobromide (I), NH₃, and guanidine. (I) and HBr gave optically inactive γ -bromo- α -aminobutyric acid hydrobromide, m.p. 164°, also obtained from synthetic α -aminobutyrolactone. P. G. C.

Djenkolic acid, a new amino-acid containing sulphur. A. G. VAN VEEN and A. J. HYMAN (Rec. trav. chim., 1935, 54, 493—501).—*Djenkolic acid*, $\text{CH}_2[\text{S}\cdot\text{CH}_2\cdot\text{CH}(\text{NH}_2)\cdot\text{CO}_2\text{H}]_2$ (I), decomp. 300—350°, $[\alpha]_D^{25} - 25^\circ$ in 1% HCl, is obtained in 1.6% yield from the djenkol bean (*Pithecolobium lobatum*). It gives a *Bz*₂ derivative (+1H₂O), m.p. 85° (decomp.), hydrochloride, m.p. 250°, unstable *Et*₂ ester hydrochloride, m.p. 60°, and dihydantoin derivative, C₉H₁₂O₄N₄S₂, m.p. 200°. (I) yields CH₂O when treated with H₂SO₄ and is hydrolysed by conc. H₂SO₄ to S, SO₂, NH₃, and cystine. P. G. C.

Preparation of carbamide from carbon dioxide and ammonia. III. M. TOKUOKA (Bull. Agric. Chem. Soc. Japan, 1935, 11, 41—44).—Thermodynamical considerations and experimental data show that the optimal temp. for the prep. of CO(NH₂)₂ from NH₂·CO₂NH₄ or CO₂+NH₃ is > the m.p. of NH₂·CO₂NH₄, but > 19°. A catalyst is unnecessary but up to 2% of H₂O causes acceleration. The presence of a little EtOH is immaterial. 35% conversion can be obtained in 30 min. E. A. H. R.

Hydrogen cyanide. V. Reactions of imino-formylcarbylamine. L. E. HINKEL, E. E. AYLING, and J. H. BEYNON (J.C.S., 1935, 674—679).—Imino-formylcarbylamine (I) is hydrolysed in cold H₂O to HCO₂NH₄ (cf. A., 1896, i, 71). (I) with AgNO₃ in H₂O gives an indefinite compound probably owing to the hydrolysis of (I), but with AgNO₃ in EtOH the compound 2AgNO₃·5HCN is formed. (I) with HgCl₂ in Et₂O affords the compound HgCl₂·3HCN, converted by HCl into the compound 2HgCl₂·3(2HCN·HCl). (I) and AlCl₃ afford AlCl₃·2HCN (II), m.p. 125°, identical with the compound obtained from AlCl₃ and HCN (A.,

1932, 132). (I) is not formed when (II) is heated alone or with quinoline. AlCl₃ and NH₂·CH·N·CHCl (III) [from (I) and HCl] give the compound AlCl₃·2HCN·HCl (IV), m.p. 80°, identical with that obtained from (II) and HCl at 80°, and by the decomp. of the compound AlCl₃·2HCN·3HCl (V), m.p. 62°, prepared by the action of AlCl₃ on the sesquihydrochloride (VI) of HCN. (IV) at 100° yields (III), and with PhMe and AlCl₃ affords *p*-C₆H₄Me·CHO, also obtained together with tolyl-hydramine (VII) by heating (V) with PhMe. (V) with PhMe and AlCl₃ at 50—55° affords only (VII). (I) heated with 2 mols. of a primary aromatic amine (NH₂Ph, *p*-C₆H₄Me·NH₂, *p*-C₆H₄Br·NH₂, *p*-C₆H₄Cl·NH₂, and *p*-OMe·C₆H₄·NH₂, α - and β -C₁₀H₇·NH₂, but not *o*- and *p*-NO₂·C₆H₄·NH₂, 3 : 1 : 4-NO₂·C₆H₃Me·NH₂, or *p*-NH₂·C₆H₄·OH) affords the corresponding *NN'*-di-arylformamidine obtained by Dains (A., 1902, i, 602) from these amines and (VI) or (III). This supports the view that the first step in the latter reactions is the removal by the base of HCl from (VI) or (III) with the formation of (I), which then reacts with the amine. NHPHMe and (III) [or (VI) but not (I)] at 100° afford *N*-phenyl-*N*-methylformamidine hydrochloride, m.p. 192°, which with H₂O at 100° gives form-methyl-anilide, m.p. 8—10°, b.p. 244—245° (lit. b.p. 243—244°), and with 4*N*-NaOH gives NHPHMe. (III) and EtOH (dry) yield CH(OEt)₃ and formamidine hydrochloride, m.p. 81°, and these products were also obtained from (I), HCl, and EtOH. They are also obtained (Claisen *et al.*, Ber., 1883, 16, 309) together with EtCl from EtOH and (VI), which must therefore readily decompose into (III) and HCl. H. G. M.

Saturation pressure of mustard oils and sulphides. H. BAUER and K. BURSCHKIES (Ber., 1935, 68, [B], 1238—1243).—In connexion with the physiological activities of vapours measurements are recorded of v.p. and temp. of PhNCS, MeNCS, Et₂S, (CH₂·CH·CH₂)₂S, Bu₂S, Bu₂S₂, diisomyl sulphide, thiodiglycol, and CH₂·CH·CH₂·OH. H. W.

Magnesium methoxides. (MLLE.) M. L. QUINET (Bull. Soc. chim., 1935, [v], 2, 1201—1205).—Mg reacts smoothly with MeOH in presence of a little Mg(OMe)₂ to give at –20° a compound, Mg(OMe)₂·4MeOH (I), at 20° a compound, Mg(OMe)₂·2MeOH, and at 66° MgCO₃ and other decomp. products. (I) in air gives (II) and over H₂SO₄, more rapidly in vac. or at 110°, a compound 3Mg(OMe)₂·MgCO₃·H₂ and C₂H₆. (I) in moist air at room temp. gives Mg(OH)₂·4MgCO₃, and a solution of (I) in MeOH, faintly alkaline to phenolphthalein, is unchanged by CO₂, but with a few drops of H₂O gives a gel. (I) with *N*-H₂SO₄ or *N*-HCl gives first this gel and then the Mg salt. MgCl₂ gives a ppt., $x\text{MgCl}_2\cdot y\text{Mg(OMe)}_2\cdot z\text{MeOH}$. R. S. C.

Interchange of heavy atoms in organo-metallic compounds. I. NORVICK (Nature, 1935, 135, 1038—1039; cf. this vol., 851).—Bi amyl dichloride and MgEtBr yield BiEt₃ and tri-*n*-amyl- and diethyl-*n*-amyl-bismuthine, indicating some looseness of linking between the Bi and the alkyl residues. L. S. T.

Organic compounds of tin. M. LESBRE (Bull. Soc. chim., 1935, [v], 2, 1189—1201).—Mainly a comparison of known org. compounds of Sn with those of

C, Pb, Ge, etc. If SnCl_2 (1 mol.) is added to 10% aq. NaOH (7 mols.), the NaHSnO_2 formed decomposes at $>20^\circ$ to Sn and $\text{Na}_2[\text{Sn}(\text{OH})_6]$, but at $<20^\circ$ with RBr or RI (less well with RCl) gives *alkyl-* or *aryl-stannonic acids*, RSnO_2H , in which $\text{R}=\text{Ph}$, CH_2Ph , allyl, $\alpha\text{-C}_{10}\text{H}_7$, $\text{CH}_2\text{Br-CH}_2$, CHCl_2 , and CH_2Ac , which give *hydrates*, $+\text{H}_2\text{O}$, *Na*, and *K* salts, a *basic salt*, RSnO_2Ag , Ag_2O , and *complex acids*, $[\text{RSnCl}_5]\text{H}_2$ and $[\text{RSnBr}_5]\text{H}_2$ [K_2 , $(\text{C}_5\text{H}_6\text{N}_2\text{H})_2$, and $(\text{NH}_4)_2$, decomp. $>200^\circ$, salts], and decompose, when heated, partly into SnO and ROH , and partly into SnO_2 and RH , but, if $\text{R}=\text{aryl}$, some SnR_4 and H_2O are also obtained.

R. S. C.

Metallo-organic compounds of tin. S. N. NAUMOV and Z. M. MANULKIN (J. Gen. Chem. Russ., 1935, 5, 281—287).— SnMe_4 is obtained in 85% yield by boiling an Et_2O solution of MgMeI with SnCl_4 for 5 hr., distilling off the Et_2O , and heating the residue at $120\text{--}140^\circ$ for 8 hr. SnMe_4 and I in Et_2O yield SnMe_3I , which with MgEtBr in Et_2O affords SnMe_3Et ; this, in turn, is converted into SnMe_2EtI , SnMe_2EtPr , and SnMeEtPrI , separation of which into its optical antipodes was unsuccessful.

R. T.

Synthesis of mixed dihalogen derivatives of compounds of tin with aliphatic radicals. K. A. KOTSCHESCHKOV (J. Gen. Chem. Russ., 1935, 5, 211—215).—The reactions $\text{SnR}_4 + \text{SnX}_4 \rightarrow 2\text{R}_2\text{SnX}_2$ ($\text{R}=\text{Me}$, Et , Pr ; $\text{X}=\text{Cl}$, Br) take place with considerable heat evolution. The following reactions are described: $\text{SnMeBr}_3 + \text{SnMe}_4 \rightarrow 3\text{SnMe}_2\text{Br}_2$; $\text{SnEt}_3\text{X} + \text{SnX}_4 \rightarrow 3\text{SnEt}_2\text{X}_2$; $\text{SnMe}_3\text{Br} + \text{SnMeBr}_3 \rightarrow 2\text{SnMe}_2\text{Br}_2$.

R. T.

Preparation of mercury diisobutyl. A. MÜLLER (J. Amer. Chem. Soc., 1935, 57, 1142—1143).— HgBu^i_2 , b.p. $85^\circ/11\text{ mm.}$, is prepared in 27% yield from Bu^iBr and 0.5—1% Na-Hg in EtOAc .

R. S. C.

Hexadeutero benzene. I. G. R. CLEMO and A. McQUILLEN (J.C.S., 1935, 851—855).—Apparatus and conditions are described for optimum conversion of C_2H_2 into C_6H_6 over a Te catalyst, and the method is applied to the conversion of C_2D_2 into *hexadeutero benzene* (I), b.p. 82.5° , m.p. -1.0° . Nitration of (I) using HNO_3 and H_2SO_4 gave a $(\text{NO}_2)_2$ -compound, m.p. 89° not lowered when mixed with $m\text{-C}_6\text{H}_4(\text{NO}_2)_2$. Nitration using DNO_3 and D_2SO_4 gave *m-dinitrohexadeutero benzene*, m.p. 78° , mixed m.p. with $m\text{-C}_6\text{H}_4(\text{NO}_2)_2$ 87° .

P. G. C.

Function of sulphuric acid in nitration. D. I. JAMES (J.C.S., 1935, 785—787).—The conclusions of Hetherington *et al.* (A., 1933, 267) concerning the effect of H_2SO_4 on mononitration of PhNO_2 and $\text{C}_6\text{H}_4\text{Me-NO}_2$ are extended to nitration of 1:2:4- $\text{C}_6\text{H}_3\text{Me}(\text{NO}_2)_2$. Up to a point, represented approx. by 95° and an excess of 4 mols. of H_2SO_4 beyond that required to form the monohydrate, the action of the excess of H_2SO_4 is sufficiently explained by its promoting the miscibility of the reagents. Beyond this point, rise of temp. and increase of H_2SO_4 concn. diminish the amount of HNO_3 available for nitration.

P. G. C.

Dealkylation of aromatic hydrocarbons. Reversibility of the Friedel-Crafts reaction. N. N.

ORLOV and L. S. SOLODAR (J. Appl. Chem. Russ., 1935, 8, 117—127).— PhMe is obtained in 25% yield from xylene and AlCl_3 (4%) at the b.p., by a continuous process. No advantage is gained by passing HCl during the process, in disagreement with Dougherty's view as to the mechanism of the Friedel-Crafts reaction (A., 1929, 421).

R. T.

Condensation of alcohols with aromatic hydrocarbons in presence of anhydrous aluminium chloride. I. Condensation of *tert.*-aliphatic alcohols with benzene and toluene. I. TZUKKERVANIK (J. Gen. Chem. Russ., 1935, 5, 117—120).—*tert.*- $\text{C}_5\text{H}_{11}\text{OH}$ and AlCl_3 yield CMe_2CHMe and *tert.*- $\text{C}_5\text{H}_{11}\text{Cl}$, whilst Bu^iOH affords only Bu^iCl ; in presence of C_6H_6 or PhMe a Friedel-Crafts reaction takes place, to give $\text{C}_5\text{H}_{11}\text{Ph}$, b.p. $189\text{--}191^\circ$, and *m-amyltoluene*, b.p. $208\text{--}210^\circ$, and PhBu^i or *m-C}_6\text{H}_4\text{MeBu}^i.*

R. T.

Constitution and reactivity. IX. Sulphonation of benzylidene chloride and benzotrichloride. K. LAUER (J. pr. Chem., 1935, [ii], 142, 252—257).— CPhCl_3 treated with gaseous SO_3 yields almost exclusively *m*-sulphobenzoic acid. Similar treatment of CH_2PhCl and CHPhCl_2 gives unsatisfactory results. CHPhCl_2 and $\text{H}_2\text{SO}_4\text{H}_2\text{O}$ at 35° yield mixed sulphobenzylidene chlorides, which with CaCO_3 form sulphobenzaldehydes, oxidised to a product which is mainly *p*-sulphobenzoic acid.

E. W. W.

Sulphonation of mesitylene. H. J. BACKER (Rec. trav. chim., 1935, 54, 544—551).—Mesitylene is converted by ClSO_3H into the 2:4-disulphonyl chloride, m.p. $123.5\text{--}124^\circ$, which with oleum at 105° (16 hr.) gives *mesitylenetrisulphonic acid* (*Ba* and NH_4 salts). The following derivatives and salts of mesitylenedisulphonic acid are described: *di-strychnine*, *Ba*, *K*, and *Tl* salts; *Ph}_2* ester, m.p. $110\text{--}111^\circ$; *di-amide*, m.p. 240° ; *di-methylamide* (I), m.p. $171\text{--}171.5^\circ$; *di-methylnitrosoamide*, m.p. 183° ; *di-dimethylamide*, m.p. $137.5\text{--}138^\circ$; *di-tert.-butylamide*, m.p. 223° (decomp.); *di-anilide*, m.p. $150\text{--}151^\circ$; *di-o-toluidide*, m.p. 178° . *Nitromesitylenedisulphomethylnitroamide*, $\text{NO}_2\text{-C}_6\text{Me}_3(\text{SO}_2\text{-NMe-NO}_2)_2$ [from (I) and HNO_3 at -10°], m.p. 181° (explodes).

P. G. C.

Structure of tolan. A. WEISSBERGER (J.C.S., 1935, 855—856; cf. A., 1933, 339).—Catalytic hydrogenation of tolan (I) gives a 99.3% yield of $(\text{CH}_2\text{Ph})_2$, m.p. $52.5\text{--}53.2^\circ$; since rearrangement under these conditions is unlikely and CHPh_2Me is liquid at room temp., it is considered that (I) is CPh:CPh not CPh_2C (Smyth *et al.*, A., 1931, 669; Berger, this vol., 431).

P. G. C.

Highly arylated aromatic compounds. V. W. DILTHEY, W. SCHOMMER, W. HÖSCHEN, and H. DIERICH (Ber., 1935, 68, [B], 1159—1162; cf. this vol., 213).—Gradual addition of diphenyldiacetylene to 2:3:4:5-tetraphenyl- $\Delta^{2:4}$ -cyclopentadien-1-one (I) at $240\text{--}250^\circ$ yields CO and 2:3:4:5:6-pentaphenyltolan, m.p. 258° , which slowly decolorises Br and is oxidised by CrO_3 in AcOH to 2:3:4:5:6-pentaphenylbenzil, m.p. $276\text{--}277^\circ$. Replacement of acetylenes by olefines in the above reaction does not affect the elimination of CO , but the additional H causes

reduction of (I). Nevertheless, (I) and $(\cdot\text{CH}_2\text{CH}_2)_2$ at 260—290° afford 2 : 3 : 4 : 5 : 2' : 3' : 4' : 5'-*octaphenyl-diphenyl*, m.p. 318—319°, which does not add Br, whilst (I) and cyclohexene at 280° slowly yield 5 : 6 : 7 : 8-*tetraphenyl-1 : 2 : 3 : 4-tetrahydronaphthalene*, m.p. 271—272°. (I) and CPh:CBBr at 160° give *bromopentaphenylbenzene*, m.p. 281—282°. Pentaphenylpyridine, m.p. 241—242° (perchlorate, m.p. 299°), is slowly produced when a mixture of (I) and PhCN is boiled, but is best obtained in a sealed tube at 275—300°. 2 : 3 : 4 : 5-Tetraphenylthiophene, m.p. 184—185°, is obtained from (I) and S at 270—350°.

H. W.

Experimental demonstration of the allene asymmetry. P. MATTLAND and W. H. MILLS (Nature, 1935, 135, 994).—van 't Hoff's prediction that unsymmetrically substituted allenes would show enantiomorphism has been verified. With the usual dehydrating agents $\alpha\gamma$ -diphenyl- $\alpha\gamma$ -di-*n*-naphthylalyl alcohol is converted into *r*-*diphenyldi-1-naphthylallene*, m.p. 242—244°. If dehydration is effected with *d*- or *l*-camphorsulphonic acid in C_6H_6 an optically active product is obtained from which *d*-, m.p. 158—159°, $[\alpha]_{5461}^{20} +437^\circ$, and *l*-, $[\alpha]_{5461}^{20} -438^\circ$, *-diphenyldi-1-naphthylallene* are isolated.

L. S. T.

Bromo-derivatives of naphthalene. J. SALKIND and Z. STETZURO (J. Gen. Chem. Russ., 1935, 5, 94—99).—1 : 4- $\text{C}_{10}\text{H}_6\text{Br}_2$ and Br in CS_2 at 0° afford $\text{C}_{10}\text{H}_6\text{Br}_2\text{Br}_4$ (I) and 1 : 4 : 6- $\text{C}_{10}\text{H}_5\text{Br}_3$ (II); at 80° the chief product is 1 : 4 : 6 : $x : x : \text{C}_{10}\text{H}_3\text{Br}_5$, m.p. 179—183°. (I) in C_6H_6 and NaOEt (at the b.p.) yield 1 : 4 : 6 : 7- and 1 : 2(3?) : 4 : 6- $\text{C}_{10}\text{H}_4\text{Br}_4$, m.p. 116—120°, both of which afford (II) when reduced (Zn in AcOH). 2 : 6- $\text{C}_{10}\text{H}_6\text{Br}_2$ and Br in CHCl_3 (in presence of Fe) give a mixture of 2 : 6 : $x : \text{C}_{10}\text{H}_5\text{Br}_3$, m.p. 171—173°, and 2 : 6 : $x : x : \text{C}_{10}\text{H}_4\text{Br}_4$, m.p. 100—101°. Bromination of 1 : 2 : 6- $\text{C}_{10}\text{H}_5\text{Br}_3$ affords $\text{C}_{10}\text{H}_3\text{Br}_5$, m.p. 274—279°. (I) and Mg in Et_2O give MgBr_2 and $\text{C}_{10}\text{H}_6(\text{MgBr})_2$.

R. T.

Action of selenium on compounds containing angular methyl groups. G. R. CLEMO and H. G. DICKENSON (J.C.S., 1935, 735—738).—An attempt to obtain simple examples of the structural changes which occur when, e.g., sterols are dehydrogenated with Se (cf. A., 1933, 610). 9-Methyldecahydronaphthalene (A., 1931, 1302), 8-methylhydrindane, b.p. 159—160°/760 mm. [from 2-acetyl-1-methyl- Δ^1 -cyclopentene and $\text{CHNa}(\text{CO}_2\text{Et})_2$, followed by hydrolysis and reduction], and 2-carboxy-1-methylcyclohexane-1-acetic acid were not attacked by Se, Pt, S, S+Se, or SeO_2 . 1 : 1 : 6-Trimethyltetrahydronaphthalene gave 1 : 6- $\text{C}_{10}\text{H}_6\text{Me}_2$. The Cl_2 -compound, b.p. 150—155°/13 mm., from 2 : 4-diketo-9-methyldecahydronaphthalene and PCl_5 was converted by Se (280—300°; 60 hr.) into 1- $\text{C}_{10}\text{H}_7\text{Me}$; migration of the Me may have resulted from the action of the PCl_5 or Se. 2 : 4-Diketo-8-methylhydrindane, b.p. 143°/0.3 mm., m.p. 91—92°, was converted by PCl_5 into a Cl_2 -compound, b.p. 109—110°/12 mm., which gave a small quantity of non-picrate-forming oil when heated with Se.

P. G. C.

Anthracene-9 : 10-disulphonic acid. C. MARSCHALK and N. OUROUSSOV (Bull. Soc. chim., 1935,

[v], 2, 1216—1218).—9 : 10-Dichloroanthracene and 5% aq. Na_2SO_3 in PhOH at 170—180° give Na_2 anthracene-9 : 10-disulphonate, cryst., readily hydrolysed by acid to anthracene and very readily oxidised to anthraquinone.

R. S. C.

Synthesis of carcinogenic 1 : 2-benzpyrene. A. WINTERSTEIN, H. VETTER, and K. SCHÖN (Ber., 1935, 68, [B], 1079—1085).—Improvements in Cook's method of preparing 1 : 2-benzpyrene from $(\cdot\text{CH}_2\text{CO})_2\text{O}$ and pyrene (I) (A., 1934, 601) coupled with chromatographic purification at two stages of the operations increase the yield of the hydrocarbon to 35—40%. (I) and methylsuccinic anhydride afford γ -pyrenoyl- α (or β)-methylpropionic acid, m.p. 204—205° (corr.; Berl), whence γ -1-pyrenyl- α (or β)-methylbutyric acid, m.p. 176° (corr.; Berl), transformed by SnCl_4 into 4'-keto-2'(3')-methyl-1' : 2' : 3' : 4'-tetrahydro-1 : 2-benzpyrene, m.p. 176—177° (corr.; Berl). The ketone is converted by Se into 2'(3')-methyl-1 : 2-benzpyrene, m.p. 143—144° (corr.; Berl).

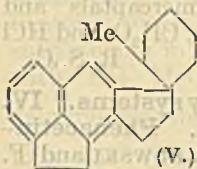
H. W.

Syntheses of polycyclic compounds related to the sterols. IV. Identification of 3'-methyl-1 : 2-cyclopentenophenanthrene and its preparation from cholesterol. D. J. C. GAMBLE, G. A. R. KON, and B. SAUNDERS (J.C.S., 1935, 644—646; cf. this vol., 741).—When carefully purified, 3'-methyl-1 : 2-cyclopentenophenanthrene (I) (A., 1934, 288) is identical with the hydrocarbon $\text{C}_{18}\text{H}_{16}$ (II) prepared by the method of Bergmann *et al.* (A., 1933, 1154). The $\text{C}_6\text{H}_3(\text{NO}_2)_3$ (III) and $\text{C}_6\text{H}_2\text{Me}(\text{NO}_2)_3$ compounds and the styphnate (IV) of (I) and (II), respectively, have the same m.p., but the picrate of (I) melts $1^\circ <$ that of (II). They are not fluorescent in daylight, but show a violet fluorescence in ultraviolet light. A hydrocarbon of identical properties was isolated from the dehydrogenation product of cholesterol, except that the picrate melted 4° too low. This is due to the presence of a second form (this vol., 286). (III) and (IV) (*ibid.*, 741), but not the picrate, are suitable for the identification of the hydrocarbon.

H. G. M.

Synthesis of cholanthrene. J. W. COOK, G. A. D. HASLEWOOD, and (Mrs.) A. M. ROBINSON (J.C.S., 1935, 667—671).—1-Iodoacenaphthene (A., 1931, 81), Mg, Et_2O , EtBr, and $(\text{CH}_2)_2\text{O}$ afford β -1-acenaphthylethyl alcohol, m.p. 94—95°, b.p. 179—180°/0.3 mm. [3 : 5-dinitrobenzoate, m.p. 233—234.5°; chloride (I), m.p. 54—55°, b.p. 145—150°/0.1 mm.; bromide (II), m.p. 66°, b.p. 165°/0.4 mm.]. (II) heated with K dissolved in Et cyclohexanone-2-carboxylate and C_6H_6 affords Et 2-(β -1'-acenaphthylethyl)cyclohexanone-2-carboxylate (III), m.p. 76—77°, b.p. 210—220°/0.4 mm., hydrolysed (MeOH-KOH) to α -(β -1'-acenaphthylethyl)pimelic acid, m.p. 165°. (III) is cyclised by H_2SO_4 to Et hexahydrocholanthrenecarboxylate, m.p. 150° (solutions of this have an intense violet fluorescence), hydrolysed to the acid, m.p. 241—242° (with evolution of gas). This on heating with Pt-black at 295—305° during $1\frac{1}{2}$ hr. yields cholanthrene, m.p. 170—171° (sublimes 170—190°/0.05 mm.) (picrate, m.p. 167—168°). This on oxidation ($\text{Na}_2\text{Cr}_2\text{O}_7$ -AcOH) and subsequent decarboxylation yields 5-methyl-1 : 2-benzanthraquinone (A., 1934, 180). (I), Mg, Et_2O , and 2-methylcyclohexanone

afford 1-ethylacenaphthene, m.p. 30°, b.p. 120—125°/0.4 mm. (picrate, m.p. 102—102.5°), and an oil, b.p. 210/0.7 mm., which on heating with KHSO_4 gives 2-methyl-(β -1'-acenaphthylethyl)- Δ^1 -cyclohexene (IV), b.p. 182—185°/0.2—0.3 mm. (picrate, m.p. 107—108°); this on treatment with AlCl_3 gives a mixture which on purification had m.p. 178—182° (picrate, 157—158°) and gave the same product after treatment



with Se at 320—330° for 32 hr. This is believed to be the spiran (V). The cyclisation of (IV) is therefore anomalous. 2-Methylcyclohexanone and β -1-naphthylethyl chloride, Mg, and Et_2O afford 2-methyl-1-(β -1'-naphthylethyl)-cyclohexanol, b.p. 185—195°/0.5 mm. (3:5-dinitrobenzoate, m.p. 136°), dehydrated by KHSO_4 to 2-methyl-(β -1'-naphthylethyl)- Δ^1 -cyclohexene, b.p. 135°/0.1 mm. This is cyclised by AlCl_3 to the anticipated methyl-octahydrochrysene (VI), b.p. 145°/0.1 mm. (picrate, m.p. 105—106°), and a heavy oil. (VI) was dehydrogenated to chrysene by Se at 295—305°, but not by Pt-black.

H. G. M.

Dissociable organic oxides. 1:1'-Diphenylrubene, $\text{C}_{30}\text{H}_{20}$; thermal decomposition of its photo-oxide, $\text{C}_{30}\text{H}_{20}\text{O}_2$. C. DUFRASSE and M. LOURY (Compt. rend., 1935, 200, 1673—1675; cf. A., 1931, 1151).—Hydrolysis of Et 1:1'-diphenylrubene-3:3'-dicarboxylate (cf. this vol., 213) gives 1:1'-diphenylrubene (I), m.p. 301—302°, and another product. The absorption spectrum of (I) resembles those of other rubenes, but is displaced towards the violet. Photo-oxidation of (I) affords an oxide, m.p. 234—235°, which is converted at 170°, without evolution of gas, into a resin; some rubene is also formed.

J. L. D.

Boranilide. C. R. KINNEY and D. F. PONTZ (J. Amer. Chem. Soc., 1935, 57, 1128—1129).—Chaudhuri's directions (J.C.S., 1920, 117, 1081) for the prep. of boranilide give $(\text{NH}_2\text{Ph})_2\text{ZnCl}_2$; some of the reactions described for the product could not be duplicated, but BzCl gives NHBzPh and $\text{Br}-p\text{-C}_6\text{H}_4\text{Br}\cdot\text{NH}_2$.

R. S. C.

Hydrolysis of substituted benzanilides. F. ASINGER (J. pr. Chem., 1935, [ii], 142, 291—300).—The times of half-hydrolysis by about 12.5% KOH - EtOH under reflux of benz-3:4:5-, m.p. 210°, and 2:4:6-tribromoanilide, m.p. 204°, 3:4:5-, m.p. 220°, and 2:4:6-tribromobenzanilide, m.p. 237°, and NHBzPh are 2, 215, 5, ∞ , and 16 hr., respectively, showing the effect of steric hindrance. The prep. of the necessary acids and bases and of 3:4:5- $\text{C}_6\text{H}_2\text{Br}_3\cdot\text{NO}_2$ is modified. 3:4:5- $\text{C}_6\text{H}_2\text{Br}_3\text{Me}$ gives $\text{C}_6\text{H}_2\text{Br}_3\cdot\text{CBr}_3$ at 200—220°, but 2:4:6- $\text{C}_6\text{H}_2\text{Br}_3\text{Me}$ at this temp. gives only 2:4:6-tribromobenzyl bromide, m.p. 75°, b.p. 202°/18 mm., the CBr_3 -compound being obtained at 250—260°.

R. S. C.

Reaction between chloral hydrate and phenylhydrazine. I. C. TORRES and S. BROSÁ (Anal. Fis. Quim., 1934, 32, 509—518).— $\text{CCl}_3\cdot\text{CH}(\text{OH})_2$ with 2:4-(NO_2) $_2\text{C}_6\text{H}_3\cdot\text{NH}\cdot\text{NH}_2$ (I) in dil. H_2SO_4 yields 2:4-(NO_2) $_2\text{C}_6\text{H}_3\cdot\text{NH}\cdot\text{NH}\cdot\text{CH}(\text{OH})\cdot\text{CO}_2\text{H}$ (cf. Brady, A., 1931, 937) and chloroglyoxalbis-2:4-dinitrophenylhydrazones, decomp. 278° (Ac derivative, decomp.

228°), which with NaOAc and Ac_2O yields the Ac_3 derivative of (I), m.p. 207° (decomp.), also given by (I), NaOAc , and Ac_2O .

F. R. G.

Interaction of ethylene oxide with *m*-phenylenediamine. J. O. GABEL and R. M. MATZKEVITSCH (Ukrain. Chem. J., 1935, 10, 4—6).— $(\text{CH}_2)_2\text{O}$ and $m\text{-C}_6\text{H}_4(\text{NH}_2)_2$ (30°; 8 hr.) yield β -*p*-aminophenylaminoethyl alcohol, m.p. 52—53° [picrate, m.p. 106—108° (decomp.); benzoate].

R. T.

Complex compounds of 2:4:6-triaminotoluene.—See this vol., 944.

Reactions of diazotised *p*-sulphanilic acid and formation of an azoxybenzene. E. JUSTIN-MUELLER (Bull. Soc. chim., 1935, [v], 2, 1024—1028).—Diazotised $p\text{-NH}_2\cdot\text{C}_6\text{H}_4\cdot\text{SO}_3\text{H}$ (I) is adsorbed by wool fibres in an acid medium. In an alkaline medium a reddish-brown coloration appears both on the fibres and in the solution. This is due not to the presence of tyrosine in the fibres (cf. A., 1905, i, 75), but to the formation of azoxybenzene-*pp'*-disulphonic acid (II). This occurs in alkaline solutions of diazotised (I), and also, but more slowly, in an AcOH medium. (II) is readily split into (I) by $\text{Na}_2\text{S}_2\text{O}_4$.

H. G. M.

Coloured local anaesthetics. J. H. GARDNER and L. JOSEPH (J. Amer. Chem. Soc., 1935, 57, 901).—Diazotised procaine (I) gives dyes with $\text{H}\cdot\text{acid}$, $o\text{-OH}\cdot\text{C}_6\text{H}_4\cdot\text{CO}_2\text{H}$, and $m\text{-C}_6\text{H}_4(\text{OH})_2$, decomp. 250°, $o\text{-OH}\cdot\text{C}_6\text{H}_4\cdot\text{CO}_2\text{Me}$, m.p. 196.5°, $o\text{-NH}_2\cdot\text{C}_6\text{H}_4\cdot\text{CO}_2\text{Me}$, m.p. 216—219°, $p\text{-C}_6\text{H}_4\text{Br}\cdot\text{NH}_2$, m.p. 109—110°, and $\alpha\text{-C}_{10}\text{H}_7\cdot\text{NH}_2$, m.p. 190° (decomp.). Bisazo-dyes are obtained from (I) and $\alpha\text{-C}_{10}\text{H}_7\cdot\text{NH}_2 + \alpha\text{-C}_{10}\text{H}_7\cdot\text{NH}_2$, decomp. 250°, (I) and $\text{Me anthranilate} + \alpha\text{-C}_{10}\text{H}_7\cdot\text{NH}_2$, decomp. 250°, and (I) and $p\text{-NO}_2\cdot\text{C}_6\text{H}_4\cdot\text{NH}_2 + \text{procaine}$, m.p. 169—172°. The acid and OH-compounds have no anaesthetic action.

R. S. C.

Preparation of a fat-soluble azo-dye. I. Dye from stearic acid. O. ROUTALA and A. ARHO (Suomen Kem., 1935, 8, B, 25—26).—Stearo- β -naphthylamide affords a $(\text{NO}_2)_1$ -derivative (45%), reduced to 3-aminostearo- β -naphthylamide (45%), the diazonium derivative of which couples with α - and $\beta\text{-C}_{10}\text{H}_7\cdot\text{NH}_2$ to give dyes, the latter of which when diazotised couples again with $\beta\text{-C}_{10}\text{H}_7\cdot\text{NH}_2$. These dyes are sol. in fats and fatty acids.

J. L. D.

[Metallic salts of] diazoamino-compounds.

II. III. Unsaturated chromophores. I. A. MANGINI (Gazzetta, 1935, 65, 298—308, 308—317).—II. The following derivatives of diazoaminobenzene yield *Hg* and *Ag* salts which are (I) yellow, (II) red, or (III) orange (mixed) (cf. A., 1934, 68): *p*-bromo-, *Hg* (I and II or III) and *Ag* (II and III) salts; *o*-nitro- (new prep. from $o\text{-NO}_2\cdot\text{C}_6\text{H}_4\cdot\text{NH}_2$), *Hg* (I, II, and III) and *Ag* (II) salts; 4-bromo-2'-nitro-, *Hg* (I and III) and *Ag* (II and III) salts; 4-bromo-3'-nitro-, *Hg* (I) and *Ag* (I, III, and unstable II) salts; 4-bromo-4'-nitro-, *Hg* (I, II, and III) and *Ag* (I, II, and III) salts. β -Naphthyl diazoaminobenzene yields *Hg* (I, II, and III) and *Ag* (II) salts. 4-Bromo-2'-nitrodiazoaminobenzene, m.p. 149—150°, is obtained from diazotised $o\text{-NO}_2\cdot\text{C}_6\text{H}_4\cdot\text{NH}_2$ and $p\text{-C}_6\text{H}_4\text{Br}\cdot\text{NH}_2$.

III. The *Na* and *K* salts of *o*-nitro- and 4-bromo-2'-nitro- and -4'-nitro-, and the *K* salts of *m*-nitro- and

4-bromo-3'-nitro-diazoaminobenzene, are all intensely coloured. Since *m*-compounds are included, the coloration is not due to a quinonoid structure. It is suggested that the NO₂-group acts as a negative auxochrome, promoting a dipole structure in the diazoamino-system, and that the Na and K salts are formed with the latter, and are not nitronic.

E. W. W.

Action of aromatic hydroxysulphonic acids on hippuric acid. I. G. MACHEK (Monatsh., 1935, 65, 433—442).—The product from PhOH and hippuric acid (I) in presence of H₂SO₄ gives, not sulphophenylglycine, C₆H₅O₂NS + H₂O (A., 1885, 55, 1235), but a salt, *glycine phenylsulphonate*, C₈H₁₁O₆NS, new m.p. 185—186°, which is also obtained using glycine instead of (I). Similarly are obtained *glycine o*-, *m*-, and *p*-*cresolsulphonates*, m.p. 161—162°, 175—176°, and 180—181° (all corr.), respectively. The last gives a Ag salt. These substances all give a strong FeCl₃ reaction.

E. W. W.

Constitution and reactivity. XI. Oxidation of *o*- and *m*-dinitrobenzene. K. LAUER (J. pr. Chem., 1935, [ii], 142, 310—312).—*o*-C₆H₄(NO₂)₂ and 30% oleum at 120—134° give 12% of 2:3-dinitrophenol. *m*-C₆H₄(NO₂)₂ and 35% oleum at 140—150° give 2:4- (6 parts) and 2:6-dinitrophenol (1 part).

R. S. C.

Two optically active diastereomeric forms of α -phenylsulphoxypropionic acid. L. RAMBERG and I. HEDLUND (Arkiv Kemi, Min., Geol., 1935, 11, B, No. 55, 1—5).—*d*- α -Phenylthiolpropionic acid (I), $[\alpha]_D^{25} +123.0^\circ$ in 0.03*N* aq. solution, with H₂O₂ in COMe₃ at 0° affords after 5 days two optically active phenylsulphoxypropionic acids *A*+, m.p. > 180° (depends on mode of heating), $[\alpha]_D^{25} +190^\circ$ in 0.01*N* aq. solution, and *B*—, m.p. 98.3—98.6°, $[\alpha]_D^{25} -112^\circ$ in 0.03*N* aq. solution. These are readily separated on account of their different solubilities in C₆H₆, and on further oxidation both give *d*- α -phenylsulphonylpropionic acid (II). This oxidation is accompanied by slight racemisation, although (I) is oxidised directly to (II) by KMnO₄ without any racemisation. The solubility of *A*+ and *B*— in H₂O at 15° and $[\alpha]_D^{25}$ at various concns. are given.

H. G. M.

Thiophenols. II. Reaction between aromatic mercaptals and formaldehyde. W. H. TAYLOR (J. Amer. Chem. Soc., 1935, 57, 1065—1068; cf. A., 1934, 69).—PhSH, excess of CH₂O, and HCl in AcOH at room temp. give CH₂(SPh)₂ (I), m.p. 36°, but after several months at room temp. or a few hr. when heated the product is a mixture of mono- to tetra-merides, double m.p. 140—145° and 245—250°. The appropriate aldehyde, thiophenol, and HCl in AcOH give *m*-nitrobenzaldehyde diphenyl- (III), m.p. 65.5°, and *di-p*-tolyl-mercaptal (III), m.p. 85.5°, *p*-tolualdehyde *di-p*-tolylmercaptal, m.p. 72°, *o*-nitrobenzaldehyde diphenylmercaptal, m.p. 101°, and 2-bromo-5-hydroxybenzaldehyde *di-p*-tolylmercaptal (IV), m.p. 97°. (II), (III), and (IV) with CH₂O and HCl in hot AcOH give products (V), m.p. (double) 192—195° and 250°, 180—181°, and 179°. (I), CHPh(SPh)₂, CHPh(S·C₆H₄·NO₂-*p*)₂, CHPh(S·C₆H₄Me-*p*)₂, and CH₂(S·C₆H₄Me-*p*)₂ give similar products (V), m.p. (double) 181—184° and 250°, (double) 192—195° and

250°, 183°, 183—184°, and 186°, respectively. CPh₂(SPh)₂ does not react. (V) appear to be formed by replacement of the aldehyde by CH₂O and to be (VI) or its substitution products; for the products with double m.p. condensation may have occurred in the *p*-position with formation of large rings. (V) are not formed from the formaldehyde mercaptals and HCl in AcOH or from the thiophenols, CH₂O, and HCl in AcOH. M.p. are corr.

R. S. C.

Thermal equilibrium in ternary systems. IV. Antipyrine-phenacetin-salol. V. Phenacetin-acetanilide-sulphonal. K. HRYNAKOWSKI and F. ADAMANIS (Rocz. Chem., 1935, 15, 173—179, 184—190).—IV. The eutectic, m.p. 32.5°, contains antipyrine 13.5%, phenacetin 4%, and salol 82.5%.

V. The eutectic, m.p. 69.5°, contains phenacetin 22%, NHPAc 44%, and sulphonal 34%. R. T.

Thermal equilibrium in the system β -naphthol- β -naphthylamine. K. HRYNAKOWSKI and M. SZMYTÓWNA (Rocz. Chem., 1935, 15, 180—183).—The m.p. diagram corresponds with Roozeboom's third type.

R. T.

Preparation of 1-alkyl- β -naphthols. K. DZIEWOŃSKI and C. DRAGAN (Rocz. Chem., 1935, 15, 198—201).— β -C₁₀H₇·OH, anhyd. NPhMe₃, and β -C₁₀H₇·ONa yield 1-methyl- β -naphthol (300°; 8 hr.) (*picrate*, m.p. 163—164°). The corresponding 1-*Et* compound, m.p. 105° (*benzoate*, m.p. 75°), is prepared analogously.

R. T.

Action of hydroxylamine on the hydrogen sulphite compounds of 1-nitroso- β -naphthol-6- and -7-sulphonic acids. S. V. BOGDANOV and I. I. LEVKOEY [with V. V. DURMASCHKINA] (J. Gen. Chem. Russ., 1935, 5, 18—27).—NaHSO₃ is added to an aq. suspension of Na 1-nitroso- β -naphthol-6-sulphonate (I) to complete dissolution of the latter, when HCl and NH₂OH·HCl (II) are added, to yield a ppt. of Na 2-nitroso- α -naphthol-4:6-disulphonate (III) (75% yield). (III) is also obtained by the action of HCl on the *dioxime* of 1:2-diketo-1:2:3:4-tetrahydronaphthalene-4:6-disulphonic acid, prepared from (I), NaHSO₃, and (II) in presence of NaOAc in neutral aq. solution, and converted by NaOH into the Na salt of the *dioxime* of 1:2-naphthaquinone-6-sulphonic acid, the *anhydride* of which is described. Under analogous conditions, the -7-sulphonic acid corresponding with (I) affords the -4:7-disulphonic acid analogue (IV) of (III). The constitutions of (III) and (IV) are established by comparing the products of reduction with the corresponding synthetically prepared aminonaphtholdisulphonic acids.

R. T.

Purification of benzonaphthol. G. A. KIRCHGOF and A. D. STEPANOV (Khim. Farm. Prom., 1934, No. 3, 16—17).—Washing with dil. alkali is followed by crystallisation from petroleum. CH. ABS. (r)

Purification of benzonaphthol. T. I. ZACHAROVA and F. PALEI (Khim. Farm. Prom., 1934, No. 3, 19—20).—Addition of PhCl to the reaction mixture hinders resin formation. The crude product meets pharmaceutical requirements. CH. ABS. (r)

Manufacture of monohydroxychrysene.—See B., 1935, 585.

Rearrangement of ψ -nitrosites of propenyl-phenyl ethers. Synthesis of β -nitro- α -alkoxy-phenylpropanols and their methyl ethers. V. BRUCKNER and E. VINKLER (J. pr. Chem., 1935, [ii], 142, 277—290).—The decomp. of propenylbenzene- ψ -nitrosites and β -nitro- α -acetoxypropylbenzenes varies inexplicably with the nature of the substituents in the Ph nucleus. Asarone- ψ -nitrosite with hot MeOH gives 2:4:5-trimethoxy- $\alpha\beta$ -dioximinopropylbenzene peroxide, $\text{O} \begin{smallmatrix} \text{N:CAR} \\ \text{O—N} \end{smallmatrix} \text{CMe}$, m.p. 155° (lit. 149°), and 2:4:5-trimethoxy- β -nitro- α -methoxypropylbenzene (I), m.p. 118°, also obtained with MeOH-HCl at 65°. Methylisoeugenol- ψ -nitrosite with hot MeOH gives β -nitro-3:4-dimethoxypropio-phenoneoxime, m.p. 91° (decomp.), and the (impure) glyoxime peroxide, but with HCl-MeOH at 70° affords 3:4-dimethoxy- β -nitro- α -methoxy-*n*-propylbenzene (II), m.p. 119°, also obtained from the corresponding α -OAc-compound (III) and HCl in MeOH or aq. MeOH. (III) and HCl-COMe₂ give, however, 3:4-dimethoxy- β -nitro- α -hydroxy-*n*-propylbenzene, m.p. 124—133° (decomp.), which is unchanged by HCl-MeOH and with AcCl-C₅H₅N re-forms (III). iso-Safrole- ψ -nitrosite with hot MeOH gives β -nitro-3:4-methylenedioxypropio-phenoneoxime, m.p. 122° (decomp.) (with alkali gives the glyoxime peroxide), and with HCl-MeOH affords 3:4-methylenedioxy- $\alpha\beta$ -dioximino-*n*-propylbenzene, m.p. 206—207° (decomp.), stable to alkali but hydrolysed by hot dil. H₂SO₄. 3:4-Methylenedioxy- β -nitro- α -acetoxy-*n*-propylbenzene is unchanged by 7% HCl-COMe₂, but with HCl-MeOH gives the α -OH-compound, an oil (decomposed when distilled), which is reduced electrolytically to 3:4-methylenedioxy- β -amino- α -hydroxy-*n*-propylbenzene hydrochloride, m.p. 195—196° (decomp.). (II) gives similarly electrolytically 3:4-dimethoxy- β -amino- α -methoxy-*n*-propylbenzene hydrochloride, m.p. 180°, but (I) affords 2:4:5-trimethoxy- β -hydroxyl-amino- α -methoxy-*n*-propylbenzene, m.p. 128°.

R. S. C.

Thermal analysis of binary systems of antipyrine and resorcinol with certain organic compounds. K. HRYNAKOWSKI and F. ADAMANTIS (Rocz. Chem., 1935, 15, 163—172).—The m.p. diagrams of the systems antipyrine with *o*-, *m*-, and *p*-C₆H₄(OH)₂, salicylic and benzoic acids, and salipyrine, also of resorcinol with pyrocatechol, quinol, and phenacetin, indicate complete miscibility of the fused components. The existence of a no. of compounds previously described by other authors is confirmed. Resorcinol and phenacetin form a 3:2-compound, m.p. 76.5°.

R. T.

2:4:5-Trimethoxy-1-allylbenzene.—See this vol., 1041.

Stereochemistry of dicyclic ring systems. XI. Stereoisomerism of hexahydrohydrindenes and their derivatives. III. Hexahydrohydrindenes substituted in the five-membered ring. W. HÜCKEL, M. SACHS, J. YANTSCHULEWITSCH, and F. NERDEL (Annalen, 1935, 518, 155—183; cf. A., 1927, 238).—Both Et₂ *cis*-, b.p. 176°/21 mm., and

trans-cyclohexane-1-propionate-2-carboxylate, b.p. 164°/13 mm. [from the *cis*-, m.p. 103°, and *trans*- (I) -acid, which are prepared by catalytic reduction of *o*-CO₂H-C₆H₄-CH₂-CH₂-CO₂H], give with Na-EtOH, Et hexahydro- α -hydrindone-2-carboxylate, hydrolysed (KOH) to (I) and hexahydro- α -hydrindone, the oxime, m.p. 80°, of which is separated by crystallisation from ligroin (or by benzylation) into the *cis*-oxime (II), m.p. 100° (*Bz* derivative, m.p. 96°), and *trans*-oxime (III), m.p. 146° (*Bz* derivative, m.p. 153°) (ratio 10:1). Reduction (Na-EtOH) of (II) gives a mixture of two *cis*-amines, separated as the *Bz* derivative, m.p. 180°, and *Bz* derivative, m.p. 131°, of *cis*-hexahydro- α -hydrindylamine-I (*Ac* derivative, m.p. 126°) and -II: similar reduction of (III) gives only *trans*-hexahydro- α -hydrindylamine (*Ac* derivative, m.p. 110°) as its *Bz* derivative, m.p. 153°. Reduction (Adams) of α -hydrindone (improved prep.) affords first α -hydrindol, and finally a mixture of *cis*-hexahydro- α -hydrindols, separated (through various esters) into a form, m.p. 18° (*H phthalate*, m.p. 127°; *H succinate*, m.p. 63°; *p*-nitrobenzoate, m.p. 72°; phenylurethane, m.p. 115°) [oxidised to the ketone which gives only (II)], and a liquid form (*H phthalate*, m.p. 140°; *H succinate*, liquid; *p*-nitrobenzoate, m.p. 89°; phenylurethane, m.p. 100°). Similar reduction of β -hydrindone affords first β -hydrindol, m.p. 70° (*H phthalate*, m.p. 133—134°; *Ac* derivative, m.p. 32°; phenylurethane, m.p. 130°), and finally a mixture of *cis*-hexahydro- β -hydrindols, from which is isolated a pure form, m.p. 5°, b.p. 110°/12 mm. (cf. loc. cit.) (*p*-nitrobenzoate, m.p. 115°; oxalate, m.p. 94°). The other form, m.p. 10°, b.p. 108°/11 mm. (*H phthalate*, m.p. 103.5—105°; *H succinate*, m.p. 65.5°; phenylurethane, m.p. 102°), cannot be isolated pure from the mother-liquor, but is obtained by the action of HNO₂ on the amine (IV) below. Reduction (Na-EtOH) of *cis*-hexahydro- β -hydrindoxime affords a mixture of amines (IV), separated after benzylation into the *Bz* derivative, m.p. 144° (main product; also obtained by catalytic reduction), and the *Bz* derivative, m.p. 133° (dimorphous), of *cis*-hexahydro- β -hydrindylamine. Similar reduction of the *trans*- β -oxime, m.p. 161° (*Bz* derivative, m.p. 123°), gives *trans*-hexahydro- β -hydrindylamine (*Bz*, m.p. 140°; and *Ac*, m.p. 94°, derivatives), converted by HNO₂ into (V) (below). Reduction (Skita or Na-EtOH) of *trans*-hexahydro- β -hydrindone affords only *trans*-hexahydro- β -hydrindol (V), m.p. 23°, b.p. 102°/11 mm. (*H phthalate*, m.p. 87°; *H succinate*, m.p. 58°; oxalate, m.p. 70°). Reduction (Adams) of β -hydrindoxime affords only *di*-(β -hydrindyl)amine, m.p. 102°. When heated with KHSO₄ at 180° (V) gives mainly *di*-(*trans*-hexahydro- β -hydrindyl) ether, m.p. 38°, and a little *trans*-hexahydrindene, b.p. 154—155° (oxidised by KOH-KMnO₄ to *trans*-cyclohexane-1-acetic-2-carboxylic acid). *dl*-*trans*-cyclohexane-1:2-diacetic acid is resolved (cinchonine and brucine salts) into the *d*-, [α]_D²⁵ +48.28°, and *l*-, [α]_D²⁵ -48.28° in EtOH, -acids, converted by Ac₂O at 250°, respectively, into *l*-, b.p. 92°/13 mm., [α]_D²⁵ -297.3° in EtOH [oxime, m.p. 160°, [α]_D²⁵ -97.74° in EtOH (*Bz* derivative, m.p. 130°, [α]_D²⁵ -60.50° in COMe₂)], and *d*-*trans*-hexahydro- β -hydrindone, b.p. 88°/11 mm., [α]_D²⁵ +297.4° in EtOH. *cis*-Hexahydrohydrindene, b.p. 166°/

760 mm., has a heat of combustion 1347.5 kg.-cal. per mol., the *trans*-compound, b.p. 159°/760 mm. (by Clemmensen reduction of *trans*-hexahydro- β -hydrindone), has 1345.7 kg.-cal. per mol. Comparisons with the various decalone derivatives are made. J. W. B.

Asymmetric reactions. IV. Causes of optical selectivity in reactions with optically active catalysts. R. WEGLER and A. RÜBER (Ber., 1935, 68, [B], 1055—1059; cf. A., 1934, 771).—The selectivity of the catalytic action of nicotine, benzylpipercoline, α -phenylethyl-dimethyl- or -methylpropylamine on the partial esterification of $\text{CHPhMe}\cdot\text{OH}$ by Ac_2O or the partial conversion of *r*-hydratropyl chloride into amide is very slight in comparison with that of brucine; a relationship between selectivity and constitution of catalyst is not obvious. In the presence of cinchonine (as Ac derivative) an ester-alcohol mixture is obtained with $\alpha_D +3.9^\circ$, whereas in that of the isomeric cinchonidine the product has $\alpha_D -2.2^\circ$. Apparently in the first case a predominating portion of the centres of asymmetry has a positive selective influence, whereas in the second instance the configurative alteration at two centres causes a more pronounced selectivity in the opposite sense. The possibility of obtaining catalysts of high selectivity by choice of isomerides obtained by accumulating asymmetric centres in a given compound is examined by converting camphor into the corresponding *N*-dimethylbornylamines, one of which gives an alcohol-ester mixture with $\alpha_D^{20} +1.6^\circ$, whereas the other affords a product with $\alpha_D^{20} +12.8^\circ$.

H. W.

Preparation of aromatic alcohols by the crossed Cannizzaro reaction with formaldehyde. D. DAVIDSON and M. T. BOGERT (J. Amer. Chem. Soc., 1935, 57, 905).—Aromatic aldehydes and CH_2O in hot MeOH give 85—90% yields of HCO_2H and the aromatic alcohol with 2—5% of aromatic acid. Anisyl, piperonyl, and veratryl alcohols are conveniently prepared thus.

R. S. C.

Sensitivity of β -amino- and β -hydroxylamino- α -alkoxyphenylpropyl alcohols to alkali. V. BRUCKNER [with A. KRÁMLI and E. VINKLER] (J. pr. Chem., 1935, [ii], 142, 301—309).—3 : 4-Dimethoxy- β -veratrylideneamino- α -hydroxy-*n*-propylbenzene (I), m.p. (+ H_2O) 151° after sintering at 90—100° or (anhyd.) 151° (sharp), is obtained (a) from 3 : 4-dimethoxy- β -acetamido- α -hydroxypropylbenzene and KOH-aq. MeOH at room temp. (several weeks), or from 3 : 4-dimethoxy- β -amino- α -hydroxypropylbenzene and (b) hot 10% H_2SO_4 or (c) veratraldehyde (II) and cold NaOH. 3 : 4-Methylenedioxy- β -piperonylideneamino- α -hydroxypropylbenzene (III), m.p. 119°, is obtained by methods (a) and (b). The nitron, m.p. 150—151°, corresponding with (I) is obtained from 3 : 4-dimethoxy- β -hydroxylamino- (IV) or β -*N*-acetylhydroxylamino- α -hydroxy-*n*-propylbenzene and 5% KOH-aq. MeOH (1 : 1) at room temp. (2—3 weeks) and from (III) and (II). The nitron, m.p. 179°, corresponding with (III) is similarly obtained. The reactions involved are: $\text{OH}\cdot\text{CHAr}\cdot\text{CHMe}\cdot\text{NRAc}$ ($\text{R}=\text{H}$ or OH) \rightarrow $\text{KOAc} + \text{OH}\cdot\text{CHAr}\cdot\text{CHMe}\cdot\text{NHR}$ (V) or \rightarrow $\text{NHAc} + \text{ArCHO}$; (V) \rightarrow $\text{NHAc} + \text{ArCHO}$; $\text{ArCHO} + \text{(V)}$ \rightarrow (I) and (III) or their nitrones.

R. S. C.

Use of the ψ -nitrosites of propenylphenol ethers for the synthesis of β -hydroxylamino- and β -amino- α -arylpropanols. Wandering of acyl groups. Methylisoeugenol and isosafrole derivatives. V. BRUCKNER and (in part) V. KARDOS (Annalen, 1935, 518, 226—244).—Methylisoeugenol- ψ -nitrosite (improved prep. in 75% yield) is converted by Ac_2O -conc. H_2SO_4 into β -nitro- α -3 : 4-dimethoxyphenylpropyl acetate (I), m.p. 98°, hydrolysed (dil. KOH-EtOH) to $\text{C}_6\text{H}_3(\text{OMe})_2\cdot\text{CH}\cdot\text{CMe}\cdot\text{NO}_2$. Electrolytic reduction (conditions prescribed) of (I) affords (III) (below) and β -acetamido- α -3 : 4-dimethoxyphenylpropan- α -ol (II), m.p. 130—131° (additive compound with CHCl_3 and with C_6H_6), the structure of which is proved by its conversion by POCl_3 in boiling CHCl_3 into 6 : 7-dimethoxy-1 : 3-dimethylisoquinoline, m.p. 121.5°. The formation of (II) involves Ac migration from O to N. The reverse migration (N to O) also occurs since (II) with 4.66% MeOH-HCl affords the hydrochloride, m.p. 174—175° (decomp.), of β -amino- α -3 : 4-dimethoxyphenylpropyl acetate [reconverted by basification into (II)], and, by refluxing with 1% MeOH-HCl, is converted into the hydrochloride, m.p. 184° (decomp.), of β -amino- α -3 : 4-dimethoxyphenylpropan- α -ol (Bz derivative of Me ether, m.p. 121°). Under different conditions in the electrolytic reduction of (I) the main product is the *N*-Ac derivative (III), m.p. 176° (decomp.), of β -hydroxylamino- α -3 : 4-dimethoxyphenylpropan- α -ol (also formed by Ac migration from O to N), converted by *N*-MeOH-HCl at room temp. into the hydrochloride, m.p. 138°, of β -hydroxylamino- α -3 : 4-dimethoxyphenylpropyl acetate [converted by 40% CH_2O into the methylene nitron, m.p. 197° (decomp.)], reconverted into (III) by aq. Na_2CO_3 . Similar derivatives are prepared from isosafrole- ψ -nitrosite. This with Ac_2O - H_2SO_4 gives β -nitro- α -3 : 4-methylenedioxyphenylpropyl acetate (IV), m.p. 85°, hydrolysed to β -nitroisosafrole, reduced electrolytically to the hydrochloride, m.p. 188°, of β -amino- α -3 : 4-methylenedioxyphenylpropane. Electrolytic reduction of (IV) affords the *N*-Ac derivative (V), m.p. 162°, of β -hydroxylamino- α -3 : 4-methylenedioxyphenylpropan- α -ol [converted by HCl-MeOH into the hydrochloride, m.p. 159°, of β -hydroxylamino- α -3 : 4-methylenedioxyphenylpropyl acetate (methylene nitron, m.p. 218°), which is reconverted into (V) by NaOH], and β -acetamido- α -3 : 4-methylenedioxyphenylpropan- α -ol (VI), m.p. 124°, converted by MeOH-HCl into the hydrochloride, m.p. 176°, of the isomeric *O*-Ac derivative (reconverted by NaOH). (VI) with $\text{POCl}_3\text{-CHCl}_3$ affords 6 : 7-methylenedioxy-1 : 3-dimethylisoquinoline, m.p. 147°. (VI) is hydrolysed (10% H_2SO_4) to the corresponding β - NH_2 -compound, m.p. 96.5° [hydrochloride, m.p. 195—196° (decomp.)].

J. W. B.

Amino-alcohols. X. Ring-substituted propadrines. W. H. HARTUNG, H. C. MUNCH, and F. S. CROSSLEY (J. Amer. Chem. Soc., 1935, 57, 1091—1093; cf. A., 1933, 746).—Five ephedrine analogues are less useful than ephedrine. The relation of structure to pharmacological activity in this group is discussed. The following Et ketones are prepared: (a) from MgEtBr and the nitrile: *m*-tolyl (76.6%), b.p. 134—135°/30—33 mm. (semicarbazone, m.p. 172°); α - (68%), b.p. 166—169°/8 mm., and β - C_{10}H_7

(67%), b.p. 180—190°/8—10 mm., m.p. 56° (oxime, m.p. 133—133.5°; semicarbazone, m.p. 199°); (b) from EtCOCl: *p*-C₆H₄Cl (81%), b.p. 115°/3 mm.; *p*-C₆H₄Ph (90%), m.p. 102° (oxime, m.p. 162°). These give *oximino*-derivatives, m.p. 69.5—70°, 130°, 157°, 122—123° (gives the *dioxime*, m.p. 217° after decomp. from 208°), and 180° (*dioxime*, m.p. 235°), respectively. Hydrogenation (Pd-black; EtOH-HCl) then affords the *hydrochlorides*, m.p. 147°, 267° (uncorr.), 230—231°, 245°, and 228° (decomp.), respectively, of the corresponding β -amino- α -aryl-*n*-propyl alcohols. By analogy with ephedrine the following names are proposed: OH·CHPh·CHR·NH₂ alkaldrine; OH·CHPh·CH₂·NH₂ ethadrine; OH·CHPh·CHMe·NH₂ propadrine, etc. R. S. C.

Phenanthrene series. VIII. Amino-alcohols derived from 1:2:3:4:5:6:7:8-octahydrophenanthrene. J. VAN DE KAMP and E. MOSETTIG (J. Amer. Chem. Soc., 1935, 57, 1107—1110; cf. A., 1934, 1104).— β -Amino- α -hydroxy-derivatives are made for pharmacological examination. 1:2:3:4:5:6:7:8-Octahydrophenanthrene (prep. by H₂-Raney Ni at 120°/1600—2100 lb.; 70—85% yield), b.p. 179—180°/20 mm., cryst., gives (Friedel-Crafts; -15°; CS₂) good yields of the 9-CO·CH₂Cl (I), -CO₂H (II), m.p. 241—242° (Me ester, m.p. 45°), -Ac (III), m.p. 58—59° (oxime, m.p. 158.5—159.5°; semicarbazone, m.p. 191.5—193°), and -COEt (IV) derivatives, m.p. 52.5—53° (oxime, m.p. 146—147°). (I) does not react smoothly with sec. bases. The position 9 of the substituent is proved by prep. of (II) by hydrogenation of phenanthrene-9-carboxylic acid. (III) and (IV) give *oximino*-derivatives, reduced by SnCl₂ to 9-glycyl- [hydrochloride, m.p. 232—234° (decomp. from 225°); picrate, m.p. 215—216° (decomp.)] and 9- α -amino-propionyl-1:2:3:4:5:6:7:8-octahydrophenanthrene [hydrochloride, m.p. 231—233° (decomp.); picrate, m.p. 181—182° (decomp.)], and with Br afford the 9-CO·CH₂Br, m.p. 55—56° (does not react with NH₂Me or NH₂Et), and 9-CO·CHBrMe derivative, an oil. These yield the following 1:2:3:4:5:6:7:8-octahydrophenanthrene derivatives by condensation with the appropriate base and/or hydrogenation (PtO₂; best in EtOH-HCl): 9-dimethylamino- [hydrochloride, m.p. 236—237.5° (decomp.) after sintering at 226°; picrate, m.p. 116—117°], -diethylamino- (perchlorate, m.p. 165—166°; picrate, m.p. 144.5—145.5°), and -piperidino-acetyl- (perchlorate, m.p. 220.5—222°; picrate, m.p. 116.5—117°); 9- α -dimethylamino- [perchlorate, m.p. 198.5—200°; picrate, m.p. 185—186° (decomp.) after sintering at 180°], -diethylamino- (perchlorate, m.p. 209—210°), -piperidino- (hydrochloride, m.p. 181—182°), -methylamino-, an oil [hydrochloride, m.p. 223—224.5°; picrate, m.p. 192—193° (decomp.) after sintering at 189°], and -ethylamino-propionyl-, an oil (hydrochloride, m.p. 226—228°; picrate, m.p. 163—164°); 9- β -amino-, m.p. 103—104° [hydrochloride, m.p. 253.5—254°; picrate, m.p. 208.5—209.5° (decomp.)], -dimethylamino-, m.p. 80—80.5° (hydrochloride, m.p. 217—218°; picrate, m.p. 193—194°), -diethylamino-, m.p. 72.5—73° (hydrochloride, m.p. 148—149°; picrate, m.p. 159—160°), and -piperidino- α -hydroxyethyl-, m.p. 86—86.5° (hydrochloride, m.p. 227—227.5°; picrate, m.p. 164.5—165.5°);

9- β -amino-, m.p. 164—165.5° [hydrochloride, m.p. 278—279°; picrate, m.p. 224—224.5° (decomp.) after sintering at 223°], -dimethylamino-, an oil (hydrochloride, m.p. 227—228°; picrate, m.p. 174—174.5°), -diethylamino-, an oil (hydrochloride, m.p. 210—211°), -piperidino-, m.p. 126.5—127.5° (hydrochloride, m.p. 235—236°), -methylamino-, m.p. 129.5—130° (hydrochloride, m.p. 218—219°; picrate, m.p. 179—180°), and -ethylamino- α -hydroxy-*n*-propyl-, m.p. 124.5—125° (hydrochloride, m.p. 118—119°). R. S. C.

Pinacol-pinacolone rearrangement. VII. Rearrangement of 9:10-diaryldihydrophenanthrenediols. W. E. BACHMANN and (Miss) J. H. CHU (J. Amer. Chem. Soc., 1935, 57, 1095—1098; cf. A., 1934, 1355).—Six 9:10-dihydroxy-9:10-dihydro-9:10-diarylphenanthrenes are prepared (a) from phenanthrenequinone by the Grignard reaction and (b) by Na-Hg reduction of 2:2-diacetyldiphenyls (prep. from *o*-C₆H₄Br aryl ketones and Cu at 200—250°). In each case (a) and (b) give stereoisomeric pairs of compounds, both of which with I-AcOH lose H₂O to form the same 10-keto-9:9-diaryl compound, exclusively, which with KOH at 200—300° gives 2-diarylmethyl-diphenyl-2-carboxylic acids. The reverse of reaction (b) is effected by CrO₃-AcOH. The following are described. 9:10-Dihydroxy-9:10-dihydro-9:10-diarylphenanthrenes, m.p. referring to the products of reactions (a) and (b), respectively: phenetyl- (I), m.p. 140.5—141°, 155.5°, α -C₁₀H₇- (II), m.p. 263—264°, 204—204.5°, *p*-C₆H₄Ph- (III), m.p. 192—192.5°, 159—160°, *p*-C₆H₄Cl- (IV), m.p. 187—188°, 223°, *p*-C₆H₄F- (V), m.p. 180—181.5°, 210—211°, and *m*-C₆H₄Me- (VI), m.p. 148.5—149°, an oil. 9:9-Diarylphenanthr-9-ones: (I), m.p. 136—137°, (II), m.p. 258.5—259°, (III), m.p. 253—253.5°, (IV), m.p. 138—139°, (V), m.p. 170—170.5°, (VI), m.p. 197—198°. 2-Diarylmethyldiphenyl-2'-carboxylic acids: (I), m.p. 97—98°, (II), m.p. 215°, (III), m.p. 197—198°, (IV), m.p. 205—206°, (V), m.p. 162°, (VI), m.p. 90°. *o*-C₆H₄Br *m*-tolyl, m.p. 54.4°, b.p. 180—181°/5 mm., *p*-C₆H₄OE_t, m.p. 81°, *p*-C₆H₄Ph, m.p. 90.5—91°, *p*-C₆H₄Cl, m.p. 49—49.5°, *p*-C₆H₄F, m.p. 49.5—50°, and α -C₁₀H₇, m.p. 87°, ketones. 2:2'-Diacetyldiphenyls: *m*-C₆H₄Me·CO, m.p. 105—106°, *p*-OE_t-C₆H₄·CO, m.p. 137—138°, α -C₁₀H₇·CO, m.p. 200°, *p*-C₆H₄Ph·CO, m.p. 209.5—210°, *p*-C₆H₄Cl·CO, m.p. 139—140°, *p*-C₆H₄F·CO, m.p. 136.5—137.5°. R. S. C.

Heteropolarity. XXV. Constitution and colour. W. DILTHEY and R. WIZINGER (Ber., 1935, 68, [B], 1037—1040).—In reply to Hantzsch *et al.* (A., 1933, 1158) it is pointed out that the absorption spectra of aminated CHPh₃ dyes do not afford any experimental evidence of the new views of the action of auxochromes or of the presence of special conjugated systems. H. W.

Magenta series. I. Preparation and spectrography of the lower basic members. J. T. SCANLAN (J. Amer. Chem. Soc., 1935, 57, 887—892).—The following names are given: 4:4'-diaminofuchsonimonium chloride, magenta O; its 3-Me, 3:3'-Me₂, and 3:3':3''-Me₃ derivatives magenta I, II, and III, respectively [termed below (0), (I), (II), and (III), respectively]. The "old" (Couper) process (modified) gives these products in

a nearly pure form when the amines and nitro-compound are properly selected. The "new" (CH_2O) process gives anomalous results, as the 4:4'-diaminodiphenylmethane derivative apparently reacts by oxidation to the benzhydrol and fission to the aldehyde and hydrocarbon, thus providing only 1 Ph of the product. In accordance with this mechanism $\text{CH}_2(\text{C}_6\text{H}_4\text{NH}_2\text{-}p)_2$ (IV) with NH_2Ph , HCl , PhNO_2 , and FeCl_2 gives (0) and with $o\text{-C}_6\text{H}_4\text{MeNH}_2$ and $o\text{-C}_6\text{H}_4\text{MeNO}_2$ mainly (II), whilst the 3:3'- Me_2 derivative of (IV) with NH_2Ph and PhNO_2 gives mainly (I) and with $o\text{-C}_6\text{H}_4\text{MeNH}_2$ and $o\text{-C}_6\text{H}_4\text{MeNO}_2$ gives (III). (0), (I), (II), and (III) are characterised by absorption spectra.

R. S. C.

Surface films of sterols and their derivatives. N. K. ADAM, F. A. ASKEW, and J. F. DANIELLI (Biochem. J., 1935, 29, 1786—1801; cf. A., 1934, 1067).—Surface pressure and potential measurements of sterols and their derivatives confirm the generally accepted view of sterol constitution; differentiation between *epi* and normal configuration is sometimes possible. Sterols with OH at position 3 and with > one double linking stand practically vertical in the surface and occupy an area of 37—44 sq. Å. Tilting is produced by CO in the 3 and, to a great extent, CO or OH in the 6 or 7 position. Factors involved in tilting include H_2O -attraction and position in ring of the groups. *apo*Cholic acids form gaseous films with flat-lying mols.

F. O. H.

Synthesis of the carbon skeleton present in sterols etc. P. P. T. SAH (Sci. Rep. Nat. Tsing Hua Univ., 1935, 3, 95—107).—Theoretically possible methods are outlined.

R. S. C.

Δ^3 -Tetrahydro-*p*-toluic acid. E. LEHMANN and W. PAASCHE (Ber., 1935, 68, [B], 1068—1072).—The product of the condensation of isoprene and acraldehyde is identified as Δ^3 -tetrahydro-*p*-tolualdehyde, since it is oxidised by CrO_3 in AcOH or by Ag_2O in 50% EtOH to Δ^3 -tetrahydro-*p*-toluic acid (I), m.p. 99°, also obtained from isoprene and acrylic acid and dehydrogenated by Se at 270° to *p*- $\text{C}_6\text{H}_4\text{MeCO}_2\text{H}$. (I) yields an *Et* ester, b.p. 105—108°/12 mm., and chloride, b.p. 90°/19 mm., which yields the amide, m.p. 182°, and sec.-amide, m.p. 203°. 4(3)-Hydroxy-3(4)-methylcyclohexanecarboxylactone, m.p. 69°, converted by boiling 15% NaOH into 4(3)-hydroxy-3(4)-methylcyclohexane-1-carboxylic acid, m.p. 156°, is obtained as by-product in the prep. of (I). Addition of Cl_2 to (I) in CCl_4 at 0° is accompanied by evolution of HCl and formation of 3-chloro- $\Delta^{3(4)}$ -tetrahydro-*p*-toluic acid, m.p. 121°. Br and (I) in CCl_4 afford 3:4-dibromoheptahydro-*p*-toluic acid, m.p. 108° (*Me*, b.p. 136—137°/4 mm., and *Et*, b.p. 128°/0.8 mm., esters), converted by $\text{CH}_3\text{BrCO}_2\text{Me}$ and Cu powder at 180° into *Me*, 2:2'-dimethyl- $\Delta^{1(2):2(2')}$ -octahydro-diphenyl-5:5'-dicarboxylate, b.p. 164—165°/1.5 mm. (corresponding acid, m.p. 227°).

H. W.

Derivatives of $\alpha\alpha$ -dibenzamidopropionic acid. B. H. NICOLET (J. Amer. Chem. Soc., 1935, 57, 1073).— AcCO_2H and NH_2Bz at 110—120°/20—30 mm. give $\alpha\alpha$ -dibenzamidopropionic acid, m.p. 181—186° (decomp.) [*Et* ester, m.p. 132—133°; amide, m.p. 212—213° (slight decomp.), stable to hot Ac_2O],

converted by hot AcOH into α -benzamidopropionic acid, m.p. 137—138°, and by hot Ac_2O into the azlactone, m.p. 203—205°, which with glycine gives $\alpha\alpha$ -dibenzamidopropionylglycine, m.p. 197° (decomp.).

R. S. C.

Catalytic action of platinum and manganese dioxide on benzoyl peroxide and perbenzoic acid.—See this vol., 941.

Ring-systems with *para*-linkings. II. G. HELLER and R. EBELING (J. pr. Chem., 1935, [ii], 142, 274—276; cf. A., 1926, 286).—*p*-Nitrobenzhydrazide (modified prep.) gives *Et* acetoacetate-*p*-nitrobenzoylhydrazide, m.p. 115°, which at 170—175° yields *s*-di-*p*-nitrobenzoylhydrazine, m.p. 283°, reduced (Zn dust and HCl-AcOH) to the di-*p*-amino-compound, m.p. 303—304° (*Ac*₂ derivative, m.p. 335°), identical with the compound previously considered to be *p*-benzisopyrazolone.

R. S. C.

M.p. of sulphosalicylic acid. HORKHEIMER (Pharm. Ztg., 1935, 80, 660).—Sulphosalicylic acid (I) is usually stated to have m.p. 108—113°. If a finely-powdered sample is kept for 24 hr. over H_2SO_4 in a desiccator and the m.p. determined immediately it is opened, figures as high as 200° are obtained. Keeping for a few min. in the open allows sufficient H_2O to be absorbed to give results about 108—113°. The divergence is not due to loss of H_2O of crystallisation.

C. I.

Stereochemical studies. V. Optical isomerism of α -phenylsulphonylphenylacetic acids. W. PIECHULEK and J. SZUSZKO (Rocz. Chem., 1935, 15, 221—233).—Racemic $\text{SPh-CHPh-CO}_2\text{H}$ (I), m.p. 103—104°, and brucine yield a salt (II), $+\text{C}_6\text{H}_6$, m.p. 97° (decomp.), $[\alpha]_D^{20} +55^\circ$, from which the *d*-acid (III), m.p. 129—130°, $[\alpha]_D^{20} +216^\circ$, is regenerated; cinchonidine (IV) and *dl*-(I) yield a mixture of *d*- and *l*-salt (chiefly *d*-), from which pure (III) is obtained by hydrolysis and fractional crystallisation. The salt obtained from (III) and (IV) has m.p. 176—178° (decomp.), $[\alpha]_D^{20} +38.6^\circ$. The acid (V) regenerated from the mother-liquors from (II) has m.p. 129—130°, $[\alpha]_D^{20} -215.6^\circ$; a 1:1 mixture of (III) and (V) has m.p. 103—104°. (V) and *l*-menthylamine afford a salt, m.p. 157—158°, $[\alpha]_D^{20} -170.2^\circ$. (III) yields $\text{PhSO-CHPh-CO}_2\text{H}$ (VI), m.p. 149—150°, $[\alpha]_D^{20} +419.4^\circ$, when treated with H_2O_2 in AcOH ; the filtrate contains $\text{PhSO-CHPh-CO}_2\text{H}$, m.p. 139° (decomp.), $[\alpha]_D^{20} +195^\circ$. The (—)_s, (—)_c, m.p. 148—149° (decomp.), $[\alpha]_D^{20} -420.4^\circ$, and (+)_s, (—)_c, m.p. 139° (decomp.), $[\alpha]_D^{20} -191.2^\circ$, acids are obtained analogously from (V). 1:1 Mixtures of the (—)_s, (—)_c, and (—)_s, (+)_c acids, and of the (+)_s, (—)_c and (+)_s, (+)_c acids have m.p. 135—137°, $[\alpha]_D^{20} +116^\circ$. (III), on protracted treatment with H_2O_2 in AcOH , affords $\text{PhSO}_2\text{-CHPh-CO}_2\text{H}$, m.p. 180—187° (decomp.), $[\alpha]_D^{19} +107.6^\circ$ (both diminished on repeated crystallisation), which represents a mixture of unstable optical isomerides. The above findings for the diastereomerides of (VI) are in agreement with the principle of optical superposition. All vals. of $[\alpha]$ are in 1:1 EtOH-CHCl_3 .

R. T.

cis-Cinnamic acids.—See this vol., 916.

Modes of addition to conjugated unsaturated systems. VIII. Reduction of α -vinylcinnamic acid. C. K. INGOLD and M. A. T. ROGERS (J.C.S., 1935, 717—721).—Reduction of α -vinylcinnamic acid (I) by Na—Hg in alkaline and acid solution and by Al—Hg in neutral solution affords a mixture of α -benzylcrotonic acid (II) and varying amounts of a liquid product (III), b.p. 119—122°/2 mm., 174°/19 mm., shown, contrary to the conclusions of Kuhn *et al.* (A., 1932, 739), to be essentially β -phenyl- α -vinylpropionic acid, the theoretically expected product (A., 1929, 1270). This result was established by ozonolytic degradation by the methods of Burton and Ingold (A., 1929, 1270) and Fischer *et al.* (A., 1932, 1113). (III), however, is converted quantitatively into (II) by 2*N*-NaOH at 100° during 15 min., or at room temp. during a longer time. Et benzylmalonate with K in Et₂O and dibromoethylene afford *Et* benzyl- β -bromovinylmalonate, b.p. 130—140°/0.05—0.07 mm., reduced by Zn—EtOH to *ethyl benzylvinylmalonate*, b.p. 100—110°/0.14 mm. (cf. A., 1933, 51). This on hydrolysis by KOH—EtOH, NaOH—EtOH—H₂O, and HCl—AcOH gave only (II). *Et* α -vinylcinnamate, b.p. 106—108°/1 mm. [obtained from the Ag salt of (I) and EtI], affords on reduction (Al—Hg in moist ether) a *H*₂-derivative, b.p. 134—144°/13—14 mm. Reduction of α -styrylcinnamic acid by Na—Hg in EtOH—AcOH (cf. A., 1899, i, 614) and in NaOH—H₂O affords β -phenyl- α -styrylpropionic acid, unchanged when refluxed with 5*N* aq. NaOH during 2 hr.

The theory of Burton and Ingold is in agreement with all the known facts. It cannot, however, be applied to the reduction of β -phenylsorbic acid (A., 1933, 1159), as this case is too complicated (cf. A., 1929, 1270). Contrary to the views of Kuhn *et al.* (A., 1933, 1159), the theory readily accommodates the occurrence of pinacol-like reduction and the known effects of the purity of amalgams. Further, it can be linked to current views on over-potential.

H. G. M.

Synthesis of hydrogenated derivatives of phenanthrene and of phenanthrenic hydrocarbons. G. DARZENS and A. LÉVY (Compt. rend., 1935, 200, 2187—2189).— α -C₁₀H₇·CH₂Cl (modified prep.) gives Et₂ 1-naphthylmethylmalonate, m.p. 32° (lit. an oil), and thence Et₂ 1-naphthylmethylallylmalonate (α -1-naphthyl- Δ^3 -pentene- $\beta\beta$ -dicarboxylate), m.p. 28°, b.p. 209°/2 mm., which yields the corresponding acid, an oil, decomp. at about 185—190° into α -1-naphthylmethyl- Δ^3 -pentenoic acid, m.p. 73.5°. With H₂SO₄—AcOH (1:1) at 50° this gives the lactone, m.p. 98°, and 1-methyl-1:2:3:4-tetrahydrophenanthrene-2-carboxylic acid, m.p. 157°, converted by S at 265° into 1-methylphenanthrene. Yields are excellent.

R. S. C.

Synthesis of pinonic acid. P. C. GUHA and K. GANAPATHI (Current Sci., 1935, 3, 484—485).—*trans*-Norpinic acid (A., 1929, 445) with Ac₂O at 190—200° gives the *cis*-anhydride, which with NaOMe—MeOH (equimol. amount) affords Me H *cis*-norpinate; *cis*-norpinyl chloride with ZnMeI is converted into Me₂ pinononate, b.p. 130—135°/14 mm., hydrolysed to pinonic acid (cf. A., 1913, i, 495).

J. L. D.

2-Iodo-3-hydroxybenzoic acid. T. A. HENRY and T. M. SHARP (J.C.S., 1935, 856—857).—The compound, m.p. 133° (J.C.S., 1922, 121, 1059, m.p. incorrectly given there as 233°), obtained by the oxidation of 2-iodo-3-hydroxybenzaldehyde (I) (cf. A., 1924, i, 738) in COMe₂ with KMnO₄ is impure (I). Oxidation of the Ac derivative of (I) in COMe₂ with KMnO₄ affords 2-iodo-3-acetoxybenzoic acid, m.p. 179—180° (corr.), from which the desired 2-iodo-3-hydroxybenzoic acid, m.p. 158—159° (corr.), is obtained by hydrolysis.

H. G. M.

Action of thionyl chloride on phenylglycollic acid. P. CARRÉ and D. LIBERMANN (Bull. Soc. chim., 1935, [v], 2, 1166—1168).—OH·CHPh·CO₂H (I) and SOCl₂ (1.2 mols.) in Et₂O at room temp. give CHPhCl·COCl and the sulphite anhydride,

O<CHPh>CO, which decomposes at 29—30° into PhCHO, SO₂, and CO, or with H₂O or EtOH affords SO₂ and (I) or its Et ester, respectively. Explanations in the lit. are fallacious. CHPhCl₂ arises by reaction of PhCHO with excess of SOCl₂. OH·CPh₂·CO₂H and SOCl₂ (3 mols.) in CCl₄ at room temp. give an excellent yield of CPh₂Cl·CO₂H and a little CPh₂, probably formed from a sulphite anhydride (cf. lit.).

R. S. C.

Phenylpyruvic acid; product of its condensation with phenylacetonitrile. P. CORDIER (Compt. rend., 1935, 200, 1412—1413).—In EtOH—H₂O containing KOH or, preferably, K₂CO₃, CH₂Ph·C(=O)·CO₂H and CH₂Ph·CN afford α -hydroxy- β -phenyl- α - α' -cyano-benzylpropionic acid, slow decomp. > 160°, which decomposes into its components in presence of conc. alkali, and is transformed by AcOH at 100° into β -phenyl- α -benzylmaleic anhydride, m.p. 76°, converted by KOH and MeI into its Me₂ ester, m.p. 68°.

H. W.

Addition of mercaptans to ethylenic linkings.

B. H. NICOLET (J. Amer. Chem. Soc., 1935, 57, 1098—1099).— $\alpha\beta$ -Unsaturated ketones, in which the C:C linking is reactive, condense with mercaptans without addition of alkali. CHPh·CH·COPh (I) at 100° thus yields in 5 min. β -benzyl-, m.p. 71°, and *p*-tolyl-thiol- β -phenylpropiophenone. CHPh·CH·C(=O)·CO₂H in 10 min. gives α -keto- γ -*p*-tolyl-, m.p. 97—98° (oxime, m.p. 160°), and -benzylthiol- γ -phenylbutyric acid, an oil (oxime, m.p. 95—97°). CHPh·CH·CO₂Me with (not without) a little piperidine gives (2 hr.) Me β -*p*-tolyl-, m.p. 59—60°, and -benzylthiol- β -phenylpropionate, m.p. 119—120°. H₂S adds to such ketones in EtOH in presence of a little Na₂CO₃ and to (I) in neutral EtOH.

R. S. C.

Asymmetric syntheses. XII. Asymmetric synthesis of phenyl-*p*-tolylglycollic and *p*-tolylmethylglycollic acids. A. MCKENZIE and E. W. CHRISTIE (Biochem. Z., 1935, 277, 426—436).—The prep. is described of (–)-menthyl *p*-toluoylformate (I), C₁₉H₂₆O₃, an oil, b.p. 217—220°/11 mm., *n*_D²⁰ 1.5069, and of (–)-bornyl *p*-toluoylformate (II), C₁₉H₂₄O₃, an oil b.p. 215—217°/10 mm., *n*_D²⁰ 1.5195, and the mutarotation of these compounds examined. (I) with MgPhBr gave an acid, m.p. 128—130°, [α]_D²⁰ +1°. *d*-Phenyl-*p*-tolylglycollic acid, prepared by resolution with quinine of the *r*-acid, has [α]_D²⁰ +2.5° and

m.p. 125—127°, whereas the *r*-acid has m.p. 133—134°. (I) with MgMeI gave (–)*p*-tolylmethylglycollic acid, m.p. 139—142°, $[\alpha]_{5461}^{20}$ –47° in EtOH, which is practically optically pure, since the corresponding acid (by resolution with quinine of the *r*-acid) has m.p. 140—142°, $[\alpha]_{5461}^{20}$ –51°. (II) with MgMeI gave *r-p*-tolyltrimethylethylene glycol, m.p. 79.5—80.5°, together with *r-p*-tolylmethylglycollic acid, m.p. 102—104°. P. W. C.

β-3-Hydroxycholanolic acid. F. REINDEL and K. NIEDERLÄNDER (Ber., 1935, 68, [B], 1243—1246).—Lithocholic, [α -3-hydroxycholanolic] acid (I) is oxidised by CrO₃ to dehydrolithocholic acid (II) [semicarbazone, m.p. 231—232° (decomp.)], which is hydrogenated (PtO₂) in acid solution to β-3-hydroxycholanolic acid (III), leaflets (+1H₂O) or anhyd needles, m.p. 176—177°, $[\alpha]_D^{20}$ +25.83° in abs. EtOH [Me ester (III), m.p. 113—114.5°; Ac derivative, m.p. 183—185°]. The main product of the hydrogenation of (II) in alkaline medium is (I). (III) is partly isomerised to (I) by NaOEt at 180°. (III) and (IV) give ppts. with digitonin in 90% EtOH; these are more freely sol. than the digitonides of the sterols and do not appear in 95% EtOH. H. W.

Optical properties of some bile acids. B. JOSEPHSON (Biochem. J., 1935, 29, 1484—1489).—Sp. rotations and rotatory dispersions are given for cholic (I), deoxycholic (II), glycocholic, and taurocholic acids and their alkali salts. (I) and (II) have $[\alpha]_D^{20}$ +35.07° and 55.56° in EtOH, respectively. For the other acids the rotation is dependent on the concn. of the solution. The alkali salts of all the acids showed increasing α_D with decreasing concn. J. N. A.

Constitution of caryophyllene. H. N. RYDON (Chem. and Ind., 1935, 557).—3:3-Dimethylcyclobutane-1:2-dicarboxylic and 3:3-dimethyl-Δ¹-cyclobutene-1:2-dicarboxylic acids, synthesised from β-dimethyladipic acid by the application of the method of Fuson and Kao (A., 1929, 794), show no depression of m.p. on admixture with racemic norcaryophyllenic and with dehydronorcaryophyllenic acids, respectively. The structures assigned to the latter acids (this vol., 351, 489) are thus confirmed. H. N. R.

Orientation in the benzene ring. Preparation of 5-chloro-β-resorcylic acid. R. B. SANDIN and R. A. McKEE (J. Amer. Chem. Soc., 1935, 57, 1077—1078).—5-Chloro-β-resorcylic acid, dimorphic, m.p. 224—225° (corr.) (after several months, 211—213°), best identified by the Ac derivative, m.p. 169° (corr.), is obtained from 4-chlororesorcinol and KHCO₃ or from β-resorcylic acid and SO₂Cl₂ or Cl₂ in AcOH (cf. lit.). R. S. C.

Homoamines and homoacids. P. L. JULIAN and B. M. STURGIS (J. Amer. Chem. Soc., 1935, 57, 1126—1128).—An improved prep. of rhodanine, m.p. 170°, renders practicable the large-scale prep. of arylacetonitriles and thence of aryl-ethylamines and -acetic acids from aromatic aldehydes. Veratrylidenerhodanine, m.p. 232°, with 15% NaOH at 100° gives α-thio-3:4-dimethoxyphenylacetic acid, CH₂R-CS-CO₂H, m.p. 179°, which with NH₂OH-EtOH affords 3:4-dimethoxyphenylpyruvic acid oxime, dehydrated by warm Ac₂O to veratryl cyanide. All

the yields are excellent. Piperonal and anisaldehyde give similar results. R. S. C.

Ketonic acid analogues with thyroxine. A. CANZANELLI, R. GUILD, and C. R. HARRINGTON (Biochem. J., 1935, 29, 1617—1619).—The synthesis of 3:5-di-iodo-4-(3':5'-di-iodo-4'-hydroxyphenoxy)-phenylpyruvic acid (I), the ketonic acid analogous with thyroxine, is described. The azlactone from acetyl glycine and 3:5-di-iodo-4-(4'-methoxyphenoxy)benzaldehyde, m.p. 227° (decomp.), on boiling with 30% KOH and saturating with SO₂, give 3:5-di-iodo-4-(4'-methoxyphenoxy)phenylpyruvic acid, m.p. 205° (decomp.), dark green FeCl₃ colour in EtOH solution, demethylated with HI-AcOH to 3:5-di-iodo-4-(4'-hydroxyphenoxy)phenylpyruvic acid, m.p. 156°, which with I-KI gave (I), m.p. 173°, intense reaction with HNO₂+NH₃. The ratio of the activities of thyroxine and of (I) on the metabolism of an adult female dog on const. maintenance diet was about 11:3. P. W. C.

Formation of unsymmetrical acid amides. B. H. NICOLET (J. Amer. Chem. Soc., 1935, 57, 1064—1065).—An *as*-acid anhydride, $\begin{matrix} X \cdot CO \\ Y \cdot CO \end{matrix} > O$, may react with NH₃ first by addition, to yield

CO₂H·Y·X·CO·NH₂. If the imide, $\begin{matrix} X \cdot CO \\ Y \cdot CO \end{matrix} > NH$, reacts with NaOH first by addition at the same CO, it will yield the isomeric amide, NH₂·CO·Y·X·CO₂H. This is true for *d*-camphoric anhydride [gives mainly α-amide (I)] and imide [gives very little (I)] and for the following cases. 3-Nitrophthalic anhydride and NH₂Ph at room temp. give 3-nitrophthal-2-anilic acid, m.p. (+0.5H₂O) 172° (anhyd.) 154°, not identical with the 1-anilide, m.p. 181°, prepared from the phenylimide, which with NH₃ at 150° gives 3-nitrophthal-1-anilide-2-amide, m.p. 200—204° (decomp.). 3-Nitrophthalimide with NH₂Ph at 100° gives the 2-anilide-1-amide, m.p. 228—230°. R. S. C.

Dipole moment and structure of organic compounds. XIV. Direction of the electric moment of the N:C group. A. WEISSBERGER and R. SANGEWALD (J.C.S., 1935, 855).—The moment of *p*-C₆H₄(CN)₂ is indistinguishable from zero. The CN group therefore shows axial symmetry about the direction of the bond of attachment to the benzene ring. 4:4'-Dicyanodiphenyl is not sufficiently sol. in C₆H₆ at 25° and in decalin at 70° to make a determination of the moment possible, but it is considered that the moment is zero and that the reported val. 1.1D (A., 1930, 399) is erroneous. H. G. M.

Modes of addition to conjugated unsaturated systems. VII. Addition of hydrogen cyanide and methyl malonate to methyl cinnamylidene-malonate. D. A. DUFF and C. K. INGOLD (J.C.S., 1934, 87—93).—Condensation of Et atropate with Et ethanetricarboxylate affords Et δ-phenyl-*n*-butane-αβδ-tetracarboxylate, b.p. 165°/0.03 mm., hydrolysed and decarboxylated to δ-phenyl-*n*-butane-αβδ-tricarboxylic acid, m.p. 210—212°. Et benzylmalonate (I) with Et fumarate yields Et δ-phenyl-*n*-butane-αβγγ-tetracarboxylate, b.p. 204—208°/0.09 mm., hydrolysed and decarboxylated to a δ-phenyl-*n*-butane-αβγ-tricarboxylic acid, m.p. 168°. (I) and Et bromosuccinate

yield *Et* δ -phenyl-*n*-butane- $\alpha\beta\gamma\gamma$ -tetracarboxylate, b.p. 184—186°/0.6 mm., hydrolysed and decarboxylated to a δ -phenyl-*n*-butane- $\alpha\beta\gamma$ -tricarboxylic acid, m.p. 187—190° (decomp.) (Me_3 ester, m.p. 60°; Me_2 ester, m.p. 112°; anhydro-acid, m.p. 114°), identical with that obtained by hydrolysis of the additive product (II) from HCN and *Me* cinnamylidenemalonate (III). (II) is therefore *Me* $\beta\gamma$ -dicyano- δ -phenyl-*n*-butane- $\alpha\alpha$ -dicarboxylate, and not the $\alpha\delta$ -dicyano-isomeride as supposed by Thiele and Meisenheimer (A., 1899, i, 603), initial $\alpha\beta$ -addition being followed by prototropic change and subsequent $\beta\gamma$ -addition. The additive product of $CH_2(CO_2Me)_2$ (IV) and (III) is hydrolysed to β -phenylisohexane- $\alpha\alpha\epsilon$ -tricarboxylic acid, m.p. 140°, esterified and the Me_3 ester, b.p. 250°/0.2 mm., cyclised to the cyclic ketonic ester (V), m.p. 139°, described by Meerwein (A., 1908, i, 545), accompanied by a stereoisomeride, m.p. 64°, converted into (V) on keeping or on treatment with HCl-MeOH. (V), on hydrolysis, yields 3-phenylcyclohexanone-5-acetic acid, m.p. 118—119°, reduced (Clemmensen) to 3-phenylcyclohexane-1-acetic acid (VI), m.p. 52—54°. *Et* cyclopentanone-2-carboxylate, with CH_2PhCl in $NaOEt$ - $EtOH$, affords *Et* α -benzyladipate, b.p. 208°/16 mm., hydrolysed to α -benzyladipic acid, m.p. 116—118°. With Ac_2O this yields 2-benzylcyclopentanone (VII), b.p. 144—146°/16 mm. (semicarbazone, m.p. 198—200°). (VII) condenses (piperidine) with $CN\cdot CH_2\cdot CO_2Et$, yielding *Et* α -cyano-2-benzylcyclopentylidene-1-acetate, m.p. 81—83°, which cannot satisfactorily be hydrolysed; conc. H_2SO_4 affords *Et* 2-sulphobenzylcyclopentylidene-1-malonate, m.p. 120°. (VII), on reduction (Na -moist Et_2O), affords 2-benzylcyclopentanol, b.p. 154°/16 mm., converted by HBr - $AcOH$ into 2-bromo-1-benzylcyclopentane, b.p. 150—155°/15 mm. This with $CH_2(CO_2Et)_2$ affords *Et* 2-benzylcyclopentane-1-malonate, b.p. 142—150°/1 mm., hydrolysed to 2-benzylcyclopentanemalononic acid, m.p. 137°, which, when heated, yields 2-benzylcyclopentaneacetic acid, m.p. 53—54°. 3-Phenylcyclohexanol, with HBr - $AcOH$, yields 3-bromo-1-phenylcyclohexane, b.p. 126°/0.5 mm., which, with $CH_2(CO_2Et)_2$, affords *Et* 3-phenylcyclohexane-1-malonate, b.p. 160—165°/0.5 mm., hydrolysed to 3-phenylcyclohexane-1-malononic acid, m.p. 166°, decarboxylated to (VI), m.p. and mixed m.p. 52°. The structures assigned by Meerwein (*loc. cit.*) are thus confirmed. It is considered that, in the addition of (IV) to (III), both $\alpha\beta$ - and $\alpha\delta$ -additive products are formed, but only the latter can undergo further addition; hence, although it is thermodynamically the less stable, the excess of (IV) continuously displaces the equilibrium in its favour.

H. N. R.

Michael reaction. I. Condensation of ethyl benzylmalonate with ethyl fumarate. H. N. RYDON (J.C.S., 1935, 420—425; cf. preceding abstract).—Condensation of *Et* bromosuccinate with *Et* benzylmalonate (I) affords *Et* δ -phenyl-*n*-butane- $\alpha\beta\gamma\gamma$ -tetracarboxylate (II), b.p. 203—209°/2.5 mm., which is hydrolysed and decarboxylated to a δ -phenyl-*n*-butane- $\alpha\beta\gamma$ -tricarboxylic acid (III), m.p. 190—191°. (II) does not contain H directly replaceable by Na, since attempted methylation in C_6H_6 affords only decomp. products yielding, on hydrolysis, a mixture containing benzylmethyilmalononic acid, identified by conversion

into β -phenyl- α -methylpropionamide, m.p. 106°. (II) is readily methylated in $EtOH$, yielding *Et* δ -phenyl- α -methyl-*n*-butane- $\alpha\alpha$ -trans- $\beta\gamma$ -tetracarboxylate (IV), b.p. 175—195°/1.5 mm., hydrolysed and decarboxylated to δ -phenyl- α -methyl- α -trans- $\beta\gamma$ -tricarboxylic acid (V), m.p. 181—183°. (I) with *Et* fumarate (VI) affords *Et* δ -phenyl-*n*-butane- $\alpha\alpha$ -trans- $\beta\gamma$ -tetracarboxylate (VII), b.p. 215—220°/1.5 mm., hydrolysed and decarboxylated to δ -phenyl-*n*-butane- α -trans- $\beta\gamma$ -tricarboxylic acid (VIII), m.p. 175°. (VII) differs from (II) in possessing a H directly replaceable by Na, since methylation proceeds readily in both C_6H_6 and $EtOH$, yielding (IV). (III) and (VIII) are stereoisomeric, since, when heated, both yield β -carboxy- α -benzylglutaric anhydride, m.p. 111—113°, reconverted into (VIII) by H_2O . It is concluded that the condensation of (I) with (VI) proceeds mainly in accordance with Thorpe's mechanism (J.C.S., 1900, 77, 923).

H. N. R.

Validity of Holden and Lapworth's theory of the mechanism of abnormal Michael additions. C. K. INGOLD and H. N. RYDON (J.C.S., 1935, 857—858).—The observations of Rydon (see above) on the addition of *Et* fumarate to *Et* sodiobenzylmalonate are accommodated to Holden and Lapworth's theory (A., 1931, 1272), and do not require Michael's hypothesis for their explanation. When the steric relations between the CO_2Et groups of $CH_2Ph\cdot C(CO_2Et)_2\cdot CH(CO_2Et)\cdot CH_2\cdot CO_2Et$ (I), required as an intermediate compound by Holden and Lapworth's theory, and the no. of Walden inversions which occur in the subsequent transformation of (I) and in the direct hydrolysis of (I) are considered, it is possible to account for the formation of a product which hydrolyses to a stereoisomeride of the compound, $CH_2Ph\cdot CH(CO_2H)\cdot CH(CO_2H)\cdot CH_2\cdot CO_2H$, obtained directly by hydrolysis of (I).

H. G. M.

Lichen substances. LII. Methanolysis of lichen depsides and synthesis of divaric acid. Y. ASAHINA and H. AKAGI. **LIII. Synthesis of hydroxydivaric acid and of sekikaic acid.** Y. ASAHINA and M. YASUE (Ber., 1935, 68, [B], 1130—1132, 1133—1137).—LII. Fission of depsides is conveniently effected by gentle warming with KOH - $MeOH$, the method being particularly suitable for those of the evernic acid type which afford free acids of the orsellinic variety and *Me* esters of the evernicic acid class. Thus divaricic acid affords divaric acid (I), m.p. 179° (decomp.) (*Me* ester, m.p. 78°), and *Me* divaricate, hydrolysed to divaricic acid, m.p. 151°. Similar methanolysis of sekikaic, evernic, and lecanoric acids is recorded, whilst for gyrophoric, barbatic, and obtusatic acids a somewhat modified procedure is necessary.

[With T. WAKE.] Divarin is transformed by $Zn(CN)_2$ and HCl in Et_2O followed by boiling H_2O into divarinaldehyde, which with $ClCO_2Me$ and *N*- $NaOH$ gives dicarbomethoxydivarinaldehyde. The latter substance is oxidised by $KMnO_4$ to dicarbomethoxydivaric acid, hydrolysed to (I), m.p. 179°.

LIII. 2-Aldehydo-1-propylpyrogallol 3:5-*Me*₂ ether (II) and NH_2Ph yield the corresponding anil (III), m.p. 86—87°, slowly converted by warm MeI into the anil of 2-aldehydo-1-propylpyrogallol 5-*Me* ether (IV),

m.p. 135—136° [hydrolysed by HCl to NH_2Ph , HCl and 2-aldehydo-1-propylpyrogallol 5-Me ether (V) (+0.5 H_2O), m.p. 98°, which re-forms (IV) with NH_2Ph], and 3-hydroxy-2:4-dimethoxy-6-propylbenzylideneaniline methiodide (VI), m.p. 163—165°, hydrolysed by dil. HCl to (II) and NHPhMe , HCl. Loss of Me in the Freund-Becker reaction is therefore not due to MeI, but to a trace of HI. Treatment of (III) with NH_2Ph , HI in absence of MeI gives (IV) almost quantitatively, whilst (VI) yields (IV) when warmed with NH_2Ph . Addition of ClCO_2Et to (V) in $\text{C}_5\text{H}_5\text{N}$ at -15° affords 3:4-dicarbethoxy-2-aldehydo-1-propylpyrogallol 5-Me ether, m.p. 67—68°, oxidised by KMnO_4 in COMe_2 to hydroxydicarbethoxydivaric acid, m.p. anhyd. 124—125°, m.p. (+1 H_2O), 128—129°, hydrolysed by N-NH_3 to hydroxydivaric acid, m.p. 163—164°. Carbethoxydivaric acid, m.p. 101°, from the acid and ClCO_2Et in $\text{C}_5\text{H}_5\text{N}$ at -15°, is transformed by SOCl_2 into the corresponding chloride, which is converted by successive treatments with (V) and ClCO_2Et in $\text{C}_5\text{H}_5\text{N}$ into dicarbethoxysekika-aldehyde, m.p. 136—137°; oxidation of the latter with KMnO_4 in COMe_2 at 40—50° leads to dicarbethoxysekikaic acid, m.p. 147—148° (decomp.), hydrolysed to sekikaic acid, m.p. 143—144°, identical with the natural product. H. W.

Benzoin reaction.—See this vol., 938.

Mixed magnesium alcoholates, and their molecular compounds. II. Molecular compounds formed from magnesium alcoholate iodides, aldehydes, and certain diketones. III. Existence of equilibrium systems in ethereal solutions of magnesium alcoholate iodides. V. M. TOLSTOPJATOV (J. Gen. Chem. Russ., 1935, 5, 73—82, 83—93).—II [with B. N. SVERDLOVA]. Cryst. 1:1 and 1:2 compounds are obtained from PhCHO or $\text{CHPh}\cdot\text{CH}\cdot\text{CHO}$ and $\text{OR}\cdot\text{MgI}$ ($\text{R}=\text{Et}$, Bu^a , Bu^v) in Et_2O . $\text{OBu}^a\cdot\text{MgI}$ and $(\text{PhCO})_2$ (I) afford a 1:1 compound.

III [with A. T. RISKALTSCHUK]. $\text{OR}\cdot\text{MgI}$ ($\text{R}=\text{cetyl}$, α - and β -octyl, Bu^a , Pr) and COPh_2 in Et_2O afford the compound $\text{MgI}_2\cdot 3\text{COPh}_2$, whilst with (I) mol. compounds of the above type are formed. It is concluded that the equilibrium $2\text{OR}\cdot\text{MgI} \rightleftharpoons \text{Mg}(\text{OR})_2 + \text{MgI}_2$ exists in Et_2O . R. T.

Enamine form of Schiff's bases. R. WEGLER and A. RUZICKA (Ber., 1935, 68, [B], 1059—1062).—Treatment of *d*-valeraldehyde, α +10° to +11°, with $\text{CH}_2\text{Ph}\cdot\text{NH}_2$, NH_2Ph , or $\text{NHPh}\cdot\text{NH}_2$ in well-cooled Et_2O and removal of the solvent at 20° after contact with much anhyd. Na_2SO_4 at >5° for 3 hr. gives Schiff's bases with α +4.30°, +5.4°, and +12.7°, respectively. These bases, and also those obtained with NH_3 , NH_2Me , or $\text{CHPhMe}\cdot\text{NH}_2$, are completely racemised in 10 hr. at 50°; the phenylhydrazone and semicarbazone, m.p. 105°, are exceptions. Racemisation is retarded greatly by the presence of a little free amine. The probability that racemisation is due to the transformation $\text{CHR}_2\cdot\text{CH}\cdot\text{N}\cdot\text{CHR}_2 \rightleftharpoons \text{CR}_2\cdot\text{CH}\cdot\text{NH}\cdot\text{CHR}_2$ is strengthened by the apparent non-existence of optically active Schiff's bases from optically active hydratropaldehyde. H. W.

New diene syntheses. E. LEHMANN and W. PAASCH (Ber., 1935, 68, [B], 1146—1149).—Araldehyde (I) and α -phenylbutadiene at 100° afford 2-phenyl- Δ^3 -tetrahydrobenzaldehyde (II), b.p. 144°/12 mm. (additive compound with NaHSO_3), reduced by Zn-Hg and conc. HCl to 2-phenyl- Δ^3 -tetrahydrotoluene, b.p. 110—113°/12 mm., dehydrogenated by Se at 270—300° to *o*- $\text{C}_6\text{H}_4\text{PhMe}$, b.p. 255—258° (whence *o*- $\text{C}_6\text{H}_4\text{Ph}\cdot\text{CO}_2\text{H}$, m.p. 112.5°), and oxidised by CrO_3 in AcOH to 2-phenyl- Δ^3 -tetrahydrobenzoic acid, m.p. 105°. Addition of (II) to acrylic acid gives 3-phenyl- Δ^4 -tetrahydrobenzoic acid, m.p. 122°. Addition of HCN to (II) in presence or absence of KCN does not appear to give the corresponding cyanohydrin, the sole isolable product being 2:2'-diphenyl- $\Delta^{3:3'}$ -octahydrobenzoin, m.p. 167°. (I) and β -2:4-dimethylphenylpentadiene at 100—110° afford 2:2':4'-dimethylphenyl-2-methyl- Δ^3 -tetrahydrobenzaldehyde, b.p. 179—181°/12 mm. (NaHSO_3 compound). Condensation of the aldehydes to phenanthrene derivatives could not be effected. H. W.

Studies in the synthesis of vitamin-A. I. W. H. DAVIES, I. M. HEILBRON, W. E. JONES, and A. LOWE (J.C.S., 1935, 584—587).—Et β -hydroxy- δ -(2:2:6-trimethylcyclohexyl)- β -methylvalerate, obtained from tetrahydroionone and $\text{CH}_2\text{Br}\cdot\text{CO}_2\text{Et}$ (Reformatsky), is converted by PBr_3 in ligroin into the corresponding β -Br-ester, reduced (Zn-HCl-AcOH) to Et δ -(2:2:6-trimethylcyclohexyl)- β -methylvalerate. This is further reduced ($\text{Na-C}_5\text{H}_{11}\cdot\text{OH}$) to ϵ -(2:2:6-trimethylcyclohexyl)- γ -methyl-*n*-amyl alcohol, b.p. 136°/1.5 mm. (lit. b.p. 150—156°/7 mm.), which with PBr_3 in petroleum affords the bromide, b.p. 140—145°/4 mm. (cf. Karrer *et al.*, A., 1932, 852). This with $\text{CHNaAc}\cdot\text{CO}_2\text{Et}$ in EtOH or C_6H_6 affords an unsaturated hydrocarbon $\text{C}_{15}\text{H}_{28}$, b.p. 112—115°/2 mm. [probably ϵ -(2:2:6-trimethylcyclohexyl)- γ -methyl- Δ^a -pentene]. β -Ionone, NaNH_2 in Et_2O , and C_2H_2 afford ϵ -(2:2:6-trimethylcyclohexenyl)- γ -methylpent-8-en- α -inen- γ -ol, b.p. 112—115°/3 mm. (cf. A., 1935, 492) (gives blue colour with SbCl_5 ; Ag salt), which could not be isomerised to α -aldehydo- δ -(2:2:6-trimethyl- Δ^6 -cyclohexenyl)- β -methyl- Δ^a -butadiene (I), b.p. 92—93°/1.8 mm. (phenylsemicarbazone, m.p. 182—183°). This was obtained by dry distillation of the Ba salt of the corresponding α -carboxylic acid with $(\text{HCO}_2)_2\text{Ba}$, and was reduced by $\text{Al}(\text{OPr}^i)_3$ in Pr^iOH to the alcohol, b.p. 99—100°/2 mm. (possesses no growth-promoting activity). (I) with $\text{CH}_2\text{Br}\cdot\text{CO}_2\text{Et}$ and Zn in C_6H_6 affords Et β -hydroxy- ζ -(2:2:6-trimethyl- Δ^6 -cyclohexenyl)- δ -methyl- Δ^a -hexadiene- α -carboxylate, b.p. 138—140°, which on hydrolysis and distillation of the Ba salt of the acid with $(\text{HCO}_2)_2\text{Ba}$ regenerates (I). (I) with COMe_2 and $\text{C}_5\text{H}_{11}\text{N}$ affords β -keto- δ -hydroxy- θ -(2:2:6-trimethyl- Δ^6 -cyclohexenyl)- ζ -methyl- Δ^a -octadiene, b.p. 104—105°/1.5 mm. (phenylsemicarbazone, m.p. 171—172°). H. G. M.

Jute-lignin. VI. Isolated lignin and lignin native in jute. P. B. SARKAR (J. Indian Chem. Soc., 1935, 12, 168—172).—Lignin, whether isolated or native in jute, contains no Ac groups and no alkoxy-groups other than OMe. From the OMe content of raw jute, delignified jute, and isolated (HCl) lignin

it is calc. that the theoretical OMe content of lignin is 18.37%, in agreement with the assumed mol. wt. 830 (cf. A., 1934, 1355; this vol., 214) and the presence of 5 OMe. During isolation by means of HCl lignin loses 1.96% OMe. The amounts of CO₂ obtained from jute, delignified jute, and lignin by boiling with 12% HCl have been determined. H. G. M.

Action of 2-chlorocyclopentanone on organo-magnesium halides. V. M. MITCHOVITCH (Compt. rend., 1935, 200, 1601—1603).—The reaction yields 2-alkyl- or -aryl-cyclopentanones, without change in the ring structure (cf. A., 1934, 654). In this way, 2-methyl-, -ethyl-, and -isopropyl-cyclopentanones are obtained, and 2-phenylcyclopentanone, m.p. 126—127° [oxime, m.p. 146°; semicarbazone, m.p. 228° (each decomp.)]. E. W. W.

cycloHexanone. C. L. WILSON (Chem. and Ind., 1935, 558).—The condensation of cyclohexanone with CH₂Br·CO₂Et is described in detail. H. N. R.

Synthesis of 2-methyldicyclo-[1 : 2 : 2]-heptan-3-one. G. KOMPPA (Ber., 1935, 68, [B], 1127—1129).—Reduction of santene ketone with Na and EtOH affords mainly 2-methyldicyclo-[1 : 2 : 3]-octan-4-ol (I), b.p. 97—99°/13 mm., accompanied by a stereoisomeride, C₉H₁₆O₂, m.p. 194—195°, of santene glycol which does not give a cryst. product with OBr' or a solid diphenylurethane. (I) is oxidised by HNO₃ (d 1.27) at 100° to α-methylhomonorcarnphoric acid, CH₂·CH(CHMe·CO₂H) > CH₂, m.p. 130—131° (Ca salt; dianilide, m.p. 241.5°), the Pb salt of which passes when heated into 2-methyldicyclo-[1 : 2 : 2]-heptan-3-one (6-methylnorcarnphor), b.p. 180—182°/761 mm. (semicarbazone, m.p. 184—185°). H. W.

Autoxidation of αβ-unsaturated ketones. VIII. Function of peroxides as intermediate products. W. TREIBS (Ber., 1935, 68, [B], 1049—1050).—The hypothesis that autoxidation of αβ-unsaturated ketones in alcoholic alkaline solution involves loss of H₂O₂ from the primary additive product of ketone and O₂ and transformation of unchanged ketone by H₂O₂ into the oxide is supported by the observation that 3 : 5-dimethyl-Δ²-cyclohexenone (I) is converted by H₂O₂ in presence of NH₃ into the substance (II), C₈H₁₂O₂·NH₃, m.p. 88° (decomp.). Both added O atoms of the peroxide can be titrated with KI. Treatment of (I) with (II) in EtOH yields the oxide, C₈H₁₂O₂, b.p. 212—214°. H. W.

Synthesism of Tiemann's irone. A. VERLEY (Bull. Soc. chim., 1935, [V], 2, 1205—1209).—Rhodinal and aq. HOCl give ζ-chloro-η-hydroxy-βη-dimethyloctaldehyde, which with COMe₂ and alkali affords ι-chloro-κ-hydroxy-ζκ-dimethyl-Δ⁷-undecen-β-one, dehydrated by H₂SO₄, H₃PO₄, H₂C₂O₄, or SiO₂ to 1-chloro-2 : 2 : 4-trimethyl-3-γ-keto-Δ⁴-butenylcyclohexane ("irone" hydrochloride), from which HCl is removed by KOH, NaNH₂, NR₃, etc., to give 1 : 1 : 1 : 3-trimethyl-2-γ-keto-Δ⁴-butenyl-Δ⁵-cyclohexene, b.p. 140°/12 mm., [α]_D -21° (phenylhydrazone), which possesses Tiemann's formula for irone and has high val. as a commercial perfume. R. S. C.

Synthesis of vitamin-A. I. Action of magnesium on a mixture of ionone and αδ-dibromo-

Δ⁴-butene. V. TETERIN and A. IVANOV (Compt. rend. Acad. Sci. U.R.S.S., 1935, 2, 259—262).—The action of Mg and (·CH·CH₂Br)₂ or C₂H₄Br₂ on ionone causes reduction to the corresponding glycol (·CMe(OH)·CH·CH·C < $\begin{smallmatrix} \text{CMe}_2\cdot\text{CH}_2 \\ \text{CMe}\cdot\text{CH}_2 \end{smallmatrix}$ > CH₂)₂, which contains 2 OH (Zerevitinov) and absorbs 8 H (Pd-CaCO₃) giving a product oxidised to tetrahydroionone (semicarbazone, m.p. 163—165°). Divinyl is simultaneously produced. H. W.

α-Halogenated ketones. G. RICHARD (Compt. rend., 1935, 200, 1944—1946).—CHPhCl·COMe and powdered dry KOH in Et₂O afford CH₂Ph·COMe, Bz₂, and CH₂Ph·CH₂·CO₂H. Similarly Ph·[CH₂]₃·CO₂H is obtained from CH₂Ph·CHCl·COMe, and CHPh₂·CH₂·CO₂H from CPh₂Cl·COMe. These results are explained by tautomeric change of CHClR·COMe into CH₂R·CO·CH₂Cl, which with KOH is converted, probably through CH₂R·CH·CO, into CH₂R·CH₂·CO₂H (cf. A., 1934, 191). H. G. M.

Haloform reaction. XVI. Action of hypoiodite on hindered ketones. R. JOHNSON and R. C. FUSON (J. Amer. Chem. Soc., 1935, 57, 919—920; cf. this vol., 751).—With a limited amount of NaOI acetomesitylene gives mesityl CH₂I ketone, m.p. 34.5—35.5°, but with an excess mesityl CHI₂ ketone, m.p. 98—99°. By use of an excess of NaOI are prepared di(di-iodoacetyl)mesitylene, m.p. 160° (decomp.), di-β-isoduroyliodomethane, m.p. 191—192°, and 3-di-iodoacetyl-2 : 4 : 6-trimethylbenzoic acid, m.p. 132—133° (decomp.). No I₃-compounds could be prepared, nor could CHI₃ be obtained from these ketones. Pinacolone gives the mono- or di-iodo-compounds or CHI₃ according to the amount of NaOI used. These effects are steric. R. S. C.

Steric hindrance in α-diketones: mesityl-benzylglyoxal [αβ-diketo-γ-phenyl-α-mesitylpropane]. R. P. BARNES (J. Amer. Chem. Soc., 1935, 57, 937—940).—Mesityl styryl ketone (I) and 30% H₂O₂ in 6N-NaOH give the oxide (80% yield), b.p. 195°/8 mm., rearranged by hot aq. NaOH to αβ-diketo-γ-phenyl-α-mesitylpropane (II), m.p. 100°, shown by MgMeI to be 100% enolic when solid, but only 81—90% in various solvents (by Br). (II) is oxidised by Na₂O₂ to CH₂Ph·CO₂H and C₆H₂Me₃·CO₂H, and is, therefore, an α-diketone. It gives an O-alkyl, m.p. 55°, b.p. 230°/30 mm. (unchanged), O-Me, m.p. 75°, b.p. 157°/2 mm., and O-CPh₃ ether, m.p. 195—198°, an O-Ac, m.p. 109°, and O-Bz derivative, m.p. 81°. It resists catalytic hydrogenation, but with SnCl₂ gives β-keto-α-phenyl-γ-mesitylpropane, m.p. 72°, the constitution of which is proved because the benzoate, m.p. 86°, of its oxime decomposes above the m.p., 85°, into BzOH and CH₂Ph·CN. (II) does not give a quinoxaline or dioxime, but yields a β-oxime, m.p. 88°, identical with the oximino-derivative obtained from nitrite and mesityl β-phenylethyl ketone, b.p. 163—165°/3 mm. [obtained by hydrogenation (PtO₂; EtOH) of (I)]. The configuration of the oxime is shown by decomp. of the benzoate, m.p. 95°, above the m.p. into BzOH, (II), and CH₂Ph·CN. (I) affords a semicarbazone, m.p. 227°, assumed by analogy to be a β-C-derivative. R. S. C.

Oxidation of benzophenoneoxime. K. VON AUWERS and H. WUNDERLING (Ber., 1935, 68, [B], 1072—1078; cf. A., 1933, 505; 1934, 654).—The blue compound (I) obtained by the oxidation of $\text{CPh}_2\text{N}\cdot\text{OH}$ with $\text{K}_3\text{Fe}(\text{CN})_6$, to which the structure $\text{CPh}_2\text{N}\cdot\text{O}$ — or $\text{CPh}_2\text{N}\cdot\text{O}$ has been tentatively ascribed, liberates from acidified HI 45—57% of the amount of I which would be expected if it evolves 1 O. Attempts to obtain additive products with CPh_3 , CH_2N_2 , NO, or NO_2 failed. (I) is converted by cautious treatment with Zn dust and AcOH into $\text{CPh}_2\text{N}\cdot\text{OH}$. Reduction with H_2S immediately affords CSPH_2 , possibly through intermediate production of CPh_2NH . Free halogens and halogen acids rapidly transform (I) into a mixture mainly of COPH_2 and the corresponding salts of CPh_2NH sometimes containing diphenylketazine oxide (II). COPH_2 and usually (II) are obtained by the action of I on $\text{CPh}_2\text{N}\cdot\text{ONa}$, but the formation of (I) is never observed. The oxidised product from the Na salt is further distinguished from (I) by its greater stability towards heat, but its behaviour towards acidified KI resembles that of (I). It appears therefore that an unstable blue and a stable colourless compound are formed during the oxidation of $\text{CPh}_2\text{N}\cdot\text{OH}$ with $\text{K}_3\text{Fe}(\text{CN})_6$. More or less deeply coloured products are obtained by the action of $\text{K}_3\text{Fe}(\text{CN})_6$ on *p*-methyl-, *o*-methyl-, and *p*-chloro-benzophenoneoxime, acetophenoneoxime, Ph Bu^v ketoxime, and $(\text{CH}_3\text{Ph})_2$ ketoxime. H. W.

Synthesis of naphthyl methyl ketone. Mechanism of the Friedel-Crafts reaction. S. M. RIVKIN (J. Gen. Chem. Russ., 1935, 5, 277—280).—A mixture of α - and β - $\text{C}_{10}\text{H}_7\cdot\text{COMe}$ is obtained in 90% yield from AcCl , C_{10}H_8 , and AlCl_3 in PhNO_2 at $+10^\circ$, and in 58% yield when benzene is substituted for PhNO_2 . R. T.

Phenanthrene derivatives. III. *o*-Toluoyle and β -methylnaphthoyle-phenanthrene. W. E. BACHMANN and L. H. PENCE (J. Amer. Chem. Soc., 1935, 57, 1130—1131; cf. this vol., 622).—Phenanthrene, *o*- $\text{C}_6\text{H}_4\text{Me}\cdot\text{COCl}$, and AlCl_3 in PhNO_2 give 3- (24%), m.p. 89—90°, and 2-*o*-toluoylephenanthrene (3.4%), m.p. 115—116°, also obtained (Grignard and subsequent hydrolysis with conc. HCl at 200°; dil. HCl has no effect) in good yield from the cyanophenanthrenes and *o*- $\text{C}_6\text{H}_4\text{Me}\cdot\text{MgBr}$. Similar Grignard reactions give good yields of 9-*o*-toluoyle-, 3-, m.p. 148.5—149.5° (lit. 145—146°), 9-, m.p. 176—177° (lit. 170°), and 2-2'-methyl-1'-naphthoylephenanthrene, m.p. 184—185° (slow heating), or double m.p. (sudden heating) 168—170° and 184—185°.

R. S. C.

Planar configuration of diamagnetic nickel complexes. II. H. J. CAVELL and S. SUGDEN (J.C.S., 1935, 621—624; cf. A., 1932, 272).—Methyl-*n*-propylglyoxime, m.p. 175° (lit. m.p. 168°), affords a Ni derivative from which the α - (I), m.p. 165° (lit. m.p. 144° and 160°), and β -form (II), m.p. 133°, were obtained. Similarly methyl-*n*-butylglyoxime, m.p. 173°, prepared from Et *n*-butylacetoacetate through the intermediate oximinoketone, m.p. 60°, affords a Ni derivative, α - (III), m.p. 150°, β -form (IV), m.p.

86°. *p*- $\text{C}_6\text{H}_4\text{Cl}\cdot\text{COEt}$ was converted through its oximino-derivative, m.p. 119°, into *p*-chlorophenyl-methylglyoxime, m.p. 223°, the Ni derivative, m.p. 283°, of which is unsuitable for separation into isomerides. *p*-Chlorophenyl *n*-amyl ketone, m.p. 64°, b.p. 165°/20 mm., prepared from *n*-hexoyle chloride, C_6H_6 , and AlCl_3 , was converted through the oximino-derivative, m.p. 42°, into *p*-chlorophenyl-*n*-butylglyoxime, m.p. 206°, which gives a Ni derivative, α -form (V), m.p. 266°; indications of the existence of a lower-melting form were obtained. The α - and β -forms of these Ni derivatives are interconvertible by fusion; m.p. are therefore taken in a special way. The dipole moments of the Ni derivative were measured in C_6H_6 and are as follows (all in Debye units): (I) 1.4, (II) 1.5, (III) 1.3, (IV) 1.3, (V) 1.8, Ni benzylmethylglyoxime, α - 1.3, β -form 1.6. The small effect of the C-Cl linkings in (V) on the observed moment strongly supports the view that the Ni glyoximes have a planar configuration (cf. Pauling, A., 1931, 670) and that the higher-melting forms have the *trans*-configuration.

Ni NN-*di-n*-propyldithiocarbamate, m.p. 135°, and Ni NN-*di-n*-butyldithiocarbamate, m.p. 91°, prepared from CS_2 , KOH, aq. NiCl_2 , and the corresponding dialkylamine, are diamagnetic, and on fusion and fractional crystallisation gave only one form. H. G. M.

α -Benzoylbutyrolactone, δ -keto- δ -phenyl-*n*-butyl alcohol, and δ -keto- δ -phenyl-*n*-butyl bromide. G. V. TSHELINCEV and E. D. OSETROVA (Compt. rend. Acad. Sci. U.R.S.S., 1935, 2, 251—254).—The interaction of $(\text{CH}_2)_2\text{O}$ with $\text{CHNaBz}\cdot\text{CO}_2\text{Et}$ in EtOH gives α -benzoylbutyrolactone, b.p. 193—195°/8 mm., transformed by boiling 10% K_2CO_3 into δ -keto- δ -phenyl-*n*-butyl alcohol, b.p. 165—166°/10 mm., m.p. 32—33°, whence δ -keto- δ -phenyl-*n*-butyl bromide, m.p. 36°. H. W.

3-Methylindan-1:2-dione and its oxime; isocoumarin synthesis. G. HELLER [with R. EBELING] (Ber., 1935, 68, [B], 1085—1090; cf. von Braun et al., A., 1913, i, 1363).—3-Methylindan-1:2-dioneoxime (I) and CH_2O in AcOH—conc. HCl gave the substance $\text{C}_{12}\text{H}_{18}\text{O}_5$, m.p. about 167° (slight decomp.) after softening at 160°, which like the simplest indandione does not immediately give a coloured solution in NaOH, showing thus that a preliminary transformation is necessary. (I) and NH_2OH in AcOH— H_2O give 3-methylindan-1:2-dionedioxiime, the alkaline solution of which does not become coloured until heated. Acetyl-3-methylindandione-2-oxime, m.p. 134—135° (decomp.), from (I) and Ac_2O (corresponding Bz derivative, m.p. 131—132°), is transformed by prolonged contact with 10% NaOH into *o*- α' -hydroxyethylphenylglyoxylic acid (II), m.p. 144°, and an amorphous substance, $\text{C}_{10}\text{H}_9\text{O}_3\text{N}$, m.p. 173°. The formation of the blue colour is not due to salt formation, as in the case of isatin, but to absorption of O and transformation. (II) is converted by Ac_2O and NaOAc into 3:4-dimethylisocoumarin, m.p. 129°, transformed by conc. alkali into *o*- β -keto- α -methyl-*n*-propylbenzoic acid, m.p. 119°. (I) is transformed by NaOEt and EtI into methylindandione-oxime Et ether, m.p. 94°; the corresponding Me ether,

m.p. 138°, is too sensitive to alkali to be prepared in this manner or by Me_2SO_4 , but is obtained with CH_2N_2 . When treated with Zn dust and AcOH (I) gives a non-cryst. carmine-red Zn salt. Treatment of (I) with 10% NaOH and $\text{Na}_2\text{S}_2\text{O}_4$ followed by Ac_2O leads to 2-ketacetimido-1-hydroxy-3-methyldihydroindene, m.p. 127—128°. H. W.

Aldol condensation between aldehydes and β -keto-acids, and their importance in the biosynthesis of natural products. C. SCHÖPF and K. THIERFELDER (Annalen, 1935, 518, 127—155).—Optimum yields (in parentheses) of the condensation products of aldehydes and β -keto-acids are obtained in neutral solution, the yield decreasing in either acid or alkaline medium. Thus at p_{H} 7 PhCHO and $\text{CH}_2\text{Ac}\cdot\text{CO}_2\text{H}$ (I) afford (90%) β -hydroxy- β -phenylethyl Me ketone (II), m.p. 38—39° (Kubota *et al.*, A., 1926, 520) (semicarbazone, m.p. 172°), converted by $\text{NHPh}\cdot\text{NH}_2$ not into its phenylhydrazone (*loc. cit.*) but into benzylideneacetonephenylhydrazone, m.p. 153—154°. The yield of (II) is reduced to 10% at p_{H} 1, and to 0 at p_{H} 13. Introduction of p -OH or OMe into the aldehyde greatly reduces the condensation yields with both (I) and (IV) (below). Thus (I) with anisaldehyde (III) gives only a trace of a compound which affords anisylideneacetone-semicarbazone, veratraldehyde affords (5%) β -hydroxy- β -3:4-dimethoxyphenyl Me ketone, m.p. 93—95°, but vanillin and COPhMe give no condensation products. Similar condensation of $\text{CH}_2\text{Bz}\cdot\text{CO}_2\text{H}$ (IV) with PhCHO (74%), (III) (8%), and MeCHO (27%) gives, respectively *Ph* β -hydroxy- β -phenylethyl ketone, m.p. 53—54° (semicarbazone, m.p. 180°), *Ph* β -hydroxy- β -*p*-methoxyphenylethyl ketone (as its semicarbazone, m.p. 183—184°), and *Ph* β -hydroxy-*n*-propyl ketone (as its semicarbazone, m.p. 153—154°, sinters 149°). Condensation of PhCHO with $\text{CO}(\text{CH}_2\cdot\text{CO}_2\text{H})_2$ (in N_2) gives di-(β -hydroxy- β -phenylethyl) ketone, m.p. 163—165°, sinters 159°, and β -keto- δ -phenyl- Δ^2 -*n*-pentoic acid, m.p. 136—141° (decarboxylated to $\text{CHPh}\cdot\text{CHAc}$).

$\text{CO}_2\text{H}\cdot\text{CO}\cdot\text{CH}_2\cdot\text{CO}_2\text{H}$ with PhCHO affords (42%), $\text{CHPh}\cdot\text{CH}\cdot\text{CO}\cdot\text{CO}_2\text{H}$, *p*-OMe- $\text{C}_6\text{H}_4\cdot\text{CHO}$ gives (19%) *p*-OMe- $\text{C}_6\text{H}_4\cdot\text{CH}\cdot\text{CH}\cdot\text{CO}\cdot\text{CO}_2\text{H}$, vanillin (V) and 3:4-(OH) $\text{C}_6\text{H}_4\cdot\text{CHO}$ give, respectively, 4-hydroxy-3-methoxy-, m.p. 145—147° [also from (V) and AcCO_2H], and 3:4-dihydroxy- + H_2O (yellow and red forms), sinters 196°, m.p. 202—204° (decomp.), -benzylidenepyruvic acid. The rôle of aldehyde- β -keto-acid condensations in biosynthesis is discussed, especially in relation to gingerol, alkaloids of angostura bark, and muscone. Such condensations probably play no important part in the biosynthesis of fatty acids.

J. W. B.

Reduction of deoxybenzoin and benzoin.—See this vol., 937.

Compounds of α -benzoinoxime with bivalent metals. J. S. JENNINGS, E. SHARRATT, and W. WARDLAW (J.C.S., 1935, 818—822).—Cu benzoinoxime (I) [from aq. CuCl_2 and benzoinoxime (II) in EtOH (cf. A., 1923, ii, 880)] with hot EtOH-HCl affords Cu benzoinoxime dichloride (III), ($\text{C}_{14}\text{H}_{13}\text{O}_2\text{N}$) $\text{CuCl}_2\cdot\text{EtOH}$ (EtOH is lost on keeping),

sol. in EtOH and COMe_2 , but decomposed by H_2O into (I) and HCl. This confirms Feigl's structure $\text{CHPh}\cdot\text{O}\cdot\text{CPh}=\text{NO}\cdot\text{Cu}$ for (I). (II) also forms compounds with Ni, Pd, and Pt (a ppt., but no pure compound, could be obtained with Co) [cf. A., 1923, ii, 880; "Organic Reagents for Metals" (1934)]. These compounds (structures given) exist in two forms which are interconvertible by means of solvents (*e.g.*, EtOH, CCl_4 , and CHCl_3). Their m.p. vary with the rate of heating. The second form of Ni dibenzoinoxime (IV) (obtained from the first by treatment with CCl_4) contains 1 mol. of CCl_4 of crystallisation lost on keeping or more readily at 90°. When (II) in EtOH is added to NiSO_4 and NH_4OAc in H_2O and the mixture heated at 40° during 1 hr., Ni dibenzoinoxime diacetate (V) is obtained (structure proposed). (VI) is also obtained from (IV) and AcOH . (II) functions as a chelate group in three ways: (a) with two principal valencies as in (I), (b) with one principal valency and one co-ordinate linking, (c) with two co-ordinate links as in (III) and (V). The Ni compounds of (II) are paramagnetic, but the corresponding Pd compounds are diamagnetic. The configurations of these compounds are discussed.

H. G. M.

Michael condensation. III. Addition of simple ketones. D. B. ANDREWS and R. CONNOR (J. Amer. Chem. Soc., 1935, 57, 895—898; cf. this vol., 215).—The reactivity of simple ketones with $\alpha\beta$ -unsaturated ketones is decreased by substitution in the reactive CH_2 , the effect of Et being > that of Me. $\text{CHPh}\cdot\text{CH}\cdot\text{COPh}$ with COPhMe gives 27% of bimol. and 56% of termol. product, with COPhEt $\alpha\gamma$ -dibenzoyl- β -phenylbutane, m.p. 102—103.5° (54%), and 27% of termol. compound, m.p. 231—235°, with COPhPr $\alpha\gamma$ -dibenzoyl- β -phenyl-*n*-pentane, m.p. 91—92° (corr.) (19%), and 58% of termol. compound, m.p. 219.3—219.6° (corr.), with COPhBu^t 5% of termol. compound, m.p. 308.2—308.7° (corr.), only [when catalysed, 30% of termol., much probably quadrimol., m.p. > 360°, and a trace of possibly bimol. compound, m.p. 139.6—139.9° (corr.)], with COEt_2 a mixture (giving as only pure product the termol. compound), and with COMeBu^t the termol., $\text{C}_{36}\text{H}_{38}\text{O}_3$, m.p. 244.6—246° (corr.), and no bimol. compound. $\text{CHPh}\cdot\text{CH}\cdot\text{COBu}^t$ with COPhMe gives α -benzoyl- γ -pivalyl- β -phenylpropane, m.p. 59—59.5° (39%), and with COPhMe the bimol. (25%) and termol. (51%) compounds, but does not react with COMeBu^t .

R. S. C.

Constitution of dehydroandrosterone. W. SCHOELLER, A. SERINI, and M. GEHRKE (Naturwiss., 1935, 23, 337).—Dehydroandrosterone has a *trans*-configuration. With digitonin it affords a sparingly sol. additive product, whereas androsterone does not. This difference in behaviour affords a simple means of separating the two substances, which are present in the urine of men in approx. equal amounts.

H. G. M.

Synthesis of dehydroandrosterone by the decomposition of γ -sitosterol from soya beans. R. V. OPPENAUER (Nature, 1935, 135, 1039).—Acetylated sitosterol from soya beans was chlorinated in the 5:6-position to protect the double linking, and

the side-chain removed by CrO_3 . The sparingly-sol. semicarbazone obtained from the dichlorinated and saponified reaction mixture gave, on hydrolysis, a hydroxyketone, m.p. 147—148° (corr.), chemically and physiologically identical with dehydroandrosterone (I) from urine [*oxime*, m.p. 190° (corr.); *benzoate*, m.p. 252—253° (corr.), $[\alpha] +13.5^\circ$ in EtOH]. (I) is therefore 3-hydroxy- $\Delta^5:6$ - α -etiocholonenol-(17).

L. S. T.

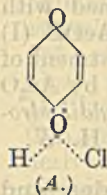
Derivatives of 2-methylcyclopentanone and -ol. M. GODCHOT and M. MOUSSERON (Compt. rend., 1935, 200, 2189—2192).—2-Methylcyclopentanone with Cl_2 and CaCO_3 gives a mixture of *cis*- and *trans*-5-chloro-ketone (I), b.p. 87°/14 mm. and 98—99°/14 mm., with a little methylcyclopentenone. Both forms of (I) with hot H_2O give the same 1-methylcyclopentan-2-one-3-ol, b.p. 110°/14 mm., m.p. 100—101° (*phenylhydrazone*, m.p. 104—105°), and with hot quinoline 2-methyl- Δ^4 -cyclopentenone (II), b.p. 140° (*semicarbazone*, m.p. 175—176°). 3-Methylcyclopentenone gives a mixture of stereoisomeric 3-chloro-1-methylcyclopentan-2-ols, b.p. 69—70°/31 mm. and 101—102°/31 mm., converted by oxidation and heating with quinoline into (II). R. S. C.

Hydroxypolyketones. I. Alkylation of benzoylformoin. A. H. BLATT (J. Amer. Chem. Soc., 1935, 57, 1103—1107).—It is proved that benzoylformoin (I), $\text{OH}\cdot\text{CHBz}\cdot\text{COBz}$, with acid in EtOH gives the monoalkyl ether $\text{O} < \text{CPh} = \text{C} \cdot \text{OR}'$ (II; $\text{R} = \text{H}$), which has glucosidic properties and with $\text{NaOR} \cdot \text{RI}$ affords the dialkyl ether (II; $\text{R} = \text{alkyl}$), hydrolysed to the isomeric monoalkyl ether (III), $\text{OH}\cdot\text{CPh}\cdot\text{C(OR)}\cdot\text{COBz}$. (I) (modified prep.), m.p. 187° (decomp.), gives 2 mols. of BzOH with Na_2O_2 , is decomposed by conc. H_2SO_4 , cannot be methylated by CH_3N_2 or $\text{MeI} \cdot \text{NaOMe}$, but with $\text{HCl} \cdot \text{MeOH}$ gives the Me ether (II; $\text{R} = \text{Me}$, $\text{R}' = \text{H}$), m.p. 182°, which does not react with NH_2OH or $o\text{-C}_6\text{H}_4(\text{NH}_2)_2$, is decomposed by conc. H_2SO_4 owing to hydrolysis to (I), with $\text{HCl} \cdot \text{EtOH}$ gives the Et ether ($\text{R} = \text{Et}$) (from which it is re-formed by $\text{H}_2\text{SO}_4 \cdot \text{MeOH}$), and with $\text{MeI} \cdot \text{NaOMe}$ affords the Me_2 ether (II; $\text{R} = \text{R}' = \text{Me}$) (4-keto-3:5-dimethoxy-2:5-diphenylfuran), m.p. 78—79°. This is unchanged by $\text{NHPh}\cdot\text{NH}_2$ or $o\text{-C}_6\text{H}_4(\text{NH}_2)_2$, gives with $\text{H}_2\text{SO}_4 \cdot \text{EtOH}$ the Me Et ether (II; $\text{R} = \text{Et}$; $\text{R}' = \text{Me}$), and with hot NaOMe an 88% or with conc. H_2SO_4 a lower yield of the Me ether (III; $\text{R} = \text{Me}$) (α -hydroxy- β -methoxy- $\alpha\delta$ -diphenyl- Δ^4 -butene- $\gamma\delta$ -dione), m.p. 126—127°, the structure of which is proved as follows. It is 85% enolic (Br titration), is also obtained from the Me Et ether by NaOMe , is reconverted into the Me_2 ether by $\text{HCl} \cdot \text{MeOH}$, and gives 2-phenyl-3-benzoylmethoxymethylquinoxaline, m.p. 131—132°, converted by MgPhBr into 2-phenyl-3- β -hydroxy- $\beta\beta$ -diphenyl- α -methoxyethylquinoxaline, m.p. 173—174°, which with CrO_3 affords COPh_2 and 3-phenylquinoxaline-2-carboxylic acid.

R. S. C.

Oxonium compounds. Acidic complexes of quinones and their chlorination and bromination. V. V. TSCHELINCEV (Compt. rend. Acad. Sci. U.R.S.S., 1935, 2, 244—250).—Treatment of a solution of benzoquinone in cold conc. HCl with Cl_2

rapidly yields 2:3-dichloro- Δ^5 -cyclohexene-1:4-dione, m.p. 147° (decomp.), converted by further action of Cl_2 into 2:3:5:6-tetrachlorocyclohexane-1:4-dione, m.p. 226° (decomp.). 2:3-Dibromo- Δ^5 -cyclohexene-1:4-dione, m.p. 170°, and 2:3:5:6-tetrabromocyclohexane-1:4-dione are obtained similarly. Thermochemical data and ketonic properties justify the structure A for compounds of quinones with HCl and invalidate Graebe's formulation of the former. H. W.



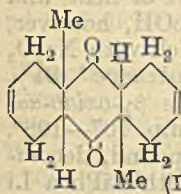
Influence of the $\text{R}\cdot\text{COO}-$ and $\text{R}-$ groups on the cationoid reactivity of the quinone nucleus. H. ERDTMAN and A. LEÓN (Anal. Fís. Quím., 1934, 32, 614—626; cf. A., 1934, 184).—The reactivities of mono- and di-alkyl- and -alkoxy-*p*-benzoquinones are in qual. agreement with the electronic theory of valency, but for more highly substituted quinones there is less agreement, probably owing to steric effects. Contrary to theory, hydroxy-*p*- and hydroxy-*m*-xyloquinones show about the same reactivity. *p*-Xyloquinone, on acetylation by Thiele's method, yields 2:3:5-triacetoxy-*p*-xylene, hydrolysed to 2:3:5-trihydroxy-*p*-xylene (I), m.p. 157—158°, and oxidised by FeCl_3 to hydroxy-*p*-xyloquinone (II), m.p. 145—146° after sublimation. (II) on acetylation gives 2:3:5:6-tetra-acetyl-*p*-xylene, m.p. 250—252°. 2:3:5-Trimethoxy-*p*-xylene, b.p. 143—145°/30 mm., from (I), with Br in CHCl_3 gives 6-bromo-2:3:5-trimethoxy-*p*-xylene (III), b.p. 175—180°/40 mm. (slight decomp.). Oxidation of (III) with HNO_3 yields 6-bromo-3-methoxy-*p*-xyloquinone, m.p. 81.5—82°. Acetylation of *m*-xyloquinone similarly yields triacetoxy-*m*-xylene, hydrolysed to 2:4:5-trihydroxy-*m*-xylene (IV), m.p. 119—121°, and oxidised by FeCl_3 to hydroxy-*m*-xyloquinone (V) (m.p. 103—104°), which on acetylation yields 2:4:5:6-tetra-acetoxy-*m*-xylene, m.p. 161°, hydrolysed to dihydroxy-*m*-xyloquinone, m.p. 168—169°. Methylation of (IV) gives 2:4:5-trimethoxy-*m*-xylene, which on oxidation with HNO_3 gives (V) and with Br in CHCl_3 yields 6-bromo-2:4:5-trimethoxy-*m*-xylene, b.p. 151—155°/23 mm., oxidised by HNO_3 to a bromomethoxy-*m*-xyloquinone, m.p. 74°. J. W. S.

Action of alkaline hydrogen peroxide on quinones and polyhydric phenols. E. WEITZ, H. SCHOBERT, and H. SEIBERT (Ber., 1935, 68, [B], 1163—1168).— α -Naphthaquinone is smoothly oxidised by H_2O_2 in alkaline solution to so-called diketotetrahydronaphthalene oxide, m.p. 136°, whilst β -naphthaquinone gives hydroxynaphthaquinone. Attempts to isolate a mono- or di-oxido-compound from benzoquinone were unsuccessful, but a vigorous action occurs when the alkali and H_2O_2 are used in large excess giving *as*-oxidoethylenedicarboxylic acid, from the Ba salt of which *r*-tartaric acid or chloromalic acid II is obtained by the action of dil. HNO_3 or HCl , respectively. Toluquinone is very rapidly oxidised, whereas chloranil is merely converted into chloranilic acid. Pyrocatechol gives the same products as quinol or benzoquinone. Resorcinol and quinol yield much CO_2 and non-investigated products. PhOH does not appear to react. Phenanthraquinone

smoothly yields diphenic acid, whereas anthraquinone is not attacked. H. W.

Preparation and hydrolysis of some α -hydroxy-anthraquinone glucosides. J. H. GARDNER, T. F. McDONNELL, and C. J. W. WIEGAND (J. Amer. Chem. Soc., 1935, 57, 1074—1076).—1-Hydroxyanthraquinone- β -D-glucoside (I), m.p. 232.2—232.8°, is obtained from the tetra-acetate, m.p. 212—212.5°, by KOH-EtOH. Acetobromo-D-arabinose, 1-hydroxyanthraquinone (II), and Ag₂O in quinoline give the triacetate, m.p. 189.2—189.4° (hydrolysed by cold K₂CO₃-EtOH), of 1-hydroxyanthraquinone- β -D-arabinoside (III), m.p. 203—203.5°. (I) and (III) are hydrolysed by KOH, HCl, or borax, with decreasing ease in the order given, to nearly pure (II), except that (III) and KOH give also an indefinite material probably formed by reduction of (II) by arabinose. These hydrolyses are not in accord for a glucosidic formula for barbaloin. R. S. C.

Synthesis of hydroaromatic compounds with "angular" methyl groups. I. E. ADLER (Arkiv Kemi, Min., Geol., 1935, 11, B, No. 49, 1—5).—*p*-Xyloquinone when heated at 160—170° during 10 hr. with about 4 mols. of butadiene (in 20% C₆H₆ solution) affords 1:4:5:8:11:12:13:14-octahydro-12:14-dimethylanthraquinone (I), m.p. 171°. A migration of the Me is excluded because the substance contains no OMe and because it is not oxidised to a quinone by atm. O₂ even in the presence of alkali at 100°. It is not acetylated by Ac₂O and C₅H₅N, yet fails to give an oxime, probably owing to steric hindrance. (I) heated with alkali gives a compound, m.p. 202°.



H. G. M.
Preparation of cyclic compounds [quinones from dienes].—See B., 1935, 621.

Manufacture of 1:2:2':1'-anthraquinono-anthraquinones.—See B., 1935, 585.

Preparation of picrotoxin. E. P. CLARK (J. Amer. Chem. Soc., 1935, 57, 1111).—The prep. (1.4% yield) of picrotoxin from *Anamirta cocculus* berries is modified. Optical data are given for this and for picrotin and picrotoxinin. R. S. C.

X-Ray crystallography of bufagin, cinobufagin, and strophanthidin.—See this vol., 921.

Yellow pigment from yeast.—See this vol., 1027.

Carotenoid pigments of *Actinia equina*, *Anemonia sulcata*, *Actinoloba dianthus*, and *Tealia felina*.—See this vol., 1005.

New pigment with lycopene spectrum. L. ZECHMEISTER and L. VON CHOLNOKY (Naturwiss., 1935, 23, 407).—The polyene from *Solanum dulcamara* behaves like lycopene, and its absorption spectrum has max. at 547, 507, 474, and 444 m μ ; it is, however, distinguished by having m.p. 151° (corr.), depressed by adding lycopene. E. W. W.

Constituents of roots of Ch'ai Hu.—See this vol., 905.

Syntheses in the vitamin-A field. J. SALKIND, S. ZONIS, and N. BLOCHIN (Compt. rend. Acad. Sci.

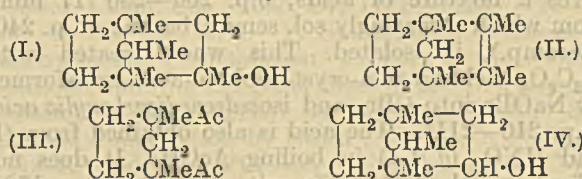
U.R.S.S., 1935, 2, 57—63).—Mg vinylacetylenyl bromide with β -ionone in N₂ gives γ -hydroxy- α -(2:2:6-trimethyl- $\Delta^{1:8}$ -cyclohexenyl)- γ -methyl- Δ^7 -heptadien- Δ^8 -inene, b.p. 135—145°/0.1 mm., which readily polymerises in air and is reduced (H₂-Pd; +10 H) to a compound (I), b.p. 125—129°/0.1 mm. (I) when oxidised (K₂Cr₂O₇-H₂SO₄) gives tetrahydroionone, trimethylcyclohexylacetic acid, and Bu^oOH. (I) has no curative action on xerophthalmia in rats.

J. L. D.
Isomerisation of linalool to geraniol. S. M. RIVKIN and E. A. MEERZON (J. Gen. Chem. Russ., 1935, 5, 274—276).—Geraniol is obtained in 14% yield from linalool and H₂O in presence of H₃BO₃ or ZnCl₂ (200°/19 atm.; 90 min.). R. T.

Recent progress in the chemistry of the terpenes. J. L. SIMONSEN (J.C.S., 1935, 781—785).—A lecture. F. R. S.

Configuration of borneol and isoborneol. P. LIPP (Ber., 1935, 68, [B], 1029—1031).—The arguments of Asahina *et al.* (this vol., 625) are not regarded as decisive and it is doubtful whether the borneol-isoborneol problem can be solved by purely chemical methods. H. W.

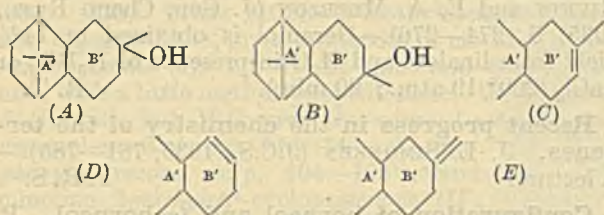
Tertiary 2:4-dimethylsantenol and 1:4-dimethylsantene. G. KOMPPA and G. A. NYMAN (Annalen, 1935, 518, 204—210).—4-Methylsantenone (this vol., 866) is converted by MgMeI into 2:4-dimethylsantenol (I), m.p. 55—58° (probably a mixture of stereoisomerides), dehydrated (KHSO₄ at 190—200°) with rearrangement to 1:4-dimethylsantene (II), b.p. 161—162°, converted by ozonolysis into the diketone (III), b.p. 108—115°/7 mm. (disemicarbazone, m.p. 235—236°), showing that the double linking is between two *tert*.-C. Hydration of (II) with AcOH-60% H₂SO₄ at 50—60° affords 4:6-dimethylsantenol (IV), b.p. 203—205° (Ac derivative, b.p. 97—98°/11.5 mm.), oxidised (CrO₃-AcOH) to the corresponding



ketone, 4:6-dimethylsantenone, b.p. 202—205°/760 mm. (semicarbazone, m.p. 177.5—178.5°), further oxidised (KMnO₄-10% KOH) to cis-1:2:3:5-tetramethylcyclopentane-1:3-dicarboxylic acid, m.p. 191—192° (anhydride, m.p. 89—90°, by cold AcCl), which contains the same no. of C, thus proving the constitution of (IV). J. W. B.

Elucidation of the constitution of certain sesquiterpenes by powerful oxidative degradation. I. Cedrene and cedrol. W. TREIBS (Ber., 1935, 68, [B], 1041—1049).—Cedrene (I) is unaffected by Pd- or Pt-asbestos at 300°, but passes in presence of Ni-pumice at 420—450° into *p*-cymene. The change of refraction in the apparently unaltered portion points to the intermediate formation of amylecymene, which loses the thermally unstable amylene. Repeated drastic oxidation of artificial (I) with KMnO₄ in COMe₂ readily yields the ketone C₁₄H₂₄O and diketone

$C_{15}H_{24}O_2$ obtained previously from natural (I); further oxidation of the salts thus obtained by $KMnO_4$ in H_2O affords much $CMe_2(CO_2H)_2$ and some $CO_2H \cdot CH_2 \cdot CMe_2 \cdot CO_2H$. The dicyclic system of (I) must therefore have the isopinane or camphane structure. Oxidation of the salts obtained from artificial (I) and $KMnO_4$ in CO_2 with hot HNO_3 (d 1.4) leads to little $CMe_2(CO_2H)_2$, $(\cdot CH_2 \cdot CO_2H)_2$, $CO_2H \cdot CHMe \cdot CMe_2 \cdot CO_2H$, and a mixture of isomeric tricarboxylic acids, $C_9H_{14}O_6$, from which camphoric acid is obtained by cryst. The dicyclic ring system



of (I) has the same structure as camphor, and cedrol (II) must have the structure A or B. Loss of H_2O during the conversion of (II) into (I) can occur in three directions. The constitution of cedrenedicarboxylic acid (III) proves that C is the predominant component of synthetic (I), whereas it is present in only small amount in natural (I).

Cedrene glycol (IV) is stable towards $KMnO_4$, but is readily oxidised by CrO_3 to a *OH-ketone*, $C_{15}H_{24}O_2$, b.p. 180—185°/17 mm., which is converted by more drastic oxidation into the ketonic acid, $C_{15}H_{24}O_3$, m.p. 82—83° (semicarbazone, m.p. 195°); since the latter can be degraded to (III) it is identical with the (non-cryst.) acid obtained by Semmler by ozonisation of natural (I). (IV) has the structure F. When treated with 30% H_2SO_4 it passes into the oxide, b.p. 148°/20 mm.

Contrary to Semmler, oxidation of (I) with $KMnO_4$ gives a mixture of acids, b.p. 200—230°/17 mm., from which a sparingly sol. semicarbazone, m.p. 240° (decomp.), is isolated. This when treated with $H_2C_2O_4$ yields a non-cryst. isoketo-acid transformed by $NaOBr$ into CBr_4 and isocedrenedicarboxylic acid, m.p. 210—211°. The acid is also obtained from (I) and HNO_3 (d 1.4) in boiling $AcOH$. It does not afford an anhydride. Since its Me_2 ester, b.p. 172°/17 mm., is converted by $MgMeI$ into a hydrocarbon, b.p. 150—160°/17 mm., the acid and Semmler's acid, m.p. 182°, must be *cis-trans*-isomerides. Artificial (I) is racemised by conc. H_2SO_4 with predominating production of an insol. stable and a sol., very readily autoxidised product. Natural (I) gives the same products in subsidiary amount, but 50% of it suffers polymerisation.

H. W.

Gossypol. L. SCHMID and S. MARGULIES (Monatsh., 1935, 65, 391—398).—Gossypol (formula $C_{30}H_{30}O_8$ confirmed) yields (Pd, H_2) hydrogossypol (I), $C_{30}H_{36}O_8$, decomp. 320° (evacuated tube), which forms no additive compound with $AcOH$, but which gives (C_5H_5N , Ac_2O) a Ac_6 derivative, decomp. 235°. $Zn-H_2$ distillation of (I) furnishes a substance (II), identified with synthetic β -isoamyl-naphthalene (III) [no picrate; the substance described as such (A., 1888, 1305; 1891, 730) is picric acid], with a sub-

stance containing O, m.p. 234—238°, b.p. 180°/12 mm. (II) or (III) with Br gives a substance, m.p. 70—72°, b.p. 135—140°/0.4 mm. (I) is oxidised by H_2O_2 - $NaOH$ to Pr^aCO_2H , with a substance, $C_{25}H_{30}O_{10}$ (?), decomp. about 170°, and a substance, b.p. 130°/12 mm.

E. W. W.

β -Oxanolols [$\beta\gamma$ -oxidopropan- α -ols]. E. P. KOHLER and C. L. BICKEL (J. Amer. Chem. Soc., 1935, 57, 1099—1101).—Cleavage of $\begin{matrix} CHR \\ \diagup \\ O \end{matrix} \rightarrow CH \cdot CR' \cdot OH$ into $CH_2R \cdot CHO$ and COR'_2 is dependent on replacement of the H of the OH by a metal, since org. Mg or Li compounds or Na in liquid NH_3 give metallic derivatives, which regenerate the oxide with acids, but, when heated, give the aldehyde and ketone. Rearrangement of the oxide to $OH \cdot CHR \cdot CH \begin{matrix} \diagup \\ CR' \end{matrix} \cdot O$ is

shown by the following reactions not to involve migration of R' or formation of a triol and to be an irreversible, catalytic reaction brought about by OH' or OMe' , since it is effected by alkali hydroxides or carbonates, BaO , $Mg(OEt)_2$, or $NMe_4 \cdot OH$, but not by OAc' , NH_3 , C_5H_5N , or piperidine. $o-C_6H_4Cl \cdot CHO$ and $COPhMe$ in $NaOH$ -aq. $EtOH$ give β -hydroxy- β -o-chlorophenylpropionophenone, m.p. 80°, hydrolysed to the aldehyde and ketone by aq. $MeOH$ or heat, and stable to hot $AcOH$. In $NaOMe$ - $MeOH$, however, $o-C_6H_4Cl \cdot CH \cdot CH \cdot COPh$ is formed, which with Na_2O_2 gives $\alpha\beta$ -oxido- β -o-chlorophenylpropionophenone (84% yield), m.p. 73—74°; $MgPhBr$ yields $\beta\gamma$ -oxido- $\alpha\alpha$ -diphenyl- γ -o-chlorophenylpropan- α -ol, m.p. 107—108°, which with $MgEtBr$ gives a Mg compound, decomposed by keeping into $CPh_2Et \cdot OH$, with $LiPh$ a Li compound, reconverted immediately by acid into the original oxide, but after 30 min. boiling in Et_2O into $(C_6H_4Cl \cdot CHO)_x$ (also obtained with $COPh_2$ by Na in NH_3), and with bases affords $\beta\gamma$ -oxido- $\gamma\gamma$ -diphenyl- α -o-chlorophenylpropan- α -ol, m.p. 114—115°, the structure of which is proved by oxidation (CrO_3) to $COPh_2$ and $o-C_6H_4Cl \cdot CO_2H$, whilst autoxidation gives $o-C_6H_4Cl \cdot CHO$. α -Hydroxy- β -methoxy- β -phenylpropionophenone is obtained by cryst., m.p. 47—48°. γ -Methoxy- $\alpha\alpha\gamma$ -triphenylpropane- $\alpha\beta$ -diol does not yield an oxide with bases.

R. S. C.

Extraction of furfuraldehyde from aqueous solutions. V. I. SHARKOV and I. BELJAEVSKI (Lesokhim. Prom., 1933, 2, No. 3, 15—19).—Salting-out effects are discussed. CH. ABS. (r)

Condensation of furan derivatives. IV. Nature of the coloured products of condensation of furfuraldehyde with acetone in aqueous sulphuric or hydrochloric acid, and the theory of reaction of alcohols and olefines with furfuraldehyde. V. Application of the furfurylidene test to the study of the process of condensation of acetone with formaldehyde. V. V. TSCHELINCEV (J. Gen. Chem. Russ., 1935, 5, 256—264, 265—273).—IV [with E. K. NIKITIN]. The compounds $C_4H_3O \cdot CH(CH_2 \cdot COMe)_2$ (I), $C_4H_3O \cdot CH \cdot CH \cdot COMe$ (II), and $CO(CH \cdot CH \cdot C_4H_3O)_2$ (III) are obtained when $C_4H_3O \cdot CHO$ (IV) and $COMe_2$ are condensed in aq. HCl or H_2SO_4 . (I) does not afford a coloured product with acids, (II) gives an orange-red and (III) a violet-red coloration. (IV), when present in large

excess, undergoes polymerisation to yield a blue polymeride. The colorations obtained with fusel oil, pinene, and liquid olefins are due to the presence of COMe_2 in these products, or to its formation under the conditions of condensation.

V [with M. N. TILITSCHENKO]. CH_2O and COMe_2 react in presence of KOH in two ways: $\text{COMe}_2 + \text{CH}_2\text{O} \rightarrow \text{CH}_2\text{:CH}\cdot\text{COMe} + \text{H}_2\text{O}$, and $2\text{CH}_2\text{O} + \text{H}_2\text{O} \rightarrow \text{HCO}_2\text{H} + \text{MeOH}$. The latter reaction is favoured by higher $[\text{KOH}]$, and is catalysed by COMe_2 , and the HCO_2H produced neutralises the KOH , thereby creating conditions unfavourable for the aldol condensation.

R. T.

Orientation in the furan series. Hill's 3:5-dibromo-2-furoic acid. H. GILMAN, R. J. V. WAL, R. A. FRANZ, and E. V. BROWN (J. Amer. Chem. Soc., 1935, 57, 1146).—Hill's "3:5-dibromo-2-furoic acid" (A., 1886, 447) is really the 4:5- Br_2 -acid, because (a) replacement of the α -Br by H, reaction with KCN - CuCN , and subsequent hydrolysis gives furan-2:4-dicarboxylic acid, (b) decarboxylation, interaction with KCN , and hydrolysis affords the 2:3-dicarboxylic acid, and (c) the Et ester with MgPhBr gives α -bromo- $\delta\delta$ -diphenyl- $\Delta^{\alpha\gamma}$ -pentadienol- γ -lactone, hydrolysed by 5% NaOH to $\text{CHPh}_2\cdot\text{COMe}$. Hill's structures for 5-chloro- and -bromo-3-sulpho- and 3:5-dichloro-furoic acid now need revision.

R. S. C.

Reactions of o-hydroxybenzylacetone. W. BAKER and J. WALKER (J.C.S., 1935, 646—648).— $\text{o-OH}\cdot\text{C}_6\text{H}_4\cdot\text{CH}\text{:CHAc}$ is reduced by $\text{H}_2/3$ atm. with Pd-SrCO_3 in MeOH to $\text{o-OH}\cdot\text{C}_6\text{H}_4\cdot\text{CH}_2\cdot\text{CH}_2\text{Ac}$ (I) in 80% yield, but with a PdCl_4 catalyst in EtOH to a mixture of (I) (NaOH -sol.) and 2-ethoxy-2-methylchroman (II), b.p. $105^\circ/11$ mm., $225^\circ/760$ mm., with some conversion into (III). The presence of (II) is due to HCl , since (I) is converted into (II) by EtOH -trace HCl at room temp. (II) is reconverted into (I) by hot dil. HCl . 2-Methoxy-2-methylchroman, b.p. $107^\circ/14$ mm., is similarly obtained. (I) dissolved in dry Et_2O over anhyd. Na_2SO_4 is slowly (2 weeks) converted (probably by way of 2-hydroxy-2-methylchroman) into 2-methylchromene (III), b.p. $95\text{--}97^\circ/10$ mm., also obtained by boiling (II) with Ac_2O . Reduction of (III) with H_2 - Pt-SiO_2 gel in AcOH gives 2-methylchroman, b.p. $100\text{--}102^\circ/11$ mm.; specimens of this compound previously described in the lit. are probably mixtures.

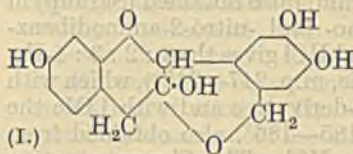
J. W. B.

Constitution of genistein. C. CHARAUX and J. RABATÉ (J. Pharm. Chim., 1935, [viii], 22, 32—33).—Genistein is an isoflavone, the formula $\text{C}_{15}\text{H}_{10}\text{O}_5$ of Baker and Robinson (A., 1929, 192) being correct. Sophoricoside is a β -glucoside of formula $\text{C}_{21}\text{H}_{20}\text{O}_{10}$.

H. G. R.

Leuco-anthocyanins and -anthocyanidins. I. Isolation of peltogynol and its molecular structure. (MRS.) G. M. ROBINSON and R. ROBINSON (J.C.S., 1935, 744—752).—Aq. extracts of the sawdust of *Peltogyne porphyrocardia* with EtOAc yield a leucoanthocyanidin, peltogynol (I), $\text{C}_{16}\text{H}_{14}\text{O}_6$, $[\alpha]_D^{25} +273^\circ$ in EtOAc (O-Ac_4 , m.p. 173° , $[\alpha]_D^{20} +125^\circ$ in CHCl_3 , O-Bz_4 , m.p. 244° , O-tetra-anisoyl , m.p. 218° , O-Me_4 , m.p. 174° , $[\alpha]_D^{20} +264^\circ$ in CHCl_3 , and O-Me_3 derivatives, m.p. 198° , $[\alpha]_D^{20} +254^\circ$ in CHCl_3 ; 2:4-

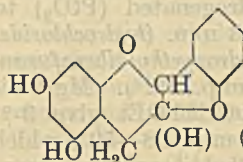
dinitrophenylhydrazone explodes 224°). Oxidation (HNO_3) of (I) gives styphnic acid, whilst the O-Me_3 compound yields 4:5-dinitroveratrole and with KMnO_4 affords *m*-hemipinic acid and *O-trimethylpeltogynic acid*, $\text{C}_{19}\text{H}_{18}\text{O}_7$ (?). Optical and X-ray crystallographic examination of (I) confirm the constitution assigned. The dihydroanthocyanidin state of oxidation is stabilised by the ketose group, and it is suggested that the corresponding structure will be found in other leucoanthocyanins and that the formation of the anthocyanidins from these precursors is actually the result of oxidation.



p-Methoxysalicylaldehyde and ω -3:4-trimethoxyacetophenone (HCl) yield *O-tetramethylfisetinidin chloride*, which with CH_2O gives a solution closely resembling that of trimethylpeltogynidin salts.

F. R. S.

Constitution of cyanomaclurin. H. APPEL and R. ROBINSON (J.C.S., 1935, 752—755).—Cyanomaclurin (I) (Perkin, J.C.S., 1905, 87, 715) has $[\alpha]_D^{20} +215^\circ$ in EtOAc or $+192^\circ$ in H_2O , neither solution showing mutarotation. The supposed Ac_5 and Bz_5 derivatives are Ac_4 , $[\alpha]_D^{20} +95^\circ$ in EtOAc , and Bz_4 derivatives, respectively. (I) forms *O-trimethylcyanomaclurin*, m.p. $73\text{--}85^\circ$ (Ac derivative), and is converted by Na_2CO_3 into morinidin chloride. Consideration of the reactions of (I) leads to the structure assigned.



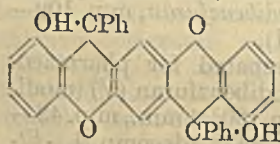
F. R. S.

Dibenzfuran [diphenylene oxide]. V. Dimetalation. H. GILMAN and R. V. YOUNG. VII. Amino-derivatives. W. H. KIRKPATRICK and P. T. PARKER (J. Amer. Chem. Soc., 1935, 57, 1121—1123, 1123—1126; cf. this vol., 867).—V. Substitution of dibenzfuran by metals ("metalation") occurs in the 1 and 8 positions, showing the great effect of the O. Mono-metalation is best effected by LiBu^α or NaBu^α in Et_2O , and dimetalation by NaBu^α , but NaEt , PbEt_4 , or Na-K and $\text{MgBu}^\alpha\text{Cl}$ may also be used. Na 1-dibenzfuryl gives 1-methyl- (I) (45% yield) and 1-hydroxy-dibenzfuran (40%), m.p. 102° [Bz derivative, m.p. $91\text{--}92^\circ$; Me ether (II), m.p. 52° , b.p. $164\text{--}165^\circ/5$ mm.]. 1:8-Disubstituted dibenzfuran gives 1:8-dimethyl- (90%), -di-iodo- (19%), m.p. 160° , and -dihydroxy-dibenzfuran (III) (3%), m.p. 190° , and dibenzfuran-1:8-dicarboxylic acid (IV) (77%), m.p. 325° (Me_2 ester, m.p. $161\text{--}162^\circ$), and -disulphonic acid, decomp. $183\text{--}185^\circ$, oxidised to the $(\text{SO}_3\text{H})_2$ -derivative, decomp. about 300° . (I) and (II) yield 1-methyl-8-carboxy-dibenzfuran, m.p. $238\text{--}240^\circ$ [Me ester, m.p. $80\text{--}81^\circ$; with KMnO_4 gives (IV)], and 1-hydroxy-8-methoxydibenzfuran, m.p. $109\text{--}110^\circ$, which with HI gives (III).

VI. NH_2 -derivatives are prepared for pharmacological examination. 2-Aminodibenzfuran (V) (modified prep.) yields the *N-Me*-, b.p. $190^\circ/4$ mm., m.p. $48\text{--}49^\circ$ [hydrochloride, m.p. $245\text{--}247^\circ$ (decomp.)], -*Et*- (hydrochloride, m.p. $>315^\circ$), -*Pr*-, b.p. $203\text{--}205^\circ/1$

mm. (hydrochloride, m.p. 190°), $-Me_2$, b.p. 211—212°/4 mm., m.p. 96° (hydrochloride, m.p. 230—232°), and $-Et_2$, b.p. 205°/2—3 mm. [hydrochloride, m.p. 203—205° (decomp.)], derivatives, with $Br[CH_2]_5Br$ 2-piperidinodibenzfuran, m.p. 111° (hydrochloride, m.p. 258—260°), by a Skraup reaction pyrido-[3:2-b]- (VI), m.p. 167·5—168·5°, and -[2:3-c]-dibenzfuran, m.p. 112°, b.p. 209—210°/3 mm. [also obtained (Skraup) in poor yield from 3-bromo- and -nitro-2-aminodibenzfuran]. (VI) with Sn and HCl gives the 1:2:3:4- H_4 -derivative (hydrochloride, m.p. 247—248°), which with Me_2SO_4 gives the *N*-Me-derivative and with LiMe the 3-Me-compound, m.p. 185—186°, also obtained from (V) and CH_2O in conc. HCl. The Skraup reaction (As_2O_5) with 3-bromo-7-aminodibenzfuran affords a bromopyridodibenzfuran, m.p. 152°. 3-Aminodibenzfuran gives (Skraup) pyrido-[2:3-b]- and -[3:2-a]-dibenzfuran and two isomerides, m.p. 185—186° [hydrochloride, m.p. 307—310° (decomp.)] and 160·5—161·5° [hydrochloride, m.p. 296—298° (decomp.)], respectively. 3-Bromo- (from the Ac derivative and Br in Et_2O), m.p. 106—107°, and -chloro-acetyldibenzfuran (prep. by $CH_2ClCOCl$ in CS_2), b.p. 206—208°/1—2 mm., m.p. 109—110° (oxidised to the 3-carboxylic acid), give 3-diethylamino- (hydrochloride, m.p. 204—206°) and -piperidino-acetyldibenzfuran (hydrochloride, m.p. 270—271°), hydrogenated (PtO_2) to 3- β -diethylamino-, b.p. 220°/2—3 mm. (hydrochloride, m.p. 137°), and -piperidino- α -hydroxyethylidibenzfuran, m.p. 103—104° (hydrochloride, m.p. 242°). Mg 3-dibenzfuryl bromide and $CH_2ClCHClOEt$ give 3- β -chloro-, b.p. 204—206°/6 mm., m.p. 58—59°, which yields 3- β -piperidino- α -ethoxyethylidibenzfuran, m.p. 175°; epichlorohydrin yields similarly 3- γ -chloro-, b.p. 205—206°/2 mm., and -diethylamino- β -hydroxypropylidibenzfuran (hydrochloride, m.p. 145°); $(CH_2)_2O$ leads to 3- β -hydroxy-, m.p. 67—67·5°, -bromo-, b.p. 179—180°/2—3 mm., m.p. 62—62·5°, and -diethylamino-ethylidibenzfuran, b.p. 169—170°/2 mm. (hydrochloride, m.p. 192—193°). Li 1-dibenzfuryl and $(CH_2)_2O$ give 1- β -hydroxy-, m.p. 70—71°, b.p. 190—191°/4 mm., -bromo-, b.p. 163—165°/2 mm., m.p. 37—38°, and thence 1-diethylamino-ethylidibenzfuran (hydrochloride, m.p. 184—185°). 1-Hydroxydibenzfuran, $p-C_6H_4MeSO_3CH_2CH_2Cl$, and aq. NaOH give 1- β -chloro-, m.p. 64—65°, and thence 1- β -diethylamino- (hydrochloride, m.p. 128·5—129·5°) and -piperidino-ethoxydibenzfuran, b.p. 213°/2 mm. (hydrochloride, m.p. 210·5—212°). The 1-Li-derivative affords dibenzfuran-1-carboxyl chloride, m.p. 118°, which gives the amide, m.p. 181—182°, and thence 1-aminodibenzfuran, m.p. 84·5—85·5° (hydrochloride: Ac derivative, m.p. 172·5°), also obtained from the 1-OH-compound, $ZnCl_2$, and NH_4Cl at 275—280°. R. S. C.

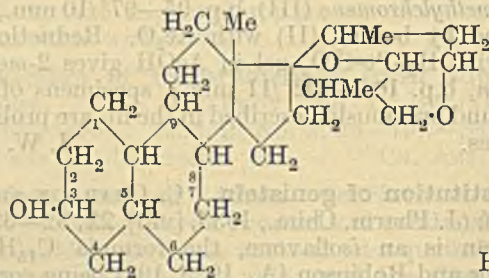
Photochemical formation of diradicals. A. SCHÖNBERG (Annalen, 1935, 518, 299—302).—In part a priority claim (cf., *inter alia*, A., 1934, 643, 997). The compound formed by exposure of a chlorophyll solution to light in presence of an acceptor (Gaffron, A., 1927, 1225) has a diradical character similar to that obtained with rubene (*loc. cit.*). Contrary to Liebermann *et al.* (A.,



1934, 531) the compound obtained by the action of HNO_3 on chromorufen is not a diradical peroxide, but a glycol (formula annexed). J. W. B.

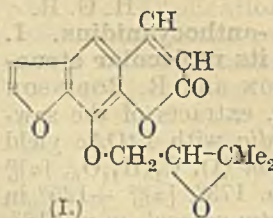
Synthesis of bergapten and its derivatives. I. Furocoumarins. J. N. RAY, S. S. SILOOJA, and V. R. VAID (J.C.S., 1935, 813—816).—7-Hydroxycoumarin with CH_2BrBz gives 7-phenacyloxycoumarin, m.p. 167° (with NaOEt forming 3'-phenyl-7:6-furocoumarin, m.p. 200°), and with CH_2ClAc yields 7-acetonyloxycoumarin, m.p. 167° (with NaOEt affording 3'-methyl-7:6-furocoumarin, m.p. 188°). β -Methylumbelliferone with CH_2ClAc forms 7-acetonyloxy-4-methylcoumarin, m.p. 157°, which with NaOEt gives 4:3'-dimethyl-7:6-furocoumarin, m.p. 220°. Acetylumbelliferone and $AlCl_3$ yield 7-hydroxy-8-acetylcoumarin, m.p. 167°, the oxime, m.p. 223°, of which with $POCl_3$ affords the isooxazole and 8-acetamido-7-hydroxycoumarin, m.p. 251°, hydrolysed to the amine, m.p. 278°. Pyrogallaldehyde and $CH_2(CO_2H)_2$ give daphnetin-3-carboxylic acid, m.p. 228°. Daphnetin and CH_2ClAc yield 8-hydroxy-7-acetonyloxycoumarin, m.p. 132—133°, methylated to the 8-OMe-compound, m.p. 81—82°, which with NaOEt forms 8-methoxy-3'-methyl-7:6-furocoumarin (+ $1H_2O$), m.p. 155°. The furocoumarins described have the linear structure. F. R. S.

Neutral saponins. Conversion of digitogenin, gitogenin, and tigogenin into identical derivatives. R. TSCHESCHE (Ber., 1935, 68, [B], 1090—1094).—Digitogenic acid semicarbazone is reduced by NaOEt at 160—170° to gitogenic acid (I). Digitogenin (II) and gitogenin (III) therefore differ only because of the presence of a third OH in the second ring of the former. Oxidation of tigogenin (IV) with CrO_3 affords (I) and an acid, $C_{26}H_{35}O_8$, m.p. 218—220° (Me ester, m.p. 85—86°), previously obtained from (III). (IV) is therefore a $(OH)_1$ -compound with the same skeleton as (II) or (III). The annexed structure is suggested for (IV) whilst (III) is the 3:4-di- and (II) the 3:4:6-tri-hydroxy-compound of the same fundamental body.



H. W.

Natural coumarins. XV. Partial synthesis of imperatorin and preparation of oxyimperatorin. E. SPATH and H. HOLZEN (Ber., 1935, 68, [B], 1123—1125).—Treatment of xanthotoxol as Na derivative with γ -methyl- Δ^8 -butenyl bromide in Et_2O (not in MeOH) yields imperatorin, m.p. 101°, trans-formed by BzO_2H in $CHCl_3$ into oxyimperatorin (I), m.p. 115—116°. H. W.



Thiacyclopentane 1 : 1-dioxides [tetramethylene sulphones]. H. J. BACKER and C. C. BOLT (Rec. trav. chim., 1935, 54, 538—544; cf. A., 1934, 662).—Catalytic hydrogenation of the unstable Δ^3 -thiacyclopentene 1 : 1-dioxide (butadiene sulphone) (I) gave the stable thiacyclopentane 1 : 1-dioxide (tetramethylene sulphone) (II). Rapidity of hydrogenation of substances of the type of (I) varies with structure. (II) has m.p. 20—21°, b.p. 149.5—150°/15 mm. (cf. A., 1917, i, 155). The following derivatives of (II) are described: 3-Me (m.p. 0—1°, b.p. 102—103°), from isoprene sulphone (cf. A., 1931, 1268); 3-Bu, m.p. 42—42.5°, b.p. 137—138°/2—3 mm.; 3-Ph, m.p. 96—97°, b.p. 220—221°/15 mm., 351—354°/760 mm.; 3-cyclohexyl (by hydrogenation of the 3-Ph compound), m.p. 62.5—63°, b.p. 202—204°/14 mm.; 3 : 4-Me₂, m.p. 50—51°, b.p. 136—137°/15 mm.; 2 : 3 : 4 : 5-Me₄, b.p. 117°/2 mm., 152—154°/14 mm. The decomp. temp. of many substances of types (I) and (II) are compared. P. G. C.

Manufacture of hydroxydiphenylene compounds and derivatives.—See B., 1935, 585.

Relative reactivities of certain 2- and 2 : 6-substituted piperidines. A. W. SINGER and S. M. McELVAIN (J. Amer. Chem. Soc., 1935, 57, 1135—1137).—The rate of reaction of piperidine with Bu⁺Br at 150—155° is depressed by 2- or 2 : 6-substituents; Me is a more effective substituent than Ph, CH₂Ph, CH₂Ph·CH₂, or CO₂Et. Et₂ pyridine-, b.p. 188—188.5°/12 mm., m.p. 42—43°, and piperidine-2 : 6-dicarboxylate, b.p. 155—156°/11 mm., are described. 2 : 6-Di(phenylethyl)piperidine has b.p. 238—239°/11 mm. R. S. C.

Trichlorides of iridium^{III}-aquodipyridines.—See this vol., 946.

Complex iron thiocyanates with pyridine.—See this vol., 946.

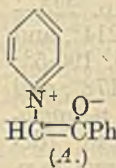
Phenacylpyridinium compounds. F. KROLL-PFEIFFER and A. MÜLLER (Ber., 1935, 68, [B], 1169—1177).—*p*-Anisyl CBrMe₂ ketone is slowly converted by boiling C₅H₅N into *p*-methoxy- ω - ω -dimethylphenacylpyridinium bromide, m.p. 171—172°, transformed by NaOH immediately followed by acid into *p*-OMe·C₆H₄·CO₂H and a little of the original salt and transformed in the usual manner into *p*-OMe·C₆H₄·CO₂H and the *N*-isopropylpyridinium salt (picrate, m.p. 193—194°). 2-Bromo-1-ketotetrahydronaphthalene smoothly yields 1-keto-2-tetrahydronaphthylpyridinium bromide (I) decomp. 216—218°, or, from MeOH with much Et₂O, a product, decomp. 246—248° (corresponding picrate, m.p. 187—188°). The action of alkali on (I) yields a substance, m.p. 75—80° (decomp.), which is certainly not the anhydro-base, reforms (I) when treated with acid or NH₄Cl, and is transformed by further treatment with alkali into γ -o-carboxyphenylpropylpyridinium chloride (II) [CO₂H·C₆H₄·[CH₂]₃·N⁺C₅H₅]⁺Cl[−], m.p. 58—59° (corresponding picrate, m.p. 138—140°). When distilled in vac. (II) passes into the lactone, m.p. 54—56°, of α - γ -hydroxy-*n*-propylbenzoic acid, m.p. 70—71°, which is oxidised by KMnO₄ to β -o-carboxyphenylpropionic acid.

1-Ketotetrahydronaphthalene and 4 Br in CS₂

afford $\beta\beta$ -dibromo-1-ketotetrahydronaphthalene, m.p. 59—60°, transformed by NPhMe₂ into α -C₁₀H₇·OH and by C₅H₅N into 2-bromo- α -naphthol, m.p. 43—46°. The anhydro-base from 2-ethylthiol-5-methylphenacylpyridinium bromide and CS₂ in CHCl₃ yield the substance, C₁₆H₁₇ONS, CS₂, m.p. 118—119° after softening, which is transformed by boiling AcOH into CS₂ and pyridinium salt and by conc. HCl or H₂SO₄ into readily hydrolysed salts of the base C₁₅H₁₁ONS₂, decomp. 285° when rapidly heated, best obtained in addition to 2-ethylthiol-5-methylbenzoic acid by the action of alkali. The same base and the corresponding benzoic acid are also produced by the action of alkali on the CS₂ compounds, decomp. 117—119°, 2-methoxy-5-methylphenacylpyridinium bromide, or the corresponding 2-OEt-derivative. H. W.

Enol-betaines. I. F. KRÖHNKE (Ber., 1935, 68, [B], 1177—1195).—The intermediate products formed by the action of alkali or, preferably, alkali carbonate on acalkylpyridinium salts (I) and their analogues are regarded as enol-betaines (cf. A). Their intense colour is not due simply to the conjugated double linkings or the enol-betaine structure, but to co-ordinative unsaturation in conjunction with polarised double linking. The presence of the ethylenic linking is established by the occasional occurrence of *cis-trans* isomerism. The compounds react very readily with Bz₂O giving *C*-Bz compounds and easily afford additive compounds. They give very marked colour reactions with chloranil, bromanil, and 2 : 3-dichloro- α -naphthaquinone, whereas those with *p*-O·C₆H₄·O, toluquinone, and α -naphthaquinone are usually fugitive. Anthraquinone and its halogenated derivatives, o-quinones, and $\alpha\beta$ -diketones do not react, whilst 2-keto-1 : 1 : 3 : 4-tetrachloro-1 : 2 : 3 : 4-tetrahydronaphthalene behaves analogously to chloranil. Picryl chloride is a very sensitive reagent, followed by 1 : 2 : 4-C₆H₃Cl(NO₂)₂, C₆H₃(NO₂)₃, mono-, di-, and tri-nitrobenzaldehyde. Similar colour changes, usually occurring only with (I), are given by compounds ·CO·CRR'(Hal), in which at least R or R' is electronegative (e.g., CHBrPhBz, COPh·CHBr₂, CHBrBz₂, CBr₃·CHO, CCl₂Ph₂) or by compounds with accumulated negative groups (CCl₃·NO₂, CHBr₃, CHI₃, C₃HCl₇, CPh₃Cl). Non-cyclic NH₄ salts with an enolisable group and quaternary N give less intense colour reactions.

Phenacylpyridinium bromide and K₂CO₃ give the additive compound C₅₂H₄₅O₄N₄Br, m.p. 74° (decomp.). Phenacylpyridiniumenol-betaine and Bz₂O yield dibenzoylmethylpyridiniumenol-betaine (II) (cf. A), m.p. 220—222°, which does not immediately give the chloranil reaction and is transformed by 2*N*-HClO₄ into dibenzoylmethylpyridinium perchlorate, m.p. 149—150° after softening at 148°. (II) is also obtained from CHBrBz₂ and C₅H₅N. The oxime, m.p. 158—159°, of phenacylpyridinium perchlorate, the compound C₇₆H₆₁O₄N₄Br, m.p. 166° (decomp.), from *p*-phenylphenacylpyridinium bromide and K₂CO₃, and acetonpyridinium bromide, m.p. 185°, are described. *p*-Bromophenacylpyridinium bromide, m.p. 235° (decomp.) (corresponding perchlorate, m.p. 241—242°), is transformed by K₂CO₃ into the corresponding



enol-betaine, m.p. 135—136° (decomp.), which yields *p*-bromophenacylpyridinium benzoate, m.p. 95—96° (decomp.), with BzOH in CHCl_3 and is converted by Bz_2O in CHCl_3 into *benzoyl-p*-bromobenzoylmethylpyridinium bromide, m.p. 219—220° (also + $2\text{H}_2\text{O}$), transformed by aq. HBr mainly into *p*- $\text{C}_6\text{H}_4\text{Br}\cdot\text{CO}_2\text{H}$. *m*-Nitrophenacylpyridinium perchlorate, m.p. 170—175°, and the corresponding *enol-betaine*, $\text{C}_{13}\text{H}_{10}\text{O}_3\text{N}_2$, m.p. 145—147° (decomp.), are described. 3:4-Dichloro- ω -bromo-2-nitroacetophenone, m.p. 139.5—140°, affords 3:4-dichloro-2-nitrophenacylpyridinium bromide, m.p. 223° (decomp.), which yields two isomeric *enol-betaines*, orange-red leaflets, m.p. 160° (with transformation), and yellow needles, decomp. about 160°. ω -Acet-thienoylpyridinium bromide, m.p. 196—197°, is converted by *N*-NaOH into thiophen-2-carboxylic acid. The following compounds are described: phenacyl-3-nitropyridinium bromide, m.p. 210—220° (decomp.) [corresponding perchlorate, m.p. 198—199° (decomp.) after softening], and the *enol-betaine*, m.p. 147°; phenacyl-3-picolinium bromide, decomp. 225—230°; phenacyl-2-picolinium bromide, m.p. 214°, and dibenzoylmethyl-2-picolinium *enol-betaine*, m.p. 190.5°; *p*-bromophenacyl-2-picolinium bromide, m.p. 178°, and the *enol-betaine*, m.p. (indef.) 135° (decomp.); *p*-bromophenacyl-3-picolinium bromide, m.p. 244—245° (decomp.) after darkening [corresponding perchlorate, m.p. 223—227° (decomp.) after softening], and the *enol-betaine*, m.p. 130° after blackening at 80°; acetonylquinolinium bromide, m.p. 211, and the *enol-betaine*, m.p. 110° (decomp.); acetonylisoquinolinium bromide, m.p. 145°, and the *enol-betaine*, m.p. 100—103° (slight decomp.) (perchlorate, m.p. 149—150° after softening); phenacylquinolinium bromide, m.p. 212°, and the *enol-betaine*, m.p. 137—139°; *p*-bromophenacylquinolinium bromide and the *enol-betaine*, m.p. 125°; *p*-phenylphenacylquinolinium bromide, m.p. 228—229° (decomp.), and the *enol-betaine*, m.p. 155° (decomp.) after darkening at 60°; phenacylisoquinolinium bromide, m.p. 204—206° (corresponding perchlorate, m.p. 194—195° after softening at 193°), the *enol-betaine*, m.p. 192—193°, and dibenzoylmethylisoquinolinium *enol-betaine*, m.p. 251—252°; *p*-bromophenacylisoquinolinium bromide, m.p. 249° after softening and decomp., and the *enol-betaine*, m.p. 180°; *p*-phenylphenacylisoquinolinium bromide, m.p. 236°, and the *enol-betaine*, m.p. 203° (decomp.); desylpyridinium bromide, m.p. 157° (decomp.), which does not give reactions with chloranil or $\text{C}_6\text{H}_2\text{Cl}(\text{NO}_2)_3$ in presence or absence of Na_2CO_3 , and the *enol-betaine*, m.p. 138° (also + H_2O), which gradually loses $\text{C}_5\text{H}_5\text{N}$ when preserved; desylquinolinium bromide, m.p. 188° after softening at 183°; desylisoquinolinium bromide, m.p. 224—225°, and the hydrated *enol-betaine*; α -benzoyl- β -phenylchylpyridinium bromide, m.p. 192—193°, from $\text{CHBrBz}\cdot\text{CH}_2\text{Ph}$ and $\text{C}_5\text{H}_5\text{N}$, which gives a non-cryst. resin with K_2CO_3 and is transformed by KOH into BzOH and β -phenylethylpyridinium salt; 2-phenacylpyridine hydrobromide, m.p. 156—157° [corresponding perchlorate, m.p. 207° (decomp.)], and 2-phenacylpyridine methiodide, m.p. 190—191°, whence the anhydro-base (? *enol-betaine*), m.p. 122—123°, which is converted by 0.33*N*-NaOH into BzOH; phenacyltriphenylphosphonium bromide, m.p. 271—272° after softening at 270°, formed with triphenylphosphine

oxide, m.p. 154—155°, from PPh_3 and CH_2BrBz in CHCl_3 , which does not give the chloranil reaction and is stable towards 3*N*-NaOH at room temp.

H. W.

Condensation of α -carboxylic esters of the pyridine series. K. WINTERFELD and F. W. HOLSCHNEIDER (Arch. Pharm., 1935, 273, 305—315).—Et picolinate (I), pyrrolidone, and NaOEt in C_6H_6 give 3-picolinoylpyrrolid-2-one, m.p. 126—128°, b.p. 175°/0.5—1 mm. [HgCl_2 compound, m.p. 223° (decomp.)], which with hot conc. HCl yields 2-pyridyl γ -aminopropyl ketone (II) [dihydrochloride, + H_2O , m.p. 175° (decomp.); salt, $\text{B}_2\text{HCl}_2\cdot 2\text{HgCl}_2$, + H_2O , m.p. 194° (decomp.); aurichloride, m.p. 165—166° (decomp.); sulphophenylhydrazone dihydrochloride, m.p. 227° (decomp.); Bz derivative, m.p. 89—90° (HgCl_2 compound)]. (I) and $(\cdot\text{CH}_2\cdot\text{CO})_2\text{NMe}$ at 110—115° give similarly α -2-picolinoylsuccinmethylinide, m.p. 90—91° (picrate, m.p. 94—95°), converted by hydrolysis and esterification into Et γ -picolinoylpropionate, b.p. 162—163°/11 mm. (platinichloride, decomp. 177—178°; HgCl_2 compound, m.p. 87—88°); the hydrochloride of the corresponding acid yields by hydrogenation (PtO_2 -Pt-black) in EtOH γ -2-pyridylbutyrolactone, b.p. 155—157°/13 mm. (hydrochloride, m.p. 217—218°; aurichloride, m.p. 158—159°). (I) and γ -butyrolactone with Na or NaOEt (at 60—70°) in C_6H_6 afford α -picolinoylbutyrolactone, m.p. 50—51°, hydrolysed by HCl in poor yield to 2-pyridyl γ -hydroxypropyl ketone, an oil (platinichloride, sinters 85—86°, decomp. 134—135°; HgCl_2 compound, m.p. 151—152°). Et α -picolinoylacetate, $\text{CH}_2\text{Br}\cdot\text{CH}_2\cdot\text{OMe}$, and NaOEt give 2-pyridyl γ -methoxypropyl ketone, b.p. 115—117°/10 mm. (hydrochloride, decomp. 143—144°), and probably a little pyridyl Me ketone (hydrochloride, decomp. 215°). Et quinoline-2-carboxylate, *N*-methyl- α -pyrrolidone, and Na in C_6H_6 at 110° give 2-quinolyl 3-*N*-methylpyrrolid-2-onyl ketone, m.p. 109—111°, hydrolysed to 2-quinolyl γ -methylaminopropyl ketone hydrochloride, decomp. 155—156°. 2-Pyridyl γ -methylaminopropyl ketone and (II), but not the other products described above, have marked action on the uterus (isolated or *in situ*) of guinea-pigs at 1:100,000.

R. S. C.

Derivatives of β -2-pyridylpentan- β -ol. K. WINTERFELD and F. W. HOLSCHNEIDER (Arch. Pharm., 1935, 273, 315—319).—2-Acetylpyridine (modified prep.) and $\text{MgPr}^{\text{e}}\text{Br}$ in Et_2O give β -2-pyridyl-*n*-pentan- β -ol (I), b.p. 102—103°/100 mm. [hydrobromide, m.p. 168°; Bz derivative (II), b.p. 174—175°], the hydrochloride, m.p. 180—181°, of which is hydrogenated (PtO_2) in EtOH to β -2-piperidyl-*n*-pentan- β -ol (III) (hydrochloride, m.p. 158—160°) giving with $\text{CH}_2\text{O}\cdot\text{HCO}_2\text{H}$ at 140—150° the *N*-Me derivative (IV), b.p. 113—114°/10 mm. (Bz derivative, b.p. 161—163°/? 10 mm.). (I) and PBr_3 at 100° give β -2-pyridyl- Δ^8 -*n*-pentene hydrobromide, m.p. 124—125°. (II) and (III) have slight, and (IV) large (25 mg. per kg. body-wt.), pressor action on cats. (IV) also paralyses smooth stomach muscle.

R. S. C.

Pyridyl-2-acetic acid and pyridyl-2:6-diacetic acid. M. P. OPARINA (Khim. Farm. Prom., 1934, No. 4, 12—15).—The oximes of the corresponding phen-

acyl compounds are converted into the anilides by the Beckmann transformation; these are then hydrolysed to the acids. CH. ABS. (r)

Condensation products of pyridine bases with benzaldehyde. M. P. OPARINA and B. SMIRNOV (Khim. Farm. Prom., 1934, No. 4, 15—16).—Condensation (ZnCl_2) of pyridine bases (b.p. 140—150°) with PhCHO yields a mixture containing distyrylpyridine and α - and β -stilbazoles. Oxidation affords 2:4- $\text{C}_5\text{H}_3\text{N}(\text{CO}_2\text{H})_2$, decarboxylated to the 4-carboxylic acid. CH. ABS. (r)

Substituted aromatic aldehydes in Hantzsch's pyridine condensation. IV. Derivatives of 3:4-dihydroxybenzaldehyde. L. E. HINKEL, E. E. AYLING, and W. H. MORGAN (J.C.S., 1935, 816—818; cf. A., 1932, 744).—The following compounds are obtained from the appropriate aldehydes by the method previously described (A., 1931, 1072) (% yields in parentheses): *Et* 4-(4'-hydroxy-3'-methoxyphenyl)- (I), m.p. 164° (74.1); *Et* 4-(2'-nitro-4'-hydroxy-3'-methoxyphenyl)-, m.p. 118° (71.9 and 57.6, yields are inconsistent owing to difficulty of isolation of product); *Et* 4-(3'-hydroxy-4'-methoxyphenyl)- (II), m.p. 165° (74.1 and 72.8); *Et* 4-(5'-nitro-3'-hydroxy-4'-methoxyphenyl)-, m.p. 185° (75.7) (+*EtOH* of crystallisation, m.p. 185°); *Et* 4-(3':4'-dimethoxyphenyl)-, m.p. 144° (76.1 and 76.6) [identical with methylation products (Me_2SO_4 - NaOH) of (I) and (II)]; *Et* 4-(2'-nitro-3':4'-dimethoxyphenyl)-, m.p. 141.5° (74.2 and 77.0); *Et* 4-(5'-nitro-3':4'-dimethoxyphenyl)-, m.p. 154° (69.3 and 71.4); *Et* 4-(6'-nitro-3':4'-dimethoxyphenyl)-, m.p. 229° (68.7 and 67.3); *Et* 4-(3':4'-methylenedioxyphenyl)-, m.p. 132° (71.9 and 71.3); *Et* 4-(6'-chloro-3':4'-methylenedioxyphenyl)-, m.p. 139° (66.7 and 67.2); *Et* 4-(6'-bromo-3':4'-methylenedioxyphenyl)-, m.p. 169° (69.9 and 69.5); *Et* 4-(6'-nitro-3':4'-methylenedioxyphenyl)-2:6-dimethyl-1:4-dihydropyridine-3:5-dicarboxylate (59.6 and 61.5) [+*AcOH* of cryst., m.p. 144°; +*EtOH* of cryst., m.p. 101° (decomp.)]. Condensation with 2:6-dinitroisovanillin (III) yields only the NH_4 salt of (III), m.p. 190° (decomp.), reconverted into (III) by warm dil. HCl . The influence of substituents in the aldehyde on the yield of dihydropyridine is discussed. 5-Nitroisovanillin has m.p. 121° (lit., m.p. 113°). H. G. M.

Manufacture of pyridine compounds.—See B., 1935, 585.

Compounds of 8-hydroxyquinoline with alkali metals and zirconium. P. SUE and G. WÉTROFF (Bull. Soc. chim., 1935, [v], 2, 1002—1007).—The prep. and analysis of the Li, Na, K(+ KOH), and NH_4 (+ NH_3) salts of 8-hydroxyquinoline and the Zr salt, $\text{Zr}(\text{C}_8\text{H}_6\text{ON})_4$, and its *Br*-derivative, $\text{Zr}(\text{C}_8\text{H}_5\text{ONBr})_4$, are described. None of these salts is suitable for accurate determination of the metal it contains. H. G. M.

2-Methyl-4-quinolyldiazines. E. KOENIGS and (FRL.) M. VON LOESCH (J. pr. Chem., 1935, [ii], 143, 59—69).—Action of $\text{N}_2\text{H}_4 \cdot \text{H}_2\text{O}$ (I) on 4-chloro-2-methylquinoline (II) at 150° gives a diamine (III), new m.p. 122°, incorrectly described by Marckwald and Chain (A., 1900, i, 521) as 2-methyl-4-quinolyldiazine (IV). (III) with HNO_2 yields a substance

(V), $\text{C}_{10}\text{H}_8\text{N}_4$, m.p. 126°, resolidifying at 240°, to melt again at 300°; (V) is converted by HCl into an isomeride, m.p. 342° (hydrochloride; *Na* salt, decomp. 230°). Similarly 4-chloro-6-methoxy-2-methylquinoline (VI) yields a diamine, $\text{C}_{11}\text{H}_{13}\text{ON}_3$, m.p. 100—103° [hydrochloride, decomp. 270°; picrate, m.p. 202° (decomp.)]; *Cu* salt], which with HNO_2 forms a substance, m.p. 186°, resolidifying at 240°, decomp. 305°, converted by HCl into an isomeride, m.p. 305°. 4-Chloro-6-ethoxy-2-methylquinoline (VII) gives a diamine, m.p. 116—117° [picrate, m.p. 200° (decomp.)]; *Cu* salt], which with HNO_2 forms a substance, $\text{C}_{12}\text{H}_{12}\text{ON}_4$, m.p. 212°, resolidifying, decomp. 270°, converted by HCl into an isomeride, decomp. 292° (hydrochloride, decomp. 265°). The action of (I) on (II) in *EtOH* on the water-bath gives the true 2-methyl-4-quinolyldiazine (IV), m.p. 200° (decomp.) [sulphate (VIII), m.p. 284—285°; hydrochloride, m.p. 306°; picrate, m.p. 204°; benzylidene derivative, m.p. 259° (all decomp.)], which with HNO_2 forms 2-methyl-4-quinolyldiazide, m.p. 78° (+ $2\text{H}_2\text{O}$) [picrate, m.p. 181° (decomp.)]. (VIII) is reduced (Zn , H_2SO_4) to 4-amino-2-methylquinoline. (VI) similarly gives 6-methoxy-2-methyl-4-quinolyldiazine, m.p. 208° [sulphate, m.p. 310°; picrate, m.p. 191° (both decomp.)], which forms 6-methoxy-2-methyl-4-quinolyldiazide, m.p. 106—107° (hydrochloride, decomp. 195°), and 4-amino-6-methoxy-2-methylquinoline, m.p. 211—213° [picrate, m.p. 250° (decomp.)]. (VII) gives 6-ethoxy-2-methyl-4-quinolyldiazine, m.p. 180° [sulphate, m.p. 276° (decomp.)]; hydrochloride, decomp. 300°; picrate, decomp. 193°], which forms 6-ethoxy-2-methyl-4-quinolyldiazide, m.p. 108° (picrate, decomp. 183°).

E. W. W.

Synthesis of quinolinic bases from hydroxymethylene derivatives of ketones. M. ROMET (Compt. rend., 1935, 200, 1676—1678; cf. A., 1887, 940).—The hydroxymethylene derivative of COEt_2 affords an anilide, which is converted by ZnCl_2 at 180° (or at 129° in *isoamyl* alcohol) into 3-methyl-2-ethyl- and 3-methyl-4-ethyl-quinoline, an oil. Similarly, the *p*-toluidide affords 3:6-dimethyl-2-ethyl-quinoline, m.p. 54° (picrate, m.p. 177°). The anilide and *p*-toluidide of the hydroxymethylene derivative of COMe_2 give quinaldine and 2:6-dimethylquinoline, respectively. The quinolines obtained indicate that the amine reacts with CO rather than CHO . COMeEt gives a mixture of two hydroxymethylene derivatives (cf. A., 1888, 671; 1916, i, 372) which give anilides, m.p. 129—130° and 96°, convertible into quinolines as above. J. L. D.

Derivatives of 8-aminoquinoline as antimalarials. IV. Compounds with long chains in position 8. O. J. MAGIDSON, O. S. MADAIEVA, and M. V. RUBZOV (Arch. Pharm., 1935, 273, 320—333; cf. A., 1934, 417).—The ratio (R), $D_{\text{tol}}/D_{\text{cur}}$, for 6-methoxyquinolines with $\text{NMe}_2 \cdot [\text{CH}_2]_n \cdot \text{NH}$ in position 8 is greater if n is an odd than if it is an even no. up to $n=9$, max. occurring at $n=3$ and 9; higher homologues have very low R . κ -Bromodecyl acetate is less reactive than the λ -Br-ester. Periodicity is noticeable in the case of reaction of ω -bromoalkyl acetates with NHEt_2 and of ω -bromoalkyldiethylamines with 6-methoxyquinoline (I).

$\text{CH}_2\text{Br}\cdot\text{CH}_2\cdot\text{CH}_2\cdot\text{OPh}$ and Na do not react in Et_2O , and in hot PhMe give PhOH, an unsaturated ether, and a little of a substance, m.p. 61–62°. With NaI in COMe_2 it gives the iodide, which with Na in Et_2O affords $\text{OPh}\cdot[\text{CH}_2]_6\cdot\text{OPh}$; with 60% HBr this yields the α , ζ -dibromide (II), also obtained from the glycol (modified prep.). (II) and KOAc in AcOH at 120° give ζ -bromohexyl acetate, b.p. 113–116°/12 mm., converted by hot NHEt_2 into ζ -acetoxyhexyldiethylamine, b.p. 129–132°/13 mm., whence the ζ -Br-amine (III), an oil (readily cyclises; hydrochloride), is obtained by 60% HBr. (I) and (III) in EtOH at 110–115° give 8- ζ -diethylamino-*n*-hexylamino-6-methoxyquinoline, b.p. 197–202°/1 mm. [meconate, m.p. 102° (decomp.); *R* 13.3]. By similar reactions are obtained 8- η -diethylamino-*n*-heptyl-, b.p. 232–237°/2.5–3 mm., *R* 33.3, 8- ι -diethylamino-*n*-nonyl-, b.p. 248–252°/3 mm., *R* 40, 8- λ -, b.p. 246–247°/2 mm., *R* 5, and 8- κ -diethylamino-*n*-undecyl-amino-6-methoxyquinoline, b.p. 238–240°/1–2 mm., *R* 0. Prep. of the following is modified: heptane- α , η -diol (from Et_2 pimelate), b.p. 160–167°/24 mm., and -dibromide; nonane- α -diol and -dibromide; Et_2 azelate; Et λ -bromoundecate; λ -hydroxyundecyldiethylamine, b.p. 168.5–169°; κ -bromoundecate acid. The following appear to be new: η -bromoheptyl, b.p. 148–153°/23–25 mm., and ι -bromononyl acetate, b.p. 144–152°/9 mm.; η -diethylaminohexyl alcohol, b.p. 146–148°/17 mm., and bromide (hydrobromide, hygroscopic, m.p. 81–84°); α , η -di(diethylamino)-heptane, b.p. 153–154°/19 mm. (hydrobromide, m.p. 245°); ι -diethylaminononyl acetate, b.p. 155–157°/9 mm., and bromide (hydrobromide); Et λ -, b.p. 183–184°/11–12 mm., and κ -diethylaminoundecate, b.p. 184–186°/14 mm. (hydrochloride, m.p. 87–88°); λ -diethylaminoundecyl chloride, b.p. 172–175°/10 mm. (hydrochloride, m.p. 89–91°); κ -diethylaminoundecyl alcohol, b.p. 167°/9 mm., and chloride (hydrochloride, m.p. 54–56°). R. S. C.

Preparation of possible antimalarial agents.—See this vol., 1017.

6-Methoxy-8-quinolyl ethyl ketone. I. T. STRUKOV (Khim. Farm. Prom., 1934, No. 3, 13–14).—8-Cyano-6-methoxyquinoline (Sandmeyer; from 8-amino-6-methoxyquinoline) with MgEtI affords 6-methoxy-8-quinolyl Et ketone. CH. ABS. (r).

8-Amino-6-methoxyquinoline. I. T. STRUKOV (Khim. Farm. Prom., 1934, No. 5, 19–21).—A technically applicable method of reduction of 8-nitro-6-methoxyquinoline is described. CH. ABS. (r).

Determination of 2-phenylquinoline-4-carboxylic acid in presence of salicylic and acetylsalicylic acids. A. CASTIGLIONI (Annali Chim. Appl., 1935, 25, 240–242).—Unlike the other two acids named, 2-phenylquinoline-4-carboxylic acid (I) is pptd. by silicotungstic acid to form $12\text{WO}_3\cdot\text{SiO}_2\cdot 2\text{H}_2\text{O}\cdot 4\text{C}_{16}\text{H}_{11}\text{O}_2\text{N}_2\cdot 2\text{H}_2\text{O}$, which, on calcination, gives silicotungstic anhydride; multiplication of the latter by 0.3504 gives (I). T. H. P.

Friedel and Crafts reaction in the carbazole series. S. G. P. PLANT, (MISS) K. M. ROGERS, and S. B. C. WILLIAMS (J.C.S., 1935, 741–744).—In the Friedel-Crafts reaction, carbazole (I) is substituted

in the 3 and 6 positions, 3-substituted carbazoles in the 6 position, and 9-acylcarbazoles in the 2 position. (I) and AcBr yield 3:6-diacetylcarbazole (II), m.p. 232° (3:6:9- Ac_3 compound, m.p. 220°; 9-*Me* compound, m.p. 192°). $p\text{-NH}_2\cdot\text{C}_6\text{H}_4\cdot\text{COMe}$ and 4-bromo-3-nitroacetophenone give (Cu) 2-nitro-4:4'-diacetyldiphenylamine, m.p. 177°, which on reduction and addition of NaNO_2 forms 5:4'-diacetyl-1-phenylbenzotriazole, m.p. 224°; 2-nitro-4-acetyl-4'-ethyldiphenylamine, m.p. 85°, and 5-acetyl-1-phenyl-4'-ethylbenzotriazole, m.p. 143°, are similarly prepared, but neither triazole could be converted into the carbazole. Reduction of (II) (Clemmensen) leads to 3:6-diethylcarbazole, m.p. 119°, also obtained by oxidising (S) 3:6-diethyl-1:2:3:4-tetrahydrocarbazole, m.p. 87–88°, prepared from the *p*-ethylphenylhydrazine of 4-ethylcyclohexanone (Fischer reaction). 3-Acetylcarbazole and BzCl afford 3-benzoyl-6-acetylcarbazole, m.p. 210°, also obtained from 3-benzoylcarbazole and AcCl. 9-Benzoylcarbazole with BzCl gives 2:9-dibenzoylcarbazole, m.p. 140–142°, and with AcCl forms the 2-benzoyl-9-acetyl compound, m.p. 136–137°, both substances being hydrolysed to 2-benzoylcarbazole, m.p. 163°. F. R. S.

Manufacture of nitrogenous condensation products.—See B., 1935, 622.

Photochemical behaviour of pyridine, 2-benzylpyridine, papaverine, and some derivatives. A. MÜLLER and M. DORFMAN (Monatsh., 1935, 65, 411–432; cf. this vol., 366).—The prep. of 2- (I) and of 4-benzylpyridine is improved, and their M_n determined. When (I) is exposed to light of λ 275 to < 238 $m\mu$, an aldehydic substance is formed. At λ 365–275 $m\mu$, the products are 2-benzoylpyridine (II) [semicarbazone, m.p. 184° (corr.)], with $\alpha\beta$ -diphenyl- $\alpha\beta$ -di-2-pyridylethane (?), m.p. 220–221°. In O_2 -free H_2O vapour, $\text{C}_5\text{H}_5\text{N}$ and papaverine are unaffected by light; (I), (II), and papaveraldine darken. The effects of light of each λ from a Hg lamp on various substances are compared. The semicarbazone, m.p. 208° (corr.), of 4-benzoylpyridine is described. E. W. W.

Metabolism of monomethyltryptophans.—See this vol., 1015.

New derivatives of phenyldimethylaminopyrazolone. J. ERDŐS and J. SÜRÜ, jun. (Magyar Társ. Ért., 1934, 10, 424–429; Chem. Zentr., 1935, i, 563).—The condensation of 4-aminoantipyrine with aldehydes to yield the following is described: *salicylidene*-, m.p. 198°; *cinnamylidene*-, m.p. 157°, and *piperonylidene*-, m.p. 230°, -4-aminoantipyrine. H. N. R.

Ring-formation in heterocyclic compounds. A. SONN and (in part) W. LITTEN, H. LAURIEN, K. SCHÜTZLER, and W. MEYER (Annalen, 1935, 518, 290–298).—The product obtained by interaction of PhN_2Cl with $\text{CO}(\text{CH}_2\cdot\text{CO}_2\text{Et})_2$ (I) is 1-phenyl-4:6-diketo-1:4:5:6-tetrahydropyridazine-3-carboxylic acid (II) (A, R=Ph; X= CO_2H), m.p. 244–245° [*Me* ester, m.p. 138° (converted by CH_2N_2 into its 6-*O-Me* ether, m.p. 154°); anilide, m.p. 177–178°], decarboxylated above its m.p. to 1-phenyl-4:6-diketo-1:4:5:6-tetrahydropyridazine (III), m.p. 221–222°.

Similar condensation with $\text{CO}_2\text{Et}\cdot\text{CHEt}\cdot\text{CO}\cdot\text{CH}_2\cdot\text{CO}_2\text{Et}$ affords 1-phenyl-5-ethyl-4:6-diketo-1:4:5:6-tetrahydropyridazine-3-carboxylic acid, m.p. 121—122°, and a similar constitution (A , $R=p\text{-C}_6\text{H}_4\cdot\text{NO}_2$, $X=\text{CO}_2\text{H}$) must be assigned to the anhydro-compound, m.p. 251°, obtained by similar condensation of $p\text{-NO}_2\cdot\text{C}_6\text{H}_4\cdot\text{N}_2\text{Cl}$ with (I) and alkaline hydrolysis (Bülow *et al.*, A., 1901, i, 239). 4:5-Dibromo-1-phenyl-1:4:5:6-tetrahydropyridazin-6-one (IV) is converted by $\text{KOR}\cdot\text{ROH}$ into the corresponding 5-bromo-4-methoxy- and 5-bromo-4-ethoxy-, m.p. 135°, -derivatives, reduced to 4-ethoxy-1-phenyl-1:4:5:6-tetrahydropyridazin-6-one, m.p. 124—125°, also obtained by the action of $\text{EtBr}\cdot\text{NaOEt}$ on (III). Prolonged heating with dil. $\text{NaOH}\cdot\text{EtOH}$ converts (IV) into 5-bromo-1-phenyl-1:4:5:6-tetrahydropyridazine-4:6-dione, m.p. 270°. With the appropriate amine (IV) yields the corresponding 5-bromo-4-methyl-, m.p. 158—159°, -4-benzyl-, m.p. 203°, -4-diethyl-, m.p. 92—93°, -4-dimethyl- (V), m.p. 116°, -amino-1-phenyl-1:4:5:6-tetrahydropyridazin-6-one. The methiodide of (V) [by NMe_3 on (IV)] with Ag_2O affords a solution from which the picrate, decomp. $>280^\circ$, of $\text{NMe}_3\cdot\text{CH}_2\cdot\text{CH}\cdot\text{N}\cdot\text{NHPh}$ is obtained. Condensation of the appropriate keto-ester with PhN_2Cl affords *Et benzeneazo-oxalodiethylacetoacetate*, m.p. 112—112.5°, and -diethylacetonedicarboxylate, m.p. 76—77°, the free acid, m.p. 150—151° (decomp.) (anhydride, m.p. 159—160°), of which, when kept, affords the phenylhydrazone, m.p. 78—79°, of $\text{CHEt}_2\cdot\text{CO}\cdot\text{CHO}$, and when heated in EtOH gives the phenylhydrazone, m.p. 68—69°, of $\text{CO}_2\text{H}\cdot\text{CEt}_2\cdot\text{CO}\cdot\text{CHO}$. The formation of such 5- and 6-membered heterocyclic rings is discussed, and it is suggested that the compounds obtained by condensation of Et formylsuccinate with $\text{NHPh}\cdot\text{NH}_2$ (Wislicenus *et al.*, A., 1909, i, 9) and N_2H_4 (von Rothenburg *et al.*, A., 1895, i, 302) have the structure $\text{NR}\cdot\text{CO}\cdot\text{N}=\text{CH}\rangle\text{CH}\cdot\text{CH}_2\cdot\text{CO}_2\text{Et}$ ($R=\text{Ph}$ and $R=\text{H}$, respectively).

J. W. B.

Pyrimidines. CXLVI. Synthesis of uracyl-5-methylamine. T. B. JOHNSON and (Miss) A. LITZINGER (J. Amer. Chem. Soc., 1935, 57, 1139—1140).—An aliphatic pyrimidine base, uracyl-5-methylamine, m.p. 295—300° (decomp.) [hydrochloride, m.p. 242—243° (decomp.); sulphate, m.p. 245—246° (decomp.)], is prepared from Et 2-ethylthiouracyl-5-acetate by way of the urethane, which is readily hydrolysed by H_2SO_4 or HCl .

R. S. C.

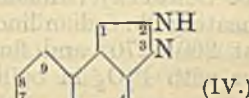
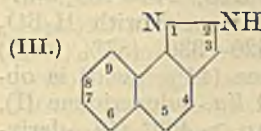
Indazoles. 2-*p*-Dimethylanilino-3-carbethoxyindazole. I. TANASESCU and E. TANASESCU (Bull. Soc. chim., 1935, [v], 2, 1016—1020).—Et *o*-nitrophenylacetate is not oxidised by nitrous vapours (cf. A., 1909, i, 925). When heated with $p\text{-NO}\cdot\text{C}_6\text{H}_4\cdot\text{NMe}_2$, EtOH, and Na_2CO_3 (or Na_3PO_4 , but not $\text{C}_5\text{H}_5\text{N}$ and $\text{C}_5\text{H}_{11}\text{N}$) on a water-bath it affords 2-*p*-dimethylanilino-3-carbethoxyindazole 1-oxide, m.p. 212° (colour reactions with HCl and alcohols described), which on reduction ($\text{Zn}\cdot\text{EtOH}\cdot\text{H}_2\text{O}\cdot\text{CaCl}_2$) affords 2-*p*-dimethylanilino-3-carbethoxyindazole, m.p. 143° (hydrochloride, m.p. 197°), and with conc. HCl at the b.p. during 15 min. 2-*p*-dimethylanilino-3-chloroindazole 1-oxide, m.p. 167°, basic and readily sol. in mineral acids.

H. G. M.

Quinazolines. VII. Interaction of 2:4-dichloroquinazoline in alcohol with ammonia and methylamine. E. VOPICKA and N. A. LANGE (J. Amer. Chem. Soc., 1935, 57, 1068—1070; cf. A., 1933, 723).—2:4-Dichloroquinazoline and $\text{EtOH}\cdot\text{NH}_3$ or $\text{EtOH}\cdot\text{NH}_2\text{Me}$ at 150° give 2:4-diamino-, m.p. 259° [hydrochloride, m.p. 308°; sulphate, m.p. 330°; acetate, $+\text{H}_2\text{O}$, m.p. 208°; nitrate, m.p. 280°; oxalate, m.p. 274°; picrate, m.p. 304° (decomp.); Ac_2 derivative, m.p. 230°], and 2:4-dimethylamino-quinazoline, m.p. 120° (hydrochloride, m.p. 312°; picrate, m.p. 232°), respectively. M.p. are corr.

R. S. C.

Naphthindazoles. V. VESELY, A. MEDVEDEVA, and E. MÜLLER (Coll. Czech. Chem. Comm., 1935, 7, 228—238).—2:1- $\text{C}_{10}\text{H}_6\text{Me}\cdot\text{NO}_2$ in $(\text{CHCl}_2)_2$ with FeCl_3 and Cl_2 affords 8-chloro-1-nitro-2-methylnaphthalene, m.p. 114° [also obtained (Sandmeyer) from the corresponding 8- NH_2 -compound], and this, when dissolved in EtOH and slowly added to Fe in boiling $\text{AcOH}\cdot\text{H}_2\text{O}$, is reduced to the amine, m.p. 89° [*Ac* derivative (I), m.p. 214—215°]. When diazotised and poured into boiling EtOH, this amine affords some 9-chloro- α -naphthindazole (II), m.p. 159° (2-*Ac* derivative, m.p. 196°) (cf. A., 1891, 312), but no 8:2- $\text{C}_{10}\text{H}_6\text{ClMe}$ could be isolated. (II) was also obtained by treating (I) in Ac_2O with N_2O_3 , and boiling the resulting crude *N-NO*-derivative in C_6H_6 for 3 hr. (cf. A., 1908, i, 298). 4-Nitro-1-amino-2-methylnaphthalene in EtOH, when diazotised and



heated, affords 2:4- $\text{C}_{10}\text{H}_6\text{Me}\cdot\text{NO}_2$ and 5-nitro- α -naphthindazole, m.p. 304—305° (2-*Ac* derivative, m.p. 196—197°). 6-Bromo- α -naphthindazole, m.p. 249—250° (cryst. from AcOH) and 202—204° (pptd. from EtOH solution by H_2O) (2-*Ac* derivative, m.p. 168°), is similarly obtained. 2:1- $\text{C}_{10}\text{H}_6\text{Me}\cdot\text{NHAc}$ in AcOH and N_2O_3 afford the *N-NO*-derivative, m.p. 82° (decomp.), converted by very cautious heating or, better, by boiling in C_6H_6 or PhMe into α -naphthindazole (III), m.p. 158° (picrate, m.p. 193°; *Ac* derivative, m.p. 108—109°). 1:2- $\text{C}_{10}\text{H}_6\text{Me}\cdot\text{NHAc}$ is converted similarly into the *N-NO*-derivative, m.p. 91° (decomp.). This, when heated alone, or better in xylene, C_6H_6 , or benzene, affords β -naphthindazole (IV), m.p. 231° (picrate, m.p. 217—218°; *Ac* derivative, m.p. 116.5°; *Ag* salt).

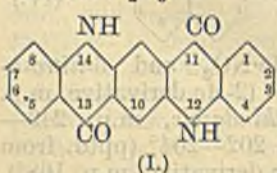
H. G. M.

Syntheses and molecular complexes in the phenazine series. II. G. R. CLEMO and H. McILWAIN (J.C.S., 1935, 738—741).—There are two types of mol. compound: (i) true phenazhydrins, formed between a phenazine and a 9:10-dihydrophenazine, green to purple, forming green dihydrochlorides, (ii) phenazine-primary or -*sec.* aromatic base complexes, orange-red, not giving hydrochlorides. Phenazine-*N*-methylidihydrophenazine dihydrochloride, m.p. 225° (decomp.), is prepared from its components, cyclohexane-1:2-dione, $o\text{-C}_6\text{H}_4(\text{NHMe})_2$, and HCl followed by NaOH give *NN'*-dimethyl-2:3:9:10-tetrahydrophenazine, m.p. 78°, whilst with $\text{NaOH}\cdot\text{AcOH}$, *NN'*-dimethyl-9:10-dihydrophenazine, m.p.

153°, is obtained [*phenazine-NN'-dimethyl-9:10-dihydrophenazine dihydrochloride*, m.p. 225—230° (decomp.)]. The following phenazine-base complexes have been prepared: *phenazine-o*-, m.p. 153°, -*m*-, m.p. 143°, and -*p*-phenylenediamine, m.p. 133°, and -*diphenylamine*, m.p. 57—58°. 1:2:3:4-Tetra- is reduced (Na-Hg) to 1:2:3:4:9:10:11:12-octa-hydrophenazine, m.p. 150°, neither compound forming a complex with phenazine. 2-Methyl-1:2:3:4-tetrahydrophenazine, b.p. 147°/0.1 mm., obtained from 1-methylcyclohexane-3:4-dione, *o*-C₆H₄(NH₂)₂, and NaOAc-AcOH, and 2-methyl-5:6:7:8-tetrahydrophenazine, m.p. 78°, obtained from 1:3:4-C₆H₃Me(NH₂)₂ and cyclohexane-1:2-dione, with I-AcOH give 2-methylphenazine, oxidised to phenazine-2-carboxylic acid. The nature of the complexes is discussed. F. R. S.

Neocyanine. F. M. HAMER (Chem. and Ind., 1935, 54, 640—641).—The evidence of absorption spectra indicates that the I atom is tautomerically shared between the N atoms of the carbocyanine chain rather than between the N atoms of the dicarbocyanine chain. H. W.

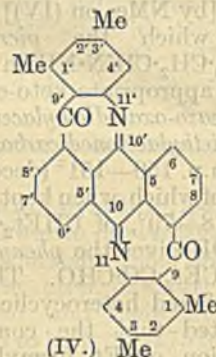
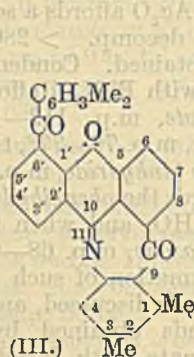
Rearrangement products of succinylsuccinic esters. VI. Formation of quinacridones from 2:5-diarylamino-terephthalic acids. H. LIEBERMANN [with H. KIRCHHOFF, W. GLIKSMAN, L. LOEWY, A. GRUHN, T. HAMMERICH, N. ANITSCHKOFF, and B. SCHULZE] (Annalen, 1935, 518, 245—259).—By heating 2:5-dianilinoterephthalic acid with H₃BO₃ at 260—270° and finally at 320—330° (87% yield) or with P₂O₅ in boiling cymene (44% yield) is obtained *lin.*-quinacridone (I), decomp. > 400° (Cl₁₀-derivative, m.p. 402°, by heating with SbCl₅-I). Similarly from the appropriate diarylamino-terephthalic acid (II) are prepared 4:8-, m.p. 347°, and 2:6-dimethyl-, m.p. 337°; 4:8-dimethoxy-, m.p. 318°; 1:2:5:6-dibenzo- (III) [together with a little 2-β-naphthylamino-7:8-benzacridone-3-carboxylic acid (IV) (*Ba* salt)], and 3:4:7:8-dibenzo-, m.p. 348° [dodecachlorodihydroxy-derivative, m.p. 410° (decomp.)], -quinacridone. Et 2:5-di-β-naphthylamino-terephthalate and Me₂SO₄ at 120—150° afford a little (III) and its 12:14-Me₂ derivative, m.p. > 400° (decomp.), and (IV). When warmed with conc. H₂SO₄ (III) gives its *disulphonic acid*. By heating the appropriate (II) with K₂CO₃, PhI, and Cu in C₅H₁₁OH at 195° are obtained 2:5-bisdiphenylamino-, m.p. 292° (decomp.) (*Ag*, *Ba*, *Pb*, and *Cu*^{II} salts), -phenyl-*o*-tolylamino-, m.p. 309° (NH₄ salt), -phenyl-*p*-tolylamino-, m.p. 287° (decomp.), -phenyl-β-, m.p. 296° (*Ag* and *Ba* salts), and -α-naphthylamino-, m.p. 320° (decomp.) (*Ba* salt), -terephthalic acid. These are converted by heating with BzCl into 12:14-diphenyl-, m.p. > 450°, 12:14-diphenyl-4:8-, m.p. 432°, and -2:6-dimethyl-, m.p. 420°, 12:14-diphenyl-2:6-dichloro-, 12:14-diphenyl-1:2:5:6- and -3:4:7:8-dibenzo-quinacridone. J. W. B.



and 2:6-dimethyl-, m.p. 337°; 4:8-dimethoxy-, m.p. 318°; 1:2:5:6-dibenzo- (III) [together with a little 2-β-naphthylamino-7:8-benzacridone-3-carboxylic acid (IV) (*Ba* salt)], and 3:4:7:8-dibenzo-, m.p. 348° [dodecachlorodihydroxy-derivative, m.p. 410° (decomp.)], -quinacridone. Et 2:5-di-β-naphthylamino-terephthalate and Me₂SO₄ at 120—150° afford a little (III) and its 12:14-Me₂ derivative, m.p. > 400° (decomp.), and (IV). When warmed with conc. H₂SO₄ (III) gives its *disulphonic acid*. By heating the appropriate (II) with K₂CO₃, PhI, and Cu in C₅H₁₁OH at 195° are obtained 2:5-bisdiphenylamino-, m.p. 292° (decomp.) (*Ag*, *Ba*, *Pb*, and *Cu*^{II} salts), -phenyl-*o*-tolylamino-, m.p. 309° (NH₄ salt), -phenyl-*p*-tolylamino-, m.p. 287° (decomp.), -phenyl-β-, m.p. 296° (*Ag* and *Ba* salts), and -α-naphthylamino-, m.p. 320° (decomp.) (*Ba* salt), -terephthalic acid. These are converted by heating with BzCl into 12:14-diphenyl-, m.p. > 450°, 12:14-diphenyl-4:8-, m.p. 432°, and -2:6-dimethyl-, m.p. 420°, 12:14-diphenyl-2:6-dichloro-, 12:14-diphenyl-1:2:5:6- and -3:4:7:8-dibenzo-quinacridone. J. W. B.

Morphanthridones. VI. Dehydration and cyclisation of 1:5-di-*m*-xyloylanthraquinone-mono- and -di-oxime to dimethyl-*m*-xyloylo-

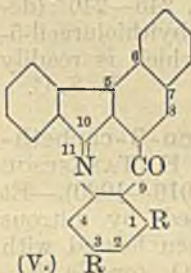
5:10-benzoylenemorphanthridone and tetramethyl-5:10-10':5'-dimorphanthridonylene. R. SCHOLL and J. DONAT. VII. Dehydration of 1-aroalloylallochrysoketoneoximes to 6:7-benz-5:10-phenylenemorphanthridones. R. SCHOLL and E. J. MÜLLER (Ber., 1935, 68, [B], 1062—1065, 1065—1068; cf. this vol., 869).—VI. 1:5-Di-*m*-xyloylanthracene is converted by HNO₃ (*d* 1.48) in boiling AcOH into 9-nitro-1:5-di-*m*-xyloylanthracene, m.p. 251—252° after softening, transformed by boiling KOH-MeOH into 1:5-di-*m*-xyloylanthraquinone-9-oxime (I), m.p. 219.5—220.5° (decomp.) after softening. (I) is preferably obtained by the action of NH₂OH on 1:5-di-*m*-xyloylanthraquinone in boiling EtOH and is separated from non-cryst. 1:5-di-*m*-xyloylanthraquinone-9:10-dioxime (II) by taking advantage of the solubility of the latter in aq. NaOH. (I) is transformed in boiling PhNO₂ containing HCl into 6'-*m*-xyloylo-5:10-benzoylene-1:3-dimethylmorphanthrid-9-one (III), m.p. 256.5—258°. Under similar



conditions (or in boiling AcOH) (II) passes more readily into 1:3:1':3'-tetramethyl-5:10-10':5'-dimorphanthrid-9:9'-onylene (IV), m.p. > 350°.

VII. Dehydrations analogous to those observed with 1-aroalloylanthraquinone-9-oximes and 1:5-diaroylanthraquinone-9:10-oximes are observed in the fluorenone series if anhyd. ZnCl₂ is used in place of the customary dehydrating agents, which yield only red to black amorphous resins.

1-*m*-Xyloylallochrysoketone is converted by NH₂OH, HCl and BaCO₃ in boiling EtOH into 1-*m*-xyloylallochrysoketone-9-oxime, decomp. 254—255° when rapidly heated (*Na* salt), converted by ZnCl₂ at 170—180° and then at 190° into 6:7-benz-5:10-phenylene-1:3-dimethylmorphanthridone (V; R=Me), m.p. 237°. allochrysoketone-1-carboxyl chloride, C₆H₆, and AlCl₃ at 60—70° afford 1-benzoylallochrysoketone, m.p. 220—222°, the oxime, decomp. about 250°, of which is transformed by ZnCl₂ into 6:7-benz-5:10-phenylene-morphanthridone (V; R=H), m.p. 227—228°.



H. W.

New mode of formation of hydantoin derivatives. Z. JERZMANOWSKA-SIENKIEWICZOWA (Rocz. Chem., 1935, 15, 202—208).—Et maleate or fumarate in EtOH and CO(NH₂)₂ in presence of NaOEt afford chiefly the *ureide*, decomp. at 273—274°, of hydantoin-5-acetic acid, together with the free acid (I) (*Me*

ester, m.p. 123°). Maleyl monoureide (II) affords *fumaryl monoureide* (III), decomp. at 262—264°, when heated with aq. HCl at 90°; the ureides yield respectively maleic and fumaric acids when hydrolysed with aq. KOH. (I) is obtained from (II) in 46%, and from (III) in 12% yield, by heating with MeOH-KOH; the reaction does not take place when EtOH is substituted for MeOH. *Fumaryl diureide*, decomp. at 285°, is obtained from fumaryl chloride and CO(NH₂)₂.

R. T.

3 : 4-Pyridino-7 : 8 : 9-triazoles. O. BREMER (Annalen, 1935, 518, 274—289).—Reduction (Na₂S₂O₄) of 3-nitro-4-aminopyridine (I) affords the 3 : 4-(NH₂)₂-compound (II), m.p. 215—216° (*dihydrochloride* + H₂O and anhyd., not melting at 280°), converted by HNO₂ into 3 : 4-pyridino-7 : 8 : 9-triazole + EtOH and solvent-free, m.p. 240° [*K* salt + 0.5H₂O; *hydrochloride*, m.p. 210° (decomp.)] (cf. this vol. 226 for nomenclature). With Br-AcOH-KOAc (I) gives its 5-*Br*-derivative, m.p. 181°, reduced to 5-bromo-3 : 4-di-aminopyridine, whence 5-bromo-3 : 4-pyridino-7 : 8 : 9-triazole (*K* salt + 4EtOH; *hydrochloride*) is obtained. (I) after reduction with SnCl₂-HCl (*d* 1.19) and treatment with Cl₂-H₂O gives the 6-*Cl*-derivative, m.p. 157—158°, of (II), converted into 6-chloro-3 : 4-pyridino-7 : 8 : 9-triazole, not melting at 280°. By condensation of 4-chloro-3-nitropyridine with the appropriate amine are obtained 3-nitro-4-methylamino-, m.p. 162—163°, -4-ethylamino-, m.p. 74° (5-*Br*-derivative, not pure; reduced to 3-amino-4-ethylamino-, m.p. 129—130°), -4-*n*-butylamino-, m.p. 47—48° (3-NH₂-compound, sinters 58°, m.p. 72—73°), -4-benzylamino-, m.p. 103° (3-NH₂-compound, m.p. 67—68°), -4-diethylaminoethylamino-, b.p. 166°/1 mm. (3-NH₂-compound, b.p. 181.5°/1 mm.), -4-β-hydroxyethylamino-, m.p. 144° (*hydrochloride*, m.p. 205—206°), -4-β-aminoethylamino-, unstable in air (*Ac* derivative, m.p. 176°; *dihydrochloride*, decomp. 265°), and (from 2-chloro-5-nitropyridine), 5-nitro-2-anilino-, m.p. 134° (*NO*-derivative, m.p. 112°), -pyridine. From these, by reduction (isolated products in parentheses above) and HNO₂ are obtained 9-methyl-, m.p. 120° [*picrate*, m.p. 178.5°; *hydrochloride*, m.p. 223° (decomp.)]; *methiodide*, m.p. 194—195°, 9-ethyl-, sinters 40°, m.p. 48°, b.p. 121.5°/1 mm. [*picrate*, m.p. 177°; *hydrochloride*, m.p. 183°; *methiodide*, m.p. 166—167°], 9-*n*-butyl-, b.p. 128°/1 mm. (*hydrochloride*, sinters 143°, m.p. 148°), 9-benzyl-, m.p. 124° (*hydrochloride*, m.p. 220°), 9-diethylaminoethyl-, b.p. 147°/1 mm., 9-β-hydroxyethyl-, m.p. 143—144° (converted by aq. EtOH-HCl into the 9-β-chloroethyl derivative, m.p. 110—111°, converted by 10% KOH-MeOH into the 9-vinyl compound, m.p. 93°), and 5-bromo-9-ethyl-, m.p. 119.5°, -3 : 4-pyridino-7 : 8 : 9-triazole. 4-Chloro-3-nitropyridine with C₂H₄(NH₂)₂·H₂O affords αβ-di-(3-nitro-4-pyridylamino)ethane, not melting at 270° (*dihydrochloride*), reduced (Na₂S₂O₄-COMe₂) to αβ-di-(3-amino-4-pyridylamino)ethane, decomp. 270°. 3-Nitro-4-pyridylhydrazine when heated with cyclohexanone in AcOH-EtOAc affords cyclohexanone-3-nitro-4-pyridylhydrazone, m.p. 91—92°. 2-Chloro-3-bromo-5-nitropyridine (PCl₅ on the 2-OH-compound) has m.p. 69.5°.

J. W. B.

Constitution and biological activity of flavins. R. KUHN and H. RUDY (Naturwiss., 1935, 23, 286).—

Synthetic and natural lactoflavin are readily esterified with H₃PO₄ by means of the glycerol extract from the small intestine of rats, whilst, under the same conditions, 6 : 7-dimethyl-9-*l*-araboflavin (this vol., 262, 760) is only slightly esterified, and 6 : 7 : 9-trimethylflavin remains unaffected. The extent of esterification runs parallel to the growth-promoting action of these substances. Enzymic esterification (this vol., 1035) therefore affords a new method for characterising flavins. It is expected that other factors apart from the redox potential and the ability to form an ester with H₃PO₄ are of importance in the relation between the chemical constitution and growth-promoting action of flavins.

H. G. M.

Synthesis of flavins. P. KARRER, H. SALOMON, K. SCHÖPP, and F. BENZ (Naturwiss., 1935, 23, 355—356).—The lactoflavin isomeride, 6 : 7-dimethyl-9-*d*-1'-lyxitylisalloxazine, m.p. 280—282°, [α]_D + 59.8° (± 5°) in 0.05*N*-NaOH (*Ac*₄ derivative, m.p. 225—226°), has been synthesised. Its properties confirm the identity of lactoflavin (vitamin-B₂) with the ribityl-flavin (cf. A., 1934, 1233; this vol., 359, 631).

F. O. H.

Porphyrins. XXXIV. Porphyrins with unsaturated side-chains. Interaction of diazo-methane and ethyl diazoacetate and vinylpyrroles. H. FISCHER and C. E. STAFF (Z. physiol. Chem., 1935, 234, 97—126; cf. this vol., 362).—Sublimation of 5-carbethoxy-2 : 4-dimethylpyrrole-3-fumaric acid (I) (*Me* ester, m.p. 177°; *Me*₂ ester, m.p. 126°) at 190—200° in a vac. yields an acid, m.p. 237°, isomeric with 5-carbethoxy-2 : 4-dimethylpyrrole-3-acrylic acid (II). (I) with Pr³OH and HCl gives the *Pr*³ ester, m.p. 126°, of (very probably) 5-carbethoxy-2 : 4-dimethylpyrrole-3-maleic acid and with Br in AcOH 5-carbethoxy-2 : 4-dimethylpyrrole-3-maleic anhydride (III), m.p. 208° [corresponding acid loses H₂O at 175° to give (II); *Me* ester, m.p. 180°; *Me*₂ ester, m.p. 133°]. The *Me*₂ ester of (I) with Br yields the *Me*₂ ester, m.p. 140°, of 5-carbethoxy-4-methyl-2-bromomethylpyrrole-3-fumaric acid (IV), with SO₂Cl₂ the *Me*₂ ester, m.p. 138°, of 5-carbethoxy-4-methyl-2-chloromethylpyrrole-3-fumaric acid, with 2SO₂Cl₂ the *Me*₂ ester, m.p. 152°, of 5-carbethoxy-4-methyl-2-dichloromethylpyrrole-3-fumaric acid, and with 3SO₂Cl₂ a Cl₃-compound which with H₂O gives the *Me*₂ ester, m.p. 181° (*Me* ester, m.p. 143°), of 2-carboxy-5-carbethoxy-4-methylpyrrole-3-fumaric acid. (IV) with MeOH gives the *Me*₂ ester, m.p. 93°, of 5-carbethoxy-4-methyl-2-methoxymethylpyrrole-3-fumaric acid (V) and with NH₂Ph the *Me*₂ ester, m.p. 120°, of 5-carbethoxy-4-methyl-2-anilinomethylpyrrole-3-fumaric acid. Prolonged action (4 weeks) of CH₂N₂ on the *Me*₂ ester of (V) gives the *Me*₂ ester, m.p. 117—118° (decomp.), of 5-carbethoxy-4-methyl-2-methoxymethyl-3-dicarboxypyrazolinylypyrrole. Reduction of (V) with Na amalgam gives the *Me*₂ ester, m.p. 71°, of 5-carbethoxy-4-methyl-2-methoxymethylpyrrole-3-succinic acid (VI). The *Me*₂ ester of (IV) with H₂O at 100° for 1 hr. gives an oil and a cryst. substance, m.p. 132—135°. Alkaline hydrolysis of (I) gives 5-carboxy-2 : 4-dimethylpyrrole-3-fumaric acid, m.p. 188° (*Me*₂ ester, m.p. 127°). With NH₂Ph at 160—170° (I) gives 5-carbethoxy-2 : 4-dimethylpyrrole-3-maleic anil (VII), m.p. 211°, 5-carbethoxy-2 : 4-di-

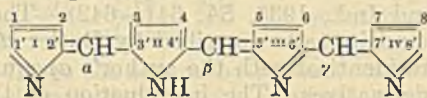
methylpyrrole-3-succinic acid (VIII) gives the corresponding *anil*, m.p. 187—188°, the Et₂ ester of 5-carbethoxy-2:4-dimethylpyrrole-3-methylmalonic acid gives the corresponding *anil*, m.p. 180°. Hydrolysis of (VII) gives 5-carboxy-2:4-dimethylpyrrole-3-maleic *anil*, which yields 5-carbomethoxy-2:4-dimethylpyrrole-3-maleic *anil*, m.p. 204°, with CH₂N₂. (VII) with 2Br gives 5-carbethoxy-2:4-dimethylpyrrole-3-N-phenylbromomaleic imide, m.p. 216°, and with 4Br 5-carbethoxy-4-methyl-2-bromomethylpyrrole-3-N-phenylbromomaleic imide, m.p. 221° (decomp.); this with MeOH gives 5-carbethoxy-4-methyl-2-methoxymethylpyrrole-3-N-phenylbromomaleic imide, m.p. 179°, and with aq. EtOH 5-carbethoxy-4-methyl-2-ethoxymethylpyrrole-3-N-phenylbromomaleic imide, m.p. 141°. The Me₂ ester of (VIII) with 1.05 mols. of Br gives the Me₂ ester, m.p. 123°, of 5-carbethoxy-4-methyl-2-bromomethylpyrrole-3-succinic acid (IX), which with MeOH gives the Me₂ ester of (VI). The Me₂ ester of (IX) with H₂O (1 hr.) loses CH₂O to give 5:5'-dicarbethoxy-4:4'-dimethyl-3:3'-tetramethyldisuccinyl-2:2'-pyrromethane (X), m.p. 170°. Hydrolysis of (X) with 8NaOH gives the Na₆ salt of 5:5'-dicarboxy-4:4'-dimethyl-3:3'-disuccinyl-2:2'-pyrromethane, which with HCO₂H and then HCl in MeOH gives the Me₈ ester, m.p. 317°, of 1:4:5:8-tetramethylporphyrin-2:3:6:7-tetrasuccinic acid (XI) (Fe salt, m.p. 228°). The Me₈ ester of (XI) with dil. HCl at 210° gives coproporphyrin II. After hydrolysis and oxidation with CrO₃ at >30° the Me₈ ester of (XI) gives carboxylated *haematic anhydride*, C₆H₆O₇, m.p. 173°; by oxidation at <0° carboxylated *haematic acid*, C₉H₉O₆N, m.p. 195° (decomp.), is obtained. The Me₂ ester of (VIII) with 2SO₂Cl₂ gives an α -dichloromethyl compound, which yields the Me₂ ester, m.p. 113° (*oxime*, m.p. 128°; *semicarbazone*, m.p. 179°), of 2-aldehydo-5-carbethoxy-4-methylpyrrole-3-succinic acid with MeOH and with 3.1 mols. of SO₂Cl₂. The Me₂ ester of (VIII) gives a Cl-compound which, with MeOH, yields the Me₂ ester, m.p. 114°, of 2-carbomethoxy-5-carbethoxy-4-methylpyrrole-3-succinic acid. (I) with CH₂N₂ gives the Me₂ ester, m.p. 126°, of 5-carbethoxy-2:4-dimethylpyrrole-3-pyrazolinedicarboxylic acid; on the Me or Et ester of (II) the corresponding *pyrazolines*, m.p. 211° and 172—175°; on 5-carbethoxy-2:4-dimethyl-3-(ω -cyano- ω -carbethoxyvinyl)pyrrole (XII) (with loss of N) the corresponding cyclopropane derivative, m.p. 116°; on 5-carbethoxy-2:4-dimethyl-3-(ω -dicyanovinyl)pyrrole (XIII) 5-carbethoxy-2:4-dimethyl-3-(2:2'-dicyanocyclopropyl)pyrrole (XIV), m.p. 161°; on 2:4-dimethyl-3-(ω -cyano- ω -carbethoxyvinyl)pyrrole-3-carboxylic acid a substance, C₁₅H₁₈O₄N₂, m.p. 139°; on 2:4-dimethyl-3-(ω -dicyanovinyl)pyrrole the corresponding cyclopropane derivative, m.p. 160°; and on 2-carbomethoxy-5-carbethoxy-4-methyl-3-(ω -dicyanovinyl)pyrrole with addition of 2CH₂ a substance (XV), m.p. 123°. CHN₂·CO₂Et with (XII) and (XIII) gives, with loss of N, the cyclopropane derivatives, m.p. 124° and 149°; with the Me ester of (II) a *pyrazoline* derivative, m.p. 143° (decomp.); and with mesitylene an acid, C₁₁H₁₄O₂, m.p. 140° (ICHN₂·CO₂Et added). 5-Carbethoxy-2:4-dimethyl-3-carbomethoxypyrazolinylpyrrole on alkaline hydrolysis and decarboxylation gives 2:4-

dimethyl-3-carboxypyrazolinylpyrrole, m.p. 165° (decomp.), which with CrO₃ gives *pyrazoline-3:4-dicarboxylic acid*, m.p. 233° (decomp.). Me 5-carbethoxy-2:4-dimethylpyrrole-3- $\alpha\beta$ -dibromoacrylate [from the Me ester of (II)] with CHNa(CO₂Et)₂ gives the Me ester, m.p. 159°, of 5-carbethoxy-2:4-dimethylpyrrole-3- β -bromoacrylic acid. (XIV) on alkaline hydrolysis loses HCN and gives a monocarboxylic acid, C₉H₁₁O₃N, m.p. 229° (decomp.) (Me ester, m.p. 145—148°), and with Br in MeOH it gives 2-carbomethoxy-5-carbethoxy-4-methyl-3-(2:2'-dicyanocyclopropyl)pyrrole, m.p. 128°. Hydrolysis of (XV) gives 3-propionyl-4-methylpyrrole-2:5-dicarboxylic acid, m.p. 203° (Me₂ ester, m.p. 48°). 2-Carbomethoxy-5-carbethoxy-3-(2-cyano-2'-carbethoxycyclopropyl)-4-methylpyrrole, m.p. 162°, is obtained from 5-carbethoxy-3-(2-cyano-2'-carbethoxycyclopropyl)-2:4-dimethylpyrrole by the action of Br and MeOH. 3-Acetyl-2:4-dimethylpyrrole-5-carboxylic acid [from 3-acetyl-5-carbethoxy-2:4-dimethylpyrrole (*oxime*, m.p. 195°)] with CH₂N₂ gives 3-acetyl-5-carbomethoxy-2:4-dimethylpyrrole, m.p. 159°. The *oxime* of 3-acetyl-2:4-dimethylpyrrole has m.p. 136°. W. McC.

Constitution of bile pigment. XIII. Constitution of bilirubin and its azo-dyes and the Gmelin reaction. H. FISCHER and H. W. HABERLAND (Z. physiol. Chem., 1935, 232, 236—258; cf. this vol., 632).—Catalytic hydrogenation (1 mol. of H₂) of bilirubin (I) gives 1':8'-dihydroxy-1:3:5:7-tetramethyl-8-ethyl-4:5-di-(β -carboxyethyl)-2-vinyldihydro-bilin (II), m.p. 315°. Total hydrogenation (3H₂) of (II) affords mesobilirubinogen, partial (H₂) yields mesobilirubin. With conc. HNO₃, (II) gives methyl-ethylmaleimide (<50% of theory). Fusion of (II) with resorcinol yields isoneoxanthobilirubic acid. Therefore in (I) the 8'-OH and the vinyl group in the pyrrole ring IV must have formed a dihydrofuran ring. The furan ring is opened by hydrogenation before the saturation of the vinyl group. With Br in CHCl₃, (I) gives tetrabromoglaucobilin hydrobromide (III), m.p. >300° [Me ester (IV), sinters 160—168°; Zn salt]. Reduction of (III) with HI and subsequent oxidation with PbO₂ affords methylethylmaleimide. Reduction of (III) with Na-Hg and oxidation with CrO₃ yields a substance, m.p. 160—165°. Hydrogenation (Pd) of (IV) gives glaucobilin Me₂ ester. (III) is therefore diketo-1:3:6:7-tetramethyl-2:8-dibromoethyl-4:5-di-(β -carboxyethyl)bilin hydrobromide. The stages of the Gmelin reaction of (IV) are described and the mechanism is discussed. Mesobilirubin is oxidised by benzoquinone or PbO₂ to the green stage which isomerises to glaucobilin (blue-green or blue), also by PbO₂ to a higher stage of oxidation (blue) isomeric with the violet compound.

When coupled with PhN₂Cl mesobilirubin IX α -Me₂ ester hydrochloride gives a mixture (V), m.p. 184—185°, mesobilirubin XIII α -ester hydrochloride yields 5-hydroxy-5'-azobenzene-4:3'-dimethyl-3-ethyl-4'- β -carbomethoxyethylpyrromethene hydrochloride (VI), m.p. 196—197°. Mesobilirubin III α -ester hydrochloride gives 5-hydroxy-5'-azobenzene-3:3'-dimethyl-4-ethyl-4'- β -carbomethoxyethylpyrromethene hydrochloride (VII), m.p. 213°. (V) consists of (VI) and (VII). Copro-bilirubin Me₂ ester dihydrochloride affords 5-hydroxy-

5'-azobenzene-4:3'-dimethyl-3:4'-di-(β -carbomethoxyethyl)pyrromethene hydrochloride (VIII), m.p. 176°. "Analytical" Me neoxanthobilirubate gives (V). Me neo- and isoneo-xanthobilirubate give, respectively, (VI) and (VII). 5-Hydroxy-4:3'-dimethyl-3:4'-di-(β -carbomethoxyethyl)pyrromethene yields (VIII). The numbering of the C atoms of bilin is:



J. H. B.

Blood-pigment. XVII. Human hæmoglobins. XVIII. Globin and its hæmin-linking groups. XIX. Methæmoglobin and its compounds with hydrogen peroxide, cyanides, fluorides, and sulphides.—See this vol., 878.

Magnetic behaviour of heavy metal compounds of the phthalocyanines.—See this vol., 924.

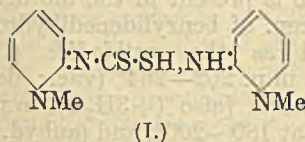
Synthesis of Δ^2 -oxazolines and Δ^2 -thiazolines from N-acyl- β -aminoethyl alcohols. H. WENKER (J. Amer. Chem. Soc., 1935, 57, 1079—1080).— $\text{NH}_2\cdot\text{CH}_2\cdot\text{CH}_2\cdot\text{OH}$ (I) and the appropriate acid at 160—200° give the N-formyl (II), b.p. 191—193°/10 mm., -Ac, b.p. 195—196°/10 mm., -propionyl, b.p. 201—203°/10 mm., and -Bz, b.p. 230—231°/10 mm., derivatives. At 260—280° these afford 2-methyl-picrate, m.p. 163° (lit. 159—160°), -phenyl-, b.p. 246—248°, and -ethyl- Δ^2 -oxazoline, b.p. 124—125° (picrate, m.p. 154°), in 30, 22, and 35% yield, respectively. (II), however, gives CO and (I). With P_2S_5 Δ^2 -thiazoline and its 2-Me, -Et [picrate, m.p. 138° (lit. 135°)], and -Ph derivatives are formed.

R. S. C.

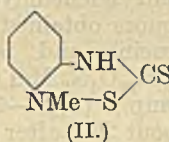
Chromate oxidation of o-toluenesulphonamide. I. G. ZILBERG (Khim. Farm. Prom., 1934, No. 4, 22—24).—The production of saccharin by this method is described; $\text{K}_2\text{Cr}_2\text{O}_7$ is superior to $\text{Na}_2\text{Cr}_2\text{O}_7$ for the purpose.

CH. ABS. (r)

Action of carbon disulphide on methylpyridone-imide. K. S. TORTSCHIREV (Gazzetta, 1935, 65, 317—321).— CS_2 (1 mol.) reacts in EtOH with methylpyridoneimide (A., 1921, i, 450) (2 mols.) to form the salt (I), m.p. 160°, of the latter with its dithiocarbamic



(I.)



(II.)

acid. With CS_2 in excess, the product is N-methylpyridodithiodiazolone (II), m.p. 135°, b.p. 173°/3 mm., a substance of the "Hector's base" type. E. W. W.

Alkaloids of *Heliotropium lasiocarpum*. III. Hydroxyheliotridane. G. MENSCHIKOV (Ber., 1935, 68, [B], 1051—1054; cf. A., 1933, 727).—Catalytic hydrogenation (Adams) of heliotrine (I) leads to the absorption of 4 H with production of hydroxyheliotridane (II), $\text{C}_8\text{H}_{15}\text{ON}$, b.p. 126—128°/12 mm., m.p. 60—65°, $[\alpha]_D^{20} -14.5^\circ$ in H_2O [methiodide, m.p. 296°; picrate, m.p. 196° (decomp.) when rapidly heated], and heliotric acid. Reduction therefore occurs exclusively in the basic portion of (I) and is accompanied by reduc-

tion of the esterified OH, since similar treatment of heliotridine dibenzoate hydrochloride affords BzOH and non-cryst. hydroxyheliotridane benzoate. (II) is probably a *tert*.-alcohol, since it cannot be oxidised to a ketone or acid. It is transformed by conc. H_2SO_4 at 170—175° into the base (III), $\text{C}_8\text{H}_{13}\text{N}$, b.p. 165—166°, $[\alpha]_D -160^\circ$ [picrate, m.p. 222° (decomp.)], probably identical in structure with the product of the action of NaOEt on chloroheliotridane (which is therefore greatly racemised). Catalytic reduction of (III) gives a base, $\text{C}_8\text{H}_{15}\text{N}$, b.p. 167—168.5°, $[\alpha]_D -99.5^\circ$ (picrate, decomp. 236°), which is almost certainly heliotridane in an optically purer form than that described previously.

H. W.

[Simplification of Pictet's synthesis of nicotine.] E. SPATH and F. KUFFNER (Ber., 1935, 68, [B], 1125—1127; cf. this vol., 635).—An acknowledgment of the priority of Wibaut (this vol., 872).

H. W.

Amidation of alkaloids with sodium and potassium amides. Structures of chloroanabasine isomerides. M. I. KABATSCNIK and M. M. KATZNELSON (Compt. rend. Acad. Sci. U.R.S.S., 1935, 2, 35—41; cf. A., 1934, 538).—The α -series of compounds of Menschikov *et al.* (A., 1934, 1014) is an α' -series. The authors re-state their previous conclusions.

J. L. D.

Vasicine. K. S. NARANG and J. N. RAY (Current Sci., 1935, 3, 552).—The picronolate of the reduction product of the compound B (this vol., 765) is identical with that of reduced vasicine. The structure of vasicine is probably that given by Morris *et al.* (*ibid.*, 873).

E. W. W.

Ergotocine. M. S. KHARASCH and R. R. LEGAULT (J. Amer. Chem. Soc., 1935, 57, 1140—1141; cf. this vol., 827).—Ergotocine, $\text{C}_{21}\text{H}_{27}\text{O}_3\text{N}_3$ (? H_{27} or H_{29}), m.p. 158—160° (decomp. from 155°), obtained by extraction of a solution of ergot at p_H 6.7—7.0 with CHCl_3 (not Et_2O , C_2HCl_3 , or C_6H_6), forms onium salts (oxalate, maleate, malonate, tartrate, and malate) with acids and also alkali salts, contains 3 active H, is hydrolysed by alkali to (?) lysergic acid and a basic fragment, and closely resembles its maleate, ergotoxine, and ergotamine in absorption spectrum. Ergine has no oxytocic activity in doses up to 4 mg. given orally to human mothers.

R. S. C.

Ergobasine, a water-soluble alkaloid from the ergot of Seigle. A. STOLL and E. BURCKHARDT (Compt. rend., 1935, 200, 1680—1682).— CHCl_3 extracts ergobasine, $\text{C}_{19}\text{H}_{23}\text{O}_2\text{N}_3$ (I), decomp. at 162°, $[\alpha]_D^{20} +90^\circ$, from the H_2O -sol. portion of the alkaloids of ergot. (I) fluoresces in aq. solution, and is sensitive to light and O_2 . It gives the general reactions of alkaloids, and affords cryst. salts.

J. L. D.

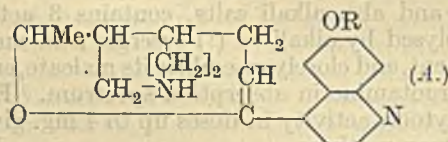
Preparation of ergometrine.—See this vol., 894.

Synthetic alkaloids from narcotine. E. V. SESHACHARYULU and S. DUTT (Proc. Acad. Sci. Agra and Oudh, 1934—1935, 4, 159—168).—Condensation of cotarnine (from HNO_3 and narcotine) with substances containing reactive $\cdot\text{CH}_2$ in presence of Ac_2O yielded the anhydro-N-acetylcotarnine derivatives of hippuric acid, m.p. 235°, camphor, m.p. 188°, phenyl-

acetic acid, m.p. 193°, phenylacetonitrile, m.p. 196°, Et cyanoacetate, m.p. 95°, Et malonate, m.p. 195°, Et oxaloacetate, m.p. 185°, Et acetoacetate, m.p. 192°, Et acetonedicarboxylate, m.p. 173°, Et succinosuccinate, m.p. 189°, thiohydantoin acetate, m.p. 227°, malonyl-carbamide acetate, m.p. 185°, deoxybenzoin, m.p. 169°, fluorene, m.p. 201°, acetylacetone, m.p. 193°, benzoyl-acetone, m.p. 199°, dimethyldihydroresorcinol, m.p. 187°, phthalide, m.p. 196°, acetophenone, m.p. 183°, 2:4-dinitrotoluene, m.p. 155°, benzylideneacetone, m.p. 203°, mesityl oxide, m.p. 194°, cinnamylideneacetone, m.p. 190°, piperonylideneacetone, m.p. 178°, furfurylideneacetone, m.p. 197°. Reactions of these substances with alkaloid reagents are described. F. O. H.

New alkaloid from the bark of *Holarrhena antidysenterica*. D. H. PEACOCK and J. C. CHOWDHURY (J.C.S., 1935, 734—735).—Lettocine, $C_{17}H_{25}O_2N$, m.p. 350—352° (methiodide, m.p. 235°), is isolated as the hydriodide, m.p. 256° (decomp.). The amount present is <0.1%; it appears to be a *tert*-base without OH. F. R. S.

Demethylation of quinidine. (MILE.) R. LUDWICZAK and J. SUSZKO (Bull. Acad. Polonaise, 1935, A, 65—78, and Roczn. Chem., 1935, 15, 209—220; cf. A., 1933, 1312; 1934, 787).—Demethylation (60% H_2SO_4) of both quinidine and isoquinidine (I) yields cupreidine (II) and an isomeric phenolic base isocupreidine (III), m.p. 242—243°, $[\alpha]_D^{20}$ -7.0° in 96% EtOH [hydrochloride (+ H_2O), m.p. 236—237° (decomp.), $[\alpha]_D^{20}$ -35.0° in H_2O]; picrate, m.p. 204—205° (decomp.); methiodide (IV), m.p. 299—300° (decomp.), $[\alpha]_D^{20}$ -24.0° in H_2O ; dimethiodide, m.p. 212—213° (decomp.); Bz, m.p. 213—214° (decomp.) (+2HCl, EtOH, m.p. 201—207°), and *p*-toluenesulphonyl (+2HNO₃·0.5H₂O) derivative, m.p. 146—147° (decomp.); amine oxide (+ H_2O), m.p. 273—274°, which regenerates (I) on methylation with Me₂SO₄ or CH₂N₂ and is converted into (II) by 60% H_2SO_4 . (III) heated with 25% AcOH (100°; 20 hr.) yields isocupreicine (V), (A; R=H) [+0.5COMe₂,



m.p. 133° (decomp.), $[\alpha]_D^{20}$ +22.5° in 96% EtOH], also obtained by demethylation (15% HBr) of isoquinicine (A; R=Me) (cf. A., 1930, 97), formed together with *N*-methylisoquinicine by methylation with CH₂N₂ of (V). (IV) heated with NaOH (5 hr.) yields *N*-methylisocupreicine, previously named *apo-N*-methylisoquinicine (*loc. cit.*). F. R. G.

Cinchona alkaloids in pneumonia. III. *apo*-Cupreines (*apo*quinine). C. L. BUTLER and L. H. CRETCHER (J. Amer. Chem. Soc., 1935, 57, 1083—1085; cf. this vol., 766).—“*apo*Quinine,” prepared from quinine by 25% HCl at 142—143° or by boiling 60% H_2SO_4 , is usually a mixture of α -(I), m.p. 180—190° (decomp.), $[\alpha]$ -215° (hydrochloride, $[\alpha]$ -163° ; dihydrochloride, $[\alpha]$ -223°); *H* sulphate, $[\alpha]_D$ -224°), and β -apocupreine, m.p. 180—190° (decomp.), $[\alpha]$ -194° (hydrochloride, $[\alpha]$ -145° ; dihydrochloride, $[\alpha]$

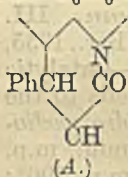
-206° ; *H* sulphate, $[\alpha]$ -208°), probably geometrical isomerides containing CHMe. Occasionally only one compound is obtained. (I) has pneumococidal effect *in vitro* at 1:300,000; both are very slightly toxic to mice and have high protective power. R. S. C.

***apo*Quinine.** T. A. HENRY and W. SOLOMON (Chem. and Ind., 1935, 54, 641—642).—The α -*apo*-cupreine and its salts described by Butler *et al.* (see above) are identical with the author's *apo*quinine (I) and its derivatives. The introduction of the term *apocupreine* is deprecated. Butler's β -*apocupreine* is a mixture of (I) and a new alkaloid of low $[\alpha]$. H. W.

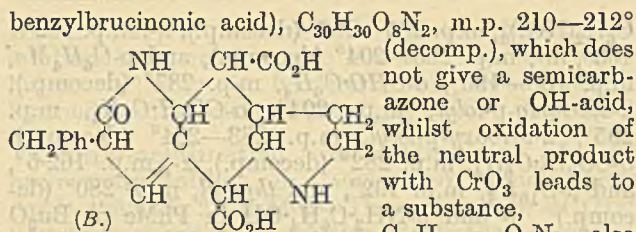
Synthesis of physostigmine (eserine). XI. Later phases of the synthetical investigations. F. E. KING and R. ROBINSON (J.C.S., 1935, 755—759).—Comparison and mixed m.p. of specimens of *dl*-noreserethole picrate and of *dl*-eserethole-*b* and its picrate, prepared by Hoshino and Kobayashi (cf. A., 1934, 667), show identity and the analytical figures for (I) as $C_{15}H_{22}ON_2$ are confirmed. De-ethylation of *l*-eserethole methiodide with HI, followed by addition of picric acid, gives *l*-eseroline methopicate, m.p. 193—195° (decomp.), in small yield. Eserethole methochloride is thermally decomposed to physostigmol Et ether, whilst the methofluoride is partly unchanged and partly converted into an unknown base (picrate, m.p. 197—198°; methopicate, m.p. 163—166°). F. R. S.

Constitution of corynanthine. C. R. SCHOLZ (Compt. rend., 1935, 200, 1624—1625).—The “ ψ -corynanthine,” obtained by treating corynanthine (I) with NaOH and re-esterifying (this vol., 365), is identical with the product from yohimbine (II) similarly treated [*i.e.*, is a Me yohimboate]. (I) and (II) are thus stereoisomeric; this is confirmed by preparing *apoyohimbine* (J.C.S., 1923, 123, 1038) from both. E. W. W.

***Strychnos* alkaloids.** LXXXVI. *iso*Benzylidenedihydrobrucine and the oxidation of 11-benzyl- and 11-nitroso-brucine. H. LEUCHS and H. BEYER (Ber., 1935, 68, [B], 1204—1210).—*iso*-Benzylidenedihydrobrucine is present in the mother-liquors obtained in the prep. of benzylidenedihydrobrucine and is isolated as the methiodide (I), $C_{30}H_{32}O_4N_2$ ·MeI·0.5CHCl₃, m.p. 262—264° (vac.; decomp.), $[\alpha]_D^{20}$ -310° in AcOH [also (+3H₂O), m.p. about 260° after softening at 180—200°, and (anhyd.), m.p. 190—195° (vac.), $[\alpha]_D^{20}$ -319.6° in AcOH, $[\alpha]_D^{15}$ $-565^\circ/d$ in CHCl₃]. In this and in the corresponding instance in the strychnine series the *p* position of the C₆H₆ nucleus of the alkaloid cannot therefore be



involved in the condensation. The production of a new ring (cf. A) is suggested. The condensation is induced by the reagents which cause the strychnine-isostrychnine isomerisation. (I) cannot be catalytically hydrogenated; it gives an Ac derivative, $C_{32}H_{34}O_5N_2$ ·MeI·0.5H₂O, m.p. 221—223° (vac.), $[\alpha]_D^{20}$ -288.5° in AcOH, which also resists oxidation. Treatment of benzylbrucine with KMnO₄ in COMe₂ gives an amorphous acid (I



11-Oximinobrucine when oxidised by CrO_3 in 3-6*N*- H_2SO_4 at 80—85° gives the NH_2 -acid, $C_{16}H_{20}O_6N_2$, m.p. > 360°, $[\alpha]_D^{20} +54.3^\circ$ (diperchlorate), hydrogenated to the acid, $C_{16}H_{22}O_6N_2$. H. W.

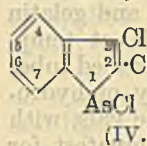
Use of liquid hydrogen chloride in preparation of dichloro-arsines. F. GOVAERT (Compt. rend., 1935, 200, 1603—1605).—Treatment of $NH(C_6H_5)_2AsR$ with HCl (cf. A., 1931, 1435) is difficult when $R=Bu^v$, since (I) decomposes at its m.p. Reaction in $C_{10}H_{12}$, Et_2O , or SO_2 was unsatisfactory, but in HCl at -85° to -90° was immediate. After evaporating off the HCl and dissolving in CCl_4 , 80% of $NHPh_2$, HCl and tert.-butyldichloroarsine, b.p. 61°/16 mm., with 20% of 10-chloro-5:10-dihydrophenarsazine, were obtained. E. W. W.

Reaction of phenylarsine with organic compounds of tin and lead. A. N. NESMEJANOV and R. C. FREIDLIN (J. Gen. Chem. Russ., 1935, 5, 53—59).— AsH_2Ph reacts with $HgPhCl$, $HgPh_2$, $PbPh_4$, $PbPh_2Cl_2$, and $PbPh_2I_2$ to yield $(AsPh)_2$, Hg or Pb , HCl , $PbCl_2$ or PbI_2 , and C_6H_6 . It does not react with $PbEt_4$, $SnEt_4$, $SnPh_2Et_2$, and $SnEt_2Cl_2$ at low temp.; at higher temp. the reaction $3AsH_2Ph \rightarrow AsPh_3 + 2As + H_2$ takes place, and the ppt. is a mixture of Pb or Sn with As . R. T.

Constitution of sulpharsphenamine. II. New interpretation. W. J. C. DYKE and H. KING (J.C.S., 1935, 805—813).—4-Nitro-2-aminophenol with Na formaldehyde H sulphite gives Na 5-nitro-2-hydroxyanilino-*N*-methylenesulphite (+2.5 or +1.5 H_2O), whilst in HCl with CH_2O and $NaHSO_3$, followed by $NaOH$, it forms Na_3 5-nitro-2-hydroxyanilino-*NN*-dimethylenesulphite (+2 H_2O , 1.5 $MeOH$), converted into the Na_2 salt (+3.5 H_2O). Similarly prepared are Na 4-nitro-2-hydroxyanilino-*N*- (+3 H_2O), Na_2 4-nitro-2-hydroxyanilino-*NN*- (+2.5 H_2O), Na_2 2-hydroxy-5-carbomethoxyanilino-*NN*-di- (+2 H_2O), Na 3-nitroanilino-*N*- (+2 H_2O), and Na_2 3-nitroanilino-*NN*-di-methylenesulphite (+1 $MeOH$). Examination by the Elveve oxidative method of S analysis has shown that part of the S is oxidised to sulphate and part remains as dithionate. Sulpharsphenamine is a Na salt of 3:3'-diamino-4:4'-dihydroxyarsenobenzene-*NNN'*-trimethylenesulphurous acid. When NH_2Ph , *o*-anisidine, *o*- and *p*- $NH_2 \cdot C_6H_4 \cdot OH$, 4-amino-2-hydroxyphenylarsinic acid, and arsphenamine are treated with CH_2O and $NaHSO_3$, the solutions show a deficiency of S by the Elveve method (cf. Newbery and Phillips, A., 1928, 311). F. R. S.

New arsindole ring closure. C. MANNICH (Arch. Pharm., 1935, 273, 275—284).—When heated with

$AsCl_3$ at 150—170° $CPh:C \cdot CH_2 \cdot NEt_2$ affords the hydrochloride, m.p. 118—119°, of γ -chloro- γ -phenyl- Δ^8 -propenyldiethylamine, b.p. 155°/14 mm. (methiodide, m.p. 140—141°) {reduced to $CH_2Ph \cdot [CH_2]_2 \cdot NEt_2$ (I), hydrolysed to $CH_2Bz \cdot CH_2 \cdot NEt_2$ (II), and giving $BzCl$ by ozonolysis}, and the hydrochloride (III), m.p. 199°, of 1:3-dichloro-2-diethylaminomethylarsindole (IV) (corresponding 1-bromohydrobromide, decomp. 205°, 1-iodohydriodide, decomp. 194—195°, and 1-hydroxyhydrochloride, m.p. 135°),



converted by aq. KCN into 3-chloro-1-cyano-2-diethylaminomethylarsindole, m.p. 65—66° (hydrochloride, m.p. 135°). (III) fused with $NaOH-KOH$ at 250° gives $BzOH$, $AcOH$, and phenolic products, and oxidation with 60% HNO_3 gives *o*-arsinobenzoic acid, not melting at 330°, converted by HI into *o*- $AsI_2 \cdot C_6H_4 \cdot CO_2H$. With 38% HCl at 150° (III) gives $COPhMe$ and (II), and is reduced by $HI-P$ to (I). Oxidation of (IV) with 30% H_2O_2 - $AcOH$ affords *o*-arsinophenylacetic acid, decomp. 184—185° (Me_1 ester, decomp. 176—177°) [reduced by $HI-P$ to *o*-carboxymethylphenyldi-iodoarsine, m.p. 155—170° (decomp.)], and (from the mother-liquor) β -*o*-arsinophenylpropionic acid, decomp. 165—170°. J. W. B.

Arsenicals containing the furan nucleus. W. G. LOWE and C. S. HAMILTON (J. Amer. Chem. Soc., 1935, 57, 1081—1083).—2-Chloromercurifuran (I) and $AsCl_3$, best in hot C_6H_6 , give furyldichloroarsine (II), lachrymatory and vesicant, unstable at room temp., rapidly resinified by heat at 10 mm. or by hot $AsCl_3$, and giving furan with hot H_2O , difuryldichloroarsine (III), similar to (II) in properties, and trifuryldiarsine (IV), m.p. 35°, which is somewhat more stable. (II) and cold $H_2S-EtOH$ give furylarsine sulphide, m.p. 125° (decomp.), sol. in warm *N*- $NaOH$ and giving furan when boiled therein. (III) gives tetrafulyldiarsine sulphide, an oil. (IV) with $HgCl_2$ in aq. $EtOH$ regenerates (I) and with I gives 2-iodofuran. 2:5-Dichloromercurifuran and $AsCl_3$ at room temp. give a solution, which with $I-CCl_4$ gives 2:5-di-iodofuran, but with H_2O affords aliphatic compounds with 1 As . R. S. C.

Organic mercurials. M. C. HART and H. P. ANDERSEN (J. Amer. Chem. Soc., 1935, 57, 1059—1061).—The following are prepared. Hg^{II} mandelate, m.p. 183—184°; 4-acetoxy-, m.p. 187—188°, and -nitratomercuri-2-nitroanisole, m.p. 219—220°; acetoxymmercuri-*m*-cresol, m.p. 177°; 3:5-diacetoxymmercuri-4-hydroxybenzoic acid; diacetoxymmercuri-*p*-chlorophenol, -*amyl-m*-cresol, m.p. 190°, and -2-chloro-5-hydroxytoluene; phenylmercuric acetate, m.p. 149°, lactate, m.p. 155—157°, and basic nitrate (Hg 63.2%), m.p. 179—183°; *p*-tolylmercuric nitrate, m.p. 179—180°, acetate, m.p. 138—140°, and lactate. Bacteriostatic data for these and 6 similar Hg compounds are recorded. In general simple compounds are more effective than complex ones. The most effective is *o*-hydroxyphenylmercuric chloride, m.p. 150—151° (1:75,000 in 5 min. to *S. aureus*), which is also bactericidal at 1:1000. R. S. C.

Halide-mercuri-nitrocresols.—See B., 1935, 655.

Synthesis of dipeptides.—See this vol., 1014.

cycloPeptides arising from blood-albumin.—See this vol., 999.

Alcoholic hydrolysis of caseinogen and gelatin. A. A. CHRISTOMANOS (Biochem. Z., 1935, 277, 394—400).—The degradation of caseinogen (I) and gelatin (II) by MeOH, EtOH, and *iso*-C₂H₅·OH at temp. between the b.p. of the alcohol and 220° in sealed tubes is investigated. The degree and velocity of hydrolysis above 180° approximate to the same vals. with all the alcohols, but at lower temp. are greatest for MeOH. Part of the total N resulting is volatile [24% with (I) and only 2.2% with (II)]. From the hydrolysis products of (I) were obtained leucine anhydride and leucine-valine anhydride, and the presence of a tyrosine-tryptophan compound was indicated, whilst from (II) glycylalanine anhydride was obtained. P. W. C.

X-Ray study of hydration and denaturation of proteins.—See this vol., 922.

Mol. wt. of proteins. (MME.) A. ROCHE (Bull. Soc. Chim. biol., 1935, 17, 704—744).—A lecture.

Identification of organic compounds by the mixed m.p. G. LOCK and G. NOTES (Ber., 1935, 68, [B], 1200—1204).—The mixed m.-p. method for the identification of similarly constituted compounds, particularly of polyhalogenated derivatives with closely similar m.p., is valid only when distinct depression is observed, notably when the relative proportions of the components are greatly varied. It is not sufficient to use any accidental mixture; the substances in extreme ratios must also be employed. Functional derivatives of such compounds frequently have very similar m.p. and show analogous behaviour. The following compounds are incidentally described: 2:6-dichloro-4-bromo-3-ethoxybenzaldehyde, m.p. 66.5°, from the OH-aldehyde, NaHCO₃, and Et₂SO₄, its *anil*, m.p. 59°, *oxime*, m.p. 128.5°, *phenylhydrazone*, m.p. 122°, and 2:6-dichloro-4-bromo-3-ethoxybenzoic acid, m.p. 148° (corr.); 2-chloro-4:6-dibromo-3-ethoxybenzaldehyde, m.p. 81.5°, its *anil*, m.p. 63.5°, *oxime*, m.p. 152°, *phenylhydrazone*, m.p. 113.5°, and 2-chloro-4:6-dibromo-3-ethoxybenzoic acid, m.p. 167° (corr.). H. W.

Identification of linoleic and linolenic acids. T. G. GREEN and T. P. HILDITCH (Biochem. J., 1935, 29, 1552—1563).—The best method for characterising linoleic (I) and linolenic acid (II) is oxidation with alkaline KMnO₄ to the tetra- or hexa-hydroxystearic acid, but the yields are only 40% and 15—18%, respectively, from (I) and (II). (I) of seed fats is very probably confined to one geometrical form. The isomeric tetrahydroxystearic acids obtained from (I) with alkaline KMnO₄ and with AcO₂H bear no simple relationship to each other. J. N. A.

Azides. IV. *p*-Chlorobenzazide as a reagent for the identification of phenols. C. H. KAO, H. Y. FANG, and P. P. T. SAH (Sci. Rep. Nat. Tsing Hua Univ., 1935, 3, 109—112).—*p*-C₆H₄Cl·CO·N₃ and the appropriate phenol in hot PhMe give the following *N*-*p*-chlorophenylurethanes: *Ph*, m.p. 150—152°, *o*-NO₂·C₆H₄, m.p. 280—281° (decomp.), 2:4:6-

C₆H₂(NO₂)₃, m.p. 285—286° (decomp.), *o*-, m.p. 162—163°, *m*-, m.p. 203—204° (decomp.), and *p*-C₆H₄Me, m.p. 188—190°, *o*-CHO·C₆H₄, m.p. 287° (decomp.), 2-aldehydo-*p*-tolyl, m.p. 294°, *o*-CO₂H·C₆H₄, m.p. 295°, 2-carboxy-*p*-tolyl, m.p. 283—284° (decomp.), *o*-CO₂Et·C₆H₄, m.p. 282° (decomp.), α -, m.p. 162.5°, and β -C₁₀H₇, m.p. 192°, and *thymyl*, m.p. 280° (decomp.). *o*- and *p*-NH₂·C₆H₄·OH in PhMe or Bu₂O give the *carbamides* (or, less probably, urethanes), m.p. 200° and 248—250° (decomp.). These derivatives may be used for identification of the phenols.

R. S. C.

Pyrocatechol as reagent for identification of titanium.—See this vol., 951.

Acidimetric titration of *p*-hydroxybenzoic acid alone and in presence of acetic acid. I. M. KOLTHOFF (J. Amer. Chem. Soc., 1935, 57, 973—974).—*p*-OH·C₆H₄·CO₂H (I) can be determined as a monobasic acid by titrating to *p*_H 6.8 with standard NaOH, using bromothymol-blue. The results are about 0.3% high. The sum of AcOH and (I) can be determined by titrating to *p*_H 6.95 with NaOH. Phenolphthalein is unsuitable as an indicator for (I).

E. S. H.

Extraction method for the determination of acids and its application to *p*-hydroxybenzoic acid.—See this vol., 947.

Micro-copper-pyridine reaction on organic acids. A. J. STEENHAUER (Pharm. Weekblad, 1935, 72, 667—669).—Characteristic, cryst. compounds are obtained when anisic, anthranilic, benzoic, fumaric, cinnamic, salicylic (I), and acetylsalicylic (II) acids are treated with aq. CuSO₄·C₅H₅N. The test is recommended for distinguishing (I) from (II).

S. C.

2:4-Dinitrophenylhydrazine as a quantitative reagent for carbonyl compounds. II. *Benzo-phenone* and *acetone*. G. W. PERKINS and M. W. EDWARDS (Amer. J. Pharm., 1935, 107, 208—211; cf. A., 1934, 425).—COPh₂ and COMe₂ are determined with an error of < 3%. Iddles and Jackson's determinations of PhCHO (cf. this vol., 101) are criticised.

J. L. D.

Highly sensitive reaction of indole and pyrrole. P. SACCARDI (Annali Chim. Appl., 1935, 25, 157—159).—The reaction of Au with pyrrole in HCl solution (cf. A., 1935, 355) detects 7.05 × 10⁻⁶ g. of Au in 10 c.c. By H₂S 8.1 × 10⁻⁴ g. of Au in 10 c.c. is detectable. The min. amount of pyrrole detectable is 6.87 × 10⁻⁵ g. in 10 c.c. Indole behaves similarly, 1.37 × 10⁻⁴ g. of Au or 4.9 × 10⁻⁵ g. of indole being detectable.

T. H. P.

Photometric determination of small amounts of pyrrole. F. FROMM (Mikrochem., 1935, 17, 141—154).—The solution, containing 0.1—90 mg. of pyrrole (I), is made alkaline, and (I) is extracted with Et₂O. The Et₂O is removed by dropping the solution into glacial AcOH at 40—50°, the solution being then diluted to 100 c.c. and heated at 100° for 10 min. with HCl+0.05% isatin, forming pyrrole-blue (II), which is determined photometrically with filtered light. 90—97% of (I) present is converted into (II). (I) in turbid or tarry solutions may be separated as the HgCl₂ compound (III) by addition of saturated aq.

HgCl₂. (III) is dissolved in 5% aq. NaCN, the solution being made up to 100 c.c. and treated as before. (I) may also be determined photometrically by condensation with *p*-NMe₂·C₆H₄·CHO. J. S. A.

Bromo-acidimetric determination of 8-hydroxyquinoline. A. CASTIGLIONI (Annali Chim. Appl., 1935, 25, 236—240).—The action of Br-H₂O on 8-hydroxyquinoline (I) solution yields the compound C₉H₄NBr₂·OBr, which readily loses, as HBr, the Br replacing the hydroxylic H. Thus, 1 mol. of I yields, in all, 3 HBr, and may thus be determined by titration of the resulting acidity with NaOH. T. H. P.

Colour reactions for pyrimidone. N. SCHOORL (Pharm. Weekblad, 1935, 72, 669—670).—0.1N-I solution is a more sensitive and more satisfactory reagent than K₂S₂O₈ in the colour test for pyrimidone (cf. this vol., 877). S. C.

Mercurimetric method for the determination of hydrastinine, hyoscyamine, scopolamine, eserine, and apiol. Reaction for identifying apiol. A. IONESCO-MATIU and C. POPESCO (Bull. Soc. Chim. biol., 1935, 17, 671—677).—The authors' method (A., 1934, 269) of determining substances pptd. by Hg^{II} is applied to the determination of hydrastinine, hyoscyamine, scopolamine, eserine, and apiol. Apiol may be identified by the red coloration produced on warming after addition of phosphomolybdic acid and H₂SO₄. A. L.

Reaction of Weydel and its application to the colorimetric micro-determination of caffeine. G. DENIGÈS (Bull. Soc. Chim. biol., 1935, 17, 657—666).—The reaction of Weydel for the colorimetric determination of purine derivatives is modified by the substitution of aq. Br as oxidising agent and aq. Hg(OAc)₂ or Zn(OAc)₂ for the NH₃. A. L.

Biochemistry.

Blood. C. C. STURGIS, R. ISAACS, S. M. GOLDHAMER, F. H. BETHELL, and G. E. FARRAR (Arch. Int. Med., 1935, 55, 1001—1081).—A review of recent literature on diseases affecting the condition of the blood. A. L.

Permeability of the erythrocyte to glycerol. A. K. PARPART and J. C. SHULL (J. Cell. Comp. Physiol., 1935, 6, 129—135).—Data for ox erythrocytes are given. A. G. P.

Solvent-water in the normal mammalian erythrocyte. A. K. PARPART and J. C. SHULL (J. Cell. Comp. Physiol., 1935, 6, 137—150).—Approx. 50 vol.-% of the cell-H₂O can act as solvent for glycerol or (CH₃·OH)₂. Urea probably dissolves in or reacts with other than aq. constituents of the cell. A. G. P.

Variation of the protein content of the red corpuscles after intake of food. G. PETRÁNYI and A. BLAZSÓ (Z. ges. exp. Med., 1934, 94, 689—695; Chem. Zentr., 1935, i, 741—742).—The increase of protein in the red corpuscles after ingestion of food does not originate from hæmoglobin. The corpuscles apparently play a part in protein transport. R. N. C.

Absorption of light by carbon monoxide-hæmochromogens. S. SCHÖNBERGER (Biochem. Z., 1935, 278, 428—436).—The max. on the curves for neutral and alkaline (Na₂CO₃) CO-hæmoglobin are at the same points, but the curve for the alkaline form is 4% higher than that for the neutral. The curves for CO-hæmochromogens (globin, albumin, NH₃) are identical (in the visible part of the spectrum) with that of neutral CO-hæmoglobin, but the curve for CO-hæm is not. W. McC.

Determination of bilirubin in blood by the diazo-method. E. G. GODFRIED (Biochem. J., 1935, 29, 1337—1339).—The modification by McNee and Keefer (Brit. Med. J., 1925, ii, 52) of Thannhauser and Andersen's method (A., 1922, ii, 671) is satisfactory for clinical purposes. F. O. H.

Method for making indefinite or invisible bloody finger-prints visible. M. WAGENAAR (Pharm. Weekblad, 1935, 72, 463—470).—The part is painted with a solution of benzidine (0.1 g.) and 3% H₂O₂ (3 c.c.) in EtOH (40 c.c.), when a permanent brown stain is obtained. S. C.

New hæmoglobinometer, the "Orthohæmometer." K. BÜRGER (Münch. med. Woch., 1934, 81, 1815—1816; Chem. Zentr., 1935, i, 603).—Dil. blood is treated with a little Na₂S₂O₄ and compared colorimetrically with a standard. The hæmoglobin content per erythrocyte averages 32.4 × 10⁻¹² g. in men and 30.2 × 10⁻¹² g. in women. A. G. P.

Properties of reptilian blood. II. The gila monster (*Heloderma suspectum*, Cope). H. T. EDWARDS and D. B. DILL. **III. The chuckwalla (*Sauromalus obesus*, Baird).** D. B. DILL, H. T. EDWARDS, A. V. BOCK, and J. H. TALBOTT (J. Cell. Comp. Physiol., 1935, 6, 21—35, 37—42).—II. Compared with human blood that of *H. suspectum* has a low hæmoglobin (I) content and the (I) has a relatively low buffer val. The O₂ dissociation curve at 20° resembles that of man at 37.5°. The effects of temp. and reaction on the combination of O₂ and CO₂ with blood are examined.

III. The blood of *S. obesus* resembles that of *H. suspectum* except in its response to temp. changes. A. G. P.

Adult blood after eleven years on egg and milk diet. J. HAMEL, M. CHAVAROT, and P. AUBRY (Compt. rend. Soc. Biol., 1935, 119, 864—866).—After feeding with egg and milk through the nose for 11 years the blood was normal. H. G. R.

Formation of cyclopeptides arising from blood-albumin by hydrolysis in the autoclave. V. S. SADIKOV, E. V. LINDQUIST-RISAKOVA, R. G. KRISTALLINSKAJA, V. N. MENSCHIKOVA, L. N. RUBEL, E. G. CHALEZKAJA, and A. G. PESSINA (Biochem. Z., 1935, 278, 60—70).—Hydrolysis of this protein by different methods (e.g., with 25% HCl for 36—72 hr., with 3% H₂SO₄ in the autoclave at 180° for 2 hr.,

with alkali, etc.) gives very different results. Autoclave hydrolysis with raised temp. for a shorter time enriches the yields of cyclic compounds, which must be regarded as the precursors of the NH_2 -acids, and lessens the degradation, e.g. of tryptophan. The greater part of the *cyclopeptides* is then separated by continuous extraction with Et_2O , CHCl_3 , and EtOAc . Tables summarise the total, amide-, NH_2 -, and humin-N, and the tyrosine, tryptophan, cystine, histidine, methionine, etc. contents of the various fractions and of the acid hydrolysis products of these fractions. P. W. C.

Spectroscopic determination of gum acacia in blood. Rate of disappearance in normal dogs. S. A. PEOPLES and N. M. PHATAK (Proc. Soc. Exp. Biol. Med., 1935, 32, 635—637).—Gum acacia (I) is determined in blood by Folin-Wu pptn., dilution of the filtrate, hydrolysis with H_2SO_4 , addition of bile salts, and spectroscopic examination in comparison with a standard solution. The intensity of the absorption band \propto the (I) content. (I) is eliminated very slowly from the blood-stream in normal dogs. R. N. C.

Diurnal variations in plasma-lipids. E. M. BOYD (J. Biol. Chem., 1935, 110, 61—70).—Free and ester cholesterol (I), phospholipins, and neutral fats in normal subjects at different times of the day showed only slight variations which could not be correlated with the intake of ordinary meals or sleep. The variation from one person to another was 2—3 times $>$ the average variation per person per day. The conditions for hydrolysis in the total (I) determination were standardised. H. D.

Blood-cholesterol and resistance to saponin in animals on liver diet. G. INGRASSIA (Riv. Patol. sper., 1934, 13, 459—468).—In dogs receiving raw liver daily, blood-cholesterol rose, but on continued liver administration returned to normal. The red blood-cells showed a greater resistance to the haemolytic action of saponin. NUTR. ABS. (m)

Determination of cholic acids in blood. B. JOSEPHSON (Biochem. J., 1935, 29, 1519—1524).—Details are given for the determination of bile acids in blood. Practically no loss of acids occurs if the proteins are pptd. with EtOH containing $\text{Ba}(\text{OH})_2$. With concn. of acids $>$ 5 mg. per 100 c.c. the error is $>$ 6—8%. J. N. A.

Determination of total fatty acids in blood. C. P. STEWART and E. B. HENDRY (Biochem. J., 1935, 29, 1677—1682).— EtOH-CHCl_3 and EtOH -light petroleum mixtures will extract the same amount of fatty acid from blood as do $\text{EtOH-Et}_2\text{O}$ mixtures. The yield of fatty acid is not increased by refluxing the blood with $\text{EtOH-Et}_2\text{O}$, but some oxidation occurs giving an increase in CO_2H groups. Refluxing does not increase the recovery of lipin-P. EtOH-NaOH and NaOEt are equally good as hydrolysing agents, and a single hydrolysis by the former will give the max. yield of fatty acids. The filtration method is compared with the method in which fatty acids are extracted by light petroleum. The sol. fatty acids in blood amount to $<$ 3% of the total. P. W. C.

Presence of creatinine in blood. J. A. BEHRE and S. R. BENEDICT (J. Biol. Chem., 1935, 110, 245—248).—A criticism of the conclusion by Hayman *et al.* (this vol., 642) that creatinine is the chief chromogenic compound in blood-plasma. E. A. H. R.

Determination of blood-indole. P. MAZZOCCO (Compt. rend. Soc. Biol., 1935, 119, 879—881).—The method of García-Blanco and Vidal (A., 1933, 1065) has been modified utilising Et_2O -extraction. H. G. R.

Diazo-value of blood. G. BARAC (Compt. rend. Soc. Biol., 1935, 119, 545—547).—There are only traces of monophenols in the blood, the diazo-val. being due principally to glyoxalines. H. G. R.

Spectrophotometric study of the diazo-reaction of the blood. A. LAMBRECHTS and G. BARAC (Compt. rend. Soc. Biol., 1935, 119, 547—549; cf. preceding abstract).—The absorption spectrum of the diazo-reaction of blood is nearly identical with that of the glyoxalines. H. G. R.

Specific carbohydrates of blood groups. II. K. FREUDENBERG and H. EICHEL (Annalen, 1935, 518, 97—102; cf. A., 1934, 795).—A detailed description is given of the isolation of the polysaccharide mixture (I) from the urine of individuals of the blood-group A. Hydrolysis of (I) by acids leads to the isolation of glucosamine. Inactivation of (I) by alkali is caused mainly by elimination of *N*-Ac, since acetylation of the inactive product (II) yields an inactive acetate, sol. in CHCl_3 , from which *O*-Ac can be removed without affecting the re-introduced *N*-Ac; the material so obtained has about the same activity as the original substance. Ketene, which in H_2O acetylates solely NH_2 , completely restores the activity of (I). (I) is not affected by amylases or diastases, but is partly degraded with complete loss of activity by snail enzyme, whereby *N*-acetylglucosamine (III) is obtained. The presence of a uronic acid (IV) in small amount is established. (I) therefore contains galactose (V) and (III), but it remains uncertain whether (IV) is a component of (I) or an admixture. Considerations of the N balance indicate the presence of a further N component probably with higher % N. (V) is also obtained by the acid hydrolysis of the material obtained from the urine of individuals of blood-group O. H. W.

Blood-sugar curves after intravenous injection of hypertonic glucose. N. FIESSINGER and A. BRON (Compt. rend. Soc. Biol., 1935, 119, 839—841).—In normal cases the curves for arterial and capillary blood are similar, showing an elevation of 0.4—0.75 g. after 10 min. In cirrhosis, the curve rises to 0.5—1.5 g. and the duration is prolonged for $1\frac{1}{2}$ hr. In hepatic oedema, the val. for capillary blood rises to 1 g. and that for arterial to 1.5 g. H. G. R.

Mercury-cadmium deproteinisation and micro-iodometric determination of blood-sugar. C. DUMAZERT and M. BIERRY (Compt. rend. Soc. Biol., 1935, 119, 737—739).—Blood is deproteinised by an acid solution of $\text{Hg}(\text{NO}_3)_2$ and $\text{Cd}(\text{NO}_3)_2$. The sugar in the filtrate is oxidised with I in $\text{NaOH-Na}_2\text{HPO}_4$ solution at room temp., excess of I liberated with

H₂SO₄, the solution neutralised with Na₂B₄O₇, and I titrated with 0.005*N*-Na₂S₂O₃. The method gives results concordant with those obtained by the Hagedorn-Jensen method, and permits the micro-determination of the "true" blood-sugar. R. N. C.

Determination of fructose in blood. J. PATTERSON (Biochem. J., 1935, 29, 1398—1399).—The NHPh₂ method of Radt (A., 1928, 1151) for determination of fructose in aq. solution and in blood is slightly modified and used for determinations in the bloods of 2 normal and 3 pathological subjects, the results comparing closely with those obtained by the method of Scott (cf. this vol., 770). 100 ml. of blood contain about 1 mg. of fructose. P. W. C.

Blood-sugar of the fasting, gizzardectomised fowl (*Gallus domesticus*). W. H. BURROWS, J. C. FRITZ, and H. W. TITUS (J. Biol. Chem., 1935, 110, 39—41).—The peak in the blood-sugar curve of fowls occurring on the 4th day of fasting (A., 1934, 683) is not observed in gizzardectomised animals. H. D.

Blood-chemistry of birds after destruction of the comb or enucleation of the eyeballs. C. I. PARHON and G. WERNER (Compt. rend. Soc. Biol., 1935, 119, 630—632).—Blood-sugar rises in cockerels deprived of their combs, and in ducks deprived of their eyeballs. Blood-Ca and cholesterol fall, whilst K and the K/Ca ratio rise. R. N. C.

Fermentability of blood-sugar, especially of the bound sugar in diabetics. M. MORIMUNE (Mitt. med. Akad. Kioto, 1934, 12, 281—288).—No significant difference was found between the fermentability of both free and bound blood-sugar in diabetics as compared with normal individuals.

NUTR. ABS. (b)

Spontaneous variations in blood-sugar in normal and diabetic subjects. J. O. NUÑEZ (Ann. Méd., 1934, 36, 234—241).—Consecutive blood-sugar determinations at intervals of 5 min. show that there are spontaneous variations in the blood-sugar levels of both normal and diabetic subjects. These may be the result of instability of the autonomic nervous system.

NUTR. ABS. (b)

Glycolysis in blood. II. Glycolysis and distribution of phosphate compounds. S. MORGULIS and J. D. MUNSSELL (Biochem. Z., 1935, 278, 89—100).—No quant. relationship could be detected between changes of the different blood-P fractions and the degree of glycolytic power. Under the action of arsenate, glycolysis is greatly increased in rabbit's but somewhat decreased in dog's blood (cf. A., 1932, 530, 1273), the readily hydrolysable esters increasing and the difficultly hydrolysable esters decreasing in strongly and showing a tendency to decrease in weakly glycolysing systems. P. W. C.

Determination of phosphorus in blood with the step photometer. S. A. SIWE (Biochem. Z., 1935, 278, 437—441; cf. Teorell, A., 1931, 662).—By means of a modification of the method of Fiske *et al.* (A., 1926, 443) the P content of 0.05—0.1 c.c. of blood-serum is determined with an error of $\pm 5\%$. The results agree well with those of Briggs (A., 1922, ii, 718). W. McC.

Colloidal calcium phosphate of blood and calcium partition in serum. D. M. GREENBERG, C. E. LARSON, and E. V. TUTTS (Proc. Soc. Exp. Biol. Med., 1935, 32, 647—650).—Results indicate that the colloidal salt is Ca₃(PO₄)₂, and that the equilibrium between protein-bound Ca and Ca⁺⁺ conforms to the law of mass action. R. N. C.

Determination of calcium in blood. S. A. SIWE (Biochem. Z., 1935, 278, 442—446).—The Ca content of 0.05—0.1 c.c. of blood-serum is determined by pptg. with (NH₄)₂C₂O₄, dissolving the ppt. in HNO₃, adding excess of 0.01*N*-KMnO₄, and titrating with 0.01*N*-Na₂S₂O₃ after addition of KI. The whole procedure is carried out in one tube, the apparatus of Linderström-Lang *et al.* (A., 1931, 1445) being used. The error is $\pm 3.6\%$. Alternatively, the ppt. of CaC₂O₄ is converted into CaCO₃ by heating at 550—600° [the temp. given by Nordbø (A., 1932, 531) is too low], dissolved in excess of 0.01*N*-HCl, and titrated with 0.01*N*-NaOH. The error is $\pm 3.5\%$.

W. McC.

Comparison of wet and dry ashing methods for determination of blood-iron. A. A. FABIAN, A. SACHS, and V. E. LEVINE (Proc. Soc. Exp. Biol. Med., 1935, 32, 662—664).—The dry method is recommended. The blood is dried, ashed at low red heat, and evaporated with HNO₃. Fe is dissolved out with HCl and separated from Cu (if necessary) by pptn. with aq. NH₃, Cu being determined by the McFarlane method. The Fe ppt. is dissolved in H₂SO₄, K₂S₂O₈ added, and the Fe determined colorimetrically with KCNS. R. N. C.

Mineral differences in blood composition according to sex, in *Cyprinus carpio*. E. A. PORA (Compt. rend. Soc. Biol., 1935, 119, 373—375).—Na and serum-Cl in the blood of the male are > in the female, whilst K, Ca, total protein, the alkaline reserve and the NaCl/total osmotic pressure ratio are less.

R. N. C.

Citric acid content of serum in rabbits with special reference to certain diets. H. LINDHOLM (Skand. Arch. Physiol., 1934, 70, 295—302).—The serum of rabbits fed on a mixed diet of grass, roots, oats, and barley contains 10 mg. of the acid per 100 ml. (6.3 mg. after 24 hr. starvation). When the diet contains no grass or other green food the val. is 6—8 mg., and this can be raised by adding green food.

NUTR. ABS. (m)

Selective accumulation of lipochrome. L. ZECHMEISTER, P. TUZSON, and E. ERNST (Nature, 1935, 135, 1039).—The blood-serum of the horse, after feeding on green food, contains no xanthophyll, but the carotene content is increased. Xanthophylls probably do not cross the wall of the gut, and selection appears to take place in the digestive organs.

L. S. T.

Globulin and albumin fractions of serum. VII. Tyrosine and cystine contents of protein fractions of fluids from sarcoma, carcinoma, and liver (in cirrhosis). B. LUSTIG and E. MANDLER (Biochem. Z., 1935, 278, 312—319; cf. A., 1931, 505; 1932, 960).—Colorimetric methods for determination (without hydrolysis and isolation) of NH₂-acids in proteins give only qual. vals. The tyrosine (I) con-

tent of the H_2O -sol. globulin fractions is $>$ that of the globulins sol. in aq. NaCl and much $>$ that of the globulins sol. in aq. Na_2CO_3 . All but one of the albumin fractions have similar (I) contents. The cystine (II) content of the albumin fractions is much $>$ that of the globulins. The H_2O -sol. euglobulins from carcinoma fluid contain more (II) than do the those from the other fluids. The globulins sol. in aq. NaCl and aq. Na_2CO_3 do not differ as regards (II) content. Albumin fractions from carcinoma and sarcoma fluids have (II) content $<$ that of corresponding fractions from the other fluid. The euglobulins sol. in aq. Na_2CO_3 when digested with pepsin and HCl yield a fraction, insol. in H_2O and rich in P and carbohydrate, which appears to yield xanthine bases on acid hydrolysis. W. McC.

Isolation of serum-vitellin. M. LASKOWSKI (Biochem. Z., 1935, 278, 345—348; cf. this vol., 374).—Plasma from laying hens acidified with HCl (p_{H} 5.0—5.5) is diluted tenfold with H_2O , pptd. material is dissolved in 5% aq. NaCl , and the solution is saturated with NaCl . After removal of pptd. impurities the vitellin (I) is pptd. by dilution (hundredfold) with H_2O . Dissolution in 5% aq. NaCl , saturation with NaCl , filtration, and dilution are repeated, and the ppt., after washing with Et_2O — EtOH , is successively extracted with EtOH (24 hr.) and Et_2O . (I) thus obtained is still impure (contains about 0.9% of protein-P). Plasma from cocks or non-laying hens yields no (I) when treated in this way. Possibly the (I) is identical with that of hens' eggs (cf. Calvery *et al.*, A., 1932, 294). W. McC.

Changes in blood-serum under the influence of heat. C. ACHARD and A. BOUTARIC (Compt. rend., 1935, 200, 1697—1700).—The smallest amount of adsorbent C which will restore the surface tension of horse blood-serum, diluted 1/500 with 0.85% NaCl , to that of the diluent is about 160 mg. per 15 c.c. This quantity diminishes regularly with increasing time and rise of temp. of heating, indicating that the no. of individual protein particles decreases. F. A. A.

Hæmolytic action of carbohydrates [? hydrocarbons]. L. P. BRIULLOVA (J. Physiol., U.S.S.R., 1934, 17, 389—391).—The presence of hydrocarbons, aliphatic or aromatic, stimulates hæmolysis by saponins. CH. ABS. (p)

[Relation between] time of coagulation and concentration of coagulant. A. FISCHER (Biochem. Z., 1935, 278, 320—325; cf. A., 1933, 522).—The rate of coagulation of blood-plasma \propto a power of the concn. of the coagulant and is calc. by means of a simple equation valid within limits much wider than those within which the equation previously given is applicable. W. McC.

Coagulating action of homologous organ-extracts. A. FISCHER (Biochem. Z., 1935, 278, 334—339).—As regards their power to coagulate autologous and homologous blood-plasma, extracts of organs of the hen form the series, lung $>$ muscle $>$ heart $>$ kidney $>$ spleen $>$ brain $>$ liver, this order being preserved at all ages of the hen from embryo onwards. As regards their relative content of heparin

the extracts form the series brain $>$ lung $>$ spleen $>$ liver. W. McC.

Stoicheiometric combination of heparin and coagulant. A. FISCHER and T. ASTRUP (Biochem. Z., 1935, 278, 326—333).—The proportions in which extracts of organs and blood-plasma (from hens) and heparin interact indicate that heparin and the substance which stimulates coagulation react in stoicheiometric proportions (1 mol. of each). The compound dissociates in solution. W. McC.

Coagulation of the blood as a chain reaction. A. FISCHER (Nature, 1935, 135, 1075).—An active principle of coagulation, which can be transferred indefinitely into new plasma without loss of activity, is described. It is formed during the clotting process of blood-plasma and increases and then disappears almost instantaneously at the moment of coagulation. The facts support the view that blood-coagulation is a chain reaction. L. S. T.

Combination of heparin with protein. A. FISCHER (Biochem. Z., 1935, 278, 133—160).—Heparin (I) combines with protein only on the acid side of, and in close proximity to, the isoelectric point, and is therefore always in the free condition in blood-plasma and in serum. Organ extracts which accelerate clotting of blood combine with (I), and the spontaneous changes (denaturation) in such extracts on keeping which result at first in an increase followed later by a decrease of clotting-acceleration power are accompanied by parallel changes in the extent of combination with (I). Protein combines with (I) only when it has been denatured, the liberated basic groups being utilised for the union. Addition of clotting-active lipins to protein results in denaturation and union with (I). Blood-clotting is regarded, therefore, as a special case of denaturation, and the inhibiting action with (I) depends on its great affinity for the basic groups of the active material of the organ extracts, these groups in absence of (I) reacting with the acid groups of the plasma-protein. P. W. C.

Possibility of a new quantitative technique of the Wassermann reaction, based on the nullifying action of the components of alexin. O. G. BIER (Compt. rend. Soc. Biol., 1935, 119, 758—760).—The use of the alexin fractions serves to differentiate sera where the Sordelli-Miravent technique breaks down. R. N. C.

Behaviour of the fractions of alexin in the Wassermann reaction. O. G. BIER (Compt. rend. Soc. Biol., 1935, 119, 756—758).—The serum-yeast fraction has the strongest nullifying action on the Wassermann reaction. R. N. C.

Behaviour of alexin in an electric field. P. GIRARD, M. LOURAU, and E. PITRES (Compt. rend. Soc. Biol., 1935, 119, 408—410).—Alexin in an electric field behaves like an ion the isoelectric point of which is difficult to recognise on account of its sensitivity to p_{H} . Its mobility is $>$ that of hæmolysins or agglutinins, and is apparently the same as that of globulins, to which class alexin probably belongs. R. N. C.

Use of sera precipitated by N/300-hydrochloric acid in the fixation reaction for tuberculosis. R. WAHL and P. LAVAL (Compt. rend. Soc. Biol., 1935, 119, 389—390).—The sensitivity of the fixation reaction is not increased by previous pptn. of the sera with 0.003N-HCl. R. N. C.

Production of diphtheria toxin with high antigenic power. E. M. TAYLOR (Compt. rend. Soc. Biol., 1935, 119, 510—512).—The antigenic power of diphtheria toxin can be increased by peptic digestion. H. G. R.

Basal metabolism in rabbits and the Schwartzman phenomenon. G. EUSTATZIOU, I. POPESCO, and S. STAMATESCO (Compt. rend. Soc. Biol., 1935, 119, 619—621).—Basal metabolism increases similarly in rabbits injected subcutaneously with the toxic filtrate of *B. coli*, whether or not they show a positive Schwartzman phenomenon. The increase is parallel with the intensity of the local reaction, but not with the rise of temp. R. N. C.

Adsorption of purified diphtheric vaccines by aluminium hydroxide. S. SCHMIDT (Biochem. Z., 1935, 278, 257—262).—The extent to which purified, salt-free diphtheric vaccines are adsorbed by $\text{Al}(\text{OH})_3$ frequently varies with their N (protein) content. A high degree of adsorption increases the efficiency of the vaccine. W. McC.

Preparation of anti-vibrioseptic serum by suspension of the antigen in lanolin. M. WEINBERG and M. GUILLAUME (Compt. rend. Soc. Biol., 1935, 119, 719—721). R. N. C.

Antitoxic power of some metal-protein complexes obtained from anti-diphtheria and anti-tetanus sera. H. DIACONO (Compt. rend. Soc. Biol., 1935, 119, 801—804).—Diphtheria and tetanus antitoxins are pptd. unchanged by HgCl_2 or CuSO_4 and may be eluted from the complex with Na_2SO_3 . H. G. R.

Which component of the complement is lacking in the lymph of the peripheral vessels? S. FUNAOKA and T. SHIMAOKA (Proc. Imp. Acad. Tokyo, 1935, 11, 203—205).—The albumin, but not the globulin, fraction obtained by Liefmann's procedure from guinea-pig blood contains the complement necessary for hæmolysing the corpuscles of goat blood. Lymph drawn from the popliteal sac has no hæmolytic action. J. L. D.

Spectrographical study of the biochemical reactions of nerves. B. MINZ and M. PAIC (Compt. rend. Soc. Biol., 1935, 119, 521—524).—On electrical excitation of a fragment of vagus nerve in Locke-Ringer solution, a substance having a characteristic absorption spectrum passes into the solution. H. G. R.

Crystal structure of the myofibrils. Metal-histology of animal fibres. F. WORSCHTIZ (Fortschr. Röntgenstrahlen, 1934, 50, 174—178; Chem. Zentr., 1935, i, 585).—The micelle structure of the myofibrils is not altered by drying. The X-ray diagram indicates a structure of a cryst. character, the lattice const. of which in the direction of the thread axis is 22 Å. Interference is caused by the existence of a liquid-cryst. substance of the smectic type, which

originates probably from the sarcoplasm of the muscle threads or the intrafibrillary liquid. R. N. C.

Decomposition of animal substances while embedded in marine sediments. F. HECHT (Kali, 1934, 28, 209—215; Chem. Zentr., 1935, i, 652). H. J. E.

Isolated cell and tissue constituents. III. Separation of the thyroid into colloid, cells, and nuclei. M. BEHRENS (Z. physiol. Chem., 1935, 232, 263—269; cf. A., 1933, 1184).—Thyroid tissue after freezing, drying, and pulverising is separated into colloid, cells, and nuclei by taking advantage of their different densities in suitably chosen liquids. The colloid consists principally of thyroglobulin, but contains other proteins; it is sol. in cold H_2O and in AcOH on warming. Only a trace of cells is sol. in AcOH. Insulin was separated from pancreas by the same method. J. H. B.

Secretion of dyes by the kidney. R. HÖBER (J. Cell. Comp. Physiol., 1935, 6, 117—128).—The tubules of the aglomerular kidney of the toadfish are permeable to certain diffusible acid dyes. The distribution of injected dyes is examined and compared with that in the frog. A. G. P.

Seasonal variations in the contents of water, organic and mineral substances of the muscle and liver of the frog. A. GRADINESCO and C. DEGAN (Bull. Soc. Chim. biol., 1935, 17, 751—763).—In the gastrocnemius muscle and the liver of the green frog the content of org. and mineral substances increases in summer and autumn and decreases in winter and spring. These losses are compensated for by corresponding increases in the H_2O content. The variations in the male are > those in the female. A. L.

Nuclein metabolism. V. Constitution of nucleic acid. K. MAKINO (Z. physiol. Chem., 1935, 232, 229—235).—Depolymerisation of yeast-nucleic acid (I) by N-NaOH at room temp., which does not decompose the mononucleotides, liberates four acidic groups. Since thymonucleic acid (II) cannot be depolymerised chemically without destruction of the mononucleotides, it was hydrolysed by nuclease. Although dephosphorylation is approx. equal to depolymerisation, no increase in acidity occurs through dephosphorylation. Four acidic groups are again liberated. Thus (I) and (II) possess four ester linkings, and as both are tetrabasic they probably possess a similar ring structure. J. H. B.

Choline, acetylcholine, and carnitine content of muscle. E. STRACK, P. WÖRDEHOFF, E. NEUBAUER, and H. GEISSENDÖRFER (Z. physiol. Chem., 1935, 233, 189—203).—Neither choline (I) nor acetylcholine (II) was detected in the skeletal muscle of the ox and dog. (II) was also shown to be absent by the biological test. In the muscle free (I) is not produced on incubation at 37°. In the hydrolysed aq. extract of skeletal muscle, no (I) was obtained by Au pptn., although the muscle does not destroy added (I). The so-called (I) and (II) found by Kinoshita (A., 1910, ii, 631) and Bischoff *et al.* (A., 1932, 765) was probably carnitine (III). Ox-muscle contains 0.01—0.2% of (III) chloride. J. H. B.

Glycogen and total carbohydrate content of the human heart. H. BLUME (Beitr. path. Anat. allg. Pathol., 1934, 93, 20—35; Chem. Zentr., 1935, i, 433).—The glycogen (I) contents of the ventricle and septum of the normal human heart are equal. (I) in the infant heart is $>$ in the adult. The heart contains 0.46—1.46% of carbohydrate, 70% of which is (I); a (I) content $>$ 1.5% indicates hypertrophy. After death 90% of the (I) of the heart is converted into glucose in 9 hr., the remainder being unaltered; in infants the breakdown is slower. R. N. C.

Glycogen of the placenta. H. GUTHMANN and L. BÖHME (Arch. Gynäkol., 1934, 158, 336—344).—At the 2nd month maternal portions of human placenta contained nearly twice as much glycogen (I) as foetal portions. By the 6th month this difference had disappeared. No evidence was obtained that (I) could pass as such from maternal to foetal tissues. If (I) transference does take place, hydrolysis and resynthesis must occur. NUTR. ABS. (b)

Quantity, distribution, and significance of placental glycogen in the different phases of pregnancy. Function of human and hæmochorial placenta. B. SZENDI (Arch. Gynäkol., 1934, 158, 409—425).—In rabbits the placental glycogen (I) increased rapidly from 0.3% on the 11th to 1.0% on the 17th day of gestation and thereafter fell to about 0.1% on the 30th day. In human pregnancy the placenta contained most (I) about the 2nd month (0.5%); by the 9th month $<$ 0.1% of (I) was present. Hence the (I) in the placenta is part of the metabolic structure of the placental cell and is not connected with the carbohydrate metabolism of the embryo. NUTR. ABS. (b)

Fatty acids of pig liver. III. General analysis. E. IRVING and J. A. B. SMITH (Biochem. J., 1935, 29, 1358—1368; cf. A., 1934, 913, 1381).—Data from bromination and from oxidation and hydrogenation of fractionally distilled Me esters are given. The main saturated acids (approx. 36%) are palmitic (14%) and stearic (18.8%) and the unsaturated oleic (28%), C_{20} (20%), and C_{22} (7.5%). The C_{20} and C_{22} acids have probably 2—4 double linkings. F. O. H.

Relationships of liver-lipins. F. BREUSCH and R. SCALABRINO (Z. ges. exp. Med., 1934, 94, 569—578; Chem. Zentr., 1935, i, 737).—In man the proportion of lipochromes increases somewhat with age. Vals. were high in uræmia and hypertension, and subnormal in liver cirrhosis. The vitamin-A content decreased with age and, markedly, in uræmia and cirrhosis, but was high in diabetes. Free cholesterol varied but little. Cholesteryl esters increased in hypertension and in sclerosis. Phosphatides increased in uræmia and decreased in cirrhosis and hypertension. The total fat content was high in carcinoma and tuberculosis. With increasing total fat the I val. declined. A. G. P.

Polysaccharoproteins. V. State of glycogen in muscle. E. M. MYSTKOWSKI (Biochem. Z., 1935, 278, 240—245; cf. this vol., 882).—In muscle (rabbit, dog) there is equilibrium between the various forms (free, dissolved, protein-bound) of glycogen. Part of

it is bound to myosin, but probably none to myogen. The globulin-X also binds a small amount, and the stroma always contains some. The results of Willstätter *et al.* (A., 1934, 913) are confirmed.

W. McC.

Ammonia content and ammonia formation in muscle. XXII. I. Determination of adenosinetriphosphoric acid. II. Second ammonia-forming substance of muscle. J. K. PARNAS and C. LUTWAK-MANN (Biochem. Z., 1935, 278, 11—22).—A method for determination of adenosinetriphosphoric acid (I) is described with the help of which it is shown that muscle contains no adenylic acid. The sum of NH_3 -N and of the (I)- NH_2 -N of muscle increases during NH_3 formation by 2 mg. of N per 100 g., and it appears, therefore, that muscle contains in addition to (I) some other NH_3 -forming substance. P. W. C.

Constitution of adenosinetriphosphoric acid. K. MAKINO (Biochem. Z., 1935, 278, 161—163).—The readily hydrolysable H_3PO_4 groups are not attached to OH at C2 or C3 of ribose or to NH_2 of adenine. P. W. C.

Synthesis of asterubin. D. ACKERMANN (Z. physiol. Chem., 1935, 234, 208—211; cf. this vol., 771).—Aq. taurine (I) heated at 120° for 5 hr. with dimethylcyanamide gives asterubin in poor yield. The biological synthesis probably takes the form of a reaction between (I) and guanidine. W. McC.

Total nitrogen of the liver of frogs in summer and winter and during fasting and administration of nitrogen-rich diet. C. GAUTIER, J. RATELADE, and R. CASATI (Bull. Soc. Chim. biol., 1935, 17, 745—750).—The total N of the liver of frogs decreases considerably in summer and winter when the animals are fed on frog-muscle. A. L.

Structure of tooth-tartar (Calculus dentalis supragingivalis). H. PHILIPP (Z. physiol. Chem., 1933, 233, 209—214).—X-Ray diagrams of tooth-tartar indicate that the phosphate belongs to the apatite group and is, from its behaviour at 1000° [combination with adsorbed phosphate, yielding β - $Ca_3(PO_4)_2$], a hydroxyapatite. Owing to adsorbed phosphate it analyses approx. as $Ca_3(PO_4)_2$, but contains 0.28% of CO_2 . J. H. B.

Molybdenum content of sound and carious teeth. H. TER MEULEN (Chem. Weekblad, 1935, 32, 350).—Sound and carious human teeth contain 0.55 and 0.03—0.06 mg. Mo per kg., respectively. Ox and calves' teeth contain 0.21—0.34 mg. and the bones 0.04 mg. Mo per kg. S. C.

Chemistry of bone-salts. J. MAREK, O. WELL-MANN, and L. URBÁNYI (Z. physiol. Chem., 1935, 234, 165—175; cf. A., 1934, 1133; this vol., 234; Gabriel, A., 1894, ii, 21).—The bones of calves and cows, on boiling with H_2O , aq. KOH, aq. K_2CO_3 , glycerol (I), (I)+KOH, or aq. Na_2HPO_4 , are converted into material similar to $Ca_3(PO_4)_2$. Most of the combined CO_2 is present as $CaCO_3$. These and other facts indicate that the mineral part of the bones consists chiefly of $Ca_3(PO_4)_2$ and $CaCO_3$ with small amounts of $Mg_3(PO_4)_2$ and Ca alkali phosphate. Klement's conclusions are erroneous. W. McC.

Rôle of zinc in reproduction. Experiments with castrated silk-worms (*Bombyx mori*, L.). A. AKAO (Keijo J. Med., 1935, 6, 49—60).—The [Zn] in the ovaries and testes is similar, and the total quantity in the former is therefore greater (24 times). The Zn content of the blood of normal and castrated males and normal females is similar, but there is a sudden rise with ovariectomised females shortly before emergence from the cocoon. The [Zn] in the blood-cells is 4 times that in the plasma. K is not subject to a similar variation in the ovariectomised female.

P. G. M.

Composition of the fishes *Bothus macoticus*, Pall, and *Gobius melanostomus*, Pall. K. WYNOFF (Z. Unters. Lebensm., 1935, 69, 174—176).—The % of H₂O, protein, fat, and ash are given.

E. C. S.

Lipochromes of sea anemones. I. Carotenoid pigments of *Actinia equina*, *Anemonia sulcata*, *Actinoloba dianthus*, and *Tealia felina*. I. M. HEILBRON, H. JACKSON, and R. N. JONES (Biochem. J., 1935, 29, 1384—1387).—Hydrolysis of actinocythrin (I) from *A. equina* (A., 1934, 676) yields a violet pigment, *violerythrin*, m.p. 191—192°, absorption spectrum max. at 625, 576, and 540 m μ in CS₂. The pigment of *A. sulcata* is mainly *sulcatoxanthin*, C₄₀H₅₂O₈ (?), ill-defined m.p. 125—130°, absorption max. at 516, 482, and 450 m μ in CS₂; the tentacles contain chlorophyll-*a* (Elmhirst and Sharpe, Biochem. J., 1920, 14, 48). *A. dianthus* yields a red acidic pigment, m.p. 195—197°, whilst *T. felina* contains two lipochrome esters, one possibly identical with (I) and the other (max. at 500 m μ in CS₂) giving an acidic pigment, m.p. 205—208°.

F. O. H.

Coalescence of fat particles. W. FRITZ (Milch. Forsch., 1934, 16, 476—484; Chem. Zentr., 1935, i, 813).—Chain formation of fat globules in milk exposed to an electric field is followed by coalescence if the temp. is raised to < 90°. The relationship between this phenomenon and the ionic layer surrounding the globules is discussed.

A. G. P.

Occurrence of an octadecadienoic acid in cow butter-fats. T. G. GREEN and T. P. HILDITCH (Biochem. J., 1935, 29, 1564—1575).—The mixture of unsaturated C₁₈ acids from cow butter-fat consists of oleic acid (75%), tri- or tetra-ethenoid C₁₈ acids (1.5%), and octadecadienoic acid (I) (23.5%). Oxidation of the octadecadienoic acids from butter-fat and ground-nut oil shows that they are structurally similar, but that (I) is a different geometrical isomeride of the Δ^2 -acid of seed-fats. It is concluded that the kind of (I) in butter-fat depends on the diet of the cow, and that linoleic acid when present in the glycerides of land animals is a product of assimilation and not of synthesis.

J. N. A.

Cause of low stability of vitamin-C in milk. J. E. JACOBSEN (Z. Unters. Lebensm., 1935, 69, 306—313).—Vitamin-C is determined in a serum prep. from milk by titration at p_H 2.5 with dichlorophenolindophenol. The extremely small amount of -C in milk is readily destroyed by mixing or by pouring from one vessel to another. -C is more resistant in fresh than in stored milk. Change from winter feeding to pasture caused no increase in % of

-C. It is calc. that the adult must consume 3 litres of the best milk *per diem* to satisfy completely his -C requirement.

E. C. S.

Cryoscopic measurements of Indian milk. P. S. MACMAHON and L. N. SRIVASTAVA (Analyst, 1935, 60, 307—309).—The mean f.-p. depressions of cow's and buffalo's milk were 0.551° and 0.562°, respectively.

E. C. S.

Magnesium content of the cerebrospinal fluid: relation to blood-magnesium. C. B. UDAONDO, M. SCHTEINGART, and R. GAIBROIS (Rev. Soc. Argent. Biol., 1933, 9, 321—324).—The Mg contents of spinal fluid and of serum were practically the same and were unchanged in chronic affections of the central nervous system.

CH. ABS. (p)

Van den Bergh reaction of bilirubin in xanthochromic cerebrospinal fluid. S. L. VAUGHAN and R. S. HUBBARD (Proc. Soc. Exp. Biol. Med., 1935, 32, 618—620).—The reaction occurs promptly when the protein (I) concn. is normal, or the bilirubin (II) concn. is high. It is increasingly delayed as (II) falls and (I) rises.

R. N. C.

Adenylic acid in the central nervous system. C. RIEBELING (Klin. Woch., 1934, 13, 1422—1424; Chem. Zentr., 1935, i, 744).—The mean NH₃ content of the cerebrospinal fluid is 0.07 mg. per 100 c.c. It increases considerably in epilepsy, the extra NH₃ probably originating in the brain. Brain-NH₃ increases rapidly after death through enzymic deamination of a parent substance, probably adenylic acid. NH₃ is high in the brains of patients who have died in convulsions.

R. N. C.

Acid secretion by the stomach. IV. Effect of alkalosis on the secretion of acid in the dog. Effect of the ionic environment in the blood. G. DELRUE and A. LACQUET (Arch. internat. Physiol., 1934, 39, 295—310).—The production of alkalosis in a dog by prolonged ingestion of NaHCO₃ altered neither the p_H nor the total acid content of the gastric juice secreted.

NUTR. ABS. (b)

Influence of the acid-base equilibrium on gastric secretion. N. F. MACLAGAN (J. Physiol., 1934, 83, 16—17P).—There was no correlation between the acidity of the gastric juice and the acid-base ratio of the blood. The induction of NH₄Cl acidosis had no influence on the acidity of gastric secretion in response to histamine or EtOH test meals.

NUTR. ABS. (b)

Spectrographic study of the gastric content in fasting men. I. L. KARCZAG and M. HANÁK. II. L. KARCZAG (Biochem. Z., 1935, 278, 105—107, 108—111).—I. Normal gastric and duodenal juice and their ultrafiltrates possess a selective absorption in the ultra-violet, which is considerably modified by alkali and acid and is not accounted for by the content of protein, polypeptides, aromatic NH₂-acids, uric acid, etc.

II. The above properties of gastric juice closely resemble those of the vitamin-B complex.

P. W. C.

Gastro-intestinal p_H in rats. I. M. EASTMAN and E. G. MILLER, jun. (J. Biol. Chem., 1935, 110, 255—262).—Normal rats generally show an acid re-

action in the gastro-intestinal tract, with the p_H rising from the stomach to the ileocaecal valve, falling in the caecum, and again rising in the colon. Young rats have a higher alimentary p_H than adult rats. On a bread diet the contents of the colon tend to be more acid than in the caecum. The McCollum rachitogenic diet causes a slight but consistent rise in the intestinal p_H throughout, otherwise wide variations in diet have no significant effect. Local conditions of absorption, secretion, and bacterial action, rather than the p_H at higher levels, determine the p_H at a given level. E. A. H. R.

Gastro-intestinal studies. IV. The relation of p_H to the pepsin and rennin content of the gastric juice. O. M. HELMER, P. J. FOUTS, and L. G. ZERFAS (Amer. J. Digest. Dis. Nutrit., 1934, 1, 120—123).—The presence of pepsin and rennin in human gastric secretion after histamine stimulation is dependent on p_H . Pepsin and rennin were present when the p_H was ≤ 7 , but neither could be detected when the p_H was > 7 . The concn. of the enzymes, however, did not depend on the amount of acid secreted. When the acidity is determined by p_H methods or titration, stomach contents which show a p_H of 7 are considered to have an acidity, a condition in which there is an absence of free acid, pepsin, and rennin. NUTR. ABS. (b)

p_H of the duodenal contents in absence of bile. G. LOEWY (Compt. rend. Soc. Biol., 1935, 119, 382—384).—Deprivation of bile causes a rise of duodenal p_H , the increase at the pyloric end being $>$ at the jejunal end. R. N. C.

p_H of the duodenal contents in the absence of pancreatic juice. G. LOEWY (Compt. rend. Soc. Biol., 1935, 119, 490—491).—In the absence of pancreatic juice the stomach, duodenum, and jejunum of the dog have the same p_H . No inflammation of the mucous membrane of the duodenum or jejunum is observed. H. G. R.

Duodenal secretion and sugar metabolism. J. LA BARRE and P. HOUSSA (Compt. rend. Soc. Biol., 1935, 119, 538—540).—Sugar tolerance is decreased if secretion is removed by prolonged washing of the intestine with dil. HCl. H. G. R.

Elimination of dyes in gastric and pancreatic secretions. Mechanism of secretion of acid and base. R. C. INGRAHAM and M. B. VISSCHER (J. Gen. Physiol., 1935, 18, 695—716).—Following intravenous injection into dogs, dyes appearing in the gastric and pancreatic juice (invoked by histamine and secretin, respectively) ionise with the chromogen electro-positively and -negatively, respectively. An explanation of the phenomena based on polar adsorption at the membrane pores of the glands (i.e., electrostatic filtration) agrees with the conception of the mechanism of the natural secretions. F. O. H.

Keratin digestion in the larvæ of the clothes moth. K. LINDERSTRÖM-LANG and F. DUSPIVA (Nature, 1935, 135, 1039—1040).—The secretion of the middle intestine of *Tineola biselliella* contains a powerful proteinase (I) (p_H optimum at 9.3) which is little sensitive to SH-compounds. The secretion contains a reducing agent of unknown nature, which

appears capable of reducing the S-S linkings in the hair. The reduction of the hair-keratin then opens the peptide chains to attack by (I). Digestion of sheep-wool by (I) using Na thioglycollate as reducing agent at p_H 10 resulted in rapid degradation of the wool with the formation of equiv. amounts of NH_2 and CO_2H . Pancreatic trypsin-kinase had no effect owing to inhibition by the SH-compounds.

L. S. T.

Formation of gall-stones. A. DE KUTHY (Bull. Soc. Chim. biol., 1935, 17, 774—779).—Since in the intact bile vesicle the ratio of the amount of bile salts (I) to that of cholesterol (II) remains const. during a stoppage and the solubility of (II) increases as the square of the concn. of (I), a stoppage does not lead to the pptn. of (II). Infections and metabolic disturbances, however, which cause a diminution of the concn. of (I) increase the tendency for (II) pptn. A. L.

Constituents of human seminal plasma. M. W. GOLDBLATT (Biochem. J., 1935, 29, 1346—1357).—The concns. of constituents of the plasma (from centrifuging normal semen) have the following ratios to those of blood-plasma: Cl^- , cholesterol, 0.3—0.5; HCO_3^- , 0.7—1.0; Ca, glucose, urea, 2.0—3.0; lactic acid, 5.0—6.0; acid-sol. P (inorg. 50, spermine-30, and undetermined 20%), 30. Proteins present include mucin, nucleoprotein, albumin, globulin, and proteoses (primary and occasionally secondary). Protamines, histones, and SH groups are absent. Glycolysis (demonstrable only if active sperm cells are present) is associated with a large increase in lactic acid, which, however, is insufficient to account for the loss in reducing power. Diastase and thrombo-kinase, but not protease, are present. F. O. H.

Action of monohalogenoacetic acids on the glycolysis and mobility of sperms. E. E. IVANOV (Biochem. Z., 1935, 278, 101—104).—The mobility of mammalian sperms can be retained in presence of either HCN or of the monohalogenoacetic acids even when the concn. of these reagents is sufficient to inhibit respiration or glycolysis, respectively.

P. W. C.

Urine analysis. N. S. KING and O. UVAROV (Vet. Rec., 1935, 15, 553—555).—Results are given for urine analysis in typical cases of illness in dogs.

R. N. C.

Application of the iodide-thiocyanate process in the determination of urinary sugar. E. TSCHIRCH and D. KRÜGER (Pharm. Ztg., 1935, 80, 695—696).—Urinary sugar is determined rapidly and accurately by boiling with a known quantity of Fehling's solution, acidifying, removing excess of Cu^{++} with KI and KCNS, and titrating the liberated I with 0.1N- $Na_2S_2O_3$. The urine generally requires dilution.

R. N. C.

Excretion and determination of thiosulphate in urine. W. ZÖRKENDÖRFER (Biochem. Z., 1935, 278, 191—194; cf. Wollak, A., 1929, 1030).—0.1N-I is slowly added to urine (made just acid, if necessary, with AcOH) until interaction with $Na_2S_2O_3$ is slow, and large excess of I is added. After ≤ 15 min. aq. $Pb(OAc)_2$ is added, the mixture is filtered, and K_2SO_4 added until pptn. ceases. After several hr. the mix-

ture is filtered and KI, aq. starch, and a few drops of dil. H_2SO_4 are successively added to the filtrate (vol. 200 c.c.). If a blue colour develops it is destroyed with just sufficient 0.01% aq. NaHSO_3 . One drop of phenolphthalein solution, 5% aq. NH_3 (to rose-pink colour), and 5 c.c. of 10% aq. KCN are now successively added. After 15 min. 25 c.c. of dil. H_2SO_4 (1:3) are added and the liquid is titrated with 0.01*N*-I, more starch being added if necessary. The $\text{Na}_2\text{S}_2\text{O}_3$ thus determined is half of that originally present. For determination of $\text{Na}_2\text{S}_4\text{O}_6$ the procedure prior to addition of NH_3 and KCN is omitted. In rabbits and man the amount of $\text{Na}_2\text{S}_2\text{O}_3$ excreted increases with that administered (intravenous>subcutaneous>oral). $\text{Na}_2\text{S}_2\text{O}_3$ not so excreted is quantitatively removed in the urine as Na_2SO_4 . Injection of S causes no increase in $\text{Na}_2\text{S}_2\text{O}_3$ excretion.

W. McC.

Volatile amines of human urine. H. LÖFFLER (Z. physiol. Chem., 1935, 232, 259—262).—The method of isolation and detection of the amines is described. NH_3 and NHMe_2 are the chief volatile bases of normal human urine; NMe_3 and NH_2Me occur in smaller amount.

J. H. B.

Thyrotropic substances in human urine. B. GIEDOSZ (Klin. Woch., 1934, 13, 1507; Chem. Zentr., 1935, i, 741).—Intravenous injection in rabbits of urine from healthy or sick individuals produces in some cases a thyrotropic effect, and in other cases an increase of colloids, due to folliculin-like substances.

R. N. C.

Effect of exercise on excretion of uric acid. Effect of benzoic acid on uric acid elimination in liver diseases. A. J. QUICK (J. Biol. Chem., 1935, 110, 107—112; cf. A., 1932, 1277).—In man excretion of uric acid (I) is unaffected by mild, but is diminished by strenuous, exercise, the excretion of creatinine remaining unaffected and the lactic acid (II) of the blood increasing at the same time. Since administration of (II) diminishes excretion of (I), (I) retention may be due to over-production of (II). In liver diseases administration of BzOH causes prolonged (I) retention, but the degree of retention does not run parallel with the accompanying diminution in the rate of hippuric acid production. W. McC.

Dehydroandrosterone [in urine].—See this vol., 981.

Differentiation of chloride and bromide by the kidney. M. A. B. TOXORÉUS (Arch. exp. Path. Pharm., 1935, 178, 416—419).—Determinations of Br' and Cl' in urine, blood, plasma, and serum after oral administration of aq. NaBr to rabbits and dogs fail to support the contention of Frey (A., 1932, 89) and of Möller (*ibid.*, 412, 639) that the kidney does not distinguish between Cl' and Br' (cf. A., 1930, 639).

F. O. H.

Protein-free urines giving a biuret-like reaction. E. G. GODFREY (Biochem. J., 1935, 29, 1340—1345).—Fresh urine of healthy or diseased persons gives a rose or purplish-red colour with 1% aq. CuSO_4 and 5% aq. Na_2CO_3 , the reaction not being identical with the biuret test. The substance responsible is not a peptone or urobilin, but either a

pigment or associated substance of the urochrome group.

F. O. H.

Xanthurenic acid. II. L. MUSAJO. **III. Origin of xanthurenic acid.** L. MUSAJO and F. M. CHIANCONE (Atti R. Accad. Lincei, 1935, [vi], 21, 461—467, 468—470).—II. The urine of animals fed on fibrin contains, in the albino rat and the rabbit, xanthurenic acid (I), kynurenine (II), and kynurenic acid (III); in the dog, (III) and (II), without (I). The isolation of (II) is described.

III. Albino rats fed on a diet containing tryptophan (IV) or (II) excrete (I); those fed on gelatin do not, and those fed on (III) excrete only minute amounts of (I). It is concluded that (I) is produced in the animal from (IV) by way of (II), which gives either (I) or (III); (I) may be a hydroxykynurenic acid.

E. W. W.

Crystal structure data and calculus (urate) formation. F. WORSCHITZ and J. VON HERMAN (Fortschr. Röntgenstrahlen, 1934, 50, 305—307; Chem. Zentr., 1935, i, 585).—The structure of spherical calculi is that of a polycryst. aggregate, generally with orientation and inner strain along the radii.

R. N. C.

Porphyria metabolism. Spectroscopic determination of porphyrins. K. LAGEDER (Arch. Verdauungs-Krankh., 1934, 56, 237—256).—A spectroscopic method of porphyrin (I) determination is described. The normal rate of urinary excretion of (I) is 0.01—0.08 mg. per 24 hr. It is frequently very low in subjects on a meat-free diet. It is increased in cirrhosis of the liver, icterus, pulmonary tuberculosis with fever, sometimes in pernicious anaemia, but seldom or not at all in cancer of the stomach, hæmolytic jaundice, and Addison's disease. There is a correlation between abnormal skin pigmentation (*e.g.*, in psychopathic states) and disturbance of (I) metabolism.

NUTR. ABS. (m)

Experimental acidosis. V. Acidosis and liver function. S. TATSUZAWA (Sei-i-kwai Med. J., 1933, 52, No. 10, 91—103).—Liver function in rabbits is disturbed in experimental acidosis.

CH. ABS. (p)

Relation between the respiration of the red corpuscles, glutathione, and the reticulocytes in secondary anæmias in the rabbit. G. LITARCZEK, S. BAICOIANO, and M. BALS (Compt. rend. Soc. Biol., 1935, 119, 764—768).—Corpuscular respiration α the reticulocyte content of the blood, but is not absolutely dependent on the blood-glutathione.

R. N. C.

Corpuscular respiration in secondary anæmias in the rabbit. G. LITARCZEK, S. BAICOIANO, and M. BALS (Compt. rend. Soc. Biol., 1935, 119, 761—763).—The increase of respiration of the blood of anæmic rabbits is a function of the red corpuscles alone.

R. N. C.

Treatment of hæmophilia: action of Congo-red. C. P. WALDORF and A. G. ALVAREZ (Semana méd., 1935, I, 6—11).—Among many substances examined, Congo-red, injected intravenously or intramuscularly, gave best results.

CH. ABS. (p)

Mouse leucæmia. X. Metabolic differences between transmission lines of mouse lymphatic

leucæmia. J. VICTOR and M. R. WINTERSTEINER (Amer. J. Cancer, 1934, 22, 561—571).—Metabolic differences, as shown by O_2 consumption, aerobic and anaerobic glycolysis of lymph nodes, are exhibited between lines of transmissible leucæmia from the same organ and between those derived from different organs in the same case. CH. ABS. (p)

Blood-potassium after extirpation of the adrenal glands. C. I. URECHJA, G. BENETATO, and (MME.) RETEZEANU (Compt. rend. Soc. Biol., 1935, 119, 439—440).—Extirpation of both adrenals in the cat produces a marked rise of blood-K. Extirpation of one adrenal in the cat or dog produces a slight rise followed by a fall. R. N. C.

Calcification process of the aorta studied radiographically. F. WORSCHITZ and J. VON HERMAN (Fortschr. Röntgenstrahlen, 1934, 50, 307—309; Chem. Zentr., 1935, i, 585).—The X-ray picture of the sclerotic aorta is marked by additive Ca rings, whilst the interference of the fibres declines. The deposition of the sclerotising substance takes place intracellularly or intramurally according to the crystal structure, the deposited crystals not exceeding 10^{-6} cm. in size. The calcified centre appears as a homogeneous substance, showing no stratification of the crystals. R. N. C.

Carbohydrate tolerance in cancer patients and the effect thereon of X-radiation. F. H. L. TAYLOR and H. JACKSON, jun. (Amer. J. Cancer, 1934, 22, 536—547).—Lowered carbohydrate (I) tolerance in cancer results from malnutrition and cachexia. Irradiation has no effect on (I) metabolism. CH. ABS. (p)

Therapy of spontaneous mouse tumours: failure of additional inorganic compounds. M. C. MARSH (Amer. J. Cancer, 1934, 22, 572—577).—Injection of saturated aq. NaCl into epithelial tumours destroyed these. Other inorg. salts, oxides, hydroxides, I, and $CHCl_3$ had no effect. CH. ABS. (p)

Effect of radiation, lactate, and iodoacetic acid on tumours. W. R. FRANKS, M. M. SHAW, and W. H. DICKSON (Amer. J. Cancer, 1934, 22, 601—605).—Growth of tumours was not inhibited by injections of Na lactate and the efficiency of subsequent X-irradiation was unchanged. $CH_2I \cdot CO_2H$ slightly inhibited growth of tumours, and its effect was increased by previous irradiation. CH. ABS. (p)

Co-enzyme of glycolysis from tumours. III. H. KRAUT and R. W. NEFFLEN (Z. physiol. Chem., 1935, 232, 270—279; cf. A., 1933, 1202).—Co-enzyme T (I) from ox-brain is purified by adsorption on kaolin and elution with 0.0001N-NaOH. The presence of $AcCO_2H$ cannot be detected. Further purification is attained by pptn. with 25% aq. HCl, (I) being an acid. It may also be pptd. as the Ba salt, which is then decomposed by H_2SO_4 . Purified (I) shows no loss of activity after 5 min. at 100° . J. H. B.

Enzymic efficiency in malignancy. I. Influence of growing Walker carcino-sarcoma on concentration of blood and tissue enzymes of the albino rat. B. SURE, M. C. KIK, and K. S. BUCHA-

NAN (Biochem. J., 1935, 29, 1508—1514).—Subcutaneous inoculation of Walker carcino-sarcoma No. 256 in the rat caused marked decreases in the serum-amylase, -esterase, and -trypsin, and small decreases in hepatic esterase, pancreatic amylase, and serum-phosphatase. H. D.

Chemical composition of normal and cataract crystalline lenses. M. PAGET, G. PARTURIER, and G. LEVIN (Compt. rend. Soc. Biol., 1935, 119, 581—583).—In the cryst. lens in senile cataract, cholesterol, Ca, and total S are increased, whilst Na and K are relatively decreased. R. N. C.

Carbohydrate metabolism in circulatory insufficiency. V. C. VASILENKO and M. L. JEVTUCHOVA (J. Cycle méd., 1933, 3, 319—330).—Of 52 cases of cardiac disease, 30% showed some variation of the blood-sugar (I) from normal (16% hypo- and 14% hyper-glycæmia), under-nourished patients always having a low (I). The curve of alimentary hyper-glycæmia in circulatory insufficiency showed a much slower rise, but eventually attained a higher level than in a normal subject. The (I) bore no stable relation to the sugar content of ascitic fluid or fluid from oedematous areas. NUTR. ABS. (b)

Effect of ingestion of minute quantities of cobalt by sheep affected with "Coast disease." E. W. LINES (J. Coun. Sci. Ind. Res. Australia, 1935, 8, 117—119).—Diseased sheep improved rapidly after feeding 1 mg. of Co as $Co(NO_3)_2$ daily. Ironstone gravel produced no beneficial effect. A. G. P.

Metabolism of sulphur. XXII. Cystine content of hair and nails of cystinurics. H. B. LEWIS and L. FRAYSER (J. Biol. Chem., 1935, 105, 23—27).—The cystine content of the hair and nails of cystinurics was not different from normal. H. D.

Experimental "superabundance" diabetes in a normal dog. M. WIERZUCHOWSKI (Compt. rend. Soc. Biol., 1935, 119, 664—666).—The R.Q. rises steadily to a val. slightly > 1 in a normal dog receiving glucose (I) intravenously for 6 hr. at 1—9 g. per kg. per hr.; it remains at this steady max., independent of the rate of injection and the intensity of glycolysis, until the end of the injection, when it falls again to normal. The amount of (I) oxidised increases with rate of injection, the curve being a hyperbola until oxidised (I) reaches a max. when the rate is 6 g. per kg. per hr. The oxidation quotient of (I) increases with rate of injection, reaching 3.6 at 5 g. per kg. per hr. R. N. C.

Relation between the metabolism of carbohydrates, uric acid, and oxalic acid in diabetes. M. MAIO (Riv. Patol. sper., 1934, 13, 469—485).—The blood- $H_2C_2O_4$ (I) in diabetes was raised, but there was no relationship between the blood and urine vals. or between (I) and uric acid vals. There was, however, parallelism between blood- and urine-(I) and the glycæmic level, but not abs. proportionality. With dietary control, (I) fell somewhat, and with simultaneous insulin administration the fall was more pronounced, particularly for blood-(I). NUTR. ABS. (b)

Hypoglycæmia provoked in diabetics. A. BAUDOUIN, J. LEWIN, and E. AZÉRAD (Compt. rend. Soc.

Biol., 1935, 119, 686—688).—The blood-sugar curves of diabetics after injection of insulin fall into two groups, depending on whether or not the blood-sugar recovers after reaching its min. R. N. C.

Elimination of chlorine in skin diseases. J. R. PRAKKEN (Nederl. Tijdschr. Geneesk., 1934, 78, 3851).—Urinary elimination of Cl was moderately diminished in eczema and dermatitis exfoliativa, and very greatly in a case of pemphigus, the Cl and albumin contents of the blood-plasma being also lowered. NUTR. ABS. (m)

Guanidine, glucose, and calcium content of the blood in eclampsia. V. I. KRIEGER (Med. J. Austral., 1934, ii, 746—749).—Vals. for guanidine (I) are not markedly > in normal pregnant women (eclamptics: 0.21—0.54; mean, 0.39; normal: 0.27—0.39; mean, 0.34 mg. per 100 ml.). Hypoglycæmia is present in some cases, but, contrary to Minot and Cutler, there is no correlation of glucose and Ca with (I). NUTR. ABS. (m)

Rôle of the marrow in the production of hyperglycæmia following experimental "cerebral" embolism. H. HERMANN, F. JOURDAN, and P. CORNUT (Compt. rend. Soc. Biol., 1935, 119, 601—603).—The spinal marrow plays a part in the production of the hyperglycæmia provoked by experimental encephalomedullary embolism, this function being important in animals that have not been decapsulated, on account of the release of adrenaline by anæmic excitation of the spinal adrenaline-secreting centres. R. N. C.

Liberation of histamine-like substances in experimental cerebral embolism. J. TINEL, G. UNGAR, and A. GROSSIORD (Compt. rend. Soc. Biol., 1935, 119, 702—703).—Injection of lycopodium powder in the primitive carotid of the dog produces increased gastric secretion both in the injected animal and in another animal with which its circulation is crossed; the effect is thus due to histamine-like substances. R. N. C.

Carbohydrate metabolism in Graves' disease and goitre: effect of operative treatment. T. CHIBA (Tôhoku J. Exp. Med., 1934, 23, 474—493).—The fasting blood-sugar was within normal physiological limits in 14 cases of Graves' disease and goitre. Carbohydrate tolerance, as measured by glucose "double loading," was impaired in proportion to the degree of toxicosis in Graves' disease, but was normal in simple goitre without thyrotoxicosis. Following thyroidectomy in Graves' disease, normal carbohydrate metabolism was either entirely or partly restored. NUTR. ABS. (b)

Iodine metabolism and the thyroxine content of nodular goitres. I. ABELIN and N. E. FINKELSTEIN (Schweiz. med. Woch., 1934, 64, 985—987).—Inorg. I in simple goitre was 19% of the total compared with the normal mean. 56% of all the glands were deficient in thyroxine-I (about 10% instead of the normal mean of 25%). Total I per g. was subnormal in all goitrous glands. I present in di-iodo-tyrosine (I) and I organically bound other than in thyroxine and (I) were also determined. NUTR. ABS. (m)

Iodine and thyroid hyperplasia. I. Iodine content of human skimmed milk from goitrous and non-goitrous regions. R. G. TURNER (Amer. J. Dis. Children, 1934, 48, 1209—1227).—The I content of milk from mothers in goitrous regions was > that from non-goitrous regions. The Ca and inorg. P of milk from the former were > those from the latter during the first 3—4 months of lactation, but subsequently became lower. CH. ABS. (p)

Fat tolerance in hyperthyroidism. O. E. HEPLER (Arch. Int. Med., 1935, 55, 979—996).—Administration of thyroid to dogs, after causing a slight decrease, resulted in a considerable increase in blood-fat (I), blood-cholesterol (II) remaining normal. During a rest period immediately following, (I) and (II) increased greatly, then during a second period of thyroid administration both decreased somewhat, although they were still > normal. During hyperthyroidism the metabolism of the body may be at a higher level, thus requiring the maintenance of the (I) and blood-sugar also at a higher level. A. L.

Iodine metabolism in hyperthyrosis. L. SCHEFFER (Klin. Woch., 1934, 13, 1570—1572; Chem. Zentr., 1935, i, 588).—I excretion is in equilibrium with I intake in hyperthyrosis; a considerable proportion of the I is excreted in the fæces, which normally contain only very small quantities. In Basedow's disease, where the excretion is > the intake, the principal excretory organ is the kidney. Hence urinary and fæcal I determinations provide a means of distinguishing between hyperthyrosis and thyrotoxicosis. R. N. C.

Lipoidosis. S. J. THANNHAUSER (Klin. Woch., 1934, 13, 161—167; Chem. Zentr., 1935, i, 589—590).—A review. R. N. C.

Reaction of lipins in blood-leucocytes to fever and infection. E. M. BOYD (Surg. Gynecol. and Obstet., 1935, 60, 205—213).—The lipin content of leucocytes from persons recovering from fever was high; that from those who did not recover was low. CH. ABS. (p)

Influence of infection on tissue respiration. W. FREI and O. FROEBEL (Biochem. Z., 1935, 278, 1—10).—The O₂ utilisation of liver and kidney slices from guinea-pigs infected with fowl cholera, paratyphosis Gärtner, Rauschbrand's bacillus, etc. is > with slices of normal animals, but no relationship could be detected between respiration, clinical results, and body-temp. The respiration of slices from animals poisoned with the culture filtrates of these organisms and also of normal liver and kidney slices on addition of culture filtrates was increased. No essential difference was detected with aerobic and anaerobic organisms. P. W. C.

Treatment of cutaneous Streptococcus infections with intravenous cuprammonium sulphate. E. OTHAZ (Rev. assoc. med. Argent., 1934, 48, No. 336).—Injection with NaOBz or caffeine gave satisfactory results, but secondary effects were observed. CH. ABS. (p)

Hyperglycæmia and hypoglycæmia provoked in myxœdema. A. BAUDOUIN, E. AZÉRAD, and J. LEWIN (Compt. rend. Soc. Biol., 1935, 119, 688—

690).—Blood-sugar in two cases of myxœdema recovered after ingestion of glucose, but not after insulin (I). The so-called "hypoglycæmia troubles" appeared when hypoglycæmia due to (I) was relatively small, but not at higher vals., and hence are independent of the blood-sugar. R. N. C.

Blood-sugar in internal disease. F. W. LAPP and H. DIBOLD (Deut. Arch. klin. Med., 1934, 177, 40—47).—Variations in the fasting blood-sugar (I) were observed according to the time of day. In gastric, intestinal, and hepatic disease the fasting (I) averaged 70—110 mg. per 100 ml.; vals. were low in gastric and intestinal conditions and high in obesity. Under normal conditions fasting (I) shows a fall at noon: in duodenal ulceration, hyperchlorhydric gastritis, and intestinal conditions the noon and evening vals. were raised; in hypochlorhydric gastritis, achylia, and obesity these findings were reversed. The tolerance to glucose in the above conditions did not agree with the daily "profile" of the (I), being increased in the former and somewhat diminished in the latter group. Seasonal variations were detected in the fasting (I), the val. being max. during February to April and min. during the winter months. NUTR. ABS. (b)

Decrease in sodium chloride content of blood after vomiting. A. TORDAY (Orvosi Hetilap, 1934, 78, 959—961).—Ill effects of vomiting are caused not only by loss of fluid, but also by loss of Cl'. CH. ABS. (p)

Iron metabolism in infancy. Relation to nutritional anæmia. H. W. JOSEPHS (Bull. Johns Hopkins Hosp., 1934, 55, 259—272).—Infants up to 2 months old have a small negative Fe balance which subsequently changes to positive at approx. 6 mg. per month. Infection causes a negative Fe balance. An exclusive milk diet cannot cause severe anæmia in the absence of other factors disturbing Fe metabolism. CH. ABS. (p)

Thyroxine in infancy. J. C. PELLARANO and S. SCHERE (Semana méd., 1935, I, 133—143).—Thyroxine gave better results than thyroid extracts. CH. ABS. (p)

Elimination of the gonadotropic hormone of the anterior pituitary and of folliculin in mania, depression, and schizophrenia at puberty. W. OESTERREICHER (Wien. klin. Woch., 1934, 47, 1385—1388; Chem. Zentr., 1935, i, 586).—Folliculin elimination is considerably reduced in women with mania or depression, but in schizophrenia it is found only in hebephrenics. R. N. C.

Hyperglycæmia provoked in nephritics. F. RATHERY, P. DE TRAVERSE, and V. FARLEY (Compt. rend. Soc. Biol., 1935, 119, 386—389).—Hyperglycæmia after ingestion of glucose in nephritics is > in normal subjects, and more prolonged. There is no correlation between hyperglycæmia and glycosuria or increased blood-urea. R. N. C.

Ability of nephritic patients to deaminate and form urea from ingested glycine. E. KIRK (J. Clin. Invest., 1935, 14, 136—141).—Following ingestion of glycine, the increase in plasma-NH₂-N was greater in uræmic than in normal cases. The

return to predigestive levels also occurred more slowly. The delayed conversion into urea in uræmic cases is due to the retardation of the deaminising function rather than of the urea-forming reaction.

CH. ABS. (p)

Causes of the brevity of the hyperglycæmic effect produced by section of the four depressors in the dog. J. MALMÉJAC, E. DESANTI, and C. DUMAZERT (Compt. rend. Soc. Biol., 1935, 119, 731—733).—The brief hyperglycæmia following section of the depressors is due to increased secretion of adrenaline, which is rapidly corr. by increased insulin secretion. R. N. C.

Clinical significance of a very low concentration of urea in blood. A. E. OSTERBERG and N. M. KEITH (J. Lab. Clin. Med., 1934, 20, 141—144).—Low blood-urea vals. are associated with wasting diseases and with bilateral renal disease. In the latter, there may be increased excretion of urea by kidneys or a decreased production through disturbed N metabolism. CH. ABS. (p)

Salyrgan and ammonium chloride in cardiac œdema. I. HARRIS, E. L. RUBIN, and J. S. LAW-RANCE (Acta med. Scand., 1934, 83, 23—40; Chem. Zentr., 1935, i, 745—746).—Salyrgan diuresis is associated with hydræmia which is probably related to the decreased cation concn. of the serum. NH₄Cl-diuresis is associated with a concn. of blood. Serum-cations are reduced by NH₄Cl with restricted, and remain normal with excessive, amounts of fluid. A. G. P.

Calcium and phosphorus metabolism in osteomalacia. III. Effects of varying levels and ratios of intake of calcium to phosphorus on their serum levels, paths of excretion, and balances. S. H. LIU, R. R. HANNON, S. K. CHOU, K. C. CHEN, H. I. CHU, and S. H. WANG (Chinese J. Physiol., 1935, 9, 101—117).—In healing osteomalacia, serum- and faecal Ca \propto Ca intake. When Ca:P is high serum- and urine-P are low and faecal P and urine-Ca increase. On lowering the ratio, urine-Ca tends to disappear and -P to increase. P retention depends on Ca and P intake, but excess Ca can be retained without an equiv. amount of P for bone formation. H. G. R.

Guanidine and parathyroid glands. J. A. SAUNDERS (Biochem. J., 1935, 29, 1597—1598).—Guanidine (I) is not isolated from the blood of parathyroidectomised cats and dogs in tetany, nor is (I), injected into the operated animals, excreted any less rapidly than normally. H. D.

Action of the diet-factor J on the development of pneumonia in guinea-pigs. H. VON EULER, H. SÖDER, and M. MALMBERG (Z. Hyg. Infektionskr., 1935, 116, 672—682).—Guinea-pigs inoculated with pneumococci while on a complete basal diet containing vitamin-A, -B, and -D develop fatal bronchopneumonia. This is not avoided by administration of ascorbic acid, but is prevented by daily doses of lemon, blackberry, or elderberry juice, which contain factor J. R. N. C.

Chemo- and sero-therapy of pneumococcal pneumonia in the mouse. F. NEUFELD and W. A.

COLLIER (Z. Hyg. Infektionskr., 1935, 117, 129—136).—At early stages the effect of Au and immune-serum combined is > that of either alone. At later stages the combination is less effective, whilst the separate effects of Au and serum are increased.

R. N. C.

Changes in the distribution of fats in the cells of the corpus luteum of pseudo-gestation in rabbits. A. PERAUS (Compt. rend. Soc. Biol., 1935, 119, 771—772).—The distribution of fats in the corpus luteum in pseudo-pregnancy is the same as in pregnancy, but the activity of the corpus luteum is of short duration.

R. N. C.

Histidine secretion in pregnancy. B. BODÓ (Orvosi Hetilap, 1934, 78, 761—763).—A positive Kapeller-Adler reaction was obtained in pregnancy urines. Histidinuria is probably related to altered protein metabolism following disturbed liver functions in pregnancy.

CH. ABS. (p)

Renal rickets. H. A. SALVESEN (Acta med. Scand., 1934, 83, 485—500).—In a case of renal rickets (I) (boy aged 15 years) the urine had low sp. gr. Blood-urea (II) increased from 170 to 368 mg., serum-Ca (III) was 4.8—7 mg., and inorg. P 7 mg. per 100 ml., whilst plasma- CO_2 was 31.8 vols.-% and p_{H} 7.28. There was a reduction of 24 millimols. in total bases of the blood. Ca lactate and cod-liver oil by mouth produced a decrease in (II), an increase in (III), and temporary clinical improvement. (I) is due to Ca deficiency effected through phosphate retention. Parathyroid over-activity may be a factor.

NUTR. ABS. (m)

Rickets and spasmophilia. I, II, III. S. SIVE (Acta paediat., 1934, 17, 1—71, 157—183, 184—214).—There is frequently no alteration in the composition of cerebrospinal fluid in tetany. Manifest tetany may be present even with normal vals. for serum-Ca. It may occur in breast-fed infants when the breast-milk is low in Ca. The occurrence of rickets with low serum-Ca may be due to associated tetany.

NUTR. ABS. (m)

Thyroid in the pathogenesis of human rickets and tetany. Blood-iodine. A. NITSCHKE and H. DOERING (Acta paediat., 1933, 16, 473—479).—The blood of normal infants contained, on an average, 9.3×10^{-6} g. of I per 100 ml., but with rickets or tetany 2.9 and 2.8×10^{-6} g., respectively. The blood-I of such children after treatment with vitamin-D (I) rose from 2.4 to 8.8×10^{-6} g. Excess of (I) in rabbits caused a rise in blood-I well above normal. In rickets and tetany there was also a fall in basal metabolic rate. (I) may have an indirect, stimulating action on the thyroid.

NUTR. ABS. (b)

Production of calcæmia after intravenous injection of calcium gluconate in dogs with acute and chronic tetany. F. MATHIEU (Compt. rend. Soc. Biol., 1935, 119, 549—551).—After injection of Ca gluconate, calcæmia persists longer in latent than in acute tetany.

H. G. R.

Phosphorus retention and alkalosis in infantile tetany. N. MORRIS (Acta paediat., 1933, 16, 580—587).—Tetany, complicating rickets in children, may occur without excessive retention of P over Ca, and

excessive P retention may occur without signs of tetany. Alkalosis is not necessarily a concomitant of tetany or acidosis of active rickets. Acidosis induced by administration of NH_4Cl cures tetany probably by making available the body-store of Ca. No support is given to the view that tetany and rickets are due to disturbance in the acid-base balance of the body.

NUTR. ABS. (m)

Ammoniogenesis. Blood-ammonia in tetany from hyperventilation. G. POPOVICIU, G. BENETATO, and C. OPRISU (Compt. rend. Soc. Biol., 1935, 119, 443—444).—Blood- NH_3 increases in simple and adrenaline hyperventilation, but falls in that due to ergotamine. Acid-base equilibrium is shifted towards alkalosis, and blood-P falls.

R. N. C.

Non-protein-nitrogen content of serum and elimination of glycine during experimental tuberculosis. F. PEZZANGORA (Compt. rend. Soc. Biol., 1935, 119, 513—515).—After infection, the non-protein-N increases rapidly and gradually returns to normal; after injection of glycine, it falls rapidly and slowly returns to normal.

H. G. R.

Effect of the tuberculin reaction on metabolism of residual nitrogen, and curve of elimination of glycine in normal, tuberculous, or BCG-inoculated rabbits. F. PEZZANGORA (Compt. rend. Soc. Biol., 1935, 119, 727—730).—Residual N metabolism is unchanged by tuberculin in normal, slightly raised in BCG-inoculated, and considerably in tuberculous, rabbits.

R. N. C.

Blood-cholesterol in typhoid fever. H. SZPIDBAUM (Compt. rend. Soc. Biol., 1935, 119, 667—668).—The blood-cholesterol curve proceeds in the inverse sense to the temp. curve in typhoid fever.

R. N. C.

Effect of the gonadotropic hormone on blood-cholesterol and evolution of typhoid fever. H. SZPIDBAUM (Compt. rend. Soc. Biol., 1935, 119, 668—672).—Injection of the gonadotropic hormone of pregnancy urine in cases of typhoid fever produced increases in blood-cholesterol and falls of temp.

R. N. C.

Resistance of capillaries. II. Fall of capillary resistance in patients on gastro-intestinal diets, particularly ulcer diet, and its behaviour with vitamin-C. III. Improbability of avitaminosis-C as the ætiological factor in gastric ulcer. P. SCHULTZER (Acta med. Scand., 1934, 83, 544—554, 555—564; Chem. Zentr., 1935, i, 431; cf. A., 1934, 1389).—II. Capillary resistance falls in patients with gastric ulcer on a diet deficient in vitamin-C, and is restored to normal by -C.

III. The distribution of decreased capillary resistance in patients is apparently independent of the type of disease, which makes it improbable that -C deficiency is the ætiological factor in gastric ulcer.

R. N. C.

p_{H} of gastric juice in gastroduodenal ulceration. G. SELVAGGI (Policlin., 1934, 41, 674—684).—Before injection of histamine (1 mg.) the average p_{H} of the juice was about 1.75 in healthy persons and in persons with ulcers. After injection the vals. were about 2.6 and 1.12—2.67, respectively.

NUTR. ABS. (m)

Chemical and electrical properties of connective tissue. R. KELLER (Biochem. Z., 1935, 278, 447—453; cf. A., 1934, 1246).—The tissue is electro-negative. W. McC.

Distribution of electrolytes in a solution of albumin. L. AMBARD and C. DEVILLER (Compt. rend. Soc. Biol., 1935, 119, 575—576).—Distribution of Cl^- is not uniform, the concn. being max. in the intermicellary zone, and, in the micelles, inversely \propto their size. R. N. C.

Hofmeister's series and the grouping of ions. R. KELLER (Biochem. Z., 1935, 278, 454—459).—The diffusion of ions into and out of different parts of the animal organism and their ionic contents accord with the predominantly (biologically) electro-positive or -negative nature of the parts and suggest a classification of the ions similar to or identical with that of Hofmeister. Account must be taken of non-ionised electrolytes, however, and physiological concns. only considered. W. McC.

Relation of water and electrolytes to metabolism. H. A. DAVIS (Science, 1935, 81, 493—494).—The O_2 consumption of dogs is markedly increased by intravenous injection of isotonic solutions of 0.9% NaCl and 5% glucose solutions, the effect produced by glucose being the greater. The H_2O lost \propto the increase in O_2 consumption and metabolic rate. H_2O given by mouth increased the consumption only slightly and is retained longer than that given by vein. Repeated blood-letting lowered the metabolic rate and isotonic solutions were then retained for longer periods. The O_2 consumption of the body-tissues appears to be one of the fundamental factors concerned in H_2O regulation. L. S. T.

Effect of salt and sugar solutions on water exchange through the skin of frogs. B. B. RUBENSTEIN (J. Cell. Comp. Physiol., 1935, 6, 85—99).—Passage of H_2O through frog-skin may occur in both directions and is probably under nervous control. Mucus or slime covering the skin exerts an anti-osmotic effect which is abnormally high in relation to its osmotic activity. This effect corresponds with a "protective" action depending on some form of structural fixation of the protein on the cell surface. A. G. P.

Theory of permeability of thin films. J. F. DANIELLI and H. DAYSON (J. Cell. Comp. Physiol., 1935, 5, 495—508).—The permeability of living cells is explicable if the plasma membrane be assumed to consist of lipid matter. Such a membrane is capable of distinguishing mols. of different sizes and solubility characteristics and ions of different charge. Salt antagonism is also explained. A. G. P.

Permeability of living cells to heavy water. B. LUCKÉ and E. N. HARVEY (J. Cell. Comp. Physiol., 1935, 5, 473—482).—The rate of penetration of D_2O was the same as that of H_2O . High concns. of D_2O inhibited the development of fertilised cells. A. G. P.

Effect of temperature on osmotic equilibrium of living cells (unfertilised eggs of *Arbacia punctulata*). B. LUCKÉ (J. Cell. Comp. Physiol., 1935, 5,

465—471).—In the range 5.4—29.3° temp. had no effect on the osmotic equilibria. A. G. P.

Osmotic regulation in *Gunda ulvæ*. L. C. BEADLE (J. Exp. Biol., 1934, 11, 382—396).—*G. ulvæ* can live in any concn. of sea- H_2O down to 5%. Internal osmotic relationships are examined.

CH. ABS. (p)

Tension at the surface of mackerel-egg oil: nature of the cell surface. J. F. DANIELLI and E. N. HARVEY (J. Cell. Comp. Physiol., 1935, 5, 483—494).—The low interfacial tension between the aq. and the oily matter of the egg is attributable to the absorption of a globulin-like protein at the oil surface. The denaturation of egg-proteins at the oil- H_2O interface is examined and the nature of the cell surface is discussed. A. G. P.

Influence of variations of the cryoscopic depression of the external medium on that of the blood and urine of anodonts. M. FLORKIN (Bull. Acad. roy. Belg., 1935, [v], 21, 432—435).—Specimens of *Anodonta cygnea* were kept in fresh H_2O to which varying amounts of sea- H_2O were added. The blood and urine were always isotonic and became isotonic with all external media having a cryoscopic depression > 0.1 . W. R. A.

Relative values of cations in antagonising the action of hydroxyl ions on the premembrane system of the eggs of five echinoids. A. R. MOORE (J. Cell. Comp. Physiol., 1935, 5, 433—440).—The crit. concns. of cations adequate to preserve the membrane-forming capacity of eggs were determined in solutions of urea isosmotic with sea- H_2O at p_{H} 8.0. Vals. for alkali metals were similar for an individual species, but differed with the species. The effectiveness (1/crit. concn.) of Mg, Sr, Ca, and Ba, as chlorides, increased in the order named, and was much $>$ that of the alkali metals, whilst that of cobaltamine salts increased with valency, bivalent compounds being more effective than alkaline earths. A. G. P.

Binuclear cells in tissue cultures. J. ZWEIBAUM and M. SZEJNMAN (Bull. Acad. Polonaise, 1935, B, 37—48).—The formation of binuclear cells in cultures of fowl embryo *in vitro* is favoured by low p_{H} , excess of CO_2 , O_2 insufficiency, evaporation, hypertonia or hypotonia of the medium, and a temp. of 34—36°. Prolonged cultivation in the same medium favours binuclear cell production by formation of acid metabolic products. R. N. C.

Inducing agent in embryonic development. F. G. FISCHER, E. WEHMEIER, H. LEHMANN, L. JÜHLING, and K. HULTZSCH (Ber., 1935, 68, [B], 1196—1199).—Evidence is adduced in favour of the view that the inducing agent of unorganised materials may be an acid. Whether this is also the case with living agents is not established. H. W.

Linking of chemical changes in muscle. D. M. NEEDHAM and W. E. VAN HEYNINGEN (Nature, 1935, 135, 585—586).—Working with dialysed muscle extracts, it is shown that adenylic acid and creatine are essential intermediaries in the reaction by which muscle obtains its energy from the transformation of glycogen into lactic acid. W. P. R.

Permeability of the intestine *in vitro*. H. G. K. WESTENBRINK (Arch. néerl. Physiol., 1935, 20, 116—122).—The permeability to glucose of rat intestine immersed in Ringer's solution saturated with air at 37° increases with the time of immersion. The adaptation of glucose resorption through the intestinal walls in presence of carbohydrate in the food, observed *in vivo*, cannot be demonstrated *in vitro*, nor can the partial conversion of fructose into glucose during its passage through the walls. R. N. C.

Basal metabolism and prolonged exogenous hyperthermia. S. GELINEO (Compt. rend. Soc. Biol., 1935, 119, 645—647).—The basal metabolism of rats placed in high external temp. for long periods increases at the outset, but soon falls to normal, showing no further change throughout the period. R. N. C.

Metabolism in undernutrition. J. M. STRANG, H. B. MCCLUGAGE, and M. A. BROWNLEE (Arch. Int. Med., 1935, 55, 958—978).—During the treatment of human undernutrition by administration of diets of high calorific val. only very slight changes in the basal metabolism were observed. The levels of N metabolism were within normal limits, and the digestive and absorptive capacities of the patients were adequate. A. L.

Effect of prolonged feeding with tomatoes. A. SCHEUNERT and M. SCHIEBLICH (Z. Unters. Lebensm., 1935, 69, 127—131; cf. Z. Krebsforsch., 1931, 34, 348, 362; 1932, 36, 128).—No harmful consequences resulted from feeding rats for 1 year on a diet containing 42% of raw or cooked tomatoes. E. C. S.

Nutrition of *Flabellula mira*, Schaeffer. N. E. RICE (J. Elisha Mitchell Sci. Soc., 1934, 50, 39—40).—*F. mira* reproduces in media containing 20—150% of the total salts in normal sea-H₂O, rarely in 20% sea-H₂O, and not in distilled H₂O, or in solutions isotonic with sea-H₂O containing single salts or combinations of salts lacking in NaCl. Reproduction is normal in solutions containing MgCl₂ and CaCl₂ in proportions occurring in sea-H₂O and less frequent in those containing NaCl and either MgCl₂ or CaCl₂. The rate of reproduction is correlated with osmotic concn., and to the ratio of uni- to bi-valent cations. In the range examined p_H had no influence. CH. ABS. (p)

Metabolism of the lung-fish. I. Fasting metabolism in active fish. H. W. SMITH [with N. FARANACCI and A. BREITWEISER] (J. Cell. Comp. Physiol., 1935, 6, 43—67).—From the beginning of fasting the O₂ consumption falls in a regular (approx. logarithmic) manner for at least 300 days, reaching a val. of 10—20% of that in the fully-fed condition. The decline in O₂ consumption is related to a change in the nutritional state rather than to the wt. of the fish. The latter decreases more slowly as fat and protein are consumed. A. G. P.

Changes in the body constituents during metamorphosis of *Bombyx mori*. L. Y. YONEZAWA and K. YAMAFUJI (Bul. Sci. Fak. Terkult. Kjušu, 1935, 6, 126—138).—A detailed account is given of the variation during the life-cycle of the insect of its carbohydrate, fat, total and protein-N, total and

org. phosphate, ash, and Fe contents. During the spinning of the cocoon most of the protein is excreted and fat and glycogen are stored for utilisation in the pupal stage. Variations in the nature of the fat and protein in the various stages of development are also described. E. A. H. R.

Respiration of fragments obtained by centrifuging the egg of the sea urchin, *Arbacia punctulata*. R. SHAPIRO (J. Cell. Comp. Physiol., 1935, 6, 101—116).—The unfertilised but nucleated half of the cell consumes O₂ at a rate similar to that of the whole, whereas the pigmented half containing most of the yolk and echinochrome but no nucleus shows much higher vals. On fertilisation the O₂ consumption of the nucleated half increases, but that of the pigmented half is unchanged. A. G. P.

Relative effects of increased carbon dioxide tensions and decreased oxygen tensions on the heart frequency of young trout. C. HAYWOOD, T. O. STEVENS, H. M. TEWINKEL, and M. SCHOTT (J. Cell. Comp. Physiol., 1935, 5, 509—518).—Increased CO₂ tension causes a rapid decline in heart frequency of trout. A lowered O₂ tension produces a similar effect after a preliminary lag period. Rates of recovery from these effects are examined. A. G. P.

Mechanism of [tissue] respiration. A. SZENT-GYÖRGYI (Nature, 1935, 135, 1040).—A reply to criticism (cf. this vol., 777). L. S. T.

Mechanism of the Pasteur effect. K. DIXON and E. HOLMES (Nature, 1935, 135, 995—996).—KCl produces increased O₂ uptake in brain-tissue with substrates other than glucose (I), e.g., fructose and lactate, which cannot form lactic acid (II) in N₂. The rate of disappearance of lactate is increased by K. KCl also causes aerobic glycolysis of mannose which can form (II) anaerobically. The co-existence of aerobic glycolysis and increased respiration with (I), and the slight action of O₂ on the glycolysis of normal cells, is probably due to a change in the permeability of the cell-membrane which limits the rate at which (I) can reach the cell-enzymes. Inhibition of the Pasteur effect consists of a removal of this limitation, and the increase in permeability results in increased rates of respiration and (II) formation. O₂ and Ca decrease this permeability. Rb and Cs have a similar effect to K in causing aerobic glycolysis. L. S. T.

Metabolism of normal and tumour tissues. XIII. Neutral salt effects. F. DICKENS and G. D. GREVILLE (Biochem. J., 1935, 29, 1468—1483).—Alkali chlorides when added in 0.1M concn. to Ringer's solution increase the respiration of rat brain-tissue, the order of activity being Li, Na < Rb, Cs, K. KCl increases the glucose oxidation, but decreases the anaerobic glycolysis. The effects on the brain metabolism of leaving out, in turn, various cations of the solution are described. Neutral salt effects on brain metabolism are ascribed to changes in the colloidal state of the protoplasm, and the similarity between control of brain metabolism by changes in the medium, and the control of muscle contraction is pointed out. J. N. A.

Effect of high-protein diet on arterial pressure in cases of hypertony. I. HARRIS, C. N. ALFRED,

and A. G. H. ENGLISH (Lancet, 1935, i, 1327—1328).—When a high-protein diet does not raise the blood-pressure there is an increase of non-protein-N, and when it raises the blood-pressure conspicuously non-protein-N does not increase but may even fall. When the blood-pressure falls, non-protein-N increases.

L. S. T.

Amino-acid composition of important food-proteins. I. Theoretical. A. E. SCHARPENAK. II. Method of determining the amino-acid composition of proteins. III. Amino-acid composition of meat-proteins (beef). O. N. BALASCHOVA, V. V. LVOVA, E. M. SOLOVEEVA, and A. E. SCHARPENAK (J. Physiol. U.S.S.R., 1934, 17, 264—267, 268—276, 277—286; cf. this vol., 652).—II. Hydrolysed proteins were extracted with BuOH prior to fractionation.

III. Analytical data are given. Cystine vals. are low (1.2%). CH. ABS. (p)

Biological value of proteins and the digestibility of food constituents of mixed vegetarian diets containing processed wheat brans. S. WAN (Chinese J. Physiol., 1935, 9, 125—140).—15% of bran does not affect the biological val. or digestibility of the other constituents, the biological val. being increased slightly if processed bran is used. On reducing the protein to 10% both biological val. of the protein and digestibility of the fat and carbohydrate are increased, but digestibility of the ash and fibre is decreased. All bran diets gave fairly good growth, reproduction, and lactation.

H. G. R.

Metabolism of amino-acids. III. Deamination of amino-acids. H. A. KREBS (Biochem. J., 1935, 29, 1620—1644).—The enzymic system catalysing the deamination of the natural ("l") NH_2 -acids is different from that catalysing the deamination of the non-natural "d"-acids, in that the former system is destroyed by drying, cannot be extracted, and is inhibited by octyl alcohol and 0.01M-KCN, whilst the latter is not destroyed by drying, is readily extracted from fresh or dried tissue by aq. solutions, and is not affected by octyl alcohol or KCN. The activity of the "d"- and "l"- NH_2 -acid deaminases under varying conditions, and their occurrence in various tissues and animals, is investigated. The "l"- NH_2 -acid deaminase is active in ground tissue when suspended in a small vol. of fluid, but activity disappears on dilution, approx. \propto the extent of dilution. The cell respiration shows a similar sensitivity to dilution. The effect of dilution is explained on the assumption that a ternary collision plays a rôle in the reaction. The deamination of l- and d- NH_2 -acids in kidney slices is inhibited by substances which can be oxidised by kidney. If two different substances, each of which causes an increase in O_2 consumption, are added together to kidney or yeast, no summation of the effects on the O_2 uptake ensues, the substrates competing for the O_2 and displacing each other. The process of activation of O_2 is identical for all substrates which show no summation.

P. W. C.

Synthesis of dipeptides with an amino-group in a serine residue. E. ABDERHALDEN and A.

BAHN (Z. physiol. Chem., 1935, 234, 181—195; cf. A., 1933, 1063).—Advantage is taken of the fact that N-Bz derivatives of NH_2 -acids and peptides vary greatly in their resistance to acid hydrolysis (e.g., with 10% H_2SO_4 for 3 hr. at 70—80°) in the separation of the constituents of mixtures (e.g., of aspartic and glutamic acids) and in the synthesis of peptides containing a serine residue, this residue having the free NH_2 group. The peptides are identified by treatment with PhSO_2Cl and hydrolysis of the product to benzenesulphonylserine and the NH_2 -acid with which it was combined. dl-Leucyl-dl-serine treated with MeOH at 0° and then (3 days) with MeOH saturated with NH_3 gives the anhydride, m.p. 224°, which with 10% H_2SO_4 (4 days) yields dl-seryl-dl-leucine, m.p. 216° (benzenesulphonyl derivative). Similarly glycyl-dl-seryl anhydride, m.p. 218—220°, gives dl-serylglycine (benzenesulphonyl derivative). 1 mol. of serine reacts with dicarbobenzyloxytyrosyl chloride (I) to give di(dicarbobenzyloxytyrosyl)serine (II), m.p. 158—159°, $[\alpha]_D^{20} +22.5^\circ$ in 20% HCl [no (II) is produced if 2 mols. of serine are used], and dicarbobenzyloxytyrosylserine (III). (III) on reduction (H_2 -Pd) gives l-tyrosyl-dl-serine, which yields the anhydride (IV), m.p. 253—255°, as before. dl-Seryl-l-tyrosine (dibenzenesulphonyl derivative) is obtained from (IV) by acid hydrolysis (alkaline hydrolysis gives tyrosylserine). (II) is rapidly hydrolysed by erepsin and less rapidly by trypsin. (III) on treatment with erepsin gives l-tyrosyl-d-serine, $[\alpha]_D^{20} +18^\circ$ in 20% HCl, but is not attacked by trypsin. The anhydride from l-tyrosyl-l-serine on acid hydrolysis gives l-seryl-l-tyrosine, m.p. 293—298°, $[\alpha]_D^{20} +27.5^\circ$ in 20% HCl. 2 mols. of (I) with 1 mol. of tyrosine give di(dicarbobenzyloxytyrosyl)tyrosine, reduced (H_2 -Pd) to dityrosyl-tyrosine (hydrochloride), which readily decomposes into tyrosine and tyrosyltyrosine. W. McC.

Blood-arginine and growth. M. REISS, L. SCHWARZ, and F. FLEISCHMANN (Z. physiol. Chem., 1935, 234, 201—207).—100 c.c. of normal rabbit blood contain 5—7 mg. of free arginine (I). This amount is reduced to about half in pregnant rabbits (normal vals. restored *post partum*). Rabbits with carcinoma and rats with sarcoma have diminished amounts of (I) in their blood. In virgin rabbits (but not in those from which the ovaries have been removed) administration of the hormone of the anterior lobe of the pituitary causes decrease in blood-(I), but the normal vals. are then attained if the ovaries are removed. Intravenous injection of arginase activators (cysteine, glutathione, FeCl_2) causes decrease in blood-(I). W. McC.

Adrenaline synthesis *in vitro* under physiological conditions. W. SCHULER and A. WIEDEMANN (Z. physiol. Chem., 1935, 233, 235—256).—Slices of the surviving adrenal of the guinea-pig can synthesise adrenaline (I) [or a substance reacting as (I)] from tyramine, but not from dihydroxyphenylalanine or phenylhydroxyethylamine. The (I) was determined by the Folin reaction using the spectrophotometer and in some cases was identified by the biological method (effect on blood-pressure). The adrenal medulla is active, but not the cortex. Tyramine is probably synthesised in another organ,

possibly the kidney. The synthesis is but little affected by the concn. of the substrate or the amount of tissue employed, but depends almost entirely on the synthetic power of the sample of tissue, which varies widely with different samples and is a vital function of the cell.

J. H. B.

Metabolism of monomethyltryptophans. W. G. GORDON and R. W. JACKSON (J. Biol. Chem., 1935, **110**, 151—164; cf. A., 1929, 1485; Matsuoka *et al.*, A., 1931, 513).—3-Indolyl-5-(1-methylhydantoyl)methane, m.p. 213—214° (obtained from the product of interaction of 3-indolealdehyde and 1-methylhydantoin by reduction with Na-Hg), when boiled with aq. Ba(OH)₂ gives α -methylamino- β -3-indolylpropionic acid (I), m.p. 297° (decomp.) [picrate, m.p. 186° (decomp.)]. Although 5- and 2-methyltryptophan cannot replace tryptophan (II) in the diet of rats, (I) stimulates their growth, although not so efficiently as does (II), when they are subsisting on a diet deficient in (II).

W. McC.

Organs which regulate indolæmia and indoxylæmia after injection of indole. B. A. HOUSSEY, V. DEULOFEU, and P. MAZZOCCO (Compt. rend. Soc. Biol., 1935, **119**, 875—876).—Indole (I) is transformed into indoxyl (II) in the liver. Only one third of the (I) introduced into the circulation can be recovered as (II).

H. G. R.

Indoxylogenic substances in the organism. B. A. HOUSSEY, V. DEULOFEU, and P. MAZZOCCO (Compt. rend. Soc. Biol., 1935, **119**, 877—879).—Substances which increase indoxylæmia when introduced into the blood are tabulated.

H. G. R.

Fate of nicotine in fresh liver. A. WENUSCH (Biochem. Z., 1935, **278**, 349—350).—In 24 hr. at 37° fresh minced pig-liver has no effect on nicotine, which is recovered unchanged.

W. McC.

Diffusion equilibria for the isolated frog's kidney. II. Urea. E. J. CONWAY and F. KANE (Biochem. J., 1935, **29**, 1446—1458).—Active isolated frogs' kidneys can concentrate urea from an external urea-Locke solution, whereas inactive kidneys (urea-cyanide-Locke) do not possess this power. Determination of urea in the frog's kidney by the xanthidrol and the urease methods gave identical results.

P. W. C.

Nitrogen catabolism in invertebrates. IV. Synthesis of uric acid in *Helix pomatia*. E. BALDWIN (Biochem. J., 1935, **29**, 1538—1546).—Surviving slices of the hepatopancreas of *H. pomatia* convert a mixture of urea and tartronic acid into uric acid. It is suggested that urea is synthesised in *H. pomatia* by means of the ornithine cycle, and then converted into uric acid probably by way of dialuric acid.

J. N. A.

Endogenous nitrogen metabolism of hypophysectomised rats. B. BRAIER and R. MOREA (Compt. rend. Soc. Biol., 1935, **119**, 881—882).—On a protein diet, urinary N does not vary, but the creatinine is < normal. On a protein-free diet, endogeneous protein catabolism is < normal.

H. G. R.

Cholesteryl esters as a mechanism of fat metabolism. H. PETERSILIE (J. Lab. Clin. Med.,

1934, **20**, 144—149).—Abnormal variations in the % of cholesteryl esters in blood, in cases of liver and kidney diseases, depend on conditions of diet and therapy, and are closely related to carbohydrate metabolism.

CH. ABS. (p)

Fate of vegetable sterols in the animal organism. II. H. DAM and U. STARUP (Biochem. Z., 1935, **278**, 342—344; cf. this vol., 113).—In the dog, intravenously injected vegetable sterol is excreted in the faeces. In the rat, the amount excreted is 82% of that injected. New-born rats of a mother receiving injections of the sterol excrete no sterol in the faeces.

W. McC.

Fat metabolism. B. FLASCHENTRÄGER and K. BERNHARD (Naturwiss., 1935, **23**, 356).—Ingestion of Me decoate by dogs fed on a diet including coconut oil and butter is followed by the occurrence of sebatic (I) and suberic acids in the urine. Et, but not Me, dodecoate behaves similarly, but to a smaller extent, whilst Na decoate and cooking-fat yield (I). The bearing of the data on ω -oxidation is discussed (cf. A., 1934, 1027).

F. O. H.

Fat absorption. Its value as an index of function of the liver. M. SULLIVAN and J. A. B. FERSHTAND (Arch. Int. Med., 1935, **55**, 834—841).—Using the Rückert method, the average total serum-lipin of man in the fasting state was 0.576 c.c. per 100 c.c., which was not affected by body-wt. or fasting. The absorption curves, after ingestion of cotton-seed oil, were characteristic for diseases of the liver and for diabetes.

H. G. R.

Is it possible, in a balanced ration, to substitute for glycerides the corresponding fatty acids? B. LECOQ (Compt. rend., 1935, **200**, 1979—1980).—Oils (castor, olive, etc.) cannot be replaced by mixtures of glycerol and the fatty acids in a pigeon ration, without nutritional disturbance, even when yeast is supplied to provide vitamin-B.

A. G. P.

Comparative value of fat and carbohydrate in the utilisation of protein. E. F. TERROINE (Bull. Soc. Chim. biol., 1935, **17**, 690—692).—A criticism of the results of Maignon (this vol., 388).

A. L.

Comparative value of fat and carbohydrate in the utilisation of protein. F. MAIGNON (Bull. Soc. Chim. biol., 1935, **17**, 693—695).—A reply (cf. preceding abstract).

A. L.

Influence of lipin on the carbohydrate metabolism. I. Changes in the content of glucose and lactic acid in blood and of the latter in urine of rabbits caused by the injection of cholesterol and lecithin. N. HOSAKA (Japan. J. Exp. Med., 1934, **12**, 455—495).—Starvation of rabbits caused a decrease in the blood- and urinary lactic acid (I) and in the blood-sugar (II). Injection of cholesterol (III) during starvation caused the blood-(I) first to rise and then gradually to fall, and the urinary (I) and (II) to decrease. Injection of lecithin (IV) produced a fall in blood-(I), and an increase in the urinary (I) and (II). Injection of these lipins into rabbits which were being fed produced no changes. The results produced by injection of (III) and (IV) irradiated with X-rays or a quartz lamp were also investigated.

NUTR. ABS. (b)

Mutual displacement of glycogen and fat in liver cells. S. NAGAO (Tôhoku J. Exp. Med., 1934, 24, 555—564).—In rabbits on a normal diet, intravenous injection of fat caused a complete disappearance of liver- and muscle-glycogen. The fat content of the liver and, to a smaller extent, of the muscles was raised. Increased deposition of liver-glycogen following intravenous injection of glucose was accompanied by a decrease in liver-fat. With simultaneous administration of fat and glucose there was no significant change. NUTR. ABS. (b)

Law of mass action and specific dynamic action of carbohydrates. M. WIERZUCHOWSKI (Compt. rend. Soc. Biol., 1935, 119, 436—438).—The sp. dynamic heat increase in the dog on continuous injection of glucose \propto the rate of injection when this is small; it increases less rapidly than the rate, reaching a steady max. at 6 g. per kg. per hr. The ratio of the heat evolved by all the glucose assimilated to sp. dynamic heat increase is const. for the whole range of rates of assimilation. The sp. dynamic action of glucose is almost entirely of oxidative origin when the rate of injection is > 1 g. per kg. per hr. R. N. C.

Mechanism of alimentary hyperglycæmia. I. Blood-sugar after oral and intraduodenal glucose administration. II. Rate of absorption of glucose in the small intestine. III. Sugar content of blood in various vessels after intraduodenal glucose administration. F. MEYTHALER and H. SEEFISCH (Arch. exp. Path. Pharm., 1935, 178, 461—466, 467—469, 470—479).—I. Oral or intraduodenal administration of glucose to men and dogs is followed successively by an alimentary pre-hyperglycæmia (1—5 min. duration), pre-hypoglycæmia (1—5 min.), and hyperglycæmia (approx. 1 hr.) and finally a post-hyperglycæmic hypoglycæmia (approx. 1 hr.).

II. Glucose intraduodenally administered to narcotised (somnifen) dogs is rapidly absorbed. The portal vein blood-sugar (I) curve indicates that the absorption is related to the rhythmic function of the intestinal mucous membrane. The initiation of absorption is independent of the concn. of glucose, whilst its rapidity and extent are not related to the fasting val. of the (I).

III. Intraduodenal administration of glucose to dogs produces an immediate (within 1 min.) increase of the portal (I), the rate of absorption being independent of the nutrition of the animal. The portal (I) is $>$ that of the hepatic vein, whilst the difference between the latter and that of the inferior vena cava represents the peripherally retained sugar. The variations in (I) immediately following absorption are described and the mechanism involved is discussed. F. O. H.

Metabolism of galactose. I. Phosphorylation during galactose fermentation and its relation to the interconversion of the hexoses. G. A. GRANT (Biochem. J., 1935, 29, 1661—1676).—The sp. mechanism developed in certain yeasts during the process of adaptation on galactose (I) and required for fermentation of (I) is largely destroyed when the adapted yeast is treated with PhMe or

dried or used for the prep. of cell-free juice. During the fermentation of (I) by adapted yeast, chiefly 1 : 6-diphosphofructofuranose together with diglucose phosphate, trehalose monophosphate, and possibly smaller amounts of Robison's ester accumulate in solution, but no evidence was obtained of the production of a (I) phosphate and moreover synthetic (I) 6-phosphate was not readily fermented by this yeast. The polysaccharides synthesised by the adapted yeast when grown on (I) consist mainly of glucose and to a smaller extent of fructose and mannose. The mechanism of the transformation of (I) into the other hexoses is discussed. P. W. C.

Gastric and duodenal function in relation to sugar tolerance tests. M. PELLEGRINI (Atti R. Accad. Fisioer. Siena, 1934, 11, 478).—Changes in motor and secretory activity of the stomach are reflected in changes in the level of blood-sugar (I) after ingestion of sugar. Hypersecretion and hypermotility frequently give a curve showing an early max. concn. of (I), whilst hypo- and a-chlorhydria give a retarded rise in (I). The shape of the (I) curve is very variable in cases of gastric and duodenal ulcer. NUTR. ABS. (b)

Post-mortem glycogenolysis in rabbit liver. H. R. NOLTIE (Quart. J. Exp. Physiol., 1934, 24, 261—270).—The rate of glycogenolysis in rabbit liver incubated at 38° is not determined by the initial glycogen %. Although "free sugar" increases markedly, lactic acid rises but little, and the two together are always insufficient to account for the glycogen loss. The results are similar whether the glycogenolysis occurs in air or in N₂.

NUTR. ABS. (b)

Effect of prolonged muscular work on the metabolism of carbohydrates introduced at constant velocity into the circulation. M. WIERZUCHOWSKI, T. CHMIELEWSKI, A. GOSTYNSKA, and H. FISZEL (Compt. rend. Soc. Biol., 1935, 119, 433—435).—The rate of assimilation of glucose in the dog is increased by muscular work; maltose assimilation also increases proportionally with the rate of hydrolysis by blood-maltase. Assimilation of sucrose is slightly diminished, whilst that of fructose is unaffected. R. N. C.

Comparative determination of the rate of oxidation of alcohol in the organism by blood-alcohol curves and direct measurement. E. LE BRETON (Compt. rend. Soc. Biol., 1935, 119, 568—571).—In the case of EtOH ingested or introduced intraperitoneally in rabbits, determination of the rate of oxidation by blood-EtOH curves is not trustworthy. Widmark's results for man are only approx. R. N. C.

Effect of the concentration of alcohol attained at the surface of the tissues on its rate of oxidation *in vivo*. E. LE BRETON (Compt. rend. Soc. Biol., 1935, 119, 572—575).—In rats and mice the rate of oxidation of EtOH is independent of the blood-EtOH (I); in the guinea-pig, cock, and rabbit, it decreases with (I). R. N. C.

Transformation of natural *l*-phosphoglyceric acid by animal tissue. II. Conversion into

phosphopyruvic acid. H. K. BARRENSCHEEN, G. LORBER, and W. MEERAUS (Biochem. Z., 1935, 278, 386—395; cf. this vol., 521).—Since Hg^{II} salts convert phosphopyruvic acid (I) into AcCO_2H (II), (I) and (II) can be determined in presence of each other as dinitrophenylhydrazones. In fresh muscle extract and pulp and kidney pulp (rabbit) and in human erythrocytes the conversion of phosphoglyceric acid (III) into (I) rapidly (< 30 min.) reaches its max., but the conversion of (I) into (II) proceeds much more slowly. When $\text{HgCl}_2 + \text{HCl}$ are used to deproteinise, more H_3PO_4 is found than when $\text{CCl}_3\cdot\text{CO}_2\text{H}$ is used, the excess corresponding with the amount of (II) produced from (I). Only part of the easily hydrolysed phosphate produced during transformation of (III) is accounted for by production of (I).

W. McC.

Production of phosphoric esters in the intestinal mucous membrane during resorption of sugars, glycerol, [and fat]. L. LASZT and H. SÜLLMANN (Biochem. Z., 1935, 278, 401—417; cf. this vol., 521).—The amount of acid-sol. org. phosphate in the rat intestine is greatly (about 100%) increased by administration of glucose, fructose, galactose, glycerol, and olive oil and increased to a smaller extent by that of sorbose. No increase follows administration of xylose, arabinose, or mannose. Most of the org. phosphate produced is easily hydrolysed. Hence the resorption of carbohydrates (and glycerol) and fats in the intestine is associated with phosphorylation.

W. McC.

Interference of hepatic fructolysis and adrenaline glycogenolysis in a normal dog at three states of assimilation. M. WIERZUCHOWSKI and F. SEKURACKI (Compt. rend. Soc. Biol., 1935, 119, 661—664).—Blood-lactic acid (I) in the normal dog on continuous injection of fructose reaches different levels according to the diet previously administered to the animal; (I) after protein $<$ after carbohydrate (II) $<$ after starvation. All three levels are raised proportionately by adrenaline (III). Urinary lactic acid also reaches similarly dependent levels, but the max. effect with (III) is obtained after the (II) diet. Glycogenolysis also plays a part in lactic acid increase.

R. N. C.

Significance of lactic acid in heart metabolism. A. RÜHL (Klin. Woch., 1934, 13, 1529—1534; Chem. Zentr., 1935, i, 592—593).—The intact heart in a heart-lung prep. takes up lactic acid (I) from the coronary blood in normal conditions and partial O_2 deficiency, but liberates it in complete anoxæmia due to HCN . (I) is also consumed in $\text{CH}_2\text{I}\cdot\text{CO}_2\text{H}$ poisoning. Glucose is taken up only in the hyperglycæmic state. Only 30% of the O_2 consumed is accounted for by oxidation of (I) and carbohydrates. In an insufficient heart an increase of (I) uptake corresponds with a decreased O_2 consumption.

R. N. C.

Effect of diet on ketogenesis. H. TRIMBACH (Arch. internat. Physiol., 1934, 39, 434—461).—An exclusive fat diet produces a greater ketonuria than does a strict carbohydrate diet in the rat and pig, but not in the dog. Proteins are not ketogenic. A diet of fat and carbohydrate reduces the ketonuria caused by an exclusive fat diet.

NUTR. ABS. (m)

Effect of the hydrogen carbonate ion on muscle metabolism. E. M. BERKOVICH (J. Physiol. U.S.S.R., 1934, 17, 383—388).—The lactic acid content of muscle is increased by CO_2 and HCO_3' , but not by CO_3'' .

CH. ABS. (p)

Distribution of potassium in cells and the changes taking place during stimulation. V. BUREAU (Arch. internat. Physiol., 1934, 39, 311—328).—The reagent used by Macallum to demonstrate the presence of K in tissues is hypertonic and toxic, so that the cells are stimulated and the distribution of K is changed before pptn. of the K can occur. The reagent was therefore modified to make it isotonic and to ensure rapid fixation of the tissues. Under such conditions, when the cell was at rest, the intracellular K was most abundant close to the cell-membrane and the nuclear membrane. K was also distributed uniformly, but in smaller concn., throughout the cytoplasm and nucleoplasm. In striped muscle, K was condensed on the cell-membrane and inside the anisotropic discs. There was no K in the isotropic discs. Stimulation of cells led to passage of K to the outside of the cell.

NUTR. ABS. (b)

Sodium and calcium requirements of the animal organism (*Drosophila*). D. L. RUBINSTEIN, V. LVOVA, and H. BURLAKOVA (Biochem. Z., 1935, 278, 418—427; cf. A., 1934, 1035).—*D. melanogaster* lives and reproduces normally when almost completely deprived of Na and Ca (95% and 99% removed) by propagation on a medium (purified yeast, salts, and glucose on SiO_2 gel) free from Na and Ca.

W. McC.

Metabolism of copper. E. J. COULSON, R. E. REMINGTON, and K. M. LYNCH (U.S. Dept. Commerce, Bur. Fisheries Invest. Rept., 1934, 23, 1—12).—Prolonged feeding of Cu (525 mg. per kg. of diet) in the form of "green" oysters or CuSO_4 had no toxic effect on rats. Oysters fed in conjunction with a high-Cu diet inhibited storage of Cu in the liver.

CH. ABS. (p)

Preparation of possible antimalarial agents. R. F. A. ALTMAN (Chem. Weekblad, 1935, 32, 345).—Derivatives of 6-methoxyquinoline with $\text{NH}\cdot[\text{CH}_2]_n\cdot\text{NET}_2$ in position 8 show antigametocidal properties similar to those of "plasmoquin." Derivatives of quinine containing substituents in the sec-OH and $\cdot\text{CH}\cdot\text{CH}\cdot$ groups have no therapeutic activity.

S. C.

Derivatives of 8-aminoquinoline as anti-malarials.—See this vol., 989.

Identity of the reducing substance in the urine of normal persons after the ingestion of amidopyrine. M. ENKLEWITZ (J. Pharm. Exp. Ther., 1935, 54, 100—104).—A reducing substance appearing in urine after the ingestion of amidopyrine (I) has been identified as the glycuronate of (I).

M. T.

Rôle of amidopyrine in the ætiology of granulocytopenia with special reference to its chemical structure. L. F. HERZ (J. Lab. Clin. Med., 1934, 20, 33—40).—Amidopyrine is a very frequent cause of granulocytopenia. Its toxicity is due to the imido-group and its action resembles that of $\text{NHPh}\cdot\text{NH}_2$.

CH. ABS. (p)

Reaction of the blood-vessels. I. Electrical stimulation. II. Influence of various medicaments on electrical excitation. III. Influence of various nerve or muscle poisons on electrical excitation. IV. Influence of paralysing drugs on electrical excitation. V. Influence of stimulative drugs on electrical excitation. Y. KOSUGE (Acta Schol. Med. Kyoto, 1934, 17, 22—26, 27—29, 123—131, 132—136, 137—145).—I. The technique is described.

II. Codeine phosphate decreased electrical response. Theocin Na acetate in small concns. (to 0.01%) increased and in higher concns. decreased electrical stimulation.

III. Atropine, eserine, cocaine, and nicotine decreased and Ba(ClO₃)₂ increased response. Pilocarpine and adrenaline in low concns. had a positive and in large proportions a negative effect.

IV. Morphine, Na phenobarbital, urethane, dial, and chloral hydrate caused a decrease in response.

V. Increased response followed treatment with caffeine, NaOBz, diuretin, gadamin, digifolin, strophanthin, pituitrin, or EtOH. Strychnine had the opposite effect. CH. ABS. (p)

Action of pilocarpine group on alkali reserve and blood-sugar. A. M. PREOBRASHENSKI (J. Physiol. U.S.S.R. 1934, 17, 886—895).—Intravenous injection of pilocarpine alkaloids into dogs increases blood-sugar and lowers the alkali reserve. Eserine, pilocarpine, and arecoline were the most active in this respect. A. G. P.

Vasodilating action of quinine; cardiovascular effects of quinine phenylethylbarbiturate. H. BUSQUET and C. VISCHNIAC (Compt. rend. Soc. Biol., 1935, 119, 503—506).—The contractions of the heart are increased and blood-pressure is lowered. H. G. R.

Absorption of drugs through oral mucosa. R. P. WALTON and C. F. LACEY (J. Pharm. Exp. Ther., 1935, 54, 61—76).—The ratios of sublingual dosages to similarly effective subcutaneous dosages as determined on dogs are as follows: Na pentobarbital (I) 1:1; apomorphine (II) 2:1; strychnine 4:1; atropine (III) 8:1; morphine (IV) 10:1; dilaudid (V) 15:1; codeine, > 15:1. No distinct effect was produced by sublingual application of adrenaline (VI) and insulin, even in large doses. With alcoholic solutions there was an increase of absorption of (III). With men, results comparable with those produced in dogs were obtained for (I)—(VI). M. T.

Metabolic action of strophanthin on the warm-blooded heart. B. WEICKER (Arch. exp. Path. Pharm., 1935, 178, 524—533).—With the perfused cat's heart, therapeutic doses of strophanthin do not affect the total acid-sol. PO₄ content, whilst toxic doses decrease phosphagen (I), adenylypyrophosphoric acid (II), and free adenylic acid (III). Stimulation of work output by the impaired heart may produce aerobic resynthesis of (I) followed by that of (II) and (III). Transient anaerobic increase in work output increases (I) practically to normal vals.; resyn-

thesis of (II) or (III) does not occur. The mechanism of the cardiac action of *Digitalis* preps. is discussed.

F. O. H.

Distribution of therapeutic substances in various parts of the central nervous system and their micro-determination in tissues. I. Scopolamine and atropine. F. VEIT and M. VOGT. II. Quinine and mezcaine. M. VOGT. III. apomorphine and bulbocapnine. IV. Strychnine. F. VEIT. V. Barbituric acid derivatives. VI. Chloral hydrate. M. VOGT (Arch. exp. Path. Pharm., 1935, 178, 534—559, 560—576, 577—592, 593—602, 603—627, 628—638).—I. The determination of scopolamine (I) and atropine (II) (< 10⁻⁴ and 10⁻⁴ mg., respectively) in brain-tissue (2 g.) is described. Administration to dogs and cats is followed by a transient period during which the greatest concn. occurs in the cell-rich parts of the nervous tissue; the distribution then becomes more equalised. Finally (I) and (II) disappear from the nervous tissue and appear in liver, kidney, and blood.

II. A micro-extraction method for quinine and mezcaine (β-3:4:5-trimethoxyphenylethylamine) in tissue is described. Following injection into animals their distribution in nervous and other tissues is similar to that of (I) and (II).

III. apomorphine and bulbocapnine (method of determination in tissues given) behave similarly to (I) and (II). The liver content attains vals. > those of the brain.

IV. The distribution of strychnine (method of determination in tissues given) in animals in which the tolerated dose is increased by Et₂O narcosis is similar to that of (I) and (II), marked preferential localisation occurring in certain parts of the nervous system. The content in liver and kidney is > that of brain and, to a greater extent, that of blood. Only traces occur in the cerebrospinal fluid.

V. The equalisation of distribution of dial and phanodorm in nervous tissue occurs more rapidly than that of veronal, the irregular distribution phase of which is detected with difficulty. The narcotic effect of each ∝ the content in the brain. The content of liver or kidney is < that of the brain, whilst small amounts occur in the cerebrospinal fluid.

VI. The micro-determination of chloral hydrate by reduction to Cl' (Zn-AcOH) followed by Volhard titration is applied to nervous tissue. Following administration to cats or dogs, the content in nervous tissue rapidly attains a max. and then diminishes, during which period the distribution in various parts is irregular. Only traces appear in the cerebrospinal fluid. F. O. H.

Respiratory effects of morphine, codeine, and related substances. IV. Effect of α-monoacetylmorphine, monoacetyldihydromorphine, diacetylmorphine (heroin), and diacetyldihydromorphine on the rabbit. C. I. WRIGHT and F. A. BARBOUR (J. Pharm. Exp. Ther., 1935, 54, 25—33).—α-Mono- and di-acetylmorphine have very nearly the same effect on the respiration of the rabbit. A dose of 0.03 mg. per kg. definitely decreases the respiratory rate, minute vol., and the response to CO₂

stimulation. The hydrogenated derivatives of acetylmorphines are much less effective as respiratory depressants. > 0.1 mg. of mono- or di-acetyldihydromorphine is required to decrease the minute vol. and to change significantly the response to CO_2 stimulation. Also the rate of O_2 consumption, the heart rate, and rectal temp. are more strongly affected by the above acetylmorphine compounds than by their hydrogenated derivatives. M. T.

Motor effects of morphine and some derivatives on Thierry fistulæ. R. P. WALTON and C. F. LACEY (J. Pharm. Exp. Ther., 1935, 54, 53—60).—The min. dilauid (I) dose producing a definite spastic effect is about $1/30$ the min. dose of morphine (II) and $1/300$ that of codeine (III). The abs. doses producing a 20-min. spastic period are respectively 0.01, 0.3, and 3.0 mg. per kg. body-wt. There is no indication of a connexion between the initial stimulating effect and the constipating effect of (I). It does not produce prolonged periods of spasticity to the same degree as (II) and (III). M. T.

Cardiostimulant effect of Japan camphor: *d-trans-7-aldehydopocamphor* as the true active substance.—See this vol., 865.

Diuresis following the administration of salyrgan; its effect on the specific gravity, the total nitrogen, and the colloid osmotic pressure of the plasma of normal and oedematous dogs. A. H. BRYAN, W. A. EVANS, jun., M. N. FULTON, and E. A. STEAD, jun. (Arch. Int. Med., 1935, 55, 735—744).—In normal dogs the effect of salyrgan was slight, but in oedematous dogs a prolonged diuresis was observed together with a rise in sp. gr., total N, and colloid osmotic pressure of the plasma, indicating a direct effect on the kidney. H. G. R.

Pharmacology of convolvine. J. K. NOLLE (Khim. Farm. Prom., 1934, No. 5, 39—46).—Convolvine (from *Convolvulus pseudocantabrica*), $\text{C}_{15}\text{H}_{21}\text{NO}_2$, m.p. 114 — 115° , is a strongly basic, optically inactive cryst. substance, the hydrochloride of which is anæsthetic. CH. ABS. (p)

Effect of some barbituric acid derivatives on the intestine of the cat. N. B. DREYER and C. O. HEBB (Proc. Nova Scotian Inst. Sci., 1933—1934, 18, 282—285).—Many barbiturates, even in massive doses, increase the tonus of cat intestine if respiration and the circulation are unimpaired. Section of the vagi or splanchnics has no effect. J. L. D.

Distribution of barbiturates in brain. T. KOPPANYI and J. M. DILLE (J. Pharm. Exp. Ther., 1935, 54, 84—86).—There is no sp. distribution of Na-barbital nor any accumulation in the sleep centres after the administration of small hypnotic doses. The distribution in the different parts of the central nervous system is approx. the same after large and small doses, with the exception of cerebellum and medulla, the amount in these being somewhat $<$ in the rest of the brain. M. T.

Antagonism between thyroxine and narcotics with regard to their structure. I. ZÁRDAY and P. WEINER (Orvosi Hetilap, 1934, 78, 682—684).—Antagonism is demonstrated between narcotics of the barbituric group and thyroxine. CH. ABS. (p)

Effect of specific substances of the body on blood-pressure in man. IV. Action of liver preparations (Campolon, Degewop, Hepatrat, and Hepatopson) administered intravenously. H. A. HEINSEN and H. J. WOLF (Klin. Woch., 1934, 13, 523—526; Chem. Zentr., 1935, i, 589).—Liver preps. provoke falls of blood-pressure, suggesting the presence of histamine-like substances or of Lange's "fourth substance." R. N. C.

Plants with cardiac action. R. JARETZKY (Arch. Pharm., 1935, 273, 334—348).—A lecture. *Adonis vernalis*, L., but not 4 other varieties or 2 related plants, contains (most in the stems) substances with cardiac action and yields *eranthin-A*, insol. in CHCl_3 , and *-B*, CHCl_3 -sol., which give some strophanthin colour reactions. *Gratiola officinalis*, L., yields *gratiotoxin*, which has great cardiac action. Purified gratiolin has m.p. 268 — 269° (decomp. from 255°) (cf. lit.). *Bavica volubilis*, Harv., bulbs, but not related plants, contain extremely active glucosides. R. S. C.

Assay of *Allium* preparations. U. HINTZELMANN (Arch. exp. Path. Pharm., 1935, 178, 480—485).—The survival period of mice poisoned by 0.2—0.3 c.c. daily of vigantol is prolonged two- to three-fold by simultaneous administration of preps. from *A. ursinum*. The application of this phenomenon to the assay of *Allium* preps. is discussed. F. O. H.

Pharmacodynamic action and chemistry of secretin. G. ÅGREN (Skand. Arch. Physiol., 1934, 70, 10—87).—A method for preparing pure secretin in quantity is described. It can be prepared only from the mucosa of the small intestine. Injected intravenously, a concn. of $1:40 \times 10^6$ in the blood of a urethanised cat is sufficient to cause pancreatic secretion. Administered subcutaneously, intramuscularly, or intraperitoneally it is rapidly destroyed and consequently without action on the pancreas. It is a true cholagogue, increases the flow of succus entericus, but does not affect gastric secretion or urine formation by the kidney. There is no action on blood-sugar level, on blood-pressure, or on the musculature of the gall-bladder or gut. The chemistry of the substance is discussed.

NUTR. ABS. (m)

Influence of vitamin- B_2 on hæmatopoiesis in experimental anæmia in the albino rat. M. I. SMITH and E. F. STOHLMAN (U.S. Publ. Health Repts., 1934, No. 49, 1569—1575).—Recovery of rats from NHPh-NH_2 -induced anæmia is not materially affected by the absence of vitamin- B_2 from the diet.

CH. ABS. (p)

Biological action of 7-methyl-9-[*d*-1'-ribityl]-isoxalloxazine. P. KARRER, H. VON EULER, M. MALMBERG, and K. SCHÖPP (Svensk Kem. Tidskr., 1935, 47, 153—154).—The compound exhibits vitamin- B_2 activity so that the Me in position 6 is not essential, but the min. dose for normal growth is probably about double that for the Me_2 derivative. W. O. K.

Phenanthrene derivatives. IV. Veratrine-like action on skeletal muscle. R. G. SMITH (J. Pharm. Exp. Ther., 1935, 54, 87—99).—The

veratrine-like effect could be obtained in cats, rabbits, and mice only with the Na phenanthrene-9-carboxylate (I). Other phenanthrene derivatives examined, e.g., salts of the 2- (II) and 3-carboxylic acids (III), yielded no comparable results. On direct and indirect stimulation with the sciatic nerve being cut and on direct stimulation in the curarised animals, there was a distinct muscular effect by (I) and to a smaller degree by four other 9-substitution products of phenanthrene, but not by (II) and (III). In frogs, this effect was replaced by a morphine-like picture when (I) was used.

M. T.

Effect of trimethylenetetrazole on the heart. A. DE CHÂTEL (Orvosi Hetilap, 1934, 78, 813—814).—Relatively large doses restore normal rhythm in a heart poisoned by CHCl_3 .

CH. ABS. (p)

Pharmacological action of phenaceturic acid. II. Y. TOZAWA (Folia Pharmacol. Japon., 1934, 19, No. 1, 90—101).—Diuretic effects are described.

CH. ABS. (p)

Effect of some isomeric sodium aminonaphthalenetrisulphonates on the structure of diphtheria toxin and antitoxin. H. GOLDIE (Compt. rend. Soc. Biol., 1935, 119, 402—405).—Na naphthalenetrisulphonates permit the pptn. of globulins by citric acid at p_H 5, this effect being independent of the no. and positions of the SO_3H , and of the presence or absence of an NH_2 . Albumins are partly pptd. Complete pptn. of the active principles of diphtheria toxin (I) and antitoxin is permitted only by β -naphthylaminetrisulphonates (II). Pptn. with α -naphthylaminetrisulphonates is slow and incomplete, but is complete with Na 8-hydroxy- α -naphthylamine-3:6-disulphonate, which also ppts. peptones in acid solution. (II) do not affect the toxic and antigenic powers of (I).

R. N. C.

Effect of histamine, adrenaline, and destruction of the spinal cord on the osmotic pressure of the blood in the skate. A. F. CHAISSON and M. H. F. FRIEDMAN (Proc. Nova Scotian Inst. Sci., 1933—1934, 18, 240—244).—Adrenaline subcutaneously has no effect on the blood-Cl' (I), blood concn., or the vol. of gastric secretion. Histamine lowers the first two (and later increases Cl'), but has no effect on the secretion. Destruction of the cord invokes a large and highly acid gastric secretion and lowers blood concn., probably a result of loss of urea.

J. L. D.

Mobilisation of calcium by salts of pyrocatecholdisulphonic acid. O. RIESSER and L. KARBE (Arch. exp. Path. Pharm., 1935, 178, 455—460).—Oral or intramuscular administration of the Na salt increases the total and, to a greater extent, the ultrafilterable Ca of the blood. With daily administration, the effect rapidly diminishes, being approx. zero on the third day. This diminution, but less marked, also occurs with the Ca salt. The Ca content of brain and heart also slightly increases. The source of the mobilised Ca is unknown.

F. O. H.

Oral toxicity of α -*n*-alkylphenols to white rats. H. W. BROWN and P. D. RAMSON (Proc. Soc. Exp. Biol. Med., 1935, 32, 592—594).—The toxicity decreases as the alkyl chain increases in length. The α -*n*-alkylphenols are less toxic than the corresponding

4-*n*-alkylresorcinols, but equally toxic with the corresponding 6-alkyl-*m*-cresols.

R. N. C.

Dinitrophenol. Blood, urine, and tissues of dogs on continued medication and after acute fatal poisoning. M. L. TAINTER, W. C. CUTTING, D. A. WOOD, and F. PROESCHER (Arch. Path., 1934, 18, 881—890).—Administration to healthy dogs of 5—10 mg. of 2:4-dinitrophenol per kg. of body-wt. daily for 27 weeks caused no change in wt., O_2 capacity of the blood, fragility of red cells, blood picture, or serum-bile pigment. Slight transient albuminuria occurred, but no increase in blood-urea. The animals remained healthy.

NUTR. ABS. (b)

Pharmacology of *l*-ascorbic acid. J. V. SUPNIEWSKI and J. HANO (Arch. exp. Path. Pharm., 1935, 178, 508—523).—Parenterally administered *l*-ascorbic acid (Na salt) rapidly disappears from the blood and appears in the urine, the vol. of which increases. In mammals a pressor action follows cardiac stimulation, whilst the respiration is first stimulated and then depressed. The sensitivity of mice to MeCN poisoning is diminished.

F. O. H.

Toxicity and hypoglycæmic effect of guanidine compounds. G. S. SAMUELSEN (J. Pharm. Exp. Ther., 1935, 54, 17—24).—Benzthiazolyguanidine (I) produces, in fairly large doses, a rise in the blood-sugar level in rabbits. Benzselenazolyguanidine (II) and α -*m*-tolyl-, $\alpha\alpha$ -diphenyl-, α -3:6-dimethylphenyl-, and α -*o*-tolyl-diguanide show, if any, only a slight effect on blood-sugar level, raising it in some cases, when lethal doses are used. In all cases except (I), there is a rise in blood-N. All preps., with the exception of (II), are more or less toxic, the order of toxicity increasing with the no. of Ph and Me groups.

M. T.

Gastric motility in experimental hyperaminocidanaemia. J. LA BARRE and P. DESTREE (Compt. rend. Soc. Biol., 1935, 119, 536—538).—Intravenous injection of glycine causes a hypermotility of the stomach.

H. G. R.

Action of monoiodoacetic acid on carbohydrate metabolism in rabbits. Y. NISHIDA (Mitt. med. Akad. Kyoto, 1934, 12, 1379—1380).—For 5 hr. after subcutaneous injection of the min. lethal dose of $\text{CH}_2\text{I}\cdot\text{CO}_2\text{H}$ in rabbits there was a progressive increase in blood-sugar and -lactic acid and a decrease in the alkali reserve. In comparable muscles, frozen *in situ* with liquid CO_2 and removed at intervals, glycogen decreased slightly and lactic acid increased steadily. If both splanchnic nerves were cut all these changes were less marked.

NUTR. ABS. (b)

Chemical constitution and antitoxic activity (*in vitro*) of some organic molecules. L. VELLUZ (Bull. Soc. Chim. biol., 1935, 17, 838—847).—The antitoxic action of certain org. compounds for tetanus and diphtheria toxin is associated with the presence of the CO_2H . Substituted benzoic acids are active for tetanus and naphthenic and benzofuran derivatives are sp. for diphtheria. Phenolic and halogen groups, inactive alone, increase the antitoxic action when associated with CO_2H ; the free NH_2 , however, has an inhibiting action. The position of the sub-

stituents in active isomeric compounds has a marked effect on antitoxic action. A. L.

Poisoning by potassium borotartrate. P. O. SAGRERAS and L. TREPAT (Rev. Assoc. med. Argentín., 1932, 46, No. 318, 1670—1675). CH. ABS. (p)

Action of hypertonic solutions on the crystal structure of animal fibres. F. WORSCHITZ and J. VON HERMAN (Fortschr. Röntgenstrahlen, 1934, 50, 178—180; Chem. Zentr., 1935, i, 585).—The micelle structure of muscle fibres is destroyed irreversibly by hypertonic solutions of NaCl, homatropine, pilocarpine, urea, or AcOH, the extent of the change increasing with the concn. R. N. C.

Influence of a calcium diet on disturbances of the liver function. I. Calcium diet and bilirubin metabolism. II. Calcium diet and the metabolism of urobilin substances. Y. ASODA (Japan. J. Gastroenterol., 1934, 6, 51—55, 56—60).—I. After liver injury with CCl_4 the appearance of bilirubin (I) in the blood was less frequent, and injected (I) disappeared more rapidly in rabbits receiving Ca lactate.

II. The urobilin substances of blood, urine, and bile were unaffected by Ca feeding, but CCl_4 injury to the liver was somewhat less severe. CH. ABS. (p)

Influence of thyroid and pituitary glands on chloride distribution. M. A. B. TOXOPEUS (Arch. exp. Path. Pharm., 1935, 178, 412—415).—Following intravenous injection of aq. NaCl into dogs, the NaCl content of the skin, but not that of the muscle, increases. With simultaneous subcutaneous injection of thyroxine or posterior pituitary extract there is a relative displacement of NaCl from skin to muscle. F. O. H.

Penetration of therapeutic substances from the organism of the mother into the embryo. M. N. LEBEDEVA (Khim. Farm. Prom., 1934, No. 4, 44—45).—Arsphenamine, Sb, Bi, As, and germanin, following injection into pregnant animals, were found in \times traces in the embryo. CH. ABS. (p)

Inclusions in renal epithelial cells following the use of certain bismuth preparations. A. M. PAPPENHEIMER and E. H. MAECHLING (Amer. J. Path., 1934, 10, 577—588).—Globules occurring in nuclei and cytoplasm of the cells following intramuscular injection of various Bi preps. gave equivocal tests for Bi, were insol. in lipin solvents or in strong acids or alkalis, resisted tryptic digestion, gave no reaction for Ca or Fe, but stained as myelin. CH. ABS. (p)

Pathological changes encountered in wild ducks. J. P. TORREY, F. THORPE, jun., and R. GRAHAM (Cornell Vegetarian, 1934, 24, 289—298).—Inclusion of Pb shot in the diet caused Pb poisoning in ducks. CH. ABS. (p)

Lead compounds R232 and R237b used in experimental therapy of tumours and leucosis. C. KREBS and J. CLEMMESSEN (Z. Krebsforsch., 1934, 41, 260—266; Chem. Zentr., 1935, i, 437).—The compounds R232 and R237b (K and Na plumbodithiopyridinecarboxylates), dissolved in H_2O and stabilised at p_{H} 7.4 with glycine, show relatively low

toxicities to their high Pb contents, but are apparently without therapeutic effect on mouse carcinoma.

R. N. C.

Poisoning by thallium acetate. A. BUZZO and C. F. GANDOLFO (Rev. Assoc. med. Argentín., 1932, 46, No. 313, 97—99).—Toxic effects of TlOAc , used as a depilatory, were cured by hypertonic glucose, serum, insulin, and Na "hyposulphite."

CH. ABS. (p)

Growth of human fibroblasts in media containing silver. J. P. M. VOGELAAR and E. EHRLICHMAN (Amer. J. Cancer, 1934, 22, 555—560).—Fibroblasts from the thyroid grew normally in media containing 0.0028 mg. of Ag per c.c., but not in those having 0.04 mg. Activation of the proteolytic enzymes with certain [Ag] is indicated.

CH. ABS. (p)

Influence of metals on adrenaline hyperglycæmia in rabbits. H. SCHNETZ (Arch. exp. Path. Pharm., 1935, 178, 420—438).—Injection of simple or complex salts of Cu, Zn, Cd, Mn, Ni, Co, Fe^{II} , and Fe^{III} has no effect on the fasting blood-sugar of rabbits. The hyperglycæmia due to injection of 0.1 mg. of adrenaline per kg. of body-wt. is, however, considerably reduced by previous daily subcutaneous injection of the salts of the analogous metals Cu, Zn, and Cd, but not with those of Mn, Ni, Co, Fe^{II} , or Fe^{III} . Daily injection of 0.5—2.0 mg., but not of 0.2—0.1 mg., of Cu or Zn per kg. will produce the effect (cf. this vol., 410). F. O. H.

Influence of metallic couples on the growth *in vitro* of fibroblasts and osteoblasts. G. MÉNÉGAUX and D. ODIETTE (Compt. rend. Soc. Biol., 1935, 119, 485—486).—The toxicity of a metal is not affected by the presence of another metal as a couple. H. G. R.

Action of metallic chlorides on tissue cultures. II. Hepatic, renal, and nerve tissue. J. VERNE and C. SANNIÉ (Bull. Soc. Chim. biol., 1935, 17, 678—689).—The toxicity of the alkali and alkaline-earth metals is small; that of the heavy metals is considerable and varies according to the nature of the metal. The fibroblasts of the liver, kidney, and nerve tissue, although more resistant than the functional cells, are more sensitive than those of the chicken-embryo heart. A. L.

Effect of physico-chemical changes in environment on embryo formation in the frog. J. W. CULBERTSON and H. V. WILSON (J. Elisha Mitchell Sci. Soc., 1934, 50, 50—51).—Exposure to low temp. or to dil. solutions of NaCl or LiCl disturbs the physiological organisation of the embryos of artificially inseminated frog eggs. CH. ABS. (p)

Preventive rôle of methæmoglobin-forming substances (sodium nitrite) in intoxication by fluorides. V. KARASSIK, V. ROCHKOV, and O. VINOGRADOVA (Compt. rend. Soc. Biol., 1935, 119, 807—809).—The mortality of white mice injected with NaF is decreased from 80 to 24% by previous injection of NaNO_2 . H. G. R.

Effects of fluorine on respiration, blood-pressure, coagulation, and blood-calcium and -phosphorus in the dog. D. A. GREENWOOD,

E. A. HEWITT, and V. E. NELSON (J. Amer. Vet. Med. Assoc., 1935, 39, 28—42).—Intravenous injection of NaF increased respiration and lowered blood-pressure. Oral administration (0.45—4.52 mg. of F as NaF per kg. body-wt.) did not affect the total Ca, acid-sol. inorg. P, hæmoglobin, or coagulation time of blood. Bones were unchanged, but teeth became mottled.
CH. ABS. (p)

Fluorine poisoning. A. SLAVIERO (Arch. Ist. Biochim. Ital., 1934, 6, 285—310; Chem. Zentr., 1935, i, 746).—Physiological effects on dogs are recorded.
A. G. P.

Fluorine toxicosis. M. C. SMITH (Amer. J. Publ. Health, 1935, 25, 696—702).—Drinking-H₂O containing < 1 p.p.m. of F will cause the permanent teeth of children to have faulty enamel, but if [F] is > 12 p.p.m. the first set also will be affected. The action is not directly in the mouth, but through the blood-stream on the organ producing the enamel. Later, this organ disappears, and the enamel of adults is unaffected, although the dentine which receives nutrient from the blood may be affected and result in a general weakening which does not show externally. The decalcification is not prevented by an increased Ca content of the diet or by a liberal intake of vitamin-D, e.g., from cod-liver oil. Since the level of human tolerance to F is so low, the growing use of insecticides containing it is to be deprecated.
C. J.

Pathologico-anatomical conditions in arsine poisoning. H. HILTERHAUS (Arch. Gewerbepath. Gewerbchyg., 1935, 6, 70—79).—Conditions in two cases of AsH₃ poisoning are described, including hæmolytic action and methæmoglobin content.
R. N. C.

Determination of minimal concentrations of arsenic in expired air. A. PLESCHTIZER and A. A. PREOBRJENSKY (Arch. Gewerbepath. Gewerbchyg., 1935, 6, 80—86).—The expired air of cases of As poisoning contains traces of As, which can be detected by Feigl's reaction, or by absorption with Br and NH₃ and cultivation in the solution of *P. brevicarule*, which forms AsHET₂.
R. N. C.

Toxic effects of sulphur on guinea-pigs and rabbits. G. B. LAWSON, K. T. REDFIELD, and O. D. BOYCE (J. Lab. Clin. Med., 1934, 20, 169—171).—Effects of ingestion and injection of S are examined.
CH. ABS. (p)

Action of sulphur-containing gases on the cocoons of *Bombyx mori*. L. I. HIRAIWA, K. YAMAFUJI, and Y. YONEZAWA (Bull. Sci. Fak. Terkult. Kjushu, 1935, 6, 119—125).—2 parts of SO₂ in 10,000 and 2 parts of H₂S in 100,000 interfere with the formation of the cocoon and affect the quality of the silk.
E. A. H. R.

Toxic gases. Adjuvant groups in organic halogen compounds. M. HANNE (Chim. et Ind., 1935, 33, 1317—1320).—The effect of modifying groups in the mol. on the toxic, vesicant, lachrymatory, and sternutatory properties of known org. Cl-compounds is discussed.
F. N. W.

Influence of carbon dioxide and ammonia on cocoon formation of *Bombyx mori*. L. K.

YAMAFUJI, Y. YONEZAWA, and I. HIRAIWA (Bull. Sci. Fak. Terkult. Kjushu, 1935, 6, 111—118).—CO₂, expired by the larvæ, and NH₃ (in very low concns.) have a damaging effect on the formation of the cocoon.
E. A. H. R.

Toxicity for sheep of aqueous solutions of hydrocyanic acid and the effectiveness of the nitrite-thiosulphate combination as a remedy. J. F. COUCH, A. B. CLAWSON, and H. BUNYEA (J. Washington Acad. Sci., 1935, 25, 272—276).—The min. lethal dose of HCN administered to sheep in a drench is 2.3 mg. per kg. Intraperitoneal administration of 15 c.c. of a solution containing 1 g. of NaNO₂ and 2 g. of Na₂S₂O₃ produced recovery in about 50% of cases with doses up to 4 times the min. lethal dose.
W. O. K.

Pathogenesis of silicotic tissue changes. I. Experimental production of silicotic welts by quartz and colloidal silicic acid. H. SIEGMUND.
II. Behaviour of quartz dust in silicotic tissue.
III. Nature of asbestosis particles. G. F. KOPPENHÖFER (Arch. Gewerbepath. Gewerbchyg., 1935, 6, 1—17, 18—37, 38—62).—I. Quartz particles injected into the blood-stream in rabbits are removed by the reticulo-endothelial cells, but are deposited in different tissues according to their size, where they produce characteristic changes. Colloidal H₂SiO₃ injected intravenously produces fibrosis in the liver.

II. The morphological changes produced in silicotic tissues by quartz particles are described.

III. The gelatinous shell of asbestosis particles in tissue sections is of inorg. origin, and contains Fe, Mg, and SiO₂.
R. N. C.

Atmospheric ozone and heliotherapy. R. LATARJET (Compt. rend. Soc. Biol., 1935, 119, 610—612).—The therapeutic effect of solar radiation is diminished considerably by O₃ in the atm.; it falls more rapidly than O₃ increases. The O₃ content is influenced by the height of the sun at noon.
R. N. C.

Physico-chemical effects of irradiation of crystalline ovalbumin solutions with α -particles. L. E. ARNOW (J. Biol. Chem., 1935, 110, 43—59).—Irradiation of ovalbumin (I) solutions by α -particles produced coagulation at the isoelectric point only; quantities of gas (chiefly H₂) were evolved; there was no change in the N content of the solution. The η , ultra-violet absorption, and coagulation temp. of the solution were raised at $p_H < 4.8$ and lowered at $p_H > 4.8$ by the irradiation. From the curves of gas evolution against Rn disintegration it is deduced that H₂ and O₂ are utilised by (I), the former process involving at least two reactions.
H. D.

Effect of light on the sensitivity of wheat seedlings to X-rays. L. C. CHESLEY (J. Cell. Comp. Physiol., 1935, 6, 69—84).—Seedlings sprouted in light were less sensitive to X-rays than were those sprouted in darkness, when compared on a fresh wt. or respiration basis. Linear growth was not protected by light. The influence of light decreased as irradiation was increased, and also tended to become less with time. Results are discussed in relation to the theory of the destruction of auxin by X-rays.
A. G. P.

Effects of radiations on biological systems.
II. Immediate and subsequent effects of X-irradiation on respiration of *Drosophila* larvæ. R. HUSSEY and W. R. THOMPSON (J. Gen. Physiol., 1935, 18, 669—674; cf. A., 1932, 1150).—X-Irradiation of the larvæ produces an immediate decrease in the CO_2 respiration [which \propto the time of irradiation] and a latent effect persisting for several days. F. O. H.

Radium emanation and elimination of phosphorus by frog's muscle. O. V. HYKES and J. REĀBEK (Biochem. Z., 1935, 278, 123—132).—Rn increases PO_4 elimination to a greater extent than does rise of temp. of both resting muscle and of muscle undergoing nervous stimulation. Under the prolonged action of Rn, the PO_4 elimination is not linear, but is greatest for the first few min. Rn affects first the permeability, and may also affect the chemical processes occurring in muscle. P. W. C.

Photons in chemistry and biology. F. DANIELS (Science, 1935, 81, 523—528).—A lecture. L. S. T.

Action of electrolytes on electrical stimulation of skeletal muscle. I. CHAO (J. Cell. Comp. Physiol., 1935, 6, 1—19).—The immediate sensitising effect of Na salts was in the order $\text{Cl}' < \text{Br}' < \text{NO}_3' < \text{I}' < \text{SCN}'$. The action of NaSCN is characterised by a period of secondary depression which is probably related to the presence of CaCl_2 . KCl produces at first an increase followed by a decrease in response, the relative intensity of these effects increasing with concn. CaCl_2 at all concns. decreased contraction. Antagonism between the actions of Ca and K salts occurs within certain narrow ranges of concn. A. G. P.

Theory of diffusion in cell models. II. Solution of the steady state for three diffusing substances. L. G. LONGSWORTH (J. Gen. Physiol., 1935, 18, 627—642).—Theoretical considerations of diffusion in cell models (A., 1934, 107) have been extended to the simultaneous penetration of H_2O and two salts. Vals. thus calc. for the steady state agree with experimental data. F. O. H.

Elementary actions of mineral waters. P. TESTONI (Annali Chim. Appl., 1935, 25, 111—116).—Classification of a mineral water according to its elementary composition is insufficient to indicate its biological effects. T. H. P.

Dinner demonstration of threshold differences in taste and smell. A. F. BLAKESLEE (Science, 1935, 81, 504—507).—Results of a large-scale experiment are described. L. S. T.

Mechanism of enzyme actions. K. G. FALK (Science, 1935, 81, 471—475).—A discussion. L. S. T.

Catalytic causation of physiological phenomena. A. MITTASCH (Naturwiss., 1935, 23, 361—369).—A review of the characteristics of catalytic action and the types of bio-catalysts. The connexion between bio-catalysis and stimulation and instinctive reaction is considered. A. J. M.

Synthesis of synthetic enzymes. W. LANGENBECK (Bull. Soc. Chim. biol., 1935, 17, 627—636).—A résumé. A. L.

Tissue-enzymes. F. MAIGNON (4me. Congr. Chim. biol., Paris, Nov., 1934).—Extracts of fresh organs of healthy animals (Lebedev's method) contain substances which restore functional activity in cases of insufficiency of liver, kidney, ovary, thyroid, etc. The extracts show marked specificity and have no effect on the healthy organism. In old dogs with hepatic or renal insufficiency, a single dose of 1 mg. maintains normal conditions (blood-urea etc.) for a week or more, and a second dose has a similar effect. NUTR. ABS. (b)

Ascorbic acid oxidase. H. TAUBER, I. S. KLEINER, and D. MISHKIND (J. Biol. Chem., 1935, 110, 211—218).—The isolation of an enzyme, from the pericarp of the Hubbard squash, which oxidises ascorbic acid (I) instantaneously and completely is described. Its kinetics are those of a single enzyme, and in this it differs considerably from Szent-Györgyi's hexoxidase (cf. A., 1931, 533). (I) is probably oxidised by the introduction of two OH at the double linking. The oxidation product of (I) can be reduced again by H_2S . No oxidation takes place in an atm. of N_2 . The enzyme shows activity only between p_{H} 4 and 7 (max. activity about p_{H} 5.6). It is more easily destroyed by excess of H' than of OH' ; it is stable to O_2 , CO , and to small concns. of KCN (0.005%). It is irreversibly inactivated by 0.01% KCN and by H_2S . Trypsin slowly inactivates it, so that it must either be a protein or have protein as an indispensable part. E. A. H. R.

Enzymic dehydrogenation of citric acid. T. WAGNER-JAUREGG and H. RAUEN (Z. physiol. Chem., 1935, 233, 215—222).—The rate of methylene-blue reduction by citric acid (I) in presence of phosphate extracts of various seeds and of frog muscle is accelerated by addition of co-enzyme (from horse erythrocytes) and yellow enzyme (from yeast). This holds with bean extracts for the substrates *l*-malic acid, EtOH, and hexosemonophosphoric acid. The degradation of (I) occurs in stages with the co-operation of two different co-enzymes, yellow enzyme only assisting at a later stage. Acetonedicarboxylic acid is not a stage, and is probably not the end-product of the dehydrogenation. J. H. B.

Synergistic action of milk- and muscle-oxidases. D. I. MACHT and H. F. BRYAN (J. Biol. Chem., 1935, 110, 101—105).—Methylene-blue is decolorised by juice or suspensions of muscle (rat, ox, chicken, rabbit, frog, gold-fish, pike) much more rapidly than by milk, but the times required for decolorisation are greatly reduced when small amounts (< 1 part in 60) of milk are added to the juice (or suspension) or small amounts of juice (or suspension) to the milk. W. McC.

Correlation of oxidation and phosphorylation in hæmolyzed blood in presence of methylene-blue and pyocyanine. J. RUNNSTRÖM and L. MICHAELIS (J. Gen. Physiol., 1935, 18, 717—727).—Aërobic oxidation of glucose (I) or anaërobic glycolysis does not occur in hæmolyzed blood (horse)-(I) systems. With blood-hexose phosphate in presence of methylene-blue (II), aërobic oxidation occurs, and is increased by cozymase (when phosphorylation occurs). Re-

placement of (II) by pyocyanine does not change the rate of oxidation, but phosphorylation occurs in absence of cozymase. Oxidation always occurs during phosphorylation, but not *vice versa*. $\text{CH}_2\text{I}\cdot\text{CO}_2\text{H}$ always inhibits phosphorylation, but only under certain conditions decreases oxidation; neither process is affected by CN^- . F. O. H.

Yellow oxidation enzyme. H. THEORELL (Biochem. Z., 1935, 278, 263—290).—By treatment in the modified cataphoresis apparatus (see below) followed by pptn. with aq. $(\text{NH}_4)_2\text{SO}_4$ (67% at p_{H} 5.2) the enzyme, $[\alpha] -30^\circ$ in H_2O , mol. wt. 70,000—75,000, isoelectric point at p_{H} 5.25 \pm 0.03, is obtained pure and cryst. in about 60% yield. It exhibits absorption max. at 265, 380, and 465 $\text{m}\mu$ and min. at 240, 320, and 415 $\text{m}\mu$. The polysaccharide associated with (but not bound to) the enzyme acts as protective colloid. Enzyme reconstituted from the components after hydrolysis is as active as non-hydrolysed enzyme. Heating (to 75°) causes irreversible hydrolysis. The protein component, which is very labile and easily denatured, combines with hæmins to give hæmochromogens. The yellow component (flavin-phosphoric ester) is readily sol. in H_2O , but insol. in MeOH , COMe_2 , or CHCl_3 . When dry this component is stable in the dark. In aq. solution the Ca salt is more stable. Since the yellow component is only very slowly inactivated by blood-serum, it probably has a more powerful vitamin action than has lactoflavin. W. McC.

Cataphoresis apparatus for preparative purposes. H. THEORELL (Biochem. Z., 1935, 278, 291—297; cf. this vol., 188).—Materials (*e.g.*, yellow respiratory enzyme) which cannot otherwise be isolated can be purified in quantity in a modified form of the apparatus previously described. Conducting liquids (buffer solutions) and semi- or non-permeable membranes appropriate to the substances to be purified are required. W. McC.

Catalase in body-fluid of the silkworm. S. MATSUMURA (Bull. Sericult. Japan, 1935, 7, 5).—The body-fluid catalase activity in the male silkworm is $>$ in the female. It is strong soon after the 4th moult, but becomes weaker at maturity. It varies with race and strain, but is not related to blood colour. E. A. H. R.

Mechanism of increase in amylase activity during autolysis of barley powder. R. H. R. RAU (Proc. Indian Acad. Sci., 1935, 1, B, 686—692).—Amylase activity in barley powder increases during autolysis as a result of liberation of β -amylase. No amylokinase is formed. A. G. P.

Protective action in ultra-violet irradiation of amylase solutions. W. R. THOMPSON and R. THOMPSON (J. Gen. Physiol., 1935, 18, 675—680).—The protective action of dog's sera against the destruction of aq. pancreatic amylase preps. by ultra-violet irradiation is due to competitive absorption by the sera for inactivating radiations. F. O. H.

Rennin and the diastatic power of ungerminated grains. T. CHRZASZCZ and J. JANICKI (Biochem. Z., 1935, 278, 112—122).—Rennin is able to increase the amylolytic power of various grains, the

effect being greatest in respect to the saccharifying power and only slight in respect to the dextrinifying and liquefying powers. With most grains the effect is as great as that with papain, whilst with oats and buckwheat it is even greater. The effect is not due to the traces of pepsin in rennin. Addition of CaCl_2 inhibits this increase of the active amount of amylase by rennin. P. W. C.

Inactivation of heparin in blood. A. SCHMITZ and L. KÜHL (Z. physiol. Chem., 1935, 234, 212—215).—The inactivation is almost complete in 3 hr. at 56° in blood-serum, and only a small part of the inactivating power remains after 18 hr. at room temp. in plasma (hen) or albumin or globulin solutions. W. McC.

Determination of the unit of heparin. A. SCHMITZ (Z. physiol. Chem., 1935, 234, 216—217; cf. A., 1932, 1054).—The procedure of Scott *et al.* (A., 1933, 1317) is untrustworthy. The concn. of heparin \propto the log of the coagulation time. Determinations must be made at 38° in 2—20 min. A "heparin unit" is 30 times that amount which increases the log of the coagulation time of hen plasma, under given conditions, by 0.1. W. McC.

Preparation of thrombin. A. C. ROBERTS (Proc. Soc. Exp. Biol. Med., 1935, 32, 606—608).—Fibrin from calves' blood, after being freed from hæmoglobin, is extracted for 24 hr. with Et_2O , and then with cold 8% NaCl . The NaCl extract is filtered, and excess of NaCl removed by dialysis against H_2O ; this is followed by further dialysis against a PO_4^{3-} buffer at p_{H} 7.38, and against H_2O . The solution is filtered, and thrombin obtained by evaporation at room temp. R. N. C.

Coagulation and inactivation of emulsin by heat. Influences of crystalloidal and of colloid solutions. D. L. FOX and L. L. SORKNESS (Biochem. J., 1935, 29, 1532—1537).—Emulsin (I) in dil. aq. solution is inactivated by incubation for 0.5 hr. at a temp. $> 75^\circ$, but is not pptd. Fluorescein, Congo-red, and neutral-red lower the inactivation temp., as does a p_{H} val. of 1.97 or > 7.65 . Glucose raises it several degrees, whilst 0.5% lactose solution has no effect. Dil. acids and phosphates cause pptn. of (I). In the absence of H_2O , (I) can be heated to 150° without loss of activity. There is no direct relationship between heat-inactivation and heat-coagulation of (I). J. N. A.

Baicalinase, an enzyme causing fission of flavoneglucuronide. II. T. MIWA (Acta Phytochim., 1935, 8, 231—243).—Scutellarein (Ac_4 derivative, m.p. 237°) is identified among the products of the hydrolysis of scutellarin (I) by baicalinase (II). Fission of (I) and of baicalin by (II) is a reaction of the first order after 25% hydrolysis, proceeding most rapidly at p_{H} 5.7 and $50\text{--}60^\circ$. H. W.

[Properties of] highly purified cozymase. H. VON EULER, H. ALBERS, and F. SCHLENK (Z. physiol. Chem., 1935, 234, I—II).—Cryst. cozymase (possibly $\text{C}_{12}\text{H}_{19}\text{O}_4\text{N}_4\text{P}$) regenerated (in 80% yield) from the Cu^+ salt is much more active than the starting material and is almost free from S. No increase in activity is achieved by repeated conversion into the

salt and regeneration. The degree of activity attained is independent of that of starting material which has activity \leq a certain val. The purification is without effect on the co-enzyme activity towards EtOH dehydrogenase, but destroys the activator effect in the hexose phosphate dehydrogenation system if purified dehydrogenase solutions are used. W. McC.

Enzymes of *Bombyx mori*, L. X, XI. Gastric lipase. K. YAMAFUJI and Y. YONEZAWA (Bull. Agric. Chem. Soc. Japan, 1935, 11, 14—16, 30—33).—X. The gastric lipase (I) of silkworms has its p_H and temp. optima at 9.8 and 40°, respectively. Heating at 70° for 1 hr. nearly destroys (I). Quinine and atoxyl have only a slight toxic effect. Its activity increases on starvation for 1 day, but decreases if starvation is prolonged. The (I) content of the male is $>$ that of the female, and increases during growth up to the 5th day, while the body-fat is built up, after which it decreases. There is no significant difference in the (I) content of different species of silkworm.

XI. A prep. of lipase from the gastric juice of silkworms is described and an account of its kinetics given. The pancreatic lipase of vertebrates and (I) have similar activators and inhibitors. E. A. H. R.

Castor-bean lipase. VIII. E. TAKAMIYA (Bull. Agric. Chem. Soc. Japan, 1935, 11, 46—48).—Castor beans contain a lipase-activating substance the power of which is destroyed by autoxidation. E. A. H. R.

Determination of lipase in pancreas. L. VOGEL and P. LAEVERENZ (Z. physiol. Chem., 1935, 234, 176—180).—When the method of Willstätter *et al.* (A., 1923, i, 403) is applied to impure preps., the vols. of aq. CaCl_2 and albumin should be increased to 1.6 c.c., and 1.6 c.c. of 2% Na oleate solution should be added. W. McC.

Lipase activity of mammalian organs in the healthy and carcinomatous organism. S. EDLBACHER and M. NEBER (Z. physiol. Chem., 1935, 233, 265—275).—The lipase activity of brain extract is only about 0.02 of that of liver. Fission by lipase in the organs examined is the same in O_2 , air, and N_2 . The characteristic inhibition by atoxyl and quinine of human lipase is not shown by lipase from rat's liver and brain. Tumours and necrotic tissue show activity of the same order as brain. The lipase activity of organs of carcinomatous animals is much $<$ that of normal animals. J. H. B.

Extraction and preservation of α -lipase of blood-serum. Z. GRUZEWSKA and E. BÉRAUT (Compt. rend. Soc. Biol., 1935, 119, 699—700).—Dried serum is freed from fat with EtOH and Et_2O , and α -lipase extracted with pure or 87% glycerol. The extracts retain their hydrolysing power for long periods in the cold, and the active principles of the serum are unaltered. R. N. C.

Rachitogenic action of cereals. Calcium and phosphorus liberated by digestion of cereals *in vitro*, with or without sodium chloride. G. POPOVICIU, G. BENETATO, and R. OPREAN (Compt. rend. Soc. Biol., 1935, 119, 445—447).—Digestion of cereal flours *in vitro* by pancreatic enzymes and enterokinase at p_H 8.4 liberates small quantities of Ca and P. Addition of NaCl increases Ca liberation. R. N. C.

Occurrence of trypsin in the stomach. M. HIRVONEN (Skand. Arch. Physiol., 1934, 71, 16—17).—In most cases the contents of the fasting human stomach contained trypsin (I). After a test meal, (I) was also present; the more acid the gastric contents, the greater was the amount of (I). NUTR. ABS. (b)

Enzymic histochemistry. IX. Pepsin in gastric mucosa of pigs. X. Acid localisation in gastric mucosa of pigs. XI. Peptidase in gastric mucosa of pigs. K. LINDERSTRÖM-LANG and H. HOLTER. XII. Esterase in gastric and duodenal mucosa of pigs. D. GLICK. XIII. Enzyme distribution in the stomach of pigs as a function of histological structure. K. LINDERSTRÖM-LANG, H. HOLTER, and A. S. OHLSEN (Compt. rend. Trav. Lab. Carlsberg, 1935, 20, No. 11, 1—32, 33—41, 42—56, 57—65, 66—125).—Pepsin (I) is found mainly in the chief cells of the fundus, but is also found in the fundus, in the neck chief cells, and in the pylorus, cardia, and duodenum. (I) in the neck chief cells is not so easily extracted by glycerol as that in the fundus chief cells. In different layers of the fundus mucosa glycerol extracts very varying amounts of (I), and this may be in accord with the concept of a desmo- and a lyo-pepsin. HCl is found exclusively in the fundus, and, probably, in its parietal cells. Peptidase is found in the fundus and cardia only in the chief cells, in the pylorus also in the neck chief cells, and in the duodenum in the cylinder cells and Brunner cells. There is no typical localisation of esterase activity in definite regions or layers of the gastric mucosa. E. A. H. R.

Effect of mucin and mucinoids on peptic digestion. H. C. BRADLEY and M. HODGES (J. Lab. Clin. Med., 1934, 20, 165—169).—The digestion of caseinogen, native and coagulated fibrin, etc. is retarded by the presence of gastric mucin for 3—4 days, but subsequently normal amounts are digested. Chondroitin sulphate and vegetable mucinoids produce similar effects. CH. ABS. (p)

Adsorption of crystalline pepsin by denatured ovalbumin and silk-fibroin. P. S. YANG (Chinese J. Physiol., 1935, 9, 189—196).—Loss of activity of pepsin solution by adsorption on ovalbumin or silk-fibroin involves an equiv. loss of pepsin-protein. H. G. R.

Proteases of *Ficus carica*. G. DE VITO (Annali Chim. Appl., 1935, 25, 151—156).—As with papain and bromelin, the proteolytic action of these enzymes is greatly enhanced by HCN. T. H. P.

Thiol nature of papain. T. BERSIN (Biochem. Z., 1935, 278, 340—341).—The activation of papain by $\text{K}_3\text{Fe}(\text{CN})_6$ in presence of veronal is due to reduction of the $\text{K}_3\text{Fe}(\text{CN})_6$. Since the author's results have been confirmed by Hellermann *et al.* (A., 1934, 1402), Purr (this vol., 252), and Mirsky *et al.* (*ibid.*, 506), the criticisms of Maschmann *et al.* (*ibid.*, 897) are rejected. W. McC.

Nature of urease; fractional ultrafiltration. P. GRABAR and A. RIEGERT (Compt. rend., 1935, 200, 1795—1797).—The behaviour of cryst. urease (I) towards ultrafiltration resembles that of globulin; other (I) preps. were less homogeneous. Such smaller

particles as are produced by partial tryptic digestion of cryst. (I) have no (I) activity. F. A. A.

Arginase activation. L. WEIL (J. Biol. Chem., 1935, **110**, 201—209).—The cysteine-Fe⁺⁺ complex, unlike cysteine or Fe⁺⁺ alone, activates arginase (I) independently of the origin or purity of the enzyme prep. After depletion of Fe⁺⁺ by feeding with 2:2'-dipyridyl, addition of Fe⁺⁺ to liver-(I) preps. produces a strong activation. The liver-(I) of carcinomatous animals shows similar activation, but the amount is < in normal animals. E. A. H. R.

Glyoxalase. V. Enzymic nature of kidney antiglyoxalase. E. F. SCHROEDER, M. P. MUNRO, and L. WEIL (J. Biol. Chem., 1935, **110**, 181—200).—The action of kidney antiglyoxalase (I) is explained as an enzymic hydrolysis of glutathione (II) (the glyoxalase co-enzyme), probably into glycine and glutamylcysteine, p_H optimum 7. Pancreatic (I) is probably identical with pancreatic carboxypolypeptidase, as this hydrolyses reduced (II) slowly and oxidised (II) more rapidly. High concns. of *d*- and *l*-histidine have no effect on glyoxalase activity, so that the claim that the (I) action of a pancreas prep. is due to histidine is disproved. E. A. H. R.

Production and properties of dry glyoxalase. P. G. EFENDI, J. O. GIRŠAVIČIUS, and A. P. RIZHOVA (Biochem. Z., 1935, **278**, 246—251).—Liver (fresh or dried with COMe₂ and Et₂O) is extracted with H₂O, and 0.1*N*-NaOAc (p_H 4) is added; purified material is obtained from the filtrate, after neutralisation with aq. NaHCO₃, by repeated pptn. with COMe₂, drying, and re-extraction with H₂O or physiological aq. NaCl. Most or all of the glutathione is removed. The enzyme exhibits no special sensitivity towards EtOH. Dried preps. lose a great part of their activity within 1 month. W. McC.

Antiglyoxalase action of histidine. J. O. GIRŠAVIČIUS and A. P. RIZHOVA (Biochem. Z., 1935, **278**, 252—256; cf. this vol., 122, 476).—When the change of p_H caused by histidine (I) is prevented, the amounts of (I) required to inhibit the action of glyoxalase are > those required when there is no prevention. Inhibition is gradual when fresh liver extracts are used, but when dried preps. are used inhibition is independent of time. No competition for AcCHO occurs between (I) and glutathione. W. McC.

Enzymic hydrolysis of dihydroxyacetonephosphoric acid. H. COLLATZ (Biochem. Z., 1935, **278**, 364—371).—The views of Schäffner *et al.* (this vol., 661) notwithstanding, K dihydroxyacetonephosphate and (better) its NaHSO₃ compound are completely hydrolysed in a few days by taka-phosphatase to CO(CH₂·OH)₂ and H₃PO₄. W. McC.

Phosphatases. III. Mechanism of the inactivating action of sodium oxalate and phosphates on "alkaline" phosphatases of animal tissue. S. BELFANTI, A. CONTARDI, and A. ERCOLI (Biochem. J., 1935, **29**, 1491—1507; cf. this vol., 660).—The hydrolysis of β -glycerophosphate (I) in the presence of Na₂C₂O₄ by liver extracts at alkaline p_H is slow at first, then increases rapidly, and finally attains approx. the same rate as without Na₂C₂O₄.

Bone extracts do not show the phenomenon. By varying the concns. of enzyme and (I) it is shown that the inhibitory action of Na₂C₂O₄ ceases when a certain concn. of inorg. P is freed. Added inorg. P prevents the inhibition of both liver and bone extracts; Na₂C₂O₄ tends permanently to deactivate the latter. Pig's kidney extract behaves similarly to that of rabbit's liver. H. D.

Phosphatase in fractures. E. H. BOTTERELL and E. J. KING (Lancet, 1935, i, 1267—1270).—The phosphatase (I) content of callus and bone near healing fractures, produced experimentally in rabbits, is > that of normal bone. This increase appears to accompany the formation of hypertrophic cartilage cells, osteoblastic activity, and the formation of bone matrix. There is little indication of concomitant changes in the serum-(I) of man or rabbits during the repair of fractures. Introduction of (I) into the site of experimental fractures produces no change in the rate or apparent quality of the calcification of the bone matrix. L. S. T.

Degradation of α - and β -glycerophosphate by fresh yeast and by dissolved yeast-enzymes. W. SCHUCHARDT (Biochem. Z., 1935, **278**, 164—172).—Yeast-phosphatase can degrade at p_H 4 and 6 both α - and β -glycerophosphates, but the β -isomeride is more readily attacked than the α . With aq. suspensions of dried yeast at p_H 4 the β -form and at p_H 6 the α -form is the more readily attacked. With yeast maceration juice and with glycerol extracts of yeast before and after dialysis, the α -variety is more readily decomposed. P. W. C.

Fermentation enzymes. III. First phases of phosphorylation in alcoholic fermentation. A. SCHÄFFNER, H. BERL, and E. BAUER (Z. physiol. Chem., 1935, **234**, 146—150; cf. this vol., 784).—Added hexosediphosphoric acid (I) has no catalytic effect in a purified enzyme system [the reaction ceasing when all (I) has been consumed], and (I) cannot be replaced by hexosemonophosphoric acid (II). The Neuberg and Robison esters yield dihydroxyacetonephosphoric acid when attacked by zymoheaxase only after addition of yeast maceration juice which contains an enzyme (or component of an enzyme) capable of converting (II) into (I). The primary product of phosphorylation is a hexose mono-ester identical with or easily convertible into the Robison ester. W. McC.

Yellow pigment containing sulphur from yeast. R. KUHN, T. WAGNER-JAUREGG, F. W. VAN KLASVEREN, and H. VETTER (Z. physiol. Chem., 1935, **234**, 196—200).—Yeast, milk, sugar-beet, and similar materials contain at least 3 structurally different blue-fluorescent substances, the fluorescence of which is removed by reduction (*e.g.*, with Na₂S₂O₄) and restored by shaking with air. One of these is *thiochrome* (I) (20 mg. from 1200 kg. of yeast), C₁₂H₁₄ON₄S, m.p. 222° (decomp.), a H₂O-sol. base containing NMe; absorption max. 358 and 375 m μ (hydrochloride, max. 348 m μ). The fluorescence of (I) in alkaline solution is irreversibly destroyed by sunlight. In yeast (I) is probably present entirely as a colourless, non-fluorescent chromogen possibly identical with vit-

amin- B_1 (II) (cf. Peters, this vol., 415). Me is quantitatively eliminated from (I) and (II) picrolonate during determination of NMe by the method of Slotta *et al.* (A., 1932, 291). W. McC.

Reproduction in yeast cultures. A. KLEM (Hvalrad. Skrift., 1933, No. 7, 55—91; Chem. Zentr., 1935, i, 734—735).—The rate of CO_2 production per single cell is examined. Relationships between the EtOH concn. and that of sugar in the culture liquid are determined. A. G. P.

Respiration of yeast. J. GJAJA and L. MARKOVIC (Compt. rend. Soc. Biol., 1935, 119, 639—641).—Variation of the concn. of yeast suspension in a medium containing EtOH or glucose, through vals. $>7\%$, scarcely affects the O_2 consumption, which, however, is increased by dilution to $<$ this val. In a mineral medium the variations of O_2 consumption are less marked; NaF suppresses it in a glucose or EtOH medium, but not in a mineral medium. Hence there are two types of respiration of yeast. R. N. C.

Action of 2 : 4-dinitrophenol on washed yeast. J. FIELD and A. W. MARTIN (Compt. rend. Soc. Biol., 1935, 119, 458—461).—Washing the yeast in distilled H_2O or PO_4''' buffer has no effect on the stimulation of respiration by 2 : 4- $\text{C}_6\text{H}_3(\text{NO}_2)_2\cdot\text{OH}$. H. G. R.

Action of dinitrocresol on yeast fermentation and oxidation. M. E. KRAHL and G. H. A. CLOWES (J. Amer. Chem. Soc., 1935, 57, 1144).—4 : 6-Dinitro-o-cresol at optimum concn. ($10^{-5}M$) increases the rate of anaërobic CO_2 and EtOH production, to a smaller extent the (aërobic) consumption of O_2 , and the total amount of glucose consumed by yeast cells, but not the rate of growth of the cells. Higher concns. cause abnormally low activity. R. S. C.

Action of top yeast on levosin in solution and during the process of bread-making. R. GEORROY (Bull. Soc. Chim. biol., 1935, 17, 848—851).—Free levosin (I) extracted from wheat flour is not fermented by top yeast. During the process of bread-making, however, the (I) in the flour is fermented, although much more slowly than sucrose and maltose. A. L.

Precipitinogenic properties of "radium" strains of *Zygosaccharomyces mandshuricus*. Saito. J. M. OLENOV (Bot. Arch., 1935, 37, 140—149).—New strains produced by repeated irradiation of cultures show successive changes in the serological reactions of their proteins. A. G. P.

Permeability of *Amæba proteus* to water. S. O. MAST and C. FOWLER (J. Cell. Comp. Physiol., 1935, 16, 151—167).—Permeability data in Ringer's solution containing lactose are recorded. Permeability is not influenced by the thickness of the plasma-gel, but is probably regulated by the plasma-lemma. A. G. P.

Growth of *Chilomonas paramecium* in inorganic media. J. B. LOEFER and R. P. HALL (Science, 1935, 81, 486).—The strain used appeared incapable of synthesising protoplasm from NH_4 and other inorg. salts. L. S. T.

Auxogenic action of vitamin- B_1 on a micro-organism. W. H. SCHOPFER (Compt. rend., 1935,

200, 1965—1967).—The effects of a no. of cryst. preps. of vitamin- B_1 on the growth of *Phycomyces* are practically identical, and confirm the essential character of $-B_1$ for the synthesis of growth-substance by the organism. A. G. P.

Acid-producing power as a means of characterising strains of *Aspergillus niger*. G. VASSILIEV (Biochem. Z., 1935, 278, 226—234).—The production and accumulation of citric and gluconic acids by different strains of *A. niger* (on a medium containing sugar) is specifically influenced by 0.01% ZnSO_4 , which restricts these activities in some cases, but stimulates them in others. ZnSO_4 also affects the respiration of the mould and its power to consume sugar. W. McC.

Formation of intermediate products in the growth of *Aspergillus niger* as a function of the age of the mycelium. R. BONNET and R. JACQUOT (Compt. rend., 1935, 200, 1968—1970).—Formation of $\text{H}_2\text{C}_2\text{O}_4$ in cultures of *A. niger* increases with the age of the culture in media containing KNO_3 , but none is formed in those containing NH_4 salts. $\text{H}_2\text{C}_2\text{O}_4$ is an unutilisable by-product, and its production is related to the maintenance of an appropriate energy balance in the culture. Citric acid is formed from spores and is subsequently utilised during the growth of mycelium. In older cultures autolysis of mycelium results in a further accumulation of citric acid in the medium. A. G. P.

Can excess of a metal correct insufficiency of potassium in the development of *Aspergillus niger*? C. PONTILLON (Compt. rend. Soc. Biol., 1935, 119, 349—350).—K can be replaced by Na, Mg, or Ca, but Fe and Al inhibit germination of the spores. R. N. C.

Thermochemical investigations of the energy balance during the growth of fungi. A. YAMAMOTO and S. YAMAGATA (Acta Phytochim., 1935, 8, 245—254).—The formation of 1 g. of the substance $\text{C}_{409}\text{H}_{717}\text{O}_{233}\text{N}_{46}$ of *A. oryzae* from NH_3 and galactose is accompanied by evolution of 632.5 g.-cal. H. W.

Production of trimethylarsine by *Penicillium brevicaulis* (*Scopulariopsis brevicaulis*). F. CHALLENGER and C. HIGGINBOTTOM (Biochem. J., 1935, 29, 1757—1778).—Bread cultures of *P. brevicaulis* containing hydroxytrimethylarsonium nitrate (A., 1933, 266) or hydroxytri-*n*-propylarsine oxide (corresponding *picrate*) evolve AsMe_3 and AsPr^a_3 , respectively; no odour of NMe_3 is detected with $\text{NMe}_3\text{Cl}\cdot\text{OH}$ or NMe_3O . Na arsenate affords AsMe_3 but no gaseous product giving a ppt. with 2 : 4-dinitrophenylhydrazine. Neither Na nor Ca β -hydroxyethylarsinate yields AsMe_3 . Addition of propionates or butyrates to cultures (normal or grown with EtCO_2Na or PrCO_2Na as sole source of C) containing As_2O_3 yield always pure AsMe_3 , contrary to the theory of formation of methylarsinic acid from AcOH ; also arsinoacetic acid affords only traces of AsMe_3 (due to hydrolysis). With glycine or alanine, NH_3 but not betaine is formed in absence of As_2O_3 , whilst in presence of As_2O_3 the yield of AsMe_3 is \approx normal. Yields of AsMe_3 with fructose, xylose, glycerol, etc. as source of C and with addition of MeOH,

EtOH, HCO_2Na , CH_2O , $(\text{CH}_2\text{O})_3$, $(\text{CH}_2)_6\text{N}_4$, or Na formaldehydesulphoxylate are tabulated. Reactions between choline chloride or betaine and arsenite, selenite, and tellurite indicate the possibility of elimination of Me from methylated bases. No active enzyme prep. could be isolated from the mould. The data indicate a reducing action by *P. brevicaulis* on As^{V} derivatives; reduction of $\text{OH}\cdot\text{CH}_2\cdot\text{PO}_3\text{H}_2$ to a volatile phosphine or MePO_3H_2 , however, could not be achieved. The bearing of the results on the mechanism of methylation by moulds is discussed.

F. O. H.

Biochemistry of micro-organisms. XLVI. *i*-Erythritol, a metabolic product of *Penicillium brevicompactum*, Dierckx, and *P. cyclopium*, Westling. A. E. OXFORD and H. RAISTRICK (Biochem. J., 1935, 29, 1599—1601).—*i*-Erythritol (I) is isolated in small yields together with mannitol from the mycelium and the metabolism solution of *P. brevicompactum* and *P. cyclopium* when grown on media containing glucose and tartaric acid, growth being stopped before all the sugar has disappeared. With *P. cyclopium* the presence of tartaric acid is not essential for its formation. (I) is present in the mycelium in the largest amounts in the earlier stages of growth, and may disappear from the mycelium before disappearing from the medium.

P. W. C.

Protein synthesis by the genus *Azotobacter*. R. A. GREENE (Soil Sci., 1935, 39, 327—336).—Proteins occurring in the organisms were principally globulins, glutelins, and albumins. Arginine and lysine were the chief NH_2 -acids; tyrosine, tryptophan, cystine, and histidine were found in smaller amounts. Approx. 40% of the total N occurred in the non-basic fraction. A S-containing substance (possibly glutathione) was also detected. A close similarity is shown between the composition of *A. vinelandii* and *A. agilis*, and between *A. chröococcum* and *A. Beijerinckii*.

A. G. P.

Formation of hydrogen from glucose and formic acid by "resting" *B. coli*. I. A. TASMAN and A. W. POT (Biochem. J., 1935, 29, 1749—1756).—Differentiation between the formation of mol. H_2 from glucose (by glucose hydrogenlyase) and from HCO_2H (by formic hydrogenlyase) by "resting" *B. coli* could not be confirmed (cf. A., 1930, 251; 1932, 880; 1933, 1333). Production of H_2 by growing and "resting" *B. coli* generally has HCO_2H , and in a few cases AcCO_2H , as an intermediary.

F. O. H.

Volume increase of bacteria from X-ray irradiation. T. J. DIETZ (Radiology, 1935, 24, 31—38).—The increased vol. per normal bacterium (*E. coli*) following irradiation comprises an increased protoplasmic vol. due to stimulation and additional swelling caused by H_2O absorbed from the medium.

CH. ABS. (p)

Chemistry of the diphtheria bacillus. Fractional extraction of the lipins; separation of the hapten fraction; presence of soap in the bacterial cell. M. A. MACHEBŒUF and H. CASAGNE (Compt. rend., 1935, 200, 1988—1990).—The hapten of the diphtheria bacillus closely resembles that of the tubercle bacillus. It occurs only in the P-rich fraction of the lipin sol. in COMe_2 . It is possibly free

and not in the form of an antigenic protein complex. The MeOH extract of the diphtheria bacillus contains appreciable amounts of Na palmitate. A. G. P.

Purification of diphtheria toxoid. P. J. MOLONEY and M. D. ORR (Biochem. J., 1935, 29, 1525—1531).—The toxoid is pptd. from its crude solutions by FeCl_3 or COMe_2 , or by adsorption on FePO_4 . The yields (70—100%) and degrees of purification are the same for the three methods.

J. N. A.

Purification and concentration of diphtheria toxin and anatoxin with sodium β -naphthylamine-3 : 6 : 8-trisulphonate. H. GOLDIE (Compt. rend. Soc. Biol., 1935, 119, 518—520).—The toxin or anatoxin can be pptd. with the Na salt and citric acid at p_{H} 4 and redissolved in physiological salt solution.

H. G. R.

Serological analysis of the different lipid fractions of BCG. E. CHARGAFF and W. SCHAEFER (Ann. Inst. Pasteur, 1935, 54, 708—714).—Only the phosphatide fraction of BCG shows antigenic activity *in vitro* and *in vivo*. It acts in a dose of 0.0003 mg.

M. T.

Fluorescence of phthiocol, the pigment of the human tubercle bacillus. C. DHÈRE (Compt. rend. Soc. Biol., 1935, 119, 780—782).—Phthiocol is not fluorescent in the usual org. solvents, but shows a violet fluorescence in ultra-violet light, after treatment in Et_2O solution with aq. Na_2SO_4 . The orange and red bands of the ultra-violet fluorescence spectrum of cultures of *B. tuberculosis* are not due to the presence of phthiocol.

H. G. R.

Methylene-blue reduction by *B. tuberculosis* R and S. T. GUTHE (Compt. rend. Soc. Biol., 1935, 119, 694—697).—Methylene-blue is reduced by avian and mammalian strains of *B. tuberculosis* R and S. Reduction is more rapid with the mammalian than with the avian strains of the S variety.

R. N. C.

Oxidation of amino-acids by resting *Bacillus proteus*. F. BERNHEIM, M. L. C. BERNHEIM, and M. D. WEBSTER (J. Biol. Chem., 1935, 110, 165—172).—At p_{H} 7.8 in presence of the resting bacillus, leucine, phenylalanine, and methionine are rapidly oxidised utilising 1 O per mol. Serine (I), alanine (II), and proline (III) utilise, respectively, 3, 4, and 7 O per mol. Tyrosine and tryptophan (IV), which utilise, respectively, 2 and 3 O, are oxidised more slowly. Glycine is completely oxidised to CO_2 , H_2O , and NH_3 , but valine (V), isoleucine (VI), hydroxyproline, and histidine are only very slowly oxidised. Except with (I) and (II), both forms of which are oxidised, only the naturally occurring optical isomerides are oxidised. In *dl*-mixtures non-natural isomerides of (V) and (VI) restrict the oxidation of the natural isomerides. The oxidations are completely inhibited by 0.005M-KCN. Except with (V) the extent of deamination corresponds with the O_2 uptake. Only (I)—(V) are decarboxylated. Methylene-blue, in the presence of the bacillus, is reduced by the acids at varying rates not correlated with the rates of O_2 uptake during oxidation.

W. McC.

Action of intestinal bacteria on aesculin-gelatin. L. JAME, R. CROSNIER, and F. MOREL (Compt. rend. Soc. Biol., 1935, 119, 849—850).—The blackening

effects on an aesculin-gelatin medium by various intestinal bacteria are tabulated. H. G. R.

Fermentation of sugars by the group [*Salmonella pullorum-gallinarum*]. G. PACHECO and C. RODRIGUES (Compt. rend. Soc. Biol., 1935, 119, 889—890).—The group can be identified by differential fermentation reactions. H. G. R.

Physiology of the respiration of bacteria. II. Intracellular indophenol reaction of bacteria. S. YAMAGUCHI (Acta Phytochim., 1935, 8, 263—284).—In normal cells respiration is due to the oxygenated cytochrome system, and in such cells the intracellular oxidation of the "Nadi" reagent in presence of indophenolase (I) is carried on by mol. O_2 transferred by this system. In considering poisoning, the effect on (I) and the system must be considered separately. The "Nadi" oxidation of *Micrococcus ochraceus* and 4 *Pseudomonas* type is either not restricted or accelerated by 90% CO , which does not hamper the O_2 respiration of these bacteria. The indophenol reaction occurs also without aid of the cytochrome oxidation. On the other hand, the indophenol reaction of *B. mycoides*, *B. xylinum*, *B. subtilis*, and *B. mesentericus vulgaris*, in which respiration is rendered possible by the cytochrome system, is hampered by CO , and the restriction is removed by irradiation, as is the case with respiration, so that the action of (I) is more or less dependent on the cytochrome-O. Indophenolase reaction is not observed with *Escherichia*, *Proteus*, and *Staphylococcus* types in which respiration is restricted by CO . The indophenol reaction of all bacteria examined is remarkably restricted by HCN ; "Nadi" oxidation of *M. ochraceus*, the O_2 respiration of which is resistant to HCN , is greatly hindered. Generally, HCN affects the indophenol reaction of bacteria at concn. so small that the respiration is unaltered. HCN exerts therefore a twofold action: the damaging of (I) and the restriction of cytochrome activity. No parallelism appears between the occurrence of cytochrome and (I) in bacteria. With the exceptions of *B. mycoides* and *B. abortus equi* (I) is not present in bacteria free from cytochrome-c. In all types of bacteria containing (I) the c-component of cytochrome is present, although in certain bases the "Nadi" reaction is not observed. H. W.

Bacterium tumefaciens, Smith and Townsend: biochemistry of two varieties of different pathogenicity. G. AMOUREUX (Ann. Inst. Pasteur, 1935, 54, 730—763).—The two species display some differences in their action on sugars, $AcCO_2H$, and peptone. They have similar actions on starch, *l*-aspartic acid, asparagine, and urea. The action of *B. tumefaciens* on substrates containing sucrose is probably due to the enzymic action of invertase. There are probably four enzymes in *B. tumefaciens*, viz., dextrinase, amylase, invertase, and urease, all being endocellular. No action on ovalbumin and gelatin and no coagulation of milk or gelification of pectin could be demonstrated. M. T.

Mechanism of the acetic acid fermentation. A. JANKE and S. KROPACSY (Biochem. Z., 1935, 278, 37—59).—The oxidation of $EtOH$ to $AcOH$ by resting cultures of *B. ascendens* is followed using the

authors' methods (see this vol., 1044). The further oxidation of $AcOH$ to CO_2 , supposed to take place with proliferating organisms, does not occur. Curves show the influence of p_H on the O_2 -utilisation curves. The dismutation process ceases as soon as a relatively small amount of acid has accumulated in the fermentation liquid. Very different p_H optima are obtained for the two dehydrogenation processes on the one hand and for the dismutation process on the other. With the same suspension of organisms, the O_2 utilisation for both dehydrogenation processes depends on the p_H and on the age of the culture. The velocity of the dismutation process in acid solution is so small that in the technical $AcOH$ process it can play no significant part. P. W. C.

Physiology of acetic bacteria. II. Oxidation of organic acids in presence of acetic bacteria. K. TANAKA (Acta Phytochim., 1935, 8, 285—313).— $AcOH$, $(-CH_2 \cdot CO_2H)_2$, $AcCO_2H$, malic (I) and fumaric acid (II) are degraded in presence of *B. acetii* with absorption of O_2 and evolution of CO_2 ; the quotients CO_2/O_2 are in harmony with the vals. calc. for complete oxidation to CO_2 and H_2O . HCO_2H , $EtCO_2H$, $H_2C_2O_4$, $OH \cdot CH_2 \cdot CO_2H$, glutaric, tartaric, and citric acids are unaffected. Max. activity of the bacteria is observed at p_H 5 with substrate concn. 0.03—0.1M. If any two of the above acids are present simultaneously, a summation effect with respect to absorption of O_2 is never observed; the mechanism of degradation of the various acids is therefore closely similar. The oxidising power of the bacteria towards $AcOH$ and $(-CH_2 \cdot CO_2H)_2$ is most affected by rise in temp. and towards $AcCO_2H$ least. Aldehydease is far more stable than alcohol-dehydrase and the activities can be separated by this means. In the dehydrogenation of these acids the bacteria cannot utilise benzoquinone or methylene-blue as H acceptor. Addition of $PhMe$ greatly retards the dehydrogenation of acids; the activity of the bacteria towards (I) and (II) is restored by thorough washing, but towards other acids is mostly or completely lost. $CH_2I \cdot CO_2H$ at very low concn. restricts the absorption of O_2 . All aerobic oxidations except that of $AcCO_2H$ are greatly retarded by minute amounts of HCN . CO also restricts oxidation; prevention of this inhibition by light is somewhat indistinctly observed. The powerful inhibitory action of benzoquinone is irreversible. H. W.

Bacterial metabolism. I. Reduction of propionaldehyde and propionic acid by *Clostridium acetobutylicum*. K. C. BLANCHARD and J. MACDONALD (J. Biol. Chem., 1935, 110, 145—150). Since fermenting cultures of the bacteria convert $EtCHO$ and $EtCO_2H$ into Pr^oOH ($EtCO_2H$ first into $EtCHO$) without accompanying production of any other end-products (e.g., aldols or their transformation products) not normally produced by the bacteria in the fermentation of carbohydrates, it is improbable that intermediate production of aldol occurs during the production of Pr^oCO_2H and Bu^oOH from carbohydrates by these bacteria. W. McC.

Activator of the metabolism of *Bacterium propionicum*. P. CHAISE and C. FROMAGEOT (Bull. Soc. Chim. biol., 1935, 17, 874—892; cf. A., 1934,

330).—The accelerating action of potato extract on the growth of *B. propionicum* (I) on a boiled maize medium containing glucose is confirmed using a conc. prep. of potato extract made by treatment with $\text{Hg}(\text{OAc})_2$ in aq. Na_2CO_3 and H_2S . When lactic acid is substituted for glucose in the medium no activation occurs. Determinations of the amount of fermentation taking place with small quantities of (I) indicate that with glucose as substrate there is a threshold for the amount of (I) below which no growth takes place in the absence of the activator. By the action of the activator the threshold is lowered. With lactic acid as substrate the phenomenon is not so marked. A. L.

Behaviour of bacteria and infectious lysin in the ultra-violet spectrum. C. HALLAUER (Z. Hyg. Infektionskrankh., 1935, 117, 18—25).—Lysins agree approx. with the organisms that produce them with regard to resistance to ultra-violet radiations, formation of max. of sensitivity, and the spectral range of radio-sensitivity. R. N. C.

Ultrafiltration of the virus of vesicular stomatitis. J. H. BAUER and H. R. COX (Proc. Soc. Exp. Biol. Med., 1935, 32, 567—570).—The filtration end-point of the virus is independent of the source or serological type, and is approx. 140 m μ . R. N. C.

Formation of the Forssman antigen by a strain of *B. dysenteriae*, Shiga, in different nutrients. M. EISLER and A. HOWARD (Z. Hyg. Infektionskrankh., 1935, 117, 56—65).—The antigen is not produced when *B. dysenteriae*, Shiga, *L* is grown in media containing asparagine, leucine, and cystine as N source, and lactate, mannitol, and glycerol as C source. The agglutinability is fundamentally altered. If glycyl-glycine or -leucine is added, these effects do not occur. This behaviour is sp. for the *L* strain. R. N. C.

Paradoxical relation between ζ -potential and suspension stability in *S* and *R* variants of intestinal bacteria. E. W. JOFFE and S. MUDD (J. Gen. Physiol., 1935, 18, 599—613).—Determinations of electrokinetic potentials and suspension stability of 4 strains of non-flagellate intestinal bacteria indicate that the *S* (smooth) variants have ζ -potentials of approx. zero over a wide range of p_{H} and electrolyte concn., yet form stable suspensions by virtue of hydrophobic constituents. *R* (rough) variants have potentials varying with p_{H} and electrolyte concn. in the normal way, whilst the vals. of potential are crit. for suspension stability. F. O. H.

Physico-chemical difference in antibodies against *S* and *R* variants of a single bacterial strain. E. W. JOFFE (J. Gen. Physiol., 1935, 18, 615—625).—The antibodies against *R* and *S* variants of *B. typhosum*, when studied as deposits on maximally sensitised bacterial surface, differ in isoelectric point and ζ -potential. With increasing time of immunisation (rabbit), the isoelectric point moves to the alkaline side, but the agglutination titre does not change in a parallel manner. Rabbits immunised with single cell strains of *R* slowly develop antibodies for *S* and *vice versa*. F. O. H.

Bactericidal substances of human serum, particularly in fever. F. WULFF (Compt. rend. Soc. Biol., 1935, 119, 424—426).—Some properties of the anti-typhoid and anti-meningococcal substances of febrile serum are described. R. N. C.

Action of gastric juice on typhoid bacilli. K. TODOROVITCH (Compt. rend. Soc. Biol., 1935, 119, 638—639).—The resistance of the bacilli to gastric juice falls as total acidity increases. R. N. C.

Antagonistic action of sterile broth extract of *B. prodigiosus*. M. EISLER and I. JACOBSON (Z. Hyg. Infektionskrankh., 1935, 117, 76—91).—A thermostable substance that inhibits growth of diphtheria bacilli, gonococci, and certain other types is present in sterilised broth in which *B. prodigiosus* has been grown. Its action is associated with its adsorption on the bacilli and is $>$ that of pyocyanase. R. N. C.

Resistance to drugs and chemical tolerance of trypanosomes. E. SINGER and V. FISCHL (Z. Hyg. Infektionskrankh., 1935, 116, 683—687).—Strains of *T. nagana* exposed temporarily to non-trypanocidal atabrin or rivanol afterwards absorb considerably more of these drugs than untreated strains; hence chemical tolerance is fundamentally different from resistivity to drugs. Spontaneously resistant *T. lewisi* is not affected either positively or negatively by solu-salvarsan. R. N. C.

Chemotherapy of rat trypanosomiasis. V. FISCHL and E. SINGER (Z. Hyg. Infektionskrankh., 1935, 116, 652—659).—Many arsenicals and other substances, including normal and syphilitic human serum, were without therapeutic effect on rats infected with *T. lewisi*. Storage and activity were parallel only in the case of arsenicals, Au compounds being stored in considerable quantities in spite of their inactivity. R. N. C.

Antagonism of the actions of chemotherapeutic agents. II. A. HASSKÓ (Z. Hyg. Infektionskrankh., 1935, 116, 669—671).—Me- and Et-violet and pyocyanine reduce the absorptivity for trypanflavin of the flagellae of *T. nagana* in rats. Brilliant-green exerts the same effect through its high toxicity when injected intraperitoneally, but not subcutaneously. Trypan-red and -blue are both absorbed by trypanosomes, and reduce absorptivity to a min. There is no great difference between the dye contents of the parasites and the serum. R. N. C.

Mode of action of chemotherapeutic agents. I. A. HASSKÓ (Z. Hyg. Infektionskrankh., 1935, 116, 660—668).—Inoculation into normal mice of trypanosomes treated with trypanflavin or neosalvarsan (I) results in a retarded increase of trypanosomes; the retardation \propto the quantity, therapeutic index, and time of action of the drug, which affects the vitality of the flagellates. Their disappearance from the bloodstream inversely \propto the dye content. Parafuchsin has scarcely any effect on trypanosomes. (I) cannot be detected in them, the active agent being formed from (I) by the animal body. The therapeutic effect of tartar emetic is reduced by exclusion of reticulo-endothelial cells. R. N. C.

Action of alkaloids on pure cultures of *B. radicola*. G. MEZZADROLI and L. SGARZI (Atti R. Accad. Lincei, 1935, [vi], 21, 105—110).—With liquid cultures (containing glucose, K_2HPO_4 , and KNO_3) of *B. radicola*, caffeine increases growth in concns. of 0.005—0.025%, depresses it at 0.11%, and is toxic at 0.15%. Quinine and, to a greater extent, strychnine give corresponding lower vals. The effects are less marked in solid (agar) nutrients. F. O. H.

Effect of dyes on colonies of certain pathogenic fungi. III. J. W. WILLIAMS and L. GREEN (Proc. Soc. Exp. Biol. Med., 1935, 32, 625—628).—The effects of certain dyes on a no. of fungi are given. In general, growth is more profuse and more frequently coloured on acid than on basic dyes.

R. N. C.

Bactericidal and sterilising powers of aminobenzoic esters. A. MOREL, A. ROCHAIX, and H. DELABORDE (Compt. rend. Soc. Biol., 1935, 119, 612—615).—The bactericidal and sterilising powers of a no. of aminobenzoic esters on different organisms are given. They are < those of vegetable essences. They are not very different from those of the corresponding hydroxybenzoic esters. Sterilising power is not affected by the position of the NH_2 ; it is reduced by introduction of Me, but increased by Bu, in the NH_2 .

R. N. C.

Bactericidal and fungicidal action of homologous halogenophenol derivatives and its "quasi-specific" character. II. Derivatives of *o*-chlorophenol. Chlorine-free alkylphenol derivatives. E. KLARMAN, V. A. SHTERNOV, and L. W. GATES (J. Lab. Clin. Med., 1934, 20, 40—47; cf. A., 1934, 68).—Aliphatic and aromatic derivatives of *o*- $C_6H_4Cl\cdot OH$ (I) show similar relationships between mol. wt. and bactericidal and fungicidal properties, as do corresponding *p*-derivatives of *p*- $C_6H_4Cl\cdot OH$, although their action is less effective. Higher homologues of (I) and the *p*-alkyl derivatives of $PhOH$ (Cl-free) have a selective or "quasi-sp." action on Gram-positive organisms. The microbiological potency increases, and toxicity to animals decreases, with increasing mol. wt. of the substituting radical. Introduction of Cl into the nucleus of *p*-alkylphenols decreases their toxicity. CH. ABS. (*p*)

Stimulatory and inhibitory effects of silver and formaldehyde on bacterial growth: growth curves. W. OETTEL (Arch. Hyg. Bakt., 1934, 113, 71—91; Chem. Zentr., 1935, i, 424).—In sub-lethal concns. solutions of colloidal Ag and of CH_2O produce periodically alternating stimulatory and inhibitory effects on the growth of *B. coli* and of staphylococci. The nature and extent of these effects vary with the concn. of antiseptic applied.

A. G. P.

Sterilisation of hydatid sand by formolised and by iodised solutions. F. DÉVÉ (Compt. rend. Soc. Biol., 1935, 119, 352—354).—Hydatid gravel is sterilised by 1% aq. CH_2O , by Lugol's I solution, whether freshly prepared or after 4 months' storage, and by 0.1% I in EtOH.

R. N. C.

Culture of micro-organisms on Cellophane membranes. T. R. BHASKARAN, M. SREENIVASAYA, and V. SUBRAHMANYAN (Current Sci., 1935, 3, 484).—

Cellophane, closely applied to the surface of a culture medium, permits the ready growth of bacteria, which are thereby obtained free from the solid constituents of the medium.

J. L. D.

Adrenal cortex and resorption of fat. F. VERZAR and L. LASZT (Biochem. Z., 1935, 278, 396—400; cf. this vol., 524).—In rats, the inability to resorb fats caused by extirpation of the adrenals is counteracted (up to 77% of administered olive oil resorbed) by subcutaneous injection of the hormone ("eucortone") of the adrenal cortex. Adrenaline and/or ascorbic acid have no such effect. The hormone acts by controlling phosphorylations.

W. McC.

Variations of blood-sugar in the course of continuous intravenous injection of adrenaline. J. MALMÉJAC and V. DONNET (Compt. rend. Soc. Biol., 1935, 119, 734—736).—Continuous intravenous injection of adrenaline (I) at the rate of 0.05 mg. per kg. per hr. in dogs produces an increase of blood-sugar, which reaches its max. in $\frac{1}{2}$ hr., and then returns to normal. This fall is due to increased secretion of insulin and to suppression of (I) secretion.

R. N. C.

Blood-vessels, blood-pressure, and adrenaline. D. P. ORAHOVATS and T. GOTSER (Pflüger's Archiv, 1935, 235, 367—376).—Adrenaline (I) produces a vaso-dilatation of the intestinal blood-vessels in the dog more often than a vaso-constriction, whilst the effect on the vessels of the extremities varies. (I) injected into the mesenteric artery causes contraction of the blood-vessels. The effects are independent of the quantity of (I) injected, and are not affected by pH changes, spinal or vagal section, atropine, asphyxia, or hyperventilation.

R. N. C.

Effect of adrenaline on the metabolism of isolated muscle. D. NACHMANSOHN, J. WAJZER, and R. LIPPMANN (Compt. rend., 1935, 200, 1981—1982).—The action of adrenaline on the energy metabolism of muscle consists only of a sp. acceleration of lactic acid production.

A. G. P.

Hypoglycæmia provoked by insulin before and after nephrectomy. E. GAUJOUX, M. RECORDIER, and M. ANDRAC (Compt. rend. Soc. Biol., 1935, 119, 745—746).—The max. fall in blood-sugar provoked by insulin in rabbits varies after nephrectomy; in some cases after double nephrectomy it is < after single nephrectomy. Blood-sugar remains low for a longer period in nephrectomised rabbits.

R. N. C.

Effect of the state of the kidney on the activity of insulin. E. GAUJOUX, M. RECORDIER, and M. ANDRAC (Compt. rend. Soc. Biol., 1935, 119, 747—748).—The max. fall of blood-sugar provoked by insulin is independent of blood-N.

R. N. C.

Can glycogen accumulate in the liver of a totally depancreatized dog under the influence of an insulin deprived of vagotonising action? L. HÉDON and A. LOUBATIÈRES (Compt. rend. Soc. Biol., 1935, 119, 358—360).—Vagotonin-free insulin provokes glycogen deposition similarly to the commercial product.

R. N. C.

Pituitary growth-hormone and glutathione concentration: does the hormone influence the

concentration concurrently with the stimulation of increase in weight? P. W. GREGORY and H. Goss (J. Exp. Zool., 1934, 69, 13—35).—The livers and muscles of rats killed after a period of growth induced by anterior pituitary injections show an increased content of I-reducing substances. This is not due to ascorbic acid, which remains the same as in controls. It is attributed to an increase of glutathione compounds during the induced growth.

NUTR. ABS. (b)

Effects of antuitrin-S and pituitary extract on the armadillo ovary. G. W. D. HAMLETT (Anat. Rec., 1935, 62, 201—207).—Human pregnancy urine extract and whole pituitary extract stimulate cystic and luteinised follicle production, and in some cases corpus luteum formation. The urine extract, but not the pituitary extract, causes resorption of the unimplanted blastocyst.

R. N. C.

Concentration of the antidiuretic factor of the anterior lobe of the pituitary. H. R. DOWNES and L. RICHARDS (J. Biol. Chem., 1935, 110, 81—90).—Dried pituitary gland is extracted with aq. AcOH and the antidiuretic factor is separated from the extract by dialysis; impurities are removed from the dialysate by pptn. with COMe_2 . Biological assays indicate that the treatment removes vasopressin, most of the oxytocin, thyrotropin, intermedin, and the gonad-stimulating hormone. The antidiuretic factor occurs chiefly in the posterior lobe and the pars intermedia.

H. D.

Effect of the thyrotropic hormone on carbohydrate metabolism. V. JONÁŠ (Z. ges. exp. Med., 1934, 94, 495—503).—Repeated injection of thyrotropic hormone (I) had no effect on the fasting blood-sugar (II) of healthy subjects or patients with Graves' disease, but caused a higher and more prolonged curve after the ingestion of glucose, usually with glycosuria. In two cases of Graves' disease with disturbances of carbohydrate metabolism these became more marked. In a patient with myxedema (II) rose and approached normal; the alteration in carbohydrate metabolism, which resembled that occurring in Graves' disease, generally occurred later than the increase in basal metabolism. In one patient with Graves' disease, who showed galactosuria after galactose, administration of (I) caused a higher and more prolonged (II) curve and a greater degree of galactosuria. The disturbances in carbohydrate metabolism occurring in Graves' disease are directly related to altered thyroid function.

NUTR. ABS. (m)

Seasonal changes in the thyroid gland of the thirteen-lined ground-squirrel (*Citellus tridecemlineatus*) with particular reference to its sexual cycle. M. ZALESKY (Anat. Rec., 1935, 62, 109—137).—Thyroid activity falls during hibernation, but can be stimulated to levels > the summer level by anterior pituitary extract. In the female the max. activity coincides with pregnancy and lactation. Activity is not affected by castration, sex hormones, or pregnancy urine extracts.

R. N. C.

Action of thyroid secretion on the variations of the chromic residual index of the blood-plasma. M. POLONOVSKI, H. WAREMBOURG, and J. DRIESSENS (Compt. rend. Soc. Biol., 1935, 119,

585—586).—Thyroxine reduces the index in cases of diabetes and cancer when this is initially high, but does not affect it when it is initially normal or low.

R. N. C.

Diuresis of hyperthyroidism. A. S. DIX, J. M. ROGOFF, and B. O. BARNES (Proc. Soc. Exp. Biol. Med., 1935, 32, 616—618).—Thyroid administration produces diuresis in normal, but not in depancreatised, dogs, although it increases the metabolic rate in the latter.

R. N. C.

Gonadotropic hormones from various organs. S. SZARKA (Orvosi Hetilap, 1934, 78, 1009—1012).—Luteocrescin (I) differs in biological action from gonadotropic hormones from urine or anterior pituitary. The luteinising and ovary-stimulating effect of (I) is much > that of hormones from the named sources.

CH. ABS. (p)

Differential effect of some gonadotropic substances on development of cyclic sex characteristics in the English sparrow. E. WITSCHI and W. N. KECK (Proc. Soc. Exp. Biol. Med., 1935, 32, 598—603).—The hormone of the pituitary, but not that of pregnancy urine, accelerates the development of the sex glands.

R. N. C.

Colour reaction of the sex hormones and its application to colorimetric determination. W. ZIMMERMANN (Z. physiol. Chem., 1935, 233, 257—264).—Alkaline $m\text{-C}_6\text{H}_4(\text{NO}_2)_2$ gives a coloration with the $\text{CO}\cdot\text{CH}_2\cdot$ group. It detects androsterone, follicular hormone, luteosterone, and pregnandione in amounts of 0.01, 0.02, 0.05, and 0.025 mg., respectively, and may be used for the determination of these hormones.

J. H. B.

Constitution of equol. G. F. MARRIAN and D. BEALL (Biochem. J., 1935, 29, 1586—1588).—Equol (A., 1932, 1156) is isolated from the Et_2O -sol. phenolic fraction of the PhMe extract of urine of both pregnant and non-pregnant mares and stallions by crystallisation from CHCl_3 . The yields varied seasonally, becoming zero in winter. Mild KOH fusion yielded 2:4-(OH) $_2\text{C}_6\text{H}_3\text{CO}_2\text{H}$, resorcinol (I), and a trihydric phenol which gave a Me_2 ether with CH_2N_2 . More vigorous fusion gave (I), $p\text{-OH}\cdot\text{C}_6\text{H}_4\cdot\text{CO}_2\text{H}$, and $p\text{-C}_6\text{H}_4\text{Et}\cdot\text{OH}$. On the basis of these facts three formulæ are suggested for the constitution of equol: 7-hydroxy-2-, 7-hydroxy-3-(4'-hydroxyphenyl)-chroman, and 6-hydroxy-2-(4'-hydroxybenzyl)-coumaran.

H. D.

Presence of testicle hormones in the blood. L. PTASZEK (Soc. biol. Lwow, 1933, May 8th).—Resection of the vas deferens causes an increase in the male sexual hormone in blood.

CH. ABS. (p)

Male hormone. VI. Male hormone from boar testes. New crystalline male hormone. VII. Test of the male hormone by measurement of increase in weight of seminal vesicles of castrated rats. New rat unit. A. OGATA and S. HIRANO (J. Pharm. Soc. Japan, 1934, 54, 1010—1019).—VI. The cryst. hormone, m.p. 129—130°, is N-free and more active than other testicular preps. Its activity is not destroyed by boiling with KOH-EtOH.

VII. A new technique is described.

CH. ABS. (p)

Quantitative studies on the response of the capon's comb to androsterone. A. W. GREENWOOD, J. S. S. BLYTH, and R. K. CALLOW (Biochem. J., 1935, 29, 1400—1413).—For the study of the response of the comb of the brown Leghorn capon to cryst. androsterone (I), groups of five kinds of similar initial comb-size and body-wt. are used and the technique of comb measurement is carefully standardised. Daily injections are made for 5 days and the response is measured in terms of increase of max. length + height of comb. The response \propto the log of the dose between the limits of 0.5 and 8 mg. The results, which imply a standard error of about $\pm 18\%$ in the determination of the dose, are considered in relation to the formulation of a technique for the assay of male hormone. The amount and nature of the solvent influence the response, the latter being the same for groups of birds of different ages (4 months to 6 years) and for both subcutaneous and intramuscular injection. As a precautionary measure, birds should not be used earlier than 12 months after castration. No relationship was detected between body-wt. and comb response. Birds should not be used for a new series of doses until 1 month after the previous doses. The activity of (I) is unaffected by heating the solution in arachis oil at 150° for 24 hr.

P. W. C.

Growth and maintenance of the fowl's comb by administration of androsterone. R. K. CALLOW and A. S. PARKES (Biochem. J., 1935, 29, 1414—1423).—Very rapid growth of the combs of capons with complete restoration to normal size in the course of a few weeks can be induced by injections of cryst. androsterone (I) in doses of the order of 2.5—5 mg. daily. The comb can be maintained at the normal level by daily doses of 1 mg. of (I). This requirement is not inconsistent with the view that secretion of (I) accounts for the whole androkinetic activity of the testes of the cock. Observations are made also on the restoration of the vas deferens. The comb of the Leghorn capon is several times more sensitive to (I) than is that of the Plymouth Rock capon. The comb of the hen is much less responsive than is that of the capon.

P. W. C.

Effect of androsterone and of male hormone concentrates on the accessory reproductive organs of castrated rats, mice, and guinea-pigs. R. K. CALLOW and R. DEANESLY (Biochem. J., 1935, 29, 1424—1445).—Androsterone (I) is injected into groups of adult rats for 14 days, beginning on the day of castration. 1 mg. daily maintained the growth and normal structure in the prostate of 140—160-g. rats, but > 2 mg. daily were required for maintenance of seminal vesicles. Larger rats receiving 3 mg. (I) had prostate larger than and seminal vesicles of normal size. With mice 1—2 mg. daily of (I) failed to maintain completely the seminal vesicles or the cranial lobes of the prostate. A comparison of different urine concentrates showed that in two urines the effect per capon unit on the accessory glands of rats is much the same as that produced per capon unit of cryst. (I), whilst in a third urine, the activity on rats was 3—4 times as great. The activity of the most effective urine concentrate can-

not be reproduced by combined administration of œstrone and (I), which gave results little if any better than (I) alone. Some urine concentrates may contain a male hormone other than (I) with much greater activity on the accessory glands of mammals.

P. W. C.

Crystalline male hormone from testes (testosterone), more active than androsterone prepared from urine or from cholesterol. K. DAVID, E. DINGEMANSE, J. FREUD, and E. LAQUEUR (Z. physiol. Chem., 1935, 233, 281—282).—A hormone from testis extract, *testosterone* (I), m.p. $154—154.5^\circ$, $[\alpha]_D^{25} + 109^\circ$ in EtOH, has an activity of 1 capon unit in 10^{-5} g. An activator present in inactive testis extract or urine is necessary to enable (I) to exert its full growth-promoting power on the seminal vesicles of the infantile castrated rat.

J. H. B.

Androsterone. IV. Degradation of stigmasterol to isoandrosterone and androstenedione. Relationship between hormone of the corpus luteum, allopregnanolone, and androsterone. A. BUTENANDT and H. COBLER. **V. Androstenediol, a physiologically active reduction product of androsterone.** A. BUTENANDT and K. TSCHERNING (Z. physiol. Chem., 1935, 234, 218—223, 224—234).—IV. *alloPregnanolone* (1 g. from 17 g. of stigmasterol) with MeMgI gives a *carbinol* (I), $C_{22}H_{36}O_2$, m.p. $182—186^\circ$, which loses H_2O when heated with AcOH and Ac_2O , giving the *acetate* (II), m.p. 144° , of the unsaturated alcohol, $C_{22}H_{36}O$, and an *isomeride*, m.p. $111—112^\circ$. A second *isomeride*, m.p. $64.0—64.5^\circ$, is obtained from the mother-liquors of (I) by acetylation. Oxidation of (II) with O_3 gives the *acetate*, m.p. $96—97^\circ$, of *isoandrosterone* (III) (3-hydroxy α -allocholanone-17), which differs from androsterone (IV) only in the spatial position of the OH. (III), like (IV), yields androstenedione on oxidation with CrO_3 .

V. Reduction of (IV) with Na and Pr^+OH gives a mixture of which the chief constituent is androstenediol (V), m.p. 221° , $[\alpha]_D^{25} + 12.6^\circ$ [diacetate (VI) m.p. $159—160^\circ$]. (V) and (VI), which are identical with the corresponding substances described by Ruzicka *et al.* (this vol., 346), are about three times as active as (IV), the effects of (VI) being more protracted and its max. effect being attained later.

W. McC.

Use of albino rats for assay of the male sex hormone. Y. WANG and H. WU (Chinese J. Physiol., 1935, 9, 149—163).—The rats are castrated at 4 weeks and given 2 daily injections at 8 weeks; 48 hr. later the preputial glands are dissected and weighed. 1 rat unit corresponds with a 50% increase in wt. over that of the control. The effect of the same amount of hormone in 2 daily injections is $>$ that of a single injection.

H. G. R.

Chemistry of œstrogenic substances. E. FRIEDMANN (Nature, 1935, 135, 622—623).—A discussion of the mol. structures which give rise to œstrogenic activity. It is claimed that benzylidene- and (to a greater extent) furfurylidene-pyruvic acid are active.

Chemistry of œstrogenic substances. J. W. COOK and E. C. DODDS (Nature, 1935, 135, 793,

959).—Friedmann's views (see above) are criticised. No oestrogenic activity of benzylidene- or furfurylidene-pyruvic acid or their Na salts could be detected when injected in amounts of 100 mg. per rat.

L. S. T.

Effect of progynon on regeneration of erythrocytes. T. MINOCHI and H. SCHWALM (Klin. Woch., 1934, 13, 1565—1568; Chem. Zentr., 1935, i, 586).—Progynon (I) has only a slight effect on the red-cell count in normal or castrated female rabbits. After venesection in normal animals, (I) increases the reticulocyte count; the effect does not appear in castrated animals.

R. N. C.

Does folliculin provoke the interruption of gestation by arrest of the function of the corpus luteum? S. SKOWRON and A. PERAUS (Compt. rend. Soc. Biol., 1935, 119, 772—774).—The abortive action of folliculin in rabbits is not related to arrest and regression of the corpus luteum, and is not checked by progestin.

R. N. C.

Action of ovarian hormone on lachrymal elimination of sodium chloride. D. MICHAIL and P. VANCEA (Compt. rend. Soc. Biol., 1935, 119, 447).—Lachrymal NaCl is increased by injection of ovarian hormone, reaching its max. 1 hr. after injection. The effect is the same in both sexes.

R. N. C.

Colorimetric determination of oestrin in the urine of non-pregnant women. G. F. MARRIAN and S. L. COHEN (Nature, 1935, 135, 1072).—The method described for pregnancy urine (A., 1934, 1269) is of little val. for the determination of the much smaller amounts of oestrin present in the urine of non-pregnant women.

L. S. T.

Hydrolysis of combined forms of oestrone and oestriol in human pregnancy urine. S. L. COHEN and G. F. MARRIAN (Biochem. J., 1935, 29, 1577—1585).—The optimum conditions for the hydrolysis of human pregnancy urine previous to the determination of oestrone (I) and oestriol (II) (A., 1934, 1269) are a $[H^+]$ such that the final $p_H < 1$, and autoclaving at 120° for 2 hr. Destruction of both (I) and (II) occurs on heating in alkaline or acid solution in presence of O_2 . Heating urine with alkali causes only about 50% hydrolysis; subsequent treatment with HCl completes the process.

H. D.

New agent produced from urine of pregnant women and its biological effects. J. BAUMANN (Orvosi Hetilap, 1934, 78, 1138—1141).—The new substance affects the ovaries of mature but not of infantile rats, and differs from the oestrus hormone and from gonadotropic agents.

CH. ABS. (p)

"Anti-hormones." T. MARTINS (Compt. rend. Soc. Biol., 1935, 119, 753—755).—Theoretical.

R. N. C.

Relations between hormones and vitamins. Mechanism of the action of the antirachitic vitamin in the organism with reference to the physio-pathology of the thymus. M. MESSINI and M. COPPO (Arch. Ist. Biochim. Ital., 1935, 8, 195—232).—The toxic action of vitamin-D (I) in thymectomised rabbits is $<$ in normal rabbits; blood-Ca is not increased, nor bone decalcification compensated by (I), and calcification of fractures is not

affected as in parathyroidectomised animals. (I) increases bone Ca and ash, but scarcely affects P, H_2O , and dry residue. The action of (I) on the normal calcification process is obstructed in thymectomised animals by the acid reaction, which prevents its catalysis of the formation of the $Ca_3(PO_4)_2$ -saline complex. A sp. thymus function, possibly hormonal, is hence probably involved in the regulation of the action of (I) on Ca.

R. N. C.

Rôle of vitamin-A in nutrition. M. B. RICHARDS (Brit. Med. J., 1935, 1, 99—102).—A review.

CH. ABS. (p)

Vitamin-A and cholesterol metabolism. J. A. COLAZZO, I. TORRES, and SANCHEZ-RODRIGUEZ (Klin. Woch., 1934, 13, 1678—1682; Chem. Zentr., 1935, i, 429).—The level of cholesterol in serum and organs of rats was considerably lowered in avitaminosis-A and increased (especially in the central nervous system) in hypervitaminosis-A.

A. G. P.

Effect of vitamin-A on the serum-cholesterol in man. F. LASCH (Klin. Woch., 1934, 13, 1534—1536; Chem. Zentr., 1935, i, 429).—Increased serum-cholesterol following administration of vitamin-A is primarily due to the increased proportion of cholesteryl esters.

A. G. P.

Influence exerted by the nervous system on the vitamin-A content of the blood. A. CHEVALIER, J. MALMEJAC, and Y. CHORON (Compt. rend. Soc. Biol., 1935, 119, 739—740).—Blood-vitamin-A is increased by excitation of the central ending of the pneumogastric, and of the peripheral ending of the splanchnic.

R. N. C.

Chemical composition of the white rat during the course of avitaminosis-A. L. EMERIQUE (Bull. Soc. Chim. biol., 1935, 17, 612—619).—The tissues of white rats undergoing progressive avitaminosis-A show first a deficiency in the protoplasmic constituents, then in the reserve fatty matter, and finally, when the avitaminosis has reached an advanced state, in the calcification of the bones. Under normal conditions there may therefore be an equilibrium between vitamin-A and -D.

A. L.

Discrepancy between biological assays and other methods of determining vitamin-A. I. R. S. MORGAN, J. R. EDISBURY, and R. A. MORTON (Biochem. J., 1935, 29, 1645—1660).—Biological assays for vitamin-A (I), Lovibond blue vals., and spectroscopic estimates of the % of (I) ($C_{20}H_{29}\cdot OH$) present are given for 22 oils and concentrates covering a range of potency of 530—1,290,000 international units per g., and the results are examined statistically. Accepting the characteristics of the rich Carr and Jewell concentrate as those of the pure (I), the assays are extrapolated to pure (I) and give vals. varying from 1.23 to 3.38 ($\times 10^6$) units per g. (mean 1.77) when calc. from the blue vals. and from 1.08 to 2.9 ($\times 10^6$) units per g. (mean 1.73) calc. from the spectroscopic estimates. This variation is $>$ can be accounted for by the known error of the assays. Generally the highest vals. are given by cod-liver oils of medicinal grade. Accepting the unit of (I) as the activity of 0.6×10^{-6} g. of β -carotene (II), it is calc. that if (II) is efficiently converted into (I) at the levels of dosage

used in the assays, the potency of pure (I) would be 1.56×10^6 units per g. Vals. < this might be accounted for by the presence of biologically inactive material showing selective absorption and chromogenic power, whilst vals. significantly higher suggest the existence of a biologically active material without selective absorption or chromogenic power, or with these characteristics much weaker than in (I).

Modification of Sherman and Smith's vitamin-A-deficient ration for rats. H. C. HOU (Chinese J. Physiol., 1935, 9, 197—205).—By substituting soya-bean protein for casein, a shorter depletion period and a better wt. increase were observed. Substitution of potato for corn-starch gave the shortest depletion period and the best wt. increase.

P. W. C.

Syntheses in the vitamin-A field.—See this vol., 978, 979, 983.

Effect of type of carbohydrate on vitamin-B synthesis in the digestive tract of the rat. N. B. GUERRANT, R. A. DUTCHER, and L. F. TOMEY (J. Biol. Chem., 1935, 110, 233—243).—The vitiating effect of coprophagy on vitamin-B (I) assay is most serious when the experimental diet contains dextrinised maize-starch (II) as the source of carbohydrate. Animals fed on such a diet have an unusually large caecum, which contains an enormous no. of live yeast cells and incompletely digested (II). It is suggested that under these conditions (I) is synthesised, and coprophagy enables animals fed on a (I)-free diet to maintain their normal growth curve. E. A. H. R.

Relationship between nutrition and the enzymic activity of the blood-serum. K. ARIMOTO (Sei-i-kwai Med. J., 1933, 52, No. 10, 103—107).—Feeding albino rats with excess of vitamin-B causes no appreciable increase in blood-amylase (I) unless excess of carbohydrate is also supplied, when (I) decreases.

CH. ABS. (p)

Vitamin-B₁ content of foods. A. Z. BAKER and M. D. WRIGHT (Biochem. J., 1935, 29, 1802—1807).—The trustworthiness of the cure of bradycardia as a method of determining vitamin-B₁ (A., 1934, 705) is confirmed. The contents (in international units) of various foods thus determined are tabulated.

F. O. H.

Crystalline vitamin-B₁. VII. Relation to pathological states. R. R. WILLIAMS, R. E. WATERMAN, and J. C. KERESZTESY (Science, 1935, 81, 535—536).—The antineuritic activity of the crystals towards human beri-beri has been confirmed. Rats fed on a vitamin-B₁-free diet show complete freedom from polyneuritis with only $1-2 \times 10^6$ g. of the crystals per day, but growth is slight. Marked insufficiency of B₁ may be possible without manifestations of polyneuritis.

L. S. T.

Tissue respiration in avitaminosis-B₁. H. G. K. WESTENBRINK (Arch. néerl. Physiol., 1935, 20, 175—176).—A reply to Abderhalden and Wertheimer (cf. this vol., 669).

R. N. C.

Crystalline vitamin-B₁. VIII. Sulphite cleavage. II. Acidic product. R. R. WILLIAMS, E. R. BUCHMAN, and A. E. RUEHLE (J. Amer. Chem.

Soc., 1935, 57, 1093—1095; cf. this vol., 668).—The "aminosulphonic acid" (I), $C_6H_5O_3N_2S$, obtained from vitamin-B₁, is probably a 6-aminopyrimidine. It chars slowly > 400°, melts > 440°, is sol. in dil. alkali or NH_3 , conc. HNO_3 , or H_2SO_4 (with which it does not react), has p_H 5.2 in saturated aq. solution, does not react with $p-SO_3H \cdot C_6H_4 \cdot N_2Cl$ (II), moist NaOH at 135°, NH_3 , or HCl at 100°, is pptd. by $AgNO_3$ at p_H 8.9 but not by phosphotungstic acid, gives much SO_3^{--} with NaOH at 185° and SO_4^{--} with H_2O at 200°, and with conc. HCl at 150° gives a 96% yield of a "hydroxysulphonic acid" (III), $C_6H_5O_4N_2S$, m.p. 360°, which gives no colour with $p-SO_3H \cdot C_6H_4 \cdot N_2Cl$, resists hydrolysis, and is probably a 6-hydroxypyrimidine. (I) and (III) resemble also the 2-substituted pyrimidines chemically, but differ therefrom in absorption spectra and in that 2-hydroxy-4:6-dimethylpyrimidine gives a strong colour with (II). The absorption spectra of 6-amino- and 6-hydroxy-2:4-dimethylpyrimidine resemble those of (I) and (III), respectively.

R. S. C.

Characteristics of avitaminosis in rats caused by lack of skin factors in the diet. H. VON EULER and M. MALMBERG (Biochem. Z., 1935, 278, 351—363).—Some of the symptoms (e.g., loss of hair and skin) of pellagra are caused by lack of lactoflavin (I) in the diet. At least partial cure (florid dermatitis cured) is achieved by administration of (I) with supplement (yeast juice). Basal diets containing in addition (I) and supplement lack components present in a normal mixed diet. Healthy skin can readily be distinguished histologically from skin of rats deprived of (I) even when external symptoms of pellagra are absent.

W. McC.

Determination of vitamin-B₂ by measurement of fluorescence. F. H. COHEN (Arch. néerl. Physiol., 1935, 20, 167—174).—The fluorescence of pure vitamin-B₂ (I) in aq. EtOH increases linearly with the concn. up to 10^{-6} g. per c.c.; at higher concns. the rate of increase slackens. Fluorescence falls with p_H ; it varies slightly with the solvent, max. occurring in C_5H_5N , and min. in H_2O , at the same concn. The adsorption of (I) on franconite and subsequent elution are quant. Plant extracts after irradiation show a residual fluorescence. Pure (I) added to the extracts cannot always be recovered quantitatively. The (I) content of carrot extracts is determined from the difference of intensities of fluorescence before and after exhaustive irradiation.

R. N. C.

Enzymic esterification of lactoflavin with phosphoric acid. H. RUDY (Naturwiss., 1935, 23, 286—287).—The glycerol extract of the enzyme of the small intestine of rats, in 0.01M- PO_4^{--} at p_H 7.2 and 37°, converts lactoflavin quantitatively into a phosphoric ester. The vitamin-B₂ phosphoric ester so obtained, like that obtained by means of $POCl_3$ (this vol., 545), gives readily sol. Ca and Ba salts. No esterification occurs when the phosphatase solution is deactivated by heating for a short time. It is probable that those flavins which cannot be esterified with H_3PO_4 in the animal body cannot show any growth-promoting action.

H. G. M.

Constitution and biological activity of flavins.—See this vol., 993.

Ascorbic acid of the adrenals and mortification. G. MOURIQUAND and A. COEUR (Compt. rend. Soc. Biol., 1935, **119**, 615—616).—The Giroud-Leblond AgNO_3 reaction is positive in normal guinea-pig adrenals 96 hr. after death. It remains negative after this time in scorbutic animals. R. N. C.

Histochemistry of adrenal gland. I. Distribution of vitamin-C. D. GLICK and G. R. BISKIND (J. Biol. Chem., 1935, **110**, 1—7).—Ox adrenals were sectioned by the method of Linderström-Lang (A., 1934, 1260) and the vitamin-C (I) in the different sections was determined (this vol., 793); the (I) content is plotted against distance from the surface of the gland. The no. of cells per slice of tissue was counted and hence the quantity of (I) per cell was plotted as above. The highest peak in the curve occurs in the fascicular region. H. D.

Behaviour of *l*-ascorbic acid and chemically related compounds in the animal body. Antiscorbutic activity in relation to retention by the organism. S. S. ZILVA (Biochem. J., 1935, **29**, 1612—1616).—When the animal organism (guinea-pig) was exhausted of *l*-ascorbic acid and a variety of substances administered (e.g., *l*-arabo-, *l*-gluco-ascorbic acid, which are antiscorbutically active to different extents; *d*-ascorbic, *d*-gluco- and *d*-galacto-ascorbic acid, which are inactive) the degree of "fixation" by the tissues, especially by the adrenals, anterior lobe of pituitary, and intestine, appeared to vary directly with the degree of antiscorbutic activity, and the kidney excreted these compounds in amounts which varied inversely with the potency. P. W. C.

Effect of vitamin-C (ascorbic acid) on the growth of plants. S. VON HAUSEN (Suomen Kem., 1935, **8**, B, 27—28; cf. A., 1933, 757; 1934, 225).—Ascorbic acid (I) causes an increased development of plants grown in sterile cultures. (I) is stored by the plant. J. L. D.

Diphtheria toxin and vitamin-C. D. M. CARDOSO (Compt. rend. Soc. Biol., 1935, **119**, 749—750).—Diphtheria toxin destroys vitamin-C in the adrenals of guinea-pigs. R. N. C.

Action of different biological agents on vitamin-C. I. *Penicillium digitatum* (Pers.). Sacc. M. BIFANO and O. SERVAZZI (Arch. Ist. Biochim. Ital., 1935, **8**, 151—156).—The vitamin-C content of lemon-juice is not appreciably decreased by experimental infection of the lemons with *P. digitatum*. R. N. C.

Vitamin-C content of some Indian plant materials. M. DAMODARAN and M. SRINIVASAN (Current Sci., 1935, **3**, 553).—The ascorbic acid content of *Phyllanthus emblica*, L., *Moringa oleifera*, Lamk., *Sesbania grandiflora*, Pers., *Capsicum frutescens*, L., and *Anacardium occidentale*, L., is 1—4 mg. per g. of fresh material. Extracts from the first and last are stable, the former even for a week; the others undergo oxidation rapidly. After pptn. by Hg salts, or treatment with $\text{Pb}(\text{OAc})_2$ or $\text{CCl}_3\cdot\text{CO}_2\text{H}$, the extracts are readily autoxidisable: the presence of protective substance(s) in *P. emblica* and *A. occidentale* is there-

fore deduced. Ascorbic acid in *C. frutescens* reaches a max. at a certain stage of ripeness. E. W. W.

Interfering action of glutathione in the silver nitrate test for ascorbic acid. J. L. SVIRBELY (Biochem. J., 1935, **29**, 1547—1551).—The $\text{NH}_3\text{-AgNO}_3$ test for ascorbic acid (I) depends on the amounts of (I) and glutathione (II) present. If (II) is absent, the limit of sensitivity is 0.015 mg. of (I). Adrenaline, glycogen, lactose, gelatin, and starch do not interfere. With increasing amounts of (II) the test is less sensitive, and is not as definite as titration with dibromophenol-indophenol-blue. J. N. A.

Determination of vitamin-C in brain, cerebrospinal fluid, and serum. F. PLAUT, M. BÜLOW, and F. PRÜCKNER (Z. physiol. Chem., 1935, **234**, 131—145).—The determination of the ascorbic acid (I) contents of these materials by a spectrographic method described is frequently possible (often impossible with human blood-serum), and the results agree well with those obtained by titration. Complete removal of interfering substances is sometimes impossible and undesired oxidation of (I) cannot always be avoided. W. McC.

Vitamin-D content of vegetable oils. T. BERZACZY and K. RUPILIUS (Wien. klin. Woch., 1934, **47**, 1449—1450; Chem. Zentr., 1935, i, 431).—Crude olive oil, in contrast to the commercial oil, has anti-rachitic activity. The activity is dependent on the harvesting time, winter-gathered fruit supplying the most active oil. The activity is increased by ultraviolet irradiation, with or without addition of Fe^{++} . R. N. C.

Seasonal variations in the vitamin-D potency of pilchard oil. B. E. BAILEY (Pacific Biol. Sta. Nanaimo, Prog. Dept. 1934, No. 19, 5—6).—The vitamin-D potency of the oil probably \propto the oil content of the fish. CH. ABS. (p)

Calcium and phosphorus. X. Effect of variation of calcium, phosphorus, and vitamin-D in the diet on iron retention in rats. D. H. SHELLING and H. W. JOSEPHS. XI. Effect of prophylactic and curative doses of standardised viosterol on human tissues; necropsy report of thirteen cases showing no tissue damage. D. H. SHELLING and D. A. JACKSON (Bull. Johns Hopkins Hosp., 1934, **55**, 309—313, 313—334; cf. this vol., 409).—X. A high-Ca, low-P diet causes abnormally low hæmoglobin vals. in rats, whether viosterol (I) is given or not. Fe retention is similarly lowered and is $<$ that of animals fed on low-Fe milk. (I) increases Fe retention in rats receiving a high-P diet, but does not affect those on a high-Ca diet.

XI. Administration of (I) had no ill-effects on the soft tissues or skeletons of infants. CH. ABS. (p)

Calcifying factors in the diet of salamander larvæ. E. M. PATCH (Science, 1935, **81**, 494).—Salamander larvæ do not differ widely from higher animal forms in their responses to calcification factors in the diet. They should form a suitable means for the biological assay of calcifying agents. L. S. T.

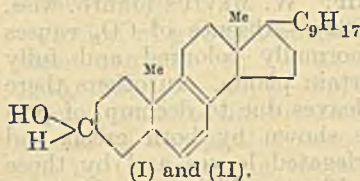
Ring structure of calciferol. I. M. HEILBRON, K. M. SAMANT, and F. S. SPRING (Nature, 1935, **135**, 1072).—With CrO_3 or KMnO_4 calciferol (I) and calci-

feryl acetate yield an oily aldehyde, $C_{21}H_{34}O$ (semicarbazone, m.p. 242°). A three-ring formula is suggested for (I) and the probable positions of the ethylenic linkings are indicated. L. S. T.

Vitamin-D and its thermal and photochemical reaction products. M. MÜLLER (Z. physiol. Chem., 1935, 233, 223—234).—Se dehydrogenation of the mol. compound isopyrovitamin (I)—pyrocalciferol (II) yields methylcyclopentenophenanthrene. Thus ring-closure on heating the vitamin (III) occurs at the same place as the photochemical fission. The acetate of (I) (dinibenzoate, m.p. $171-172^\circ$, $[\alpha]_D +281^\circ$ in $CHCl_3$) with conc. HNO_3 affords 1 : 2 : 3 : 4 : 5- $C_6HMe(CO_2H)_4$ (IV) (isolated as the Me_4 ester), and condenses with maleic anhydride giving a product $C_{34}H_{48}O_5$, m.p. $203-204^\circ$. The H_2 uptake of the acetate is 3 mols. (II) (acetate, m.p. $81-82^\circ$, $[\alpha]_D +403^\circ$ in $CHCl_3$) with HNO_3 also affords (IV). The acetate with maleic

anhydride gives a product, m.p. $161-162^\circ$, and takes up $2H_2$. These properties are expressed by the annexed constitution.

(I) and (II) probably differ only in



the steric arrangement of the substituents at C_5 and C_{10} .

Se or Pt dehydrogenation of suprasterol-I (V) or -II (VI) gave non-cryst. products. (V) absorbs (Pt) $3H_2$ (2 quickly), (VI) absorbs about $3.5H_2$ (oxalate $6.6H_2$). Ring-closure must have occurred in (V), but is doubtful in (VI). The constitution of the products derived from (III) is discussed. J. H. B.

Vitamin-E. I, II. Measurement of absorption band. S. UENO, Y. OTA, S. YOKOYAMA, and S. MATSUDA (J. Soc. Chem. Ind. Japan, 1935, 38, 190—192B, 192—195B).—I. From the unsaponifiable matter of rice oil a fraction, b.p. $200-250^\circ/1$ mm., has been obtained which closely resembles the vitamin-E fraction isolated from wheat-germ oil by Evans and Burr. Constituents of the unsaponifiable matter vary with the mode of manufacture of the oil.

II. The absorption spectra of rice oil and some of its components have been measured. The fraction of b.p. $200-250^\circ/1$ mm. has an absorption band at about $260 m\mu$ (cf. A., 1933, 987). H. G. M.

Rate of absorption of ammonium- and nitrate-nitrogen from culture solutions by ten-day-old tomato seedlings at two p_H levels. L. B. ARRINGTON and J. W. SHIVE (Soil. Sci., 1935, 39, 431—435; cf. B., 1934, 468, 776).—The rate of absorption of NO_3-N was much $>$ that of NH_4-N at p_H 4 and 7. Intake of NH_4-N at p_H 7 was $>$ that at p_H 4, whereas that of NO_3-N was somewhat higher at p_H 4. The influence of the reaction of the medium on N absorption was more marked in the case of NO_3-N than of NH_4-N . A. G. P.

Absorption of ions by living cells. H. LUNDEGÅRDH (Naturwiss., 1935, 23, 313—318).—The rôle of adsorption, hydration, dissociation, etc. in the absorption of ions by plant cells is discussed (cf. A., 1933, 874). A scheme is advanced depending on the p.d. existing between the sides of a cell membrane, a

negatively-charged colloid participating in the transport of cations, whilst the anions are primarily carried by positively-charged protoplasmic micelles, the complex being oxidatively (aërobic or anaërobic) decomposed to CO_2 and the acid corresponding with the anion. F. O. H.

Water relationships of tomato plants. I. W. SELMAN (Cheshunt Exp. Sta. Ann. Rept., 1934, 89—95).—The suction force of tomato leaf-cells increases during the day in summer, probably as the result of increased osmotic pressure of the cell contents. The phenomenon does not occur in winter. Loss of H_2O per unit leaf area by transpiration is highest in embryonic and least in fully expanded leaves. Differences in permeability of leaf cells to H_2O are indicated. Increases in leaf area during the night are closely correlated with the H_2O deficit of the cells. A. G. P.

Nutrient intake of plants from flowing and stationary nutrient solutions. II. E. UNGERER (Z. Pflanz. Düng., 1935, 39, 15—23; cf. this vol., 131).—The poorer growth of plants in dil. but flowing media as compared with that in conc. stationary media results from inability to take up sufficient K and N in the early stages of growth from solutions of low osmotic pressure. It is unlikely that plants can grow to maturity in nutrients as dil. as the soil solution.

Assimilation of inorganic nitrogenous salts, including sodium nitrite, by the grass plant. W. G. E. EGGLETON (Biochem. J., 1935, 29, 1389—1397).—The transformation of various forms of inorg. N applied to the soil into org. N in the plant is investigated, determinations of NH_4^- , pepsin-HCl-sol, true protein-, total, NH_3^- , NO_2^- , and NO_3^-N being carried out (the last three determinations also on the corresponding soil extracts). Inorg. N was detected in substantial amounts in the herbage only 2 hr. after application to the soil. In early spring, synthetic processes in the leaf are slow enough to permit accumulation of simple org. and inorg. compounds. This margin of partly elaborated N rapidly disappears, but at a diminished rate, when inorg. N salts are applied to the soil. NO_2^- occurs naturally in spring grass, and the amount is increased when the grass is treated with $(NH_4)_2SO_4$ or $NaNO_3$ at this time. Grass treated with $NaNO_2$ at the rate of 3 cwt. per acre shows no visible signs of distress, although some metabolic disturbances do occur. The possible significance of NO_2^- in the synthesis of protein is discussed and it is suggested that nitrites play a part in the "grass tetany" of cattle. P. W. C.

Absorption of nitrates by corn in the dark. P. L. GILE (Science, 1935, 81, 520—521).—Maize grown under alternating periods of light and dark assimilates NO_3^- as well in darkness as in light. Practically all the N needed can be taken up in complete darkness. L. S. T.

Nitrogenous nutrition of the flower. R. COMBES (Compt. rend., 1935, 200, 1970—1972; cf. this vol., 552).—The protein content of the calyx and corolla of *Lilium croceum* increases rapidly with growth until the flower begins to open, when vigorous proteolysis and translocation ensue. The protein content of

the andrœcium declines steadily from the "button" stage until full expansion. In the gynœcium protein increases throughout, but the major portion of the N leaving the perianth is translocated to the stem.

A. G. P.

Zinc and cadmium as stimulators of oxidation processes in certain plant-seed extracts. T. THUNBERG (Skand. Arch. Physiol., 1934, 69, 247—254; Chem. Zentr., 1935, i, 733).—Zn and Cd activate the decolorisation of redox indicators in plant extracts.

A. G. P.

Restoration of potassium effect by action currents. W. J. V. OSTERHOUT and S. E. HILL (J. Gen. Physiol., 1935, 18, 681—686).—Treatment of *Nitella* cells with distilled H₂O removes the ability to give p.d. (approx. 80 mv.) between 0.01M-KCl and NaCl ["K effect"]; this effect, however, is restored by action currents following application of a p.d. of 500 mv. It appears to be due to a substance or mixture, substance R.

F. O. H.

Mechanical restoration of irritability and of potassium effect. S. E. HILL and W. J. V. OSTERHOUT (J. Gen. Physiol., 1935, 18, 687—694).—The irritability and "K effect" of *Nitella* cells, lost on treatment with distilled H₂O, are restored by the mechanical forcing of sap (containing substance R) into the protoplasm (cf. preceding abstract).

F. O. H.

Photosynthetic behaviour of leaves with variations in temperature. B. N. SINGH and K. KUMAR (Proc. Indian Acad. Sci., 1935, 1, B, 736—753).—With normal atm. [CO₂] the assimilation of radish leaves increases with rise of temp. to a max. at 30°. Above this assimilation has the same initial rate as at 30°, but this declines with time. The hourly decrease in assimilation is very marked at 37°. Increased [CO₂] at 29° causes a higher rate of assimilation. Assimilation commences at < 12.6° and ceases at 47.4°.

A. G. P.

Effect of light on growth and differentiation in tomato seedlings, variety E.S.I. B. D. BOLAS and I. W. SELMAN (Cheshunt Exp. Sta. Ann. Rept., 1934, 86—89).—The curve representing the wt. per plant at the seventh leaf stage at different periods of the year closely resembles that for the total illumination per day or for day length, but is displaced several weeks forward. Although illumination ceases to limit assimilation after about April (greenhouse), it affects growth and leaf differentiation throughout the summer months.

A. G. P.

Reaction of the assimilatory system to alterations of light intensity. B. N. SINGH and K. KUMAR (Proc. Indian Acad. Sci., 1935, 1, B, 754—762).—The assimilation rate of radish leaves increases with light intensity up to 68,000 m.-candles under normal atm. conditions and up to somewhat higher vals. when [CO₂] is artificially increased. A time factor is apparent at 180,000 m.-candles. The depression in photosynthetic activity at high light intensities is related to a reversible inactivation of chloroplasts. The threshold val. for this activity is approx. 4000 m.-candles.

A. G. P.

Nature of the photoperiodic effect (induction), and the effect of length of day on the activity of [plant] oxidising enzymes. M. C. TSCHAILACHIAN

and V. A. ALEXANDROVSKAJA (Compt. rend. Acad. Sci. U.R.S.S., 1935, 2, 161—166).—"Short-day" plants (millet) exhibited no "long-day" photoperiodic after-effects, and *vice versa*. Induction effects in millet and barley occurred when the causative factor accelerated the fruiting process and the development of the plants. The peroxidase (I) of millet was higher under long-day conditions, and that of barley (a "long-day" plant) under short-day conditions. Temporary (6-day) exposure of plants to an altered day period affected (I) in the direction in which the new photoperiod acted. In soya bean and *Phaseolus*, (I) was more active under short-day conditions when growth processes were retarded. Tomato leaves contained no (I). The catalase activity of plant leaves was practically unchanged throughout the experiment.

A. G. P.

Behaviour of illuminated [plant] leaves in carbon dioxide-free air. W. MEVIUS (Jahrb. wiss. Bot., 1935, 81, 327—382).—Absence of CO₂ causes rapid defoliation of normally coloured and fully turgescient leaves in certain plants. In others there is a slow yellowing of leaves due to decomp. of proteins. The effects are shown by both green and colourless areas of variegated leaves and by those screened with tinfoil. Plants which normally bear anthocyanin pigments in leaves and stems cease to produce pigment in newly developing leaves, when deprived of CO₂. This effect is accentuated if the supply of NO₃ is maintained. The formation and destruction of these pigments are photosynthetic processes, and are closely related to the carbohydrate and N economy of the plants.

A. G. P.

Chlorophyll fluorescence and assimilation of carbonic acid. IV. Effect of oxygen on fluorescence in living leaves. H. KAUTSKY and A. HIRSCH (Biochem. Z., 1935, 278, 373—385; cf. this vol., 794).—The usual course of the fluorescence on irradiation of green leaves is a consequence of interaction between O₂ (bound in dissociable form to the chloroplast) and stimulated chlorophyll. Leaves irradiated in an atm. free from O₂ fluoresce from the beginning with max. unchanging intensity until liberated or added O₂ restores the normal behaviour.

W. McC.

Growth-stimulating substance in indigenous plants. II. Physiology. F. BOAS (Ber. deut. bot. Ges., 1935, 53, 495—511).—The presence is recorded of widely varying amounts of yeast growth-promoting substance in numerous plants and in cattle manure. Notably large amounts occur in mistletoe and in camomile. The proportion of this substance in *Phaseolus* varies with the λ of light to which the plant is exposed.

A. G. P.

Artificially induced root formation by means of growth-substance paste. F. LAIBACH and O. FISCHNICH (Ber. deut. bot. Ges., 1935, 53, 528—539).—The growth-promoting effects of the treatment of intact *Coleus* stems with β -indolylacetic acid paste are described.

A. G. P.

Inhibition of the action of growth-substance by parts of living plants. P. KORNMAN (Ber. deut. bot. Ges., 1935, 53, 523—527).—The activity

of agar block preps. of the growth-promoting substance of maize-gluten meal was counteracted by placing on the block tips of, or rings from, the base of the coleoptile of oats, but not the coleoptile tips of maize. Agar-oat flake preps. were not affected by oat tips; their activity was increased by maize tips but decreased by basal rings of oats. Maize tip-agar blocks were unactivated by oat tips. The presence of a growth-inhibiting substance in the older parts of a no. of plants is indicated. A. G. P.

Method for determining the callus-forming action of pastes containing growth-promoting substance. F. LAIBACH and O. FISCHNICH (Ber. deut. bot. Ges., 1935, 53, 469—477).—The activity of growth-promoting substance is determined by the rate of callus formation on decapitated epicotyls of *Vicia faba* in comparison with that of a standard prep. of β -indolylacetic acid (73×10^{-6} g. per g. of lanolin paste). A. G. P.

Action of growth-substance in parallelotropic plant organs. A. T. CZAJA (Ber. deut. bot. Ges., 1935, 53, 478—490).—Application of growth-substance parallel to the direction of the growth-substance stream in decapitated stems etc. causes lengthening but no thickening of the stem. Transverse applications cause thickening below the point of application. Cell elongation due to the growth-substance is unaccompanied by cell division. The latter occurs as a secondary effect of the disturbed polarity, following transverse treatment of stems with growth-substance. A. G. P.

Vitamins and growth-factors in plants. Growth-factor content of spores of *Phycomyces*. W. H. SCHOPFER (Ber. deut. bot. Ges., 1935, 53, 466—468).—The heterotrophic character (in respect of growth-factors) of *Phycomyces* is established. Spores contain enough growth-factors for germination, but external supplies of vitamin- B_1 or extracts of cultures on vitamin-containing media are necessary for further development. A. G. P.

Growth-hormone of plants. VII. Fate of growth-substance in the plant and nature of growth process. J. BONNER and K. V. THIMANN (J. Gen. Physiol., 1935, 18, 649—658; cf. A., 1934, 1272).—Removal of hormone-producing tips of *Avena* coleoptiles is followed by a decrease in growth (and hence in hormone) to approx. 50% in 2 hr. and then by a return to normal levels after 3 hr. Immediate increase in growth follows application of hormone-containing agar blocks. The hormone is inactivated in the plant to an extent either = or, when conditions are unfavourable for growth, > the proportionate amount of growth. Inactivation of the hormone, which appears to be irreversible, is not affected by HCN. The process of growth is discussed. F. O. H.

Growth-hormone and dwarf type of growth in maize. J. VAN OVERBEEK (Proc. Nat. Acad. Sci., 1935, 21, 292—299).—Auxin destruction, which may be due to oxidation-reduction changes, is greater in *nana* maize than in normal, and this causes the dwarf type of growth. Another growth-factor (cell-extension material) is present in coleoptiles of maize. M. S.

Auxins. A. J. H. SMIT (Chem. Weekblad, 1935, 32, 398—403).—A lecture.

Effect of oestrogenic substances on plants. IV. W. SCHOELLER and H. GOEBEL (Biochem. Z., 1935, 278, 298—311; cf. A., 1934, 1145).—Follicular hormone (cryst. but not quite pure) supplied in H_2O during early stages of growth to plants (primula, fuchsia, pink, chrysanthemum, violet, forget-me-not, cyclamen, tomato) growing in soil has a powerful general and sp. effect on the growth, the no. of blossoms and fruit being very greatly increased. The amount of hormone required for optimal effect varies from species to species of plant. W. McC.

Flower development and hormone action. R. HARDER and I. STÖRMER (Nachr. Ges. Wiss. Göttingen, Math.-Phys. Kl., VI, 1934, 1, 11—16; Chem. Zentr., 1935, i, 737).—Contrary to the results of Schoeller and Goebel (A., 1934, 1145), neither cryst. α -folliculin nor progynon affects the flowering of a no. of plants. A. G. P.

Growth and metabolism of plants with mineral salt nutrition. III. Sugar content of the press-juice of tobacco leaves in relationship to the mineral salt nutrition of plants. K. BÖNING and E. BÖNING-SEUBERT (Biochem. Z., 1935, 278, 71—88).—Increase of the mineral salts administered to the plant decreases, and decrease of salts increases, the sugar content of the leaf press-juice, the effect of the anions and cations being in the order $PO_4 < SO_4 < NO_3 < Cl$ and $Ca < Na < K$. Thus the more readily permeable ions have the largest decreasing effect on the leaf-sugar content, whilst the less permeable either have little effect on or may increase the sugar content. P. W. C.

Structure of cell-wall of coffee[bean]. K. TAUFEL and H. THALER (Z. Unters. Lebensm., 1935, 69, 152—158).—A sample of coffee contained 52.6% of cell-wall (i.e., residue after extraction with Et_2O and H_2O), of which 47.0% consisted of the glucose fraction (mannan 15.3, xylan 1.8, cellulose 29.9%) and 5.6% of material rendered sol. by treatment with aq. ClO_2 (cf. A., 1931, 1101). E. C. S.

Influence of the pyrrole nucleus on the formation of chlorophyll. G. POLLACCI (Ber. deut. bot. Ges., 1935, 53, 540—542).—The growth of *Chlorella vulgaris* and other algæ is not injured if Mg is supplied in the form of Mg pyrrole-2-carboxylate (I). Replacement of (I) by $MgSO_4$ in Fe-free media results in new growth containing high leucoplast but no chloroplast contents. Re-addition of (I) causes normal green growth. The function of Fe in the cells is purely catalytic. It is probably concerned in the formation of the pyrrole compounds. A. G. P.

Leaf, flower, and fruit characters of the Santra orange (*Citrus nobilis* var. *deliciosa*). S. S. BHAT (Poona Agric. Coll. Mag., 1934, 26, 116—124).—Analytical data are given. CaC_2O_4 was deposited in leaves as cystoliths below the upper epidermis; it also occurred in leaves of *Citrus sinensis*, Swingle. CH. ABS. (p)

Distribution of constituents of the beech (*Fagus sylvatica*, L.). E. GAUMANN (Ber. deut.

bot. Ges., 1935, 53, 366—377).—The fat, protein, and carbohydrate contents of the various organs of the beech at different growth periods are examined.

A. G. P.

Chemical genetics of barley mutants. Chlorophyll and gramine contents of the mutants. H. VON EULER, H. HELSTRÖM, and N. LÖFGREN (Z. physiol. Chem., 1935, 234, 151—164; cf. A., 1934, 1419).—The chlorophyll and gramine (I) contents of normal and chlorophyll-defective barley mutants are recorded. (I), $C_8H_6N \cdot CH_2 \cdot NMe_2$, which occurs chiefly in the roots (not in the coleoptile), on heating for 3 hr. at 80° with 0.1N-HCl gives a substance exhibiting max. absorption at 330 m μ and identical with "phenyl-X," the product of spontaneous transformation. The transformation probably consists in addition of H₂O to a pyrrole double linking. The product of transformation is accompanied by another substance having absorption max. at 270 m μ .

W. McC.

Identity of calycopterin and thapsin. W. KARRER and K. VENKATARAMAN (Nature, 1935, 135, 878).—The yellow colouring matter from the leaves of *Calycopteris floribunda*, Lamk (this vol., 246), and the thapsin obtained from a Spanish *Digitalis* (*ibid.*, 91) are identical. The name "calycopterin" should be retained for the flavone constituents of these two plants.

L. S. T.

Carotene and xanthophyll in pineapples. O. C. MAGISTAD (Plant Physiol., 1935, 10, 187—191).—The yellow colour in pineapples is due principally to carotene (I) (0.1—0.25 mg. per 100 g. of flesh) and xanthophyll (II). The ratio (I):(II) averages 8—13:1.

A. G. P.

Pigments of pink grapefruits, *Citrus grandis*, L., Osbeck. M. B. MATLACK (J. Biol. Chem., 1935, 110, 249—253).—The dried flesh of the Foster and the Marsh pink grapefruits was extracted with CS₂, and after a preliminary purification, the pigments were separated and isolated by the Tswett chromatographic method. The separated pigments were identified spectroscopically as lycopene (I) and β -carotene (II). (I) predominates in Foster and (II) in Marsh variety.

E. A. H. R.

Carotenoids. I. Carotenoids of *Diospyros* fruits. II. Carotenoids of *Arbutus* fruits. K. SCHÖN (Biochem. J., 1935, 29, 1779—1782, 1782—1785).—The fruits of *D. costata* and *A. unedo* contain α - and β -carotene, lycopene, cryptoxanthin, zeaxanthin, and violaxanthin (I). Approx. 80% of the total pigment of *A. unedo* is (I), m.p. 203° (corr.).

F. O. H.

[Chemistry of] algæ. I. Lipochromes of *Fucus vesiculosus*. I. M. HEILBRON and R. F. PIPERS. II. Relationship between certain algal constituents. III. Isolation of lactoflavin. I. M. HEILBRON, E. G. PARRY, and R. F. PIPERS (Biochem. J., 1935, 29, 1369—1375, 1376—1381, 1382—1383).—I. Dead material from *F. vesiculosus* (I) contains β -carotene (II) and zeaxanthin, whilst the living plant contains (II) and fucoxanthin (III) but no xanthophylls usually associated with higher plants. (III), $C_{40}H_{60}O_6$, m.p. 166—168° (uncorr.), $[\alpha]_D^{20}$ (cf. A., 1931, 733), which yields a

substance $C_{40}H_{78}O_2$, m.p. 63—64°, on complete hydrogenation under pressure, appears to be a dihydroxycapsorubin (this vol., 233).

II. Examination of the unsaponifiable fractions from *Cladophora sauteri*, *Nitella opaca*, *Oedogonium*, and *Rhododymenia palmata* indicates the lipins to be characteristic for each species and related to their habitat. All contain lutein, taraxanthin, (II), and small amounts of hentriacontane (A., 1934, 1347), whilst *C. sauteri* contains α -carotene. *N. opaca* and *Oedogonium* yield a *phytosterolin*, $C_{35}H_{66}O_6$, m.p. 283—285° (cf. A., 1934, 637).

III. Lactoflavin was isolated from aq. extracts of *C. sauteri* by direct adsorption and lumilactoflavin from irradiated alkaline extracts of (I).

F. O. H.

Occurrence of cytochrome in higher plants and algæ. E. YAKUSHIJI (Acta Phytochim., 1935, 8, 325—329).—Cytochrome is detected in the seeds of *Soja hispida*, the roots of *Raphanus macropoda*, *Brassica campestris*, in *Sagittaria trifolia*, apple, and in *Allium cepa*, in cabbage-leaves (after removal of chlorophyll by COMe₂) and in *Sargassum Thunbergii*, *S. piluliferum*, *S. serratifolium*, *Cystophyllum sisymbrioides*, *Endarachne Binghamiae*, *Myeloplucus cæspitosus*, *Ishige Okamurai*, *Gelidium Amansii*, *Gymnogongrus flabelliformis*, *Porphyra tenera*, *Enteromorpha Linza*, and *Ulva* types.

H. W.

Chemistry of pigments of pepper. Red pigment in the perfection pimento (*Capsicum annuum*). W. L. BROWN (J. Biol. Chem., 1935, 110, 91—94; cf. Zechmeister *et al.*, A., 1934, 657).—The pigment is identical with the capsanthin of Hungarian paprika.

W. McC.

Saponins of *Chenopodium ambrosioides*, L. S. GREIFINGER (Wiad. farm., 1934, 61, 275—277, 289—291; Chem. Zentr., 1935, i, 746).—Saponins occur in largest amounts in roots (2.5%). The amount increases with age and is influenced by soil type and manuring. The pure saponin is amorphous, m.p. 196—200°, and has a mild hæmolytic action.

A. G. P.

Presence of saponins in tobacco; an accompanying substance. (FRL.) M. KOBEL and C. NEUBERG (J. pr. Chem., 1935, [ii], 143, 29—41).—Freshly plucked and chopped tobacco leaves heated to stop fermentation, and extracted with boiling EtOH, yield a product containing saponins. The hæmolytic action of various fractions (from aq. EtOH and/or Et₂O) is measured; it is arrested by cholesterol. Rutin is also present, with nicotine, and material hydrolysed to a product containing uronic acids and a sugar.

E. W. W.

Alkaloid content and activity of saprophytic ergot cultures. R. JARETZKY (Arch. Pharm., 1935, 273, 348—357).—Ergot grown on maltose-peptone-agar contains more alkaloids than if grown on other media, as shown by colorimetric determination by *p*-NMe₂·C₆H₄·CHO and by biological tests on the rabbit's isolated uterus.

R. S. C.

Protein of healthy potato tubers. H. KAHN (Biochem. Z., 1935, 278, 235—239).—The H₂O-sol. protein of potatoes is pptd. by salts only when their

concn. is high (6*N* to saturation). The degree of stimulation of heat-coagulation of the protein by anions and cations varies in accordance with the reversed lyotropic series, and provides a means of distinguishing between different sorts of potatoes. The protein occurs in potatoes combined with an acid (possibly $\text{H}_2\text{C}_2\text{O}_4$). W. McC.

Organic nitrogenous and non-nitrogenous compounds occurring in the Alaska pea. II. Isolation of pyrrolidonecarboxylic acid, tyrosine, and diamino-acids from the non-proteins thereof. S. L. JODIDI (J. Amer. Chem. Soc., 1935, 57, 1142; cf. B., 1934, 852).—An EtOH extract of defatted Alaska peas gives with $\text{K}_2\text{Cr}_2\text{O}_7\text{--H}_2\text{SO}_4$ pyrrolidonecarboxylic acid. The peas yield arginine (0.7%) and give colour reactions for histidine and tyrosine. R. S. C.

Betaine in wheat bran. F. E. NOTTBOHM and F. MAYER (Z. Unters. Lebensm., 1935, 69, 289—300; cf. A., 1934, 571).—The aq. $\text{Mg}(\text{OH})_2$ extract of wheat bran consists largely of betaine (I), which constitutes 0.35% approx. of the bran. The composition and properties of phosphatide (II) from wheat bran and oats (cf. A., 1911, ii, 426) are described. Both contain (I), but it is present as an impurity, probably in combination with sugar. The P.-L. no. (cf. B., 1934, 425) of wheat-bran-(II)=3.44; that of seeds \propto the % of N in the fat-free material. E. C. S.

Presence of 2-hydroxy-5-methoxyacetophenone in extracts of rhizomes of *Primula acaulis*. A. GORIS and H. CANAL (Compt. rend., 1935, 200, 1990—1992).—The isolation and characterisation of the compound are described. A. G. P.

Resin of wheat straw. L. MARION (Canad. J. Res., 1935, 12, 554—563).— $\text{MeOH--C}_6\text{H}_6$ (1:1) extracts from wheat-straw lignin (4.72%) and a resin (1.5%), which contains free fatty acids [including palmitic (I), stearic (II), and lignoceric], glycerides [yielding (I), (II), linolenic and oleic acids], ceryl cerotate, m.p. 70°, much wax [containing a little P and yielding ceryl alcohol, sitosterol, m.p. 137°, (I), and cerotic acid], a sterol ester [giving a sterol, $\text{C}_{27}\text{H}_{46}\text{O}$ (Ac derivative, m.p. 134—135°)], a phytosterolin, $\text{C}_{33}\text{H}_{56}\text{O}_6$, m.p. 291—292° (Ac derivative, m.p. 157°; yields a sterol, m.p. 137° and glucose) (cf. A., 1934, 1276), KNO_3 , and *D*-inositol. R. S. C.

2:4:5-Trimethoxy-1-allylbenzene. Asarone (allyl). B. S. RAO and K. S. SUBRAMANIAN (Current Sci., 1935, 3, 552).—The "asarone" obtained from calamus roots (A., 1934, 529), when treated with H_2SeO_3 and distilled from Na, is a liquid, b.p. 283°/685 mm., identified as 2:4:5-trimethoxy-1-allylbenzene, and named "asarone (allyl)." When heated with KOH, this gives ordinary asarone ["asarone (propenyl)"]. E. W. W.

Constituents of *Verbena officinalis*, L. I. Identity of verbenalin and cornin. B. REICHERT (Arch. Pharm., 1935, 273, 357—360).—Verbenalin from *V. officinalis* (A., 1908, i, 197) and cornin from *Cornus florida*, L. (A., 1928, 1137), are identical. R. S. C.

Composition of Bourdaine bark. III. Isolation of frangularoside and its hydrolysis

product frangularol. IV. Water-soluble complex purgative hydrolysed by rhamnodiastase. M. BRIDEL and C. CHARAUX (Bull. Soc. Chim. biol., 1935, 17, 780—792, 793—816).—III. The fresh bark, in contrast with the commercial product, gives on autolysis a rhamnoside, *frangularoside*, $\text{C}_{21}\text{H}_{24}\text{O}_9$, m.p. 234°. This on hydrolysis with aq. H_2SO_4 and HCO_2H yields *frangularol*, $\text{C}_{15}\text{H}_{14}\text{O}_5$, m.p. 301°, and rhamnose.

IV. The active principle of Bourdaine bark, extracted with 95% aq. EtOH and pptd. with COMe_2 , gives on hydrolysis with 5% aq. H_2SO_4 40% of emodol, 43% (2 mols.) of glucose, and 16% (1 mol.) of rhamnose. It is partly hydrolysed by rhamnodiastase with the formation of franguloside and glucose with small quantities of emodol and an unidentified anthraquinone derivative, m.p. 160°. It may consist of a compound of 1 mol. of franguloside with 2 mols. of glucose. A. L.

Sophoricoside, a heteroside of the fruits of *Sophora japonica*, L. C. CHARAUX and J. RABATÉ (J. Pharm. Chim., 1935, [viii], 21, 546—554).—From the boiling 80% EtOH extract of the pods of *S. japonica*, L., is isolated (1.5% yield) a β -glucoside *sophoricoside*, m.p. 297.5° (block), $[\alpha]_D -32.2^\circ$ in $\text{C}_2\text{H}_5\text{N--10\% H}_2\text{O}$, hydrolysed by boiling $\text{AcOH--6\% H}_2\text{SO}_4$ or by emulsin to glucose and genistein, previously isolated from *Genista tinctoria* (Perkin *et al.*, J.C.S., 1899, 75, 830; 1900, 77, 1310).

J. W. B.

Kuromamin, the colouring matter of "Kuro-mame." III. C. KURODA and M. WADA (Proc. Imp. Acad. Tokyo, 1935, 11, 189—191; cf. A., 1934, 229).—Kuromamin is identical with cyanidin 3-mono-glucoside (cf. A., 1931, 1423). J. L. D.

Phytosterol and phytosterolin from the sweet potato. M. B. MATLACK (Science, 1935, 81, 536).—A phytosterol, consisting mainly of sitosterol, and a phytosterolin, sitosterol glucoside, have been isolated from *Ipomœa batatas*, Poir. L. S. T.

Production of sterols by plants. The "oily chloroplasts" described by Savelli in cacti. J. MANUEL (Compt. rend. Soc. Biol., 1935, 119, 480—482).—The properties of these chloroplasts from *Echinocereus procumbens* and *Cephalocereus senilis* are described. H. G. R.

Unsaturated acids of natural oils. II. Highly unsaturated acids of the kernels of *Parinarium laurinum*. E. H. FARMER and E. SUNDERLAND.

III. Highly unsaturated acid of the kernels of *P. macrophyllum*. W. B. BROWN and E. H. FARMER (J.C.S., 1935, 759—761, 761—763; cf. B., 1933, 476).—II. Kernels of *P. laurinum* gave 44% of fat (n_D^{25} 1.5565) on extraction with petroleum. 10 g. of fat gave with KOH-EtOH 2.5—3 g. of unsaturated acid, m.p. 83.5°, which is attacked by atm. O_2 ; with alkaline KMnO_4 it gave EtCO_2H and azelaic acid, and on Pt hydrogenation stearic acid. The structure $\text{Et}[\text{CH}:\text{CH}]_4[\text{CH}_2]_7\text{CO}_2\text{H}$ is ascribed.

III. Kernels of nuts of *P. macrophyllum* or *P. Senegalense* (Rosaceæ, tropical Africa) gave 70% of drying oil (4% on nuts). The unsaturated acid from the oil is shown to be α -elæostearic acid. The

unsaturated acid, m.p. 73°, described by Steger and van Loon (B., 1934, 369) may be β -elæostearic acid formed from β -elæostearin resulting from irradiation of α -elæostearin in the oil. P. G. C.

Biochemistry of the Salicaceæ. X. Leaf enzymes of *S. purpurea*. XI. Hydrolysis of salicoside by leaf enzyme preparation. XII. Oxidation of salicoside by leaf enzyme preparation. J. RABATÉ (Bull. Soc. Chim. biol., 1935, 17, 561—571, 572—601, 602—611).—X. Whereas the enzyme from the leaves of *S. purpurea* hydrolyses rapidly phenolic glucosides such as salicoside (I), piceoside (II), helicoside, chloropiceoside, and β -phenylglucoside, the hydrolysis of β -methylglucoside (III), benzylglucoside, amygdalin, and aucuboside proceeds slowly.

XI. Under the action of the enzyme prep. (IV) from the leaves of *S. purpurea*, the hydrolysis of (I) leads to the formation of some β -salicylglucoside. Starting with MeOH and glucose, no synthesis takes place with (IV), although with emulsin (V) there is considerable synthesis. When, however, the hydrolysis of (II) by (IV) is carried out in the presence of 3% MeOH, 57% of the glucose liberated is converted into (III) compared with 6% when (V) is used. Addition of (V) in this reaction does not prevent the synthesis, which can take place only if the glucose is liberated in the presence of the alcohol. The glucose when liberated is probably in an active form.

XII. The oxidation of saligenol is 3 times as rapid as, and is brought about with less CO₂ formation than, that of pyrocatechol (VI). It is believed therefore that the action of the oxidase responsible for the blackening of the leaves of *Salix* does not lead to the intermediate formation of (VI). A. L.

Alleged autohydrolysis of vegetable ivory. D. MELNICK and G. R. COWGILL (Biochem. J., 1935, 29, 1515—1518).—Paton's statement (A., 1924, i, 801) that a mannanase exists in *Phylelephas macrocarpa* is disproved by incubation experiments; failure to obtain reducing substances from the ivory after heating at 100° and washing is due to the removal of these substances by this treatment and not to the inactivation of an enzyme. A reducing substance is pptd. from an aq. extract of the ivory with AcOH which on hydrolysis is converted into mannose. Albumin and globulin fractions showing no enzymic activity are prepared. H. D.

Hemicelluloses extracted from mesquite wood after chlorination. L. SANDS and P. NUTTER (J. Biol. Chem., 1935, 110, 17—22).—Mesquite sawdust was extracted as before (A., 1933, 989), treated with Cl₂ and aq. NH₃, and the hemicelluloses (I) were removed by aq. NaOH. By successive extractions four fractions were obtained. The pentosan content increased as the delignification proceeded. Hydrolysis of (I) gave xylose in three fractions and glucose in one. No free uronic acid was found in the hydrolysates, 2 mols. of pentose being associated with the acid. H. D.

Analysis of carbohydrates of the cell-wall of plants. I. Relation between uronic anhydride content and furfuraldehyde. F. W. NORRIS and C. E. RESCH (Biochem. J., 1935, 29, 1590—1596).—The determination of the products of distillation of the

cell-wall with 12% HCl is investigated. The relation between uronic acid (I) concn. and the CO₂ produced by the decarboxylation method of Dixon (A., 1930, 453) in pure specimens of galacturonic, pectolic, and euxanthic acids is determined. Furfuraldehyde (II) is pptd. from the reaction products as the phloroglucide and weighed as such and the relation between (II) produced and (I) concn. is determined for the same acids. H. D.

Liberation of methyl sulphide by seaweed. P. HAAS (Biochem. J., 1935, 29, 1297—1299).—The identity of the gaseous odoriferous principle evolved by *Polysiphonia fastigiata* and *P. nigrescens* with MeSH has been confirmed. P. W. C.

Amount of hydrocyanic acid in blue couch grass (*Cynodon incompletus*, Nees). H. FINNEMORE and A. B. JAFFRAY (J. Council. Sci. Ind. Res. Australia, 1935, 8, 136—138).—The decrease in HCN content of the grass (determined after complete decomp. of glucoside by enzyme) during drying and subsequent storage was much < that in cases recorded by Seddon and King (A., 1930, 812). A. G. P.

Iodine content of tea. A. ITANO and Y. TUZI (Proc. Imp. Acad. Tokyo, 1935, 11, 141—143).—Japanese tea contains 0.45—1.20 $\times 10^{-6}$ g. of I per g. of dried leaves, of which 33—75% is extracted by hot H₂O. More I is contained in younger leaves. H. G. R.

Constituent of *Pertusaria dealbata*, Ach., Nyl. G. KOLLER and H. HAMBURG (Monatsh., 1935, 65, 375—379).—This lichen when extracted with Et₂O gives a substance C₁₉H₁₆O₁₁, decomp. 223° (in evacuated tube), which is considered to be thamnolic acid (A., 1929, 818; 1932, 275), since it contains OMe, decomposes to form an atranol-like substance, with orcinol Me₁ ether, and is converted by MeOH into Me evernate and a resin, and by HCO₂H into thamnol, and since the acid C₁₀H₁₀O₆, m.p. 207°, which it gives on treatment with KHCO₃ and Na₂SO₃, is methylated to Me 3:5-dimethoxytoluene-1:4-dicarboxylate (A., 1929, 1460). E. W. W.

Chemical characteristics of fungi. G. REIF and G. BORRIES (Biochem. Z., 1935, 277, 329—336).—A table summarises the colours obtained when aq. extracts of the dried, finely powdered, Et₂O-extracted tissues of a variety of fungi were treated with m-NO₂-C₆H₄-CHO-H₂SO₄ reagent. P. W. C.

"Blackfellow's bread," the sclerotium of the fungus *Polyporus mylittæ*, Cke. and Mass. J. C. EARL and G. H. MCGREGOR (J. Proc. Roy. Soc. New South Wales, 1935, 68, 149—152).—The principal constituent of the sclerotium of *P. mylittæ* is closely allied to fibre cellulose, containing a polyfructosan (?) in admixture with the main polyglucosan constituent. Fats and proteins are absent. F. N. W.

Histological characteristics of plants grown in toxic concentrations of boron. I. E. WEBBER (J. Agric. Res., 1935, 50, 189—194).—Histological abnormalities in B-injured stems and leaves of prune, peach, and apricot are most marked in tissues in which accumulation of B is relatively large. No sp. reaction of the plant to B is observed. A. G. P.

Physiology of germination of sugar beet. E. W. SCHMIDT (Z. Wirts. Zuckerind., 1935, 85, 303—315).—Seedling injury, closely resembling in appearance that of mosaic virus, is produced by dil. solutions of HgCl_2 , TiSO_4 , KI, and Na_3AsO_3 , HgCl_2 being the most active in this respect. Solutions of KClO_3 caused general destruction of the chlorophyll apparatus of the leaves. Root injury by KClO_3 is intermediate in severity between that by Na_3AsO_3 and KI, and is < that by HgCl_2 and TiSO_4 . A. G. P.

Composition of mineral matter in wart-resistant and -susceptible varieties of potato. A. NĚMEC (Phosphorsäure, 1934, 4, 352—357; Chem. Zentr., 1935, i, 812).—Resistant varieties have higher Mg and usually Mn contents, but less Ca, than susceptible kinds. The Mg:Ca ratio in the former varies from 2.4 to 4.4 and that in the latter from 1.5 to 3.2. Infected tubers and also the warts have a low ash content and the warts contain much Ca and SiO_2 and little Mg. A. G. P.

Diseases of potatoes. II. E. PFANKUCH and G. LINDAU (Biochem. Z., 1935, 277, 129—138).—Acceleration of oxido-reduction reactions appears to be the most important metabolic disturbance in diseased tubers, but this is not a const. change in the press juice. The phenolase activity is at first greater but the difference disappears after a time. The determination of phenolase activity is best carried out in a buffered solution of quinol-*isovitamin-C*. P. W. C.

Chemistry of white rots of wood. IV. Effect on wood substance of *Ustilina vulgaris*, Tul. W. G. CAMPBELL and J. WIERTELAK (Biochem. J., 1935, 29, 1318—1321).—*U. vulgaris* produces in lime (*Tilia vulgaris*, Hayne) wood a typical white rot, both the carbohydrates (cellulose etc.) and lignin being attacked and the alkali-solubility when calc. as % of sound wood decreasing steadily as decay proceeds. The organism also attacks beech wood (*Fagus sylvatica*, L.) but more slowly, the attack being conc. as before on the cellulose. The fungus has a pronounced detrimental effect on the mechanical properties of the wood. P. W. C.

Properties of the curly top virus [of sugar beet]. C. W. BENNETT (J. Agric. Res., 1935, 50, 211—241).—Isolation of the virus is described. Its resistance to ageing and to desiccation is influenced by the nature of the medium in which it is preserved. Acid media (p_H 2.9) caused rapid inactivation, but alkaline media (p_H 7.9) are not deleterious. Preps. in 75% EtOH or COMe_2 retain considerable activity after 56 days. The virus is notably resistant to CuSO_4 (1 in 200), HgCl_2 (1 in 50), CH_2O (1 in 100), and PhOH (1 in 25) but is inactivated by exposure to the expressed juice of beet or other plants. A. G. P.

Statistical aspect of the production of primary lesions by plant viruses. J. G. BALD (Nature, 1935, 135, 996). W. J. YOUNDEN (*ibid.*, 1075). L. S. T.

"Iron-stain" disease of potatoes. G. EHREKE (Biochem. Z., 1935, 278, 195—225).—As compared with the healthy parts of potatoes the brown ("iron-stained") parts have high salt and H_2O contents, reduced catalase and increased oxidase and per-

oxidase activity, increased O_2 consumption, increased fermenting power, usually decreased NH_2 -acid content, increased diastase activity, increased content of reducing substances (glutathione, ascorbic acid), and increased Fe and Mn contents. These characteristics are especially pronounced in the starch-free parts of the diseased tissue. W. McC.

Spectrochemistry of algæ. C. DHĚRÉ and A. RAFFY (Compt. rend. Soc. Biol., 1935, 119, 232—235; cf. A., 1931, 884).—The fluorescence spectra of *Ulva lactuca*, *Fucus serratus*, and the phycocyanin of *Aphanizomenon flos aquæ* have been examined using plates especially sensitive to infra-red. H. G. R.

Intake of fluorescent substances by living plant cells. H. DÖRING (Ber. deut. bot. Ges., 1935, 53, 415—437).—Applications of fluorescence microscopy are described and factors affecting the absorption of luminescent substances are examined. A. G. P.

Use of methylal for inclusions in paraffin. J. DUFRÉNOY (Compt. rend. Soc. Biol., 1935, 119, 375—376).—Methylal, being sol. in H_2O and paraffin, can be used as an intermediary in the replacement of H_2O in tissues by paraffin. R. N. C.

Reactions of dyes with cell-substances. I. Staining of isolated nuclear substances. II. Differential staining of nucleoprotein and mucin by thionine and similar dyes. E. G. KELLEY and E. G. MULLER, jun. III. Apparatus for the definition of colour in stained histological sections. E. G. KELLEY (J. Biol. Chem., 1935, 110, 113—118, 119—140, 141—144).—I. In histological staining (e.g., of β -nucleohistone, α -nucleoprotein, nucleic acid, histone, metaprotein, thymus) the changes in colour produced by varying the p_H , type of dye, and type of fixative are adequately explained by supposing that salt formation occurs, but adsorption may also take place. With unmordanted hæmatoxylin the histological metachromasy appears to depend directly on $[\text{H}^+]$.

II. Dyes which, on dilution, exhibit a shift towards longer $\lambda\lambda$ in the position of max. absorption stain mucins and nucleoproteins differently, the mucins being coloured chiefly by the form of the dye which occurs in conc. solution, the nucleoproteins chiefly by that which occurs in dil. solution. The difference does not depend on $[\text{H}^+]$.

III. An instrument similar to the Nutting monochromatic colorimeter is described. W. McC.

Mechanism for controlled continuous flow of nutrient solutions. F. P. MEHRLLICH (Plant Physiol., 1935, 10, 169—177).—Apparatus is described. A. G. P.

Determination of hydrogen exponent by means of the step-photometer. A. JANKE and F. SEKERA (Biochem. Z., 1935, 277, 452).—A correction of the author's paper (A., 1932, 471). The indicator, 2:4-dinitrophenol, is used in a concn. not of 0.01M but of 0.002M. P. W. C.

Use of quinhydrone and antimony electrodes for determining the p_H of solid culture media. P. E. TILFORD (Phytopath., 1935, 25, 362—367).—Suitable technique is described. In the p_H range 2.0—7.1 the quinhydrone electrode gave results in

closer agreement with colorimetric tests than did the Sb electrode. In alkaline ranges both electrodes recorded unduly low vals. The former is more generally satisfactory than colorimetric tests. A. G. P.

Spectroscopically pure γ -ferric oxide in colloidal aggregation as a biological indicator.—See this vol., 834.

Reagents for analysis of plant sections. E. STEIMETZ (Bull. Soc. bot. France, 1934, 81, 296—297; Chem. Zentr., 1935, i, 446).—A solution for the differential staining of cell constituents is described. H. N. R.

Deproteinising agent. R. VLADESCO (Compt. rend. Soc. Biol., 1935, 119, 768—770).—Saturated solutions of CuSO_4 and $\text{K}_4\text{Fe}(\text{CN})_6$ together form a good general deproteinising agent through pptn. of $\text{Cu}_2\text{Fe}(\text{CN})_6$. It removes none of the normal determinable constituents from blood and milk, except uric acid. R. N. C.

Destruction of organic matter in plant material by nitric and perchloric acids. J. E. GIESEKING, H. J. SNIDER, and C. A. GETZ (Ind. Eng. Chem. [Anal.], 1935, 7, 185—186).—Wet ashing with boiling HNO_3 — HClO_4 gives good recovery for Ca, Mg, K, and P. The analytical results are uniformly > after dry ashing procedures. J. L. D.

Micro- and submicro-determination of methyl alcohol. Determination in blood and tissues. M. NICLOUX (Bull. Soc. Chim. biol., 1935, 17, 194—202).—The author's earlier method for determination of EtOH by complete oxidation with $\text{K}_2\text{Cr}_2\text{O}_7$ and determination of $\text{K}_2\text{Cr}_2\text{O}_7$ disappearing can be applied also to MeOH with the same degree of accuracy. P. W. C.

Determination of ethyl alcohol and its oxidation products in biological substrates. A. JANKE and S. KROPACSY (Biochem. Z., 1935, 278, 30—36).—The oxidation is stopped by addition of Ag_2SO_4 , the EtOH + MeCHO determined by oxidation with CrO_3 — H_2SO_4 mixture, the MeCHO alone by a modified H sulphite method, and the AcOH by steam-distillation of the solution after acidification with H_3PO_4 and titration of the distillate. P. W. C.

Determination of total cholesterol with digitonin. R. GORFINET (Compt. rend. Soc. Biol., 1935, 119, 330—331).—After saponification and acidification with HCl, cholesterol is pptd. with digitonin. H. G. R.

Application to the colorimeter of the Schoenheimer and Sperry method for determination of total and free cholesterol. F. FRITZ (J. Biol. Chem., 1935, 109, 525—527).—The Schoenheimer—Sperry determination of cholesterol (A., 1934, 1240) is adapted to the colorimeter; samples of serum extracts must contain > 0.05 mg. of cholesterol, and a fresh quantity of the standard solution must be used for each determination. H. D.

Colorimetric determination of amino-acid function by triketohydrindene hydrate (ninhydrin). M. POLONOVSKI and F. MORENO-MARTIN (Compt. rend. Soc. Biol., 1935, 119, 583—585).—The blue compound of α - NH_2 -acids and ninhydrin is separated from photosensitising yellow substances

by extraction with CHCl_3 , followed by re-extraction from the CHCl_3 with 0.01N-NaOH, and can then be used for colorimetric determination. R. N. C.

Simple modification of Nessler colorimetry for determination of total, residual, and polypeptide-nitrogen and of urea. E. HERZFELD (Mikrochem., 1935, 17, 155—164).—1 c.c. of serum is deproteinised at 100° with 20 c.c. of EtOH containing 5 drops of 1% aq. AcOH. EtOH is evaporated from the filtered liquid, H_2SO_4 is added, and the residue oxidised with H_2O_2 . The liquid is diluted, made alkaline, and Nessler solution + 5 c.c. of 1% gelatin added. Albumoses and peptones are similarly determined after degradation with pepsin. Urea is determined by deproteinising with AcOH and hydrolysing with urease. J. S. A.

Composition of tissue-proteins. I. Determination of purines in tissues. S. GRAFF and A. MACULLA (J. Biol. Chem., 1935, 110, 71—80).—The composition of the tissue-proteins in relation to the anatomy and physiology of the cell is investigated. Purines (I) are determined in microtome slices of the frozen tissue by extraction with EtOH, EtOH— Et_2O (1:1), and COMe_2 . The extract is hydrolysed by a 10N- HCO_2H —N-HCl mixture, which does not destroy (I). (I) are pptd. with Cu_2O twice under controlled conditions, and after dissolving the Cu complex in H_2SO_4 and H_2O_2 total N is determined. H. D.

Determination of carbon dioxide in culture solutions. L. B. ARRINGTON, C. H. WADLEIGH, and J. W. SHIVE (Soil. Sci., 1935, 39, 437—441).—Apparatus is described. A. G. P.

Micro-volumetric determination of sodium in blood. S. RASEJA (Bull. Soc. Chim. biol., 1935, 17, 817—830).—The material is oxidised with HNO_3 and HClO_4 , $\text{PO}_4^{''}$ removed with CaO, and Na pptd. as $\text{NaMg}(\text{UO}_2)_3(\text{OAc})_6$. The ppt. is reduced with Zn—Hg for 3 hr. at 80°, and the U^{IV} titrated with aq. KMnO_4 . By this method Na in normal human blood-corpuseles and plasma is 0.6954 and 3.3843 mg. per c.c., respectively, and the ratio Na:Cl of the plasma 1.097. A. L.

Micro-determination of sodium. A. P. WEINBACH (J. Biol. Chem., 1935, 110, 95—99).—Na is determined (e.g., in 0.1 c.c. of serum, plasma, or whole blood) by a volumetric modification of the method of Barber *et al.* (A., 1932, 52). W. McC.

Digesting biological materials for calcium and phosphorus analysis. H. W. GERRITZ (Ind. Eng. Chem. [Anal.], 1935, 7, 167—168).—Digests of biological materials with boiling HNO_3 —70% HClO_4 are suitable for the determination of elements which do not form insol. perchlorates. J. L. D.

Microchemical detection of aluminium and its presence in the plant world. Y. YOSHII and T. JIMBO (Sci. Rep. Tôhoku, 1932, [iv], 7, 65—77; Bied. Zentr., 1934, A, 5, 261).—Alizarin-S is used for detecting Al in plant materials. Marked accumulation of Al occurs in leaves of nearly all members of the afmilies, Symplocaceæ, Diapensiaceæ, Theaceæ, Cytheaceæ, Gleicheniaceæ, and Lycopodiaceæ. A. G. P.