BRITISH CHEMICAL ABSTRACTS

A.—PURE CHEMISTRY

FEBRUARY, 1935.

General, Physical, and Inorganic Chemistry.

Excitation of Balmer series by electrodeless discharge. H. NAGAOKA, Y. SUGIURA, and T. MISHIMA (Proc. Imp. Acad. Tokyo, 1934, **10**, 450—451).—Dry H_2 was circulated at low pressure through a tube 10 cm. diam., surrounded by a coil of thick wire. Discharges from a 125-kv. transformer of frequency 6×10^6 cycles per sec. were passed between Zn balls. C. W. G.

Influence of the Stark effect on the fine structure of the Balmer lines of hydrogen. N. P. HEYDENBURG (Physical Rev., 1934, [ii], 46, 1069—1075).—The possibility of small electric fields, present in a discharge tube, accounting for the discrepancies between observed and calc. doublet splitting of the Balmer lines is investigated. Doppler curves are plotted for each component and superimposed. For the H_β line, fields $\geq$ 100 volts per cm. do not explain Houston's results (cf. A., 1934, 467). A field of 500 volts per cm. agrees with Gibbs' results (cf. *ibid.*, 575) for H_α, but not for H_β. N. M. B.

Spectrum of the hydrogen molecule. I. The 3, $4d^3\Sigma, \Pi, \Delta \longrightarrow 2p^3\Pi$, and $3s^3\Sigma \longrightarrow 2p^3\Pi$ systems. O. W. RICHARDSON and T. B. RYMER (Proc. Roy. Soc., 1934, **A**, **147**, 24—47).—Several new bands and a new band system ending on the lowest triplet state $2p^3\Pi_{ab}$ are described. These include: (1) the $4d^3\Delta_a \longrightarrow 2p^3\Pi$ system; (2) the substitution of new $v' = 2$ and 3 levels for those given by Richardson and Davidson (A., 1933, 1219); (3) the non-diagonal lines of $4d^3\Sigma, \Pi_b, \Pi_a$, and $\Delta_b \longrightarrow 2p^3\Pi$; (4) extension of the $3s^3\Sigma \longrightarrow 2p^3\Pi$ system to the $v' = 0$, 2, 3, and 4 (?) levels; and (5) extension of the $3d^3\Sigma\Pi\Delta$ complex $\longrightarrow 2p^3\Pi$ to the $v', v'' = 4', 4''$ levels. L. L. B.

Spectrum of H_2. II. Band systems due to transitions from four new triplet states to $2p^3\Pi$. III. New bands and band systems ending on $2s^3\Sigma$ and an extension of the singlet system $^1Q \longrightarrow 2p^1\Sigma$. O. W. RICHARDSON and T. B. RYMER (Proc. Roy. Soc., 1934, **A**, **147**, 251—272, 272—292).—II. Four new band systems from hitherto undiscovered upper triplet states to $2p^3\Pi$ are described. The consts. and properties of the upper states are worked out and the possible electronic configurations considered.

III. Three new band systems ending on $2s^3\Sigma$ and coming from hitherto undiscovered upper states are described. An account is given of the $v' = 0$ progression of the singlet system $^1Q \longrightarrow 2p^1\Sigma$, and the progression previously known (A., 1929, 616, 731) is shown to be $v' = 1$. The band consts. and properties of the upper states are worked out. L. L. B.

Heat of dissociation of hydrogen molecule deduced from a new ultra-violet resonance band sequence. Heats of dissociation of HH^2, H_2^2, and HCl. H. BEUTLER (Z. physikal. Chem., 1934, **B**, 27, 287—302).—Discharge through A containing traces of H_2 reveals lines due to H_2 which constitute a resonance-band system leading from $2p\sigma^1\Sigma_u^+$, $v' = 10$, $K' = 2 \longrightarrow 1s\sigma^1\Sigma_g^+$, $v'' = 1 - 14$, $K'' = 1$ and 3. Excitation is effected by absorption of the A line 1066·4 Å. by mols. at the level $v'' = 2$, $K'' = 1$. The extension of the series of vibrations v'' by $v'' = 13$ and 14 shows the no. of v'' vibrational levels to be finite and permits a more exact extrapolation giving heat of dissociation of H_2, 102·68 ± 0·12 kg.-cal. The vals. 103·50 ± 0·12, 104·48 ± 0·12, and 101·63 ± 0·22 kg.-cal. are calc. for the heats of dissociation of HH^2, H_2^2, and HCl, respectively. R. C.

Fine structure of $H^2\alpha$. F. H. SPEDDING, C. D. SHANE, and N. S. GRACE (Physical Rev., 1933, [ii], 44, 58).—Spectroscopic measurements of H_2O containing 50% H_2^2O show that $H^1\alpha$ and $H^2\alpha$ are widely separated, each showing its own system of interference fringes. Preliminary vals. for e/m are $< 1{\cdot}758 \times 10^7$ e.m.u. L. S. T.

Spectrum of deuterium? F. SANFORD (Science, 1934, **80**, 478). L. S. T.

Influence of the polarisation of the inner electron in the field of the outer [electron] on the spectral terms of a two-electron system (especially helium). G. LUDWIG (Helv. phys. Acta, 1934, 7, 273—284; Chem. Zentr., 1934, ii, 722).—Theoretical. H. J. E.

Inert gas molecules. K. G. EMELÉUS and O. S. DUFFENDACK (Physical Rev., 1933, [ii], 44, 945).—The behaviour of the He band spectrum in discharge tubes carrying small currents indicates that the He mol. is actually produced under discharge conditions from one normal and one metastable He atom according to the scheme $He(1^{1,3}S) + He(2^{1,3}S) \longrightarrow He_2(2^{1,3}\Sigma)$. The possibility of observing the visible He band spectrum is closely associated with the metastability of the $2^3\Sigma$ level. The band spectra of the mols. Ne_2, A_2, etc. will be difficult, if not impossible, to excite. L. S. T.

Li^+ fine structure and wave functions near the nucleus. J. A. WHEELER and G. BREIT (Physical Rev., 1933, [ii], 44, 948).—The fine structure of the $(1s\,2p)^3P$ level of Li^+ has been calc. L. S. T.

Be III $1snp\ ^1P_1 - 1s^2\ ^1S_0$ series. P. G. KRUGER and F. S. COOPER (Physical Rev., 1933, [ii], **44**, 418).—

Wave-lengths, term vals., and the series limit are calc. The ionisation potential of Be III is 153·012 volts. L. S. T.

Ionisation potential of Be III. B. Edlén (Physical Rev., 1933, [ii], 44, 778).—New investigations confirm the author's previous val. (A., 1931, 539) for the series limit, which is $1s^2\ ^1S_0 = 1{,}241{,}180$ cm.$^{-1}$ (see above). L. S. T.

Magnetic dipole radiation and the atmospheric absorption bands of oxygen. J. H. Van Vleck (Astrophys. J., 1934, 80, 161—170).—The atm. bands of O_2 are best interpreted as magnetic dipole radiation rather than as ordinary dipole or quadrupole radiation. L. S. T.

Regularities in the radiation emitted by the positive column in the neon discharge. H. Krefft and E. O. Seitz (Physikal. Z., 1934, 35, 980—983).—The spectral energy distribution of the red Ne lines in the positive column is characteristic and easily reproducible, but the abs. efficiency depends on experimental conditions. A. J. M.

Widening and displacement of absorption lines. C. Füchtbauer [with P. Schulz, A. F. Brandt, and F. Gössler] (Physikal. Z., 1934, 35, 975—977).—The displacement of the absorption line of the principal series of K, Na, and Cs up to the 23rd and 26th members by the addition of He, Ne, and A was investigated. The curves for He and Ne show max. in the violet, whilst A produces only red displacement. The limiting vals. are the same for Na and K. The effective cross-section of He for very slow electrons obtained from the above data is 15·5 cm.^{2} per cm.^{3} The effect of A and He on the width of the higher series lines of Na was investigated. The width attains a max at about $1s - 6p$. A. J. M.

Isotope effect in the spectrum of neon. II. H. Nagaoka and T. Mishima (Sci. Papers Inst. Phys. Chem. Res. Tokyo, 1934, 25, 223—231; cf. A., 1930, 1337).—The relative intensities of the lines of Ne^{20} and Ne^{22} are not in the ratio of the relative amounts present. The isotope effect ($\delta\nu/\nu$) is $47{\cdot}2 \times 10^{-7}$ for $1s_2 - 2p_h$ terms and is almost const. at $34{\cdot}8 \times 10^{-7}$ for $1s_{3,4,5} - 2p_h$ terms. The relative intensities of some lines, especially the 5852 Å. ($1s_2 - 2p_1$) line, vary with changes in frequency of excitation between 50 and 10^7 cycles. Lines of the Ne isotopes form good wave-length standards if the difficulty of self-reversal is overcome. J. W. S.

Effect of pressure on the higher terms of the alkalis. E. Amaldi and E. Segrè (Nuovo Cim., 1934, 11, 145—156; Chem. Zentr., 1934, ii, 724).—Data for the displacement of the higher terms in the Na and K absorption series, due to addition of H_2, N_2, He, and A, are recorded and discussed. H. J. E.

Pressure displacement of the higher lines of spectral series. E. Fermi (Nuovo Cim., 1934, 11, 157—166; Chem. Zentr., 1934, ii, 724).—A theoretical discussion of Amaldi and Segrè's results (see above). H. J. E.

Absorption spectrum of rhombic sulphur in polarised light. H. G. Smith and R. H. Craddock (Trans. Roy. Soc. Canada, 1934, [iii], 28, III, 173—176).—The absorption spectrum and pleochroism of rhombic S between 4000 and 5800 Å. have been observed for 4 directions of the electric vector of the incident light relative to the crystal axes. The differences of the fractional transmissions for the various directions are relatively small, despite the marked anisotropic structure of the crystals, but the change in the long wave-length limit of the ultra-violet absorption exhibits marked variations. H. F. G.

Structure of discontinuities in the absorption of some gases in the region 10—100 Å. J. A. Prins (Physica, 1934, 1, 1174—1180; cf. A., 1934, 712).—Measurements for A, CCl_4, and N_2 are recorded and discussed. H. J. E.

Hyperfine structure of spectrum lines of manganese arc in vacuum. I. W. Mohammad and P. N. Sharma (Phil. Mag., 1934, [vii], 18, 1144—1149; cf. White, A., 1930, 970).—Structure data for 20 lines in the visible region are reported. N. M. B.

Persistence of some lines due to impurities in iron. R. Breckpot and A. Mevis (Ann. Soc. Sci. Bruxelles, 1934, 54, B, 290—298).—In connexion with quant. spectral analysis, the spectra obtained when known amounts of impurities (Cu, Ba, Pb, Bi, Sn, Sb) in an Fe base are used in the method (A., 1934, 857, 858) are examined. A. J. M.

Hyperfine structure of the arc lines of molybdenum and copper. L. Sibaiya (Proc. Indian Acad. Sci., 1934, 1, A, 321—324).—Lines arising from transitions to the ground state in the arc spectra of Cu and Mo in a Schüler tube are self-reversed, but give correct vals. for the hyperfine structure components. Cu^{63} and Cu^{65} each have a nuclear spin of 3/2, and the m^2D terms show positive isotope shift. The Mo lines $4d^54s^7S_3 - y^7P_{2,3,4}$ and $4d^54s^7S_3 - z^7P_{2,3,4}$ are all singlets, whereas a nuclear moment of ½ for Mo^{95} and Mo^{97} demands at least two satellites. It is concluded that the interval factors are negligibly small. J. W. S.

Standard wave-lengths in the copper spectrum in the region 80—650 Å. F. S. Cooper and P. G. Kruger (Physical Rev., 1933, [ii], 44, 324).—Several hundred lines in the spectrum of Cu VI, VII, VIII, and IX have been photographed, and standard wave-lengths calc. The spectra of Co, Ni, Cu, and Zn have also been photographed in this region, and a partial analysis has been made. L. S. T.

Absorption spectrum of arsenic. G. E. Gibson and A. Macfarlane (Physical Rev., 1934, [ii], 46, 1059—1068; cf. Swings, A., 1933, 823).—Data and vibrational analyses for 80 band heads in the range 2200—2750 Å., when ultra-violet light is absorbed by As vapour heated to 1100°, are given. N. M. B.

Arc spectrum of selenium. J. E. Ruedy and R. C. Gibbs (Physical Rev., 1934, [ii], 46, 880—888).—Measurements for 510 lines in the range 300—11,000 Å. of the arc spectrum of Se excited by a positive column discharge in He, and classifications for 391 of these lines, are tabulated. All known Se I terms and numerical vals. and perturbations are listed. N. M. B.

Arc spectrum of selenium. K. R. Rao and S. G. Krishnamurty (Current Sci., 1934, **3**, 200).—Four of the levels of Se I previously reported (A., 1934, 935) are now definitely assigned. L. S. T.

Resonance series in selenium vapour. I. S. Pasierbiński (Acta phys. polon., 1932, **1**, 503—511; Chem. Zentr., 1934, ii, 199).—Three new resonance series are recorded. H. J. E.

Spectrum of niobium IV. R. J. Lang (Physical Rev., 1933, [ii], **44**, 325).—The spectrum of Nb has been photographed from 2500 to 250 Å. in the vac. spark and from 2500 to 1250 Å. in the spark in N_2. The lines of Nb III and Nb IV have been separated, and further terms for Nb IV located. L. S. T.

Hyperfine structure and nuclear moment of niobium. N. S. Grace and S. S. Ballard (Physical Rev., 1933, [ii], **44**, 128).—The hyperfine structure of the lines 4059, 4675, 5344, and 4672 Å. in the spectrum of Nb I indicates a nuclear moment $\geq 7/2$ for Nb. L. S. T.

Nuclear spin of iodine. S. Tolansky (Nature, 1934, **134**, 851—852).—The greater detail given by the arc and spark spectra of I excited in a cooled hollow cathode discharge establishes the nuclear spin as 5/2 (cf. A., 1932, 787). L. S. T.

Absorption of light in gases. R. W. Ditchburn and H. J. J. Braddick (Nature, 1934, **134**, 935).—Addition of He reduces the absorption of light by Cs vapour. In general, the absorption of a gas cannot be assumed $\propto$ the concn. of the active atom or mol. (cf. this vol., 138). Many photochemical and astrophysical calculations may thus need revision. L. S. T.

Series of cæsium atoms in an electric field N. T. Zé and C. S. Piaw (Nature, 1934, **134**, 1010).—The effect of an electric field on the absorption spectrum of Cs is described. L. S. T.

Hyperfine structure of the rare earths. N. S. Grace (Physical Rev., 1933, [ii] **44**, 603).—A discussion of King's results (A., 1931, 7, 780; 1932, 440). L. S. T.

Arc spectrum of europium. H. N. Russell and A. S. King (Physical Rev., 1934, [ii], **46**, 1023—1024).—Term vals. and lines, intensities, and temp. classifications are tabulated. The principal ionisation potential is 5·64 volts. N. M. B.

Nuclear moment of thulium (Tu^{169}), yttrium (Y^{89}), and rhodium (Rh^{103}). H. Schüler and T. Schmidt (Naturwiss., 1934, **22**, 838—839).—Hyperfine structure investigations of the spectrum of Tu in the wave-length range 6500—4000 Å. indicate that the splitting is considerably smaller than in the case of other rare-earth elements of odd at. no., the greatest val. being 55×10^{-3} cm.$^{-1}$ Many lines consist of two equally strong components. The nuclear moment of Tu is ½. It is probable that Tu has a very small nuclear magnetic moment (I). Within the same wave-length range the spectra of Y and Rh show no trace of a structure. These elements must have a very small (I). A. J. M.

Structure of spectra of hafnium and tungsten. A. T. Williams (Compt. rend., 1934, **199**, 1201—1202).—Data are classified. H. J. E.

Second spectrum of hafnium (Hf II). W. F. Meggers and B. F. Scribner (J. Res. Nat. Bur. Stand., 1934, **13**, 625—657).—Data for > 1000 lines and Zeeman data for 207 lines are tabulated and classified. The ionisation potential of Hf is 14·8 volts. H. J. E.

Hyperfine structure and nuclear spin of tantalum. N. S. Grace and E. McMillan (Physical Rev., 1933, [ii], **44**, 325, 949—950).—Most of the Ta arc lines have structure. The structures of the lines, especially of 5997·24 and 6020·69 Å., show that the nuclear moment of Ta is 7/2. L. S. T.

Hyperfine structure and nuclear moment of gold. J. Wulff (Physical Rev., 1933, [ii], **44**, 512).—Many of the lines in the spectra of Au I and Au II show four components. The levels involved can be relegated to a hyperfine term system if a nuclear moment of 3/2 be assumed (cf. A., 1931, 1103). The interval rule is better satisfied in a no. of levels for a val. of 5/2, but from the nature of the coupling involved this val. is unlikely. The splitting of the resonance lines agrees with previous results. L. S. T.

High series terms in the arc spectrum of mercury. I. Walerstein (Physical Rev., 1934, [ii], **46**, 874—879).—Wave-lengths, wave-nos., and term vals. are tabulated for the higher members in the singlet and triplet diffuse and sharp series in the spectrum of luminous Hg vapour drawn into a low-pressure chamber. The $^3S_1$, $^1S_0$, ^1D, and ^3D terms develop as series following a Ritz formula. N. M. B.

Paschen–Back effect. II. *JJ*-coupling (approx.). J. B. Green and R. A. Loring (Physical Rev., 1934, [ii], **46**, 888—893; cf. A., 1934, 467).—The Paschen–Back effect of the λλ 5789—5790, 3662—3663, 3131—3132, and 2967—2968 Hg lines was in good agreement with Houston's theory. The red shift of the central component of λ 5790 at several field strengths approx. $\propto$ (field strength)^2. *g*-vals. are calc. from Zeeman effect measurements of several other Hg lines. N. M. B.

Rôle of absorption of the exciting line in resonance spectra. W. Kessel (Acta phys. polon., 1933, **2**, 91—95; Chem. Zentr., 1934, ii, 198).—The contribution of the various components of the green Hg line to the excitation of the resonance series of I and Te vapour has been examined. H. J. E.

Second-order Zeeman effect in the arc spectrum of mercury. J. B. Green and R. A. Loring (Physical Rev., 1933, [ii], **44**, 325). L. S. T.

Physical properties of the radiation from the discharge in mercury vapour. H. Krefft (Physikal. Z., 1934, **35**, 978—980).—The abs. radiation efficiency of 29 series lines in the Hg discharge was determined for definite current strengths, the pressure of the Hg vapour being varied continuously between 0·01 and 1000 mm. The radiation emission is a reproducible property of the Hg discharge with respect to spectral energy distribution and abs. efficiency.

The behaviour of the continuous background with regard to changes of v.p. and current strength was investigated. A. J. M.

Re-emission in the fluorescence bands of mercury vapour. (Miss) A. Faterson (Bull. Acad. Polonaise, 1934, A, 239—241).—Hg vapour at 450° and 100 mm., excited by Zn and Cd sparks, shows re-emission of the 2139, 2100, and 2164 Å. Zn lines and of the 2144 Å. Cd line, all in the region of intense mol. absorption. The re-emission varies in intensity with pressure in the same way as the fluorescence bands. The phenomenon is not due to anomalous at. diffusion because the separation of re-emitted and resonance lines is too great (200 Å.). J. W. S.

Effect of hydrogen on the afterglow in mercury vapour. M. M. Mann and W. M. Nielsen (Physical Rev., 1934, [ii], 46, 991—994).—With no potential applied to a grid in the luminous Hg vapour stream, the introduction of H_2 at a pressure $> 4 \times 10^{-4}$ mm. slightly decreased the intensity of the afterglow; at higher pressures the lines increase in density. With grid potentials of 3·5—4 volts, H_2 at a pressure $> 4 \times 10^{-4}$ mm. markedly decreased the intensity of the afterglow. N. M. B.

Influence of nitrogen and carbon dioxide on the absorption spectrum of mercury vapour. R. W. Wood and H. W. Straub (Physical Rev., 1933, [ii], 44, 1030).—The absorption spectra of Hg vapour with added gases has been investigated at 170—370°. A broad absorption band appears on the short-wave side of the resonance line 2536 Å. when CO_2 or N_2 is added. L. S. T.

Isotope shift of thallium. G. Breit (Physical Rev., 1933, [ii], 44, 418—419).—Shifts are appreciable only for $6p_{1/2}$ and $6p_{3/2}$ and are nearly the same for these two terms (cf. A., 1933, 2, 760). L. S. T.

Forbidden lines in the arc spectrum of lead. H. Niewodniczanski (Physical Rev., 1933, [ii], 44, 854).—The forbidden lines 4618·0, 5312·7, 4659·4, and 7330 Å. have been observed when undamped high-frequency discharges are excited in rarefied Pb vapour + He or A. L. S. T.

Specific isotope effect in the lead spectrum. B. H. Dickinson (Physical Rev., 1933, [ii], 44, 329).—The sp. isotope effect for the separation of Pb^{206} and Pb^{208} levels in four different configurations of the Pb atom has been calc. L. S. T.

Spectrum and ionisation potential of radium. H. N. Russell (Physical Rev., 1934, [ii], 46, 989—990).—Term vals. and designations confirm a new interpretation of the connexion between the two groups of terms in Ra I (cf. Rasmussen, A., 1934, 340). The first ionisation potential is 5·252 volts. N. M. B.

Bands at 4450 and 4180 Å. in the spectra of the night sky and of the aurora. H. Hamada (Nature, 1934, 134, 851).—In addition to well-known bands, the spectrum of N_2 excited by weak currents at low pressure has bands at 4728·5 (weakest), 4432·3, and 4165·9 Å., each with apparently four intensity max. Addition of He or Ne has no effect, but A almost quenches the bands. At low temp. their intensity is enhanced. The last two may be identical with the Rayleigh bands X_1 and X_2 of the night sky, and possibly of the aurora. L. S. T.

Spectra and latent energy in flame gases. A. Egerton and A. R. Ubbelohde (Nature, 1934, 134, 848).—The luminosity or afterglow of flame gases is probably due to metastable mols., but the energy associated with them is probably < that ascribed to them by David (A., 1934, 1288). L. S. T.

Spectra and latent energy in flame gases. W. T. David (Nature, 1934, 134, 848).—A reply (see above). L. S. T.

Sparking potentials at low pressures. S. S. Cerwin (Physical Rev., 1934, [ii], 46, 1054—1056).—Sparking potentials were determined as a function of air pressure in the range 1—0·06 mm. for spark lengths 2—10 mm. between outgassed Ni electrodes in air, and gave vals. up to 80,000 volts, agreeing approx. with Paschen's law. N. M. B.

Classical analogue of electron spin. W. Wessel (Z. Physik, 1934, 92, 407—424). A. B. D. C.

Origin of $K\alpha$ satellites. E. H. Kennard and E. Ramberg (Physical Rev., 1934, [ii], 46, 1040—1046).—Proposed explanations and conditions affecting these are examined for various elements. N. M. B.

Structure of the K line of beryllium and conductivity electrons. A. Hautot (Compt. rend., 1934, 199, 1399—1401).—The width and intensity of the K line of Be can be interpreted satisfactorily on the hypothesis of free electrons. J. W. S.

Self-consistent field and some X-ray terms of the sodium atom. E. H. Kennard and E. Ramberg (Physical Rev., 1934, [ii], 46, 1034—1040).—Self-consistent field functions are tabulated for neutral Na and for six internally ionised states. The corresponding calc. at. energies lead to agreement within 0·1% for the observed and calc. frequency of Na $K\alpha$. N. M. B.

Direct and fluorescence excitation of the K level in thick copper targets. K. B. Stoddard (Physical Rev., 1934, [ii], 46, 837—842; cf. A., 1933, 657). N. M. B.

Depth distribution of origins of characteristic X-rays from thick targets. P. Kirkpatrick and D. G. Hare (Physical Rev., 1934, [ii], 46, 831—836). N. M. B.

Widths of the L series lines and of the energy levels of Au (79). F. K. Richtmyer, S. W. Barnes, and E. Ramberg (Physical Rev., 1934, [ii], 46, 843—860).—An expression is found, based on the Weisskopf-Wigner theory of the shape of spectral lines, for the shape of an X-ray absorption discontinuity. Data are given, in the range 7·6—20·8 volts, on the widths of 23 Au L series lines; from these the widths of the several L, M, N, and O states of Au are calc. N. M. B.

Probabilities of L ionisations of Au by cathode rays. D. L. Webster, L. T. Pockman, and P. Kirkpatrick (Physical Rev., 1933, [ii], 44, 130—131).—Probabilities of ionisation of L_{22} and L_{21} electrons have been measured as functions of cathode-

ray energy by intensities of the $L\alpha$ and $L\beta_1$ lines from Au leaf. L. S. T.

Secondary structure of X-ray absorption edges from elements in certain cubic crystals. G. P. Brewington (Physical Rev., 1934, [ii], 46, 861—864).—The K X-ray absorption spectra of K, Cl, Ca, and S were photographed, using KF, KCl, KBr, KI, LiCl, NaCl, RbCl, and CaS. Separation data for secondary structure on the short wave-length side of the K edge of each element are tabulated. N. M. B.

X-Ray absorption coefficient of xenon. T. N. White (Physical Rev., 1934, [ii], 46, 865—867).—Mass-absorption coeffs. for the range 0·18—1·5 Å. are tabulated and plotted, and an equation is deduced. N. M. B.

X-Ray levels and atomic constants. H. R. Robinson (Phil. Mag., 1934, [vii], 18, 1086—1099; cf. A., 1934, 1149).—Energy data for photo-electrons characteristic of various X-ray levels of Au, Pt, W, Sn, Ag, and Cu are tabulated from magnetic spectrometer measurements, using Cu $K\alpha$ and Cr $K\alpha$ radiations in turn. Comparisons with X-ray data and relations with at. consts. are discussed. N. M. B.

Ionised gases. T. V. Ionescu (J. Phys. Radium, 1934, [vii], 5, 578—584).—Mathematical. A study of self-induction and capacity is applied to the investigation of the characteristic frequency of ionised gases, the action of positive grid gas-filled lamps, and the propagation of energy in tubes of ionised gas. N. M. B.

Measurement of shot voltage used to deduce the magnitude of secondary thermionic emission. E. B. Moullin (Proc. Roy. Soc., 1934, A, 147, 100—118).—The theory of shot effect is reviewed, and the experimental method is described and illustrated by measurements of the electron charge, in conditions where secondary emission is absent, both in the presence and absence of space charge. L. L. B.

Direction of polarisation and selectivity of external photo-electric effect of metals. F. Hlučka (Z. Physik, 1934, 92, 359—366).—Normal and tangential light components have sensitivity max. at different wave-lengths for the metals Ag, Au, Pt, Ni, Cu, and Zn. The absence of parallel component max. for alkali metals is due to their optical properties. A. B. D. C.

Velocity distribution of photo-electrons in thin metal foils. E. Vasser (Physikal. Z. Sovietunion, 1934, 5, 645—658).—The proportion of high velocities increases with increase in time under vac. With change of thickness a Fermi distribution is obtained. Ch. Abs. (e)

Electron-optical images with photo-electrically liberated electrons. J. Pohl (Physikal. Z., 1934, 35, 1003—1005).—An apparatus for obtaining images of photo-cathodes with the electrons liberated from them is described. The method was applied to Pt to discover the effect of absorption of gas, and crystal structure, on the geometrical distribution of light and thermo-electric emission. A. J. M.

Relativistic quantum electro-dynamics and radiation emission on collision of electrons of high energy. G. Wataghin (Z. Physik, 1934, 92, 547—560). A. B. D. C.

Elastic electron scattering in potassium. J. H. McMillen (Physical Rev., 1934, [ii], 46, 983—988).—An improved method of measuring slow electron scattering in vapours was applied to obtain angular distribution curves from 25° to 160° for 5- to 150-volt electrons elastically scattered by K atoms. Characteristic shifting max. and min., similar to those of A for energies $>$ 50 volts, were obtained. N. M. B.

Sensitivity of light counters. M. W Karev and S. F. Rodionov (Z. Physik, 1934, 92, 615—621).—Spectral electron emission efficiency of light counters registering single electrons was determined for Al, and compared with photo-current efficiency. A. B. D. C.

Experiments with positrons. E. Rupp (Physikal. Z., 1934, 35, 999—1003).—A satisfactory artificial source of positrons (I) is described. A thin layer of Li on Al foil is bombarded with fast protons. Photographs of the tracks of the rays were obtained by means of the cloud chamber method. The majority of (I) had velocities between 800 and 1000 kv. An apparatus for the determination of e/m for (I) is described. The ratio of e/m for (I) to that for electrons (II), both of 800 kv. velocity, is 0·95 $\pm$ 0·05. A slight modification of the e/m apparatus serves to separate (I) from (II) of equal energy. Diffraction experiments with (I) at Al and Au foils gave only a continuous scattering. The proportion of elastically to inelastically scattered particles is much smaller in the case of (I) than (II) of the same velocity. The absorption coeffs. of (I) and (II) of 800 kv. velocity were obtained for Al, Cu, and Au. The absorption of (I) $\propto$ mass, to a first approximation. The velocity loss in Al was determined for various velocities. (I) give, with all substances investigated, almost pure monochromatic X-rays with absorption coeffs. 0·18 $\pm$ 0·08 cm.$^{-1}$, one absorbed (I) giving 1·8—2·2 X-ray quanta. (I) give 35—50 times more X-ray quanta than the same no. of (II). A. J. M.

Artificially excited positrons. E. Rupp (Z. Physik, 1934, 92, 485—512).—Positrons were emitted by Li, less by Mg and Be, and not at all by Cu, Hg, and Au, on bombardment by fast protons; an Al–N layer on Al is a particularly good emitter. Absorption measurements are given for positrons. For each positron absorbed two quanta of X-rays are emitted. e/m for positrons is 0·95 $\pm$ 0·05 that for electrons. A. B. D. C.

Production of the positive electron. J. R. Oppenheimer and M. S. Plesset (Physical Rev., 1933, [ii], 44, 53—55; cf. A., 1934, 468).—Theoretical. L. S. T.

Recombination of electrons and positrons. E. Fermi and G. E. Uhlenbeck (Physical Rev., 1933, [ii], 44, 510—511).—Theoretical. The explanation of the hard component observed by Gray and Tarrant (A., 1932, 791) as due to the destruction of positrons cannot easily be reconciled with the Dirac theory. L. S. T.

Dirac's theory of the positron. W. Heisenberg (Z. Physik, 1934, 92, 692).—A correction (cf. A., 1934, 1150). A. B. D. C.

Formation of negative ions in gases by electron attachment. I. NH_3, CO, NO, HCl, and Cl_2. N. E. Bradbury. II. CO_2, N_2O, SO_2, H_2S, and H_2O. N. E. Bradbury and H. E. Tatel (J. Chem. Physics, 1934, 2, 827—834, 835—839). —I. The gases were ionised by a stream of electrons from a photo-electric source, accelerated by X volts per cm., in an apparatus previously described (A., 1934, 126), and the probability h of capture of an electron by a mol. of gas at pressure p mm. was determined. X/p was plotted against h. In NH_3 negative ions are formed for $X/p > 7{\cdot}5$. It is assumed that the gas dissociates first to NH and H_2 and NH then combines with an electron. CO does not form negative ions and has, therefore, no electron affinity. NO forms negative ions by direct electron attachment, h increasing with decrease in X/p. There is also a linear variation of h with p which is explained by collision of an electron with a lightly bound polymeride N_2O_2. NO^- is formed and the remaining NO mol. carries off the excess energy. Negative ions are formed in HCl and Cl_2 h increases with X/p, indicating that dissociation of the mol. probably occurs, due to the excess energy produced in the electron attachment process. Of the possible methods of dissipation of the excess energy in electron attachment, that most generally occurring appears to be the removal of the energy by a third body involved in the process.

II. No negative ions are formed in CO_2. In N_2O they are formed when X/p is > 2, with probable dissociation, $N_2O+\varepsilon \longrightarrow N_2+O^-$. In SO_2 attachment definitely occurs for electrons of low energy, and increases rapidly as the energy of the electrons decreases, indicating a true electron affinity and a radiation process for the dissipation of energy. As X/p increases h decreases to a min. and then increases, due to dissociation and formation of SO^-. H_2S probably forms HS^- for $X/p > 6$ and H_2O gives HO^- for $X/p > 10$. Negative ion formation in H_2O is also observed at low X/p for sufficiently high vals. of p. This may be due to the formation of negative ions from small mol. aggregates existing near the point of condensation of H_2O. M. S. B.

Intensities of molecular rays diffracted by rigid crystal surfaces. W. Lenz (Z. Physik, 1934, 92, 631—639).—The geometric-optical and Huygen's methods are applied to diffraction by an ideal rigid periodic surface. A. B. D. C.

Geometric-optical and wave-theoretical methods of calculating intensities of diffraction of molecular rays by rigid crystal surfaces. E. Brandt (Z. Physik, 1934, 92, 640—660; cf. preceding abstract).—The wave method is applied, and practical approximations are given for the two methods. A. B. D. C.

Sources of positive ions. Thermionic properties of the system Li_2O–Al_2O_3–SiO_2. E. J. Jones and S. B. Hendricks (Physical Rev., 1933, [ii], 44, 322).—The mixture $3Li_2O+Al_2O_3+3SiO_2$ gives const. emission of large currents (4×10^{-4} amp. per sq. cm.) for 40 hr. A similar mixture containing K is a satisfactory source of K^+ ions. The various compounds of Li_2O, SiO_2, and Al_2O_3 have been prepared as homogeneous crystals; their thermionic properties are much superior to those of the above mixture. The nature of the lattice changes accompanying emission of positive ions has been determined by X-ray analysis. L. S. T.

Production of intense beams of positive ions. R. D. Fowler and G. E. Gibson (Physical Rev., 1934, [ii], 46, 1075—1086).—Theory of excitation and apparatus for the production of beams of several milliamps. of ions from H_2, He, N_2, and CO_2 from the low-voltage arc arc described. Data on the influence of gas pressure and c.d. in the arc, and of extractor voltage on the density of the beams, are given. Electrostatic divergence and magnetic convergence and magnetic analyses of the beams are discussed. Beams from H_2 consist of H_3^+, H_{3-1}^+, H_{3-2}^+, H_2^+, H_{2-1}^+, and H^+, depending on pressure. N. M. B.

At. wt. of tantalum. O. Hönigschmid and R. Schlee (Z. anorg. Chem., 1934, 221, 129—141).—The mean of 14 determinations of the Br content of $TaBr_5$ by nephelometric titration with $AgNO_3$ gives Ta 180·88±0·01, in agreement with Aston's val. F. L. U.

At. wt. of radium. O. Hönigschmid and R. Sachtleben (Z. anorg. Chem., 1934, 221, 65—82). —The at. wt. of Ra has been determined from the ratio $RaBr_2 : RaCl_2$ using a comparatively large quantity of highly purified $RaBr_2$. The mean of 8 determinations gave Ra=226·05 (Cl=35·457, Br=79·916). The pure $RaCl_2$ was afterwards used for the prep. of standards. M. S. B.

Masses of the lithium isotopes. K. T. Bainbridge (Physical Rev., 1933, [ii], 44, 56—57).—The mass of Li^6 referred to O^{16}, measured from five spectra by comparison with H_2^+ by the doublet method, is 6·0145±0·0003; that of Li^7 is 7·0146±0·0006. The mass ratio of the Li isotopes obtained does not agree with the val. from band spectrum analysis (A., 1933, 994), but agrees with that obtained from earlier mass-spectrograph measurements (A., 1925, ii, 1021). L. S. T.

Redetermination of the mass ratio of the lithium isotopes from the band spectrum. F. A. Jenkins and A. McKellar (Physical Rev., 1933, [ii], 44, 325—326).—From new spectrograms of the $^1\Pi \leftarrow\!- {}^1\Sigma$ bands of Li_2, accurate wave-length data for the (0,0), (0,1), and (0,2) bands from both the isotopic mols. Li^7Li^7 and Li^6Li^7 have been obtained. The mass ratio Li^7/Li^6 is 1·1690±0·0003, which is $>$ previous vals. Using 7·015 as the mass of Li^7, this gives 6·001 for Li^6. L. S. T.

Relative abundance of the isotopes of lithium, potassium, and rubidium. A. K. Brewer and P. D. Kueck (Physical Rev., 1934, [ii], 46, 894—897). From mass-spectrograph measurements, using artificial Al silicates of Li, K, and Rb as a source of ions, the abundance ratio, mass ratio, m of the two isotopes, and packing fractions p are: Li^7/Li^6=12·14±0·4, m=7·016±0·002 and 6·016±0·002, p=23±3 and 26±3; K^{39}/K^{41}=13·88±0·4, m=38·96±0·003 and 40·96±0·003, p=−9·85±0·9 and −9·37±0·9; Rb^{85}/Rb^{87}=2·59±0·04, m=84·88 and 86·88, p=

$-14{\cdot}1\pm0{\cdot}7$ and $-13{\cdot}8\pm0{\cdot}7$. Vals. for Rb diverge from those due to Aston. N. M. B.

Isotopic constitution of lithium in the sun. E. McMillan (Physical Rev., 1933, [ii], **44**, 240).—Microphotometric measurements of the Li line of the sun-spot spectrum show that the whole line 6707·8 Å. can be accounted for by Li^7 alone. The presence of Li^6 cannot definitely be confirmed, but if present its relative abundance is not much > on earth. L. S. T.

Relative abundances of elements of even and odd mass number and atomic number. T. E. Sterne (Physical Rev., 1933, [ii], **44**, 238—239).—Band spectra of homonuclear mols. indicate that nuclei of even mass no. obey the Einstein–Bose statistics and those of odd mass no. the Fermi–Dirac statistics. This explains the general preponderance of nuclei of even mass no. and even at. no. pointed out by Harkins. L. S. T.

Faraday effect at high frequencies. G. P. Harnwell, W. Bleakney, S. N. Van Voorhis, and J. B. H. Kuper (Physical Rev., 1933, [ii], **44**, 785).—Preliminary experiments show the feasibility of investigating the Faraday effect for isotopes with continuous oscillations. L. S. T.

Spectro-analytical investigations. XIII. Spectrographic test of purity of the new primary radium standard. W. Gerlach and (Frl.) E. Riedl (Z. anorg. Chem., 1934, **221**, 103—108).—A method for the spectral analysis of very small quantities of an element is described. Using 0·61 mg. of the $RaCl_2$ prepared by Hönigschmid as standard (cf. this vol., 140), the Ba content was found to be 0·002—0·004 at.-%, the actual quantity detected being $1{\cdot}6\times10^{-9}$ g. M. S. B.

Failure to detect radioactivity in beryllium with the linear amplifier. R. D. Evans and M. C. Henderson (Physical Rev., 1933, [ii], **44**, 59).—The radioactivity of Be reported by Langer and Raitt (this vol., 6) could not be confirmed using a linear amplifier responsive to the α-particles emitted from a granite containing 10^{-12} g. of Ra per g. of rock. The results indicate that Be is stable. L. S. T.

Failure to detect the radioactivity of beryllium with the Wilson cloud chamber. D. M. Gans, W. D. Harkins, and H. W. Newson (Physical Rev., 1933, [ii], **44**, 310).—The radioactivity of Be recently reported (this vol., 6) could not be confirmed (see above). L. S. T.

Energies of α-, β-, and γ-rays. H. A. Wilson (Proc. Roy. Soc., 1934, **A**, **147**, 240—250; cf. A., 1934, 579).—The energies of β-rays from elements with the same at. no. are approx. equal, in accordance with theory. Pairs of β- and γ-ray energies having sums equal to multiples of 3·85 are found for several elements. The internal conversion coeffs. for Ra-*C'* γ-rays are consistent with theory. L. L. B.

Ionisation curves of Po α-rays in rare gases. R. Naidu (J. Phys. Radium, 1934, [vii], **5**, 575—577; cf. A., 1934, 1053).—Curves for the velocity variation along trajectories and for retarding effect are given for air, He, Ne, A, Xe, and Kr. Velocities corresponding with max. ionisation are calc. N. M. B.

Disintegration of beryllium by γ-rays. W. Gentner (Compt. rend., 1934, **199**, 1211—1213).—Szilard and Chalmers' result (cf. A., 1934, 1152) was confirmed using a mesothorium source. The optimum γ-ray energy was $0{\cdot}9\times10^6$ e.v. The calc. mass of Be^9 was 9·013. H. J. E.

γ-Rays accompanying artificial nuclear disintegrations. E. McMillan (Physical Rev., 1934, [ii], **46**, 868—873).—The excitation function and absorption of γ-rays from the bombardment of F, Li, B, and Be by protons, and of γ-rays and neutrons from the bombardment of Be, C, Li, B, F, Mg, and Al by deutons were investigated, as was the absorption of the "annihilation radiation" accompanying the radioactivity excited in C. N. M. B.

Absorption of γ-rays of radium by radioactive salts. F. Běhounek (Z. Physik, 1934, **92**, 533—542).—Absorption of Ra-*C* γ-rays is given for a no. of compounds, and the absorption coeff. is related to the no. of electrons per c.c. A similar relation is shown to hold for elements. A. B. D. C.

γ-Radiation from slow neutrons. R. Fleischmann (Naturwiss., 1934, **22**, 839).—The absorption of γ-rays and neutrons from Be+Rn was investigated. On passage of the rays through paraffin, H_2O, or substances containing H_2O, the proportion of γ-rays was considerably increased. The intensity of the γ-rays at first increases rapidly with the thickness of paraffin traversed up to 2·5 cm., reaching saturation at 6 cm. and then decreasing. The radiation from the paraffin is the same in both forward and backward directions. The neutrons pass through a certain thickness of paraffin where they are rapidly retarded, and combine with H^1 nuclei to form H^2 nuclei, with liberation of γ-rays, thus accounting for the rapid increase in intensity. A. J. M.

Fermi effect. M. Danysz, J. Rotblat, L. Wertenstein, and M. Żyw (Nature, 1934, **134**, 970—971).—The intensities of the Fermi effect obtained under identical geometrical conditions when screens of Pb and Au are placed between the Be–Rn source and Si, Al, Ag, or I, in which the effect is excited, are recorded. With Ag and I, the effect increases when the screen is interposed, showing a transformation of the exciting rays. It is concluded that the capture of a neutron (I) by a heavy nucleus without emission of a heavy particle takes place only when the energy of (I) is ≯ a certain val. If the energy of (I) is too high it loses in a nuclear encounter a part of its energy, which is emitted as a γ-radiation. The increased effect observed with Ag and I would then be due to the production of slow (I) in a no. > the loss of primary slow (I) due to absorption. L. S. T.

Emission of α-particles from various targets bombarded by deutons of high speed. G. N. Lewis, M. S. Livingston, and E. O. Lawrence (Physical Rev., 1933, [ii], **44**, 55—56).—Using H_2 containing 50% H_2^2, H^1H^2 ions have been given energies of 2×10^6 volts. On striking a target these yield $6{\cdot}6\times10^{-5}$ volt-protons and $1{\cdot}33\times10^{-6}$ volt-H^2

nuclei, deutons. When bombarded by these particles the N from a target of NH_4NO_3 yields approx. 100 α-particles (I) of range 6·8 cm. per 10^9 deutons and the min. deuton energy for this disintegration is 6×10^5 volts. Li from a LiF target gives a large no. of (I) of 8·2 cm. range probably due to the accompanying protons, and some of 14·5 cm. range of $12{\cdot}5\times10^6$ volts energy. Assuming the process $Li^6+H^2 \longrightarrow 2He^4$, the total energy liberated is $23{\cdot}4\times10^6$ volts. With a Be target (I) of range 3·3 cm. are obtained and the no. of disintegrations per deuton is $<$ 100 times the no. per proton. The bombarding particle probably causes disintegration of the unstable Be nucleus without capture. Al and Mg targets, and CaF_2 and NaCl give a small no. of particles. SiO_2, $NaPO_3$, C, CuS, $Ca(ClO_3)_2$, Au, Pt, brass, and mica give no detectable (I). L. S. T.

Emission of protons from various targets bombarded by deutons of high speed. E. O. Lawrence, M. S. Livingston, and G. N. Lewis (Physical Rev., 1933, [ii], **44**, 56).—When deutons (I) of 6×10^5—$1{\cdot}33\times10^6$ volts are directed against different targets (see above), in addition to α-particles protons with ranges up to approx. 40 cm. are emitted in large nos. Each target, including Au and Pt which are unlikely to undergo disintegration, gives protons of approx. 18 cm. range. This group can be explained only by assuming that the (I) breaks up, presumably into a proton and a neutron. In all cases, proton emission is not observed when the (I) energy is $< 8\times10^5$. L. S. T.

Liberation of neutrons from beryllium by hard *X*-rays. Production of radioactive elements. A. Brasch, F. Lange, A. Waly, T. E. Banks, T. A. Chalmers, L. Szilard, and F. L. Hopwood (Naturwiss., 1934, **22**, 839, and Nature, 1934, **134**, 880).—$1{\cdot}5\times10^6$-volt *X*-rays were passed on to Be, and the neutrons liberated were directed on to $CHBr_3$, which was then found to have mols. containing radioactive (I) and ordinary Br. (I) has a half-life period of 6 hr. Increase of voltage on the *X*-ray tube caused a much more powerful activity; with both Br and I, activity sufficiently powerful to be indicated on an electroscope could be obtained. A. J. M.

Neutrons from a beryllium–radon source. J. R. Dunning and G. B. Pegram (Physical Rev., 1933, [ii], **44**, 317).—Absorption curves for C, Al, Pb, Cu, and paraffin up to 21 cm. in thickness and single points for other elements have been obtained. Scattering measurements have been made for C, Al, Cu, Sn, and Pb at angles between 35° and 135°. A beam of neutrons is not deflected by passage through a magnetic field of 10^4 gauss, indicating that it does not possess the properties of a free magnetic pole of any large multiple of unit strength. L. S. T.

Atom disintegration, atomic structure, and artificial radioactivity. H. Mark (Oesterr. Chem.-Ztg., 1934, **37**, 200—203).—A lecture.

Artificial radioactivity and the scheme of Landé. I. Kurtschatov (Compt. rend. Acad. Sci. U.R.S.S., 1934, **4**, 202—207). E. S. H.

Experimental proof of layers of neutrons in the nucleus. W. Yeh (Compt. rend., 1934, **199**, 1209—1211).—The reciprocal of the log. of the period of radio-elements produced by neutrons plotted against the no. of protons in the nucleus shows a periodic variation for a series of elements. The interpretation of nuclear structure from this observation is discussed. H. J. E.

Radioactivity induced by neutrons. W. Yeh (Compt. rend., 1934, **199**, 1404—1406; cf. preceding abstract).—When $10/\log T$ (T=half-life period of the atoms) is plotted against the no. of protons contained in radioactive elements formed by the inductive action of neutrons, the curve shows max. corresponding with the end of each complete layer of neutrons in the nucleus, the max. decreasing with increasing no. of layers of neutrons. The val. for K accords with theory. J. W. S.

Nuclear structure and artificial radioactivity. G. Guében (Ann. Soc. Sci. Bruxelles, 1934, **54**, B, 215—223).—The nuclear constitution of elements produced artificially which show radioactivity is deduced in terms of α-particles (α), diplons (π_2), protons (π), and neutrons (n). Those elements which disintegrate with emission of a positive electron have nuclei of the form $(x\alpha+\pi)$, $(x\alpha+\pi_2)$, or $(x\alpha+\pi_2+\pi)$, where x is an integer. Those which disintegrate with emission of a negative electron have nuclear constitutions of the type $(x\alpha+\pi_2+zn)$, z being even. The fact that these particular arrangements are unstable may be used to predict nuclear changes. A. J. M.

Disintegration of the elements by swiftly moving protons. M. S. Livingston, M. C. Henderson, and E. O. Lawrence (Physical Rev., 1933, [ii], **44**, 316).—When bombarded by 6×10^5 to $1{\cdot}6\times10^6$ volt-protons, all the elements investigated give evidence of disintegration. Li yields α-particles (I) of 8·9 and 9·1 cm. range with 6×10^5 and $1{\cdot}4\times10^6$ volt-protons, respectively. The process involves capture of the proton. Be yields 3·3 cm. (I) and a few of ranges up to 6·1 cm. NaCl yields (I) of ranges up to 3·4 cm. with $1{\cdot}1\times10^6$ volt-protons. Al and Mg give a few 2·7 cm. (I) and NH_4NO_3 still fewer 2·2 cm. (I) with $7{\cdot}5\times10^5$ volt-protons. L. S. T.

Three types of nuclear disintegration of calcium fluoride by bombarding protons of very great energy. E. O. Lawrence and M. S. Livingston (Physical Rev., 1933, [ii], **44**, 316—317).—When bombarded by protons CaF_2 yields α-particles (I) of 2·8 cm. range with 6—$9{\cdot}5\times10^5$ volt-protons, 2·8 cm. and 5·6 cm. (I) with $9{\cdot}5\times10^5$—$1{\cdot}35\times10^6$ volt-protons, and an additional (I) group of 6·8 cm. range with 1·35—$1{\cdot}60\times10^6$ volt-protons. The excitation threshold is sharp and the yields increase rapidly in a linear manner with an increase in proton range above the threshold val. L. S. T.

Interaction of neutrons and protons. I. Tamm (Nature, 1934, **134**, 1010—1011).—The emission or absorption of two neutrinos by the neutron or proton, although less probable than emission of a γ-ray by the excited proton, may possibly occur. The electric charge and the spin of the heavy particle would be unchanged. This would not be the case when a

single neutrino is given off, as postulated by Fermi to account for the emission of β-rays by some radioactive materials. L. S. T.

Neutrons from beryllium bombarded by deutons. M. S. Livingston, M. C. Henderson, and E. O. Lawrence (Physical Rev., 1933, [ii], **44**, 782—783; cf. A., 1934, 6).—Neutrons (I) result from the disintegration of Be bombarded by deutons (II), apparently from the disintegration of Be^9 with capture of a (II) to form Be^{10} and a (I). The yield of (I) increases linearly with the range 1—9 cm. of (II). Hence the probability that (II) will disintegrate the Be nucleus on collision is independent of (II) energy, and the increase in yield with (II) range is due only to the increased frequency of collisions. L. S. T.

Mass of the neutron. W. D. Harkins and D. M. Gans (Nature, 1934, **134**, 968—969).—For the present it is suggested that the val. 1·006 should be used for the mass of the neutron. A probable lower limit is 1·0052. L. S. T.

Passage of very fast protons through matter. H. J. Bhabha (Nature, 1934, **134**, 934).—Theoretical. L. S. T.

Investigations of ultra-radiation corpuscles. H. Kulenkampff (Physikal. Z., 1934, **35**, 996—997).—The absorption of ultra-radiation corpuscles (I) in Fe placed between or above two counter-tubes was investigated. The weakening of (I) on passing through an absorbent is due to gradual energy loss, absorption processes playing only a subordinate part. A. J. M.

Cosmic ray nuclear disintegrations. W. F. G. Swann and C. G. Montgomery (Physical Rev., 1933, [ii], 44, 52—53). L. S. T.

Absorption of cosmic rays by different substances. H. Tielsch (Z. Physik, 1934, **92**, 589—614).—Absorption measurements are given for Pb, Hg, Fe, Al, H_2O, air, and C. A. B. D. C.

Counter calibration and cosmic-ray intensity. J. C. Street and R. H. Woodward (Physical Rev., 1934, [ii], **46**, 1029—1034).—Observations with a set of counters calibrated absolutely gives the no. of ionising cosmic rays as $0·80 \pm 0·028$ per cm.^{2} per min. from unit solid angle at the vertical at sea level. The no. of rays from all directions is $1·48 \pm 0·055$ cm.$^{-2}$ min.$^{-1}$, giving an average sp. ionisation of $100 \pm 3·7$ ion pairs per cm. path of a ray. N. M. B.

Distribution of cosmic ray nuclear disintegration in time. C. G. Montgomery and D. D. Montgomery (Physical Rev., 1933, [ii], **44**, 779).—Experimental results support the hypothesis that the nuclear disintegrations produced by cosmic rays are randomly distributed in time. L. S. T.

Structure of ionised layer of the atmosphere. T. Ionescu and C. Mihul (Compt. rend., 1934, **199**, 1301—1303). H. J. E.

Constitution of the atmospheres of the giant planets. A. Adel and V. M. Slipher (Physical Rev., 1934, [ii], **46**, 902—906).—By duplicating the spectra of the gaseous envelopes of Jupiter, Saturn, Uranus, and Neptune, using an absorption cell 22·5 m. long and comparing band photographs of CH_4, approx. 40 rotation–vibration bands in the spectra of these planets are identified as due to CH_4, which appears to be the major constituent of their atm. The absence of appreciable amounts of other hydrocarbons is shown. N. M. B.

Constitution of elementary particles and nuclear forces. W. M. Elsasser (Compt. rend., 1934, **199**, 1213—1215).—Theoretical. H. J. E.

Genesis of the elements. G. N. Lewis (Physical Rev., 1934, [ii], **46**, 897—901).—It is suggested that a large part of the matter in the universe is composed, like the metallic meteors, chiefly of Fe and Ni, and that such material, thermodynamically stable against spontaneous transmutations except at very high temp., is superficially attacked by cosmic radiation to produce the material represented by the earth's crust and by stony meteors. This view is supported by comparison of the relative abundance of the chief at. species in the two types of meteors. The main disintegration processes undergone by the Fe and Ni nuclei are: splitting off of O_2, splitting into two identical parts, and splitting of He from the products of the preceding processes. N. M. B.

Jacyna's selection theorem for helium. V. Jacyna, S. Derevjankin, A. Obnorski, and T. Parfentjev (Z. Physik, 1934, **92**, 675—679).—The selection theorem is verified for He (cf. A., 1934, 1070). A. B. D. C.

Wave theory of the neutrino. G. Rumer (Compt. rend. Acad. Sci. U.R.S.S., 1934, **4**, 21—24). A. B. D. C.

Mass of the neutrino. T. Takeuchi (Proc. Phys.-Math. Soc. Japan., 1934, **16**, 294—295).—The mass of the neutrino differs from that of the antineutrino by the mass of a photon (4×10^{-64} g.). The spins are $\frac{1}{2}$ and $-\frac{1}{2}$, respectively. Ch. Abs. (e)

Equivalence of mass and energy. K. T. Bainbridge (Physical Rev., 1933, [ii], **44**, 123). L. S. T.

Expression for [energy] density in terms of the new theory of the photon. L. de Broglie (Compt. rend., 1934, **199**, 1165—1168; cf. A., 1934, 1054).—Theoretical. H. J. E.

Relativistic invariant perturbation theory of the Dirac electron. I. Scattered and retarded radiation. E. C. G. Stueckelberg (Ann Physik, 1934, [v], **21**, 367—389). A. J. M.

Atomic energy relations. I. R. F. Bacher and S. Goudsmit (Physical Rev., 1934, [ii], **46**, 948—969).—Mathematical. Approx. energies of at. levels are calc. from linear relations which express the unknown energy in terms of observed energy vals. of the atom and its ions. Results are tabulated for *s* and *p* electrons and are applied to the spectra of C, N_2, and O_2. N. M. B.

Collision of two light quanta. G. Breit and J. A. Wheeler (Physical Rev., 1934, [ii], **46**, 1087—1091).—Mathematical. The production of positron–electron pairs as a result of collision of two light quanta, and the formation of photons due to recombination, are examined. Results are applied to the

collision of high-energy photons of cosmic radiation with the temp. radiation of interstellar space. N. M. B.

Breakdown of the Coulomb law for the hydrogen atom. E. C. KEMBLE and R. D. PRESENT (Physical Rev., 1933, [ii], **44**, 1031—1032). L. S. T.

Magneto-ionic theory. H. G. BOOKER (Proc. Roy. Soc., 1934, **A**, **147**, 352—382).—Several new features of Appleton's magneto-ionic theory of the propagation of wireless waves in the ionosphere (A., 1932, 670) appear if damping due to electronic collisions be taken into account, and incidence is not necessarily vertical. L. L. B.

Electronic states of the N_2^+ molecule and their energies of dissociation. H. H. BRONS (Proc. K. Akad. Wetensch. Amsterdam, 1934, **37**, 793—801).—Potential energy–distance curves have been calc. for the electronic states of N_2^+. The products of dissociation and the symmetry of the states are discussed. R. S. B.

Magnetic moment of the proton. A. LANDÉ (Physical Rev., 1933, [ii], **44**, 1028—1029).—The magnetic properties of higher nuclei indicate that the magnetic moment of a proton is approx. two magnetons. This differs from Stern's val. (A., 1933, 996) by 20%. The proton appears to circle around inside or on the surface of the neutron shells. L. S. T.

Calculation of the perturbation of a hydrogenoid atom by a free electron. P. BRICOUT (Compt. rend., 1934, **199**, 1392—1394).—Mathematical. J. W. S.

Planck quanta and the atomic field of force. M. BRILLOUIN (Compt. rend., 1934, **199**, 1345—1349).—Mathematical. J. W. S.

Electronic at. wt. and e/m ratio. R. C. GIBBS and R. C. WILLIAMS (Physical Rev., 1933, [ii], **44**, 1029).—The at. wt. of the electron, determined from measurements of the interval between corresponding components of the $H^1\alpha$ and $H^2\alpha$ lines (A., 1934, 575), is $(5{\cdot}491\pm0{\cdot}002)\times10^{-4}$. This gives a val. of $(1{\cdot}757\pm0{\cdot}001)\times10^7$ e.m.u. per g. for e/m for the electron. L. S. T.

Band spectra measurements of mass. A. BRAMLEY (Physical Rev., 1933, [ii], **44**, 309—310).—A discussion. L. S. T.

Chemical reactivity and absorption of light. N. R. DHAR and P. N. BHARGAVA (Nature, 1934, **134**, 848—849).—Absorption in the visible region for mixtures of reacting substances, *e.g.* H_2+Cl_2, H_2+Br_2, $MeOH+Br_2$, and $EtOH+Br_2$, is $>$ that by the separate constituents. Increased absorption may be a measure of the reactivity of a system, and is due to the weakening of the binding forces of the mols. L. S. T.

Spectrum of $O^{16}H^2$. H. L. JOHNSTON and D. H. DAWSON (Physical Rev., 1933, [ii], **44**, 1031).—Approx. 500 new lines (8 bands) have been identified and assigned in the spectrum of OH^2 produced in H_2O vapour containing 35% of the H as H^2. L. S. T.

Emission and fluorescence spectra of sulphur dioxide. H. D. SMYTH (Physical Rev., 1933, [ii], **44**, 690).—A comparison of the results of Chow (A., 1933, 1227) and Lotmar (*ibid.*, 886). L. S. T.

Molecular spectra of boron and aluminium halides. E. MIESCHER (Helv. phys. Acta, 1934, **7**, 462—464; Chem. Zentr., 1934, ii, 908—909).—Band spectrum data for BCl, BBr, AlCl, AlBr, and AlI (in a Geissler tube) are recorded. H. J. E.

Band spectra of the halides of aluminium. F. H. CRAWFORD and C. F. FROLLIOTT (Physical Rev., 1933, [ii], **44**, 953—954).—$AlCl_3$ gives a well-developed group of red-degraded bands (approx. 75) from 2550 to 2900 Å., and $AlBr_3$ one from 3065 to 2745 Å., presumably due to AlBr. AlI_3 gives an intense continuous spectrum with a faintly-banded appearance in places extending from the visible to 2300 Å. L. S. T.

Spectroscopic investigation of indium halide vapours and gallium halide vapours. M. WEHRLI and E. MIESCHER (Helv. phys. Acta, 1934, **7**, 298—330, 331—359; Chem. Zentr., 1934, ii, 725—727).—Data on the emission and absorption spectra of InCl, InBr, and InI are recorded and classified. Three band systems were observed in each case. A new In *isotope* of mass 113 was detected. Data for GaCl, GaBr, and GaI are also recorded and classified. The bands resemble those of In halides. H. J. E.

Absorption spectrum of thallium fluoride vapour. Z. V. BOITZOVA and K. V. BUTKOV (Physikal. Z. Sovietunion, 1934, **5**, 765—776).—At low temp. a continuous absorption, attributed to Tl_2F_2, was observed. At higher temp. the spectrum of TlF is observed. The dissociation energy of TlF is 106 kg.-cal. CH. ABS. (*e*)

Absorption spectra of the samarium ion in solids. V. Absorption spectrum and energy levels of the Sm^{+++} ion as it exists in monoclinic crystals of $Sm_2(SO_4)_3,8H_2O$. F. H. SPEDDING and R. S. BEAR (Physical Rev., 1934, [ii], **46**, 975—983; cf. A., 1934, 1154).—Full data for the spectra at 20°, 78°, 169°, and 298° abs., and an energy level diagram are given. Results are similar to those for $SmCl_3,6H_2O$. The existence of low-lying levels separated from the basic level by 160, 188, and 225 cm.$^{-1}$ is proved. N. M. B.

Transparency of the atmosphere in the ultra-violet and a possible means of extending the Solar spectrum in the regions 2200—2000 Å. K. R. RAMANATHAN and L. A. RAMDAS (Proc. Indian Acad. Sci., 1934, **1**, **A**, 308—314).—The absorption band of O_3, which produces the short-wave limit of the solar spectrum, has relatively low intensity at 2200—2000 Å., whilst the Schumann–Runge absorption band system of O_2 begins at about 2000 Å. Hence it is calc. that, provided that the sun emits black-body radiation, and there is no other absorbing agent present in the atm., it should be possible to detect solar radiation between 2200 and 2000 Å. at heights of $\lesssim$ 16 km. in the tropics. J. W. S.

Ultra-violet absorption of methane. A. B. F. DUNCAN and J. P. HOWE (J. Chem. Physics, 1934, 2,

851—852).—CH_4 shows true continuous absorption in the region 1450—850 Å., and all excited states up to the first ionisation potential are repulsive. Continuous ultra-violet absorption spectra may be general for mols. with tetrahedral symmetry. M. S. B.

Absorption of ultra-violet light by some organic substances. XXXVII. L. Marchlewski and J. Zgleczewski. **XXVIII.** W. Gosławski and L. Marchlewski (Bull. Acad. Polonaise, 1934, **A**, 256—260, 261—279).—XXXVII. *o*-Hydroxycarbanilide and its *N*-Et ether show similar absorption curves, that for the latter being shifted slightly towards longer λ. The *O*-Et ether shows weaker absorption, and a different type of absorption curve, with two max., indicating a difference in structure from the parent compound and its *N*-ether (cf. A., 1926, 9).

XXXVIII. Methyl-, ethyl-, amyl-, meta-, methylmeta-, acetyl-, and alkali-lignins all show strong absorption bands with max. at 2795—2835 Å. The absorption increases with increased concn. of acid used in prep. of lignin, the length of time of reaction, and rise of temp. With the alcohol-lignins it increases with rise of temp. and pressure of formation. The selective absorption is unaffected by acidity, but the continuous absorption is increased considerably in alkaline solution. J. W. S.

Spectrum of acraldehyde. H. W. Thompson and J. W. Linnett (Nature, 1934, **134**, 937—938).—The ultra-violet spectrum of acraldehyde (I) has a region of absorption from 4000 to 2800 Å. approx. consisting of bands with no overlapping continuum, and a region of continuous absorption from 2300 Å. to higher frequencies. The relation of these bands to mol. structure is discussed. Illumination of (I) vapour at room temp. with light of wave-length corresponding with the first region leads to a polymerisation. L. S. T.

Ultra-violet absorption of binary liquid mixtures. V. System acetone–hexane. M. Pestemer (Monatsh., 1934, **65**, 1—5; cf. A., 1934, 952).—Results for the whole range of compositions of the system support the conclusions reached in the examination of other binary systems. E. S. H.

Band position of chlorophyll in different media. B. Hubert (Proc. K. Akad. Wetensch. Amsterdam, 1934, **37**, 694—699).—Determinations of the absorption band max. of chlorophyll (I) in different solvents indicate that the shift follows Kundt's law. Comparison with the shift in leaves indicates that, if (I) is dissolved in plastid, it must be in a medium of very high refractive index. Certain observations favour the adsorption theory. M. S. B.

Chlorophyll spectrum. L. G. M. Baas-Becking and (Miss) H. C. Koning (Proc. K. Akad. Wetensch. Amsterdam, 1934, **37**, 674—678).—Preliminary. The approx. positions of the absorption and fluorescence bands of solutions of chlorophyll (I) in different org. solvents have been determined. In general Kundt's rule is obeyed, since the higher is the refractive index the greater is the shift of the band max. towards longer wave-lengths. The results indicate that (I) cannot be present in the living plastid in ordinary solution. Intensities have been determined in aq. colloids and paraffin-oil solutions and measurements of diffusion in different solvents have also been made. From absence of fluorescence in the colloidal solution, it is probable that (I) is not present in the colloidal state in plastid. M. S. B.

Temperature classification of infra-red iron lines. A. S. King (Astrophys. J., 1934, **80**, 124—135).—The spectrum of Fe from 6400 to 10,500 Å. has been observed at temp. between 2100° and 2700° in the vac. furnace and in the arc, and 367 lines have been classified according to temp. L. S. T.

Temperature variation of infra-red absorption of crystals. I. Fluorspar and calcite. F. Matossi and H. Brix. **II. Sulphates and micas.** F. Matossi and H. Kindler (Z. Physik, 1934, **92**, 303—311, 312—336).—I. Transmission spectra were obtained from −168° to 300° in the near infra-red. Combination bands become less intense and broader with rising temp., due to damping effects exceeding excitation of the fundamental; for calcspar this is at 41·4 μ.

II. Absorption spectra are given for muscovite, clinochlore, anhydrite, celestine, and baryta from 0 to 20 μ, and between −125° and 300°.

A. B. D. C.

Infra-red spectrum of heavy ammonia, NH_3^2. S. Silverman and J. A. Sanderson (Physical Rev., 1933, [ii], **44**, 1032).—Calc. and observed vals. of the four bands of the infra-red spectrum of 90% NH_3^2 are recorded. L. S. T.

Infra-red spectrum of methyl chloride. A. H. Nielsen and E. F. Barker (Physical Rev., 1934, [ii], **46**, 970—974).—Data are tabulated for new infra-red absorption bands mapped in the region 0·7—7·0 μ. Theoretical predictions and anomalous spacing are confirmed. Bands at 5900 and 4200 cm.$^{-1}$ indicate interaction between the levels ν_1 and $2\nu_4$ thought to exist in some Me compounds. N. M. B.

Polarisation and intensity measurements in the Raman spectrum of carbon dioxide. A. Langseth and J. R. Nielsen (Physical Rev., 1934, [ii], **46**, 1057—1058; cf. Dickinson, A., 1929, 1215; Hanson, A., 1934, 1056).—For the principal Raman bands at 1286 and 1389 cm.$^{-1}$, the depolarisations (for unpolarised incident light) are 0·18 and 0·14, respectively, and the relative intensities 0·61. N. M. B.

Raman spectrum of gaseous carbon dioxide. A. Adel (Physical Rev., 1933, [ii], **44**, 691; cf. A., 1933, 661). L. S. T.

Raman spectra of some linear triatomic molecules. A. Langseth and J. R. Nielsen (Physical Rev., 1933, [ii], **44**, 326; cf. A., 1933, 208).—Raman spectra of N_2O, CO_2, $CS_{2\,liq.}$, and the ions SCN′ and N_3' in aq. solution have been photographed with high dispersion, and the depolarisations of certain lines and relative intensities measured. The results support a linear structure for these mols. L. S. T.

Raman effect with triatomic molecules. VI. Constitution of nitrite ion. A. Langseth and E. Walles (Z. physikal. Chem., 1934, **B**, **27**, 209—218; cf. A., 1931, 1353).—Raman lines 1331·3±1·0,

1240±2, and 813·2±1·0 cm.$^{-1}$ have been observed, with $NaNO_2$, and their states of polarisation measured. The relative intensities are the same at 15° as at 95°. The results indicate that NO_2' is isosteric with O_3 and has a ring structure. NO_2' is apparently pale yellow. R. C.

Raman spectrum of deutero-methyl alcohol and deutero-chloroform. O. Redlich and F. Pordes (Naturwiss., 1934, **22**, 808).—The Raman spectrum of $MeOH^2$ indicates that the frequency to be ascribed to the OH vibration in the ordinary mol. is 3388 cm.$^{-1}$ For CH^2Cl_3 lines were found at 649, 905, and 2253 cm.$^{-1}$ The results do not agree with those calc. on the basis of the central force system of Bjerrum and Dennison. A. J. M.

Raman spectra [of *n*- and *sec.*-butylamine and *n*-heptylamine]. P. L. Bayley (Physical Rev., 1933, [ii], **44**, 510).—Frequencies and relative intensities are recorded. A weak line at approx. 2725 cm.$^{-1}$ is new for amines. Preliminary vals. for the frequencies of furan are also given. L. S. T.

Raman spectra of tartaric acid and tartrates in aqueous solution. I. Peyches (Compt. rend., 1934, **199**, 1121—1123).—Data are recorded for the acid and for Li, Na, NH_4, K, Rb, Cs, and Et tartrates. H. J. E.

Raman effect of acetylenes. I. Methyl-, dimethyl-, and vinyl-acetylene. G. Glockler and H. M. Davis (J. Chem. Physics, 1934, **2**, 881—889).—An improved technique has resulted in slightly different vals. for the CMe:CH frequencies (cf. A., 1933, 1229). Frequencies are also given for the other two compounds and the modes of vibration discussed. Faint rotation lines accompany the C:C vibration in liquid CMe:CMe. They are interpreted as due to rotation of the 6 H around the figure axis of the mol. The moment of inertia is 10^{-39} g.×cm.^{2} M. S. B.

Linking frequency of heavy acetylene $C_2H_2^2$. Y. Morino (Sci. Papers Inst. Phys. Chem. Res. Tokyo, 1934, **25**, 232—234).—Theoretical. Assuming the force consts. to be the same as for $C_2H_2^1$, and the mass of H^2 to be 2·014, the frequencies of $C_2H_2^2$ are calc. A hitherto unobserved Raman line at 2680 cm.$^{-1}$ and an infra-red absorption band at 2408 cm.$^{-1}$ are predicted. J. W. S.

Raman spectra of *cyclo*pentene derivatives. Synthesis of Δ^1-benzyl*cyclo*pentene. L. Piaux (Compt. rend., 1934, **199**, 1127—1128; cf. A., 1934, 942).—Data are recorded for Δ^1-cyclo*pentenylmethyl acetate*, b.p. 73—75°, and *bromide* (I), b.p. 56—59°, and Δ^1-1-*benzyl*cyclo*pentene*, b.p. 113—117° [from (I) and MgPhBr, or from *cyclo*pentanone and $CH_2Ph{\cdot}MgCl$ and dehydration of the resulting 1-*benzyl*cyclo*pentanol*, m.p. 54—55°]. H. J. E.

Rotational Raman effect in liquids. A. V. Rao (Proc. Indian Acad. Sci., 1934, **1**, A, 274—280; cf. A., 1934, 345, 1056).—C_6H_6, CS_2, *cyclo*hexane, molten salol, and CCl_4 all show a high intensity near the Rayleigh line, and a weak but definite extension of the wing beyond the theoretical limit. The intensity distribution remains almost unchanged at temp. near the b.p. of the liquids. It is suggested that the extreme wings arise from groups which cannot rotate, but oscillate about their equilibrium positions. J. W. S.

Examination of molecularly scattered light with a Fabry–Perot etalon. I. Liquid benzene. B. V. R. Rao (Proc. Indian Acad. Sci., 1934, **1**, A, 261—268).—Two fine structure components have been identified in the Rayleigh line due to mol. scattering in C_6H_6, their displacement being in agreement with theory. The variation of the frequency shift of the displaced components from the main line with the frequency of the incident radiation is in agreement with Brillouin's equation (Ann. Physique, 1922, [ix], **17**, 88). J. W. S.

Rotational Raman scattering in benzene vapour. S. C. Sirkar (Nature, 1934, **134**, 850—851).—Measurements of the distribution of intensity in the rotational wing due to C_6H_6 at 210° and approx. 16·6 atm. support the theory of Placzek and Teller (A., 1933, 446). L. S. T.

Raman spectrum of fluorobenzene. J. W. Murray and D. H. Andrews (J. Chem. Physics, 1934, **2**, 890).—The data of Crawford *et al.* (A., 1934, 1155) for the Raman frequencies of PhF differ from those of the authors (*ibid.*, 473) for 4 of the lines. The former used a filter of I in CCl_4 which does not permit an unambiguous assignment of some of the lines. A numerical error in the earlier paper is corr. Polarisation data are given for the Raman lines of PhF. M. S. B.

Raman effect. XXXVII. Raman spectra of molecules of the type XCOY. K. W. F. Kohlrausch and A. Pongratz (Z. physikal. Chem., 1934, **B**, **27**, 176—195).—The Raman spectra of compounds of the type XCOY, principally amides and crotonyl derivatives and compounds having X=Br or SH and Y=alkyl, have been studied. Normal vibration frequencies are identified by means of approximation formulæ for a valency-force system (cf. A., 1933, 209). The effect of X and Y on the CO frequency appears to be connected with their dipole moments. R. C.

Raman effect. XXXVI. Raman spectrum of organic substances. (Poly-substituted benzenes. V.) K. W. F. Kohlrausch and A. Pongratz (Monatsh., 1934, **65**, 6—17; cf. A., 1934, 1290).—Data are recorded for 1 : 3 : 5-, 1 : 2 : 3-, and 1 : 2 : 4-$C_6H_3Me_3$, 1 : 2 : 4 : 5- and 1 : 2 : 3 : 5-$C_6H_2Me_4$, C_6HMe_5, C_6Me_6, 1 : 2-, 1 : 3-, and 1 : 4-$C_6H_4(OH)_2$, 1 : 2 : 3- and 1 : 3 : 5-$C_6H_3(OH)_3$, PhOMe, 1 : 2-, 1 : 3-, and 1 : 4-$C_6H_4(OMe)_2$, 1 : 2 : 3- and 1 : 3 : 5-$C_6H_3(OMe)_3$. E. S. H.

Combination scattering and association of molecules. S. I. Leitman and S. A. Uchodin (Compt. rend. Acad. Sci. U.R.S.S., 1934, **4**, 12—14).—Scattering was investigated for solutions $PhNO_2$ in CCl_4, and AcOH in H_2O; a displacement at 623 cm.$^{-1}$ is ascribed to association of the AcOH mols. A. B. D. C.

Rayleigh scattering in crystals. F. Matossi (Z. Physik, 1934, **92**, 425—461).—The theory of depolarisation is developed for rhombic, trigonal, hexagonal, and tetragonal crystals; trigonal crystals do not show symmetry normal to the single optic

axis, as elastic consts. have a lower symmetry than optical consts. Depolarisation was observed for glass, rock-salt, topaz, calcspar, and quartz; quartz shows the lower symmetry of elastic consts. A. B. D. C.

Topography of surfaces deduced from the coefficient of diffusion of light. Application in the study of corrosion. F. Canac (Compt. rend., 1934, 199, 1117—1118).—The reflexion of light by the surface is correlated with the surface conditions. H. J. E.

Fluorescence of platinocyanide solutions. I. A. Chvostikov (Compt. rend. Acad. Sci. U.R.S.S., 1934, 4, 14—20).—Fluorescence of K, Ba, and Mg salts was observed. The K salt fluorescence appears as bands at 525 and 555 mμ, absorption bands appearing near 254, 279, and 350 mμ. Variation of polarisation with viscosity is used to calculate the half-life period of emitting centres. A. B. D. C.

Crystallisation fluorescence. H. Döring (Naturwiss., 1934, 22, 838).—CaC_2O_4, freshly separated from plant cells, shows fluorescence, whilst more aged crystals do not. A similar phenomenon is observed in the separation of thymol and similar phenols, and vanillin, from supercooled melts. A. J. M.

Luminescence and crystal structure of solidified gases. L. Vegard (Proc. K. Akad. Wetensch. Amsterdam, 1934, 37, 780—788).—The bands in the luminescence spectrum produced by bombarding solid Kr and A with cathode rays have been studied, and many have been referred to an impurity of N_2. The infra-red luminescence from A, A + 3·5% N_2, and N_2, in the solid state, has also been studied. From X-ray measurements solid β-N_2 has a hexagonal elementary cell, containing 2 mols. capable of rotation in the lattice, with a 4·039 Å., c/a 1·651. In α-N_2 the mols. are fixed on trigonal axes, space-group T_4, and the mol. centres are approx. arranged in a face-centred cubic lattice. It is suggested that in α-N_2 the excited state is kept undisturbed for sufficient time for transition to the normal to occur, and a band system is emitted, but with β-N_2 no phosphorescence can be emitted, since the excited state is disturbed by rotation. Solid O_2 exists in two forms, *I* stable between −229° and the m.p., *II* from −249° to −229°. There is some indication that the mols. rotate in form *I*. R. S. B.

Efficiency of chemiluminescence accompanying the Wedekind reaction. W. L. Asling and R. T. Dufford (Physical Rev., 1933, [ii], 44, 315).—The chemiluminescence (I) accompanying the reaction between chloropicrin and certain Grignard reagents has been quantitatively investigated. The efficiencies, which range from $4·4\times10^{-8}$ to 10^{-9}%, are discussed in relation to the possible origin of (I). L. S. T.

Luminescence on agitating mercury in impure neon at low pressure. G. Déjardin and (Mlle.) R. Schwégler (Compt. rend., 1934, 199, 1110—1112).—The spectrum, which contains mainly N lines and bands, resembles the aurora spectrum. H. J. E.

Experiments with the Kunsman anode. G. Gille (Ann. Physik, 1934, [v], 21, 443—456).—The Kunsman anode (mixture of Fe_2O_3, Al_2O_3, and alkali salt) was used to investigate the variation of velocity (I) of Cs ions emitted from it with temp. (I) was const. between 650° and 900°, increased by 0·5 volt between 900° and 1100°, and was again const. from 1100° to 1300°. The variation of (I) is due to a change in the thermo-electric emission work, a satisfactory explanation for which has not been found, although it may be connected with the β–γ Fe transformation in the anode. A. J. M.

Outer photo-electric effect of composite photocathodes at low temperatures. R. Suhrmann and D. Dempster (Physikal. Z., 1934, 35, 973—975).—Photo-electric cells with K–KH–K (I) and K–$C_{10}H_8$–K (II) cathodes show increased sensitivity at the temp. of liquid air, when irradiated with light of the selective max. [430 mμ for (I), and 290 mμ for (II)]. It is assumed that the increased sensitivity is due to the presence in excited states of light-absorbing centres, of which the life is considerable at low temp., but is shortened at room temp. owing to thermal vibration. A. J. M.

Photo-electric conductivity in silver chloride. A. Arsenieva (Compt. rend. Acad. Sci. U.R.S.S., 1934, 4, 118—120).—The photo-electric current is independent of temp. between −110° and −170°. E. S. H.

Radiation from cells formed of semi-conductors. G. Déchêne (J. Phys. Radium, 1934, [vii], 5, 553—562).—The emission of absorbable electromagnetic radiation is confirmed. Investigation of the absorption in air, and analysis by the tangent grating method, showed that semi-conducting cells of yellow HgO, $PbCl_2$, and Na_2CO_3 emit an ionising radiation situated in a region 12—600 Å. thick; its suggested origin is the thin air film in contact with the semi-conductor. N. M. B.

Barrier layer cells. R. H. Varian (Physical Rev., 1934, [ii], 46, 1051—1054).—Frenkel and Joffe's theory of the photovoltaic effect in cells containing a semiconductor (I), a thin barrier to the passage of electrons, and a metal, does not adequately explain the direction of current flow, but can be made adequate if the difference in the rate of loss of velocity of photo-electrons in (I) and in the metal is taken into account. N. M. B.

External photo-electric effect and chemical constitution. A. Pochettino (Nuovo Cim., 1934, 11, 213—223; Chem. Zentr., 1934, ii, 910—911).—Data are recorded for several C_6H_6 derivatives using λ 2536 Å. for irradiation. The presence of a C_6H_6 ring combined with one or more other 6-rings, or containing active groups (*e.g.*, NH_2), is necessary for a high photo-effect (I). Halogens, CO_2H, NO_2, or :C:O produce a low val. For isomerides the substances with the highest dipole moments have the highest (I), except when NO_2 is present. In $C_{10}H_8$ derivatives the val. is higher with α- than with β-substitution. Some dyes were studied and showed a high effect. H. J. E.

Motion of ionic lattices of insulators at extreme field intensities. A. Günther-Schulze and H. Betz (Z. Physik, 1934, 92, 367—374).—Unaged oxide

layers on Al and Ta show three regions of current flow: a pure electron current at low field intensities, and an electron and ion current of the same order at higher intensities; at still higher intensities the ionic current follows a different exponential law. The ionic current is due to interpenetration of metal and O ions. A. B. D. C.

Ionisation of liquid carbon disulphide by *X*-rays. F. L. Mohler and L. S. Taylor (J. Res. Nat. Bur. Stand., 1934, **13**, 659—664).—Data are recorded. The no. of ions produced in the liquid per quantum absorbed is approx. the same as in the vapour, but the current resulting from the ionisation is much reduced by intracolumnar recombination. H. J. E.

Photovoltaic effect. R. T. Dufford (Physical Rev., 1933, [ii], **44**, 315; cf. A., 1933, 915).—The behaviour of photovoltaic cells, especially those containing Grignard reagents, is compared with that of other types of cell. Current theories of electrode potential must be extended in order to explain the results. L. S. T.

Effect of temperature and of visible and [near] infra-red radiation on the electrical resistance of boron. R. Freymann and A. Stieber (Compt. rend., 1934, **199**, 1109—1110).—Weintraub's results for the temp. effect are confirmed (cf. Ind. Eng. Chem., 1913, **5**, 112). The resistance diminishes on irradiation. H. J. E.

Ionic mobilities in dielectric liquids. I. Adamczewski (Bull. Acad. Polonaise, 1934, **A**, 217—230).—A third ion has been detected in ionised C_6H_{14}, and three ionic mobilities each in C_5H_{12}, C_7H_{16}, and C_8H_{18}. The ionic mobilities are related empirically with the viscosity coeff. *X*-Rays furnish a better source of ions than Ra preps. for mobility investigations, owing to the stronger ionising effect and the absence of errors due to mechanical disturbance. J. W. S.

Atomic polarisation of carbon monoxide. L. A. Matheson (Physical Rev., 1933, [ii], **44**, 604).—A discussion. L. S. T.

Dipole moment of heavy water. F. H. Müller (Physikal. Z., 1934, **35**, 1009—1011).—The dipole moment of H_2^2O in C_6H_6 solution determined by a modified Williams method is $1{\cdot}78\pm0{\cdot}02D$, which agrees within experimental error with the val. for H_2O. The theoretical consequences are discussed. A. J. M.

Determination of dipole moment of sucrose. E. Landt (Naturwiss., 1934, **22**, 809).—The dipole moment of sucrose in polar solvents has been determined. In C_5H_5N the val. is 2·8, in NH_2Bu^{α} 3·4, and in $NHEt_2$ 3·4 (all $\times10^{-18}$). Interaction with the solvent is neglected. A. J. M.

Refractive index and molecular refractivity of hydrogen selenide for the D_3 line (5875·6 Å.). O. E. Frivold and O. Hassel (with J. Lohne) (Z. physikal. Chem., 1934, **B**, **27**, 316—318).—$(n_0-1)\times10^6$ measured at 8—27 mm. pressure is 788·0; mol. refractivity is calc. as 11·77. R. C.

Refractivity of cellulose and its derivatives. III. Influence of adsorbed water on refractivity of cellulose fibres. IV. Refractive indices of cellulose nitrate and cellulose acetate. K. Kanamaru (Helv. Chim. Acta, 1934, **17**, 1425—1429, 1429—1440; cf. A., 1934, 1292).—III. During absorption of H_2O by dried ramie fibres the refractive index perpendicular to the fibre axis (n_α) remains approx. const., whereas n_γ (parallel to axis) passes through a min. An explanation is suggested.

IV. The linear relationship between double refraction and N content of cellulose nitrate has been established by direct measurement of n_α and n_γ. The relationship is observed only when the nitration process gives rise to a homogeneous product. When cellulose (I) is acetylated so as to preserve the fibre structure the product is always heterogeneous, and consists of a mixture of the triacetate with unchanged (I). The diminution of n_α and n_γ on esterification of (I) indicates that n is influenced by the polarity of the side-chains. F. L. U.

Corrections to the refractive indices of quartz in the infra-red. D. G. Drummond (Nature, 1934, **134**, 937).—Corr. vals. for n are given for wave-lengths between 3 and 3·8 μ. L. S. T.

Optical anisotropy, form, and inner movements of organic molecules. H. A. Stuart and H. Volkmann (Physikal. Z., 1934, **35**, 988—990).—The optical anisotropy of *n*- and branched-chain hydrocarbons (C_2—C_{12}) in the vapour state, calc. from the Kerr const., indicates that these mols. do not form extended zig-zag chains, and are not spiral. The introduction of polar groups (·O·O, :C:O), however, causes an extension of the chain. A. J. M.

Anisotropy of the optical polarisation field in liquids. M. Ramanadham (Proc. Indian Acad. Sci., 1934, **1**, **A**, 281—287).—The refractivities of a no. of org. vapours, calc. from the vals. of n for the liquid state on the basis of the theory of the anisotropic polarisation field developed by Raman and Krishnan (A., 1928, 113), agree with observed vals. better than those calc. by the Lorentz formula. J. W. S.

Ultra-violet rotatory dispersion of camphor in sulphuric acid solution. J. Lecompte and J. Perrichet (Compt. rend., 1934, **199**, 1202—1205).—Data are recorded for varying concns. for λλ 4047, 3650, 3341, 3130, 3022, and 2967 Å. Measurements in conc. H_2SO_4 indicate that a third form or a compound of camphor exists in the solution. H. J. E.

Magnetic rotation of salts of higher fatty acids and evidence in favour of the formation of ionic micelles. S. S. Bhatnagar and P. L. Kapur (J. Indian Chem. Soc., 1934, **11**, 767—772).—$M[\omega]$ of Na and K oleates in H_2O in the concn. range 3—19% vary in a manner consistent with the formation of ionic micelles. J. G. A. G.

Verdet constant of heavy water. F. G. Slack (Physical Rev., 1934, [ii], **46**, 945—947).—Verdet consts. for H_2O containing 0, 31·1, and 99·7% H^2, measured for λλ 5893 and 5460·7 Å. at 20°, give a val. for the const. 3·93% < that of H_2O for both wave-lengths. Non-linearity of the Verdet const.–concn. relation gives an apparent const. for H^1H^2O

0·85% < that for H_2O. Vals. of the relative mol. rotatory power and magnetic rotatory dispersions are given. N. M. B.

Superposition of electric and magnetic birefringence. M. Scherer and A. Piekara (J. Phys. Radium, 1934, [vii], **5**, 568—570).—Investigations on CS_2, PhMe, 1-$C_{10}H_7Me$, and solutions of $PhNO_2$ in PhMe show that the two effects are without mutual influence, agreeing with Pockels' theory. N. M. B.

Magnetic double refraction of organic liquids. E. Matull (Ann. Physik, 1934, [v], **21**, 345—366).—The Cotton–Mouton consts. (I) of PhMe, C_6H_6, and $CHCl_3$, 7·28, 6·80, and —0·77 (all $\times 10^{-13}$), respectively, differ from those recorded. The principal magnetic polarisabilities (II) were calc. from (I). For CCl_4, the three vals. of (II) are identical, confirming the tetrahedral form of the mol. For $CHCl_3$, the negative sign of (I) indicates that the max. optical polarisabilities and (II) are coincident. The axis of max. (II) lies in the plane of the three Cl atoms, whilst that of least (II) coincides with the direction of the C·H moment. For C_6H_6, (I) is relatively large, indicating considerable magnetic anisotropy. The max. optical polarisability and (II) are perpendicular to each other. A. J. M.

Thermal variation of magnetic birefringence of paramagnetic solutions of rare-earth salts. C. Haenny (Compt. rend., 1934, **199**, 1207—1209).—Vals. are recorded for salts of Ce and Tb. H. J. E.

Allison magneto-optic effect. L. B. Snoddy (Physical Rev., 1933, [ii], **44**, 691).—Modifications in technique are described. L. S. T.

Isotopes of hydrogen by the magneto-optic method. Existence of H^3. W. M. Latimer and H. A. Young (Physical Rev., 1933, [ii], **44**, 690).—A solution of HCl in H_2O gives min. at 15·74 and 15·85 Allison units; the latter, due presumably to H^1, is much stronger. With H_2^2O (2 and 4%) as solvent, these two min. are practically equal in intensity. A third min. at 15·65 corresponds with H^3. Similar results are obtained when HBr replaces HCl. L. S. T.

Isotopes of chlorine. E. R. Bishop and F. Allison (Physical Rev., 1933, [ii], **44**, 419—420).—When HF, H_3PO_4, or KBr is added to a saturated solution of Cl_2 in H_2O, min. corresponding with Cl fluoride, Cl phosphate, and Br chloride, but not Cl bromide, respectively, were obtained by the magneto-optic method. Cl_2–H_2O gives min. corresponding with Cl chloride. The min. observed are due to Cl^{35}, Cl^{37}, and probably Cl^{39}. L. S. T.

Isotopes of calcium by the magneto-optic method. W. M. Latimer and H. A. Young (Physical Rev., 1933, [ii], **44**, 61).—Many of the min. reported by Allison (A., 1930, 1541) have been confirmed. With Ca, a third faint min., probably due to Ca^{41}, is always obtained. L. S. T.

Lead isotopes by the magneto-optic method. J. H. Yoe (Physical Rev., 1933, [ii], **44**, 420).—In agreement with other investigators (A., 1933, 204) 16 min. between 36 and 38 Allison units have been obtained with aq. $PbCl_2$ by the magneto-optic method. L. S. T.

Constitution of hypophosphoric acid. A. Hantzsch (Z. anorg. Chem., 1934, **221**, 63—64).—The reactions of $H_4P_2O_6$ and its Na salt support Nylén and Stelling's formula (A., 1934, 854) $(HO)_4P_2O_2$. It is not a mixed acid anhydride of H_3PO_3 and H_3PO_4. M. S. B.

Magnetic properties of free radicals. Xanthyl-α-naphthylmethyl. (Mme.) S. Allard (Compt. rend., 1934, **199**, 1125—1126).—Measurements of the susceptibility are used to calculate the degree of dissociation in C_6H_6 solution of dixanthyldi-α-naphthylethane. H. J. E.

Dependence of the diamagnetism of water on temperature. A. P. Wills and G. F. Boeker (Physical Rev., 1934, [ii], **46**, 907—909).—Anomalous results previously reported (cf. A., 1933, 212) are partly explained. Variation of susceptibility with temp. is plotted for the range 20—66°, and a parabolic formula is deduced. N. M. B.

Diamagnetic susceptibilities of salts forming ions with inert gas configurations. I. Halides of sodium and potassium. F. E. Hoare (Proc. Roy. Soc., 1934, **A**, **147**, 88—100).—The diamagnetic susceptibilities of the Na and K halides have been measured at 20—22° by Gouy's method, in which the force on the specimen in an unhomogeneous magnetic field is measured with a sensitive balance. L. L. B.

Nickel cyanide and complex derivatives: magneto-chemical studies. L. Cambi, A. Cagnasso, and E. Tremolada (Gazzetta, 1934, **64**, 758—772).—$Ni(CN)_2$ and its complex salts containing H_2O, NH_3, $(CH_2{\cdot}NH_2)_2$, and other org. bases give vals. of χ_{Ni}=11 Weiss magnetons approx., whereas for the halides NiX_2 and their complex salts the vals. =16 approx. It is suggested that the complex cyanides contain the complex cation [Ni,nM], which is paramagnetic with χ_{Ni}=16 (M=a mol. of NH_3 etc.), and the complex diamagnetic anion $Ni(CN)_4$. O. J. W.

Magnetic susceptibility of the ferrous salts of pyridine- and quinoline-2-carboxylic acids. L. Cambi and A. Cagnasso (Gazzetta, 1934, **64**, 772—773; cf. A., 1934, 241).—The data given for the Fe salt of quinolinic acid in the previous paper are wrong. The correct val. of χ_{Fe} for the compound $Fe(C_7H_4O_4N)_2,3H_2O$ is 26·7 Weiss magnetons at 291° abs. O. J. W.

Paramagnetic rotation of tysonite. J. H. Van Vleck and M. H. Hebb (Physical Rev., 1934, [ii], **46**, 929; cf. A., 1934, 944).—A correction. N. M. B.

What is known of ferromagnetism with small changes of field? H. Jordan (Ann. Physik, 1934, [v], **21**, 405—424).—A criticism of the work of Gans and Wittke (A., 1934, 14). A. J. M.

[What is known of ferromagnetism with small changes of field?] R. Gans (Ann. Physik, 1934, [v], **21**, 425).—A reply to Jordan (preceding abstract). A. J. M.

Chemical linking. (A) R. F. HUNTER and R. SAMUEL (Nature, 1934, **134**, 971). (B) ANON. (*ibid.*, 971—972).—Polemical. L. S. T.

Models for the demonstration of the exact space occupied by molecules. H. A. STUART (Physikal. Z., 1934, **35**, 990—991).—Models in which parts of spheres are used instead of complete ones are described. A. J. M.

Constants of the HCl molecule. P. GOMBÁS and T. NEUGEBAUER (Z. Physik, 1934, **92**, 375—384).—Theoretical. The ionic model with Hartree's proper function leads to an interat. separation 3·8% too great, a dipole moment 19% too great, and fundamental frequency 3·9% too small. A. B. D. C.

Interatomic forces and oscillation frequencies of atoms in lattices. S. FRANCHETTI (Atti R. Accad. Lincei, 1934, [vi], **20**, 186—191).—Mathematical. O. J. W.

Rôle of the electron in chemical combination. J. SAVARD (Helv. Chim. Acta, 1934, **17**, 1466—1480).—A lecture in which simple mols. are considered from the point of view of ionisation potential (cf. A., 1934, 11, 347, 577, 584, 943). F. L. U.

Collision phenomena in the recombination of hydrogen atoms to molecules. H. SENFTLEBEN and W. HEIN (Physikal. Z., 1934, **35**, 985—986).—The effect of pressure and addition of inert gases on the recombination of H to H_2 has been investigated. The reaction is one involving triple collisions. The activity of the third participant in the reaction varies with its nature, and it is found that the heavier inert gases (A and Kr) are more effective than the lighter (He and Ne) and H_2 itself. A. J. M.

Electronic configuration of molecules and their electron affinity. N. E. BRADBURY (J. Chem. Physics, 1934, **2**, 840).—The relation between the electronic configuration of a mol. and its ability to form a stable negative ion by electron attachment is discussed. M. S. B.

Fundamental oscillations of molecules of the type X_6 and X_6Y_6. M. VAN DEN BOSSCHE and C. MANNEBACK (Ann. Soc. Sci. Bruxelles, 1934, **54**, B, 230—279).—Mathematical. The general method of symmetrical co-ordinates is used to calculate the frequencies of the fundamental oscillations of mols. of the type X_6 and X_6Y_6 (C_6H_6). The forms of the degenerate motions are also obtained. It is proposed to utilise the results to calculate the fundamental frequencies of C_6H_6. A. J. M.

Reactions of atoms. W. HELLER and M. POLANYI (Compt. rend., 1934, **199**, 1118—1121).—A summary and discussion. H. J. E.

Intramolecular statistics, especially for chain molecules. I. E. GUTH and H. MARK (Monatsh., 1934, **65**, 93—121).—Theoretical. M. S. B.

Potential function for the vibrations of diatomic molecules. M. F. MANNING and N. ROSEN (Physical Rev., 1933, [ii], **44**, 953).—Mathematical. L. S. T.

Dynamical theory of the diamond lattice. I. N. S. N. NATH (Proc. Indian Acad. Sci., 1934, **1**, A, 333—345).—Mathematical. The equations of vibratory motion of the diamond lattice are formulated. A typical factor of the secular equation corresponds with the vibration of the two face-centred cubic lattices composing the diamond lattice relative to one another, this vibration being triply degenerate. This vibration is Raman-active but optically inactive, since all atoms are homonuclear, and accounts for the principal Raman frequency (1332 cm.$^{-1}$) being absent from the infra-red spectrum. J. W. S.

Nuclear forces. W. M. ELSASSER (Compt. rend., 1934, **199**, 1406—1408).—Theoretical. J. W. S.

Effect of dispersion and of lattice distortion on the atomic scattering factor of copper for *X*-rays. G. W. BRINDLEY and F. W. SPIERS (Nature, 1934, **134**, 850).—The at. scattering factor (I) for the (220) spectrum at room temp. of Cu pptd. from $CuSO_4$ by Zn is > that of Cu filings from chill-cast rod or hard-drawn wire. Distortions in a metal thus lower the val. of (I). The lowering of (I) due to dispersion is 3·3. L. S. T.

Angular variation of the refractive index for *X*-rays. J. A. PRINS (Z. Physik, 1934, **92**, 690—691).—Polemical, against Jentzsch (A., 1934, 1295). A. B. D. C.

Measurement of absolute *X*-ray intensities and absolute sensitivity of *X*-ray film with a Geiger-Müller counter. G. L. LOCHER (Physical Rev., 1934, [ii], **46**, 1047—1051).—A special counter containing Kr is described, and a "standard beam" of fluorescent Zr *X*-rays is calibrated. Using this beam, the min. exposure of *X*-ray film for detectable blackening is $0·72\times10^6$ quanta cm.$^{-2}$, incident on the film, or $4·1\times10^4$ quanta cm.$^{-2}$, absorbed in the emulsions. The total absorption coeffs. of the film, celluloid, and emulsion, for Zr *X*-rays, are 8·63, 1·66, and 13·0 cm.$^{-1}$, respectively. N. M. B.

Structure determination by the Fourier method. A. HETTICH (Z. Physik, 1934, **92**, 528—532).—The Fourier method may be applied in general to structural and chemical problems of crystals. A. B. D. C.

Property of structure analysis. N. SELJAKOV (Z. Physik, 1934, **92**, 543—546).—*X*-Ray photographs taken by the rotating-crystal method depend very much on the crystal position for both large and small angles of reflexion. A. B. D. C.

Significance of surface forms for determination of symmetry and habit of crystals. G. KALB (Z. Krist., 1934, **89**, 400—409).—The general geometry of a crystal is not always sufficient to fix its symmetry completely; an additional study of surface forms (including etch markings) is necessary. Detailed examples are given. B. W. R.

New evidence, setting an upper limit of 500 Å. or less, to dimensions of mosaic blocks (if any) in a crystal. H. E. BUCKLEY (Z. Krist., 1934, **89**, 410—415).—Crystal plates (order of 0·3 mm. thick) can be grown or cleaved so perfectly as to give interference bands in monochromatic light between front and back surfaces over considerable areas. This is taken to disprove the existence of mosaic

structures such as have been required by various authors. B. W. R.

X-Ray investigations at high pressures. W. M. Cohn (Physical Rev., 1933, [ii], 44, 326—327).—Changes in the modifications of crystals occurring in a Bridgman bomb at pressures up to 3000 atm. have been investigated by means of X-rays. L. S. T.

Theory of real crystals. A. Smekal (Z. Krist., 1934, 89, 386—399).—A summary of existing theories, with special reference to strength properties of crystals. B. W. R.

Theory of real crystals. A. G. Smekal (Physical Rev., 1933, [ii], 44, 308—309).—Polemical (cf. this vol., 19). L. S. T.

Strength and real structure of crystals. E. Orowan (Z. Krist., 1934, 89, 327—343).—A perfect lattice cannot explain such properties as crystal breaking strength, plastic slip, and electrical strength, nor can any regularly modified lattice (*e.g.*, block or secondary structures). The crack-broadening theory of Griffith with certain modifications is more satisfactory when applied to these properties. B. W. R.

X-Ray reflexion and real structure in rock-salt. M. Renniger (Z. Krist., 1934, 89, 344—374).—With a double-crystal spectrometer the reflexion width and the integrated intensity were determined for various crystals and surfaces of rock-salt. An artificial crystal gave the theoretical width and intensity; *i.e.*, over regions of order 1 mm. the lattice was perfect. This is discussed in relation to the usual theories of secondary structure. B. W. R.

Theory of the plasticity of crystals. G. I. Taylor (Z. Krist., 1934, 89, 375—386).—The observed strength of crystals is highly dependent on the past history, *i.e.*, on previous plastic distortions. A simple picture of plastic distortion is suggested, in which "dislocations" move through the lattice as slipping takes place. The dislocation moves freely only in a perfect lattice, and has a "mean free path"; this leads immediately to (*a*) a parabolic stress–strain relationship agreeing with experiment, and (*b*) a "mean free path" of about 10^{-4} cm., agreeing with the spacing of the dislocations or cracks postulated by Goetz, Zwicky, Smekal, *et al.* B. W. R.

Group phenomena in metal crystals. A. Goetz (Z. Krist., 1934, 89, 310—326).—A survey of the experimental distinction between real and ideal crystals, especially referring to metal crystals. Proper verification of a group or swarm theory is difficult, but an assumption of this kind removes many arbitrary hypotheses which are otherwise required. B. W. R.

Hooke's law and crystal structure. A. E. Caswell (Physical Rev., 1933, [ii], 44, 320).—Theoretical. L. S. T.

X-Ray rotation crystal and fibrous structure diagrams. I. Expressions of the X-ray spot and the crystal plane. II. Expressions of the X-ray spot and the crystal plane in triclinic system. III. Limit of X-ray reflexion. M. Ishihara (J. Soc. Chem. Ind. Japan, 1934, 37, 562—566B, 566—568B, 568—570B).—Mathematical. J. W. S.

Crystallisation of polymorphous substances. I. K. Lark-Horovitz and S. E. Madigan (Physical Rev., 1933, [ii], 44, 320).—The cubic form of ZnS has been evaporated in a vac. at temp. < the transition point $\alpha \rightarrow \beta$-ZnS and deposited on different surfaces at 20°. The deposit is cubic on all surfaces with a cubic lattice (Cu, Al, diamond, etc.), on amorphous surfaces such as glass and fused quartz, and on Zn, mica, and cryst. quartz. A mixture of the hexagonal with excess of the cubic modification is formed on ZnO. On hexagonal CdS (I), the deposit is also wholly hexagonal (wurtzite). When deposited simultaneously on (I) surrounded by Cu, the ZnS is hexagonal on (I) and cubic on the Cu. When evaporated in a vac., wurtzite is deposited on cubic surfaces as Zn blende, but remains hexagonal on hexagonal ZnS. L. S. T.

Transition of antimony into the vitreous amorphous state. G. Tammann and W. Müller (Z. anorg. Chem., 1934, 221, 109—112).—By the addition of Sb_2Se_3 to molten Sb the crystallisation velocity may be reduced, so that, by rapid chilling to —180° of droplets of approx. 0·4 mm. diameter, amorphous particles are formed. By heating for ½ hr. at 520° the particles become cryst. This result is not obtained in the absence of Se. M. S. B.

Nucleus formation on crystals of copper sulphate pentahydrate. N. F. H. Bright and W. E. Garner (J.C.S., 1934, 1872—1877; cf. A., 1934, 720).—The no. of nuclei (I) formed on the (110) face of crystals of $CuSO_4,5H_2O$ when dehydrated in a high vac. was determined. After an induction period (II), (I) increases linearly with time. As a rule a few visible (I) are present during (II). (I) were star-shaped, with two main directions of growth in the (110) face, and a third into the crystal in the form of a thin disc making an angle of 56° with the face. The occurrence of (II) indicates that (I) when small do not grow at a uniform rate. The crit. increment of (II) is 16 kg.-cal. A. J. M.

Cell dimensions of ordinary and "heavy" ice. H. D. Megaw (Nature, 1934, 134, 900—901).—The structure of cryst. H_2^2O is the same as that of ordinary ice, the difference between the cell dimensions being extremely small. There appears to be a small, real difference (< 0·1%) in a at 0°. Ordinary H_2O has its mols. more closely packed than H_2^2O, which has a more ice-like structure. L. S. T.

Diffuse scattering of X-rays from sylvine. G. E. M. Jauncey and W. D. Claus (Physical Rev., 1934, [ii], 46, 941—945).—Improved experimental determinations of S vals. agree with calc. results. N. M. B.

Crystal structure of LaMg and CeMg. A. Rossi (Gazzetta, 1934, 64, 774—778).—LaMg and CeMg have a cubic-centred lattice with a 3·952, 3·884 Å., $d_{obs.}$ 4·36, 4·48, $d_{calc.}$ 4·36, 4·63, respectively. The Hume-Rothery rule is discussed. O. J. W.

Crystal structure of $PrSn_3$ and $PrPb_3$. A. Rossi (Gazzetta, 1934, **64**, 832—834).—$PrSn_3$ and $PrPb_3$ have the same face-centred cubic structure as the corresponding La compounds (A., 1933, 1003) with a 4·704, 4·857 Å., $d_{obs.}$ 7·60, 10·60, $d_{calc.}$ 7·88, 10·98, respectively. O. J. W.

Crystal structure of stannite Cu_2FeSnS_4. L. O. Brockway (Z. Krist., 1934, **89**, 434—441).—The cell is tetragonal, a_0 5·46, c_0 10·725 Å., containing 2 mols. of Cu_2FeSnS_4. Space-group chosen as D_{2d}^{11}; there is, however, a possibility of a structure based on the point-group S_4. At. positions are deduced from intensity considerations. The structure resembles, but is not identical with, that of chalcopyrite. B. W. R.

Crystal lattice of ammonium persulphate, $(NH_4)_2S_2O_8$, and the structure of the persulphate group. R. C. L. Mooney and W. H. Zachariasen (Physical Rev., 1933, [ii], **44**, 327; cf. A., 1934, 1060).—NH_4 and Cs persulphates, monoclinic, have 4 mols. per unit cell; space-group $P2_1/n$ (C_{2h}^5). $(NH_4)_2S_2O_8$ has a 7·80, b 7·98, c 6·12 Å., β 95° 9′. The S_2O_8 group can be regarded as 2 SO_4 joined together by a linking across a centre of symmetry between 2 O atoms. Each S is tetrahedrally surrounded by 4 O at a distance of 1·50 Å. The distance between the 2 O connected by the valency linking is 1·31 Å., and the angle between the two linkings of these O is 128°. NH_4 is surrounded by 12 O at a mean distance of 3·15 Å. L. S. T.

Crystal structure of sodium thioantimonate. Ching-Yeung Hui (Physical Rev., 1933, [ii], **44**, 327).—X-Ray investigations show that $Na_3SbS_4,9H_2O$, cubic, a 11·835 Å., has 4 mols. per unit cell; space-group $P2_13$ (T^4); d 1·927. L. S. T.

Crystal structure of potassium uranyl acetate. I. Fankuchen (Physical Rev., 1933, [ii], **44**, 327).—X-Ray investigations indicate that K uranyl acetate is dimorphous, both forms being hexagonal. One has a 14·38, c 25·80, and the other a 13·99, c 27·70 Å. Both body-centred unit cells have approx. the same val. and contain 16 mols.; space-group, probably $I4_12$ (D_4^{10}). The U atoms are approx. in a face-centred lattice 0·25 the height of the actual unit cell. L. S. T.

Crystal structure of $Hg(NH_3)_2Cl_2$. J. M. Bijvoet and C. H. MacGillavry (Nature, 1934, **134**, 849—850).—The unit cell, 4·06 Å.^{3}, contains only 0·5 mol. Structure is discussed. L. S. T.

Crystal structure of chalcopyrite. S. Kôzu and K. Takané (Proc. Imp. Acad. Tokyo, 1934, **10**, 498—501).—The cell dimensions and axial ratio of crystals from Arakawa, Ugo, Japan, are a_0 5·28, c_0 5·22 Å., c_0/a_0 0·989; space-group V_d^5; 2 mols. $CuFeS_2$ in unit cell. C. W. G.

Structural fine-structure of barium succinate. E. Hertel and G. H. Römer (Z. physikal. Chem., 1934, **B**, **27**, 282—286).—The unit cell has I_a 7·57, I_c 10·28 Å. and contains 4 $BaC_4H_4O_4$ mols.; space-group D_{2h}^{15}. The lattice is a typical ionic lattice. R. C.

Guanidine mono-, di-, and tri-chromates. Crystallographic study. A. Swaryczewski (Bull. Acad. Polonaise, 1934, **A**, 246—255).—Crystallographic data are given. J. W. S.

Crystal lattice of oxalic acid dihydrate and the structure of the oxalate radical. W. H. Zachariasen (Z. Krist., 1934, **89**, 442—447).—This is monoclinic, a_0 6·12, b_0 3·61, c_0 12·03 Å., β 106° 12′, space-group $P2_{1/n}$. The 12 parameters (neglecting the H atoms) are uniquely and accurately determined. The oxalate radical is planar. B. W. R.

X-Ray studies of the molecular arrangement in liquids. S. Katzoff (J. Chem. Physics, 1934, **2**, 841—851).—An improved method for taking X-ray diffraction photographs of weakly absorbing liquids is described. Photographs of H_2O, C_7H_{16}, $C_{10}H_{22}$, C_6H_6, and C_6H_{12} have been made. The results are explained on the assumption that adjacent mols. in a liquid are held together similarly to those of a crystal, but are otherwise of random arrangement. M. S. B.

X-Ray investigation of crystals of *m*-azotoluene. M. Prasad and P. H. Dalal (Current Sci., 1934, **3**, 200—201).—The rotation method gives a 11·88, b 13·75, c 7·52 Å.; space-group Q_h^{11}. L. S. T.

Cholesteryl salicylate. S. B. Hendricks (Z. Krist., 1934, **89**, 427—433).—The prep. of the pure *salicylate* is described; X-ray data give a_0 9·68, b_0 12·52, c_0 6·31, α 92° 56·5′, β 101° 58·5′, γ 95° 14′, for the cell, which is triclinic, space-group $P1$. There are possible alternative units, and it is argued that in general the dimensions of units of structure are not necessarily related to the mol. dimensions. The salicylate forms a liquid crystal phase below its m.p., perhaps due to the presence of orthogonal N and O valencies. B. W. R.

M.p. and long crystal spacings of the higher primary alcohols and *n*-fatty acids. S. H. Piper, A. C. Chibnall, and E. F. Williams (Biochem. J., 1934, **28**, 2175—2188).—The m.p. and long crystal spacings of several pure C_{26} to C_{36} alcohols, acids, acetates, and Et esters and binary and ternary mixtures of known composition are recorded. Methods are indicated for using the data in determining the composition of mixed alcohols and acids present in waxes. C. G. A.

Crystals of hydrochlorides, hydrobromides, and hydriodides of methylephedrine. Crystallographic relations between *dl*-compounds and their components. B. Gossner and H. Neff (Z. Krist., 1934, **89**, 417—426).—Crystallographic descriptions, d, cleavage, consts. of unit cell (X-ray), and space-group are given for the hydrochloride and hydrobromide of *l*- and *dl*-methylephedrine, and the *dl*-hydriodide. Two modifications of the *dl*-hydrobromide are described. The constitution of these racemates is discussed from the viewpoint of a "double salt" of the *d*- and *l*-compounds. B. W. R.

X-Ray observations on lower and higher polypeptides. K. H. Meyer and Y. Go (Helv. Chim. Acta, 1934, **17**, 1488—1492).—Powder diagrams of *n*-glycylglycine (n = 3—7), compared with those of a polyglycylglycine of mol. wt. about 2000, show that as n increases the arrangement of atoms in the former

approximates to that in the latter. The atoms are mostly arranged in lattice planes at a distance of 4·15 Å. F. L. U.

Structure of rubber as shown by the time lag of fibering. W. E. Singer, J. D. Long, and W. P. Davey (Physical Rev., 1933, [ii], **44**, 319).—*X*-Ray investigation shows that there is a time lag between the time rubber is stretched and the time a fibre structure is produced. The view that rubber consists of a tangle of spiral or zigzag-shaped mols. with firmly fixed ends, the lengths of which can be temporarily untangled by application of an external force, explains the properties of the time lag. L. S. T.

Directional effects in electron diffraction from single crystals. G. A. Morton (Physical Rev., 1933, [ii], **44**, 952).—Electron diffraction photographs from the cleavage surfaces of NaCl and NaF show that the resolution of the diffracted spots varies with the azimuth of the crystal. L. S. T.

Interpretation of electron-diffraction photographs of gas molecules, with results for benzene and carbon tetrachloride. L. Pauling and L. O. Brockway (J. Chem. Physics, 1934, **2**, 867—881).—The accuracy of the visual method of interpreting electron-diffraction photographs has been tested in 4 different ways. When carefully applied it can give vals. of interat. distances accurate to about 1%. The regular plane hexagon model for the C_6H_6 mol. has been verified. The C–C separation in C_6H_6 is 1·390 ± 0·005 Å. and the C–Cl separation in CCl_4 is 1·760 ± 0·005 Å. M. S. B.

Bloch theory applied to the study of alloys and of the properties of bismuth. H. Jones (Proc. Roy. Soc., 1934, **A**, **147**, 396—417).—The Bloch theory is applied to binary alloys which form ε- and η-phases both having a close-packed hexagonal structure, and to alloys of Bi with small concns. of other metals in solid solution. A Brillouin zone is found for Bi containing 5 electrons per atom. The conductivity of Bi–Sn and Bi–Pb alloys, and the diamagnetic properties of the solid solutions of Sn, Pb, Te, Se, in Bi are considered. L. L. B.

Ferromagnetic transformation and catalytic activity. J. A. Hedvall, R. Hedin, and O. Persson (Z. physikal. Chem., 1934, **B**, **27**, 196—208).—A more detailed account of work already reported (A., 1934, 608). There is no evidence of a change in the macro-structure of Ni at the Curie point (cf. A., 1933, 574). There is an increase in the rate of oxidation of Ni at this point. R. C.

Thermal expansion and the ferromagnetic change in volume of nickel. C. Williams (Physical Rev., 1934, [ii], **46**, 1011—1014).—The coeff. of expansion of single and polycryst. specimens of Ni of known (varying) purity was measured at 2·5° intervals in the range 200—500°. The ferromagnetic change in vol. per unit vol. of pure Ni is 3·24 ± 0·15 × 10^{-4}. N. M. B.

Gyromagnetic effect for a ferromagnetic substance above its Curie point. W. Sucksmith (Nature, 1934, **134**, 936)).—The mass susceptibilities of three Ni–Cu alloys (Ni approx. 56%) with Curie points at −14°, −9°, and −2° range from 98 to 180(× 10^{-6}). g is approx. 2, indicating that the paramagnetism of the Ni is due to spin alone, as in the ferromagnetic state. L. S. T.

Magnetostriction of pure and alloyed Bi single crystals. A. Wolf and A. Goetz (Physical Rev., 1934, [ii], **46**, 1095—1107).—The existence of a magnetostrictive effect for steady moderate fields is shown. Using 99·97% Bi single crystals the modulus of magnetostriction is $+5{\cdot}7 \times 10^{-16}$ parallel to the trigonal axis, and $-7{\cdot}0 \times 10^{-16}$ normal to the trigonal axis. Bi crystals with Pb, Sn, and Te in concn. within the solubility range were studied. Sn and Pb first diminish the contraction normal to the trigonal axis, and with increasing concn. cause an elongation, Sn being four times as effective as Pb. Parallel to the axis small concns. of Sn decrease, and larger concns. increase, the elongation; the effect of Pb is small. Te causes a much larger sp. effect, but no change in sign. The change of the stress coeff. of the susceptibility with the concn. of foreign atoms is discussed. Results support the assumption of the existence of two types of insertion of foreign atoms in the crystal lattice: selective adsorption for small concns. and vol. absorption for larger concns. N. M. B.

Electrical properties of materials at high radio frequencies. J. S. McPetrie (Nature, 1934, **134**, 897—898). L. S. T.

Mechanism of electrical conductivity. R. W. Pohl (Z. Metallk., 1934, **26**, 217—219).—A brief account of recent work of the author and his collaborators with especial reference to electronic condition in salt crystals. A. R. P.

Direct determination of the free paths of electrons in metals. A. Eucken and F. Förster (Z. Metallk., 1934, **26**, 232—235).—An apparatus is described for determining the diameter (d) of very thin metal wires by measuring the torsional vibration in vac. If the sp. electric resistance of the wire (ρ_d) is then determined, the free path (l) of the electrons is given by $\rho_d = \rho_\infty(1 + 8l/3\pi d)$. For Bi at 0° l is 11 μ, showing that the no. of free electrons at this temp. is only 1 for every 10^6 Bi atoms, *i.e.*, that the classical theory and not the Sommerfeld–Fermi theory (I) applies to Bi. For Ag at 0° l is $57{\cdot}7 \times 10^{-7}$ cm. (± 1·5%), a val. which is in accordance with (I) and shows that every Ag atom provides a free electron. At very low temp. the equation does not apply, the const. $8/3\pi$ being replaced by another factor varying with the temp. A. R. P.

Interaction of electrons in metals. E. Wigner (Physical Rev., 1934, [ii], **46**, 1002—1011; cf. A., 1934, 1283).—Mathematical. N. M. B.

Reflexion of light from silver mirrors on transition from the amorphous to the crystalline state at low temperatures. R. Suhrmann and G. Barth (Physikal. Z., 1934, **35**, 971—973).—The electrical resistance and reflexion of thin layers of Ag formed by vac. condensation at 20° abs. were determined up to 390° abs. The variation of resistance is parallel to that of reflecting power (I). As the resistance decreases (I) increases first in the long-

wave region, and later in the visible and ultra-violet. In the transition from the amorphous to the metallic state, first the weakly bound, and then the more strongly bound, electrons play the part of metal electrons. A. J. M.

Susceptibility measurements of aluminium mixed crystals. H. Auer (Z. Physik, 1934, 92, 283—290).—The susceptibility of Al with small quantities of Mn, In, Ge, Ga, Cu, Ag, Zn, Li, and Mg does not follow the additivity law; deviations are towards diamagnetism, and are dependent on the solvent metal. Extent of impurity may be determined spectroscopically, so that these measurements can be used to elucidate metallic constitution. A. B. D. C.

Reflecting power of aluminium and its alloys in different regions. D. H. Clewell and J. Wulff (Physical Rev., 1933, [ii], 44, 952).—The reflecting powers of Al, Be, Mg, Si, and Ag alloys have been measured throughout the region 2000—7000 Å. and compared with those of films of the same metals. L. S. T.

Absorption and reflexion of gold between 380 and 1400 Å. I. Liben and H. M. O'Bryan (Physical Rev., 1933, [ii], 44, 952).—Reflexion from Au mirrors at various angles of incidence, and transmission of thin Au films, have been determined in a vac. spectrograph. Sputtered Au mirrors give more reproducible reflexion than evaporated surfaces. L. S. T.

Use of model substances for the investigation of metal mechanics. A. Smekal (Z. Metallk., 1934, 26, 220—224).—An account is given of the results obtained in studying the elastic properties and recrystallisation of NaCl and of their application to the problems of the mechanism of metal deformation and recrystallisation. A. R. P.

Elastic moduli of rock-salt. L. Balamuth (Physical Rev., 1934, [ii], 46, 933; cf. A., 1934, 836).—A correction. N. M. B.

Elastic moduli for different textures of regular metals. D. A. G. Bruggeman (Z. Physik, 1934, 92, 561—588).—Elastic moduli for polycryst. solids may be calc. from vals. for the single crystal. A. B. D. C.

***X*-Ray analysis of the deformation textures of metallic materials.** F. Wever (Kolloid-Z., 1934, 69, 363—368).—A review of published work on the *X*-ray structure of cold-worked metals. E. S. H.

Allotropy and crystallisation of vitreous substances. P. Mondain-Monval (Ann. Chim., 1935, [xi], 3, 5—72).—An abrupt change in the thermal expansion and sp. heat of vitreous Se and S takes place at the softening temp. θ ($\theta_{Se} = 32°$; $\theta_S = -29°$). θ has been determined by following the rate of change of penetrability of the substance by a metal point with change of temp. Below θ the rate of penetration, and therefore the fluidity, is practically zero. θ has also been determined for a no. of other vitreous substances (sucrose, glycerol, B_2O_3, a black wax, colophony, and glass). It is found that the transformation of the metastable cryst. varieties of S and Se into the respective stable forms takes place above θ, but not below. M. S. B.

Thermo-electric force of thin films. E. A. Johnson and L. Harris (Physical Rev., 1933, [ii], 44, 944—945).—The e.m.f. of thin sputtered thermocouples of Sb and Bi varies with the thickness of Bi (Sb 3×10^{-5} cm.) up to 10^{-4} cm. Varying the thickness of Sb (5×10^{-6} cm. to 10^{-4} cm.) has no effect with 2×10^{-4} cm. of Bi. Thicknesses $>10^{-4}$ cm. give a thermal e.m.f. corresponding with that of massive Bi–Sb. Different cryst. orientation in thin layers of Bi may be the cause of this effect. L. S. T.

Thermal conductivities of bismuth single crystals as influenced by a magnetic field. M. T. Rodine (Physical Rev., 1934, [ii], 46, 910—916).—Thermal and electrical conductivities of two specimens of Bi single crystals were determined as a function of temp., in the range —170° to —50°, and orientation of magnetic field relative to the crystallographic axes. N. M. B.

Electrical resistance of gold, copper, and lead at low temperatures. W. J. de Haas, J. de Boer, and G. J. van den Berg (Physica, 1934, 1, 1115—1124).—Measurements are recorded between 1° and 20° abs. The val. for Au has a min. at 3·70° abs. The transition temp. of Pb is 7·20° abs. H. J. E.

Superconductivity of thin films. E. F. Burton, J. O. Wilhelm, and A. D. Misener (Trans. Roy. Soc. Canada, 1934, [iii], 28, III, 65—79).—The temp. of transition (I) to the superconducting state of thin films of Sn varies with the thickness, there being a limiting thickness (about 2×10^{-5} cm.) for which (I) is < 2° abs. The anomalous behaviour of such thin films is not due to irregularities of structure. The pronounced sensitivity to current strength varies with the thickness. A superconducting film $< 40 \times 10^{-5}$ cm. thick is no longer superconductive (above 2° abs.) when it is covered with non-superconducting metal. Since alloy formation could not have occurred under the conditions of the experiment, it appears that a free surface is necessary for the occurrence of superconductivity, although a layer of definite thickness is also required. H. F. G.

Superconductivity. A. Papapetrou (Z. Physik, 1934, 92, 513—522).—Theoretical. A. B. D. C.

Recent work on superconductivity. W. Meissner (Physikal. Z., 1934, 35, 931—938).—A review of recent work on the occurrence of superconductivity in metals, thin metallic layers, and alloys, and the magnetic behaviour of superconductors, with a discussion by various investigators. A. J. M.

Thermodynamics of the superconducting state. C. J. Gorter and H. Casimir (Physikal. Z., 1934, 35, 963—966).—The assumption that the superconducting phase is a two-phase system is extended. A. J. M.

Electronic theory of superconduction. R. Schachenmeier (Physikal. Z., 1934, 35, 966—969).—In a superconductor, the two outer electrons are supposed to have different functions. One is attached to the core, the other is a conductivity

electron (I), this being responsible for the superconductivity. The wave-function corresponding with (I) is unchanged by the application of a weak magnetic field. A. J. M.

Excitation of nuclear vibrations of oxygen by molecular collision (according to determinations of absorption of sound). H. O. Kneser (Physikal. Z., 1934, **35**, 983—984).—The connexion between excitation of nuclear vibrations and absorption of sound waves (I) is discussed. The dependence of (I) in O_2 on the frequency of the waves and on the purity of the gas has been determined. With very pure O_2 there is no (I), but when foreign gases are present (H_2O, EtOH, NH_3, C_6H_6, C_2H_2, H_2S, H_2, He) (I) increases to a max. and then decreases to zero as the concn. of impurity (II) is increased. Extrapolation of the (I)–(II) curve to zero concn. indicates that the cessation period of the vibrational heat in pure O_2 is $< 0{\cdot}001$ sec. The probability of collision between two O_2 mols. is very small, but is greater between O_2 and foreign mols. A. J. M.

Collision excitation of intramolecular vibrations in gases and gas mixtures studied by sound dispersion measurements. I. Experimental method and results of precise measurements of velocity of sound in ultrasonic region. II. Dispersion of sound at various temperatures in chlorine and carbon dioxide, pure and with admixed foreign gases. A. Eucken and R. Becker (Z. physikal. Chem., 1934, **B**, **27**, 219—234, 235—262; cf. A., 1933, 554).—I. An apparatus for the precise determination of the wave-length of ultrasonic waves and depending on the principle of the acoustic interferometer is described. This may be used even with corrosive gases over a wide temp. range. The derivation of the vals. of c_p/c_v reduced to zero pressure for the components of a gas mixture from the velocity of sound is described, the error being 0·4—1%.

II. The velocity of sound of frequencies 58, 145, and 292 kilohertz has been measured in Cl_2 and CO_2, pure and with admixed foreign gases, at −33° to 145°. The results show that the no. of collisions necessary to withdraw one energy quantum from a vibrating mol., Z, is very high for pure Cl_2 and CO_2 at room temp., but may be reduced considerably by the presence of reactive foreign mols. It is deduced theoretically that $Z \propto 1/T^{n'}$, where n' depends on the index of repulsion of the mols. and a quantity expressing the increase, on mutual approach of the mol. centres, of the probability of loss of a vibrational quantum. The experimental data confirm this conclusion. In general, light mols. are more effective than heavier mols. in inducing excitation by collision. R. C.

Velocity of sound in neon gas. W. H. Keesom and J. A. van Lammeren (Proc. K. Akad. Wetensch. Amsterdam, 1934, **37**, 614—615, and Physica, 1934, **1**, 1161—1170).—The velocity of sound in Ne has been measured by a resonance method between 0° and the temp. of liquid Ne (−247°). A new vapour cryostat has been designed for the lower temp. Down to liquid O_2 temp. C_p/C_v calc. for $p=0$ is 1·667 to ± 0·2%. The dependence of sound on pressure has been investigated at 27·80° and 26·25° abs. C_p and C_v at these temp. and at pressures 0—1 atm. have been calc. M. S. B.

High-frequency sound waves in Kundt's tube. O. Brandt and H. Freund (Z. Physik, 1934, **92**, 385—389). A. B. D. C.

Difference between the specific heats of solid and liquid tin in the neighbourhood of the m.p. L. D'Or and C. Degard (Bull. Soc. chim. Belg., 1934, **43**, 510—512).—By application of Fischer's equation (cf. A., 1927, 615) to Sn–Bi solid solutions it is calc. that C_p (solid)$-C_p$ (liquid)$=+0{\cdot}44\pm0{\cdot}06$ g.-cal. per g.-atom for Sn. E. S. H.

Properties of condensed heavy hydrogen. K. Clusius and E. Bartholomé (Physikal. Z., 1934, **35**, 969—971).—The following data have been obtained for H_2^1 and H_2^2 (first val. in each case refers to H_2^1): m.p. 13·95°, 18·59° abs., heat of fusion 28·0, 47·0 g.-cal., pressure at triple point 58·3, 127 mm., mol. vol. at triple point 26·13, 23·15 c.c., characteristic temp. θ for C_p (solid) 91°, 89°. The differences in these vals. are explained by the difference in zero-point energy of the two gases, and the anharmonicity of the lattice vibrations. A. J. M.

Phase equilibria of the third kind. E. Justi and M. von Laue (Physikal. Z., 1934, **35**, 945—953).—Phase equilibria of the third kind, as shown by O_2 at the transition point (44° abs.), are considered. Transformations of the NH_4Cl type (NH_4 salts, HI, HBr, PH_3), where the sp. heat–temp. curve shows a sharp max., are considered. A. J. M.

Transformations of state of a higher kind. A. Eucken (Physikal. Z., 1934, **35**, 954—959).—The continuation of the v.-p. curve above the crit. point is discussed as an example of a transformation of the third kind. Phase transformations (I) of the NH_4Cl type are considered as masked (I) of the first kind. They are due either to changes in the mol. arrangement in the crystal, or to the appearance or disappearance of rotation in the mols. Since in these cases the rotational state changes over a very small temp. range, the rotational hindrance exerted by the mols. on each other is the smaller the more mols. there are rotating. The variation of sp. heat with temp. of mixed crystals of CH_4 and A has been investigated. It was found that the max. was displaced to lower temp. and its width was considerably increased, showing decreased hindrance. A. J. M.

F.p. of gallium. W. F. Roeser and J. I. Hoffman (J. Res. Nat. Bur. Stand., 1934, **13**, 673—676).—The f.p. was 29·780±0·005°. Ga does not dissolve its oxide appreciably. H. J. E.

Experimental determination of the heat capacity of explosive gases. A correction. B. Lewis and G. von Elbe (J. Chem. Physics, 1934, **2**, 890).—The heat capacity of O_3 cannot be calc. by the method previously given (A., 1934, 846). M. S. B.

Determination of the specific heat of gases at high temperatures by the sound velocity method. I. Carbon monoxide. G. G. Sherratt and E. Griffiths (Proc. Roy. Soc., 1934, **A**,

147, 292—308).—Working with > one frequency and correcting the data for the effect of frequency on the velocity of sound in the gas, the sp. heat of CO determined up to 1800° is in good agreement with that deduced from spectroscopic data. The discrepancy, even at fairly high temp., between sp. heats determined by sound velocity methods and those deduced from spectroscopic data is attributed to the use of a single frequency. L. L. B.

Heat capacity of gadolinium sulphate octahydrate below 1° abs. W. F. Giauque and D. F. MacDougall (Physical Rev., 1933, [ii], 44, 235—236).—The heat capacity has been determined by means of a series of adiabatic demagnetisations at 1·7° to 0·287° abs. in fields up to 8000 gauss. The results are compared with a theoretical curve obtained by considering the interaction of two $Gd^{...}$ ions treated as simple magnets. L. S. T.

Real gases according to the thermodynamic equation of state. III. Specific heats c_v and c_p, and the compressional and expansion coefficients, β and α, of helium. V. Jacyna (Z. Physik, 1934, 92, 661—674).—Theoretical (cf. A., 1934, 1070). A. B. D. C.

Thermal behaviour of metals at very low temperatures. W. H. Keesom (Physikal. Z., 1934, 35, 939—944).—The vals. of $\theta=7{\cdot}745TC^{-\frac{1}{3}}$ (C=at. heat), which should be const. if the Debye T^3 law is accurate, show an increase and then a sudden fall as the temp. is decreased below 4° abs., in the case of Ag, Zn, Sn, Pb, and Bi. The effect is not due to the desorption of He used in the cooling from the surface of the metal. The corresponding increase in sp. heat at very low temp. is due to free electrons. The sudden change of sp. heat of a metal on transition from the superconducting to the ordinary state was investigated for Sn and Tl, and the results are compared with thermodynamic theory. A. J. M.

Discontinuities in the energy and the specific heat. A. Bijl (Physica, 1934, 1, 1125—1142).—A general theoretical discussion of association, illustrated by reference to gaseous condensation and the transition of $NaNO_3$ at 275°. H. J. E.

Rate of vaporisation of molybdenum in a vacuum. L. Norris and A. G. Worthing (Physical Rev., 1933, [ii], 44, 323).—The changes in wt. of various long filaments of Mo heated in a vac. to various incandescence temp. give an empirical equation of the form $\log m=A+BT^{-1}+CT^{-2}$ for the rate of evaporation (m). Contrary to the case of W, operation at const. current results in a const. temp. L. S. T.

Effect of a magnetic field on the passage of heat through gases. H. Senftleben and J. Pietzner (Physikal. Z., 1934, 35, 986—988).—The variation of the effect of a magnetic field on the thermal conductivity of a gas with the nature of the gas is investigated. This effect increases until the lines of force are perpendicular to, and then decreases as they become parallel to, the direction of heat flow. A. J. M.

Melting parameters of nitrogen and argon under pressure, and the nature of the melting curve. P. W. Bridgman (Physical Rev., 1934, [ii], 46, 930—933).—The pressure–temp. co-ordinates of the melting curve and change of vol. were measured up to 5500 kg. per sq. cm., and latent heats of fusion are calc. There is no evidence of a crit. point between liquid and cryst. phases, or of a max. or of an asymptotic temp. N. M. B.

Isotopic ratio in hydrogen. Precise density comparisons on water from various sources. II. H. J. Emeléus, F. W. James, A. King, T. G. Pearson, R. H. Purcell, and H. V. A. Briscoe (J.C.S., 1934, 1948—1950; cf. A., 1934, 1062).—A no. of samples of H_2O have been found, by the flotation method, to be heavier than normal H_2O. The vals. of $\Delta\gamma d$ (p.p.m.) for the different samples are: Polar H_2O, +1·36 and +4·2, the more northerly being the heavier; deep-seated H_2O from the Asmari limestone of the Persian oilfields, +1·9; H_2O obtained by burning permanent gas driven off from charcoal absorbers used for extracting C_6H_6 from coal-gas, +4·6; ox-blood, +2·10, +2·52, +2·31; ox-bile, +1·47; H_2O from combustion of Trinidad cane-sugar, +7·56. The distribution of heavy H of beet-sugar and mixed molasses after fermentation was also investigated. A. J. M.

Density of liquid iodine. T. Nayder (Bull. Acad. Polonaise, 1934, A, 231—238).—Liquid I has d^{120} 3·94916 (buoyancy method), and its temp. coeff. −0·003267 per 1°. J. W. S.

Thermal expansion of bismuth single crystals near the m.p. J. W. Buchta and A. Goetz (Physical Rev., 1934, [ii], 46, 1092—1095; cf. A., 1932, 796).—Highly purified Bi single crystals showed no decrease in the coeff. of expansion as the m.p. was approached. Traces of impurities (Pb, Ag, Cd, Sn) caused a decrease to negative vals. in a range of 10° or 20° below the m.p. Discrepancies between previous data are discussed in the light of these results. N. M. B.

Interpretation of the pressure–volume–temperature relations of single and composite gases. G. A. Linhart (J. Physical Chem., 1934, 38, 1091—1097).—A formula previously deduced for the p–v–T relations of several gases over a large range of temp. and pressure (A., 1933, 668) has been applied to mixtures of these gases and over a much larger pressure range. M. S. B.

Pressure–volume–temperature relations for six [mineral] oils. R. B. Dow (J. Washington Acad. Sci., 1934, 516—526).—Relative vols. at 25°, 40°, and 75°, and pressures nearly up to apparent solidifying pressures, have been determined for 6 light oils of different composition. Compressibility, thermal expansion, and various thermodynamic functions have been deduced. Similar vals. are, in general, found for all the oils. Thermal expansion varies most with temp. and pressure, and in a manner contrary to that for pure liquids at low pressures. M. S. B.

Molecular size of crystalline carbon tetrachloride and tetrabromide, and of ethylene dichloride and dibromide. E. O. K. Verstraete (Bull. Soc. chim. Belg., 1934, 43, 513—544).—The v.p. of CBr_4

at low temp. and the f.p. of solutions of CBr_4 and CCl_4 in $CHCl_3$ and C_2HCl_5 have been determined. The m.p. of the stable forms of CBr_4 and CCl_4 have been obtained by extrapolation and the heats of transformation calc. The *d* of the modifications of CBr_4, CCl_4, $C_2H_4Br_2$, and $C_2H_4Cl_2$ have been determined. The results indicate that the two forms of CCl_4 and CBr_4 are bimol. and the two modifications of $C_2H_4Br_2$ unimol. E. S. H.

Vapour pressure of hydrocarbons. SCHMITT (Compt. rend., 1934, **199**, 1299—1301).—Vals. for *n*-C_6H_{14}, methyl*cyclo*pentane, C_6H_6, and PhMe are represented by formulæ. H. J. E.

Dependence of vapour pressure on temperature above the critical point. J. E. VERSCHAFFELT (Physikal. Z., 1934, **35**, 1013—1014).—The continuation of the v.-p. curve above the crit. point observed by Trautz and Ader (A., 1934, 723) is derived analytically. A. J. M.

Statistical mechanics applied to the calculation of the entropy of rigid gas molecules. (MLLE.) G. SCHOULS (Bull. Acad. roy. Belg., 1934, [v], 20, 1014—1022).—Mathematical. N. M. B.

Two-dimensional equation of state and structure of surface layers. II. Surface layer of pure liquids. B. TAMAMUSHI (Bull. Chem. Soc. Japan, 1934, **9**, 475—493; cf. A., 1934, 1304).—An equation of state for the surface layer of pure liquids is developed in which the surface tension (σ) is represented as the sum of the static cohesion, thermal energy, and intermol. forces. Eötvös' formula is derived, and the const. shown to depend on temp. and on the nature of the substance, increasing with increase in cohesional forces. The abnormal behaviour of anisotropic liquids is explained, and vals. of the dipole moment of *p*-azoxy-anisole and -phenetole agreeing with those experimentally determined are calc. by assuming that at the transition temp. σ=cohesional forces. F. L. U.

Equation of state. I. R. BECKER (Z. Physik, 1934, **92**, 680—682, 689). G. SCHWEIKERT (*ibid.*, 683—688, 689).—Polemical. A. B. D. C.

General form of the equation of state for a monatomic ideal gas. G. POLVANI (Physical Rev., 1933, [ii], **44**, 123).—A claim for priority (cf. A., 1933, 551). L. S. T.

Fusion. K. F. HERZFELD and (MISS) M. G. MAYER (Physical Rev., 1934, [ii], **46**, 995—1001; cf. A., 1934, 241).—Mathematical. As a type of the simplest crystal, the equation of state of frozen A is developed. The pressure as a function of the vol. at a given temp. has a min., indicating the breakdown of the crystal. The temp. for this min. at zero pressure is interpreted as the m.p. The case of He and substances of high m.p. is considered. N. M. B.

Compressibility of helium gas between 2·6° and 4·2° abs. W. H. KEESOM and H. H. KRAAK (Proc. K. Akad. Wetensch. Amsterdam, 1934, **37**, 746—747).—Isotherms of He have been determined at 4·224°, 3·095°, and 2·581° abs., and virial coeffs. calc. R. S. B.

Viscosity and conductivity of molten glasses. K. LARK-HOROVITZ and C. L. BABCOCK (Physical Rev., 1933, [ii], **44**, 321).—The conductivity and η of molten glasses as a function of temp. have been determined at 50° intervals up to 1400°. There is no sudden break in the curves. Resistivity and η can, in most cases, be represented by $\eta=A\rho^B$ for temp. from the softening point to 1400°. *A* and *B* change from glass to glass. L. S. T.

Transport phenomena in Einstein–Bose and Fermi–Dirac gases. II. E. A. UEHLING (Physical Rev., 1934, [ii], **46**, 917—929; cf. A., 1933, 551).—Mathematical. Equations for the heat conductivity and viscosity coeffs. of gases as a function of temp. and density are obtained for the case of mols. acting as rigid elastic spheres, and are evaluated for H and He. N. M. B.

Evaporation of binary liquid mixtures. A. PAKSCHVER and G. LURIE (Chem. Fabr., 1934, 7, 448—452).—The velocity of evaporation of a binary mixture of const. composition is expressed in terms of its surface area, the v.p. of the components, and the atm. pressure. The speed of evaporation in an air stream of velocity *v* follows the empirical law $V=V_0(1+k\sqrt{v})$, where *k* is a coeff. dependent on temp. and on the composition of the mixture. The theory has been verified for EtOH–Et_2O mixtures. J. W. S.

Volatility at 20° of heptane–alcohol–benzene mixtures. R. SALMONI (Annali Chim. Appl., 1934, 24, 539—549).—The two binary EtOH systems show marked max. volatility (I) in the EtOH-poor region, owing to dissociation of the associated EtOH mols. on dilution with the inert component. The triangular diagram for the ternary mixtures shows that the (I) of binary mixtures containing 20% of EtOH is further increased by addition of 20% of C_6H_6. At 20° the (I) of all the mixtures is sufficient to give an inflammable air–vapour mixture and, with mixtures rich in C_6H_6 or C_7H_{16}, much > sufficient. The ternary mixtures are of val. especially for starting up a motor engine at about 0°. T. H. P.

Azeotropism in relation to polymerisation and solvation, and negative azeotropism from the functional viewpoint. M. LECAT (Ann. Soc. Sci. Bruxelles, 1934, **54**, B, 283—290).—The connexion between positive (max. in v.p.–composition curve) (I) and negative (min. in curve) (II) azeotropism and the mol. condition of the components is discussed. Polymerisation may give rise to either (I) or (II), and not exclusively (I). The effect depends on the degree of polymerisation. Solvation is not strictly necessary for (II), but is favourable to it. All negative binary azeotropic mixtures (about 200 are known) contain either an acid, an organic halogen derivative with > 1 halogen atom, or a phenol. These are discussed in detail. A. J. M.

Frequency of azeotropism without the Bancroft point, and limited azeotropism. M. LECAT (Ann. Soc. Sci. Bruxelles, 1934, 54, B, 212—215).—Theoretical. A. J. M.

Temperature-viscosity measurements in the systems CaO–SiO_2 and CaO–SiO_2–CaF_2. C. H.

HERTY, jun., F. A. HARTGEN, G. L. FREAR, and M. B. ROYER (Bur. Mines, Rept. Invest., No. 3232, 1934, 31 pp.).—The concentric-cylinder method for high-temp. η determinations has been applied to the mixtures $CaO–SiO_2$ (36—57% CaO, 1464—1688°) and $CaO–SiO_2–CaF_2$ (12·64—61% CaO, 10·6—52·5% SiO_2, and 0·39—76·7% CaF_2, 1010—1740°). There is a ridge of max. η sloping from the 50 : 50 $CaO–SiO_2$ binary towards the CaF_2 apex. The decrease in η with fluorspar content is continuous over the range studied, but is greatest near the $CaO–SiO_2$ binary line. CH. ABS. (e)

Active oxides. LXXXII. Changes in the magnetic properties of mixtures of CdO/Fe_2O_3, CuO/Fe_2O_3, and PbO/Fe_2O_3 during chemical combination. H. KITTEL (Z. anorg. Chem., 1934, 221, 49—55).—On heating, the magnetic susceptibilities remain fairly const. until combination of the oxides begins to take place, generally above 500°, when paramagnetism increases. At still higher temp. ferromagnetism appears, indicating the presence of a ferrite. M. S. B.

Mobility of gold in solid lead. W. SEITH and H. ETZOLD (Z. Elektrochem., 1934, 40, 829—832; cf. A., 1933, 1110).—The diffusion coeff. of Au in solid Pb, measured between 113° and 300°, $\propto e^{-14,000/RT}$, and is not affected by pressures up to 1000 atm. When a current is passed through a rod of homogeneous Pb–Au alloy at 150—180°, Au accumulates at the positive end. The transport no. of Au in solid Pb at this temp. is about 10^{-10}. F. L. U.

Compression of metals in the formation of intermetallic compounds. W. BILTZ (Z. Metallk., 1934, 26, 230—232).—Differences between the mol. vol. of intermetallic compounds and the sum of the at. vols. of their components show that readily compressible metals undergo a considerable contraction on combination; the contraction is slight when the metals are much less compressible. A. R. P.

Character of metallic solid solutions and compounds. U. DEHLINGER (Z. Metallk., 1934, 26, 227—230).—Recent work on the nature of intermetallic compounds is critically reviewed with especial reference to the influence of valency and affinity. A. R. P.

***X*-Ray analysis of iron–aluminium alloys. II.** A. OSAWA (Kinz. no Kenk., 1933, 10, 432—445; cf. A., 1934, 137).—From *X*-ray analysis the phases existing at room temp. are α-Fe, $FeAl_2$ (rhombohedral; a 6·314 Å., α 87° 24′ 28″; 18 atoms per unit cell), Fe_2Al_5 (monoclinic; a 9·910, b 10·811, c 8·824 Å., β 124° 59′ 53″; 56 atoms per unit cell) and $FeAl_3$ (rhombic; a 15·804, b 11·870, c 8·088 Å.; 104 atoms per unit cell). $(FeAl)_n$ (parameter 5·980 Å.; 16 atoms per unit cell) was obtained by quenching from > 1080° in H_2O. The parameter of the α-solid solution increases from 2·854 Å. for Fe to 2·891 Å. with 46·7 at.-% Al. No deformation structures such as Fe_3Al or FeAl are present in the α-solid solution. CH. ABS. (e)

Equilibrium diagram of aluminium–magnesium system. M. KAWAKAMI (Kinz. no Kenk., 1933, 10, 532—554).—Al and Mg are mutually sol., forming α- and ε-phases. The β, γ, and δ intermetallic phases consist mainly of Al_8Mg_5, AlMg, and Al_3Mg_4, respectively. CH. ABS. (e)

Equilibrium relations in aluminium–nickel alloys of high purity. W. L. FINK and L. A. WILLEY (Amer. Inst. Min. Met. Eng., Inst. Met. Div., Tech. Publ. 569, 1934, 11 pp.).—Alloys with 0—18% Ni have been examined. $NiAl_3$ and solid solution form a eutectic mixture (639·9°, 5·7% Ni). The solid solubility of Ni in Al decreases from 0·05% at the eutectic temp. to 0·005% at 500°. Al–Ni alloys exhibit age-hardening. CH. ABS. (e)

Effect of quenching strains on lattice parameter and hardness values of high purity aluminium–copper alloys. A. PHILLIPS and R. M. BRICK (Amer. Inst. Min. Met. Eng., Inst. Met. Div., Tech. Publ. 563, 1934, 19 pp.).—Quenched Al–Cu alloys of high purity may have abnormally large lattice parameters which increase with rapidity of cooling, specimen diameter (up to 0·5 in.), and with Cu content of the solid solution. Alloys with 5·4% Cu in solution when rapidly quenched have a max. age-hardening capacity at room temp. The greater is the degree of strain the sooner does pptn. occur at 275—325°. CH. ABS. (e)

High zinc region of the copper–zinc phase-equilibrium diagram. E. A. ANDERSON, M. L. FULLER, R. L. WILCOX, and J. L. RODDA (Amer. Inst. Min. Met. Eng., Inst. Met. Div., Tech. Publ. 571, 1934, 29 pp.).—Data obtained by *X*-ray, electrical conductivity, and microscopical methods are recorded, confirming earlier results. CH. ABS. (e)

Equilibrium in the lead–zinc system with special reference to liquid solubility. R. K. WARING, E. A. ANDERSON, R. D. SPRINGER, and R. L. WILCOX (Amer. Inst. Min. Met. Eng., Inst. Met. Div., Tech. Publ. 570, 1934, 10 pp.).—The solubility is > and the temp. of complete miscibility < previously reported. The monotectic temp. is 417·8° (0·7% Pb). CH. ABS. (e)

Magnetic, electric, and spectroscopic investigation of gold–silver alloys. H. AUER, E. RIEDL, and H. J. SEEMANN (Z. Physik, 1934, 92, 291—302).—Magnetic susceptibility and electrical resistance show no change after heating in vac. or in N_2, or after remelting in vac. (cf. Shimizu, A., 1933, 455). A. B. D. C.

Ternary system copper–silver–cadmium. L. LOSANA and C. GORIA (L'Ind. Chimica, 1934, 9, 1603—1615).—M.-p. data and photomicrographic observations are recorded and a few *X*-ray photographs are appended. No ternary compounds are formed. The structure of the alloys is influenced considerably by the rate of cooling. The composition of several alloys which are particularly resistant to oxidation is given. D. R. D.

Ternary aluminium–silver–magnesium alloys. B. OTANI (Kinz. no Kenk., 1933, 10, 262—276).—The equilibrium diagram for mixtures of Al with AgMg is recorded. The ternary compound AlAgMg is formed at 570°. Its solubility in Al is 14% at 538° and 0·4% at 300°. The combined effects of

AgMg and Cu, Si, Mn, and Ni on Al have been examined. The alloy with AgMg 6 and Cu 4% has excellent mechanical properties after suitable heat-treatment. Ch. Abs. (e)

New magnetic alloy with a very large coercive force. V. Drožžina and R. Janus (Nature, 1935, 135, 36—37).—Nd containing approx. 7% Fe is strongly ferromagnetic. The large coercive force, which is > that of Fe or its alloys, indicates that a new alloy is present. L. S. T.

Critical solution temperatures of some hydrocarbons in sulphur dioxide. R. T Leslie (J. Res. Nat. Bur. Standards, 1934, 13, 589—597).—From miscibility temp. curves for various hydrocarbons the following crit. solution temp. in SO_2 have been determined: *n*-C_5H_{12} 2°, β-methylpentane 10°, *n*-C_6H_{14} 12°, methyl*cyclo*pentane 8°, *cyclo*hexane 12°, β-methylhexane 18°, *n*-C_7H_{16} 19°, methyl*cyclo*hexane 15°, β-methylheptane (I) 24°, ethyl*cyclo*hexane 25°, *n*-C_8H_{18} 25·5°, nonanaphthene (II) 27°, hexahydromesitylene (III) 30·5°, *n*-C_9H_{20} 32°, *n*-$C_{10}H_{22}$ 36·5°, *n*-$C_{11}H_{24}$ 42°, and *n*-$C_{12}H_{26}$ 47°. Vals. for NH_2Ph are (I) 75°, (II) 57°, and (III) 56·9°. SO_2 and NH_3 are considered unsuitable for separating const.-boiling mixtures of hydrocarbons, but NH_2Ph is more promising. A. R. P.

Distribution equilibrium between alcohol, benzine, and water. F. Spausta (Mitt. tech. Versuchsamtes, 1933, 22, 9—17; Chem. Zentr., 1934, ii, 1559). H. J. E.

Passage of helium through apparently compact solids. (Lord) Rayleigh (Nature, 1935, 135, 30).—He passes through gelatin, celluloid, and Cellophane at room temp., probably by penetration between the constituent crystals. It does not pass through single crystals of quartz; beryl, which has a more open crystal structure, appears to be permeable. L. S. T.

Solubility of lead sulphate in water and aqueous solutions of sulphuric acid. H. D. Crockford and D. J. Brawley (J. Amer. Chem. Soc., 1934, 56, 2600—2601).—Data are recorded for 0°, 25°, 35°, and 50°. The solubility falls rapidly with the addition of minute quantities of H_2SO_4, but increases again at about 70% H_2SO_4. The solid phase in equilibrium throughout is $PbSO_4$. E. S. H.

Saturated solutions of carbamide in liquid ammonia. Vapour pressures and compositions from −26·4° to 101·0°. W. Scholl and R O. E. Davis (Ind. Eng. Chem., 1934, 26, 1299—1301).—The compositions and v.p. of saturated solutions of $CO(NH_2)_2$ in NH_3, determined by use of an isoteniscope, agree well with the data of Jänecke. A break occurs in the temp.–composition curve at 45·6° and 74·6% $CO(NH_2)_2$, corresponding with the transition from $CO(NH_2)_2,NH_3$ to $CO(NH_2)_2$; a similar break occurs in the temp.–pressure curve. A. G.

Ammoniates of calcium and barium nitrates. II. M. A. Portnov and B. B. Vassiliev (Z. anorg. Chem., 1934, 221, 149—153; cf. A., 1934, 1185).—The solubility of $Ca(NO_3)_2$ in liquid NH_3 has been determined between −70° and 70°, and of $Ba(NO_3)_2$ between −27° and 51°. With both substances unstable (probably tetra-)ammoniates are formed. F. L. U.

Solubilities and activity coefficients of the three nitroanilines in aqueous solutions of typical salts at 85°. J. N Pearce and L. J. Garwood (Proc. Iowa Acad. Sci., 1932, 39, 161).—Solubilities have been determined at 25° in H_2O, and in aq. NaCl, $BaCl_2$, K_2SO_4, and $MgSO_4$. Activity coeffs. are calc. These increase for the four salts in the above order and also increase with salt concn. Ch. Abs. (e)

Velocity of crystallisation of sucrose. K. Smolenski and A. Zelazny (Bull. Acad. Polonaise, 1934, A, 172—189).—The formation of secondary germ crystals after inoculation is attributed to the presence of crystal dust. Crystallisation of supersaturated solutions of sucrose (I) induced by the addition of (I) crystals of known size and no. has been followed refractometrically. For pure unstirred solutions at 25°, $dx/dt=KF(n_0-x)^2/n_0$, where n_0 is the initial crystallisable (I), F is the surface, and x the amount of (I) crystallised, per 100 g. of H_2O, after t min. dx/dt is diminished by impurities. R. S.

Distribution of trichloroacetic acid between two contiguous liquid phases. N. A. de Kolosovski and F. S. Kulikov (J. Gen. Chem. Russ., 1934, 4, 915—926).—The partition coeff., y, of $CCl_3{\cdot}CO_2H$ for the systems H_2O–PhMe, –cumene, –$CHCl_3$, –CCl_4, –EtBr, –$PhNO_2$, –*n*- and *sec*.-$C_5H_{11}{\cdot}OH$, and –$CH_2Ph{\cdot}OH$, at 25° is given by $y=k_1c-k_2$, where k_1 and k_2 are consts., and c is the total concn. of $CCl_3{\cdot}CO_2H$. R. T.

Rôle of intergranular fissures in the occlusion and evolution of hydrogen by palladium. D. P. Smith and G. J. Derge (J. Amer. Chem. Soc., 1934, 56, 2513—2525).—The absorption and desorption of H_2 have been studied, particularly with respect to time of decay, annealing temp., rate of cooling, grain size, effect of air, and deformation. Variations in the metal other than those caused by mechanical deformation affect absorption and desorption in the same sense. Mechanical deformation may affect absorption and desorption in the same or opposite senses, according to its severity. The rate of absorption at atm. temp. and pressure is independent of time for both worked and unworked metal. Diffusion appears to occur primarily along slip-plane fissures and secondarily through the unstrained lattice. E. S. H.

Sorption of sulphur dioxide by active charcoal. II. Effect of heating on the sorptive power of coconut charcoal. III. Sorption equilibrium at high temperatures. IV. Hysteresis. K. Arii (Bull. Inst. Phys. Chem. Res. Tokyo, 1934, 13, 1428—1434, 1435—1438, 1439—1445; cf. A., 1934, 1066).—II. The absorptive power of coconut charcoal (I) activated at 690° increases with time of activation. At 800°, max. activity is reached in 2 hr. and is unchanged on further heating. (I) activated at 990° for 30 min. has very high adsorption, but the activity decreases on further heating. *X*-Ray

analysis and the change in magnetic susceptibility show that the loss of activity is due to graphitisation.

III. The adsorption isotherm of SO_2 at low pressures is expressed by $a=10{\cdot}47p^{0{\cdot}135}$ and $2{\cdot}67p^{0{\cdot}917}$ at 90° and 100°, respectively.

IV. A hysteresis effect is observed at 20—30° with (I) activated at 800° for 1 hr. This is attributed to difficulty in escape of SO_2 from the interior of (I). J. W. S.

Chemisorption on charcoal. V. Influence of ultraporosity on adsorption. A. KING (J.C.S., 1934, 1975—1980; cf. A., 1934, 1067).—It is suggested that activation of charcoal by O_2 or CO_2 increases the pore diameter in agreement with the result that the max. size of mol. adsorbed increases with the degree of activation. The density also increases with the time of oxidation. Traube's rule is obeyed if the pores are sufficiently enlarged by oxidation or evacuation. The theory of sp. adsorption by charcoals is discussed. R. S.

Vapour pressure isotherms of water on active charcoal applied to its behaviour towards carbonyl chloride. H. ENGELHARD and W. STILLER (Z. Elektrochem., 1934, 40, 833—836).—Specimens of active C containing equal quantities of adsorbed H_2O, prepared (I) by dehydrating wet material and (II) by allowing previously dried material to absorb H_2O, are not equally effective in removing $COCl_2$ vapour from air; (II) becomes ineffective sooner than (I). The difference in the resistance times (*i.e.*, duration of capacity to remove $COCl_2$ beyond the limit of detection under standard conditions) corresponds with the difference between the v.p. shown by the adsorption and desorption isotherms of the C–H_2O system. This behaviour is considered to be due to liquid H_2O partly blocking the pores in (II) and thus hindering entry of the vapour. F. L. U.

Equation for the kinetics of activated adsorption. S. ROGINSKY (Nature, 1934, 134, 935).—The equation $q=\alpha^{-1}\log(t+t_0)+C$, where q is the amount of gas adsorbed during time t, and α and C are consts. for a given system, reproduces the data of various investigators for the sorption of gases on metals or metallic oxides. It does not agree with Taylor's theory of activated adsorption. L. S. T.

Sorptional and catalytic properties of active manganese dioxide, with reference to vapours and gases. I. E. V. ALEXEEVSKI and Z. E. GOLBRAICH (J. Gen. Chem. Russ., 1934, 4, 936—947).—The adsorptive power of active MnO_2, prepared from $KMnO_4$ and $MnSO_4$, increases with the mol. wt. of the members of a homologous series of adsorbates. For CCl_4 and PhCl, breaks in the adsorption isotherms indicate capillary condensation. NH_2Ph is converted into NPh:NPh (48% yield at room temp.) by MnO_2, which is reduced to Mn_3O_4, whilst PhCN is hydrolysed to NH_2Bz. C_6H_{14} and C_5H_{12} at 40° react violently with MnO_2, with production of CO, CO_2, H_2O, and of small quantities of unsaturated hydrocarbons; under analogous conditions, MeOH yields CO, CO_2, H_2O, and traces of CH_2O, whilst PhMe affords PhCHO. NH_3 is adsorbed without oxidation at 0°, whilst at >50° the reaction $4NH_3+9MnO_2\longrightarrow 2N_2+3Mn_3O_4+6H_2O$ takes place. R. T.

Effect of air on the condensation of water vapour. E. F. M. VAN DER HELD (Physica, 1934, 1, 1153—1160).—Theoretical. The retarding effect of air on condensation is attributed to the resistance offered to diffusion by an air-rich boundary layer. H. J. E.

Adsorption of phenol and resorcinol from aqueous solution by carbon. A BOUTARIC and (MLLE.) P. BERTHIER (Bull. Soc. chim., 1934, [v], 1, 1549—1560).—The adsorption by animal, activated, vegetable, and gas C has been investigated interferometrically. There is no evidence of discontinuities in the adsorption isotherms, which in all cases conform to the Freundlich equation and not to that of Perrin. In general, added solutes which are only weakly adsorbed by C do not affect the adsorption of PhOH (I) and resorcinol (II), but >0·53 g. per litre of K phosphate (III) diminishes the adsorption, although (III) is adsorbed to only a small extent. The diminished adsorption of (I) and (II) in the presence of >0·25 g. of BzOH (IV) and >0·5 g. of succinic acid (V) per litre is probably related to the marked adsorption of (IV) and (V). J. G. A. G.

Interchange of adsorbed ions. E. J. W. VERWEY (Chem. Weekblad, 1934, 31, 789—795).—A review of recent work on the interchange of ions between a solution and an adsorbed layer. D. R. D.

Adsorption and catalysis. I. Carbon disulphide–water reaction. L. A. MUNRO and J. W. MCCUBBIN (Trans. Roy. Soc. Canada, 1934, [iii], 28, III, 29—33).—The quantity of CS_2 adsorbed from saturated air at 25° by Al_2O_3 gels of different H_2O contents, and the quantity of H_2S produced, have been determined. The adsorption rises to a pronounced max. (at about 8%) with decrease of the H_2O content, but the catalytic activity is a max. at 9—16% H_2O and shows no direct relation to the adsorptive power. H. F. G.

Surface and interfacial tension of mercury by the sessile drop and drop-weight methods. H. BROWN (J. Amer. Chem. Soc., 1934, 56, 2564—2568).—A modification of the sessile drop apparatus is described, and the results obtained thereby are compared with those of the drop-wt. method. The interfacial tension of Hg against H_2O is 374·3 dynes per cm. at 25°; the surface tension of Hg in dry air or in vac. is 473 (±0·3%) dynes per cm. at 25°. Irreversible adsorption effects and the difference between results obtained by static and dynamic methods are explained on the basis that surface oxidation of Hg in air occurs only in the presence of H_2O vapour. E. S. H.

Validity of Antonow's rule for the solid–liquid interface, and the measurement of the surface tension of solids. R. LOMAN and N. P. ZWIKKER (Physica, 1934, 1, 1181—1201).—Antonow's rule has been verified by measurements of angles of contact for H_2O and Hg drops on 56 stones, minerals, etc. The relation is applied to calculate the surface tension of specimens of Fe, steel, and granite. The pre-treatment of the solid surface is discussed. H. J. E.

Influence of atmospheric carbon dioxide on the surface tension of aqueous solutions of sodium salts of fatty acids. A. Lottermoser and B. Baumgürtel (Kolloid-Beih., 1934, **41**, 73—94).—In solutions of Na salts of the lower fatty acids, CO_2 reduces the surface tension (I) slightly, the effect increasing with increasing concn. of the solution, whilst with the soaps CO_2 reduces (I) markedly, the effect decreasing with increasing concn. of the soap. In all cases after a time (I) begins to rise again. The influence of temp. and concn. has been studied quantitatively. O_2 reduces the (I) of Na oleate solutions only slightly, whilst CO_2 reduces (I) markedly. The influence of temp. and concn. on the (I) of Na oleate in absence of O_2 and CO_2 has been determined. CO_2 coagulates Na abietate and causes a slight rise of (I). E. S. H.

Interface equilibria and inner equilibria in heterogeneous systems. III. Significance of molecular structure of salt-like compounds for charging adsorption on their surfaces. L. Imre (Z. physikal. Chem., 1934, **171**, 239—256; cf. A., 1933, 671).—Measurements of the adsorption of $Pb^{\cdot\cdot}$ on $BaSO_4$ and sparingly sol. Pb salts at low concns. of adsorbate have shown that the elementary vol., v, occupied by each adsorbed ion on the various adsorbents falls in the order $BaSO_4>PbSO_4>PbCl_2>PbI_2>PbBr_2$. The abs. vals. of v deduced by means of Boltzmann's distribution law, however, are $\gg$ the normal at. dimensions. The explanation is that in applying the Langmuir–Hückel isotherm to such systems the vol. term involved is not the vol. of the solution, but the much smaller phase vol. of the dissolved mols. Theoretical considerations show that the more polar is the lattice the larger is v, and this is confirmed experimentally. R. C.

Structure investigations of interfaces by means of *X*-rays and electrons. E. Rupp (Kolloid-Z., 1934, **69**, 369—378).—Published work is reviewed. E. S. H.

Energetics of surface phenomena. W. Kossel (Ann. Physik, 1934, [v], **21**, 457—480).—The mechanism of the growth of crystals according to the Gibbs theory and the mol. theory is discussed. A. J. M.

Laminar systems. I. Uni- and multi-molecular sulphide and hydroxide layers at phase boundaries. S. G. Mokruschin (Kolloid-Z., 1934, **70**, 48—55).—Published work is reviewed, and preliminary observations of the characteristics of sulphide and hydroxide films formed on metals are recorded. E. S. H.

Orientation of oxide films on metals. R. F. Mehl, E. L. McCandless, and F. N. Rhines (Nature, 1934, **134**, 1009).—Thin films of FeO and Cu_2O grown on Fe and Cu, respectively, have an at. arrangement definitely related to the lattice structure of the metal on which they are formed. L. S. T.

Structure of surface films. XXI. Surface potentials of dibasic esters, alcohols, aldoximes, and ketones. N. K. Adam, J. F. Danielli, and J. B. Harding (Proc. Roy. Soc., 1935, **A**, **147**, 491—499).—A const. val. of μ is obtained for mols. with $^2CO_2Et$ groups at opposite ends of a long chain, so long as the mols. are flat and the films gaseous. The val. is much lower for these groups when the mols. are standing on end (in the condensed state). For alcohols, Me ketones, and aldoximes, μ changes but slightly on transition from the expanded to the condensed state. It thus appears that there is no necessary reorientation of the end groups as the mols. come closer together. L. L. B.

Electron microscope and its application, especially to the study of thin films on metals. E. Brüche (Kolloid-Z., 1934, **69**, 389—394).—Apparatus and technique are described and the application of the method to the study of metallic surfaces is illustrated. E. S. H.

Spreading of complex proteins. E. Gorter, H. van Ormondt, and T. M. Meijer (Biochem. J., 1935, **29**, 38—47).—The influence of the introduction of a prosthetic group into a protein mol. on its spreading (I) is studied. Combination of tartrazine (II) with ovalbumin (III) does not influence the (I) at the isoelectric point (IV), whilst the min. at p_H 2·7—3·0 disappears. Combination of spermidine (V) with pepsin (VI) decreases (I) on the acid side of (IV) and increases it on the alkaline side. Nucleic acid is without influence on the (I) of (III). Acetylation of (VI) modifies the min. on the acid side of (IV). Additions of (II) and (V) produce similar effects with (III) and (VI), respectively. These effects are similar to those produced by adding negative and positive bivalent ions, respectively. H. D.

Influence of time on the spreading of proteins. E. Gorter and G. T. Philippi (Proc. K. Akad. Wetensch. Amsterdam, 1934, **37**, 788—793).—The velocity of spreading of ovalbumin on acetate buffer has been determined by following the boundary of the film by means of a Po electrode. The time for the boundary to reach its final val. is a min. at p_H 1·0, p_H 13·0, and at the isoelectric point, and reaches high vals. on both sides of this point. This explains the W-shaped curve obtained when area, reduced to zero pressure, is plotted against p_H and the measurements are made at a const. time after the formation of the film. R. S. B.

Spreading of myosin. E. Gorter and H. van Ormondt (Biochem. J., 1935, **29**, 48—52).—Myosin is made to spread on H_2O by previous treatment with trypsin (I); the area–time curve is dependent on (I) concn. and the time of treatment with (I). H. D.

Effect of carbonic acid on the spreading of ovalbumin on the surface of water and variations in the thickness of these films in unimolecular layers. H. Devaux (Compt. rend., 1934, **199**, 1352—1354).—The variations observed in the spreading of ovalbumin on pure H_2O are due to variation in p_H, the observer's breath yielding sufficient CO_2 to cause inaccuracies. Unimol. films can be obtained which vary from 0·9 to 8 mμ in thickness, according to the p_H. If these variations are due to orientation, the albumin mol. must be long and narrow. J. W. S.

Flow potentials of barium sulphate. H. R. Kruyt and R. Ruyssen (Proc. K. Akad. Wetensch. Amsterdam, 1934, **37**, 624—632).—Measurements

were made on natural barytes and on 4 differently prepared samples of pptd. $BaSO_4$. All the samples had exactly the same cryst. structure, but the degree of development of the active surface differed and influenced the electrokinetic potential (ζ). Natural barytes retained a negative charge in presence of aq. $BaCl_2$ and the ζ-concn. curve is similar to that of paraffin. Pptd. $BaSO_4$, of dimensions 10 μ approx., has a negative charge in contact with pure H_2O, but is charged positively by $BaCl_2$ and negatively by sol. sulphates. Chlorides of Sr, Ca, Mg, Zn, and Cd impart a positive charge, whilst NaCl and KCl increase the negative charge. M. S. B.

Theory of cataphoresis and electro-osmosis. J. J. Bikerman (Z. physikal. Chem., 1934, **171**, 209—220).—The rate of formation of the double layer has been derived from considerations based on the theory of the diffuse double layer. The relation between cataphoretic and electro-osmotic velocity, the ζ-potential vals. deduced from electro-osmotic measurements with membranes having very fine pores, and the effect of proximity to the wall on surface conductivity and the methods of measuring it are examined. R. C.

Does electrokinetic potential measured by the electro-osmotic method with ceramic diaphragms vary with the current strength ? J. Velišek and A. Vašiček (Z. physikal. Chem., 1934, **171**, 281—285).—Measurements with aq. KCl solutions have shown that the amount of solution transported in 1 sec. $\propto$ the current strength, I, so that, contrary to Schönfeldt's findings (A., 1933, 776), the ζ potential calc. in the usual way is independent of I. R. C.

Spherites. A. Wieler (Kolloid-Z., 1935, **70**, 79—94).—The production of spherites and pptn. membranes by the interaction of solutions is described, and their relation to org. forms is discussed. E. S. H.

Theory of apparent molecular volume. III. Apparent molecular volume of sucrose. O. Redlich and H. Klinger (Monatsh., 1934, **65**, 137—140).—In agreement with theoretical considerations, the apparent mol. vol. of sucrose in dil. solution varies linearly with the sucrose concn. (c) and not with $\sqrt{c}$ as is the case with strong electrolytes. Deviations from the linear relation are found when c is large. M. S. B.

Cryoscopy and association in *p*-chlorotoluene. R. P. Bell, E. C. Baughan, and M. W. Vaughan-Jackson (J.C.S., 1934, 1969—1972).—The cryoscopic const. of *p*-C_6H_4MeCl (I) is 5·53° per kg. $CH_2Cl{\cdot}CO_2H$, $CHCl_2{\cdot}CO_2H$, and $CCl_3{\cdot}CO_2H$ are bimol. and the mol. refractivities are const. in (I) over the range 0·05—0·35 mol. per kg. R. S.

Diffusion of copper sulphate. L. W. Öholm (Finska Kem. Medd., 1934, **43**, 121—135; cf. A., 1934, 1170).—The diffusion coeffs. for Cu, Zn, Cd, and Mg sulphates have approx. the same val. R. S.

***X*-Ray diffraction in ionic solutions.** J. A. Prins (Physica, 1934, **1**, 1171—1173).—The diffraction pattern of saturated aq. $Th(NO_3)_4$ and $UO_2(NO_3)_2$ shows a ring, which shifts to smaller angles and decreases in intensity with dilution. It indicates a more or less regular arrangement of the ions in the liquid. This effect is not observed with aq. $AgNO_3$, $Pb(NO_3)_2$, or $Ba(NO_3)_2$. Aq. LiI, LiBr, RbBr, and other alkali halides give a broad ring, unaffected by dilution, and this is attributed to interference between the scattering from a heavy ion and that from adjacent H_2O mols. H. J. E.

Refractometric investigation of the formation of compounds in aqueous solution, hitherto designated as double salts. G. Spacu and E. Popper (Bul. Soc. Stiinte Cluj, 1934, **7**, 400—520; Chem. Zentr., 1934, ii, 704).—Data are recorded for aq. solutions of 16 pairs of salts (*e.g.*, $HgCl_2$+NaCl, $HgCl_2$+$K_2Cr_2O_7$, $CdCl_2$+KCl, $NaNO_3$+KNO_3) in varying proportions. H. J. E.

Observation of the Brownian movement with the unaided eye. E. Lau and J. Johanneson (Physikal. Z., 1934, **35**, 1013).—A similar observation to that of Andreev (A., 1934, 361) has been made. If a point source is viewed through a thin layer of milk between two glass plates, a variation in the light scattered by the milk is observed. If, however, the cell is placed horizontally, the variations cease, showing that they are not due to the Brownian movement, but to alteration in the position of the scattering centres caused by currents. It is suggested that Andreev's observation is similarly explained. A. J. M.

Linear problems of the theory of Brownian movement. III. G. A. Krutkov (Compt. rend. Acad. Sci. U.R.S.S., 1934, **4**, 120—124).—Theoretical. E. S. H.

Ultracentrifugal measurements with synthetic highly polymerised substances. R. Signer (Kolloid-Z., 1935, **70**, 24—26).—Observations on the influence of concn. and mol. wt. on sedimentation of polystyrenes are reported. The variation of mol. wt. in the fractions of a specimen of polystyrene having a mean mol. wt. 80,000 has been determined. E. S. H.

***X*-Ray and electron analysis of disperse systems, fibres, films, and interfaces.** Wo. Ostwald (Kolloid-Z., 1934, **69**, 264—266).—A lecture. E. S. H.

***X*-Ray analysis of difform and disperse systems (with special reference to electron interference).** E. Schiebold (Kolloid-Z., 1934, **69**, 266—301).—A lecture. E. S. H.

Determination of particle size by *X*-ray and electron analysis. R. Brill (Kolloid-Z., 1934, **69**, 301—312).—A lecture. E. S. H.

***X*-Ray and electron analysis of inorganic gels, especially hydroxides and oxides.** R. Fricke (Kolloid-Z., 1934, **69**, 312—324).—A summary of published work. E. S. H.

***X*-Ray analysis of organic gels.** F. Halle (Kolloid-Z., 1934, **69**, 324—340).—A lecture. E. S. H.

***X*-Ray analysis of protein fibres.** W. T. Astbury (Kolloid-Z., 1934, **69**, 340—351).—Published work is reviewed. E. S. H.

X-Ray analysis of lamellar disperse systems. U. HOFMANN (Kolloid-Z., 1934, **69**, 351—357).—A review of published work, especially on graphite and certain minerals. E. S. H.

Highly polymerised compounds. CI. Connexions between solvation, solubility, and viscosity of polystyrenes. H. STAUDINGER and W. HEUER [with E. HUSEMANN] (Z. physikal. Chem., 1934, **171**, 129—180).—The solubility, S, of two polystyrenes in various solvents has been examined by determining how much MeOH or $COMe_2$ must be added to the solutions just to cause pptn. Good solvents for polystyrenes (I) solvate all the groups of the mol., whilst poor solvents solvate principally the aromatic groups. S for polymeric-homologous (I) falls with rising mol. wt., M, very rapidly with the hemicolloids and slowly with the meso- and eu-colloids. The sp. viscosity, η_{sp}, of a solution in a good solvent is > that of an equally conc. solution in a poor solvent. A mixture of a good solvent and a precipitant behaves like a poor solvent. For a given solute in various solvents, the vals. of η_{sp}/c, where c is the basic molarity, for a given temp., T, approach as T rises. The vals. for the M of a given solute deduced from η_{sp} for solutions in C_6H_6 and COMeEt by $\eta_{sp}/c = K_mM$ agree for hemi- and meso-colloids, but not for eucolloids. For gel solutions and conc. sol solutions $\log(\eta_{sp}/c) = K_{St}.c + [\log(\eta_{sp}/c)]_{c\to 0}$, where for a given (I) K_{St} has a const. val. independent of solvent and temp. This leads to a new equation for the M of (I): $M = (K_{St} - 0{\cdot}17)/1{\cdot}5 \times 10^{-5}$. Conc. solutions of homopolar org. substances with thread mols. are associated sol solutions if M is ≯ 1000 and gel solutions if M is larger. R. C.

Viscosity properties of synthetic highly polymerised substances. I. SAKURADA (J. Soc. Chem. Ind. Japan, 1934, **37**, 473—474B).—The character of viscous solutions of complex synthetic (polystyrene and polymerised ω-hydroxydecoic acid) (I) and natural (cellulose nitrate, starch, and rubber) (II) substances is compared by means of the consts. a and ϕ in the equation for η. Since a increases with an increase of η for (I) and is independent of η for (II), it is inferred that solutions of (I) and (II) differ fundamentally in respect of the shape of the particles. A. J. H.

Specific volume and the form and electric charge factors of colloidal particles of cellulose nitrate and acetate. I. SAKURADA (J. Soc. Chem. Ind. Japan, 1934, **37**, 468—470B).—For cellulose nitrate solutions of decreasing viscosity the form and electric charge factor α vary irregularly, but the sp. vol. ϕ decreases regularly; both α and ϕ increase with increasing viscosity for cellulose acetate solutions. Cellulose nitrate and acetate particles are concluded to be spherical and chain-like, respectively. A. J. H.

Influence of temperature on the viscosity of a very syrupy and concentrated solution of a lyophilic colloid [cellulose nitrate]. F. HIRATA and T. DAIMON (J. Soc. Chem. Ind. Japan, 1934, **37**, 459—462B).—Variations in η of a 22·88% solution of cellulose nitrate (11·4% N) in $COMe_2$ as determined by measurement of the rates of fall of carborundum particles between 8° and 40° are expressed by $\eta = 12{,}740e^{-0{\cdot}04649t}$ (cf. Busse and Karrer, A., 1934, 28). A. J. H.

Particle form in colloidal rubber solutions. I. SAKURADA and K. TANAKA (J. Soc. Chem. Ind. Japan, 1934, **37**, 470—473B).—Measurement of the variation of the sp. viscosity with the concn. of rubber in 8 different solvents shows that the colloidal particles are nearly spherical; particles of masticated rubber are uniform in shape, but not spherical or chain-like. A. J. H.

Colloid chemical researches on soaps. W. PROSCH (Kolloid-Z., 1935, **70**, 106—108).—A discussion. E. S. H.

Colloid chemistry of metal soaps. II. Structure viscosity in benzene solution. WO. OSTWALD and R. RIEDEL (Kolloid-Z., 1935, **70**, 67—74; cf. A., 1934, 1305).—The viscosity and structure viscosity of Al soaps in C_6H_6 at 25° have been determined. With the middle members (laurate and myristate) the increase of viscosity with concn. is very marked, and the abs. viscosity shows a pronounced max. in very dil. solutions (0·00667M) and at high concns.; these members form gels at concns. at which the other members are fluid. These anomalies are discussed in relation to dielectric properties. E. S. H.

Hydration of the crystalline fibres of soap curd. J. W. MCBAIN, H. I. BULL, and L. S. STADDON (J. Physical Chem., 1934, **38**, 1075—1084).—The dew-point method of measuring v.p. has been employed to determine the hydration of curd fibres of NaP (P=palmitate) and NaL (L=laurate) at 20°. In presence of saturated aq. $Na_2C_2O_4$, NaP fibres have the composition $NaP,2{\cdot}6H_2O$ and NaL fibres probably $NaL,1{\cdot}2H_2O$. Dehydration curves in absence of a salt indicate the existence of $NaP,8—10H_2O$, $NaP,30H_2O$, and possibly $NaP,2{\cdot}6H_2O$, but part of the apparent H_2O of hydration may be adsorbed H_2O. Curd fibres obtained from liquid-cryst. anisotropic soap solution have the composition $NaP,4{\cdot}4—4{\cdot}9H_2O$. M. S. B.

Lyophilic colloids, their theory and application. M. H. FISCHER and M. O. HOOKER (Kolloid-Beih., 1934, **40**, 241—412).—A comprehensive discussion, with special reference to the aq. systems containing soaps, gelatin, casein, and SiO_2, particularly from the point of view of gelation and solvation. E. S. H.

Specific heats and densities of hydrophobic sols. M. ANNETTS and H. SIMS (Canad. J. Res., 1934, **11**, 665—666).—Sp. heats of Au and Cu hydrosols containing 40 mg. per 100 c.c. differ from that of H_2O by ≯ 1 part in 400 at 25—30°. Vals of d agree, within 4 parts in 100,000, with those calc. from the wt. of the residue on evaporation. F. L. U.

Dielectric measurements with eucolloids. WO. OSTWALD and R. RIEDEL (Kolloid-Z., 1935, **70**, 75—79).—The dielectric and optical polarisations of ethyl- and benzyl-cellulose and caoutchouc in C_6H_6 have been determined. The calc. dipole moments for the cellulose derivatives are $10—40 \times 10^{-18}$ and for caoutchouc $10—50 \times 10^{-18}$, according to the assumed mol. wt. E. S. H.

Precipitation of ferric oxide hydrosol in solutions of moranyl. H. Goldie (Compt. rend. Soc. Biol., 1934, **117**, 622—624).—Fe_2O_3 hydrosol is pptd. from $FeCl_3$ solutions containing moranyl (I) in the p_H zone 5—7, in the form of heavy yellow hydrophobic flakes (II), negatively charged, and poor in intermicellary liquids containing acid $FeCl_3$. This pptn. occurs in (I) solutions as dil. as 1 : 100,000, and can be used to detect traces of (I) in protein-free solutions. Conc. strong acids interfere by destroying (I), conc. strong alkalis by changing the structure of the micelles. A (I)-free suspension of (II) in H_2O "sensitises" Fe_2O_3 to pptn. in the acid zone as (II), a phenomenon not exhibited by suspensions of brown alkali-pptd. Fe_2O_3 hydrosol. R. N. C.

Coagulation of colloids. X. Viscosity variation during mutual coagulations of positive ferric oxide sol and colloid arsenious sulphide, manganese dioxide, and antimony sulphide. S. S. Joshi and K. P. N. Pannikkar (J. Indian Chem. Soc, 1934, **11**, 797—804; cf. A., 1934, 1171).—When Fe_2O_3 sol is mixed with the oppositely charged colloids As_2S_3, MnO_2, and Sb_2S_3 coagulation usually occurs with comparable quantities of the two colloids. In the case of slow coagulation there is an initial fall in η of approx. 6·5% and the η–time curve shows irregularities. For rapid coagulation the initial fall in η is insensible, and η increases rapidly with time without irregularities. In some cases variations in η occur when no coagulation is apparent, and it is suggested that η is a more sensitive property for studying coagulation than degree of turbidity. R. S. B.

Theory of coagulation. N. Fuchs (Z. physikal. Chem., 1934, **171**, 199—208).—The fundamental equation of Smoluchowski's theory of rapid coagulation has been deduced by a new method, and doubts of its validity are unfounded. An important correction is, however, required in the theory, the magnitude of which depends on the val. of λ/a, where a is the particle radius and λ the mean path of the particle in a particular direction. For dispersions with a liquid dispersing medium the correction is negligible, but for aerosols it cannot be neglected. Smoluchowski's theory of slow coagulation requires complete reconstruction. Whereas Smoluchowski assumed the rate of coagulation, v, to be $\propto$ to the fraction, α, of the collisions which are effective, it is found that v depends less on α as λ/a diminishes. This is important for the interpretation of experimental data on the stabilisation of sols. Harper's theory of coagulation (A., 1934, 960) is rejected. R. C.

Reversible opalescence changes in gum sols. N. Peskov and E. Preis (Kolloid-Z., 1935, **70**, 62—67).—The opalescence–temp. curves of the sols exhibit hysteresis. The S-shaped character of the curves is less pronounced the greater is the EtOH content of the dispersion medium. E. S. H.

Influence of the nature of impurities on the formation of Liesegang rings in gelatin (silver chromate). M. F. Taboury and R. Echard (Bull. Soc. chim., 1934, [v], **1**, 1525—1531; cf. A., 1933, 224, 225).—Rings are produced in the system gelatin (I)–K_2CrO_4–$AgNO_3$ in the presence of a limited concn. range of sp. impurities, and it is inferred that these must give a ppt. with $AgNO_3$. The impurities are divided into three classes: (1) those which induce ring formation in washed (I) include KCl, KBr, and KCN, which are effective in the ranges 0·5—2%, 1—5%, and 2—8%, respectively, and afford data conforming to Jablczynski's relation, (2) those which are without influence, *e.g.*, NaF, and (3) those which prevent ring formation in unwashed (I), *e.g.*, $Na_2S_2O_3$, which dissolves AgCl, and KI which reacts with chromate. J. G. A. G.

Fluidities of thixotropic gels. Bentonite suspensions. H. A. Ambrose and A. G. Looms (Physical Rev., 1933, [ii], **44**, 320).—Flow measurements on bentonite suspensions (I), showing the property of thixotropy and of fluidity varying with shearing stress, have been carried out in capillary tubes, brass pipes, and a rotary apparatus (II) of special design. (II) showed that the structure of such gels must be broken down or built up until an equilibrium state of flow is reached in order to obtain reproducible measurements. No slip at the walls occurs in non-plug flow. Turbulent flow of (I) was also investigated. (I) behave as a viscous liquid in the turbulent region, and the vol. of flow at any pressure gradient may be assumed to be the same as that of H_2O. L. S. T.

Swelling of gelatin in deuterium oxide. H. Q. Woodard and L. C. Chesley (J. Amer. Chem. Soc., 1934, **56**, 2562—2563).—Gelatin swells less in H_2^2O than in H_2O. The ratio is 86% (wt.) in 90% H_2^2O and 93% (wt.) in 42% H_2^2O. E. S. H.

Relative flocculation value of alcohols towards protein solutions. W. S. Eisenmenger (Kolloid-Z., 1935, **70**, 94—96).—The flocculating power (I) of the aliphatic alcohols increases with increasing mol. wt. and shows a relation with the b.p. In a series containing the same no. of C atoms, (I) decreases in the order *n*, *iso*, *sec.*, *tert.*, which is also the order of decreasing toxicity. $CH_2Ph{\cdot}OH$ has a particularly high (I) towards blood serum. E. S. H.

Precipitation power and dielectric polarisation of alcohols. Wo. Ostwald (Kolloid-Z., 1935, **70**, 96—100).—The relative pptn. power a of alcohols for protein solutions (cf. preceding abstract) increases rapidly with increasing polarisation in accordance with the expression $(a+k_1)(P_1-P_2)=k_2$, where P_1 is the limiting polarisation for the highest homologous alcohol sol. in H_2O, P_2 the mol. polarisation of the pure alcohol in question, and k_1 and k_2 are consts. characteristic of the protein solution. E. S. H.

Aqueous solutions of proteins. M. Piettre, A. Boutaric, and M. Roy (Compt. rend., 1935, **200**, 94—95).—The degree of polymerisation of the following proteins, as determined by the amount of charcoal necessary for complete adsorption from solution, increases in the order given: serum-albumin (ox), lactalbumin, serum-albumin (heifer), mammary albumin, myosin, liver-albumin, ox serum-myxoprotein, ovalbumin, ricin. C. G. A.

Pressure and the water relations of proteins. I. Isoelectric gelatin gels. (Miss) D. J. Lloyd

and T. Moran (Proc. Roy. Soc., 1934, **A**, **147**, 382—395).—When isoelectric gelatin gel is submitted to pressure, pure H_2O is forced out of the gel, and the concn. of the residual gel is a function of the pressure. The effects of varying the pressure (up to 48,000 lb. per sq. in.), the temp. (0° and 20°), and the initial concn. of the gel (4·5—41·4%) have been examined. The relationship between the activity of H_2O and concn. of gel, calc. by applying the Katz equation to the pressure data, agrees with that obtained from an analysis of the f.p.–concn. curve of gelatin gel (A., 1932, 694). The results confirm the suggestion that the H_2O in gelatin gels is to be regarded as existing in two states: (1) firmly held H_2O, most of which is removed only at low activities ($<0·2$), and (2) loosely held H_2O, present only at high activities ($>0·7$). The nature of the forces holding the different types of H_2O to the gelatin mol. is discussed.

L. L. B.

Crystalline proteins: hormones and enzymes.—See this vol., 122.

Effect of hydrogen ions and thrombase on the coagulation of fibrinogen. G. Crut (Compt. rend., 1935, **200**, 95—98).—Fibrinogen is sol. at p_H 1—2·6. At higher p_H there is pptn. (different from the normal coagulation) which is max. at p_H 4·4—4·6. Above p_H 6 the solution remains clear. Up to p_H 6 the phenomena are the same in presence of thrombase, but above p_H 6 coagulation occurs, with max. velocity between p_H 7 and 8. Coagulation is followed by fibrinolysis.

C. G. A.

Colloidal behaviour of sericin. VII. H. Kaneko (Bull. Chem. Soc. Japan, 1934, **9**, 510—520; cf. this vol., 33).—The different forms of N present in the hydrolysis products of sericin-*A* and -*B* have been determined. A summary of previous papers is given.

F. L. U.

Plant colloids. XL. Reaction of starches with proteins. M. Samec [with A. Durjava] (Kolloid-Beih., 1934, **40**, 449—457; cf. A., 1934, 843).—Amylopectin, pptd. from starch solution by electrodialysis, neutralises solutions of gelatin or ovalbumin, reducing the $H^{\cdot}$ activity to $10^{-6}N$. Simultaneously the viscosity falls, and the solution becomes more easily pptd. by EtOH and less easily by electrodialysis.

E. S. H.

Colloid chemistry of chlorophyll. H. A. Bakker (Proc. K. Akad. Wetensch. Amsterdam, 1934, **37**, 688—694).—Cataphoresis of a suspensoid of chlorophyll (I) in H_2O showed it to be negatively charged. Flocculation by electrolytes was observed and depended on the valency. A suspensoid of phæophytin also showed a negative charge. A fluorescent sol and coacervate of lecithin (II) with (I) have been prepared. Since lecithinoids may be important components of plastid, it is not impossible that (I) may occur as coacervate of (II) in the living plant.

M. S. B.

Application of physico-chemical analysis to the investigation of peptisation. II. Peptisation of wheat-flour proteins. A. Dumanski and T. P. Tjashelova (J. Gen. Chem. Russ., 1934, **4**, 951—957).—The peptising action on wheat proteins of NaCl, EtOH, and AcOH, alone or in pairs, has been studied by the methods previously described (A., 1932, 910). The presence of >1 protein is indicated, and methods for their separation are suggested.

R. T.

Physical chemistry of starch and bread making. XXIV. Hindering of *X*-ray diagram retrogression of starch paste and starch solutions by heating. J. R. Katz and A. Weidinger (Z. physikal. Chem., 1934, **171**, 181—189; cf. this vol., 33).—Retrogression is hindered by rise of temp. and inhibited above 60°. At each temp. a state of equilibrium is ultimately reached. At higher temp. the equilibrium state is the fresh state, at lower temp. the retrogressed state; at 20—60° the *X*-ray diagram shows superimposed *V*- and *B*-spectra. The increases on retrogression in opacity, viscosity, and proportion of substance resisting malt run approx. parallel with the change in *X*-ray diagram.

R. C.

Fine structure of wood. I. Volume swelling of pine wood and lignin in different media. H. Saechtling and H. Zocher (Kolloid-Beih., 1934, **40**, 413—448).—The swelling phenomena of wood are discussed in the light of the spiral arrangement of anisotropically swelling cellulose micelles. The dimensional changes have been measured during swelling in C_6H_6, Et_2O, $COMe_2$, C_5H_5N, MeOH, and H_2O. The amount of the swelling liquid taken up increases in the order given, excepting C_5H_5N, which has a sp. effect probably connected with its basic character.

E. S. H.

Use of photo-cells for the determination of the degree of dissociation in the gaseous equilibrium $N_2O_4 \rightleftharpoons 2NO_2$ from the degree of absorption of light. K. Bergwitz and O. E. Schweckendiek (Physikal. Z., 1935, **36**, 35).—The method allows the simultaneous variation of pressure and temp., the amount of NO_2 present at any temp. being determined by the intensity of the light absorbed by it.

A. J. M.

Chemical equilibrium between hydrocarbons. VIII. Equilibria of the reactions $C_6H_{14} \rightleftharpoons C_6H_{12}+H_2$; $C_8H_{18} \rightleftharpoons C_8H_{16}+H_2$. A. A. Vedenski and P. J. Ivannikov (J. Gen. Chem. Russ., 1934, **4**, 975—978).—Empirical formulæ connecting the equilibrium const. with temp. are given.

R. T.

Relation between molecular interaction and the thermodynamic properties of solutions. R. P. Bell and O. Gatty (Phil. Mag., 1935, [vii], **19**, 66—82).—Theoretical.

H. J. E.

Chemical constitution and the dissociation constants of monocarboxylic acids. II. J. F. J. Dippy and F. R. Williams (J.C.S., 1934, 1888—1892; cf. A., 1934, 364).—Classical and thermodynamic dissociation consts. of AcOH, BzOH, *p*-anisic acid, *o*- and *m*-chloro-, *o*-bromo-, *m*-nitro-, 2:4-dinitro-, *p*-methoxy-, and 3:4-dimethoxy-phenylacetic acid are given. *K* is increased by introduction of a 3-alkoxy-group into BzOH or $CH_2Ph{\cdot}CO_2H$, but diminished by a 4-alkoxy-group.

R. S.

Anomalous strength of salicylic acid. G. E. K. Branch and D. L. Yabroff (J. Amer. Chem. Soc., 1934, **56**, 2568—2570).—The dissociation consts. of

o-, *m*-, and *p*-$OH{\cdot}C_6H_4{\cdot}CO_2H$, and *o*-, *m*-, and *p*-$OMe{\cdot}C_6H_4{\cdot}CO_2H$ in 25% EtOH at 25° have been determined. That of salicylic acid (I) is abnormally large. An explanation based on H linking, which gives rise to a chelate ring, is put forward; this explains also the low second dissociation const. of (I). E. S. H.

Dissociation constants of acetoacetic, glycollic, and acetic acids in solutions of sodium chloride. K. J. Pedersen (J. Physical Chem., 1934, **38**, 993—998).—The ratios of the dissociation consts. of $CH_2Ac{\cdot}CO_2H$ (I) to those of AcOH (II) and $OH{\cdot}CH_2{\cdot}CO_2H$ (III), respectively, have been determined by the quinhydrone electrode at 0° and 18° in aq. NaCl of concn. 0—0·5*M*. The dissociation consts. at 0° and 18° and at infinite dilution have been calc.: (I) 2·57 and $2{\cdot}62\times10^{-4}$, (II) 1·70 and $1{\cdot}79\times10^{-5}$, (III) 1·36 and $1{\cdot}48\times10^{-4}$. M. S. B.

Dissociation constants of formic and acetic acids in concentrated salt solutions. Á. von Kiss and A. Urmánczy (Z. physikal. Chem., 1934, **171**, 257—267).—The dissociation consts., K_c, in solutions of various neutral salts have been determined at 25° by e.m.f. measurements. At salt concns. $< N$, $\log K_c$ is a linear function of the concn. Except for $CaCl_2$, the salts show the same order in respect of the neutral salt effect for both acids. The ratio K_a/K_c for AcOH, compared with that for HCO_2H, varies with the salt and its concn. R. C.

Strengths of phenolic ketimines and their methyl ethers as bases. J. B. Culbertson, P. Bieber, and A. Zavodsky (Proc. Iowa Acad. Sci., 1932, **39**, 177).—The ionisation consts. of monohydroxydiphenylketimines and their Me ethers are recorded. Ch. Abs. (*r*)

Combination scattering and "association of molecules." S. I. Leitman and S. A. Ukholin (J. Chem. Physics., 1934, **2**, 825—826).—The association of $PhNO_2$ in CCl_4 and of AcOH in H_2O has been studied by the combination-scattering (Raman spectrum) method. Although $PhNO_2$ is known to be associated in CCl_4 the solution shows no evidence of the formation of complexes. In the spectra of aq. AcOH, however, the lines corresponding with the wave-no. 623 cm.$^{-1}$ change in relative intensity with change of concn. This wave-no. appears, therefore, to be characteristic of complex mols. of AcOH. Reasons for the difference in behaviour of the two solutions are discussed. M. S. B.

Association of phenol in different solvents. F. A. Philbrick (J. Amer. Chem. Soc., 1934, **56**, 2581—2585).—By a modification of the $KBrO_3$–KI procedure, 3—10 mg. of PhOH can be determined to within ±0·05%. The distribution of PhOH between H_2O and PhMe, PhCl, C_6H_6, $PhNO_2$, and CCl_4, respectively, at 25° shows that PhOH is present in these solvents as single and double mols. Differences in the calc. association consts. are ascribed to solvation of single PhOH mols.; the effect of substituents in the benzene ring is in the order: Me, Cl, (H), NO_2, OH. E. S. H.

Activity coefficients of salts in ethylene dichloride from solubility measurements. R. P. Seward (J. Amer. Chem. Soc., 1934, **56**, 2610—2612).—The solubility of NMe_4Cl in $C_2H_4Cl_2$ in the presence of quaternary NH_4 salts has been determined at 25°. The decrease in the activity coeff. varies with the added salt and is greater the smaller are the added ions. E. S. H.

Cyanide solutions. R. M. Wick (Monthly Rev. Amer. Electroplaters' Soc., 1934, **20**, No. 10, 10—16).—Solutions of K Ag cyanide contain $Ag(CN)_3''$ and $Ag(CN)_2'$, the relative amounts depending on [CN′]. Ch. Abs. (*e*)

Condition of sodium dissolved in fused sodium hydroxide. F. Halla and H. Tompa (Z. anorg. Chem., 1934, **221**, 18—20).—The authors' previous conclusions (cf. A., 1934, 1166) are in agreement with Rinck's observations (A., 1933, 228) on the variation of the equilibrium const. of the reaction $NaOH+K \rightleftharpoons Na+KOH$. The upper temp. limit for which the equilibrium const. for the reaction $K_2O+Na=Na_2O+K$ can be determined is 400°. M. S. B.

Compound of glucose and potassium chloride. S. Matsuura (Sci. Rep. Hirosima Higher Tech. School, 1929, **1**, 217—221).—The system glucose–KCl–H_2O reveals no mol. compound such as is found with NaCl (A., 1927, 518). Ch. Abs. (*r*)

Constitution of phosphate complexes of iron and aluminium. K. A. Jensen (Z. anorg. Chem., 1934, **221**, 1—5).—The solubility of $FePO_4$ and $AlPO_4$ in acid solution containing Cl′ and PO_4''' increases with the concn. of PO_4''', but is practically independent of the concn. of Cl′. The phosphate complexes formed contain, therefore, no Cl. The rapid increase in mol. conductivity, with dilution, of aq. $FeCl_3$ decomposed by H_3PO_4 appears to be due to the formation of colloidal $FePO_4$ and free acid. M. S. B.

Condensation reactions of boric acid. W. C. Schumb and W. H. Hartford (J. Amer. Chem. Soc., 1934, **56**, 2613—2615).—The prep. of MoO_3 and WO_3 is described, and their solubilities at 28° have been determined. Solubility and p_H measurements for saturated solutions of MoO_3 and WO_3 in aq. $Na_2B_4O_7$, Na_2CO_3, and Na_3PO_4, respectively, show that boromolybdate ions do not exist, although the existence of borotungstate ions is demonstrated. E. S. H.

Complex formation between aniline and picrate ion. Solubility measurements. K. J. Pedersen (J. Amer. Chem. Soc., 1934, **56**, 2615—2619).—Two forms of anilinium picrate have been prepared; the metastable form is 28% more sol. in H_2O at 18°. From solubility data it is concluded that the picrate ion forms complexes with 1 and 2 mols. of NH_2Ph. There is no evidence of complex formation between NH_2Ph and $NH_3Ph^{\cdot}$. E. S. H.

Dielectric constants of solutions of amphoteric electrolytes. I. Existence of zwitter ion. O. Blüh. **II.** O. Blüh and J. Kroczek (Z. physikal. Chem., 1934, **B**, **27**, 263—269, 270—281).—I. Published data for the dielectric const., ε, of solutions of amphoteric electrolytes and its bearing on the existence of zwitter ions are reviewed. Reasons are given for rejecting the claim that the ε of an aq. solution of an aromatic amphoteric electrolyte is < that of the solvent.

II. Measurements of the ε of aq. solutions of amphoteric aromatic electrolytes (A., 1923, ii, 823) have been repeated using a method permitting comparison with solutions of strong electrolytes of the same high-frequency conductivity. The ε of almost all the solutions is > that of H_2O, proving the presence of zwitter ions. In solutions of *p*-$NH_2{\cdot}C_6H_4{\cdot}SO_3H$ and *m*-$NH_2{\cdot}C_6H_4{\cdot}CO_2H$ these are present in considerable amount, whilst in solutions of *o*- and *p*-$NH_2{\cdot}C_6H_4{\cdot}CO_2H$ and hippuric acid there are few, if any. R. C.

Colours appearing in the systems cupric chloride–hydrogen halide–water–alcohol (ether, aldehyde, ketone, acid, ester). E. Beutel and A. Kutzelnigg (Monatsh., 1934, **65**, 82—90).—Many alcohols, ethers, and other org. liquids give a green colour with $CuCl_2$ and HBr under certain conditions, leaving a purple residue after evaporation; *sec.*- and *tert.*-alcohols give the effect at room temp. Conc. HCl gives a yellow colour, whilst HF discharges the colour. The influence of temp. and concn. of the reagents on these effects has been studied. E. S. H.

Complex salts of 2 : 2′-dipyridyl with bivalent copper. II. F. M. Jaeger and J. A. van Dijk (Proc. K. Akad. Wetensch. Amsterdam, 1934, **37**, 618—623; cf. A., 1934, 1317).—If an EtOH solution containing 1, 2, or 3 equiv. of dipyrydyl (dip) is added to aq. $Cu(NO_3)_2$ the corresponding complex (dip) *salts* are deposited on slow evaporation, viz., $[Cu(dip)(H_2O)_2](NO_3)_2,H_2O$ (I), dark blue, dichroitic, thick, tabular crystals or smaller needles; $[Cu(dip)_2](NO_3)_2,H_2O$ (II), dark blue, weakly dichroitic, thick, imperfect, triclinic crystals; $[Cu(dip)_3](NO_3)_2,6H_2O$ (III), flat, hexagonal, dark blue crystals, plastic owing to gliding planes, and red in thin layers. Crystallographic data are given. (II) and (III) are much less sol. than (I). From aq. $Cu(OAc)_2$ with 1, 2, or 3 equiv. of (dip) the following *salts* are obtained: $[Cu(dip)(H_2O)_2](OAc)_2,3H_2O$ (IV), dark blue prismatic needles with reddish reflexions; $[Cu(dip)_{1\cdot66}(H_2O)_{0\cdot66}](OAc)_2,5H_2O$ or a mixture of 1 mol. of (IV) with $2[Cu(dip)_2](OAc)_2,6H_2O$; $[Cu(dip)_{1\cdot38}(H_2O)_{1\cdot24}](OAc)_2,2H_2O$. M. S. B.

Complex metal–thiocarbamide salts. II. Equilibrium in trithiocarbamide–cuprous chloride solution. III. Conductivity and viscosity measurements on trithiocarbamide–cuprous chloride solutions. IV. Direct displacement of copper in trithiocarbamide cuprous chloride by other metals. G. Walter and E. Storfer. V. Electrochemical relations of complex metal–thiocarbamide salts. G. Walter, M. Adler, and G. Reimer (Monatsh., 1934, **65**, 21—35, 38—52, 53—58, 59—81; cf. A., 1931, 831).—II. $Cuthi_3Cl$ (I) in conc. solution is pptd. by aq. KCl or HCl; at lower concns. $Cuthi_2Cl$ (II) is pptd., and CuthiCl (III) is pptd. from dil. solutions. Small quantities of CH_2O ppt. (II), whilst in presence of medium amounts of CH_2O addition of KCl causes pptn. of (III). In presence of conc. CH_2O, KCl ppts. (III) from freshly prepared solutions of (I), but not from old solutions. On ageing, the conductivity and $[H^+]$ of the solution vary; p_H is on the acid side, and the conductivity changes anomalously with dilution. It is suggested that solutions of (I) contain (II) and (III).

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III. Addition of CH_2O to (I) produces a decrease in electrical conductivity and an increase in viscosity, to a degree depending on the age of the solution. The CH_2O undergoes a stepwise reaction with the three bound $CS(NH_2)_2$ groups.

IV. The following *compounds* have been prepared by direct replacement of Cu in (I): $MnCl_2,10CS(NH_2)_2$, $ZnCl_2,10CS(NH_2)_2$, $2CdCl_2,5CS(NH_2)_2$, m.p. 203—206°, $PbCl_2,4CS(NH_2)_2$, decomp. 116—120°, $2SnCl_2,5CS(NH_2)_2,2H_2O$, m.p. 175° (decomp.).

V. Measurements of the potentials of Cu, Ag, Cd, and Zn in solutions of their complex $CS(NH_2)_2$ salts show that the Cu and Ag complexes are stable, whilst those of Zn and Cd are resolved into their components, especially in dil. solutions. These measurements and observations of chemical deposition show that in such solutions the electrochemical series is: Ni, Ag (Fe, Sn, Pb), Cu, Cd, Zn. The Cu and Zn complex solutions are suitable for the electrolytic deposition of the metals. E. S. H.

Diagram of state for mixtures of any number of constituents. V. Fischer (Ann. Physik, 1934, [v], **21**, 426—432).—A plane orthogonal isobaric diagram is constructed for a mixture of any no. of constituents, and is applied to N_2–O_2–A–CO mixtures. A. J. M.

Two co-existent phases. A. K. Vlček (Chem. Listy, 1934, **28**, 262—268, 282—283).—Theoretical. R. T.

F.p. of mixtures of H_2O and H_2^3O. Latent heat of fusion of H_2^3O. V. K. LaMer and W. N. Baker (J. Amer. Chem. Soc., 1934, **56**, 2641—2643).—By extrapolation of the experimental data the f.p. of pure H_2^3O is 3·802°. The calc. latent heat of fusion of H_2^3O is 1510 g.-cal., which is estimated to be at least 10 g.-cal. too low. E. S. H.

Absorption of nitrogen on fusion of iron in the arc and the iron–nitrogen diagram. A. Portevin and D. Seferian (Compt. rend., 1934, **199**, 1613—1615).—The absorption has been studied in an arc containing at. N, when Fe_4N is formed. An equilibrium diagram for the system α-Fe–Fe_4N (0—10% Fe_4N) is described, differing from that of Fry (B., 1923, 1074). The Curie point (I) of Fe is lowered by the presence of Fe_4N, the (I) of which is at 480°. H. J. E.

System pyridine–acetic acid. II. M.p. L. E. Swearingen and R. F. Ross (J. Physical Chem., 1934, **38**, 1085—1089).—M.-p. data for mixtures of C_5H_5N and AcOH indicate the presence of the compounds $C_5H_5N,AcOH$, m.p. −59°, and $C_5H_5N,4$ or $5AcOH$, m.p. approx. −42°. The composition of the second compounds also corresponds with the composition of max. viscosity. M. S. B.

Solid–liquid equilibria in system β-naphthol–β-naphthylamine. K. Hrynakowski and M. Szmytówna (Z. physikal. Chem., 1934, **171**, 234—238).—The components are miscible in all proportions in the solid state and the liquidus and solidus curves touch at a min.; no compounds are formed (cf. A., 1919, ii, 54). R. C.

Redetermination of thermal dissociation equilibria of inorganic compounds. IV. Deter-

mination of dissociation equilibria of strontium and barium hydroxides with high-temperature vacuum balance. V. Determination of dissociation equilibria of hydrates of strontium and barium hydroxides with high-temperature vacuum balance. S. Tamaru and K. Siomi (Z. physikal. Chem., 1934, **171**, 221—228, 229—233; cf. A., 1932, 1204).—IV. The dissociation pressures, p, of $Ba(OH)_2$ at 500—750° and $Sr(OH)_2$ at 390—670° are given by $\log p = -25{,}100/4{\cdot}575T + 6{\cdot}906$ and $\log p = -25{,}190/4{\cdot}575T + 8{\cdot}531$, respectively. $Ba(OH)_2$ forms liquid and solid solutions with BaO.

V. For $Sr(OH)_2,8H_2O \rightleftharpoons Sr(OH)_2,H_2O + 7H_2O$ and $Ba(OH)_2,8H_2O \rightleftharpoons Ba(OH)_2,H_2O + 7H_2O$ $\log p(\text{mm.}) = -13{,}200/4{\cdot}575T + 10{\cdot}80$ and $\log p(\text{mm.}) = -13{,}600/4{\cdot}575T + 10{\cdot}84$, respectively. No evidence could be obtained for the existence of $Sr(OH)_2,2H_2O$, $Ba(OH)_2,3H_2O$, and $Ba(OH)_2,16H_2O$. R. C.

Effect of pressure on the dissociation of a solid. T. E. Field (J. Amer. Chem. Soc., 1934, **56**, 2535).—The effect of piston pressures up to 105 atm. on the dissociation pressure of $BaCl_2,8NH_3$ has been determined. The mol. fraction of NH_3 in equilibrium at 31·85° and at various pressures of H_2 up to 150 atm. has been determined by approaching the equilibrium from both sides. At every pressure the product of mol. fraction and total pressure is > the pressure calc. from the Poynting equation, assuming that the inert gas has a pressure effect only on the activities of the solids, and the divergence is the greater the higher is the pressure. E. S. H.

Alkali aluminium silicates. VIII. Validity of Hüttig's equation for permutites. E. Gruner (Z. anorg. Chem., 1934, **221**, 142—148; cf. A., 1933, 579).—V.-p. isotherms for H-, Na-, and Ca-permutite have been determined from 69° to 184°. Hüttig's formula $\log_e p = \log_e p_0 - kn/n'$ is not valid for permutites without H_2O of hydration, but gives vals. which are very high and not const. If n' is diminished by a const. quantity representing those H_2O mols. which exercise a purely chemical function in the mol., the expression becomes valid, and $k \cong 1$. F. L. U.

Equilibrium relations in system calcium oxide–sulphur dioxide–water (acid region) at pressures below atmospheric. F. H. Conrad and W. L. Beuschlein (J. Amer. Chem. Soc., 1934, **56**, 2554—2562).—The system has been examined at 15° and 25°, and at pressures up to 1 atm. The solid phase in equilibrium appears to be $2CaSO_3,H_2O$. E. S. H.

Phase-rule studies on metallic thiocyanates. III. The systems $Ba(NCS)_2$–NH_4NCS–H_2O and $Ba(NCS)_2$–$AgNCS$–H_2O at 25°. V. J. Occleshaw (J.C.S., 1934, 1892—1895; cf. A., 1934, 1091).—The compounds $Ba(NCS)_2,NH_4NCS,H_2O$, $Ba(NCS)_2,AgNCS,2H_2O$, $Ba(NCS)_2,2AgNCS,2H_2O$, and $Ba(NCS)_2,3AgNCS,2H_2O$ are recorded and some crystal properties described. The double salts decompose when recrystallised from water. The solubility curves of NH_4NCS and $Ba(NCS)_2,3H_2O$ intersect at a metastable invariant point, but the results do not conform with Kuklin's theorem. R. S.

M.-p. diagram of the system $AlCl_3$–NaCl–KCl. L. Wasilewski, A. Kaczorowski, and M. Dynkin (Przemysł Chem., 1934, **18**, 608—617).—The recorded eutectic data are: $AlCl_3$ 66, NaCl 34, 93°, $AlCl_3$ 71, KCl 29, 114°; $AlCl_3$ 66, NaCl 20, KCl 14, 70°. Transition point data are: $AlCl_3$ 50, NaCl 50, 146°; $AlCl_3$ 50, KCl 50, 241°; $AlCl_3$ 43·5, NaCl 43·5, KCl 13, 123°; $AlCl_3$ 54, NaCl 31, KCl 15, 110°. Composition is expressed in mol.-%. R. T.

Equilibria in the mutual system Na_2SO_4–NH_4HCO_3–H_2O at 0°. A. P. Belopolski, S. J. Schpunt, and M. T. Serebrenikova (J. Appl. Chem. Russ., 1934, **7**, 669—686).—The solid phases are $Na_2SO_4,10H_2O$ (I), $Na_2SO_4,(NH_4)_2SO_4,4H_2O$ (II), $(NH_4)_2SO_4$ (III), NH_4HCO_3 (IV), and $NaHCO_3$ (V). At the 3 invariant points the solid phases are (II), (III), and (IV) (0°); (I), (II), and (IV); and (I), (IV), and (V). The cryst. fields of (I) and (V) diminish with fall in temp. R. T.

Metal displacement equilibria in fused halides, oxides, and pyrophosphates. K. Jellinek and H. Siewers (Z. Elektrochem., 1934, **40**, 871—884; cf. A., 1933, 783).—Equilibria in the following reactions have been determined: $Cu + AgCl(Br) \rightleftharpoons Ag + CuCl(Br)$, $Zn + CdCl_2(Br_2) \rightleftharpoons Cd + ZnCl_2(Br_2)$, $3Pb + Bi_2O_3 \rightleftharpoons Bi_2 + 3PbO$, $Zn + PbCl_2 \rightleftharpoons Pb + ZnCl_2$, $2Pb + Ag_2P_2O_7 \rightleftharpoons 2Ag_2 + Pb_2P_2O_7$. The law of mass action is followed in all but the two last. Differences between the normal potentials of the two metals in their respective compounds are given for each system except the last. Bi is diat. in molten Pb. F. L. U.

Double decomposition in absence of a solvent. XXVI. Mutual system $Ba(NO_3)_2 + 2KCl \rightleftharpoons BaCl_2 + 2KNO_3$. A. P. Rostkovski (J. Gen. Chem. Russ., 1934, **4**, 1010—1020).—The phase diagrams indicate formation of KNO_3,KCl and $BaCl_2,2KCl$. R. T.

System $MgCl_2$–KCl–$MgSO_4$–K_2SO_4–H_2O at 100°. A. N. Campbell, K. W. Downes, and C. S. Samis (J. Amer. Chem. Soc., 1934, **56**, 2507—2512).—In the quaternary system the stable double salt is langbeinite. Kainite does not occur. E. S. H.

Heat of formation of ammonia and nitric acid. G. Becker and W. A. Roth (Z. Elektrochem., 1934, **40**, 836—843).—New determinations give 11·01±0·07 and 14·84±0·08 kg.-cal. per mol. of NH_3 and dil. aq. HNO_3, respectively, at 20° and const. pressure, the latter substance from N_2, O_2, and H_2O. F. L. U.

Heat of combustion of standard sample benzoic acid. R. S. Jessup and C. B. Green (J. Res. Nat. Bur. Stand., 1934, **13**, 469—495).—A brief description of a standard bomb calorimeter and of the method of using it is given, followed by tabulated results for a large no. of tests made on BzOH. The mean val. obtained for the calorific val. of pure BzOH is 26,419 international joules per g. (wt. corr. for air buoyancy) when the sample (I) is burned at 25° in O_2 at 30 atm. abs. in a bomb (II) of const. vol., the mass of (I) and of the H_2O in (II) each being 3 g. per litre of the vol. of (II); this val. is within 0·03% of recent determinations of other workers. A. R. P.

Thermochemical researches on diazo-derivatives of *p*-chloroaniline and a few other amines. M. Wojciechowski (Bull. Acad. Polonaise, 1934, **A**, 280—292).—The mol. heats of diazotisation of NH_2Ph, p-$C_6H_4Cl{\cdot}NH_2$, p-$NH_2{\cdot}C_6H_4{\cdot}SO_3H$, and *H*-acid are 22·74, 21·64, 18·38, and 21·66 kg.-cal. per mol., respectively. Diazotisation is not quant. for the first two unless 20% excess $NaNO_2$ is present, but with the two last it is quant. The heat of reaction of p-$C_6H_4Cl{\cdot}N_2Cl$ with NaOH increases with [NaOH], probably owing to tautomeric change. The heats involved in the change of diazonium hydroxides into their isomerides and their heats of reaction with β-$C_{10}H_7{\cdot}OH$ have also been measured. The heat of reaction of p-$C_6H_4Cl{\cdot}NH_2$ with HCl is 6·49 kg.-cal. per mol. J. W. S.

Optical method for determination of heats of dissociation of organic molecular compounds of the type AB_2. G. Briegleb and J. Kambeitz (Z. physikal. Chem., 1934, **B**, **27**, 161—175).—The determination of the heat of dissociation of org. mol. compounds in solution from measurements of extinction coeff. is described. The method has been applied to compounds of $C_6H_3(NO_2)_3$ with stilbene, tolane, and dibenzyl. R. C.

Integral heats of dilution, relative partial molal heat contents, and heat capacities of dilute aqueous sodium chloride solutions. E. A. Gulbransen and A. L. Robinson (J. Amer. Chem. Soc., 1934, **56**, 2637—2641).—Data covering the range 0·0001—0·816*M* and 10—25° are recorded. E. S. H.

Osmotic pressure and the thermal effect of chemical reactions from the viewpoint of technical thermodynamics. C. Grabowski (Przemysł Chem., 1934, **18**, 385—397).—Theoretical. R. T.

Behaviour of electrolytes in mixed solvents. VI. Electrical conductivities of some salts in water–ethyl alcohol solutions. L. C. Connell, R. T. Hamilton, and J. A. V. Butler (Proc. Roy. Soc., 1935, **A**, **147**, 418—433).—Data for LiCl and KI in a series of H_2O–EtOH solutions are recorded. The change of Λ_0 $\propto$ the fluidity of the solvent up to 20 mols.-% EtOH, but beyond this increasing divergence is found, and this is ascribed to solvation of the ions by EtOH mols. The Kohlrausch equation $\Lambda=\Lambda_0-x\sqrt{c}$ is obeyed in all the solvents. From the fact that Onsager's equation applies more exactly in the mixed than in the pure solvents, it is inferred that the former are better ionising media. Measurements for $ZnCl_2$ suggest that it is completely dissociated, even in conc. solutions, whilst in EtOH it behaves as a weak uni-univalent electrolyte with $K_0=4\times10^{-8}$. In the mixed solvents the ionisation for each salt concn. seems to be complete up to about 40 mols.-% EtOH; it then falls to about 1% in pure EtOH. In more conc. solutions (c=0·01—0·5) EtOH depresses the ionisation more readily. The extent of complex ion formation in the alcoholic solutions is estimated. L. L. B.

Resistivity of sulphuric acid solutions and its relation to viscosity and temperature. G. W. Vinal and D. N. Craig (J. Res. Nat. Bur. Stand., 1934, **13**, 689—697; cf. B., 1933, 752).—Data are recorded from 30° to —40° for 15—45% H_2SO_4. The composition of solutions of max. resistivity depends on the temp. An empirical relation between resistivity, kinematic viscosity, and abs. temp. is given. H. J. E.

Electrolytic conduction by proton jumps: transference number of barium hydrogen sulphate in solvent sulphuric acid. L. P. Hammett and F. A. Lowenheim (J. Amer. Chem. Soc., 1934, **56**, 2620—2625).—The apparent transference no. of $Ba^{\cdot\cdot}$ in solutions of $Ba(HSO_4)_2$ in H_2SO_4 is 0·012. Using $CCl_3{\cdot}CO_2H$ as reference solute the true transference no. is shown to be about 0·006. Conduction in these solutions does not depend on simple ionic migration, and supports the theory of conduction by intermol. proton jumps. E. S. H.

High-frequency conductivity of an electrolyte in the region of anomalous dipolar absorption of the solvent. M. Kubo (Bull. Inst. Phys. Chem. Res. Japan, 1934, **13**, 1415—1427).—A method for the measurement of high-frequency conductivities is described and applied to glycerol and aq. glycerol solutions of NaCl between —80° and 80°, where anomalous dispersion is shown by the solvent. J. W. S.

Single electrode potentials and the e.m.f. of a cell. E. Hutchisson and A. L. Robinson (Physical Rev., 1933, [ii], **44**, 323).—The e.m.f. of a cell has been obtained by summing the p.d. at the metal–liquid and metal–metal interfaces (electrolyte at unit activity) calc. by applying a Born–Haber–Fajans cycle. L. S. T.

Applicability of Nernst's electrochemical law to extremely dilute solutions. Normal potentials of bismuth and polonium. M. Haïssinsky (Compt. rend., 1934, **199**, 1397—1399).—The crit. potential (I) for the cathodic deposit from dil. $Bi(NO_3)_3$ solutions has been studied with the apparatus of Joliot (A., 1930, 713), using Ra-*E* and Th-*C* as radioactive indicators of Bi deposition. (I) is independent of the material of the cathode (Au or Ag) and is sensibly the same for HNO_3 and AcOH solutions. Initially, Bi deposits on the cathode at much lower potentials than is suggested by theory, but this deposit redissolves slowly and redeposition occurs only when the potential reaches the theoretical val. This phenomenon is especially marked for concns. $<10^{-8}N$. The normal potential of $Bi/Bi^{\cdot\cdot\cdot}$ at 18° is $+0{\cdot}226\pm0{\cdot}015$ volt. The normal potentials calc. for the electrodes $Po/Po^{\cdot\cdot\cdot\cdot}$ and $Po/Po^{\cdot\cdot\cdot}$ are $+0{\cdot}775\pm0{\cdot}015$ and $+0{\cdot}53\pm0{\cdot}03$, respectively. J. W. S.

Electrochemistry of magnesium. II. S. Bodforss and H. Kajmer (Z. physikal. Chem., 1934, **171**, 190—198; cf. A., 1931, 435).—The electrode potential, E, of different samples of Mg in buffer solutions has been measured. With decrease in p_H from ~ 7, E becomes increasingly negative and passes through a max. Rotating the electrode shifts the E–p_H curve towards higher p_H. The curve also depends on the anion of the buffer, and the effect of NH_4 salts, fluorides, and pyrocatechol has been studied. The rate of evolution of H_2 from Mg in buffer solutions is for each buffer $\propto$ to the amount of acid and prac-

tically independent of the acid/salt ratio, observations which agree fairly well with Kilpatrick and Rushton's results (A., 1934, 605). R. C.

Thermodynamic study of potassium amalgams. M. H. Armbruster and J. L. Crenshaw (J. Amer. Chem. Soc., 1934, **56**, 2525—2534).—The e.m.f. of the cell K(c_2)(amalgam)|KCl(aq.)|K(c_1)(amalgam) has been measured at 15°, 25°, and 35° over a wide range of concn., using dropping electrodes. Reproducible results are obtained when the amalgams contain 0·01—0·40 g. of K per 100 g. of Hg. The influence of variations in technique is discussed. The calc. standard electrode potential of K is 2·9243 volts at 25°. The solubility of K in Hg has been determined between 0° and 35°. E. S. H.

Glass electrode. III. Statistical explanation of the alkaline solution behaviour. M. Dole (J. Chem. Physics, 1934, **2**, 862—866).—Gurney's quantum-mechanical theory of electrode potential (A., 1932, 26, 669), when applied to the glass electrode, gives the same equation previously obtained by application of the liquid-junction theory (*ibid.*, 126, 1207), but makes unnecessary any assumptions concerning the mobility of $H^{\cdot}$ and $Na^{\cdot}$. It also explains other difficulties inherent in the earlier theory. Negative ions have no effect on glass electrode potentials because the form of the glass lattice is such that large repulsive forces for negative ions come into play and these have not sufficiently high energies to reach the glass surface. Gross and Halpern's theory (A., 1934, 601) is criticised. M. S. B.

Influence of sucrose on the p_H of alkaline solutions. K. Smolenski and W. Kozlowski (Bull. Acad. Polonaise, 1934, **A**, 160—171).—Sucrose (I) behaves as a polybasic acid and reduces the p_H. The val. of the dissociation equilibrium const. K depends on the ratio [NaOH]/[sucrose]. Assuming (I) to be dibasic, $K_1=3-4\times10^{-13}$ and $K_2=0{\cdot}3\times10^{-13}$. R. S.

Platinum electrode potentials in mildly alkaline sugar solutions, the electromotively active reductant present, and the catalytic effect of iron on its oxidation. J. M. Ort and M. H. Roepke (J. Physical Chem., 1934, **38**, 1061—1074).—Pt electrodes in alkaline sugar solutions do not give exactly reproducible potentials. This is attributed to adsorption of an oxygenated glucose ion, GO′, at the surface of the electrode. Oxidation or reduction appears to remove it. The electromotively active reductant accumulating in such solutions appears to be H_2. On addition of excess of oxidant H_2 is oxidised, GO′ is formed, and finally GO_2', giving a high oxidation potential. Finely-divided Pt and Fe do not catalyse the rate of formation of the reductant (cf. A., 1932, 345), but they catalyse the oxidation of GO′ to GO_2', and then the oxidation of H_2 by GO_2' giving GO′ and H_2O. A formula is given for the relation between time and reduction potential after the reduction of added oxidants. It has been confirmed by the determination of the potential fall after the reduction of $K_2Fe(CN)_6$ in conc. aq. glucose at p_H 10. The results apply qualitatively to other sugars. M. S. B.

Determination of the dissociation constants of weak bases by the silver iodide electrode. B. B. Owen (J. Amer. Chem. Soc., 1934, **56**, 2785—2786).—The possibilities of the AgI electrode are discussed. E. S. H.

Stannous–stannic oxidation–reduction potential. C. S. Huey and H. V. Tartar (J. Amer. Chem. Soc., 1934, **56**, 2585—2588).—The e.m.f. of cells of the type Hg|HCl,$SnCl_2$,$SnCl_4$|HCl|H_2,Pt has been determined at 15°, 25°, and 35°. The normal oxidation–reduction potential of $Sn^{\cdot\cdot}$–$Sn^{\cdot\cdot\cdot\cdot}$ at 25° is −0·154 volt. The change in heat content for $Sn^{\cdot\cdot} \longrightarrow Sn^{\cdot\cdot\cdot\cdot}+2e$ (in 1·1*M*-HCl) is 120 g.-cal. E. S. H.

Oxidation–reduction potentials of hypoxanthine ⇌ xanthine and xanthine ⇌ uric acid. S. Filitti (Nature, 1935, **135**, 35).—A reply to criticism (A., 1934, 1257). L. S. T.

Oxidising agents and vat-dyed cotton. H. A. Turner, G. M. Nabar, and F. Scholefield (Nature, 1935, **135**, 68).—Evidence of a simple relationship between the e.m.f. of a Pt electrode in a dil. solution of NaOCl and the action of the latter on cellulose fibres dyed with a reduced vat dye has been obtained. L. S. T.

Occurrence and position of the principal inflexion point in certain acid–base titration curves. E. D. Eastman (J. Amer. Chem. Soc., 1934, **56**, 2646—2648).—Mainly a reply to criticism (A., 1932, 1101). E. S. H.

Electrometric titration of lecithin and kephalin. T. H. Jukes (J. Biol. Chem., 1934, **107**, 783—787).—Kephalin (I) in 98% EtOH behaves towards NaOH as a monobasic acid with pK_a' val. of 8·9, very close to that of $^{+}NH_3Et$. Lecithin (II) shows no base-binding power. Both lipins show acid-binding power at very low p_H vals. (I) and (II) form zwitter ions which should be represented as $RO{\cdot}\overset{+}{P}(O^-)_2{\cdot}CH_2{\cdot}CH_2{\cdot}\overset{+}{N}R'_3$, where R′=H for (I) and Me for (II). A. E. O.

Electrometric titration of zein and iodozein. A. Neuberger (Biochem. J., 1934, **28**, 1982—1992).—The acid-binding power for different preps. of zein (I) in 90% EtOH varies between 16·6 and 20·1 and the base-binding power between 46·2 and $54{\cdot}6\times10^{-5}$ mols. per g. of protein. From titrations at different temp. and concn. of EtOH it is shown that the titration curve of (I) is determined by the no. of free CO_2H, phenolic, iminazole, and guanidino-groups. The I of iodozein (II) is found exclusively in the C_6H_6 ring of tyrosine (III). Titration curves of (II) confirm that the base-binding power of (I) is due to the (III) groups. C. G. A.

Titration constants of some amides and dipeptides in relation to alcohol and formaldehyde titrations of amino-N. J. Melville and G. M. Richardson (Biochem. J., 1935, **29**, 187—195).—Titration consts. at 25° are given for *d*-glutamine, *d-iso*glutamine, *l-iso*asparagine, *d*-glutaminylglycine, *d*-glutaminyl-*d*-glutamic acid, and *d*-alanyl-*l*-proline, and re-determined for *d*-tyrosyl-*d*-arginine and glycyl-*l*-proline. The effect of structure on pK', is discussed. The position of ·CO·NH· is the most important factor in determining the magnitude of peptide pK'_{NH_2},

hence peptides containing a free $\cdot CO\cdot NH_2$ show an abnormally low pK'_{NH_2}, and largely escape determination in CH_2O titration; *e.g.*, peptides of glutamine and asparagine would be 75—90% titrated in the preliminary p_H adjustment. No titration method can be safely applied without previous knowledge of the composition of the biological fluid to be tested (cf. A., 1934, 574). The criteria for buffering dipeptidase hydrolyses are discussed, and *iso*glutamine is recommended as the only adequate buffer for the study of peptide scission. A. E. O.

Mutual displacement of metals. N. A. Izgarischev and I. A. Mirkin (J. Gen. Chem. Russ., 1934, 4, 982—987).—The phenomena of replacement by Zn of Cu, Cd, Pb, Ni, Fe, and Co are ascribed to the overpotential of H_2 in presence of the galvanic couples formed, and to activation of H_2 by the cations present. R. T.

Dissolution rates of zinc electrodes in acid solutions. H. Mouquin and W. A. Steitz (Trans. Electrochem. Soc., 1935, 67, 35—40).—The velocity of dissolution (v) of rotating Zn anodes under an applied variable p.d. (E) at const. current has been studied in HCl, $CH_2Cl\cdot CO_2H$, and AcOH at 20°, using H_2O_2 as depolariser. Correction has been made for loss due to electrolysis, the results representing chemical action only. v passes through a min. which is approx. the same for each acid, and $(v_{min.} - v_0) \propto$ the degree of ionisation of the acid ($v_0 = v$ for $E=0$). The product of current and voltage at the min. is approx. const. It is suggested that v is controlled by electrostatic attraction between anode and solution. R. S. B.

Researches on cathodic polarisation of metal electrodes by means of Heyrovsky and Shikata's polarograph. I. Cathodic polarisation of solid metal electrodes. II. Overpotential phenomenon appearing in electrodeposition of metallic ions. III. Theory of the overpotential of hydrogen. I. Zlotowski (Bull. Acad. Polonaise, 1934, A, 115—126, 127—142, 143—160).—I. The electrode is renewed continuously by drawing a wire through the cell. An enamelled wire bared at intervals gives periodic renewal. The wire cathode and a Ag plate anode have been used in conjunction with the polarograph (cf. A., 1925, ii, 674).

II. Overpotentials for Cd, Pb, and Zn deposited from 0·1*N*-$CdCl_2$, -$Pb(OAc)_2$, and -$Zn(OAc)_2$ on a non-renewed Cu cathode are −0·046, −0·044, and −0·086 volt, respectively, and for Cd from 0·1*N*-$CdCl_2$ on Ag, −0·066 volt. The overpotential (I) is increased by continuous renewal of the cathode surface and by increasing dilution of the metallic ions in accordance with the view that it is associated with the formation of germ crystals.

III. The deposition potential (I) of H_2 on Pt, Cu, Ag, Pb, and Hg cathodes has been studied. Vals. for 0·1*N*-HCl on non-renewed electrodes are Pt −0·02, Cu −0·420, Ag −0·497, and Hg −0·931 volt. Continuous renewal of the cathode reduces (I) in proportion to the (I) of the non-renewed electrode. (I) for non-renewed electrodes of Cu and Hg in HCl is a min. at 0·1*N*. The relation $\pi = a + b \log i$ holds in every case, but b increases with $1/[H^+]$ and varies with the cathodic metal. (I) is ascribed to the accumulation of H atoms on the cathode surface and to some physical hindrance possibly related to the interfacial tension. R. S.

Limiting currents in the anodic polarisation of metals in aqueous solutions. IV. E. Müller and K. Schwabe (Z. Elektrochem., 1934, 40, 862—870; cf. A., 1933, 785).—Potential–c.d. measurements have been made on anodes of Pb immersed in aq. solutions of inorg. and org. Pb salts. In certain of these, *e.g.*, $Pb(ClO_4)_2$, the apparent resistance increases from about 100 ohms to $> 10^6$ ohms, and a polarisation e.m.f. of 60 volts has been observed. The latter can be due only to the anode functioning as a condenser and receiving a capacitative charge. Similar behaviour is shown by Zn in saturated $ZnSO_4$, but not by Ni in 0·5*M*-$Ni(ClO_4)_2$. The results are discussed. F. L. U.

Hydrogen overvoltage and the anodic behaviour of tungsten in aqueous solutions of potassium hydroxide. M. de K. Thompson and C. W. Rice, jun. (Trans. Electrochem. Soc., 1935, 67, 41—48).—W anodes dissolve in KOH with 100% current efficiency even at high polarisation, which is more pronounced at low temp., high c.d., and in dil. solutions; polarisation produces a burnished electrode. After all KOH has been converted into K_2WO_4 electrolysis gives O_2 at the anode, a blue colour due to a small amount of W^V, and $K_{10}W_{12}O_{41}$ as a ppt., and the current efficiency falls. The anodic potential–c.d. curves of W in aq. KOH of varying concn. resemble the curves for Mo, but are restricted to a lower c.d. owing to polarisation. The H overvoltage decreases with increasing concn. of KOH, and is least in aq. H_2SO_4. R. S. B.

Influence of cathodic hydrogen overvoltage on the [tensile] strength of different kinds of steel. T. Krassó (Z. Elektrochem., 1934, 40, 826—829).—Certain kinds of steel become brittle when cathodically polarised in pure 0·1*N*-H_2SO_4. The H overvoltage for such is $>$ for steels the tensile strength of which is unaffected. Addition of As or Hg to the electrolyte raised the H overvoltage and induced brittleness in 10 out of the 12 specimens examined. It is inferred that absorption of H by steel depends on a certain overvoltage being attained. The lowering of the overvoltage by H_2S, reported by Alexeiev and Perminov (following abstract), is in conflict with previous work (cf. A., 1930, 1254). F. L. U.

Overvoltage and cathodic brittleness of steel. D. Alexeiev and P. Perminov (Z. Elektrochem., 1934, 40, 823—826; cf. A., 1934, 356).—The cathodic polarisation of steel in *N*-H_2SO_4 is lowered by the presence of H_2S but raised by that of As_2O_3, both of which induce brittleness by promoting the entry of H into the metal. It is inferred that the process is not determined by overvoltage. F. L. U.

Overvoltage. VII. Electrode discharge phenomena studied by means of an electromagnetic interrupter together with an oscillograph. A. L. Ferguson and G. M. Chen (J. Physical Chem., 1934, 38, 1117—1125).—With the apparatus described it is possible to superimpose curves for various types of potentials as determined

by the direct method and in each case to break the circuit at the same point on the film. The results give no indication of the existence of a transfer or surface resistance, thus confirming previous conclusions (A., 1932, 701). M. S. B.

Passivity of iron and steel in nitric acid solutions. III, IV. Y. Yamamoto (Bull. Inst. Phys. Chem. Res. Japan, 1934, **13**, 1446—1500, 1501—1517; cf. A., 1934, 736).—III. HNO_3 containing $CO(NH_2)_2$ does not render Fe and steel passive. This is attributed to the removal of HNO_2, which acts as an O_2 carrier to the surface of the metal. Fe in HNO_3 loses its passivity on addition of $CO(NH_2)_2$ in a short time. HNO_3-resistant stainless steel is attacked severely by HNO_3 containing $CO(NH_2)_2$.

IV. The effect of HNO_3 in making Fe passive is increased by addition of $NaNO_2$, but the passivity of Fe immersed in HNO_3 is not destroyed by subsequent addition of $NaNO_2$. J. W. S.

Photovoltaic cells and photo-electric cells with an irreversible layer. G. Athanasiu (Compt. rend., 1934, **199**, 1604—1607).—A discussion. The assumption of an irreversible layer, as in Cu–Cu_2O photo-electric cells, is shown to be inapplicable to photovoltaic cells in general. H. J. E.

Determination of flame velocities of mixtures of inflammable gases.—See B., 1934, 53.

Equation for hydrogen-oxygen explosion limits. H. H. Storch and C. W. Montgomery (J. Amer. Chem. Soc., 1934, **56**, 2644—2646).—An equation representing the explosion limits as a function of the partial pressures of the reactants is derived. E. S. H.

Spark ignition of methane–oxygen mixtures. G. A. Gimmelman and M. B. Neiman (Compt. rend. Acad. Sci. U.R.S.S., 1934, **4**, 35—41).—Capacity and potential producing the spark, pressure, electrode separation, and reaction temp. were varied; the efficiency of the spark varies as CV^2, and not as CV, in agreement with Semenov's equation. A. B. D. C.

Kinetics of the reaction between gaseous methyl alcohol and nitrous oxide. E. W. R. Steacie and R. D. McDonald (J. Physical Chem., 1934, **38**, 1031—1043).—The reaction between gaseous MeOH and N_2O has been studied at 500—570°. The velocity is much > that of the thermal decomp. of N_2O and approx. $\propto$ $[N_2O]$, but is independent of [MeOH]. The apparent heat of activation is approx. 60,000 g.-cal. Velocity $\propto$ surface area, indicating that the reaction is either heterogeneous or a chain process. The latter alternative is doubtful, since it was not found possible to cause an explosion by raising the temp. The main reaction is probably $MeOH+N_2O=CH_2O+H_2O+N_2$, $CH_2O=H_2+CO$. M. S. B.

Thermal oxidation of methylamine. L. J. Jolley (J.C.S., 1934, 1957—1966).—The slow homogeneous reaction between gaseous NH_2Me and O_2, examined between 250° and 600°, consists of a series of consecutive reactions giving mainly a mixture of CH_2O, CO, CO_2, HCN, NH_3, and H_2O. Since the reaction is retarded by increase in the ratio surface/vol. of the containing vessel, a chain mechanism is probably involved. The velocity $\propto$ a power of $[NH_2Me]$ between 1 and 2 and approx. the first power of $[O_2]$. Foreign gases have no marked influence. Above a definite limiting pressure, determined by the temp., ignition occurs. It is a thermal process and results in a series of products different from those in the slow reaction. Greatly increased proportions of H_2, CO, and N_2 are found. There is an initial period of induction. Thermal decomp. of NH_2Me does not become appreciable until 500° is attained. It consists mainly of the two reactions $NH_2Me=HCN+2H_2$ and $NH_2Me+H_2=CH_4+NH_3$. Since oxidation readily takes place at. 250° these reactions cannot take part in the oxidation process. M. S. B.

Slow oxidations at high pressures. I. Methane and ethane. II. Methyl alcohol, ethyl alcohol, acetaldehyde, and acetic acid. D. M. Newitt and P. Szego (Proc. Roy. Soc., 1935, **A**, **147**, 555—571).—By using hydrocarbon–O_2 mixtures containing $< 5\%$ of O_2 and a flow method in which the gaseous medium is passed rapidly at 50 atm. through a reaction zone maintained at a suitable temp. between 340° and 430°, the proportion of primary product (alcohol) surviving is increased, until with CH_4 it corresponds with 50% and with C_2H_6 with 62·6% of the hydrocarbon burnt: there is no trace of peroxidation. Additional evidence supporting the hydroxylation theory of hydrocarbon combustion is obtained by studying the slow oxidation and thermal decomp. of each of the principal intermediate oxidation products of C_2H_6 (EtOH, MeOH, MeCHO, AcOH) at appropriate temp. and pressures. The oxidation of AcOH in a SiO_2 vessel at 426—486°/200 mm. proceeds uniformly without an induction period, the products consisting of CO, CO_2, CH_4, H_2O, and traces of MeOAc and $COMe_2$. L. L. B.

Significance of proknocks in hydrocarbon combustion. A. R. Ubbelohde and A. Egerton (Nature, 1935, **135**, 67).—Org. compounds which can disrupt to give radicals thus: EtO–—OEt, EtO–—OH, AcO–—OH, EtO–—NO, have a pronounced proknocking effect in concns. as low as 10^{-5}—10^{-6} mol. fraction. Peroxides and NO_2-compounds which do not disrupt in this manner show no such marked effects. L. S. T.

Thermal decomposition of acetaldehyde. C. N. Hinshelwood (Nature, 1935, **135**, 67).—New data confirm the homogeneous nature of the reaction under conditions of previous work (cf. A., 1934, 1294, 1312), and show that the pressure increase measures the actual rate of disappearance of MeCHO. L. S. T.

Thermal decomposition of acraldehyde. H. W. Thompson and J. J. Frewing (Nature, 1934, **134**, 900).—The decomp. of acraldehyde has been studied at 550°. Three independent "bimol." regions occur over the approx. ranges 15—40, 40—200, and 200—600 mm. The energy of activation, which is of the order of 5×10^4 g.-cal., is different in the several regions (cf. A., 1934, 1311). L. S. T.

Vapour-phase hydrolysis. S. Yamasaki and T. Titani (Bull. Chem. Soc. Japan, 1934, **9**, 501—

504).—There is no detectable hydrolysis of CH_2PhCl vapour when heated for 5 hr. with H_2O vapour at 130° or 200°, or of EtOAc vapour after 150 hr. at the same temp. F. L. U.

Rate of reactions in solution. R. S. Bradley (J.C.S., 1934, 1910—1917).—Formulæ for uni- and bi-mol. reactions in liquids, which take into account the mol. structure of the liquids and avoid the introduction of viscosity, are calc. Agreement with experimental data is found in a no. of cases. For bimol. reactions the formula applies to reactions between mols. and large ions which are not strongly solvated, as well as to reactions between mols. The same conceptions may be applied to the study of diffusion in solutions. M. S. B.

Kinetics of oxidation of nitrous acid by chloric and bromic acids. W. G. Lowe and D. J. Brown (Z. anorg. Chem., 1934, **221**, 173—176).—The reaction between ClO_3' and HNO_2 is of the second order; $k \propto [H^{\cdot}]$. Alteration of $[Cl']$ produces no significant change in k. The reaction with BrO_3' is similarly unaffected by changing $[Br']$, whence it is inferred that oxidation of Br′ to Br plays no part. F. L. U.

Kinetics of the reaction between potassium permanganate and oxalic acid. II. H. F. Launer and D. M. Yost (J. Amer. Chem. Soc., 1934, **56**, 2571—2577; cf. A., 1932, 1002).—Reaction between MnO_4' and C_2O_4'' is extremely slow, whilst that between $Mn^{\cdot\cdot\cdot\cdot}$ or $Mn^{\cdot\cdot\cdot}$ and C_2O_4'' proceeds at a measurable rate. $Mn^{\cdot\cdot\cdot\cdot}$ is present in equilibrium with MnO_4', $Mn^{\cdot\cdot\cdot}$, and $Mn^{\cdot\cdot}$; a solution containing no Mn of low valency reacts slowly or not at all with $H_2C_2O_4$. The mechanism of reaction proposed varies according to the concn. of the reagents; the intermediate formation of CO_2' is assumed. E. S. H.

Velocity of decomposition of diazo-compounds in water. XVI. E. Yamamoto (J. Soc. Chem. Ind. Japan, 1934, **37**, 687—690B).—The rate of decomp. of aq. α-$C_{10}H_7{\cdot}N_2Cl$ is unaffected by the addition of $MgSO_4$, $Al_2(SO_4)_3$, $CaCl_2$, or $Pb(OAc)_2$; it is slightly increased by $CuSO_4$ (after an induction period), $FeSO_4$, or NaOAc, and greatly increased by NaOH or Na_2CO_3. A. G.

Kinetics of sucrose inversion by adiabatic temperature measurements. S. S. Joshi and G. R. Phansalker (J. Indian Chem. Soc., 1934, **11**, 751—766).—The velocity of the initial stages of the inversion of aq. sucrose (I) (2—30 g. per 100 c.c.) by 0·4—0·9*N*-HCl has been determined by the rise of temp. measured under adiabatic conditions. The velocity coeff., k, is a function of $[HCl]$, and with const. $[HCl]$, k increases with increasing $[(I)]$. The sp. heat of aq. (I) diminishes with increase of $[(I)]$ and the heat of dilution of aq. HCl in H_2O is > in aq. (I), possibly owing to removal of H_2O from the solvent phase by hydration of (I). J. G. A. G.

Variation of the velocity coefficient of the saponification of amides by sodium carbonate in saturated solutions. E. Calvet and (Mme.) Calvet (Compt. rend., 1934, **199**, 1313—1315).—Vals. are recorded for the saponification of NH_2Bz by Na_2CO_3 (0·1—3*N*) at 17·90°. NH_2Bz behaves in solution as if it exists in 2 forms in equilibrium, only one being saponifiable. H. J. E.

Kinetic considerations regarding the Riesenfeld test in the investigation of the nature of a peroxy-compound. H. A. Liebhafsky (Z. anorg. Chem., 1934, **221**, 25—32).—By using a buffer solution in the Riesenfeld test, *i.e.*, the reaction of peroxy-compounds (I) with KI, a clear distinction may be made between true (I) such as $K_2S_2O_8$ and apparent (I) such as H_2O_2. In the former case liberation of I progresses continuously and in the latter the liberation of I soon reaches a stationary state and evolution of O_2 takes place at a rate corresponding with the rate of destruction of (I). (I) of an intermediate character behave like mixtures of H_2O_2 and $K_2S_2O_8$. M. S. B.

Kinetics of the interactions of sodium hydroxide with penta- and hexa-chloro- and -bromo-ethane in aqueous and ethyl-alcoholic solutions. W. Taylor and A. M. Ward (J.C.S., 1934, 2003—2010).—In aq. EtOH–NaOH at 25° and 35° the halogen compounds, C_2HX_5 (X=Cl or Br), lose HX immediately and C_2X_6 lose X_2 very slowly. Both types give C_2X_4, the latter undergoing a further very slow elimination of X. On the assumption that the reactions are all bimol., ratios of the velocity coeff. k for the compounds $C_2H_2X_4$ and C_2HX_5 have been determined by a competitive method. Elimination of X from C_2X_6 and C_2X_4 is essentially bimol., but complications, varying with the character of X, are caused by oxidation of EtOH by X. The compounds $C_2H_{6-n}X_n$ are classified into two groups, according to whether they undergo slow or immediate elimination of X. Observed vals. of k have been compared with those calc. from crit. increments. M. S. B.

Kinetics of the decomposition of ammonium amalgam. A. J. Deyrup (J. Amer. Chem. Soc., 1934, **56**, 2594—2599).—The decomp. of NH_4 amalgam at −20° and −30° follows the rate law $dx/dt = k_2(a-x)^{\frac{1}{2}}x$. Decomp. is mainly heterogeneous, occurring at the surface of bubbles of the reaction product, which consist of spherical shells of liquid NH_3 enclosing gaseous H_2. The heterogeneous reaction is probably an electrode reaction obeying the laws of overvoltage; it is completely inhibited by > 0·005*M*-Li. The homogeneous decomp. measured at 0°, 10°, and 20° follows the rate law $dx/dt = k_1(a-x)^2$, which may be explained by effective collisions between two NH_4 ions and two electrons. The energy of activation of the homogeneous reaction is 22,400 g.-cal. E. S. H.

Local element effect in corrosion processes. I. Stern and N. Nekrasov (Physikal. Z. Sovietunion, 1934, **5**, 729—745).—A theoretical relationship between the total potential of a metal surface and the individual local potentials is deduced and applied to the electrochemical changes in the corrosion of Fe. The active area of an Fe surface was calc. as approx. 10% of the total area. Ch. Abs. (*e*)

Increased velocity of formation of silicates in powdered mixtures as a result of the loosening of the metal oxide [lattice] and the crystallo-

graphic transformation of the quartz. J. A. Hedvall and G. Schiller (Z. anorg. Chem., 1934, **221**, 97—102).—The amount of reaction taking place between quartz and ZnO, CuO, NiO, CoO, and Co_3O_4 has been determined. In general there was an increase in reactivity at the β⟶α transition, and then, after a halt, a still more pronounced increase in velocity at the temp. of formation of cristobalite. This was especially marked in the case of Co_3O_4, since the temp. is also that at which, owing to its nearness to the thermal dissociation temp. of Co_3O_4, there is a strong tendency towards the break-up of the crystal lattice of the latter.

M. S. B.

Mechanism of chlorination of aliphatic acid chlorides. I. Dark reaction. E. Hertel, G. Becker, and A. Clever (Z. physikal. Chem., 1934, **B**, **27**, 303—315).—The reaction of Cl_2 at concns. of 0·05—0·65 mol. per litre with AcCl, EtCOCl, and PrCOCl at 15—50° is of zero order, and not catalysed by HCl. Dilution of the acid chloride (I) with CCl_4 retards the reaction without altering its order, an effect probably connected with a variation in the physical properties of the medium. These observations are explained by supposing the primary reaction to be transformation of (I) into an active form, probably by keto–enol change. The reactivity of (I) seems to be connected with its Raman spectrum, the dissociation const. of the corresponding acid, and the dipole moment of the corresponding ketone.

R. C.

Velocity of bromination of acetoacetic acid. K. J. Pedersen (J. Physical Chem., 1934, **38**, 999—1022).—The velocity of bromination of $CH_2Ac{\cdot}CO_2H$ (I) has been determined in the following media: (1) 0·022—0·75*M*-HCl at 0°, (2) aq. (I) and $CH_2Ac{\cdot}CO_2Na$, (3) aq. $OH{\cdot}CH_2{\cdot}CO_2H$ and $OH{\cdot}CH_2{\cdot}CO_2Na$, (4) aq. AcOH and NaOAc at 0° and 18°. The results may be explained on the assumption that the rate of bromination is determined by the enolisation of the undissociated (I) and $CHBrAc{\cdot}CO_2H$ (II) (cf. A., 1933, 910) which is catalysed in each case by bases and not by acids. The unimol. coeffs. for the uncatalysed or H_2O-catalysed reaction have been calc. and also the coeffs. for the catalysis of the enolisation by $CH_2Ac{\cdot}CO_2'$, AcO′, and $OH{\cdot}CH_2{\cdot}CO_2'$. A comparison is drawn between basic strength and the val. of the catalytic const. The calc. val. for the dissociation const. of (II) is 0·021.

M. S. B.

Catalytic decomposition of hydrogen peroxide by iron salts. F. Haber and J. Weiss (Proc. Roy. Soc., 1934, **A**, **147**, 332—351).—The decomp. of H_2O_2 by both Fe^{II} and Fe^{III} salts is both a chain and a radical reaction involving the radicals OH and H_2O and the anion HO_2'. Varying concns. of the reactants alter the length of the chains and provide alternative methods for terminating them, giving rise to various reaction products. The main stages of the reactions accord with: (1) $Fe^{\cdot\cdot}+H_2O_2=Fe^{\cdot\cdot\cdot}+OH'+OH$; (2) $OH+H_2O_2=H_2O+HO_2$; (3) $HO_2+H_2O_2=O_2+H_2O+OH$; (4) $OH+Fe^{\cdot\cdot}=Fe^{\cdot\cdot\cdot}+OH'$. By inserting the appropriate reaction velocity coeffs., an equation can be obtained from which the ratio of the consumption of H_2O_2 to $Fe^{\cdot\cdot}$ may be expressed mathematically, and this agrees with the experimental results. The effect of Fe^{III} salts is described and partly explained.

L. L. B.

Decomposition of nitrates and nitrites of metals having various valencies. IV. Vanadyl nitrate. E. Vernazza (L'Ind. Chimica, 1934, **9**, 1616—1623).—Aq. $VO(NO_3)_2$ decomposes, even at room temp. in an atm. of CO_2, evolving NO, NO_2, and N_2O and pptg. hydrated V_2O_5. At the b.p. the reaction is $6VO(NO_3)_2+5H_2O=3V_2O_5+10HNO_3+2NO$. HNO_3 acts as a catalyst. Consequently the decomp. occurs with acceleration. $VO(NO_3)_2$ could not be obtained from the aq. solution, but on evaporating a mixture of $VOSO_4$ and $NaNO_3$ in EtOH, greenish-brown prisms, believed to be *vanadyl nitrate*, separate. They decompose rapidly with evolution of nitrous fumes.

D. R. D.

Catalytic action of ammonium salts and ammono-acids on ammonolysis of santonin in liquid ammonia solution. A. I. Schattenstein (Z. physikal. Chem., 1934, **171**, 286—288).—The ammonolysis, which gives santonamide, is catalysed by this. The catalytic activity of NH_4 salts does not vary with the anion at low concns. and differs from their thermodynamic activity as judged by v.-p. measurements.

R. C.

Kinetics of the formation of sulphonic acids from dithio-acids. I. Oxidation of cystine to cysteic acid by thallic sulphate. II. Positive and negative catalytic effects of halides on the oxidation of cystine to cysteic acid by thallic sulphate. P. W. Preisler and D. B. Preisler (J. Physical Chem., 1934, **38**, 1099—1107, 1109—1115).—I. The amount of $Tl_2(SO_4)_3$ reduced was determined at intervals by adding excess of aq. KI and starch and titrating with $Na_2S_2O_3$ until the bright yellow colour only of pptd. TlI remained. The rate-controlling reaction in presence of H_2SO_4 is of the second order. In the complete reaction 1 g.-mol. of cystine is oxidised to cysteic acid, whilst $5Tl^{\cdot\cdot\cdot}$ are reduced. *K* (bimol.) increases with increase in $Tl^{\cdot\cdot\cdot}$ up to 0·0005 g.-ion, when *K* becomes nearly const. *K* decreases slightly with increase of [cystine], but is nearly const. above 0·002*M*. [$Tl^{\cdot}$], and therefore the oxidation–reduction potential of the system $Ti^{\cdot\cdot\cdot}$–$Tl^{\cdot}$, has no apparent effect on *K*. *K* decreases with increase in [H_2SO_4]. At 30° in *N*-H_2SO_4, using 0·0005 g.-atom $Tl^{\cdot\cdot\cdot}$ and 0·001*M*-cystine, $Tl^{\cdot\cdot\cdot}$ reduction takes place at the rate of 23·3 g.-atom and cystine oxidation at the rate of 4·7 g.-mol. per min. per litre. By measurements at 15—35° and different acidities the heat of activation 24,000 g.-cal. has been obtained.

II. KI, when present at a very low concn., catalyses the above reaction, and the rate increases with increasing concn. up to a max., after which it diminishes. At a sufficiently high concn. KI has a retarding effect. The rate of catalytic reduction increases as the ratio KI/$Tl^{\cdot\cdot\cdot}$ increases. [Cystine] or [$Tl^{\cdot}$] does not affect the catalytic reaction rate, but increase in [H_2SO_4] increases it. The energy of activation of the catalytic reaction is 21,700 g.-cal. The KI catalysis is a zero order reaction over a wide range of concn. Cl' and Br' have an inhibiting effect

which is complete when the ratio halide/Tl''' exceeds 2. F' has no effect. Br' and, to a smaller extent, Cl' increase the acceleration in the I'-catalysed reaction. M. S. B.

Reduction of platinum oxide by carbon monoxide and catalysis of the reaction between carbon monoxide and oxygen. P. V. McKinney (J. Amer. Chem. Soc., 1934, **56**, 2577—2580).—Dry PtO_2 is reduced by CO at 25° after an induction period, the duration of which is diminished by raising the temp. The process is autocatalytic and exothermic, and may become explosive. When the reagents are moist, reduction occurs at 0° and the induction period is shorter. Small amounts of Fe accelerate the reaction. PtO_2 catalyses the reaction between CO and O_2 at 80° and is not reduced when O_2 is in excess. The combustion of CO in O_2 is also catalysed by Pt-black prepared from PtO_2 and CO. With excess of O_2, reaction occurs at 184° and is complete at 218°. E. S. H.

Pyrophoric properties of copper methyl alcohol catalysts. V. A. Plotnikov and K. N. Ivanov (J. Gen. Chem. Russ., 1934, **4**, 1003—1005).—The pyrophoric properties of Cu–ZnO–Cr_2O_3, Cu–ZnO, and Cu–Cr_2O_3 catalysts (I) prepared by simultaneous pptn. of $Cu(OH)_2$ and $Zn(OH)_2$ and/or $Cr(OH)_3$, and reducing the ppt. with H_2 or CO, are a consequence of the highly disperse state of the Cu, agglutination of the particles of which is prevented by the ZnO or Cr_2O_3. The (I) are converted chiefly into Cu_2O on free oxidation in air. R. T.

Iron catalysts for ammonia synthesis.—See B., 1935, 20.

Catalytic decomposition of thiophen in presence of hydrogen.—See B., 1935, 12.

Catalytic hydrogenation of unsaturated compounds. III. Selectivity of attack in relation to the nature of the catalyst. E. H. Farmer and L. A. Hughes (J.C.S., 1934, 1929—1938; cf. A., 1934, 509).—In the 50% hydrogenation of sorbic acid (I) and Na muconate, resulting in a step-wise reduction, the solvents employed, PhMe, EtOAc, H_2O, and EtOH, appear to exert no sp. action apart from the fact that ageing of the catalyst, with resulting modification of the additive mode, may occur in low concn. of solvent. Poisoning of the catalyst decreases the activity, but does not appear to affect the additive mode of (I). The action of the catalyst is sp., but the action of one particular catalyst does not vary greatly with the form or method of application. M. S. B.

Hydrogenation of ethylene with heavy hydrogen. R. Klar (Z. physikal. Chem., 1934, **B**, **27**, 319—320).—The rate, k, of hydrogenation with H_2 and H_2^2 over an Fe catalyst has been measured at 0—175°. For H_2^2 k is a max. at ~150° and for H_2 at ~125°. Up to ~100° k for H_2 is > for H_2^2 at the same temp., but above 100° is smaller. The approach of k for H_2^2 to k for H_2 with rise in temp. is temporarily interrupted at 55°. R. C.

Catalytic dissolution of copper in sulphuric acid. M. O. Charmandarian and G. H. Dachniuk (J. Appl. Chem. Russ., 1934, **7**, 736—739).—Dissolution of Cu in H_2SO_4 is catalysed by Ag and in particular by β-CoS, which increases the velocity 3-fold; the CoO is inactivated after 10 operations, but may be re-activated by aq. $(NH_4)_2S$. R. T.

Polymerisation of vinyl bromide. A. Guyer and H. Schütze (Helv. Chim. Acta, 1934, **17**, 1544—1548).—The influence of various substances on the polymerisation of CH_2:CHBr in the dark has been studied. A classification based on chemical nature is not possible. The largest positive effect observed was with H_2O_2. In the absence of any added material, a glass containing vessel, especially if Bohemian, accelerates polymerisation, whilst Fe or bronze completely inhibits it. F. L. U.

Active oxides. LXXXIII. Systems zinc oxide–chromic oxide and cupric oxide–chromic oxide as catalysts of the decomposition of methyl alcohol. O. Kostelitz (Kolloid-Beih., 1934, **41**, 58—72; cf. this vol. 44).—The relative amounts of H_2, CO, CO_2, CH_4, C_2H_4, HCO_2H, CH_2O, HCO_2Me, and Me_2O resulting from the catalytic decomp. of MeOH at 300°, 320°, and 360°, using the oxide mixtures in different proportions, have been measured. With pure ZnO the main products are CO and H_2, whilst Cr_2O_3 gives mainly Me_2O. The forces between adjacent ZnO and Cr_2O_3 mols. are discussed in the light of the products obtained by the catalytic action of the mixtures. E. S. H.

Catalytic action of Japanese acid earth. VIII. Relation between catalytic activity and adsorption. K. Ishimura (Bull. Chem. Soc. Japan, 1934, **9**, 493—501; cf. A., 1934, 850).—Adsorption rates and capacities of different specimens of the earth for H_2O, C_6H_6, and $C_{10}H_8$ have been determined and shown to be parallel with the catalytic action on $C_{10}H_8$. F. L. U.

Fractionation of the isotopes of hydrogen and oxygen in a commercial electrolyser. E. W. Washburn, E. R. Smith, and F. A. Smith (J. Res. Nat. Bur. Stand., 1934, **13**, 599—608).—Electrolysis of 18% NaOH at 60° in a 16-litre commercial cell (Ni electrodes) gave no further isotopic separation after 160 litres of make-up H_2O (I) had been added. The gases evolved at this stage have the same isotopic composition as (I). The residue was 60 p.p.m. heavier than ordinary H_2O, approx. 50% of the change being due to enrichment of the heavy O isotope. H. J. E.

Cathodic behaviour of organic salts of copper. M. G. Kravtzoff (Compt. rend., 1934, **199**, 1105—1107).—The proportion of Cu_2O formed in electrolysis increases as the dissociation const. of the org. acid decreases. Addition of a salt with a common anion decreases the Cu_2O yield, except in the case of HCO_2NH_4 and $(HCO_2)_2Cu$. H. J. E.

Electrolytic deposition of copper–nickel–iron alloys. H. Paweck, J. Bauer, and J. Dienbauer (Z. Elektrochem., 1934, **40**, 857—862).—Homogeneous deposits cannot be obtained from solutions of the mixed sulphates, but addition of Na citrate up to 2% gives rise to homogeneous deposits of satisfactory character when the Ni content is > 42%. The influence of c.d. and of the composition of the

electrolyte on the deposit has been determined. The effect of the citrate is to displace the electrode potentials to " baser " vals., the shift being greatest for Cu and least for Fe. F. L. U.

Electrolytic production of lithium. L. Wasilewski and J. Z. Zaleski (Przemysł Chem., 1934, **18**, 628—633).—A fused 6 : 4 mol. mixture of LiCl and KCl is electrolysed at 410° in a special apparatus, using graphite anodes, and hollow, conical cathodes, from which the fused Li, containing $\not>$ 2% K, is periodically removed. R. T.

Electrodeposition of chromium under pressure.—See B., 1935, 28.

Electrolytic oxidation. VI. Anodic oxidation of acetates : mechanism of the Kolbe and Hofer–Moest reaction in aqueous solution. S. Glasstone and A. Hickling (J.C.S., 1934, 1878—1888).—The electrolysis of aq. solutions of acetates and AcOH with smooth and platinised Pt, Au, Ni, and C anodes has been studied under different conditions. Catalysts for the decomp. of H_2O_2, *e.g.*, $Pb^{\cdot\cdot}$, $Ag^{\cdot}$, $Mn^{\cdot\cdot}$, $Cu^{\cdot\cdot}$, $Co^{\cdot\cdot}$, and $Fe^{\cdot\cdot}$, inhibit the formation of C_2H_6 by the Kolbe synthesis, whilst $Na^{\cdot}$, $K^{\cdot}$, $NH_4^{\cdot}$, $Ca^{\cdot\cdot}$, $Sr^{\cdot\cdot}$, $Ba^{\cdot\cdot}$, $Mg^{\cdot\cdot}$, $Zn^{\cdot\cdot}$, $Ni^{\cdot\cdot}$, and $UO_2^{\cdot\cdot}$, which do not decompose H_2O_2, allow the formation of C_2H_6 to take place. Poisoning the platinised Pt anode for H_2O_2 decomp. increases the yield of C_2H_6. Au and Ni anodes become coated with oxides which decompose H_2O_2 and, therefore, do not yield C_2H_6. The Kolbe synthesis is also inhibited by the anions F', ClO_4', NO_3', PO_4''', Cl', SO_4'', or $Fe(CN)_6'''$. The effect $\propto$ the mobility of the ions. The results do not agree with previous theories of the Kolbe reaction. It is suggested that H_2O_2 is formed by the union of discharged OH' and reacts with AcO' to give C_2H_6. If the $[H_2O_2]$ or $[AcO']$ is kept low, formation of MeOH occurs, probably with AcO_2H as an intermediate product. Alkalinity is not necessary for MeOH formation. Anode potential is merely a secondary indication of the particular reaction taking place, and not a primary factor in determining it. M. S. B.

Electrolytic reduction of acetophenone. S. Swann, jun., and G. H. Nelson (Trans. Electrochem. Soc., 1935, **67**, 49—54).—COPhMe when reduced electrolytically in aq.-EtOH–H_2SO_4 with Cd, Sn, Pb, Hg, Al, Zn, C, Ni, Cu, and Fe cathodes, at 65—70° and c.d. 0·054 amp. per sq. cm., gives acetophenonepinacone (I), $(CHPhMe)_2O$, and a resin of unknown composition. A Pb cathode gives the best yield of (I), but the cathode material has very little influence on the course of the reaction. R. S. B.

Chemical action in the glow discharge. XIV. Ignition of hydrogen–oxygen mixtures. A. K. Brewer and P. D. Kueck (J. Physical Chem., 1934, **38**, 1051—1059).—Ignition in the positive column is different from that in the condensed discharge (A., 1931, 44), but there is a distinct analogy between the latter and the reaction in the negative glow. In the positive column there is a hyperbolic relation between power input and pressure. The addition of foreign gases lowers the power input necessary for ignition in proportion to the ability of these gases to retard the rate of diffusion. 25% H_2–75% O_2 is the mixture most easily ignited in the positive column. Rise in temp. causes a relatively large increase in ignitability. This is also increased by increasing the length of the positive column, but is decreased by the approach of a surface to the path of the discharge if the distance is $\not>$ about 1 cm. A glass surface has a lowering effect $<$ that of Ag. These results may be interpreted on the basis of the reaction chain hypothesis previously given (this vol., 45). The energy of the gas surrounding the discharge must, for the positive column, be very much $>$ for the condensed discharge. M. S. B.

Electrothermal production of nitric oxide in the light of researches on dissociation. W. Dominik (Przemysł Chem., 1934, **18**, 367—373).—The formation of NO and NH_3 from their elements at high temp. is ascribed to combination between dissociated mols. of N_2, O_2, and H_2, and not to the greater stability of NO or NH_3 at higher temp. N_2 is calc. to be 0·65% dissociated at 2000°, 3·6% at 3000°, and 8·3% at 4000°. R. T.

Combination of hydrogen and oxygen in direct-current discharges. E. M. Guénault and R. V. Wheeler (J.C.S., 1934, 1895—1901).—Measurements of the rate of combination of H_2 and O_2 in the d.-c. discharge have confirmed the results of earlier investigators. The temp. at different points in the path of the discharge varies systematically with the conditions of the experiment. In comparative experiments, in which N_2, A, or He was used as a diluent, the relative rates $\propto$ the temp. produced in the mixture by the discharge, and not $\propto$ the effect each diluent gas would have on the degree of ionisation. The combination of H_2 and O_2 in the d.-c. discharge is not primarily due to its ionising effect, but the chemical reaction as a result of electron excitation is probably considerably augmented by its thermal effect. M. S. B.

Action of an electric discharge on nitric oxide. Production of active nitrogen. C. Zenghélis and S. Evangelidès (Compt. rend., 1934, **199**, 1418—1419).—When an ozonising discharge is passed through NO, the latter is decomposed into N_2 (partly as active N) and O_2 (partly as O_3) as well as into NO_2. As a second phase oxidation occurs to NO_3 and N_2O_6; in the third stage of the action these combine with NO and NO_2 to form N_2O_5. J. W. S.

Active chlorine. E. J. B. Willey and S. G. Foord (Proc. Roy. Soc., 1934, **A**, **147**, 309—332).—The activation of Cl_2 in the silent discharge is not accompanied by a vol. change. No change in the absorption spectrum of activated Cl_2 could be detected. Experiments were carried out using a spark discharge between C electrodes, and also with the silent discharge. Active Cl_2 reacts with H_2O giving an increased amount of HCl. No difference (from ordinary Cl_2) could be detected in the oxidation of $FeCl_2$, but with $FeSO_4$ the amount of Cl_2 reacting decreased. No difference was observed in the oxidation of $H_2C_2O_4$, but an increase in reaction was found with AcOH in the case of the sparked Cl_2.

Active Cl_2 reacts with C_6H_6 giving both substitution and additive compounds. The effect of traces of impurities, O_2, N_2, and air, and of irradiation of the Cl_2 was investigated. The nature of active Cl_2 is discussed, the balance of evidence suggesting that it is at. L. L. B.

Heterogeneous chemical reactions in the silent electric discharge. XI. S. Miyamoto (Bull. Chem. Soc. Japan, 1934, 9, 505—510; cf. A., 1934, 739).—H_2 reacts with the following solid substances: $KAg(CN)_2$, KCNS, $Ca(CNS)_2$, NH_4CNS, $Na_2S_2O_3$, MgS_2O_3, BaS_2O_3, $Ba(ClO_3)_2$. Details are given. F. L. U.

Photochemistry. M. Bodenstein (Naturwiss., 1935, **23**, 10—16).—A lecture.

Decomposition of ozone photosensitised by chlorine. R. G. W. Norrish and G. H. J. Neville (J.C.S., 1934, 1864—1872).—The decomp. of O_3, photosensitised by Cl_2, has been studied using light of λ 365 mμ at 25°. It is a chain reaction, and quantum efficiencies, γ, up to 10 may be obtained. The law $\gamma \propto I^{-0.5}$, where I is the light absorbed, is approached when the pressure of O_3 is high and those of Cl_2 and O_2 are low. When the pressure of Cl_2 or O_2 is high, γ is independent of I, the reaction is of zero order with respect to O_3, and the rate $\propto$ the first power of I. For const. I and increasing pressure of O_2 and Cl_2 γ is depressed towards a limiting val. of 2. Foreign gases have no effect. At high Cl_2 and O_3 pressures a red liquid $(ClO_3)_n$ is obtained. When this does not separate, the results are uniform and reproducible, and there is no indication of after-effects when irradiation is discontinued. After separation, however, it continues to decompose in the dark, causing an increase of pressure. A reaction mechanism involving the propagation of chains by Cl and ClO is suggested, and applied also to the thermal decomp. of O_3 sensitised by Cl_2. M. S. B.

Photochemical reaction between chlorine and formaldehyde. Preparation of formyl chloride. K. B. Krauskopf and G. K. Rollefson (J. Amer. Chem. Soc., 1934, 56, 2542—2548).—The reaction occurs in two steps. The first is an exothermic, long-chain process, involving no pressure change, which is accompanied by a marked Draper effect and under certain conditions may become explosive. One of the products is HCOCl, which decomposes in the second step into CO and HCl. The decomp. takes place by a rapid Cl_2-sensitised photochemical process if Cl_2 is in excess, and by a slow, heterogeneous, thermal reaction if no Cl_2 is available or if illumination is stopped. *HCOCl* is prepared by allowing an illuminated mixture of Cl_2 and CH_2O to flow through a liquid-air trap. At room temp. it decomposes rapidly. E. S. H.

Photochemical carbon monoxide oxidation. W. F. Jackson (J. Amer. Chem. Soc., 1934, 56, 2631—2635).—At room temp. O reacts with O_2 to form O_3 at least 150 times as rapidly as with CO to form CO_2. At high temp. (up to 600°) in absence of H_2O the rate of oxidation is almost independent of temp. and total pressure; in presence of H_2O the reaction rate varies with pressure and has a large temp. coeff. A mechanism of reaction is suggested. E. S. H.

Photochemical reactions. Action of phosphorous and hypophosphorous acids on uranyl salts. F. Diénert and F. Villemaine (Compt. rend., 1934, **199**, 1113—1114).—Reduction occurs on illumination in a Pyrex vessel. The product is a U phosphate, its composition varying with the light intensity and the acidity. H. J. E.

Influence of salts on intermittent photographic exposures. T. H. James, J. M. Blair, and F. E. E. Germann (J. Physical Chem., 1934, **38**, 1023—1030).—Intermittent exposures of a photographic emulsion produce developable densities which are different from, and usually $<$, those produced by equal continuous exposures. The influence of different ions on this intermittent effect is similar to their influence on the Herschel effect (cf. Narbutt, A., 1930, 1385). M. S. B.

Mechanism of the desensitisation of photographic plates. M. Blau and H. Wambacher (Z. wiss. Phot., 1934, **33**, 191—197).—Plates treated with pinakryptol-yellow (I) are more sensitive to α-particles and slow protons; treated plates are also sensitised to high-speed protons, if exposed in vac. or in N_2. With visible light the desensitisation normally produced by (I) decreases with the degree of vac. obtaining during the exposure, and is almost entirely removed in an atm. of N_2, CO_2, or other O_2-free atm. The effect is not obtained by evacuation after exposure, and only weakly when the plate is kept in vac. until just before exposure. Other desensitisers (pinakryptol, induline-scarlet, phenosafranine, etc.) show the effect, but not pinaflavol. The effect is less with the more strongly dyeing reagents. Desensitisation is hence considered as an oxidation of reduced AgBr, the desensitiser being reduced by photochemical action, but reoxidisable by atm. O_2 to re-form the dye, which can then again oxidise Ag. The presence of H_2O is also necessary. J. L.

Relation between exposure and photographic blackening on exposure to Röntgen rays. E. Hofer (Z. wiss. Phot., 1934, **33**, 198—200).—Mathematical. The formula $S=f(\nu).\phi(\nu).Na$ log e is derived, where S is the blackening produced, $f(\nu)$ is the absorption coeff. of the emulsion layer, $\phi(\nu)$ is the no. of AgBr grains rendered developable by one X-ray quantum, N is the total no. of quanta to which the emulsion is exposed, and a is the size of a AgBr grain rendered developable by one quantum falling on an area of 1 sq. cm. (Cf. Arens *et al.*, A., 1931, 579; Eggert and Noddack, A., 1929, 124.) J. L.

Compensational development. W. Romer (Przemysł Chem., 1934, **18**, 533—546).—The part of the dD/d log E curve for which the slope is $> \gamma/2$ (D optical density, E intensity of illumination, γ coeff. of development) is termed the "useful section" (I), and the corresponding part of the log E axis the "gradation of usefulness" (II). Ordinary developers (III) at first shift (I) in the direction of smaller E, and then in that of greater E; these effects are ascribed to diffusion of the

(III) and of the products of reaction in the emulsion. (III) adapted to over- (under-)exposed plates exert only the latter (former) effect. The successive use of (III) for over- and under-exposed plates leads to a considerable extension of (II) in both directions (compensational development). R. T.

Autophotographic location of radioactive ions in gelatin. (Mlle.) S. Veil (Compt. rend., 1934, **199**, 1044—1046; cf. A., 1933, 1005; 1934, 961, 1172).—When radioactive ions are concerned in the formation of diffusion figures in gelatin, additional data can be obtained from the pattern obtained on a photographic plate in contact with the gelatin film. The colourless $Th(NO_3)_4$ aureole has thus been shown to have distinct diffusion zones. The autophotographic pattern of a gelatin film, impregnated with $BaCl_2$ solution containing Ra, after electrolysis to almost zero conductivity, shows a distribution of radioactive material corresponding with the relative opacity of the film. J. W. S.

Photo-decomposition of gaseous ethyl iodide and a comparison of the photo-change in the gaseous and condensed states. W. West and E. Ginsburg (J. Amer. Chem. Soc., 1934, **56**, 2626—2630).—The quantum yield (I) is $< 0{\cdot}01$ in the continuous spectrum, about 2600 Å., increases to about 0·1 at 2026 Å. in the band spectrum at about 90 mm. pressure, and is lower in this region at 0·1 mm. In the continuous region, liquid EtI and its solution in hexane have much higher (I) than the gas (about 0·6), whilst at 2026 Å. (I) in the liquid is about 0·24. Rise in temp. by 10° does not appreciably change (I) at 2026 Å. The mechanism is discussed. E. S. H.

Photochemical studies. XX. Photochemical decomposition of acetone in the Schumann region. W. M. Manning (J. Amer. Chem. Soc., 1934, **56**, 2589—2594; cf. A., 1933, 792).—The proportion of CO, H_2, CH_4, C_2H_4, and C_2H_6 produced at different initial pressures has been determined. The products and rate of reaction vary with the pressure. More H_2 is produced by decomp. in the Schumann region than when light in the near ultra-violet is used. E. S. H.

Photochemical changes of *l*-aspartic acid, *l*-asparagine, and chemically related substances by *X*-rays and ultra-violet light. J. P. Becker (Strahlenther., 1934, **50**, 357—363; Chem. Zentr., 1934, ii, 1422).—*l*-Aspartic acid (I) when irradiated with *X*-rays and dissolved in 0·1*N*-NaOH gave an absorption max. at 2650 Å., not observed with *l*-asparagine (II), *l*-malic acid, or cinnamic acid after similar treatment. Irradiation of (II) in solution gave a similar max. at 2750 Å. Ultra-violet illumination of an aq. NaOH solution of (I) gave a max. absorption at 2650 Å. H. J. E.

Photochemical process for measuring ultra-violet radiation. H. Schreiber (Meteorolog. Z., 1933, 399—402; Chem. Zentr., 1934, ii, 986).—The $COMe_2$ method of Friedrich and Bender (Meteorolog. Z., 1930, 285) has been tested and is discussed. H. J. E.

Photo-bromination of α-phenylcinnamic acid. A. Berthoud and D. Porret (Helv. Chim. Acta, 1934, **17**, 1548—1557).—The speed of this reaction, at 25° and in blue light, is greatly increased if the CCl_4 used as a solvent is first acted on by Cl_2 in the light for 8 hr., treatment which appears to destroy a negative catalyst present in material purified in the usual way. The velocity $\propto I^{0{\cdot}89}[Br_2][A]^{0{\cdot}70}$ for total absorption and $I^{0{\cdot}77}[Br_2]^{1{\cdot}66}[A]^{0{\cdot}70}$ for weak absorption (I=intensity, A=unsaturated acid), the reaction thus differing from other similar brominations. The difference is attributed to simultaneous reactions leading to the formation of more highly brominated compounds. F. L. U.

Combined action of ultra-violet light and platinum on transformation of fumaric and maleic acids and their salts. F. Berezovskaja, M. Kogon, and E. Moskalenskaja (Compt. rend. Acad. Sci. U.R.S.S., 1934, **4**, 50—56).—Conductivity measurements show that this combined action does not transform fumaric (I) into maleic (II) acid, but produces decomp. by adsorption at the Pt surface; a similar effect was observed with (II) and the Ba salt of (I), but the Ba salt of (II) showed no decomp. A. B. D. C.

Photochemical decomposition of glycine. Influence of the medium and wave-length. V. Henri, C. Weizmann, and Y. Hirshberg (Compt. rend., 1934, **199**, 1205—1207; cf. A., 1934, 264).—The decomp. rate has a max. at p_H 3 and a min. at p_H 6. The effective wave-length is < 2478 Å. Extinction coeff. measurements before and after irradiation are recorded. H. J. E.

Photosynthesis of amino-acids. N. R. Dhar and S. K. Mukherji (J. Indian Chem. Soc., 1934, **11**, 727—735).—Details are given of results already published (A., 1934, 1208). Coloured inorg. salts increase the photosynthesis. Of several NH_4 salts of org. acids, only the lactate affords an NH_2-acid on illumination in presence of TiO_2. J. G. A. G.

Kinetics of photosynthesis. E. C. C. Baly (Nature, 1934, **134**, 933).—A reply to criticism (A., 1934, 1078). L. S. T.

Mechanism of the action of light on selenium electrolytic photo-cells. R. Audubert and J. Roulleau (J. Chim. phys., 1934, **31**, 553—558).—A detailed account of work already noted (A., 1934, 584).

Lithium cobaltinitrite. S. Kikuchi (Compt. rend., 1934, **199**, 1414—1416).—On mixing aq. $LiNO_2$ [prepared from $Ba(NO_2)_2,H_2O$, 82 g., and Li_2SO_4,H_2O, 43 g.] with aq. $Co(NO_3)_2$ (28 g.) and acidifying with 50% AcOH (20 c.c.), an orange-yellow solution is obtained which on evaporation under reduced pressure deposits orange-yellow prismatic crystals of *Li cobaltinitrite*, $Li_3Co(NO_2)_6,8H_2O$, decomp. $< 100°$. It is very hygroscopic and is sol. in EtOH and EtOH–Et_2O mixtures, but not in pure Et_2O. On addition of a K salt to its aq. solution a ppt. of $K_3Co(NO_2)_6$ is formed even when the Li : K ratio is 200 : 1. J. W. S.

Interaction of alkali chlorides with calcium nitrate in liquid ammonia. A. Guyer, A. Bieler,

and E. Schmid (Helv. Chim. Acta, 1934, **17**, 1538—1544; cf. this vol., 26).—The reaction $2NaCl+Ca(NO_3)_2=2NaNO_3+CaCl_2$ is nearly quant. at 0° in NH_3 containing $\not>$ 15% of H_2O, owing to formation of $CaCl_2,8NH_3$ which is only slightly sol. in NH_3. The concn. must be such that $NaNO_3$ remains dissolved. At lower temp., and with anhyd. NH_3, the reaction is more rapid in consequence of the greater solubility of NaCl and, below —20°, of $NaCl,5NH_3$. The reaction with KCl is incomplete and much slower. F. L. U.

Preparation of pure sodium fluoride. I. Tananaev (J. Appl. Chem. Russ., 1934, **7**, 729—730).—40—45 g. of impure NaF are dissolved in 1000 c.c. of H_2O, 15—20 g. of KCl added, and the solution is filtered after 2—3 days. The filtrate is free from Na_2SiF_6 if the red colour obtained by adding a drop of 0·1*N*-NaOH and of phenolphthalein persists after boiling; if not, more KCl should be added. The filtrate is conc. to 100 c.c. in a Pt vessel and the pptd. NaF washed free from Cl′ and dried at 150°. Yield 55—60%. R. T.

Synthesis of sodium cyanamide and sodium cyanide under pressure. I. Sodium cyanamide. K. Sakurazawa, M. Handa, and R. Hara (J. Soc. Chem. Ind. Japan, 1934, **37**, 701—702B).—Approx. 100% yields of Na_2CN_2 may be obtained by the reaction $NaCN+Na+0{\cdot}5N_2\longrightarrow Na_2CN_2$ under suitable conditions, *e.g.*, 620°, 83 atm., 120 min., with Fe as catalyst. The equilibrium pressure rises rapidly with % Na_2CN_2 in the mixture. A. G.

Action of halogen compounds on alkali iodide solutions. A. Perret and R. Perrot (Bull. Soc. chim., 1934, [v], **1**, 1531—1548).—The oxidising powers of the halogen compounds have been investigated by means of the I liberated or determined in the reactions with neutral, acid, and alkaline aq. and $COMe_2$ solutions of KI or NaI alone, and with excess of $Na_2S_2O_3$, and by means of LiBr in $COMe_2$. The reaction $S_2Cl_2+2KI\longrightarrow 2S+2KCl+I_2$ proceeds to completion in 2*N*-HCl and in KI with excess of $Na_2S_2O_3$. In CCl_4, the reaction is $S_2Cl_2+2Na_2S_2O_3\longrightarrow Na_2S_4O_6+2S+2NaCl$. With neutral KI, the process $CCl_3{\cdot}SCl+2KI\longrightarrow CSCl_2+I_2+2KCl$ is complete in 20 hr., and with a mixture of KI and $Na_2S_2O_3$, 2·4—3·1 Cl atoms of $CSCl_4$ are available. $SOCl_2$ and KI afford S, and the quantity of I liberated varies with the acidity. The competing reactions are considered. The I rapidly liberated from alkaline NaI by SO_2Cl_2 oxidises the SO_3'' produced. 81% of the $PhSO_2Cl$ in a mixture of NaI in aq. $COMe_2$ and excess of $Na_2S_2O_3$ reacts: $PhSO_2Cl+2NaI\longrightarrow PhSO_2Na+I_2+NaCl$, and $(PhSO_2{\cdot})_2$ is not formed. With $CCl_3{\cdot}SO_2Cl$, I is liberated quantitatively from NaI in $COMe_2$ thus: $CCl_3{\cdot}SO_2Cl+2NaI\longrightarrow CCl_3{\cdot}SO_2Na+I_2+NaCl$. By analogy with the action of $COCl_2$ on NaI, BzCl liberates small quantities of I from NaI in anhyd. $COMe_2$. Although I is not liberated by treating aq. NaI with $(\cdot COCl)_2$, the reaction in anhyd. $COMe_2$ is $(\cdot COCl)_2+2NaI\longrightarrow 2NaCl+I_2+2CO$. Whereas ICN and BrCN liberate I quantitatively from acid KI, there is a deficiency with ClCN owing to hydrolysis. Ph_3CCl reacts with NaI in anhyd. $COMe_2$ mainly thus: $2CPh_3Cl+2NaI+2COMe_2\longrightarrow CPh_3{\cdot}OH+CHPh_3+2NaCl+I_2+CMe_2{:}CH{\cdot}COMe$. J. G. A. G.

Action of potassium iodide on fairly insoluble compounds. E. Montignie (Bull. Soc. chim., 1934, [v], **1**, 1405—1407).—Aq. KI reacts with $PbSO_4$, AgCl, TlCl, $Cu(CNS)_2$, Ag_3AsO_4, Ag_2CrO_4, Hg_2CrO_4, $HgCrO_4$, Tl_2CrO_4, and $Bi_2(CrO_4)_3$, but not with $BaCrO_4$ or $PbCrO_4$. F. L. U.

Action of potassamide on sulphur in liquid ammonia. F. W. Bergstrom (Z. anorg. Chem., 1934, **221**, 113—123; cf. A., 1934, 1110).—When S is added gradually to KNH_2 dissolved in liquid NH_3 at —33° in presence of Fe as catalyst, a yellow ppt. is at first formed which dissolves on further addition of S. The reaction at first is $6KNH_2+3S=2K_2S+S(NK)_2,NH_3+3NH_3$, and subsequently $6KNH_2+12S=2K_2S_4+S_4(NK)_2+4NH_3$. If the reaction takes place slowly K_2S_3 is formed. F. L. U.

Compounds of magnesium chloride with organic compounds. I. Compounds with alcohols and acetic acid. L. J. Olmer and (Mlle.) M. L. Quinet (Bull. Soc. chim., 1934, [v], **1**, 1579—1584).—Optimal conditions for preparing anhyd. $MgCl_2$ (I) from $MgCl_2,NH_4Cl,6H_2O$ are defined. By evaporating or by adding Et_2O to solutions of (I) in the appropriate alcohol, the following *compounds* were obtained: $MgCl_2,6MeOH$ (II), m.p. 115—120°, $MgCl_2,6EtOH$ (III), m.p. 72—77°, $MgCl_2,6Pr^{\alpha}OH$, $MgCl_2,6Bu^{\alpha}OH$, m.p. 55—60°, and a substance containing (I) and $CH_2Bu^{\beta}{\cdot}OH$. Et_2O ppts. from a mixture of alcohols the compound containing the alcohol with the lowest mol. wt. In vac., thermal decomp. of (II) and (III) affords variable proportions of HCl, the alkyl chloride, $MgCl_2$, MgO, $MgCO_3$, and C. $MgCl_2,6H_2O$ and AcCl or Ac_2O afford $MgCl_2,6AcOH$ (IV), m.p. 85—90°, at low temp. and $MgCl_2,4AcOH$ (V), m.p. 110°, at >80°. At the m.p. (IV) changes into (V), which is decomposed by heat into variable proportions of $MgCl_2$, $Mg(OAc)_2$, HCl, $MgCO_3$, and C. J. G. A. G.

Dissociation of magnesium chromate. I. G. Riss and R. G. Uritzkaja (Compt. rend. Acad. Sci. U.R.S.S., 1934, **4**, 213—217).—The prep. of pure anhyd. $MgCrO_4$ is described. Thermal decomp. follows the reactions $2MgCrO_4=2MgO,Cr_2O_3+1{\cdot}5O_2$; $2MgO,Cr_2O_3=MgO+MgO,Cr_2O_3$. H_2 reacts at 300° with inflammation. The dissociation pressure of $MgCrO_4$ is given by $\log p_{mm.}=-16{,}488/T+23{\cdot}271$; the heat of dissociation is 75,370 g.-cal. per mol. of O_2. E. S. H.

Hydrates of calcium aluminates, sulphatoaluminates, and chloroaluminates. J. Lefol (Compt. rend., 1934, **199**, 1412—1414; cf. A., 1934, 31, 853).—$Al_2O_3,4CaO,12H_2O$ passes into $Al_2O_3,4CaO,8H_2O$ in a dry atm. The reaction is reversible. $Al_2O_3,3CaO,6H_2O$, cubic, is very stable and does not lose H_2O even at a relatively low H_2O v.p. $Al_2O_3,2CaO,8H_2O$ gains or loses H_2O readily according to the H_2O v.p. in the atm. The hydrate $Al_2O_3,2CaO,5H_2O$ has been identified, but its formation is not reversible. $Al_2O_3,3CaO,3CaSO_4,30H_2O$ and $Al_2O_3,3CaO,CaCl_2,10H_2O$ are stable hydrates which in a dry atm. pass into $Al_2O_3,3CaO,3CaSO_4,7H_2O$

and $Al_2O_3,3CaO,CaCl_2,6H_2O$, respectively. The change is reversible for the latter compound, but not for the former. J. W. S.

Brick-red zinc oxide. A. KUTZELNIGG (Z. anorg. Chem., 1934, **221**, 46—48; cf. A., 1933, 239).—The red ZnO formed by dissolution of white ZnO in fused NH_4NO_3 and explosion is not due to the presence of an unknown N compound, since the N_2O_5 content is 0·25% and the loss in wt. on calcination only 0·28%. Under the microscope the cryst. form is similar to that of ZnO prepared by the decomp. of $Zn(NO_3)_2$. The magnetic susceptibility of the red ZnO is $-0{\cdot}20 \times 10^{-6}$ with 4 amp. and $-0{\cdot}25 \times 10^{-6}$ with 5 amp. The temp. of formation is $> 300°$. By heating above this temp. up to 540° the colour is gradually destroyed. No similar coloured oxide could be obtained by replacing ZnO by MgO, BeO, SnO_2, or SiO_2, or NH_4NO_3 by NH_4ClO_4. By decomp. at a lower temp. the residue from the evaporation of aq. $Zn(ClO_3)_2$ or $Zn(ClO_4)_2$ a S-yellow compound is obtained. M. S. B.

Complex [cadmium and zinc] compounds [with pyridine and quinoline].—See this vol., 222.

Preparation of metallic barium and its amalgams. V. D. POLJAKOV (J. Appl. Chem. Russ., 1934, **7**, 731—735).—Ba amalgam, prepared by electrolysing saturated aq. $BaCl_2$ with a Hg cathode (Mo connexion) and a graphite anode (0·28 amp. per sq. cm. of Hg surface for 3 hr.), is vac.-distilled in an Fe apparatus for 6 hr., gradually raising the temp. to 850°, when a product containing 10% Hg remains. This is gradually heated to 1000° in a second still (8 hr.), with a vac. of 10^{-3} mm. The residue, containing 0·02—0·2% Hg, m.p. 650°, is sealed in Cu tubes under A. H_2 combines very energetically with Ba or its amalgam. R. T.

Boron arsenate. W. C. SCHUMB and W. H. HARTFORD (J. Amer. Chem. Soc., 1934, **56**, 2646).—$BAsO_4$, prepared by boiling an aq. solution containing H_3AsO_4 and H_3BO_3, has d 3·40, n_D 1·66. It is readily hydrolysed and is slightly decomposed at red heat without melting. E. S. H.

Preparation of pure gallium. J. I. HOFFMAN (J. Res. Nat. Bur. Stand., 1934, **13**, 665—672).—A HCl solution of the specimen is extracted with Et_2O, which dissolves the chlorides of Ga, Mo, Au, Fe, Tl, and traces of other elements. Sb, As, Bi, Cd, Cu, Ge, Au, Hg, Ag, and Sn and most of the Pb, Mo, and Rh are pptd. with H_2S from an acid solution of the Et_2O extract. Fe and Tl are then pptd. with aq. NaOH and filtered off, Ga being deposited electrolytically on Pt from the alkaline filtrate. Final purification from traces of Pb and In is effected by fractional crystallisation. Pure Ga separates first. Recovery of the Ga residues is described. H. J. E.

Preparation of pure europium, gadolinium, and terbium compounds. J. K. MARSH (J.C.S., 1934, 1972—1974).—Pure $EuSO_4$ can be separated quantitatively from a mixture of earths containing 3% Eu by electrolysing once, or at most twice, with an amalgamated Pb cathode of large area. Gd may be purified by fractionation of double Mg nitrates with the addition of much $Bi(NO_3)_3$. Pure Tb is prepared by preliminary concn. as bromate and fractional crystallisation of the Me_2 phosphates. The possible influence of changes of lattice dimensions during fractionation is discussed. M. S. B.

Double sulphates of the rare-earth and alkali metals. Sulphates of praseodymium and potassium, of praseodymium and rubidium, of praseodymium and cæsium, and of samarium and sodium. S. RESTAINO (Atti R. Accad. Lincei, 1934, [vi], **20**, 192—200).—Investigation of the systems M_2SO_4–$Pr_2(SO_4)_3$–H_2O and Na_2SO_4–$Sm_2(SO_4)_3$–H_2O at 25° (M=K, Rb, Cs) shows the formation of the compounds $xPr_2(SO_4)_3,yK_2SO_4,zH_2O$ with x, y, z=1, 5, 1; 1, 4·5, 0; 1, 4, 1; 1, 3, 2; 2, 3, 8; and 1, 1, 2, respectively; $Pr_2(SO_4)_3,Rb_2SO_4,8H_2O$; $Pr_2(SO_4)_3,Cs_2SO_4,8H_2O$; $Sm_2(SO_4)_3,Na_2SO_4,2H_2O$; and $4Sm_2(SO_4)_3,5Na_2SO_4,8H_2O$. O. J. W.

Reactivity of solids. III. Combustion of carbon. K. FISCHBECK (Z. Elektrochem., 1935, **41**, 60—66).—A review.

Carbonyl fluoride COF_2. O. RUFF and G. MILTSCHITZKY (Z. anorg. Chem., 1934, **221**, 154—158).—CO and F_2 combine explosively when sparked at atm. pressure, and COF_2 can be prepared by feeding F_2 into CO through a spark gap. O_2 present in the F_2 forms CO_2 which cannot afterwards be separated from the COF_2. Pure COF_2, obtained by passing CO over AgF_2, has m.p. $-114{\cdot}0 \pm 0{\cdot}3°$, b.p. $-83{\cdot}1 \pm 0{\cdot}5°$. V.p. is given by $\log p = 7{\cdot}3231 - 843{\cdot}05/T$ (mm.) and $d = 1{\cdot}809 - 0{\cdot}00420T$. COF_2 is hydrolysed with extreme readiness. Other chemical properties are described. F. L. U.

Action of titanium tetrachloride on organic nitrogen compounds. O. C. DERMER and W. C. FERNELIUS (Z. anorg. Chem., 1934, **221**, 83—96).—The following mol. *compounds* have been obtained by the addition of an org. base to a solution of $TiCl_4$ in C_6H_6 or $CHCl_3$: $TiCl_4,NHPh_2$, $TiCl_4,2NAcPh_2$, $TiCl_4,2(CH_2{\cdot}CO)_2NH$, $TiCl_4,C_6H_4Me{\cdot}SO_2{\cdot}NH_2(p)$, $TiCl_4,CHPh{:}NPh$, $TiCl_4,CPh_2{:}NPh$, $3TiCl_4.2NPh{:}NPh$, $TiCl_4,NPh{:}N{\cdot}C_6H_4{\cdot}OBz$, $TiCl_4,NPh{:}N{\cdot}NHPh$, $3TiCl_4,2PhN{:}N{\cdot}NPh_2$, $TiCl_4,2C_5H_5N$, $TiCl_4,2C_9H_7N$, $TiCl_4,4C_6H_7N$ (γ-picoline), $TiCl_4,C_5H_{10}N$. Liquid $TiCl_4$ and $C_6H_2(NO_2)_3{\cdot}OH$ give $Cl_2Ti[O{\cdot}C_6H_2(NO_2)_3]_2$. By the action of $NH(CH_2Ph)_2$ and excess of CS_2 on $TiCl_4$ a *compound*, $Ti[S{\cdot}CS{\cdot}N(CH_2Ph)_2]_4$ is obtained. NPh_2K and $TiCl_4$ give $Ti[NPh_2]_4$. The mol. wts. of $CPh_2{:}NPh$, $COPh_2$, and $NPh{:}NPh$ in boiling $TiCl_4$ have been determined, but owing to the volatility of the solute too high vals. have been obtained for the first two. M. S. B.

Zirconium and hafnium tetrafluorides. G. VON HEVESY and W. DULLENKOPF (Z. anorg. Chem., 1934, **221**, 161—166; cf. A., 1930, 1362).—The crystallographic characters of ZrF_4 and HfF_4 are recorded. The electrical conductivity of solid ZrF_4 has been measured and found to be due almost entirely to F ions. HfF_4 can be partly separated from ZrF_4 by fractional sublimation, or by distillation of their solution in fused K_2ZrF_6. They are conveniently separated from Fe and other impurities by sublimation. F. L. U.

NO_3F, an explosive compound. G. H. Cady (J. Amer. Chem. Soc., 1934, **56**, 2635—2637).—Reaction of F_2 with dil. HNO_3 produces a gaseous *compound*, NO_3F, b.p. −42°, which explodes when heated. NO_3F reacts slowly with H_2O, liberating O_2, and liberates I from aq. KI. E. S. H.

Nitrogen selenide. W. Strecker and H. E. Schwarzkopf (Z. anorg. Chem., 1934, **221**, 193—198).—Pure $(NSe)_x$ can be prepared by the action of dry NH_3 on Et_2SeO_3 or Me_2SeO_3 dissolved in C_6H_6, and removal of the accompanying SeO_2 and Se by 10% KCN. The product is usually orange-red and amorphous, and has been obtained cryst. in monoclinic prisms analogous to N_4S_4 on one occasion only. It is highly explosive. Chlorination yields mainly $SeCl_4$. Dry HCl gives $SeCl_4$, NH_4Cl, $(NH_4)_2SeO_3$, and H_2Se. The Cl_2 and HCl used in these reactions must be greatly diluted with CO_2. F. L. U.

Absorption of oxygen by phosphorus. C. T. Kingzett (Analyst, 1934, **59**, 816; cf. A., 1934, 1186).—Attention is directed to previous work by the author (J.C.S., 1880, **37**, 792). E. C. S.

Production of pure, finely-divided vanadium. T. Döring and J. Geiler (Z. anorg. Chem., 1934, **221**, 56—62).—A method for the prep. of very pure V by the reduction of VCl_3 with pure H_2 at approx. 900° is described. M. S. B.

Decomposition of arsine by fine fibrous materials. G. Lockemann (Z. anal. Chem., 1934, **99**, 178—180).—Polemical against Gangl *et al.* (A., 1934, 1084). J. S. A.

Preparation of pure oxygen for laboratory use. J. Krutzsch and H. Kahle (Chem. Fabr., 1934, 7, 452—453).—The decomp. of H_2O_2 in a vessel of relatively small vol., leaving little free gas space, is accelerated by the presence of beads. An apparatus suitable for generating 10—50 c.c. per hr. is described. J. W. S.

Oxygen preparation from sodium peroxide. G. H. Cheesman and D. R. Duncan (Nature, 1934, **134**, 971).—An explosion under conditions similar to those previously described (this vol., 51) is reported. L. S. T.

Yellow coloration of hydrochloric acid containing selenium. H. Ditz and F. Ullrich (Z. anorg. Chem., 1934, **221**, 33—45).—Although Se is practically insol. in pure conc. HCl, it dissolves in HCl solutions of SeO_2 giving an intense yellow coloration due to the formation of Se_2Cl_2 in solution. The extent of the reaction may be studied quantitatively by titrating solutions of SeO_2 in HCl with $SnCl_2$ until a faint cloudiness due to the separation of Se appears. The Se formed by reduction of SeO_2 redissolves giving Se_2Cl_2. In approx. 37% HCl the Se_2Cl_2 formed is about 90% of the theoretical quantity. This freshly reduced Se is more sol. than powdered or pptd. Se. M. S. B.

Tellurium nitride. W. Strecker and C. Mahr (Z. anorg. Chem., 1934, **221**, 199—208; cf. A., 1926, 137).—By the long-continued action of liquid NH_3 on $TeBr_4$ a yellow powder is obtained which, after removal of NH_3, explodes on contact with H_2O. The latter property is due to heat of wetting resulting from its fine state of division. Analysis leads to the formula Te_3N_4 as previously surmised (A., 1926, 137); it is therefore not analogous to the S and Se compounds. The reaction with Br is very incomplete and yields chiefly $TeBr_4$. When the substance is suspended in Et_2O and treated with Br, the resulting HBr forms $(NH_4)_2TeBr_6$. Dry HCl reacts with the solid to give $(NH_4)_2TeCl_6$. F. L. U.

Hydrolysis of inorganic salts and chemistry of high-molecular hydrolysis products (including iso- and hetero-poly-compounds. I. G. Jander and K. F. Jahr (Kolloid-Beih., 1934, **41**, 1—57).—A summary of published work, especially on the complex oxy-acids of W, Mo, V, Ta, and Si. E. S. H.

Oxidation of manganous sulphate by hydrogen peroxide in an alkaline medium. P. Dubois (Compt. rend., 1934, **199**, 1310—1313).—The effect of p_H, $[H_2O_2]$, [aq. NH_3], and [KOH] on the composition of the ppt. was studied. With aq. NH_3 or KOH the ppt. is hydrated Mn_2O_3. With excess of KOH the composition varies between $MnO_{1\cdot5}$ and $MnO_{1\cdot8}$, and the ppt. retains KOH after washing. Excess of H_2O_2 gave the same results. H. J. E.

Hydrate and allotropic forms of manganese sesquioxide. P. Dubois (Compt. rend., 1934, **199**, 1416—1418).—Oxidation of $MnSO_4$ by H_2O_2 in presence of NH_3 yields Mn_2O_3 in a form which appears colloidal, but is cryst. to *X*-rays. When heated in air this tends to yield MnO_2, but the reaction is never complete. In absence of air, the α-form of Mn_2O_3 is formed, this being oxidised on heating in air. When heated to 600°, however, it passes into the normal β-form of Mn_2O_5, which is not oxidised by heating in air. The *X*-ray diagram of α-Mn_2O_3 is very similar to that of Mn_3O_4 resulting from the thermal decomp. of β-Mn_2O_3. J. W. S.

Complex sulphates. H. Brintzinger and H. Osswald (Z. anorg. Chem., 1934, **221**, 21—24).—By dialysis of solutions of the sulphates of bi- or tervalent metals containing excess of alkali or NH_4 sulphates it is shown that the following ions exist: $[M_2(SO_4)_4]''''$ (M=Mn, Fe, Co, Ni, Cu, Zn, Cd, or Mg) and $[Fe_3(SO_4)_6]'''$. The possibility that the effects observed may be due to heavily hydrated metallic ions is excluded by experiments to be described later. M. S. B.

Frictional oxidation [of metals]. F. Roll and W. Pulewka (Z. anorg. Chem., 1934, **221**, 177—181).—Oxidation occurring when a metal specimen is pressed against a revolving steel plate has been studied with respect to pressure and speed of rotation. The zones of Fe_2O_3 and Fe_3O_4 formed are related to the temp. produced by the friction, contrary to the statement of Fink and Hoffmann (A., 1933, 241). F. L. U.

Preparation of [iron–tin] alloys. P. Pingault (Compt. rend., 1934, **199**, 1223—1225).—The compound $FeSn_2$ (I) is formed by heating Sn with aq. $ZnCl_2$ containing 340 g. of $FeCl_2$ per litre at $< 300°$. (I) is also formed by the direct action of $FeCl_2$ on Sn at $< 300°$. H. J. E.

Intermediate compounds between ferrocyanides and ferroammines. A. G. Barbieri

(Atti R. Accad. Lincei, 1934, [vi], **20**, 273—278).—By the action of KCN on $[Fe(C_{10}H_8N_2)_3]Br_2,6H_2O$ in solution reddish-violet *crystals* of $[Fe(C_{10}H_8N_2)_2(CN)_2]3H_2O$ (I) are obtained. Prolonged warming of (I) with conc. aq. KCN gives orange-brown *crystals* of $[Fe(C_{10}H_8N_2)(CN)_4]K_2,3H_2O$ (II). From a solution of (II) the free *acid*, $[Fe(C_{10}H_8N_2)(CN)_4]H_2,2H_2O$ is obtained as a yellow ppt. by the addition of a mineral acid. With *o*-phenanthroline instead of dipyridyl the *compounds* corresponding with (I) and (II) have been prepared. Magnetic susceptibility measurements for the above compounds are recorded. O. J. W.

Influence of temperature on the formation of additive compounds. G. Scagliarini and M. Ragno (Atti R. Accad. Lincei, 1934, [vi], **20**, 278—282).—From solutions of CoX_2 (X=Cl, Br) in C_5H_5N which have been kept at 70—80° for several hr., the compounds $CoX_2,2C_5H_5N$ crystallise out, whereas from cold solutions the compounds $CoX_2,4C_5H_5N$ are obtained. The transition points for the changes $M(SCN)_2,4H_2O,2C_6H_{12}N_4 \longrightarrow M(SCN)_2,4H_2O,C_6H_{12}N_4$ (M=Co, Ni, Fe) and $MX_2,10H_2O,2C_6H_{12}N_4 \longrightarrow MX_2,4H_2O,2C_6H_{12}N_4$ (MX_2=$CoBr_2$, $CoCl_2$, or $NiCl_2$) are < 80°. O. J. W.

Influence of substituents in bases and anions on the co-ordination index of a metal. VI. Additive products of benzylamine and phenylhydrazine with the nickel salts of substituted acetic acids. A. Ablov (Bull. Soc. chim., 1934, [v], **1**, 1489—1494; cf. A., 1934, 1083).—The following *compounds* are described: $Ni(OAc)_2,4CH_2Ph{\cdot}NH_2,H_2O$; $(CH_2Ph{\cdot}CO_2)_2Ni,4CH_2Ph{\cdot}NH_2$; $(CH_2Cl{\cdot}CO_2)_2Ni,4CH_2Ph{\cdot}NH_2$; $(CHCl_2{\cdot}CO_2)_2Ni,4CH_2Ph{\cdot}NH_2$; $(CCl_3{\cdot}CO_2)_2Ni,4CH_2Ph{\cdot}NH_2$; $(CN{\cdot}CH_2{\cdot}CO_2)_2Ni,4CH_2Ph{\cdot}NH_2$; $Ni(OAc)_2,4NHPh{\cdot}NH_2$; $(CH_2Ph{\cdot}CO_2)_2Ni,4NHPh{\cdot}NH_2,3H_2O$; $(CH_2Cl{\cdot}CO_2)_2Ni,4NHPh{\cdot}NH_2$; $(CHCl_2{\cdot}CO_2)_2Ni,4NHPh{\cdot}NH_2$; $(CCl_3{\cdot}CO_2)_2Ni,4NHPh{\cdot}NH_2$; $(CN{\cdot}CH_2{\cdot}CO_2)_2Ni,4NHPh{\cdot}NH_2$. These salts probably have the constitution $[Ni(base)_4]X_2$, and the constancy of the no. of base mols. co-ordinated (cf. the variable no. of C_5H_5N which co-ordinate; A., 1934, 1084) is attributed to the higher energy of addition of $CH_2Ph{\cdot}NH_2$ arising from the greater deformability of the $\cdot NH_2$ group. J. G. A. G.

Constitution of thiosemicarbazide compounds of nickel. See this vol., 202.

Thiosemicarbazide compounds of bivalent palladium and platinum.—See this vol., 202.

Red tetraethylamminoplatinum chloride. H. Reihlen and E. Flohr (Ber., 1934, **67**, [*B*], 2010—2017; cf. Hantzsch *et al.*, A., 1930, 440).—Treatment of aq. K_2PtCl_4 with 2 mols. of NH_2Et at 15—20° until the solution becomes colourless and with a further 2 mols. at 65—70° affords tetraethylammineplatinum chloride (I), $[Pt\,ae_4]Cl_2,2H_2O$ (ae=NH_2Et) in 93% yield. (I) is transformed by 3% H_2O_2 and 5*N*-HCl into the red salt (II) $[Pt\,ae_4]Cl_2,[Pt\,ae_4Cl_2]Cl_2,4H_2O$, m.p. 177°, which does not react with dil. HNO_3, is transformed by HCl into the *compound* $[Pt\,ae_2Cl_2]$, and in acid solution liberates 1 atom of I per atom of Pt from KI. (II) is converted by Na_2PtCl_6 in cold solution into the *compounds*, $[Pt\,ae_4][PtCl_6]$ and $[Pt\,ae_4Cl_2][PtCl_6]$. With excess of K_2PtCl_6 (II) is completely transformed into the sparingly sol., violet-red *compound* $[Pt\,ae_2][PtCl_4]$. (II) and $Ag_2C_2O_4$ afford the *salt* $[Pt\,ae_4]C_2O_4$. H. W.

Varying valency of platinum with respect to mercaptanic radicals. VIII. (Sir) P. C. Ray and N. N. Ghose (J. Indian Chem. Soc., 1934, **11**, 737—742; cf. A., 1928, 44, 751).—The *product* of the interaction in EtOH solution of $(SEt{\cdot}CH_2{\cdot})_2$ (=es) and H_2PtCl_6 is $Pt\,esCl_3$ (I), m.p. 180—182° (decomp.), which is converted into $Pt\,esCl_2$ (II) by heating with $NPhMe_2$ and into the *compound* $Pt\,esCl_4$ (III), m.p. 230° (decomp.), by heating with fuming HCl and H_2O_2. C_5H_5N and (I) afford $[Pt(C_5H_5N)]Cl_2$ (IV) and the *substance* $Pt(C_5H_5N)Cl_3$, m.p. 261—265° (decomp.), (II) gives (IV), and (III) yields $[Pt(C_5H_5N)_2Cl_4]$. ($\cdot CH_2{\cdot}NH_2)_2$ (=en) produces $[Pt\,en_2]Cl_2$ with (I), (II), and (III), whilst aq. NH_3 and (III) afford $[Pt(NH_3)_4]Cl_2$. The results show that (I) is neither a mixture nor a mol. compound of (II) and (III), and (II) and (III) are probably best represented by the formulæ $[esPtCl_2]$ and $[esPtCl_4]$, respectively. J. G. A. G.

New indicators and other reagents employed in volumetric analysis. A. D. Mitchell (Inst. Chem., 1934, 21 pp.).—A lecture.

Polarimetric methods in chemistry. T. M. Lowry (Nature, 1934, **134**, 920—921, 958—960).—An address to the British Association. L. S. T.

Methylal as a solvent in analytical chemistry. L. Espil (Bull. Soc. chim., 1934, [v], **1**, 1502—1503).—The purification of technical methylal (I) is described. The range of complete miscibility with H_2O of (I) is ≫ of Et_2O (II). (I) extracts AcOH, lactic, succinic, citric, malic, and tartaric acids from aq. solution acidified with H_2SO_4, and the process is facilitated by saturating with Na_2SO_4. The advantages of (I) over (II) are emphasised and distribution data are recorded. J. G. A. G.

Determination of small concentrations. VII. Potentiometric acid and alkali determinations. E. V. Teis and O. R. Vagner (J. Gen. Chem. Russ., 1934, **4**, 927—935).—The potentiometric titration of acids by alkalis (Cu and W electrodes) gives more accurate results than when alkalis are titrated, in particular when carbonates are present. R. T.

Colorimetric determination of p_H with the Pulfrich photometer. I. S. Hahnel (Svensk Kem. Tidskr., 1934, **46**, 262—279).—Details of a method for two-colour indicators using two wavelengths are given. With sulphonephthalein indicators the p_H can be calc. from the measured absorption vals. by the theoretical equations. With thymol-blue in acid solution and with Me-red empirical equations must be used; this is probably due to the existence of > two forms of the indicator. A series of indicators is given for measurements from p_H 1·0 to 10·0. R. P. B.

Potentiometric and conductometric studies. II. Conductometric. J. Pieper (Z. Elektrochem.,

1934, **40**, 844—857).—Graphical methods of determining the equivalence point in conductometric titrations are discussed critically, and it is shown how more satisfactory results may be obtained by calculation. Both methods being empirical, the procedure to be followed in a particular experiment must be established by a preliminary titration with standardised solutions, and as far as possible identical conditions maintained. The neutralisation point in NaOH containing Na_2CO_3 can be determined only with difficulty, and the transition of Na_2CO_3 to $NaHCO_3$ not at all. The choice of apparatus is also discussed. F. L. U.

Mercurimetric determination of halogens. A. Ionescu-Matiu and S. Herscovici (Bull. Soc. chim., 1934, [v], **1**, 1379—1386; cf. A., 1933, 1023).—The authors' method has been applied to the volumetric determination of the halogens, including F. The procedure is described in detail. The degree of precision attained is the same as in the classical methods. F. L. U.

Semi-micro-volumetric determination of halogens. (Sodium–higher alcohol method.) W. Kimura (J. Soc. Chem. Ind. Japan, 1934, **37**, 590—591B; cf. A., 1928, 82).—The halogen compound is reduced with Na and a higher alcohol (best $CH_2Ph{\cdot}OH$). The resulting Na halide is determined volumetrically by Volhard's method. H. N. R.

Influence of higher alcohols and of ether on the titration of halogens by Volhard's method. W. Kimura (J. Soc. Chem. Ind. Japan, 1934, **37**, 589—590B).—The influence is negligible. H. N. R.

Accurate quantitative analysis of chlorides in presence of thiocyanates. E. Cohen and K. Piepenbroek (Z. anal. Chem., 1934, **99**, 258—269).—Schulek's iodometric method (A., 1923, ii, 591), and oxidation of CNS′ by means of HNO_3 according to Rosanoff and Hill (A., 1907, ii, 984) are satisfactory. Oxidation of CNS′ with H_2O_2 in acid solution (cf. A., 1915, ii, 124) gave accurate results only when the amount of acid was reduced to 1 c.c. of $4N$-H_2SO_4 in 60 c.c. of liquid. J. S. A.

Determination of perchlorates. C. Smeets (Natuurwetensch. Tijds., 1934, **16**, 262—266).—The best conditions for determining ClO_4' in presence of various interfering ions have been investigated. If only Li, Na, Ni, Co, Zn, Cd, Pb, Al, Cr, and/or Fe are present, a sample containing 0·2—0·3 g. of perchlorate may be dissolved in $\geqslant$ 10 c.c. of EtOH ($\leqslant$ 96% and preferably abs.) and 5—7 c.c. of cold saturated KOAc in EtOH added. After a short time, the pptd. $KClO_4$ is collected and dried at 130°. This method cannot be used in presence of Ag, Mg, Ca, Sr, Ba, Cu, or Mn, owing to the insolubility of their acetates in EtOH, nor in presence of NH_4 or other NH_3 derivatives, owing to the insolubility of their perchlorates. In these cases, 0·3 g. of the sample is moistened with 0·1 c.c. of distilled H_2O, 0·2—0·3 g. of Na_2CO_3 in 0·2 c.c. of H_2O added, and the mixture is evaporated to dryness. In this way the metals are converted into insol. carbonates and the NH_3 is volatilised. The $NaClO_4$ formed is then extracted by means of EtOH and the ClO_4' is pptd. as $KClO_4$. CO_3'' and SO_4'' do not interfere. If Cl' or NO_3' is present, the $NaClO_4$ should be extracted by means of dry $COMe_2$, the solution evaporated, the $NaClO_4$ redissolved in EtOH, and the ClO_4' pptd. as $KClO_4$. If ClO_3' is present, it should first be reduced to Cl'. D. R. D.

Detection of chlorine and bromine in air, gas mixtures, and solutions by formation of iris-blue. H. Eichler (Z. anal. Chem., 1934, **99**, 272—275).—Free Br and Cl_2 convert resorufin (I) into non-fluorescent halogenated iris-blue. (I) is used as its 0·1% solution in aq. Na_2CO_3. An approx. quant. determination of Cl_2 or Br in gases may be made by determining the vol. of gas (*e.g.*, measured roughly with a rubber pinch bulb) necessary to destroy the fluorescence of a measured amount of (I). J. S. A.

Cyanide–formaldehyde reaction, and new volumetric analytical applications. A. Mutschin (Z. anal. Chem., 1934, **99**, 335—348).—CH_2O reacts reversibly with KCN, giving $OH{\cdot}CH_2{\cdot}CN$ (I) (cf. A., 1925, ii, 1009). A 3-fold excess of CH_2O is necessary to remove CN' quantitatively. Reaction in acid solutions is slow. Hydrolysis of (I) takes place only extremely slowly, and is not accelerated by $MgSO_4$ (cf. A., 1925, ii, 606). Cl', Br', I', or CNS' in presence of CN' may thus be determined by adding excess of CH_2O to the neutral or alkaline solution, neutralising against Me-red, and titrating with $AgNO_3$. CH_2O may be determined by adding excess of KCN, and converting the excess into BrCN by means of Br–H_2O. Excess of Br is removed with N_2H_4,H_2SO_4, KI added, and the BrCN then determined iodometrically. J. S. A.

Application of cyanogen bromide as universal standardisation material. M. Møller (Z. anal. Chem., 1934, **99**, 351—354).—BrCN, readily obtained and preserved in analytical purity, may be used for standardisation (*a*) of $Na_2S_2O_3$, against the I liberated on dissolution in KI, (*b*) of acids, (*c*) of $AgNO_3$. For (*b*), BrCN is hydrolysed by KOH to CNO'. The solution is acidified, and CO_2 boiled off. The NH_3 formed is liberated by NaOH and distilled into the acid. The excess of acid is then titrated back. For (*c*), BrCN is dissolved in NaOH, and the solution neutralised. Br' so formed is titrated with $AgNO_3$. J. S. A.

Determination of bromide ion in presence of large quantities of chloride ion. F. P. Zorkin (J. Appl. Chem. Russ., 1934, **7**, 852—856).—Szabo's method (A., 1931, 811) is preferred. R. T.

Sensitivity of the starch–iodine reaction. I. M. Korenman (J. Appl. Chem. Russ., 1934, **7**, 847—851).—The sensitivity of the reaction is a function of the concns. of KI, I, and acid or alkali in the solution; for a given [I], $NC=k$, where N is the concn. of acid or alkali, C the [KI], and k a const. for the given acid or alkali. The colour obtained changes from blue to reddish-violet as the [KI] rises from 1 to 10%. R. T.

Potentiometric determination of minimal quantities of iodine. R. Flatt (Helv. Chim. Acta, 1934, **17**, 1494—1513).—The solution containing I', acidified with HCl, is titrated with $KBrO_3$, whereby I' is oxidised first to I (I) and then to ICl (II). A break in the potential curve occurs at the completion of (I) and a sharper one at the completion of (II). A micro-

method by which the I in 1 c.c. of liquid can be determined with a max. error of 5×10^{-8} g. is described. Apart from the high precision attainable, an advantage of the method is the absence of I from the reagents introduced, and the consequent possibility of repeated determinations on the same sample, after reduction of the ICl by $CrCl_2$. F. L. U.

Micro-iodometry. J. Renaudin and (Mme.) J. Renaudin (J. Pharm. Chim., 1934, [viii], **30**, 516—527).—Conditions and precautions for accurate work with 0·01*N* solutions are defined. The solutions should be neutral. A. E. O.

Determination of fluorine in phosphorites and apatites.—See B., 1935, 60.

Microchemical colour reaction of elementary sulphur. A. Schönberg and W. Urban (Ber., 1934, **67**, [*B*], 1999—2003).—The finely-powdered material (I) is placed in a m.p. capillary tube, covered with about 10 times its wt. of *benzyliminodi-p-anisylmethane*, m.p. 93° [obtained by the successive action of $SOCl_2$ and $NH_2\cdot CH_2Ph$ on $CO(C_6H_4\cdot OMe)_2$], and the tube is sealed. The contents are mixed by repeatedly inverting the tube and then heated at about 210° for 5 min. The cold product is dissolved in boiling C_6H_6, which if free S is present in (I) becomes blue owing to the formation of $CS(C_6H_4\cdot OMe)_n$. The intensity of the colour is diminished by adding a crystal of $HgCl_2$, which becomes red superficially. Reaction is not given by Se or by compounds of S. H. W.

Potentiometric determination of sulphates. I. I. Shukov and C. G. Raichinschtein (J. Gen. Chem. Russ., 1934, **4**, 962—968).—50 c.c. of EtOH, 0·2 c.c. of 0·0025*M*-$K_4Fe(CN)_6$, and 2 c.c. of 0·1*M*-$K_3Fe(CN)_6$ are added to 30 c.c. of aq. Na_2SO_4 (approx. 0·1*N*), a Pt electrode is introduced, and the system is connected with a HgCl electrode and titrated with 0·1*N*-$Pb(NO_3)_2$; the results differ by $\not>$ 0·04% from the theoretical. Salts enhancing the solubility of $PbSO_4$ cause high, and of $Pb_2Fe(CN)_6$ low, results to be obtained. R. T.

Detection of hyposulphites and sulphoxylates and of nascent hydrogen with resazurin. H. Eichler (Z. anal. Chem., 1934, **99**, 270—272).—Hyposulphites and sulphoxylates, also freshly pptd. $Fe(OH)_2$ and $Sn(OH)_2$, but not S_2O_3'' or SO_3'', in alkaline (Na_2CO_3) solution reduce the blue solution of resazurin (I) (fluorescing a weak brownish-red) to non-fluorescent hydroresorufin, which oxidises in contact with air to the vividly yellowish-red fluorescing resorufin. In acid solution, SO_3'', S_2O_3'', and nascent H also reduce (I). J. S. A.

Analysis of reducing acids of sulphur. E. Cherbuliez and A. Herzenstein (Helv. Chim. Acta, 1934, **17**, 1582—1587).—In the analysis of mineral waters H_2S can be determined in presence of other I-reducing substances by treatment with suspended $CdCO_3$ and iodometric titration of the CdS produced. In dil. ($\not>$ $10^{-4}N$) solution S_2O_3'' is determined by means of its catalytic effect on the interaction of NaN_3 and I, for which a simple iodometric method is described. SO_3'' is determined by adding colloidal S at p_H 6, when S_2O_3'' is formed according to $SO_3H'+S=S_2O_3''+H^*$, and is itself determined in the manner already described. F. L. U.

Determination of ammonia in water and air. A. Krogh (Biol. Bull., 1934, **67**, 126—131).—The H_2O sample is treated with 0·25*N*-NaOH to p_H 9—11 and then distilled under reduced pressure. NH_3 evolved is absorbed in dil. HBr, the aq. NH_4Br is treated with a definite vol. of standard aq. NaOBr at p_H 8·5—9, and the excess of NaOBr titrated with 0·0005*N*-naphthyl-red solution, which is decolorised as long as NaOBr remains. 0·05—2×10^{-6} g. of N may be determined. NH_3 in air is determined by first absorbing it in dil. HBr. Ch. Abs. (*e*)

Drop reaction for arsenic with *N*-ethyl-8-hydroxytetra[hydro]quinoline hydrochloride (kairin). W. Reppmann (Z. anal. Chem., 1934, **99**, 180—182).—A drop of solution containing As^{III}, on filter-paper, is moistened with HCl and 0·5% aq. *N*-ethyl-8-hydroxytetrahydroquinoline hydrochloride. A drop of aq. $FeCl_3$ is added, and the test paper warmed. In presence of As a reddish-brown coloration results; limit, 6×10^{-10} g. Hg, Pb, and Cu interfere. J. S. A.

Apparatus for the detection and determination of arsenic by the Gutzeit and Beck–Merres methods. R. Steinbrück (Pharm. Zentr., 1935, **76**, 5—6).—Gnessin's statements (this vol., 53) are criticised. Alteration of the Beck–Merres apparatus is unnecessary and the addition of the substance and the acid all at once is not a fault. The necessity for the evolution of H_2 to be const. and also for the use of 10% HCl is emphasised. The max. of 0·07 g. As is too low. 10^{-6} g. can be detected, but amounts of 1, 2, and 3×10^{-6} g. cannot be easily differentiated. E. H. S.

Determination of small quantities of arsenic. (Determination of arsenic in iron ore, soot, etc.) L. W. Strock (Z. anal. Chem., 1934, **99**, 321—335).—As is reduced by nascent H to AsH_3, which is absorbed in 2—6% aq. $HgCl_2$. The yellow ppt. formed does not contain the total As, but decomposes to $H_3AsO_3+Hg_2Cl_2$. For small amounts of As (0·01—1 mg.), $NaHCO_3$ is added to the solution+ppt., and exactly neutralised with HCl (Me-orange). $Hg_2Cl_2+H_3AsO_3$ are then titrated with 0·01*N*-I, requiring 8 I per atom of As. With larger amounts of As (1—10 mg.), the ppt. is allowed to decompose completely, Hg_2Cl_2 is removed by filtration, and H_3AsO_3 titrated iodometrically after exact neutralisation, as before. Fe ores etc. are fused with 2 parts of $Na_2B_4O_7+4$ parts of Na_2CO_3, dissolved in H_2SO_4 containing Na_2HPO_4, and AsH_3 is at once generated from the considerably diluted solution before pptn. of SiO_2 occurs. Metallic Fe and org. material (soot, humus, etc.) are dissolved in $H_2SO_4+H_2O_2$. J. S. A.

Volumetric determination of arsenates. F. Taboury and H. Audidier (Bull. Soc. chim., 1934, [v], **1**, 1570—1578).—The effects of concn. of reagents and time of boiling on the reduction of AsO_4''' to AsO_3''' by KI in H_2SO_4 solution have been investigated. The reduction is complete when a mixture of 10 c.c. of 0·001—0·0165*M*-As_2O_5 with 2 c.c. of H_2SO_4 (*d* 1·8) and 0·8 g. of KI is heated at 100° for 10 min.

The I liberated is exactly titrated with $Na_2S_2O_3$ and, after adding excess of $NaHCO_3$, the AsO_3''' is titrated with I. The method is used for analysis of Pb arsenate after pptg. the Pb as $PbSO_4$. J. G. A. G.

Rapid determination of silica in water-glass.—See B., 1935, 60.

Determination of dissolved organic carbon and nitrogen in sea-water. A. Krogh and A. Keys (Biol. Bull., 1934, **67**, 132—144).—A sample of the H_2O is evaporated in a Ag tube, which is heated at 500° in a stream of H_2. The NH_3 evolved is absorbed in dil. HBr, and determined, together with residual NH_3, by the NaOBr method (cf. this vol., 184). C is determined by acidifying to remove CO_3'', and pptg. most of the Cl′ with Tl_2SO_4. The H_2O is then evaporated to dryness, and heated with conc. H_2SO_4, $K_2Cr_2O_7$, Ag_2CrO_4, and CrO_3. CO_2 evolved is absorbed in aq. $Ba(OH)_2$ and excess titrated with HCl. Ch. Abs. (*e*)

Application of perchloric acid to the indirect determination of carbon dioxide in carbonates. F. Vojtěch (Chem. Listy, 1934, **28**, 299—301).—The non-volatility of $HClO_4$ and the solubility of its salts render it preferable to HCl for expelling CO_2 from carbonates. R. T.

Determination of carbon dioxide in the atmosphere of a closed system. C. Z. Rosecrans (Science, 1934, **80**, 483—484).—Attention is directed to advantages of the thermal conductivity method of determination (cf. A., 1934, 1190). L. S. T.

Determination of carbon disulphide in air.—See B., 1935, 47.

Sensitiveness of detection of the alkali metals in the arc spectrum. P. Urbain and M. Wada (Compt. rend., 1934, **199**, 1199—1201).—The limits for spectrographic detection of Li, Na, K, Rb, and Cs in the Cu arc were 2, 70, 1200, 2600, and 8000×10^{-6} mg. respectively. H. J. E.

Rapid determination of potassium. K. Nowak (Przemysł Chem., 1934, **18**, 509—510).—5 c.c. of clear, neutral solution, containing about 0·05 g. K_2O, and free from NH_3, are added to 17 c.c. of reagent (I) in a special centrifuge tube, the bottom of which is drawn out into a capillary, and previously filled with H_2O. The solution is centrifuged for 15 sec. at 21—23° and 1000 r.p.m., and the K content is read directly on a scale on the capillary from the height of the column of ppt. (I) is prepared by dissolving 450 g. of $NaNO_2$ in 800 c.c. H_2O, adding the solution after 24 hr. to 250 g. of $Co(OAc)_3$ in 800 c.c. of H_2O, diluting to 2 litres, and adding 65 c.c. of H_2O and 5 c.c. of AcOH to 100 c.c. of the solution so obtained. R. T.

Application of spectrum analysis to determination of alkalis and alkaline earths. IV. Micro-determination of potassium and calcium. W. H. Jansen, J. Heyes, and C. Richter (Z. physikal. Chem., 1934, **171**, 268—280).—The method previously described (A., 1934, 745) is used, the sensitivity being increased by utilisation of an improved atomiser which makes it possible to carry out a determination with 5 c.c. of dil. solution. The precision attainable is 8% for K and 10% for Ca. R. C.

Direct colorimetric determination of sodium. O. M. Smith and H. Blair (Proc. Oklahoma Acad. Sci., 1934, **13**, 33—35).—Caley and Foulk's method (cf. A., 1929, 900) was tested on 140 H_2O samples, and is accurate to approx. 0·35 mg. Na. Ch. Abs. (*e*)

Rapid spectroscopic determination of metals. I. Lithium. A. P. Snessarev (J. pr. Chem., 1934, [ii], **141**, 327—330).—The min. concn. (0·0000010728 g. per c.c.) of Li which can be detected spectroscopically is first determined; the unknown solution is then diluted to the same concn. Results are reproducible and compare favourably with those obtained by Gooch's method. H. B.

Use of phosphomolybdic acid in chemical analysis. J. W. Illingworth and J. A. Santos (Nature, 1934, **134**, 971).—Phosphomolybdic acid detects 1 part of Cs in 5×10^5 of H_2O and ppts. 1 of K in 10^4 of H_2O. The ppt. of $K_3PMo_{12}O_{40},nH_2O$, where n is $\not>2$ (probably 0), is stable at 120°. L. S. T.

Systematic potentiometric analysis. II. Determination of Ag, Bi, Pb, Cu, Cd. W. Hiltner and W. Gittel (Z. anal. Chem., 1934, **99**, 169—178; cf. this vol., 55).—Ag, Bi, Pb, Cu, and Cd are separated by pptn. as sulphides and dissolved in HNO_3. Ag is titrated potentiometrically with HCl at room temp. Excess of 0·1*N*-HCl is added, and the solution boiled and neutralised to Congo-red by 2*N*-NaOAc, thereby pptg. BiOCl quantitatively. The ppt. is collected, dissolved in HNO_3, and titrated with $AgNO_3$. Pb is pptd. from the filtrate as $PbCrO_4$, and this dissolved in HCl. A measured excess of 0·2*N*-$SbCl_3$ is added, and titrated back with $KMnO_4$. Excess of CrO_4'', and $Cu^{..}$ in the filtrate are reduced with N_2H_4,H_2SO_4, and Cu is pptd. as CuCNS. The ppt. is dissolved in NaOH, and CNS′ titrated with $AgNO_3$. Cd in the remaining solution is titrated with Na_2S. J. S. A.

Determination of silver by photometric titration. S. Hirano (J. Soc. Chem. Ind. Japan, 1934, **37**, 754—756B).—Ag can be titrated photometrically with NaCl, preferably in a coloured beaker and with the addition of starch as a protective colloid; Cu does not interfere. A. G.

Applicability of potentiometric silver titration in determining silver in practice. E. Raub (Mitt. Forsch.-Inst. Probieramts. Edelmet. Schwäb. Gmünd, 1934, **8**, 11 pp.; Chem. Zentr., 1934, ii, 1168).—A discussion. The potentiometric method is more accurate. In determining Ag in material insol. in HNO_3, Cl is first removed, Pb is added to concentrate the Ag, and the Ag determined potentiometrically in the Pb–Ag mixture. In alloys containing Au Cu must be added until Au : other metals is $<1:3$. H. J. E.

Volumetric [micro-]determination of calcium and magnesium in water.—See B., 1935, 48.

Application of photo-elements to the determination of salts in natural waters.—See B., 1935, 48.

Analysis of limestone.—See B., 1935, 60.

Determination of magnesium as magnesium oxide in presence of ammonium salts.—See B., 1935, 21.

Determination of magnesium using 8-hydroxyquinoline. M. JAVILLIER and J. LAVOLLAY (Bull. Soc. Chim. biol., 1934, **16**, 1531—1541).—The technique of a method for the determination of Mg by pptn. at p_H 8 of the complex (I) which it forms with 8-hydroxyquinoline (II) is described. Ca may be removed by preliminary pptn. as oxalate, and Fe, Al, Mn, Zn, and Cu, when present in small quantity, may be separated by extraction of (I) with EtOH. Interference of Fe and Al in larger amounts may be avoided by a preliminary pptn. with (II) at p_H 5—6. A. L.

Precipitation of zinc salts by alkali metal chromates in a gelatin medium. Discrimination of zinc and cadmium. (MLLE.) S. VEIL (Bull. Soc. chim., 1934, [v], **1**, 1358—1359).—Zn forms a banded ppt. of chromate in gelatin, whilst Cd does not. F. L. U.

Electrolytic determination of cadmium. J. ŠEBOR (Chem. Listy, 1934, **28**, 290—291, 297—299).—The well-stirred solution (400 r.p.m.), containing 12 g. of $K_2C_2O_4$, 3 g. of NaOAc, and 3 c.c. of 20% AcOH per 120 c.c., is electrolysed at 70—80°, using 0·1—0·2 amp. and $\geqslant$ 2·9 volts, when all the Cd is deposited as an adherent, cryst. deposit after 0·5—1 hr. In presence of Zn a current of 0·1 amp. at 2 volts is recommended. R. T.

Fluorescence analysis of minerals. H. HABERLANDT (Sitzungsber. Akad. Wiss. Wien, 1934, IIa, **143**, 11—13; Chem. Zentr., 1934, ii, 1496).—Certain yellow specimens of topaz show a yellow fluorescence, whilst others, initially colourless, become yellow and fluoresce after irradiation with Ra. Certain scheelite and zircon specimens after heating show fluorescence lines of the rare earths. Some skapolites gave the fluorescence spectrum of U compounds. H. J. E.

Sensitive drop reaction for copper. A. S. KOMAROVSKI and N. S. POLUEKTOV (J. Appl. Chem. Russ., 1934, **7**, 844—846).—A drop of saturated solution of hydroxyquinoline (I) in 80% AcOH, a drop of the solution under analysis, and a second drop of (I) are placed on the same spot on filter-paper, followed by a drop of 25% aq. KCN, when a bluish-red coloration indicates $\leqslant 0{\cdot}4\times10^{-6}$ g. of Cu^{II}. The coloration is due to C_2N_2 formed from Cu^{II} and CN'. Hg^{II}, Pb, Bi, Cd, Sb^{III}, Sn^{II}, MnO_4', WO_4'', VO_3', Ni^{II}, and Co^{II} do not interfere. Fe^{II} gives a black spot under the above conditions, and should previously be pptd. as $Fe(OH)_3$. R. T.

Determination of copper in copper sulphate.—See B., 1935, 60.

Detection and determination of copper in pharmaceutical preparations.—See B., 1935, 45.

Determination of copper in organic compounds. N. N. MELNIKOV (Z. anal. Chem., 1934, **99**, 182—184).—The compound is completely oxidised by adding $KMnO_4$ to its H_2SO_4 solution at 70—90°. Excess of $KMnO_4$ is removed with H_2O_2 or $H_2C_2O_4$, and Cu determined iodometrically. J. S. A.

Potassium stannochloride in the volumetric determination of copper. E. VOYATZAKIS (Bull. Soc. chim., 1934, [v], **1**, 1356—1357).—A weighed excess of solid K_2SnCl_4 is added to the solution of $Cu^{\cdot\cdot}$ deprived of dissolved O_2 and strongly acidified with HCl. CuCl is pptd., and the residual K_2SnCl_4 is titrated with I. F. L. U.

(A) Determination of mercury applicable to mercury cyanide. (B) Application of the mercuric sulphate reagent. G. DENIGÈS (Bull. Soc. Pharm. Bordeaux, 1934, **72**, 5—13, 13—18; Chem. Zentr., 1934, ii, 1499).—A. To 20 c.c. of the solution ($\geqslant$ 0·3% Hg^{II}) 20 drops of the HgI_2,2KI reagent (cf. A., 1932, 355) and 10 drops of HCl are added. HgI_2 is pptd. and is titrated with 0·1*N*-$Na_2S_2O_3$ at 20° until just redissolved. Non-ionised $Hg(CN)_2$ reacts quantitatively on adding the HCl, and may be determined in presence of $Hg^{\cdot\cdot}$.

B. The reagent (5 g. of red HgO in a mixture of 100 c.c. of H_2O and 20 c.c. of conc. H_2SO_4) can be used for the microchemical detection of halides, halogenates, and cyanuric acid by adding an equal of vol. of aq. NH_3 to the reagent instead of using a conc. acid solution. H. J. E.

Determination of aluminium in aqueous aluminium acetate. M. DOMINIKIEWICZ (Arch. Chem. Farm., 1934, **2**, 64—68).—5 g. of solution are heated at 100° with 4 c.c. of conc. HCl and 20 c.c. of an aq. suspension of filter-paper pulp, 5—6 drops of 30% H_2O_2 and excess of aq. NH_3 are added, and the suspension is filtered after 1 hr. The residue is washed, dried, ignited, and weighed as Al_2O_3. R. T.

Titrimetric determination of aluminium sulphate and sulphuric acid present together. G. BIRSTEIN and J. KRONMAN (Przemysł Chem., 1934, **18**, 317—321).—A series of colour standards matching the colours given by thymol-blue with a scale of concns. of $Al_2(SO_4)_3$ (I) is prepared by mixing 0·5*N*-$CoCl_2$ and -$FeCl_3$ in various proportions. The solution, the (I) content of which is approx. known, is titrated with 0·27*N*-$Ba(OH)_2$ to the same shade as the appropriate standard, and the H_2SO_4 content hence calc. The solution is further titrated with 0·5*N*-NaOH at 100° to a colour change from yellow to blue, and the (I) content hence calc. R. T.

Determination of small quantities of aluminium in complex media. Application to plants. P. MEUNIER (Compt. rend., 1934, **199**, 1250—1252).—Conditions for pptn. and colloidal ppt. formation for Al with cupferron (I) (cf. Pinkus and Martin, A., 1927, 406) have been studied. Opacity measurements are described for the determination of 0·01—0·06 mg. of Al per g. of dried plant. The elimination of other metals (*e.g.*, Fe, Cu, or Ti) by pptn. with (I) at controlled p_H is described. H. J. E.

Rapid determination of aluminium in iron ores.—See B., 1935, 63.

Determination of small quantities of aluminium in special iron-containing copper–zinc alloys.—See B., 1935, 64.

Behaviour of aqueous ammonium sulphide towards manganous ions. D. TOTOIESCU (Z. anorg. Chem., 1934, **221**, 182—186).—Aged solutions of $(NH_4)_2S$ often give no ppt. with $Mn^{\cdot\cdot}$ in presence of

NH_4 salts or of KCN. The cause is traced to the gradual disappearance of SH′ through oxidation. F. L. U.

Benzoate method for the separation of iron, aluminium, and chromium. Suggested changes for its application to qualitative analysis. L. Lehrman and J. Kramer (J. Amer. Chem. Soc., 1934, 56, 2648—2649).—Modified procedure is recommended (cf. A., 1934, 621). E. S. H.

Precipitation of aluminium with 8-hydroxyquinoline in presence of iron, nickel, cobalt, copper, chromium, and molybdenum. T. Heczko (Chem.-Ztg., 1934, 58, 1032—1033).—The alloy is dissolved, tartaric acid and excess of NH_3 are added, and the metals other than Al are converted by adding KCN into complexes from which they are not pptd. by 8-hydroxyquinoline (I). If Fe is present H_2S is also passed. Al is pptd. by adding a solution of (I) in 10% EtOH. E. S. H.

Application of flotation to qualitative analysis. A. M. Belousov and A. G. Belousova (J. Appl. Chem. Russ., 1934, 7, 837—838).—The ppt. of Ni dimethylglyoxime is masked by $Fe(OH)_2$ when Fe^{II} is present; it may be separated by shaking with *iso*-C_5H_{11}·OH (I), when it undergoes concn. at the H_2O–(I) interface. The mixture of $Al(OH)_3$ and FeS obtained by adding $(NH_4)_2S$ to aq. salts of Al and Fe is separated by adding alizarin-red (II) and (I), and shaking, when the $Al(OH)_3$–(II) complex is suspended in the (I) layer. PbS, Sb_2S_3, and As_2S_3 can be separated from S by shaking the suspension with (I), when S remains in the aq. layer. R. T.

Titration of oximes of nickel and copper. B. Tougarinoff (Ann. Soc. Sci. Bruxelles, 1934, 54, B, 314—324).—Ni dimethylglyoxime (I) is pptd. in the usual way, and is then hydrolysed by boiling with dil. H_2SO_4. The NH_2OH liberated is determined by addition of excess of acidified $Fe_2(SO_4)_3$ and titration of the $FeSO_4$ formed by 0·1*N*-$KMnO_4$. The method is applicable to the determination of Ni in alloys, *e.g.*, German silver, Ni steel, and coinage metal, if (I) is pptd. in presence of tartaric acid. For the determination of Cu^{++}, the compound with salicylaldoxime is pptd. and determined in a similar way. The method is directly applicable to Cu alloys. A. J. M.

Separation of nickel and cobalt by means of alkali phosphates. A. Colani (Bull. Soc. chim., 1934, [v], 1, 1478—1479; cf. A., 1934, 747).—Polemical and historical. Other methods are more trustworthy. J. G. A. G.

[Separation of nickel and cobalt by means of alkali phosphates.] H. Wunschendorff and (Mme.) P. Valier (Bull. Soc. chim., 1934, [v], 1, 1480).—A reply (cf. preceding abstract). J. G. A. G.

Determination of tervalent chromium in chromic acid and in chromium-plating baths. H. H. Willard and P. Young (Trans. Electrochem. Soc., 1935, 67, 55—64).—Cr^{+++} in Cr-plating baths in presence of H_2CrO_4 may be determined by adding HNO_3 and excess of 0·1*N*-$Ce(SO_4)_2$, heating at 50—55° for 5 min., and titrating with 0·05*N*-$NaNO_2$ at 50—55°, the end-point being determined potentiometrically. The Pt electrode must be cleaned in $K_2Cr_2O_7$–H_2SO_4 to obtain a sharp end-point, with which Fe and Mn at moderate concns. do not interfere. A similar method is applicable for the determination of Cr_2O_3 in H_2CrO_4. R. S. B.

Determination of chromium in tungsten steels.—See B., 1935, 63.

Potentiometric determination of chromium, vanadium, and molybdenum present together.—See B., 1935, 63.

Volumetric determination of chromium, manganese, and vanadium in steel.—See B., 1935, 64.

Weighing of molybdenum as silver molybdate. L. W. McCay (J. Amer. Chem. Soc., 1934, 56, 2548—2549).—Mo in alkali molybdates can be determined by conversion into Ag_2MoO_4, which is slightly sol. in H_2O, but insol. in H_2O containing $AgNO_3$. E. S. H.

Determination of small quantities of vanadium in uranium preparations.—See B., 1935, 60.

Laboratory apparatus for conducting pyrogenesis. J. Doliński (Przemysł Chem., 1934, 18, 366).—SiO_2 apparatus is described. R. T.

Calorimetric apparatus. K. Kling and J. Pfanhauser (Przemysł Chem., 1934, 18, 420—424).—The calorimeter bomb is enclosed within a Dewar flask (I), and the heat of combustion is calc. from the expansion of the air within the (I). The method involves an error of 50—100 g.-cal., but is suitable for most technical purposes. R. T.

Autographic thermal expansion apparatus. W. Souder, P. Hidnert, and J. F. Fox (J. Res. Nat. Bur. Stand., 1934, 13, 497—513).—A description is given of an autographic expansion apparatus utilising the optical lever method of recording continuous expansion curves photographically. The results obtained with the apparatus for low-, medium-, and high-expanding materials are compared with those obtained with the previous apparatus of the Bureau of Standards; for steels the error is 6% between 20° and 100° and 3% between 20° and 500°. A. R. P.

Magnetic method of producing low temperatures. P. Debye (Physikal. Z., 1934, 35, 923—928).—A summary of the results of the method using adiabatic demagnetisation of rare-earth salts and Cr alum is given. Consideration of entropy–temp. diagrams shows that 0° abs. is not attainable by this method. Since the nuclear moment is about $10^{-3}\times$ the Bohr magneton, the former will be of great importance in the range 0·001—0·01° abs., and hence direct results on nuclear magnetism may be expected from observations within this range. A. J. M.

Simple and inexpensive thermoregulator. A. Raignier (Natuurwetensch. Tijds., 1934, 16, 267—268).—The expansion of Et_2O in a closed metal vessel operates a lever controlling a Hg break. An accuracy of ±1° may be obtained. D. R. D.

Automatic temperature control of thermostats, ovens, etc. by means of an alternating-current valve relay. A. L. Delaunois (Natuurwetensch. Tijds., 1934, 16, 268—270).—A modification of Fonteyne's d.-c. apparatus (A., 1934, 162) is described. D. R. D.

Determination of the heat of combustion by means of the micro-bomb. J. J. Vrijling (Chem. Weekblad, 1935, **32**, 20—22).—The method is described and data for BzOH and various fuel and lubricating oils, agreeing well with macro-determinations, are recorded. D. R. D.

Investigation of photographic-photochemical processes with the aid of the electro-optical Kerr effect. A. Narath (Physikal. Z., 1934, **35**, 992—996).—A method for the determination of the intensity and wave-length of actinic light using the electro-optical Kerr effect is described. A. J. M.

Combined recording microphotometer, densitometer, and comparator. P. A. Leighton, S. Smith, and F. C. Henson (Rev. Sci. Instr., 1934, [ii], **5**, 431—434).—Full constructional details of an instrument incorporating a radiometer are given. C. W. G.

Self-registering microphotometer. L. A. Woodward and R. G. Horner (J. Sci. Instr., 1935, **12**, 17—22).—The photometer unit moves bodily across a magnified image of the plate under examination, moving uniformly and without vibration under gravity controlled by an oil leak. C. W. G.

Photometric stage for the study of emission spectra. R. Breckpot (Ann. Soc. Sci. Bruxelles, 1934, **54**, B, 299—314).—An apparatus in which the spectrum is projected on to a horizontal screen, in the centre of which is an opening over a photo-electric cell, is described. A. J. M.

Ultra-violet microscope for the examination of opaque objects. B. K. Johnson (J. Sci. Instr., 1934, **11**, 384—394).—A new form of reflecting microscope utilises a lens-mirror objective in place of an object glass. Opaque objects can be examined without introducing back-reflected light from the lens system. Ultra-violet transmissions and reflecting powers for several substances are recorded. C. W. G.

Johann's *X*-ray spectrometer for high vacuum with concave crystal. II. A. Sandström (Z. Physik, 1934, **92**, 622—630; cf. A., 1933, 1036). A. B. D. C.

Source of the Lyman continuum for use with spectrographs of high dispersion. G. Collins and W. C. Price (Rev. Sci. Instr., 1934, [ii], **5**, 423—425).—A Lyman discharge tube is so made that the capillary can easily be replaced when enlarged by use. C. W. G.

Photo-electric densitometer. E. Obermer (Chem. and Ind., 1934, 1077).—Colorimetric biochemical analyses of blood, urine, fæces, and food are mentioned. C. W. G.

Electrical characteristics of barrier-layer photo-cells. P. R. Gleason (Physical Rev., 1933, [ii], **44**, 315).—The resistance of barrier-layer photo-cells has been determined over a wide range of illumination and for currents in the same directions as and opposite to the photo-currents. L. S. T.

Use of selenium unidirectional layer photo-cells in the measurement and record of very intense illuminations. G. Liandrat (Compt. rend., 1934, **199**, 1394—1395; cf. A., 1934, 272, 716).—The effect of variation of sensitivity of these cells should be diminished by reducing the thickness of the Se layer and reducing the effect of the external surface of the layer. J. W. S.

Monochromatic filter. W. H. Aughey and W. D. Lansing (Physical Rev., 1933, [ii], **44**, 326).—Photographic plates treated with a NaOH solution of β-methylæsculetin transmit only λ 4358 Å. from a Hg arc. This filter is only a photographic, and not a visual, monochromat. L. S. T.

Precision photometry. P. Copel (J. Phys. Radium, 1934, [vii], **5**, 563—567).—Considerations on measurements with an accuracy of 1 mm. are discussed. N. M. B.

Microphotography and radiation studies with various wave-lengths of monochromatic ultra-violet radiation. A. J. Allen, R. Franklin, and E. McDonald (J. Franklin Inst., 1934, **218**, 701—716).—A detailed account of work already noted (this vol., 124). L. S. T.

Temperature control system for use in the study of the Raman effect of liquids. A. H. Leckie and W. R. Angus (J. Sci. Instr., 1935, **12**, 22—23).—Heated H_2O from the jacket circulates by convection through a bath kept at a controlled temp. C. W. G.

Cuprous oxide rectifiers. W. C. van Geel (Physica, 1934, **1**, 1143—1152; cf. Z. Physik, 1931, **69**, 765).—Current–voltage characteristics are recorded between 20° and 134°. The mechanism of rectification is discussed. H. J. E.

Temperature-control box for saturated standard cells. E. F. Mueller and H. F. Stimson (J. Res. Nat. Bur. Stand., 1934, **13**, 699—704).—The cells are contained in a small Al box, placed inside and thermally insulated from a larger Al box, in the wall of which is a Hg thermoregulator controlling an electrical heater. The temp. was const. to ±0·01°. H. J. E.

Life tests of commercial type standard cells. T. T. Smith (Rev. Sci. Instr., 1934, [ii], **5**, 425—427).—No definite time coeff. can be applied. Measurements with a single cell should not be trusted for accurate work. C. W. G.

Field combinations for velocity- and mass-spectrography. III. W. Henneberg (Ann. Physik, 1934, [v], **21**, 390—404; cf. A., 1934, 341, 713).—The use of a superposition of a cylindrical electric field, a homogeneous magnetic field, and a magnetic dipole field as a focussing lens for electrons and positive rays is described. By a special arrangement, a non-focussing " prism " may be produced. A. J. M.

Cataphoresis apparatus. H. Theorell (Biochem. Z., 1934, **275**, 1—10).—A description is given of an apparatus which may be used for accurate determination of ionic mobilities, for the separation of the constituents (I) of mixtures [including those in which (I) move in the same direction], and for other purposes. W. McC.

Precision recording cosmic-ray meter. A. H. Compton, E. O. Wollan, and R. D. Bennett (Rev. Sci. Instr., 1934, [ii], **5**, 415—422).—The steel ionis-

ation chamber holds 19·3 litres of A at 50 atm. Balancing current is supplied by ionisation by β-rays from U in an auxiliary chamber. C. W. G.

Amplifying and recording small e.m.f. H. E. Morgan, L. T. De Vore, and R. F. Baker (Physical Rev., 1933, [ii], **44**, 324).—The p.d. to be measured is applied to a sensitive galvanometer which causes a beam of light to play across the cathode of a photo-electric cell. L. S. T.

Increased resolving power of the electron-optical immersion objective. E. Brüche and W. Knecht (Z. Physik, 1934, **92**, 462—466).—The electron microscope together with an oil-immersion objective can resolve to 1·5 μ. A. B. D. C.

Camera for electron diffraction. J. A. Darbyshire and E. R. Cooper (J. Sci. Instr., 1935, **12**, 10—14).—The instrument is suitable for both reflexion and transmission. C. W. G.

Portable Geiger-Müller tube. K. Grant and M. Iliffe (J. Sci. Instr., 1935, **12**, 6—8).—Full constructional details are given. 1 mg. of Ra can be detected at 50 ft. C. W. G.

Quinhydrone micro-electrode. F. L. Vodret (Rend. Sem. Fac. Sci. Cagliari, 1933, **3**, 55—60; Chem. Zentr., 1934, ii, 1165).—A Pt wire fused into a capillary is mounted in an open glass tube constricted at the lower end. The use of the electrode is described. H. J. E.

Apparatus for uninterrupted p_H determination. M. M. Muschkatblat and I. M. Bruskin (J. Appl. Chem. Russ., 1934, **7**, 857—863).—Apparatus for the measurement of continually changing p_H (*e.g.*, dissolution of ZnO in aq. H_2SO_4) is described. R. T.

Simple micro-burette. R. Flatt (Helv. Chim. Acta, 1934, **17**, 1513—1516).—The burette consists of a U-tube in which one limb (*a*) is of wide bore, and the other of about 1 mm. bore bent over at the top and drawn to a fine point. There is no tap, the titration liquid being confined between the delivery point and a surface of Hg. Liquid is expelled by admitting Hg to (*a*) from a dropping funnel. The vol. can be measured to within 0·2 cu. mm. F. L. U.

Apparatus for continuous extraction of aqueous solutions by non-miscible solvents. A. A. Policard and R. Favier (Bull. Soc. chim., 1934, [v], **1**, 1523—1525).—The rod of a stirrer (I) situated axially in the flask (II) is surrounded by a tube down which flows the solvent (III) from a condenser fed by solvent vapour from an auxiliary flask (IV). The (III) flowing into the aq. solution just above the vanes of (I) is broken into fine droplets which rise and flow back to (IV) by way of a side tube in the neck of (II). J. G. A. G.

Microbalance to weigh to 10^{-6} g. M. Ziegler-Wellmann (Chem. Fabr., 1934, **7**, 472—473).—A direct-reading null instrument on the torsion principle using spiral hairsprings is described. D. R. D.

Soldering molybdenum to copper. A. Müller and R. E. Clay (J. Sci. Instr., 1934, **11**, 405).—A small chip of Ag is placed on a layer of $NaNO_2$ lying on the Mo. On heating until the Mo and the $NaNO_2$ react, heat is evolved sufficient to melt the Ag, which flows over the surface of the Mo, to which hard and soft solder will then adhere C. W. G.

Device for water circulation. A. B. Burch and R. M. Eakin (Science, 1934, **80**, 563—564).—A simple air pump maintaining a continuous circulation of clean aërated H_2O is described. L. S. T.

Determination of the specific gravities of liquids. E. A. Becker (Farben-Ztg., 1934, **39**, 1311—1313).—The vol. of liquid delivered by one complete stroke of certain medicinal syringes is sufficiently reproducible to enable them to replace a pyknometer. It is much easier to avoid air bubbles in this way. G. H. C.

Recording dilatometer of high sensitivity. A. Goetz, J. W. Buchta, and T. L. Ho (Rev. Sci. Instr., 1934, [ii], **5**, 428—431).—Expansion is amplified by an optical lever and thermocouple, actuating a galvanometer. C. W. G.

Visco-conductimeter. C. L. Babcock and J. V. Hoffacker (Physical Rev., 1933, [ii], **44**, 320—321).—The apparatus is suitable for determining η of ordinary liquids at room temp. and of silicate glass up to 1400°. L. S. T.

Separation of neon into its isotopic components by means of rectification. W. H. Keesom, H. van Dijk, and J. Haantjes (Proc. K. Akad. Wetensch. Amsterdam, 1934, **37**, 615, and Physica, 1934, **1**, 1109—1114).—A glass rectifying apparatus for the separation of the Ne isotopes in relatively large quantities has been constructed. Fractions of at. wt. 20·091 and 20·574 (normal at. wt. 20·183) have been obtained. The efficiency of the rectifying column is about 50% of theoretical. M. S. B.

New glass apparatus. I. Siphon with attached filter. II. Filter reagent glass. H. Barsch (Pharm. Zentr., 1935, **76**, 20—21, 21).—I. A sintered glass filter forms the siphon inlet. II. A sintered glass filter crucible with a curved rim fits into a rubber ring placed in the top of a filtering tube. E. H. S.

High-vacuum cut-off. G. W. Lobb and J. Bell (J. Sci. Instr., 1935, **12**, 14—17).—Na–Bi and Li–Bi amalgams at temp. just > m.p. are suitable for use in cut-off seals; they have Hg v.p. about 10^{-8} mm. C. W. G.

Two demonstration experiments with liquid hydrogen. K. Clusius (Physikal. Z., 1934, **35**, 929—930).—An apparatus using liquid and solid H, by means of which a temp. of 9·5° abs. may be reached, and its use for the demonstration of superconductivity in Nb carbide (transition point 10·2° abs.) is described. An apparatus for demonstrating the differences in v.p. and m.p. of H_2^1 and H_2^2 is also described. A. J. M.

Symbol for hydrogen-ion concentration. T. Hennig (Chem.-Ztg., 1934, **58**, 1021).—A question of nomenclature. E. S. H.

Heavy water in chemistry. M. Polanyi (Nature, 1935, **135**, 19—26).—A lecture. L. S. T.

Geochemistry.

Analysis of the water of the Boniface spring at Morszyn. S. Jurkowski (Arch. Chem. Farm., 1934, 2, 41—61).—The rise in concn. of salts per kg. of H_2O since 1881 is: K 5·7 to 23·9, Na 14·25 to 64·2, Mg 3·8 to 22·9, Cl 17·8 to 131·7, Br 0·004 to 0·075, and SO_4" 28 to 75·8 g. R. T.

Fluorine content of French mineral waters. R. Charonnat and (Mlle.) S. Roche (Compt. rend., 1934, 199, 1325—1328).—Numerous determinations based on de Boer's colorimetric method (A., 1926, 40) are recorded. H. J. E.

Anohaline stratification of the chemical constituents of Lake Osoresanko, Aomori Prefecture, Japan. S. Yoshimura (Proc. Imp. Acad. Tokyo, 1934, 10, 475—478).—Temp. and salinity of this acid lake both decrease towards the bottom. C. W. G.

New sulphur constituent of the thermal waters of Pistany (Czechoslovakia). E. Cherbuliez and A. Herzenstein (Helv. Chim. Acta, 1934, 17, 1587—1592; cf. this vol., 184).—A residual I-reducing effect observed in these waters after allowing for the H_2S present, not due to $H_2S_2O_3$, is ascribed to an unstable S acid. The chemical behaviour of the substance, which has not been isolated, resembles that of $Na_2S_2O_4$. F. L. U.

Radium in field waters and petroleum of Bibi-Eibat oil-field. B. A. Nikitin and M. S. Merkulova (Trav. inst. état radium, U.S.S.R., 1933, 2, 160—176).—The Ra content was variable, but decreased with depth. The U and Ra contents were not interdependent. The Ra in H_2O is due only to the leaching of minerals. Ch. Abs. (*e*)

Origin of radium in oil-field waters. L. V. Komlev (Trav. inst. état radium, U.S.S.R., 1933, 2, 207—223).—Leaching of solid rocks (granodiorite) with distilled H_2O removes about 15% of Ra at slightly elevated temp. and with long contact. Aq. $BaCl_2$ extracts Ra rapidly at room temp. The Ra, Ms-Th, and Th-*X* in field H_2O arise from the leaching of rocks. Ch. Abs. (*e*)

Radioactivity of waters from the oil-fields of Dagestan, Kuban, and Azerbaidjan. L. V. Komlev, P. Myatelkin, and V. Savchenko (Trav. inst. état radium, U.S.S.R., 1933, 2, 176—207).—Data are recorded. The Rn in the natural gas was > that required by the equilibrium conditions. Ch. Abs. (*e*)

Thorium-*X* content of water from well No. 1 in Ukhta oil-field. P. L. Bobin (Trav. inst. état radium, U.S.S.R., 1933, 2, 157—159).—Average contents of Ra and Th-*X* were $7·58\times10^{-9}$ and $2·86\times10^{-2}$ g. per litre, respectively. Ch. Abs. (*e*)

Sorption by snow. Y. Kauko and V. Mantere (Suomen Kem., 1934, 7, B, 97—98).—Snow has considerable adsorptive power for CO_2. A. G. P.

Occurrence of lithium on the earth. F. Hermann (Metallbörse, 1934, 24, 535; Chem. Zentr., 1934, ii, 1433).—The mean Li content of the earth's crust is 4×10^{-5}%. The occurrence is discussed. H. J. E.

Radioactivity of the geological layers of the Rhine valley. E. Rothé and F. Stoeckel (Compt. rend., 1934, 199, 1330—1332).—Data are recorded. H. J. E.

New mineral containing metals of the platinum group. O. E. Zvjaginzev (Compt. rend. Acad. Sci., U.R.S.S., 1934, 4, 176—179).—"Aurosmirid," a solid solution of Au, Os, and Ru in Ir, has been isolated in the residue remaining after dissolving Pt in aqua regia. The substance is very hard and brittle, and has a cubic lattice. E. S. H.

Molybdenite-quartz veins of Shih-ping-chuan, Tsingtien, Chekiang. H. M. Meng and K. Chang (Contr. Nat. Res. Inst. Geol., Sinica, 1933, No. 4, 47—58).—Porphyry, lamprophyric apophyses, and veins are described, and the paragenesis and genesis of the latter discussed. Ch. Abs. (*e*)

Ores in middle East Bothnia and the Skellefte area. M. Saksela (Suomen Kem., 1934, 7, A, 129—132).—Ores described are principally Fe, Cu, and As pyrites, Pb glance, and Zn blende. Considerable proportions of Au ore occur in some areas. A. G. P.

Zinc–lead lode at Rosebery, Tasmania. F. L. Stillwell (Proc. Austral. Inst. Min. Met., 1934, No. 94, 43—67).—A description is given of the mode of occurrence and characteristics of the following minerals of the lode: Zn blende, galena, pyrite, chalcopyrite, mispickel, tetrahedrite, bournonite, and native Au. The gangue contains quartz, spessartite, rhodochrosite, sericite, chlorite, barytes, and ilmenite. A. R. P.

Petrography of Sardinia. Characteristic kersantitic vein with prasinitic "facies" from Sarrabus. II. A. Cavinato (Atti R. Accad. Lincei, 1934, [vi], 20, 205—209).—The mineral (chloritic prasinite, ovardite; SiO_2 53·90, TiO_2 1·06, Al_2O_3 10·21, Fe_2O_3 9·00, FeO 7·76, CaO 1·59, MgO 7·18, K_2O 1·00, Na_2O 4·40, H_2O 4·90, total 101·00%) is described. O. J. W.

Mindigite, a new [copper] cobalt hydroxide. L. de Leenheer (Natuurwetensch. Tijds., 1934, 16, 237—241).—This mineral, found in the Belgian Congo, $9Co_2O_3,2CuO,16H_2O$, *d* 3·07, hardness 2·5, colour dark brown, is non-magnetic. Its apparently amorphous character is confirmed by *X*-ray powder diagrams. Curves are given for the loss of H_2O on heating at different temp. At high temp. it loses O_2, forming Co_3O_4 and CoO. Its optical properties are given. D. R. D.

Composition of titaniferous silicates, especially astrophyllite. B. Gossner and E. Reindl (Zentr. Mineral., 1934, A, 161—167; Chem. Zentr., 1934, ii, 747).—Astrophyllite, $\{[Si_2O_7]_2[(Ti,Zr)(OH,F)_2](Fe,Mn)_4(K,Na)_2\}$, is rhombic (*a* 11·70, *b* 5·40, *c* 21·10 A.; 4 mols. in unit cell). H. J. E.

Hornblende synthesis at low pressures. K. H. Scheumann and W. Lüdke (Ber. Verh. sächs. Akad. Wiss. Leipzig, math.-phys. Kl., 1933, 85, 273—278; Chem. Zentr., 1934, ii, 747).—Tremolites identical with the natural products have been prepared by

heating at 900° a mixture of silicofluorides and H carbonates pressed into pastilles with SiO_2 gel. H. J. E.

Product of [radioactive] transformation of potassium. G. VON HEVESY and W. DULLENKOPF (Z. anorg. Chem., 1934, **221**, 167—172).—The extraction of Ca from a very old Norwegian biotite is described, and explanations are proposed to account for the apparent identity of the specimen so obtained with ordinary Ca (cf. A., 1934, 825). F. L. U.

Composition and age of crystalline uraninite from Katanga. C. S. HITCHEN and R. VAN AUBEL (Compt. rend., 1934, **199**, 1133—1135).—Spectrographic analytical data are recorded and discussed. H. J. E.

Exhalation of radon from the soil. P. R. ZUPANCIC (Terrestr. Mag. and Atm. Elec., 1934, **39**, 33—46).—The method of collection and measurement is described. The average amount of Rn exhaled was 23×10^{-18} curie per sq. cm. per sec. The amount increases with rise of soil temp. CH. ABS. (*e*)

Iodine contents of the soils in Japan. A. ITANO and Y. TUJI (Proc. Imp. Acad. Tokyo, 1934, 10, 524—527).—The I content of 120 samples of Japanese soils is between 0·49 and 56·53 p.p.m., average 7·41. I contents decrease in the order clay, loam, sand, sandy loam. The higher is the p_H the greater is the I content. C. W. G.

Italian volcanic soils. L. RIGOTARD (Ann. Agron., 1934, **4**, 770—780).—The composition of deposits of varying age is examined. A. G. P.

Soils of the lower Charente. Relations between pedology and local designations. H. VERDIÉ, G. SILORET, and J. F. DE FERRIÉRE (Ann. Agron., 1934, **4**, 732—769).—The formation, analysis, classification, and practical usage of these soils are discussed. A. G. P.

Soil formation on the coloured clays of Transural. L. N. ALEXANDROVA (Trans. Dokuchaiev Soil Inst., 1934, **10**, No. 3, 23—46).—The clays were formed by the sialitic weathering of massive cryst. rocks during the Tertiary period. The content of bases is low, whilst that of R_2O_3 is high. The HCl-sol. fraction is small in comparison with that of laterites. The present soils are of the podsolic type, but are thin and with no great humus accumulation. A. M.

[Origin of] natural oil. J. M. MACFARLANE (Science, 1934, **80**, 478—479).—Polemical (cf. A., 1934, 1198). L. S. T.

Petrographical investigation of lignite, petroleum, etc. R. POTONIÉ (Braunkohle, 1934, **33**, 209—212; Chem. Zentr., 1934, ii, 1060—1061).—A discussion. H. J. E.

Radioactivity and the age of meteorites. R. D. EVANS (Physical Rev., 1933, [ii], **44**, 131). L. S. T.

Relative abundance of the oxygen isotopes O^{16} : O^{18} in stone meteorites. S. H. MANIAN, H. C. UREY, and W. BLEAKNEY (J. Amer. Chem. Soc., 1934, **56**, 2601—2609).—Methods for converting the O of silicate rocks and stone meteorites into CO, by heating with CCl_4 at 1000°, thence by reduction with H_2 to H_2O and by electrolysis to O_2, have been devised. The ratio O^{16} : O^{18} is the same, within the experimental error $\pm2·5\%$, in the terrestrial and extra-terrestrial specimens. E. S. H.

Organic Chemistry.

Electron diffraction and its application to the study of organic compounds. J. J. TRILLAT (Kolloid-Z., 1934, **69**, 378—388).—A review of published work, especially on paraffins, fatty acids, cellulose and its derivatives, and caoutchouc. E. S. H.

Isomerism. I. F. P. A. TELLEGEN (Chem. Weekblad, 1935, **32**, 3—5).—A discourse on the three types of isomerism. S. C.

Catalysis in preparative organic chemistry. K. YOSHIKAWA (Sci. Papers Inst. Phys. Chem. Res. Tokyo, 1934, **25**, 235—301).—A detailed report on experiments described previously (cf. A., 1931, 693; 1932, 918; 1934, 1102, 1206). J. W. S.

Thermal decomposition of organic compounds from the viewpoint of free radicals. XII. Decomposition of methane. F. O. RICE and M. D. DOOLEY (J. Amer. Chem. Soc., 1934, **56**, 2747—2749).—The gases formed during thermal decomp. of CH_4 in quartz at low pressures (cf. A., 1932, 1108) are passed over a Te mirror; Te_2Me_2 (but no $TeCH_2$) is thus obtained, showing the production of Me and the absence of CH_2 (cf. Kassel, A., 1932, 1209). The activation energy of the dissociation into free radicals is determined (method : A., 1934, 276) to be 100 ± 6 kg.-cal. The first step in the decomp. is probably $CH_4 \longrightarrow Me+H$; the H then combines on the walls of the vessel or reacts thus : $CH_4+H \longrightarrow Me+H_2$. H. B.

[Preparation of ethylene.] V. N. IPATIEV (Ber., 1934, **67**, [*B*], 2018; cf. A., 1934, 864).—A reply to Sakmin (*ibid.*, 508, 1198). H. W.

Combustible liquid obtained from ethylene. K. SMOLEŃSKI and S. KOWALEWSKI (Bull. Acad. Polonaise, 1934, **A**, 315—328).—The polymerisation of C_2H_4 was studied by slowly heating it at initial pressures, *P*, of 34, 51, and 90 atm. The variations of pressure with temp. showed that polymerisation begins at 300—340°, according to *P*. The liquid hydrocarbons (yield, 80—97% according to *P*) obtained contain paraffins, olefines, and aromatic compounds : the relative proportions of light and heavy (lubricating oil) fractions depend on *P*. The yield of liquid product is diminished by heating above 420° when depolymerisation occurs, and by heating the products with H_2, which increases the proportion of paraffins in the product. Al_2O_3 has no appreciable catalytic effect. H. G. M.

Polymerisation of *iso*butylene with alumina on silica gel as a catalyst, and addition of hydrogen chloride to the reaction products without catalyst. H. I. WATERMAN, J. J. LEENDERTSE, and A. J. DE KOK (Rec. trav. chim., 1934, **53**, 1151—1158).—The products (di-, 2 tri-, tetra-, and pentamerides, separated by fractional distillation) obtained by polymerisation of *iso*butylene in the vapour phase with a SiO_2 gel–Al_2O_3 catalyst (activated at 350°) at $\not>$ 40° are similar to those obtained with H_2SO_4 (Tongberg *et al.*, A., 1932, 1109) or floridin (Lebedev *et al.*, A., 1930, 316) as catalysts. They are mono-olefinic, those obtained with $AlCl_3$ being more cyclic. The $(n^2-1)/d(n^2-2)$ vals. for the low-b.p. fractions are > the theoretical vals. for the olefines, as also are those of the saturated paraffins obtained by their reduction with H_2–Ni at 190° under pressure. The Br vals. (MacIlhiney) for the polymerides are much < the theoretical C_nH_{2n} vals., and are not considered trustworthy as a measure of unsaturation. This discrepancy is possibly due to elimination of HBr, since the tri*iso*butylene fraction, completely saturated by addition of dry HCl in C_5H_{12} at —78°, readily loses HCl above 0°. J. W. B.

Isomerisation of *n*-butenes. V. N. IPATIEV, H. PINES, and R. E. SCHAAD (J. Amer. Chem. Soc., 1934, **56**, 2696—2698).—When Δ^{α}-butene (I) is passed through 100% H_3PO_4, isomerisation to Δ^{β}-butene (II) occurs to the extent of 4% at 26°, 12% at 78°, 34% at 100°, and 60% at 135°. Passage of (I) or Bu$^{\alpha}$OH through a mixture of $Al(OH)_3$ (1 mol.) and H_3PO_4 (1·6 mols.) in a Pyrex tube at 427° gives a mixture of (I) (20—30%) and (II) (70—80%). When (I) is passed under pressure through diatomaceous earth impregnated with H_3PO_4 at 249°, quant. conversion into (II) occurs (36—94% isomerisation is found at 100—200°); the catalyst loses its activity when reaction is continued for a long time at 250—325° and then causes 70—80% conversion. A second sample of the catalyst gave (probably) an equilibrium mixture [containing 72—79% of (II)], irrespective of the contact time. The amounts of (II) formed when (I) is passed through 70—72% $HClO_4$ at 21°, aq. 75% $PhSO_3H$ at 76°, and aq. 75% $ZnCl_2$ at 100° are 21, 13, and 5%, respectively; AcOH, $CH_2Cl{\cdot}CO_2H$, and $CHCl_2{\cdot}CO_2H$ at 100° do not cause isomerisation. A mixture of 6·6% of (I) and 6% of *cis*- and 87·4% of *trans*-(II) is obtained when *trans*-(II) is passed through 100% H_3PO_4 at 100°. The various mixtures are analysed by Podbielniak's method (A., 1933, 690). H. B.

Catalytic dehydration of butyl alcohols. V. KOMAREWSKY, W. JOHNSTONE, and P. YODER (J. Amer. Chem. Soc., 1934, **56**, 2705—2707).—Dehydration of Bu$^{\alpha}$OH over Al_2O_3–H_3PO_4 at 250° gives a mixture of 45% of Δ^{α}- (I) and 55% of Δ^{β}- (II) -butene; *sec.*-BuOH similarly affords (I) (24·1%) and (II) (75·9%), whilst Bu$^{\beta}$OH gives *iso*butene (III) as the sole product. (I)—(III) are identified by low-temp. distillation (Podbielniak column); (III) is characterised further by addition of HBr in AcOH and hydrolysis (H_2O) of the resulting mixture of Bu$^{\beta}$Br and Bu$^{\gamma}$Br (thus removed as Bu$^{\gamma}$OH). Analysis of (I)—(III) as dibromides is inaccurate, since Br_3- and Br_1-derivatives (from butene and HBr evolved during reaction) are also formed. Dehydration of Bu$^{\alpha}$OH over pumice–H_3PO_4 at 350—400° gives (I) (27·5%) and (II) (72·5%), whilst *sec.*-BuOH affords (I) (47·5%) and (II) (52·5%); the results of King (J.C.S., 1919, **115**, 1404) and of Young and Lucas (A., 1930, 888) are incorrect. H. B.

Formation of butadiene and acetylene by the action of the high-frequency discharge on ethylene. A. A. BALANDIN, J. T. EIDUS, and N. G. ZALOGIN (Compt. rend. Acad. Sci. U.R.S.S., 1934, 4, 132—135).—In a closed system treatment of C_2H_4 with a high-frequency discharge produces H_2, saturated hydrocarbons, and a thick oil, mol. wt. about 500. In a circulatory system the product contains butadiene (I) and C_2H_2. The amount of (I) formed is dependent on the velocity of circulation and on the amount of H_2 added to C_2H_4. A chain mechanism is proposed. H. N. R.

Effect of peroxides and acids on reduction of olefines in alcohol solution with platinum oxide catalyst. G. THOMSON (J. Amer. Chem. Soc., 1934, **56**, 2744—2747).—The time required for 91—95% reduction of $CHMe{:}CMe_2$ (I) by H_2 and an Fe-containing PtO_2–Pt-black catalyst (II) in EtOH–MeOH (95 : 5) is shortened considerably by addition of 0·001 mol. of Bz_2O_2 or furoyl or succinyl peroxide (III) (which are probably reduced to the corresponding acids), 0·002 mol. of BzOH or furoic or succinic acid, or (best) 2 drops of AcOH or conc. HCl. Using a (II) which effected only 27% addition of H_2 to the freshly distilled (over Na) (I), the % reduction can be increased by preliminary shaking of the (I) with air; a peroxide (IV), which decomposes to $COMe_2$ and MeCHO (oxidised further to AcOH), is probably formed. (IV) may be reduced to $OH{\cdot}CHMe{\cdot}CMe_2{\cdot}OH$; addition of pinacol or mannitol has only a small accelerating effect. The reduction of amylene and anethole (cf. Kern *et al.*, A., 1925, i, 625) is similarly accelerated by (III) and AcOH, respectively. A mechanism to explain the offset of the poisoning effect of Fe by small amounts of acids is discussed. H. B.

Polymerisation of olefines formed by the action of sulphuric acid on methyl*iso*propylcarbinol. G. M. KLINE and N. L. DRAKE (J. Res. Nat. Bur. Stand., 1934, **13**, 705—712).—$CHMePr^{\beta}{\cdot}OH$ at 80° with 75% H_2SO_4 yields Δ^{β}-$\gamma\delta\epsilon\epsilon$-tetramethylhexene and Δ^{β}-$\gamma\epsilon\epsilon$-trimethylheptene. Whitmore's theory of olefine polymerisation (A., 1932, 1016) does not explain this result without postulating a complicated rearrangement. A theory is proposed in which the trimethylethylene behaves as if it were activated to $^{-}CH_3{\cdot}{}^{+}CMe{:}CHMe$. It is applied to explain the formation of di- and tri-*iso*butylenes from *iso*butylene. H. J. E.

Preparation and physical properties of aliphatic acetylenes. F. R. MOREHOUSE and O. MAASS (Canad. J. Res., 1934, **11**, 637—643).—The m.p., b.p., d, γ, v.p., and the parachor and other consts. derived from these vals. for pure C_2H_2, C_2HMe, C_2HEt, C_2Me_2, and C_2HPr^{α} (prepared by alkylation of the Na derivatives obtained in liquid NH_3) are tabulated and discussed in relation to the vals. of the similar consts.

in the corresponding C_nH_{2n} and C_nH_{2n+2} series. In general the properties of the C_nH_{2n-2} series differ from those of C_nH_{2n} and C_nH_{2n+2}, due, it is suggested, to the polarity of the triple linking. Symmetry in the mol. decreases unsaturation. J. W. B.

Acetylenes. I. Preparation of Δ$^{\alpha}$-heptinene by dehalogenation methods. G. B. Bachman and A. J. Hill (J. Amer. Chem. Soc., 1934, **56**, 2730—2732).—Me *n*-amyl ketone and PCl_5 in C_6H_6 at $< 10°$ and then at room temp. give ββ-*dichloroheptane* (I), b.p. 77°/25 mm., and β-*chloro*-Δ$^{\alpha}$-*heptene* (II), b.p. 71°/75 mm.; with PCl_3Br_2 in C_6H_6, *Me* α-*bromo*-, b.p. 80°/9 mm., and αα-*dibromo*-, b.p. 118—120°/9 mm., -n-*amyl ketones* result. αβ-*Dichloroheptane* (III), b.p. 68—72°/7 mm., is best prepared from Δ$^{\alpha}$-heptene and SO_2Cl_2. When (III) and αα-dichloro- (IV) and α$^{\beta}$-dibromo- (V) -heptanes are passed with N_2 over soda-lime at 420°, Δ$^{\alpha}$-heptinene (VI) is obtained (cf. A., 1928, 269) in isolable yields of 3, 23, and 3%, respectively. Dehalogenation of the following with powdered KOH in mineral oil at 250° (cf. Guest, *ibid.*, 988) gives (VI) (isolable yield quoted): (III) 33%; (IV) 40%; (V) 64%; α-chloro- 37%, α-bromo- 88%, and αα-dibromo- (VII) 21%, -Δ$^{\alpha}$-heptenes; bromoheptene mixture [obtained by dehalogenation of (V)] 65%. (VI) is not similarly obtained from (I) or (II). (VI) polymerises readily at 300°; the polymeride cracks at 400°, but does not regenerate (VI). (VI) is not rearranged by soda-lime at 200—250° (cf. Guest, *loc. cit.*). αα-Dibromoheptane could not be prepared by Bruylants' method (Ber., 1875, **8**, 409), by reduction of (VII), or from (I) and NaBr in $MeOH$–$COMe_2$ containing I and KI. H. B.

Identification of alkyl halides. *N*-Alkyl-*p*-bromobenzenesulphon-*p*-anisidides. H. B. Gillespie (J. Amer. Chem. Soc., 1934, **56**, 2740—2741).—The following *N*-alkyl derivatives of *p*-bromobenzenesulphon-*p*-anisidide, m.p. 142° (from *p*-$C_6H_4Br{\cdot}SO_2Cl$ and *p*-$OMe{\cdot}C_6H_4{\cdot}NH_2$ in C_5H_5N), are obtained with the appropriate alkyl halide (I) in aq. EtOH–KOH: *Me*, m.p. 96—97°, *Et*, m.p. 113·5°, *Pr*$^{\alpha}$ m.p. 75°, *Pr*$^{\beta}$, m.p. 107°, *Bu*$^{\alpha}$, m.p. 74·5°, *Bu*$^{\beta}$, m.p. 78—79°, *n*-, m.p. 88·5°, and iso-, m.p. 52·5°, *-amyl*, n-*heptyl*, m.p. 56°, *allyl*, m.p. 82°, *benzyl*, m.p. 167·5°, β-*hydroxyethyl*, m.p. 92—93°, and β-*hydroxypropyl*, m.p. 92°. These derivatives are useful for the identification of (I). H. B.

Preparation of higher aliphatic bromides. J. R. Ruhoff, R. E. Burnett, and E. E. Reid (J. Amer. Chem. Soc., 1934, **56**, 2784).—The alcohol (I) is saturated with dry HBr [simplified prep. (cf. Baxter and Coffin, A., 1909, ii, 397) described] at about 100° and the crude product washed successively with conc. H_2SO_4 [removes unchanged (I)], dil. $MeOH$–NH_3, and dil. MeOH. *cyclo*Hexyl, *n*-heptyl, and do-, tetra-, and octa-decyl bromides are thus prepared in yields of 73, 88, 89, 89, and 90%, respectively. H. B.

Compounds of magnesium chloride with alcohols and acetic acid.—See this vol., 179.

Pyrogenic transformations of ethyl alcohol. K. Smoleński and S. Kowalewski (Bull. Acad. Polonaise, 1934, **A**, 304—314).—EtOH, heated in an autoclave at various temp. and for various times, affords mainly aliphatic substances. The yield of gaseous products is increased at higher temp. The max. yield of oily liquid products is obtained at 450° with an initial concn. of EtOH of 3·5 g.-mol. per litre. An Al_2O_3 catalyst increases the yield of liquid hydrocarbons, which now consist mainly of aromatic and unsaturated compounds. H. G. M.

Reaction of ethylene oxide with acetylenic Grignard reagents. J. P. Danehy, R. R. Vogt, and J. A. Nieuwland (J. Amer. Chem. Soc., 1934, **56**, 2790; cf. Faucounau, A., 1934, 1199).—$(CH_2)_2O$ and $CR{:}C{\cdot}MgX$ give Δ$^{\gamma}$-noninen-α-ol (I), δ-phenyl-Δ$^{\gamma}$-butinen-α-ol (II), and Δ$^{\gamma}$-octinen-α-ol (III), b.p. 97°/15 mm. (II) is accompanied by an approx. equal amount of the H_2O-sol. 2-phenyl-4 : 5-dihydrofuran, b.p. 55°/15 mm.; similar compounds are formed with (I) and (III). H. B.

Action of *Aspergillus niger* on *n*-αβ-diols. A. Walti (J. Amer. Chem. Soc., 1934, **56**, 2723—2726).—*dl*-$OH{\cdot}CHR{\cdot}CH_2{\cdot}OH$ (I) (R=Me, Et, Pr) are converted by *A. niger* (II) under sterile conditions into $COR{\cdot}CH_2{\cdot}OH$ (III); the recovered αβ-diols are optically active (— when R=Me and + when R=Et or Pr) and rotate in the same direction as those obtained by reduction of (III) or $OH{\cdot}CHR{\cdot}CHO$ with yeast (A., 1932, 143). Infected (II) under non-sterile conditions also converts (I) (R=Et, Pr) into (III); the recovered diols are, however, lævorotatory. Hexane-αβ-diol, b.p. 100°/5 mm., from (V) (below) and H_2O at 180° (sealed tube), is unaffected by (II). The following are described: l-*propane*-αβ-*diol*, m.p. 146°, $[\alpha]_D^{29}$ +9·3° in EtOH, d-, m.p. 117—118°, $[\alpha]_D^{30}$ +3·7° in EtOH, and l-, m.p. 118°, $[\alpha]_D^{30}$ —0·47° in EtOH, *-butane*-αβ-*diol*, and d-, m.p. 100—101°, $[\alpha]_D^{26}$ +1·2° in EtOH, and l-, m.p. 102°, $[\alpha]_D^{32}$ —2·3° in EtOH, *-pentane*-αβ-*diol di*(*phenylcarbamates*); α-*hydroxybutan*-β-*one*-2 : 4-*dinitrophenylhydrazone*, m.p. 150°; α-*hydroxypentan*-β-*one*-2 : 4-*dinitrophenylhydrazone*, m.p. 165°; αβ-*oxidopentane* (IV), b.p. 91—92°, from $OH{\cdot}CHPr{\cdot}CH_2Cl$ and warm conc. aq. NaOH; αβ-*oxidohexane* (V), b.p. 118—120°, from $OH{\cdot}CHBu{\cdot}CH_2Cl$ and powdered NaOH or KOH in Et_2O. (IV) and H_2O at 90° (sealed tube) give pentane-αβ-diol, b.p. 96—99°/11 mm., and a little *dihydroxydiamyl ether*, b.p. 130—132°/7 mm. (IV) and aq. 30% $NHMe_2$ at about 0°—room temp. afford α-*dimethylaminopentan*-β-*ol*, b.p. 165—166°/762 mm. [*methiodide* (=β-n-*propylcholine iodide*), m.p. 198°]. α-Bromohexan-β-ol, b.p. 89—90°/13 mm., is obtained from (V) and cold 48% HBr. H. B.

Preparation of ethylene glycol from dichloroethane. A. L. Klebanski and I. M. Dolgopolski (J. Appl. Chem. Russ., 1934, **7**, 790—806).—$(\cdot CH_2{\cdot}OH)_2$ (I) is obtained in 87—90% yield from $C_2H_4Cl_2$ by heating for 20—25 min. with a 5% excess of 15% Na_2CO_3 at 185—190°/100 atm.; $CH_2{:}CHCl$, a by-product of the reaction, is best absorbed by xylene from the reaction gases. Using aq.-EtOH HCO_2Na in place of Na_2CO_3 80% yields of (I) are obtained by heating at 160—170°/18 atm. for 5·5 hr. R. T.

Di-tertiary diols derived from diacetone alcohol (β-hydroxy-β-methylpentan-δ-one). R.

Jacquemain (Compt. rend., 1934, **199**, 1315—1317).—Diacetone alcohol with the appropriate Grignard compound gives βδ-*dihydroxy*-βδ-*dimethyl*-*hexane*, b.p. 98°/5 mm., -*heptane*, b.p. 107—108°/5 mm., -*octane*, b.p. 116—117°/5 mm., -*nonane*, b.p. 123—124°/2 mm., βδ-*dihydroxy*-βδε-*trimethylhexane*, b.p. 103—106°/2 mm., -βδζ-*trimethylheptane*, b.p. 105—106·5°/2 mm., and βδη-*trimethyloctane*, b.p. 119—120°/4 mm., which readily lose H_2O. J. L. D.

Constitution of polyhydroxy*cyclo*hexane. I. *l*-Tetrahydroxymannocyclitol. Y. Hamamura (Proc. Imp. Acad. Tokyo, 1934, **10**, 459—462).—αζ-Di-iodo-*d*-mannitol βγδε-tetrabenzoate (I) (cf. A., 1932, 928) with Ag in dioxan at 125—130° affords a syrup, hydrolysed [5% MeOH–$Ba(OH)_2$] to 1 : 2 : 3 : 4-*tetrahydroxy*cyclo*hexane* (II), m.p. 146—147°, $[\alpha]_D^{25}$ —27·7° in H_2O (cf. A., 1932, 834) (*Ac*$_4$ derivative, m.p. 79°), which absorbs Br in AcOH, does not reduce Fehling's solution, and with H_2 (Pd–$BaSO_4$) at room temp. gives αβγδ-*tetrahydroxy*-n-*hexane*, m.p. 123—125° (*CPh*$_3$ *ether*, m.p. 124—125°), the oxidation product (PrOH) of which confirms its structure. (I) with Zn–AcOH at 100° gives a product which is converted into βγδε-*tetrahydroxy*-n-*hexane* (?), m.p. 150°, which does not reduce $KMnO_4$ or absorb Br, and differs from (II). J. L. D.

Mannitol. IV. Acetone- [*iso*propylidene-] mannitols and mixed esters of mannitol. P. Brigl and H. Grüner (Ber., 1934, **67**, [*B*], 1969—1973; cf. A., 1934, 1199).—Mannitol is shaken with HBO_2 (or H_3BO_3) and conc. H_2SO_4 in $COMe_2$ until dissolution is complete. The solution is conc. to a syrup, which is repeatedly evaporated with MeOH to remove HBO_2. The residue is extracted with ligroin, from which di*iso*propylidenemannitol separates. Tri*iso*propylidenemannitol (I) is obtained from the mother-liquors, whilst treatment of the material insol. in ligroin with EtOH leads to *iso*propylidenemannitol. αβεζ-Di*iso*propylidenemannitol is converted by *p*-$C_6H_4Me{\cdot}SO_2Cl$ in C_5H_5N at 35° into αβεζ-*diiso*propylidenemannitol γδ-*di*-p-*toluenesulphonate*, m.p. 120—121°, $[\alpha]_D$ +9·3° in $CHCl_3$, which is hydrolysed and then transformed by BzCl in C_5H_5N into *mannitol* αζ-*dibenzoate* γδ-*di*-p-*toluenesulphonate*, m.p. 145—146°, $[\alpha]_D$ +42·2° in $CHCl_3$, whence (Ac_2O in C_5H_5N) *mannitol* βε-*diacetate* αζ-*dibenzoate* γδ-*di*-p-*toluenesulphonate*, m.p. 142°, $[\alpha]_D$ +55·9° in $CHCl_3$. Mannitol αζ-dibenzoate is converted by COMe and conc. H_2SO_4 into *iso*propylidenemannitol αζ-dibenzoate, which is transformed by *p*-$C_6H_4Me{\cdot}SO_2Cl$ and C_5H_5N at 15—20° into γδ-iso*propylidenemannitol* αζ-*dibenzoate* βε-*di*-p-*toluenesulphonate*, m.p. 96—97°, $[\alpha]_D$ +27·0° in $CHCl_3$, hydrolysed to *mannitol* αζ-*dibenzoate* βε-*di*-p-*toluenesulphonate*, m.p. 76—77°, $[\alpha]_D$ —27·8 in $CHCl_3$, whence *mannitol* γδ-*diacetate* αζ-*dibenzoate* βε-*di*-p-*toluenesulphonate*, m.p. 121°, $[\alpha]_D$ +56·4° in $CHCl_3$. The compound of Müller *et al.* (A., 1933, 931) is therefore *mannitol* γε-*diacetate* αζ-*dibenzoate* βδ-*di*-p-*toluenesulphonate*. γδ-Di*iso*propylidenemannitol, m.p. 84—85°, $[\alpha]_D^{19}$ +30·4° in H_2O, is readily obtained by partial hydrolysis of (I) with AcOH–H_2O at 15—20°. H. W.

Preparation and determination of ethylene oxide. W. Dominik and J. Bartkiewiczówna (Przemysł Chem., 1934, **18**, 373—375).—$(CH_2)_2O$ is obtained in 90% yield by dropping aq. EtOCl on to CaO in a flask heated on an oil-bath, and fitted with a reflux condenser connected with a manometer. The yield of $(CH_2)_2O$ is calc. from the rise in pressure in the flask. Lower yields are obtained when aq. NaOH is substituted for CaO. R. T.

Molecular changes of the α-disecondary oxides of the aliphatic series, and of normal structure. M. Favorski, M. Tchitchonkin, and I. Ivanov (Compt. rend., 1934, **199**, 1229—1230).—*α-Methyl-β-ethylethylene oxide* (I), b.p. 79—82° (prepared through CHMe:CHEt and its monochlorohydrin), with fused $ZnCl_2$ at 315—320° gives $COMePr^{\alpha}$. Similarly, *α-ethyl-β-propylethylene oxide*, b.p. 131—132°, is converted into $COEtBu^{\alpha}$. The C atoms nearer the periphery possess the greater affinity for O, so CO is situated as near the end of the chain as possible. J. L. D.

Specificity of phosphatase.—See this vol., 122.

Spontaneous decomposition of lecithin and its bearing on determination of isoelectric point. H. Fischgold and E. Chain (Biochem. J., 1934, **28**, 2044—2051).—Lecithin (I) is titrated electrometrically in 99% EtOH, with NaOH, giving a curve similar to that of the solvent alone; back titration with HCl shows slight buffering at p_H 7·5. Back titration after keeping 66 hr. in excess of NaOH shows the formation of a new group, *pK* 7·5. Fresh and old preps. of (I) are titrated in C_6H_6–EtOH (19 : 1) with $HClO_4$ and also with NaOEt. On the acid side no significant change in the titration occurs with age, whilst on the alkaline side an increase in the groups titratable by NaOEt occurs. The *pK* of stearic acid in 90% EtOH at 25·7° is 7·36. After emulsification of (I) in H_2O and subsequent addition of HCl and $Fe(OH)_2$ choline chloride (II) is not present in the supernatant fluid. Fatty acids are present in an EtOH extract of an old prep. of (I) after pptn. with $CdCl_2$, but not of a fresh prep. A solution of (II) in H_2O was neutral. The titration curve of (II) is identical with its blank correction curve. From the p_H of a solution of (II) in 0·1*N*-NaOH a val. of 14 for its *pK* is obtained, giving a theoretical isoelectric point of (I) at p_H 7·5 approx. H. D.

Isoelectric points of lecithin and sphingomyelin. E. Chain and I. Kemp (Biochem. J., 1934, **28**, 2052—2055).—A fresh prep. of lecithin has an isoelectric point (I) at p_H 6·7±0·2 as determined by the min. cataphoretic velocity of dispersions in aq.-EtOH media. (I) is independent of the buffers used and the ionic strengths of the solutions; in 0·05*N*-$BaCl_2$ strong adsorption of $Ba^{\cdot\cdot}$ occurs. The (I) of preps. of sphingomyelin increases from a val. <2 to a val. >6 with successive purifications through the Cd salt. H. D.

Mechanism of chlorination of aliphatic acid chlorides. I. Dark reaction.—See this vol., 174.

Oxidation of fatty acids.—See this vol., 114.

Rotatory dispersion curves of α-substituted *n*-carboxylic acids.—See this vol., 14.

Preparation of formyl chloride.—See this vol., 177.

Organic reactions with boron fluoride. VIII. Condensation of propylene with acids. T. B. Dorris, F. J. Sowa, and J. A. Nieuwland (J. Amer. Chem. Soc., 1934, **56**, 2689—2690).—$Pr^{\beta}OAc$, $CH_2Cl{\cdot}CO_2Pr^{\beta}$, $CHCl_2{\cdot}CO_2Pr^{\beta}$, and $CCl_3{\cdot}CO_2Pr^{\beta}$ are obtained in yields of 16·8, 38·8, 48·6, and 57·8%, respectively, from the acid, $Pr^{\beta}OH$, and BF_3 (cf. A., 1932, 728); the yields are in the reverse order with HCl as catalyst (Sudborough and Lloyd, J.C.S., 1899, **75**, 467). $Pr^{\beta}OBz$ (I) is similarly obtained in 60% yield. The esters are also prepared in yields of 7, 34·2, 39·5, and 48·8%, respectively, from the acid, C_3H_6, and BF_3 at 60—70°. The solubility of C_2H_6 in the acids and esters increases with the no. of Cl atoms. (I) is obtained in 88% yield from BzOH [in (I)], C_3H_6, and BF_3 at 20—30°; ring-substitution does not occur (cf. A., 1934, 1349). H. B.

Hetero-formato-salts of calcium. J. V. Dubský and J. Trtílek (Publ. Fac. Sci. Univ. Masaryk, 1934, No. 196, 1—6).—The *compounds* $[Ca_2R_2]Cl_2,8H_2O$, $[Ca_2R_2][C_6H_2(NO_2)_3{\cdot}O{\cdot}]_2,4H_2O$, m.p. 160°, $[Ca_2R_2]CrO_4,2H_2O$, $CaR_2,K_3Fe(CN)_6$, and $[Ca_2R_2](OAc)_2$, in which $R{=}HCO_2{\cdot}$, have been prepared. R. T.

Olefinic acids. XIII. Δ^{γ}-*n*-Hexenoic acid and "hydrosorbic" acid. R. A. Letch and R. P. Linstead. **XIV. Preparation and additive reactions of Δ^{δ}-*n*-hexenoic acid. Unusual isomeric change in the three-carbon system. XV. Effect of peroxides on orientation of addition of hydrogen bromide to vinyl- and allyl-acetic acids.** R. P. Linstead and H. N. Rydon (J.C.S., 1934, 1994—1995, 1995—2001, 2001—2003).—XIII. "Hydrosorbic" acid (A., 1928, 868, 1214) contains Δ^{γ}- (I) and Δ^{β}-*n*-hexenoic acids. Hot alkali partly converts the latter into the Δ^{α}-isomeride, which may be separated by partial esterification. After two repetitions of the whole process pure (I) remains. The acid thus obtained is identical with that prepared by other methods (A., 1897, i, 13, 590; 1901, i, 63; 1929, 1271). *γδ-Dibromo*-n-*hexoic acid* has m.p. 84°.

XIV. Decarboxylation of Δ^{γ}-n-*butenylmalonic acid*, m.p. 92° [from α-bromo-Δ^{γ}-*n*-butene (II) (improved prep.) and $CHNa(CO_2Et)_2$], gives Δ^{δ}-*n*-hexenoic acid (III), which after regeneration from the *p*-toluidide, m.p. 58° (cf. A., 1904, i, 547), through the *Et* ester, b.p. 65—66°/15 mm., has m.p. −37°, b.p. 107°/17 mm. With PBr_3–C_5H_5N, Δ^{γ}-*n*-buten-α-ol gives pure (II), but with H_2SO_4–HBr a mixture of (II), the Δ^{β}-isomeride [identified by conversion (A., 1931, 597) into Δ^{γ}-*n*-pentenoanilide, and Δ^{β}-*n*-butenylmalonic acid, from which (I) and its Br_2-derivative were obtained], and dibromobutane, b.p. 171—176°, is obtained. Lactonisation of (III) (cf. A., 1933, 934) gave some δ-hexolactone (IV) and considerable quantities of side-products. The hydrolysis of (IV) was followed quantitatively. *Et δ-bromohexoate* [from (IV), HBr, and EtOH] has b.p. 121—122°/21 mm. Addition of HBr to (III), alone or in light petroleum, gave some ε-Br-derivative (characterised by malonation to suberic acid).

XV (cf. A., 1933, 934). The orientation of addition of HBr to vinyl- (V) and allyl- (VI) -acetic acids in hexane is unaffected by anti-oxidants [H_2, *p*-$C_6H_4(OH)_2$, $NHPh_2$]. Addition to (VI), but not to (V), in the absence of solvent is reversed by admixture of 1% of Bz_2O_2. Addition to stale samples of (VI) in the absence of solvent occurs in the same direction as to fresh samples. The orienting effect of solvents in the above examples is not considered to be due to variations in the peroxide effect. H. G. M.

Arachidonic acid and its quantitative determination. W. C. Ault and J. B. Brown (J. Biol. Chem., 1934, **107**, 615—622).—Specimens of Me arachidonate (I) prepared by fractional distillation, by the Li soap–$COMe_2$ method, and by reduction of Me octabromoarachidonate all have the same polybromide no., 86·5. By use of this no. as described by Brown (A., 1928, 208), (I) and arachidonic acid (II) may be determined. (I) has b.p. 200—205°/1—2 mm.; (II) has m.p. −49·5°. C. G. A.

Unsaturated fatty acids and their derivatives. X. Constitution of clupanodonic acid. Y. Inoue and H. Kato. **XI. Configuration of eruco- and brassido-dibromobehenic acid.** T. Maruyama (Proc. Imp. Acad. Tokyo, 1934, **10**, 463—466, 467—469; cf. A., 1932, 252; 1933, 145).—X. Decabromobehenic acid (I) [from clupanodonic acid (II)] with KI in C_6H_6–H_2O gives the *octabromide* (III), m.p. 98—98·5°, reconverted into (I) with Br, and with O_3, followed by hydrolysis, gives *hexabromo-octadecanedicarboxylic acid* (IV), m.p. 65° [*Me* ester (V), m.p. 52—52·5°, similarly obtained from the Me ester of (I) or Me hexabromoclupanodonate (VI)]. (IV) and (V) when debrominated and hydrogenated (Pd–$BaSO_4$) both give hexadecane-αω-dicarboxylic acid (Pb salt), and ozonisation in each case affords $Pr^{\alpha}CO_2Ag$. Because both (VI) and (III) give (I), the centres of unsaturation are the same, but (VI) must have a triple and (III) a double linking. (II) with fuming HNO_3 affords an α-diketone, and with conc. H_2SO_4 and H_2O affords *monoketotrihydroxybehenic acid*, decomp. 128° (*oxime*, decomp. 150°).

XI. Erucic acid with Br gives eruco-dibromobehenic acid (VII), which with the calc. amount of EtOH–KOH at 80° affords *μ-bromo-Δ^{γ}-behenic acid* (VIII), m.p. 33°, the Me ester of which when oxidised gives octoic acid (IX) and *α-hydroxydodecane-αω-dicarboxylic acid*, m.p. 108°. (VII) with excess of EtOH–KOH at 80° gives behenolic acid and the *acid*, $CH_3{\cdot}[CH_2]_6{\cdot}CH{:}CH{\cdot}CH{:}CH{\cdot}[CH_2]_{10}{\cdot}CO_2H$ (X), m.p. 63°, the Me ester of which is oxidised to $H_2C_2O_4$, (IX), and decane-αω-dicarboxylic acid. (X) with EtOH–KOH at 150° gives behenolic acid. Brassido-dibromobehenic acid with EtOH–KOH at 80° gives μ(or ν)-*bromo-Δ^{μ}-behenic acid* (XI), m.p. 41°, the Me ester of which is oxidised to nonoic acid and brassylic acid. HBr is difficult to remove from (XI), but not from (VIII); which indicates a *cis*-structure for (VIII) and *trans*- for (XI). J. L. D.

Hydrogenation of unsaturated α-keto-acids, aldehydes, and alcohols by fermenting yeast.—See this vol., 123.

Hetero-compounds of glycollic acid. J. V. Dubský and D. Vinogradsova (Publ. Fac. Sci. Univ. Masaryk, 1934, No. 196, 7—16).—The *salts* CuR_2, NiR_2, $MgR_2,2H_2O$, BaR_2, $ZnR_2,2H_2O$, $CdR_2,2H_2O$, PbR_2, $MnR_2,2H_2O$, $CoR_2,2H_2O$, $CuR_2,2NH_3$, $[Cu_2R_2]Cl_2,3H_2O$, $[Mg_2R_2]Cl_2,3$, m.p. 282°, and $4H_2O$, $[Ca_2R_2]Cl_2,5$, m.p. 188°, and $6H_2O$, m.p. 128°, $[Ba_2R_2]Cl_2,3H_2O$, m.p. 275—280°, $[Hg_2R_2]Cl_2$, $[Pb_2R_2]Cl_2$, $[Mn_2R_2]Cl_2,4H_2O$, m.p. 162—164°, $[Ni_2R_2]Cl_2,6H_2O$, m.p. 126—128°, $CoCl_2,CoClR,10H_2O$, m.p. 52°, $[Co_2R_2]Cl_2,5{\cdot}5H_2O$, m.p. 86—90°, $[Ca_2R_2](NO_3)_2,8H_2O$, m.p. 174°, $[Zn_2R_2](NO_3)_2,4H_2O$, m.p. 119°, $[Pb_2R_2](NO_3)_2$, decomp. at 160°, $[Cu_2R_2]RR'$, $[Cu_2R_2]R'_2,H_2O$, $3ZnR_2,2ZnR'_2,11H_2O$, m.p. 230°, $[Ba_2R''_2](NO_3)_2,4H_2O$, $[Ba_2R''_4](NO_3)_2,2H_2O$, and $[Pb_2R''_2](NO_3)_2,H_2O$, m.p. 182—187°, have been prepared (R=OH·CH_2·CO_2; R′=NH_2·CH_2·CO_2; R″=HCO_2). R. T.

Hydroxy-acids obtained by the atmospheric oxidation of paraffin. II. P. P. Schorigin and A. P. Kreschkov (J. Gen. Chem. Russ., 1934, **4**, 988—994).—The product of oxidation of paraffin by atm. O_2 consists of a mixture of OH-acids (I), their anhydrides, lactones, and lactides, carboxylic acids, and unidentified, unsaponifiable substances. The (I) were converted into Me esters with Me_2SO_4, the mixture of esters fractionally distilled, the fractions hydrolysed with aq. KOH, the individual (I) fractionally pptd. as Cd salts, and the acids OH·C_9H_{18}·CO_2H, OH·$C_{11-17}H_{22-34}$·CO_2H, OH·$C_{20}H_{40}$·CO_2H (2 isomerides), OH·$C_{21}H_{42}$·CO_2H, OH·$C_{26}H_{52}$·CO_2H, and OH·$C_{31}H_{62}$·CO_2H isolated; OH is chiefly, but not exclusively, in the β-position, and the C chain is probably branched in every case. R. T.

Combined action of ultra-violet light and platinum on transformation of fumaric and maleic acids and their salts.—See this vol., 178.

Preparation of pimelic acid. A. Müller (Monatsh., 1934, **65**, 18—20).—Pimelic acid is obtained in 50% yield by treating *o*-OH·C_6H_4·CO_2H with Na in boiling amyl alcohol. H. W.

Muconic and hydromuconic acids. VI. *cis*- and *trans*-Δ$^{\alpha}$-Dihydromuconic acids. E. H. Farmer and L. A. Hughes (J.C.S., 1934, 1938—1940; cf. *ibid.*, 1923, **123**, 2531).—The mixture obtained by heating Δ$^{\beta}$-dihydromuconic acid (I) with hot aq. NaOH contains unchanged (I) and trans-Δ$^{\alpha}$-*dihydromuconic acid* (II), m.p. 191° (*Me*$_2$ ester, b.p. 127°/14 mm), also formed (32—57%) in the 50% hydrogenation (Pd or Ni) of muconic acid (as Na salt in H_2O). In both cases pure (II) was isolated by partial esterification (MeOH–HCl) and hydrolysis of the resulting *Me H* ester (III), m.p. 60°. (III) is oxidised almost quantitatively to $H_2C_2O_4$ and (·CH_2·CO_2H)$_2$. The bromide of (III) is hydrolysed to αβ-*dibromoadipic acid*, m.p. 171—173°, reconverted (Zn–$COMe_2$) into (II). 50% hydrogenation of Me *cis-cis*-muconate (*ibid.*, 2531) gives a product from which cis-Δ$^{\alpha}$-*dihydromuconic acid*, m.p. 81°, some (I) (*trans*-form), and adipic acid were isolated. H. G. M.

Methylation of trihydroxyglutaric acid and tartaric acid with diazomethane. O. T. Schmidt and H. Zeiser (Ber., 1934, **67**, [*B*], 2120—2127).—Treatment of *l*-(*arabo*)-trihydroxyglutaric acid with excess of CH_2N_2 in Et_2O gives a product containing 45·4% OMe, transformed by Ag_2O and MeI into *Me*$_2$ l-(arabo)-*trimethoxyglutarate*, b.p. 74—76°/0·005 mm., $[\alpha]_D^{18}$ +32·2° in MeOH [*l*-(*arabo*)-trimethoxyglutardimethylamide, m.p. 173—174°, $[\alpha]_D^{18}$ +59·4°±0·9° in H_2O], in 60% yield. With excess of CH_2N_2 (*xylo*)-trihydroxyglutaric acid affords essentially *Me*$_2$ *hydroxydimethoxyglutarate*, b.p. 97—99°/0·003 mm., hydrolysed to a mixture of an acid and the *monolactone* of α-hydroxy-α′β-dimethoxyglutaric acid, m.p. 109·5—110·5°. *d*-Tartaric acid is converted by an excess of CH_2N_2 into Me_2 *d*-dimethoxysuccinate, b.p. 130—132°/12 mm., in 95% yield; the same substance is produced by vigorous action, but in somewhat lower yield, from Me_2 *d*-tartrate. Mucic acid, probably by reason of its sparing solubility, reacts so slowly with CH_2N_2 in Et_2O that complete esterification is not attained. *d*-Saccharic acid reacts vigorously, acquiring about 4Me, but apparently undergoing complex change. H. W.

Identification reactions for *l*-ascorbic acid (vitamin-*C*).—See this vol., 130.

Types of lactones formed from monobasic sugar acids under varying conditions. J. M. Brackenbury and F. W. Upson (J. Amer. Chem. Soc., 1934, **56**, 2659—2662; cf. A., 1933, 808).—The rate of lactone formation by various acids in (usually) AcOH, 0·5*N*-H_2SO_4, and H_2O at 25° is studied polarimetrically. *d*-Mannonic acid is converted more slowly but to a greater extent into the δ-lactone in AcOH than in H_2O, and gradual conversion of the δ- into the γ-lactone (isolable from the equilibrium mixture; the change is also established independently) occurs; *l*-rhamnonic acid shows a similar behaviour. *d*-Gluconic acid lactonises to a greater extent in AcOH than in H_2O; the main constituent of the equilibrium mixture is (probably) the δ-lactone (which is isolable). α-*d*-Glucoheptonic acid (I) is also converted more slowly but to a greater extent into the δ-lactone (II) in AcOH than in H_2O or dil. acid; reaction is slower at 0° and gives an equilibrium mixture of (I) and (II). α-*l*-Rhamnoheptonic acid resembles (I); its δ-lactone has a — rotation in accordance with Hudson's lactone rule (A., 1910, i, 220). δ-Lactone formation by arabonic, talonic, and galactonic acid is not much > in AcOH than in H_2O. H. B.

Reduction of galacturonic acid and of methyl methylgalacturonate. K. Smoleński and A. Złotnik (Bull. Acad. Polonaise, 1934, **A**, 293—303).—*d*-Galacturonic acid (I) (from pectic materials from sugar-beet) is reduced to *l*-galactonic acid (*a*) by Na–Hg and (*b*) by Ca, the solution being maintained faintly alkaline. This establishes the *d*-configuration for (I). Me α-methylgalacturonate [obtained from (I); A., 1933, 53] is reduced in acid solution (p_H 2—3) by Na–Hg to α-methyl-*d*-galactoside (yield about 10%), hydrolysed to *d*-galactose. H. G. M.

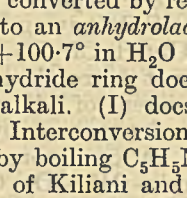
Sugars with branched carbon chains. III. Configuration of the two fructoheptonic acids and hamamelose. IV. Optical behaviour of aldonic acids in presence of sodium molybdate. O. T. Schmidt and C. C. Weber-Molster. V.

Synthesis of hamamelonic acid. O. T. Schmidt and K. Heintz (Annalen, 1934, **515**, 43—64, 65—76, 77—96; cf. A., 1930, 197; 1931, 70).—III. A mixture of α-fructoheptonic acid (I), $[\alpha]_D^{18}$ −20·26±0·5° in H_2O, −11·58±0·4° (as Na salt in H_2O) {brucine salt (II), m.p. 162° (Kiliani, A., 1928, 47); phenylhydrazide, m.p. 164°, $[\alpha]_D^{18}$ +9·6±0·5° in H_2O (Kiliani and Düll, A., 1890, 596); *amide*, m.p. 175—176°, $[\alpha]_D^{18}$ −9·3° in H_2O; *anilide*, m.p. 164—165°, $[\alpha]_D^{18}$ +22·5±0·5° in H_2O; lactone, $[\alpha]_D^{18}$ +82·15° in H_2O}, and β-fructoheptonic acid (III), $[\alpha]_D^{18}$ +1·4±0·4° in H_2O, +2·1±0·3° (as Na salt in H_2O) {*brucine* salt (+2·5H_2O), m.p. (anhyd.) 143—145° (not sharp); phenylhydrazide (IV), m.p. 190—191°, $[\alpha]_D^{18}$ −30·75±0·5° in H_2O (cf. Kiliani, A., 1922, i, 1111)}, is obtained from fructose and HCN by Kiliani's method (*loc. cit.*); (I) is separated from the mixture as (II), and (III) is then isolated from the filtrate as (IV). (III), obtained as a syrup, is converted by repeated evaporation with aq. HCl into an *anhydrolactone*, $C_7H_{10}O_6$, m.p. 189—190°, $[\alpha]_D^{18}$ +100·7° in H_2O (free acid, $[\alpha]_D^{18}$ +8·4±0·4°); the anhydride ring does not undergo fission with acid or alkali. (I) does not give an analogous compound. Interconversion of (I) and (III) could not be effected by boiling C_5H_5N or quinoline. The nitrile, m.p. 105°, of Kiliani and Düll (*loc. cit.*) (the m.p of different preps. is found to be 95—117°) is hydrolysed to (I). Comparison of the $[M]_D$ of (I), (III), gluconic, mannonic, arabonic, ribonic, and hamamelonic (V) acids and their derivatives shows that (I) and (III) are α-hydroxymethyl-gluconic and -mannonic acid, respectively. (V) (cf. Part V) shows the same optical behaviour as (I).

IV. Lutz and Jirginson's method (A., 1932, 720) of determining the configuration of α-OH-acids fails with aldonic acids. Investigation of the optical rotatory changes occurring when the following acids (as Na salts) are mixed with varying amounts of Na_2MoO_4 (I) and the solutions then treated with acid or alkali, shows that trustworthy results are obtained only when the mol. ratio Na aldonate : (I) is 2 : 1: gluconic, galactonic, talonic, mannonic, rhamnonic, α- (II) and β- (III) -fructoheptonic, 4-methylmannonic, arabonic, lyxonic, ribonic, and hamamelonic (IV). The results for (II), (III), and (IV) confirm the constitutions assigned from rotation measurements.

V. *d*-Xyloketose (I) (A., 1934, 173), aq. HCN, and a little aq. NH_3 at 0°—room temp. for 3 days give [after hydrolysis with $Ba(OH)_2$] α-hydroxymethyl-*d*-lyxonic acid (II) (*phenylhydrazide*, m.p. 155—156°, $[\alpha]_D^{18}$ −32·7±0·7° in H_2O) and galactonic acid [which arises from *d*-lyxose, formed by the action of the NH_3 on (I)], purified through the Ca salts and separated as the phenylhydrazides. In the absence of NH_3, (I) similarly affords (II) and α-hydroxymethyl-*d*-xylonic acid (*Ca* salt; phenylhydrazide, m.p. 194—195°, $[\alpha]_D^{18}$ +56±7° in H_2O). *l*-Arabinose (III) is boiled with anhyd. C_5H_5N and the resulting mixture is crystallised from EtOH+Et_2O, whereby the bulk of unchanged (III) is removed; treatment of the residue with $CH_2Ph{\cdot}NPh{\cdot}NH_2$ gives some (III)-phenylbenzylhydrazone. Subsequent treatment of the residual product with PhCHO in H_2O and extraction with Et_2O affords an aq. solution of *l*-araboketose, $[\alpha]_D^{18}$ +12·7°. This and HCN give α-hydroxymethyl-*l*-arabonic acid (phenylhydrazide, m.p. 194—195°, $[\alpha]_D^{18}$ +83±5° in H_2O) and α-hydroxymethyl-*l*-ribonic acid (*phenylhydrazide*, m.p. 204°, $[\alpha]_D^{18}$ −33±4° in H_2O). *d*-Araboketose, $[\alpha]_D$ −12·4°, similarly prepared from *d*-arabinose, and HCN afford α-hydroxymethyl-*d*-arabonic acid (phenylhydrazide, m.p. 194—195°) and hamamelonic (α-hydroxymethyl-*d*-ribonic) acid (phenylhydrazide, m.p. 202—203°, $[\alpha]_D^{18}$ +34±4° in H_2O). Hamamelose is, therefore, an α-hydroxymethyl-*d*-ribose (IV).

Further investigation of the action of C_5H_5N on *d*-xylose (V) [3·5-*dinitrobenzoylhydrazone* (VI), m.p. 194°, $[\alpha]_D^{18}$ +35·4° (final val.) in C_5H_5N] shows that (I) is accompanied by a little lyxose; the initial reaction product can be freed from (V) with 3 : 5-$(NO_2)_2C_6H_3{\cdot}CO{\cdot}NH{\cdot}NH_2$ [thus giving (VI); ketoses do not react], and (after treatment with PhCHO) (I) can then be isolated as the *p*-bromophenylhydrazone (*loc. cit.*). The production of (I) from (V) is contrary to the results of Levene and Hill (A., 1933, 1278). The composition of mixtures of aldo- and keto-pentoses cannot be determined by titration with I in alkaline solution (cf. Levene and Hill, *loc. cit.*). (V) undergoes quant. oxidation with I in aq. $KHCO_3$ after 12 hr.; (I) similarly consumes I = 65% of aldose. H. B.


(IV.)

Thiodi*iso*butyric acids. E. Larsson (Ber., 1934, **67**, [*B*], 2109—2111; cf. A., 1934, 870).—Et β-bromo-*iso*butyrate (I) and $SH{\cdot}CMe_2{\cdot}CO_2H$ are converted by NaOEt–EtOH and subsequent hydrolysis into thio-αβ′-di*iso*butyric acid, m.p. 151°. Et α-bromo*iso*butyrate and Na_2S in EtOH–C_6H_6 afford thio-αα′-di*iso*butyric acid, m.p. 142°, whilst similar treatment of (I) yields thio-ββ′-di*iso*butyric acid, m.p. 115°. The assigned constitutions (*loc. cit.*) are thus confirmed. H. W.

Application of Raman spectrography to the study of the allylic transformation and of *cis–trans* isomerism of crotonyl derivatives. (Mlle.) B. Gredy and L. Piaux (Bull. Soc. chim., 1934, [v], **1**, 1481—1489).—Raman spectra prove the following: $CH_2{:}CH{\cdot}CH_2{\cdot}CHO$ and Charon's $CH_2{:}CH{\cdot}CH_2{\cdot}CH_2{\cdot}OH$ (I) contain only a little *cis*-compound. Acetylation of (I) and of $CH_2{:}CH{\cdot}CHMe{\cdot}OH$ (II) is completely "normal." (I) with HBr and (II) with PBr_3 give the same mixture of *trans*-$CH_2{:}CH{\cdot}CH_2{\cdot}CH_2Br$ (80%) and 10% each of the other two ingredients, which with NaOAc in AcOH gives a mixture of about equal amounts of the acetates of (I) and (II), hydrolysed "normally" by alkali to a corresponding mixture of (I) and (II). R. S. C.

[**Aldehyde of violet leaves.**] E. Späth and F. Kesztler (Ber., 1934, **67**, [*B*], 2099—2100).—A reply to Walbaum *et al.* (this vol., 66). H. W.

Allyl change. Studies by the Raman effect. A. Kirrmann (Compt. rend., 1934, **199**, 1228—1229).—Crotonaldehyde with PCl_5 gives a mixture (I) of Cl-compounds which cannot be separated by fractional distillation. (I) with NaOEt affords α-chloro-γ-ethoxy-Δ^{α}-butene, the spectrum of which shows only one double linking. (I) gives two fractions, b.p. 120—123° and 124—125°, each of which shows

the same lines (1666 and 1620 cm.$^{-1}$) but of different intensities. (I) is mainly the *trans*-compound; very little of the *cis*-isomeride is formed. J. L. D.

Polymerisation of dihydroxyacetone. H. H. Strain and W. H. Dore (J. Amer. Chem. Soc., 1934, **56**, 2649—2650).—Unimol. $CO(CH_2{\cdot}OH)_2$(I), m.p. 72°, polymerises completely to the bimol. form, m.p. 78—81°, during 25—30 days at room temp.; the rate of polymerisation is determined by *X*-ray diffraction patterns (II) and is independent of the radiation. Polymerides, m.p. 130—133°, 230—260° (decomp.), and 230—250° (decomp.), obtained when (I) is kept for many months, show definite (II). H. B.

Preparation of αγ-diketones by the Claisen reaction. J. M. Sprague, L. J. Beckham, and H. Adkins (J. Amer. Chem. Soc., 1934, **56**, 2665—2668).—The following $COR{\cdot}CH_2{\cdot}COR'$ are prepared (in 50—70% yield) from COMeR, $R'CO_2Et$, and (usually) NaOEt (prepared in Et_2O or xylene) in Pr^{β}_2O or PhMe (except when large excess of ester is used), and purified by fractional distillation (Widmer column): $CH_2Ac{\cdot}COPr^{\beta}$; $CH_2Ac{\cdot}COBu^{\gamma}$ (I); $CH_2Ac{\cdot}COBu^{\beta}$; $CH_2Ac{\cdot}COEt$; $CH_2Ac{\cdot}COPr^{\alpha}$; $CH_2Ac{\cdot}COBu^{\alpha}$; $CH_2Ac{\cdot}COBu(sec.)$; hexahydrobenzoylacetylmethane; furoylacetylmethane; *tetrahydrofuroylacetylmethane*, b.p. 95—97°/8 mm. (from $COMe_2$ and Et tetrahydrofuroate); CH_2BzAc; 2 : 4 : 6-trimethylbenzoylacetylmethane, m.p. 46—47°; benzoylfuroylmethane, m.p. 68°; p-*phenylbenzoylacetylmethane*, m.p. 156—157° (from EtOAc and p-$C_6H_4Ph{\cdot}COMe$). CH_2Ac_2 is best prepared by using Na as condensing agent. $COMe{\cdot}CHNa{\cdot}COR$ and R'Hal in (usually) $COMe_2$ or dioxan (cf. Weygand, A., 1928, 643) give $COMe{\cdot}CHR'{\cdot}COR$; the following are new: α-*benzoyl-α-acetyl-pentane*, b.p. 156—160°/10 mm., and *-octane*, b.p. 178—183°/8 mm.; α-*acetyl-α-trimethylacetyl-propane*, b.p. 77—78°/17 mm., and *-pentane*, b.p. 113—117°/11 mm.; α-*acetyl-α-trimethylacetyl-β-phenylethane* (II), b.p. 155—163°/10 mm. [from (I) and CH_2PhCl]; β-*acetyl-β-trimethylacetyl-αγ-diphenylpropane*, b.p. 165—174°/1 mm. [from (II) and CH_2PhCl]. $CMe_3{\cdot}CO_2Et$ and Et valerate could not be condensed (NaOEt) with $COMeBu^{\gamma}$ or $COMeBu^{\alpha}$; similarly, Et hexahydrobenzoate, phenylacetate, and β-phenylpropionate do not react with $COMe_2$. H. B.

Alcoholysis of αγ-diketones. L. J. Beckham and H. Adkins (J. Amer. Chem. Soc., 1934, **56**, 2676—2679; cf. A., 1932, 1020).—The alcoholysis of various αγ-diketones by EtOH (twice dried over CaO) in a brass reaction vessel at 150—250°/100 atm. of H_2, is investigated by the method previously used (*loc. cit.*). For $COMe{\cdot}CH_2{\cdot}COR$ (I), the % of Ac cleavage (*A*) is R=Ph 80, Bu^{γ} 75, *sec.*-Bu 63, Bu^{β} 59, Bu^{α} 54, Pr^{α} 52, Et 51, Me 50, Pr^{β} 38. For $COMe{\cdot}CHR{\cdot}COBu^{\gamma}$, (*A*) is R=$Bu^{\alpha}$ 82, CH_2Ph 80, and Et 75%, whilst for $COMe{\cdot}CHR{\cdot}COPh$, (*A*) is R=*n*-heptyl 43, Bu^{α} 34, Et 34, and CH_2Ph 16%. β-Acetyl-β-trimethylacetyl-αγ-diphenylpropane undergoes 43% (*A*). The % (*A*) for various (I) using EtOH dried over $Al(OEt)_3$ is > with EtOH containing 0·1—0·2% H_2O; addition of 1—2% of $Al(OEt)_3$ to the reaction mixture diminishes (*A*) considerably. With the following reaction vessels, the % (*A*) diminishes thus: glass> Cu>steel or brass. The rate (*k*) of alcoholysis of various $COMe{\cdot}CHR{\cdot}COR'$ is measured by interrupting the reaction before completion and determining the amounts and ratio of the products formed; reactions are carried out in glass (in which *k* is < in brass vessels). The effects of R and R' on *k* and (*A*) are discussed. Some of the results are correlated with the polar effects of the substituent groups and the mechanism previously given (A., 1934, 759). H. B.

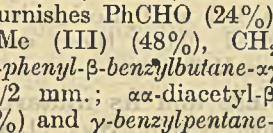
Hydrogenation and hydrogenolysis of αγ-diketones. J. M. Sprague and H. Adkins (J. Amer. Chem. Soc., 1934, **56**, 2669—2675).—Reduction [H_2 (usually 1·6—1·9 mols.) at 150—200 atm.; Raney Ni; Et_2O] of $COR{\cdot}CH_2{\cdot}COR'$ (*A*) at 125° and $COR{\cdot}CHAlk{\cdot}COR'$ (*B*) at 50—60° usually gives a good yield of the corresponding glycols. In several cases fission (hydrogenolysis) of C·C (leading to, *e.g.*, $RCHO+COR'{\cdot}CH_2Alk$ and/or their reduction products) and C·O (giving *e.g.*, $COR{\cdot}CH_2{\cdot}CH_2R'$ and/or $OH{\cdot}CHR{\cdot}CH_2{\cdot}CH_2R'$) occurs. Definite conclusions could not be reached regarding C·C fission and the enol content of (*A*) and (*B*). The order of facilitation (as determined by temp. required) of C·C fission by various groups is: Me>Et>Pr^{β}>Bu^{γ}>Ph, 2-furyl>OH>:O>$CH_2{\cdot}OH$>·CHR·OH>·COR. The relative labilities of the 2 C·C linkings in (*A*) appear to be the same in alcoholysis, hydrolysis, or hydrogenolysis.

CH_2Ac_2 is thus reduced to pentane-βδ-diol (80%) and EtOH+Pr^{β}OH; $CH_2Ac{\cdot}COPr^{\beta}$ gives (at 25°) EtOH, β-*methylhexane-γε-diol* (I) (73%), b.p. 123—124°/24 mm., and (probably) β-methyl-Δ^{δ}-hexen-γ-one (9·6%), b.p. 135—139° [semicarbazone, m.p. 180—190° (decomp.)], whilst at 125°, (I) (60%) and $COPr^{\alpha}Pr^{\beta}$ (30%) result; $CH_2Ac{\cdot}COBu^{\gamma}$ affords (at 60°) EtOH, $COMeBu^{\gamma}$ (5·4—6·7%), ββ-*dimethyl-*Δ^{δ}*-hexen-γ-one* (16·3—62%), b.p. 153—155° [oxidised ($KMnO_4$) to $CMe_3{\cdot}CO_2H$; *dibromide*, b.p. 102—104°/10 mm., m.p. 31—32°], ββ-*dimethylhexan-ε-ol-γ-one* (15—68%), b.p. 89—90°/22 mm., and ββ-*dimethylhexane-γε-diol* (17—52%), b.p. 108—109°/11 mm., m.p. 61—62°, according to H_2 absorbed (1—1·6 mols.); acetyl*iso*valerylmethane yields 77% of β-*methylheptane-*δζ*-diol* (II), b.p. 114—116°/9 mm., at 85° and (II) (44%) and $COPrBu^{\beta}$ (42%) at 125°; hexahydrobenzoylacetylmethane furnishes *cyclo*hexyl Pr ketone (38%) and α-cyclo*hexylbutane-αγ-diol* (47%), b.p. 163—167°/21 mm.; furoyl- and tetrahydrofuroyl-acetylmethane give 73 and 92%, respectively, of α-*tetrahydrofurylbutane-αγ-diol*, b.p. 160—163°/24 mm.; *p*-phenylbenzoylacetylmethane affords 57% of α-p-cyclo*hexylphenylbutan-γ-ol*, b.p. 140—144°/2 mm. [oxidised to p-$C_6H_4(CO_2H)_2$]; 2 : 4 : 6-trimethylbenzoylacetylmethane yields n-*butyrylmesitylene* (79%), b.p. 132—136°/10 mm., and α-2 : 4 : 6-*trimethylphenylbutane-αγ-diol* (12%), b.p. 177—179°/7 mm.; CH_2BzAc furnishes $PhBu^{\alpha}$ (3·7%), $CH_2Ph{\cdot}CH_2{\cdot}CHMe{\cdot}OH$ (40%), and α-phenylbutane-αγ-diol (50%); CHEtBzAc gives PhCHO (25%), COMePr (43·7%), COPhPr (11·3%), and α-*phenyl-*β-*ethylbutane-αγ-diol* (32·3%), b.p. 170—173°/12 mm.; α-benzoyl-α-acetylpentane affords PhCHO (25%), Me (35%) and Ph (18%) *n*-amyl ketones, and α-*phenyl-*β-n-*butylbutane-αγ-diol* (40·5%), b.p. 186—191°/14 mm.; α-benzoyl-α-acetyloctane

yields PhCHO (18%), Me (20%) and Ph (20%) *n*-octyl ketones, and *α-phenyl-β-n-heptylbutane-αγ-diol* (50%), b.p. 197—202°/8 mm.; α-benzoyl-α-acetyl-β-phenylethane furnishes PhCHO (24%), $CH_2Ph{\cdot}CH_2{\cdot}COMe$ (III) (48%), $CH_2Ph{\cdot}CH_2{\cdot}COPh$ (20·5%), and *α-phenyl-β-benzylbutane-αγ-diol* (30·5%), b.p. 182—187°/2 mm.; αα-diacetyl-β-phenylethane gives (III) (40%) and *γ-benzylpentane-βδ-diol* (46%), b.p. 140—143°/2·5 mm.; $CHEtAc_2$ affords EtOH, COMePr (10%), unsaturated material (9%), b.p. 154—157°, and *γ-ethylpentane-βδ-diol* (64%), b.p. 205—210°; $CHEtBz_2$ yields PhCHO (14%), COPhPr (15%), and *αγ-diphenyl-β-ethylpropane-αγ-diol* (80%), b.p. 190—196°/3 mm.; benzoyl-2 : 4 : 6-trimethylbenzoylmethane furnishes PhCHO, acetylmesitylene (25%), and *β-phenylpropionylmesitylene* (70·8%), b.p. 168—172°/1·5 mm.; benzoylfuroylmethane gives $CH_2Ph{\cdot}OH$ and 28 and 30%, respectively, of *γ-phenyl-α-tetrahydrofurylpropan-α-ol*, b.p. 128—130°/1 mm., and *-αγ-diol*, b.p. 170—171°/2 mm.; methone (5 : 5-dimethyldihydroresorcinol) affords 3 : 3-dimethyl*cyclo*hexanol (3·8%) (phenylcarbamate, m.p. 90—91°) and 80% of two stereoisomeric 5 : 5-*dimethyl*cyclo*hexane*-1 : 3-*diols*, m.p. 102—104° and 146°; CH_2Bz_2 yields COPhMe, $CH_2(CH_2Ph)_2$ (11%), and αγ-diphenylpropan-α-ol (20%) and *-αγ*-diol (51%). *α-Tetrahydrofurylbutan-γ-ol* has b.p. 120·5—123°/22 mm., 221—223°/740 mm. H. B.

Purification of α-*d*-xylose and its mutarotation. H. S. Isbell (J. Res. Nat. Bur. Stand., 1934, **13**, 515—517).—The dark-coloured xylose syrup obtained from cottonseed hulls may be purified by treatment with decolorising C (I) and basic Pb acetate in slight excess with kieselguhr to collect the ppt. The filtrate is treated with H_3PO_4 to remove most of the excess of Pb, then with H_2S to ppt. the remainder; after another treatment with (I) the nearly colourless solution obtained yields crystals of pure α-*d*-xylose (II) on evaporation and slow rotation over-night. (II) has $[\alpha]_D^{20}$ +94·8° (initial; extrapolated), +78·7° (after 5 min.), +18·3° (after 24 hr.). The mutarotation coeff. is > the accepted val. of 0·0207 during the first 5 min., but remains const. at this val. thereafter. A. R. P.

Mechanism of Walden inversion in sugars. Inversion of rhamnose *p*-toluenesulphonates. I. E. Muskat (J. Amer. Chem. Soc., 1934, **56**, 2653—2656).—Walden inversion is most likely to occur in reactions involving removal of one of the groups (attached to the asymmetric C) with the bonding electron pair, *e.g.*, alkaline hydrolysis of *p*-toluenesulphonates. The occurrence of inversion during hydrolysis of, *e.g.*, 5 : 6-anhydro-1 : 2-*iso*propylidene-glucofuranose is probably due to fission at $C_5{\cdot}O$, thus leaving C_5 positively charged; subsequent addition of H_2O gives the normal or inverted (according to steric effects and experimental conditions) sugar. Hydrolysis (aq. MeOH–KOH at 74°) of 2 : 3-*iso*propylidenemethylrhamnofuranoside 5-*p*-toluenesulphonate (I) (A., 1934, 1207) gives a little (II) (below) and (mainly) 2 : 3-iso*propylidenemethyl*-6-*deoxy*-d-*gulofuranoside*, b.p. 100°/1 mm., $[\alpha]_D^{25}$ −16·9° in MeOH (*p-toluenesulphonate*, m.p. 60°, $[\alpha]_D^{25}$ +22·3° in MeOH), which is hydrolysed (1% H_2SO_4) to 6-*deoxy*-d-*gulose*, m.p. about 65°, $[\alpha]_D^{25}$ (in H_2O) +14° ⟶ −14° [*p-bromophenylhydrazone*, m.p. 162°, $[\alpha]_D^{25}$ (in EtOH) −6·1° ⟶ +13°]. (I) and aq. MeOH–KOH at 100° (bath) afford (probably) 2 : 3-iso*propylidenemethyl* - 1 - 5 : 6-*mannofuranaloside* (II), b.p. 80°/3 mm., $[\alpha]_D^{25}$ +14° in MeOH.



(II.)

2 : 3-iso*Propylidenemethyl*-6-*deoxy*-l-*talopyranoside*, b.p. 90°/0·8 mm., $[\alpha]_D^{25}$ −15·5° in MeOH (*p-toluenesulphonate*, m.p. 76·5°, $[\alpha]_D^{25}$ +3·1° in MeOH), is similarly obtained by hydrolysis of 2 : 3-*iso*propylidenemethylrhamnopyranoside *p*-toluenesulphonate, m.p. 57°, $[\alpha]_D^{25}$ +14° in MeOH. H. B.

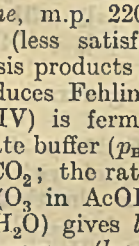
Vacciniin and other monobenzoylglucoses. P. Brigl and W. Zerrweck (Z. physiol. Chem., 1934, **229**, 117—124).—Elimination of mercaptan by $HgCl_2$ in aq. EtOH in presence of $BaCO_3$ from glucose Et_2 mercaptal 6-benzoate affords glucose 6-benzoate (I) (*phenylhydrazone*, m.p. 136°; *-osazone*, m.p. 141°). (I) is identical with vacciniin isolated from cranberries (Griebel, A., 1910, ii, 440). (I) yields a β-Ac_4 derivative, m.p. 133°, converted by $ZnCl_2$–Ac_2O into *α-glucose* 6-*benzoate* 1 : 2 : 3 : 4-*tetra-acetate*, m.p. 136°. 4 : 6-Benzylideneglucose with BzCl in C_5H_5N gives a mixture of its 1-benzoate, β-2-*benzoate* (II), m.p. 200—201°, $[\alpha]_D$ −8·4° in $COMe_2$ (+43° in presence of NH_3) [1 : 3-Ac_2 derivative, m.p. 204°, $[\alpha]$ +14·6° in $CHCl_3$ (β-form, $[\alpha]$ −80·4° in $CHCl_3$)], 3-*benzoate* (III), m.p. 177°, $[\alpha]_D$ −5·3° ⟶ 27·7° (mutarotation) in $COMe_2$. (II) on catalytic hydrogenation (Pd) yields *glucose* 2-*benzoate*, m.p. 182°, $[\alpha]_D$ +62·9° in H_2O (Ac_4-α-derivative, m.p. 186°, $[\alpha]_D$ +5·18° in $CHCl_3$). Similarly (III) affords β-*glucose* 3-*benzoate* (Ac_4-β-, m.p. 156°, $[\alpha]_D$ +13·1° in $CHCl_3$, and -α, m.p. 118°, $[\alpha]_D$ +66·7° in $CHCl_3$, derivatives), also obtainable from di*iso*propylideneglucose 3-benzoate. β-Glucose 1 : 2 : 3 : 6-tetra-acetate with BzCl in C_5H_5N affords the β-4-*benzoate*, m.p. 177°, $[\alpha]_D$ −31·0° in $CHCl_3$, yielding the α-form, m.p. 93°, $[\alpha]_D$ +41·9° in $CHCl_3$. J. H. B.

Tritylation of sugar mercaptals. M. L. Wolfrom, J. L. Quinn, and C. C. Christman (J. Amer. Chem. Soc., 1934, **56**, 2789).—Successive treatment of *d*-glucose Et mercaptal with CPh_3Cl and BzCl in C_5H_5N gives 6-triphenylmethylglucose Et mercaptal tetrabenzoate, m.p. 161—162°, $[\alpha]_D$ +49° (all rotations are in U.S.P. $CHCl_3$), converted (HBr) into the 6-Br-derivative, m.p. 169—170°, $[\alpha]_D$ +39° [also prepared by benzoylation of 6-bromoglucose Et mercaptal (Fischer *et al.*, A., 1920, i, 529)], and thence (NaI in $COMe_2$) into the 6-I-derivative, m.p. 165—166°, $[\alpha]_D$ +39°. Successive treatment of this with $AgNO_3$ (in dil. $COMe_2$) and $HgCl_2$+$CdCO_3$ (in moist $COMe_2$) affords the glucopyranose tetrabenzoate of Fischer and Noth (A., 1918, i, 225); migration of Bz has, therefore, occurred. 6-Triphenylmethylgalactose Et mercaptal tetra-acetate, m.p. 123—124°, $[\alpha]_D$ −22·5° (the tetrabenzoate has m.p. 138—139°, $[\alpha]_D$ −22·5°) (cf. Micheel and Spruck, A., 1934, 1338), is converted (HBr) into the 6-OH-derivative, m.p. 96—97°, $[\alpha]_D$ −7° [removal of SEt groups from which gives the galactose 2 : 3 : 4 : 5-tetra-acetate hydrate of Micheel and Suckfüll (A., 1933, 596)], or the 6-Br-derivative, m.p. 110—111°, according to the con-

ditions used. 6-Triphenylmethylgalactose tetra-acetate (+EtOH) has m.p. 153°, $[\alpha]_D$ −28°. Triphenylmethyl-*l*-arabinose and -*d*-xylose Et mercaptal triacetates have m.p. 101—102°, $[\alpha]_D$ −24° and m.p. 149—150°, $[\alpha]_D$ −20·5°, respectively. H. B.

Application of the principle of optical superposition in ketose series. Preparation of the true α-fructose (2 : 6)penta-acetate. E. Pacsu (J. Amer. Chem. Soc., 1934, **56**, 2788).—Partial Walden inversion occurs at C_2 during replacement of the Cl in β-chlorofructose (2 : 6)tetra-acetate by OAc (using NaOAc in boiling Ac_2O); a mixture of *α-fructose (2 : 6)penta-acetate*, m.p. 122—123°, $[\alpha]_D^{20}$ +47·4° in $CHCl_3$, and the β-isomeride is obtained. The sp. rotations of the α-derivatives can now be calc. (cf. Hudson, A., 1924, i, 372). The calc. and observed vals. for α-methylfructoside tetra-acetate (Schlubach and Schröter, A., 1928, 873) are in close agreement, thus supporting the validity of the principle of optical superposition in the ketose series. H. B.

A fermentable diketose, 5-ketofructose (5-fructonose). F. Micheel and K. Horn (Annalen, 1934, **515**, 1—10).—βγδε-Di(methylenedioxy)-$\Delta^{\alpha\epsilon}$-hexadiene (I), $[\alpha]_D^{18}$ +280·3° in $CHCl_3$ (A., 1932, 834), and BzO_2H (≡ 2·04 O) in $CHCl_3$ at about 0° give a non-cryst. mixture (*A*) of the α-mono- and αζ-di-benzoates of αβεζ-tetrahydroxy-βγδε-di(methylenedioxy)hexane; hydrolysis (5% H_2SO_4) of (*A*) affords some *5-fructonose 1 : 6-dibenzoate* (II), m.p. 155°, $[\alpha]_D^{19}$ −99·3° in EtOH. Hydrolysis (H_2O) of the product from (I) and $Pb(OAc)_4$ in C_6H_6 gives *5-fructonose 1 : 6-diacetate dihydrate*, m.p. 75° (sinters at 65°), $[\alpha]_D^{18}$ +79·4° in EtOAc, and (mainly) a syrup (III). Hydrolysis (MeOH–NaOMe in $CHCl_3$ at 20°) of (III) affords the amorphous *5-fructonose* (IV), $[\alpha]_D^{18}$ −29·7° in H_2O [*bisphenylosazone*, m.p. 198° (decomp.), $[\alpha]_D^{20}$ (in C_5H_5N) +20·8° ⟶ −9·3°; *bis-p-nitrophenylhydrazone*, m.p. 220° (decomp.)], also isolable (less satisfactorily) from the hydrolysis products accompanying (II). (IV) reduces Fehling's solution in the cold. (IV) is fermented by yeast in phosphate buffer (p_H 6·64) with the production of 1 mol. of CO_2; the rate is about ⅓ that of glucose. Oxidation (O_3 in AcOH) of (I) and subsequent hydrolysis (H_2O) gives *l*-tartaric acid. γδ-Dihydroxy-βε-diketohexane (*loc. cit.*) (*bis-p-nitrophenylhydrazone*, m.p. 208°, $[\alpha]_D^{16}$ −1101° in C_5H_5N; *di-p-nitrobenzoate*, m.p. 155°, $[\alpha]_D^{16}$ +137·9° in $CHCl_3$) has m.p. 77°, $[\alpha]_D^{16}$ +106° in H_2O. H. B.



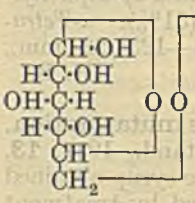
(IV.)

Configuration of digitalose. O. T. Schmidt and H. Zeiser (Ber., 1934, **67**, [*B*], 2127—2131).—Successive treatment of the dicarboxylic acid, obtained by the oxidation of digitalose, with CH_2N_2 and MeI–Ag_2O leads to *Me_2 l-(arabo)-trimethoxyglutarate*, b.p. 69—69·5°/0·003 mm., $[\alpha]_D^{14}$ +29·6° in MeOH [corresponding di(methylamide), m.p. 173—174°, $[\alpha]_D^{18}$ +59·4° in H_2O]. The bearing of this result on the configuration of digitalose is discussed. H. W.

Methylation of sorbose and of its acetyl derivatives by Fischer's method. G. Arragon (Compt. rend., 1934, **199**, 1231—1233).—Sorbose with MeOH–0·5% HCl at 0°, 20°, or 37° affords methylsorboside (I); the yield decreases at higher temp., when a hygroscopic syrup is a by-product (cf. A., 1895, i, 437). Sorbose tetra- or penta-acetate as above gives (I), but methylsorboside tetra-acetate is not de-acetylated under these conditions, or in presence of more HCl. J. L. D.

β-Glucoheptose and its mutarotation. H. S. Isbell (J. Amer. Chem. Soc., 1934, **56**, 2789—2790).—β-Glucoheptose, m.p. 121°, $[\alpha]_D^{20}$ (in H_2O) −1·4° (1·3 min.) ⟶ −5·93° (18 min.) ⟶ −0·13° (24 hr.), prepared by reduction (Na–Hg) of β-glucoheptono-γ-lactone, is obtained cryst. The mutarotation resembles that of ribose (A., 1934, 494). H. B.

Action of mercury salts on acetohalogenosugars. IX. Synthesis of derivatives of β-1-*l*-rhamnosido-6-*d*-glucose. G. Zemplén and A. Gerecs. **X. Synthesis of derivatives of the presumed β-1-*d*-glucosido-2(or 3)-*d*-glucose.** G. Zemplén and Z. Csürös (Ber., 1934, **67**, [*B*], 2049—2051, 2051—2053; cf. A., 1931, 1400).—α-Acetobromo-*l*-rhamnose, $[\alpha]_D^{20}$ −165·0° in $CHCl_3$ (from rhamnose tetra-acetate and $TiBr_4$ in $CHCl_3$), is transformed by 1-chloroglucose 2 : 3 : 4-triacetate and $Hg(OAc)_2$ in C_6H_6 at 50° into *chloro-β-1-l-rhamnosido-6-d-glucose hexa-acetate*, m.p. 142—143° after softening at 133°, $[\alpha]_D^{24}$ +70·86° in $CHCl_3$, converted by AgOAc and Ac_2O into the corresponding *hepta-acetate* (cf. *A*), m.p. 168—169°, $[\alpha]_D^{24}$ −29·66° in $CHCl_3$, which does not give a cryst. product when hydrolysed by NaOMe.



(*A*)

X. 6-Bromo-1-β-methylglucose, acetodibromoglucose, and $Hg(OAc)_2$ in C_6H_6 yield 6 : 6′-*dibromo*-1-β-*methyl*-1-d-*glucosido*-d-*glucoside penta-acetate* (I), m.p. 237° with subsequent darkening and decomp., $[\alpha]_D^{19}$ −18·1° in $CHCl_3$, in very small amount. (I) is transformed by NaI in $COMe_2$ at 100° into 6 : 6′-*di-iodo*-1′-β-*methyl*-1-d-*glucosido*-d-*glucoside penta-acetate*, m.p. 222° (slow decomp.), $[\alpha]_D^{16}$ −6·7° in $CHCl_3$, which is not identical with Helferich's 6 : 6′-di-iodo-1-β-methylcellobiose penta-acetate. (I) is therefore regarded as derived from β-1-*d*-glucosido-2(or 3)-*d*-glucose. H. W.

Physico-chemical properties of lactose. II. Factors influencing the crystalline habit of lactose. IV. Influence of salts and acids on the mutarotation velocity of lactose. B. L. Herrington (J. Dairy Sci., 1934, **17**, 533—542, 659—670; cf. A., 1934, 1168, 1174).—II. The form and growth of lactose (I) crystals is largely influenced by the ratio of the concn. of the solution to the solubility. The effect of sucrose is not sp., but results from its pptg. action on (I). Both the α-hydrate and β-anhydride form needle crystals if crystallisation is very rapid.

IV. The accelerated mutarotation (*M*) of lactose by ions other than $H^·$ and OH' is attributable to general acid and base catalysis, in which the influence of weak acids is much > that of weak bases. The catalytic effect of lactate ions is small in concns. <

0·1*N*, but increases rapidly above this. An empirical relationship between the velocity of *M* and p_H is established. A. G. P.

Preparation and enzymic fission of basic glycosides. II. B. Helferich and F. Philipp (Annalen, 1934, **514**, 228—233).—m-*Cresol*-β-d-*glucoside tetra-acetate* (I), m.p. 137—139° (corr.), $[\alpha]_D^{20}$ −19·61° in $CHCl_3$, obtained by the method previously described (A., 1933, 379) from *m*-cresol, glucose penta-acetate, and *p*-$C_6H_4Me{\cdot}SO_3H$ at 100°, is brominated (method: A., 1934, 282) to ω-*bromo*-m-*cresol*-β-d-*glucoside tetra-acetate*, m.p. 122—124° (corr.), $[\alpha]_D^{20}$ −20·4° in $CHCl_3$, which is converted (aq. EtOH–NH_3; cf. *loc. cit.*) into m-*aminomethylphenol*-β-d-*glucoside* (II), m.p. 196·5—199° (corr.), $[\alpha]_D^{20}$ −68·52° in aq. AcOH (1 mol.). The Ac_5 derivative, m.p. 96—97° (corr.), $[\alpha]_D^{17}$ −19·95° in $CHCl_3$, of (II) is hydrolysed (*N*-NaOH in $COMe_2$) to m-*acetamidomethylphenol*-β-d-*glucoside* (III), m.p. 176—177° (corr.), $[\alpha]_D^{23}$ −62·6° in H_2O, whilst (I) is hydrolysed [MeOH–NaOMe (trace)] to m-*cresol*-β-d-*glucoside* (IV), m.p. 183—184° (corr.), $[\alpha]_D^{20}$ −69·7° in H_2O. m-*Cresol*-β-d-*galactoside* (V), m.p. 166—168°, $[\alpha]_D^{18}$ −44·3° in H_2O, and its *tetra-acetate*, m.p. 81—83°, $[\alpha]_D^{21}$ +2·7° in $CHCl_3$, are similarly prepared. (III) is hydrolysed (emulsin) much more rapidly than the *o*- and *p*-isomerides (A., 1934, 282) and (II) (and its *o*- and *p*-isomerides); (IV) is hydrolysed more rapidly than (V) but less rapidly than its *o*-isomeride (*loc. cit.*). H. B.

Polysaccharides. XVIII. Constitution of xylan. W. N. Haworth, E. L. Hirst, and E. Oliver (J.C.S., 1934, 1917—1923; cf. A., 1932, 44).—Xylan (I) (from esparto celluloses of different origin) on hydrolysis gives arabinose; on methylation and subsequent hydrolysis it gives 2 : 3-dimethylxylopyranose (90%), 2 : 3 : 5-*l*-arabofuranose (about 6%), and a monomethylxylose (II). (I) therefore contains an *l*-arabofuranose unit (*A*) as a terminal group attached to a chain of xylopyranose units (*B*) (one of *A* is associated with 18—20 of *B*). The nature of the other terminal group, which is not CO_2H (cf. A., 1932, 934), is discussed with regard to the facts that the above cleavage products contain (II) but no trimethylxylose, and that (I) is non-reducing. H. G. M.

Crystalline erythrodextrin.—See this vol., 133.

Reaction of starches with proteins.—See this vol., 165.

Determination of the carboxyl groups of cellulose by conductometric titration. E. Schmidt, M. Hecker, W. Jandebeur, and M. Atterer [with W. Simson and R. Schnegg] (Ber., 1934, **67**, [*B*], 2037—2049).—Cellulose is treated with an excess of NaOH in presence of Humectol and conductometrically titrated with 0·1*N*-acid. The graph consists of 3 sections, the first representing the neutralisation of the excess of NaOH, the second depicting the liberation of the cellulose acid from its Na salt, and the third being due to the further addition of HCl. The validity of the process is established by comparative experiments with lauric, palmitic, cholic, and anthraquinone-2-carboxylic acids and with pentaerythritol, β-glucosan, mannitol, α-methyl-glucoside, sucrose, raffinose, and lævulan. Native cellulose (I) contains 0·282% of CO_2H (±1·4%). The possibility that (I) adsorbs NaOH is excluded by the observations that (1) the results are independent of the temp. between 0° and 25°; at > 25° the data are influenced by evaporation of the H_2O; (2) identical results are obtained in presence or absence of Humectol *CA*; (3) identical results are obtained with (I) from cotton wool in fibrous form or as powder after pptn. from CuO–NH_3 or from cellose *B* crushed or as powder. Since the vals. obtained by the titration of (I) with *N*/44-NaOH in presence of thymolphthalein accord with those obtained conductometrically, the hypothesis that the Na salt of (I) is decomp. by excess of NaOH into celluloses containing less CO_2H cannot be maintained. In the direct titration only ash-free cellulose can be used. The electrodialysis of cellulose is described; the products contain 0—0·6% of ash which does not influence the conductometric process. H. W.

Osmometric investigation of dilute solutions of polymeric carbohydrates. VI. Mol. wt. of crystalline cellulose acetates. II. K. Hess and M. Ulmann (Ber., 1934, **67**, [*B*], 2131—2145; cf. A., 1934, 841).—Limit dextrin acetate I (I) is as resistant to fractionation as the corresponding II (II) derivative (*loc. cit.*), which it resembles very closely in composition and röntgenographic behaviour, whilst differing somewhat in optical activity. Osmometric measurements establish a step-wise degradation of (I) from even multiples of $(C_6)_2$ to $(C_6)_2$ dependent on the concn., but the simpler forms persist at a higher concn. in the case of (I) than of (II). The stepwise transitions of (I) occur with measurable rapidity which is greater than with (II). A further difference is found in the occurrence of the $(C_6)_4$ stage in the case of (I), whereas with (II) $(C_6)_2$ appears to pass immediately and reversibly into $(C_6)_3$. In contrast to (II), the electrolytic conductivity of (I) increases with dilution at concn. > 0·1% and in this region solutions of (I) do not follow van 't Hoff's law; it is considered that at this dilution a complex of (I) and solvent dissociates into ions. In this respect (I) resembles cellobiose acetate. The behaviour of an early fraction obtained in the purification of (II) is less clearly defined than that of (II) over the whole region of concn. in consequence of adherent impurities. H. W.

Acetylation of cellulose. D. Krüger, M. Lüdtke, and F. Oberlies (Angew. Chem., 1934, **47**, 806—810).—When lower acetates of cellulose (I) (< 3Ac per $C_6H_{10}O_5$) are prepared using feebly catalysed acetylating mixtures, all the chain mols. of (I) are equally acetylated. When a strongly catalysed mixture is used, the rate of reaction is fast compared with the rate of diffusion into micelles, and the exposed chain mols. are preferentially acetylated; if the process is interrupted before equilibrium is reached the material is micro-heterogeneous. A. G.

Cellulose diacetate. I. Sakurada and T. Kitabatake (J. Soc. Chem. Ind. Japan, 1934, **37**, 604—605B).—Cellulose 2 : 3-diacetate was prepared by protecting the primary OH with $\cdot CPh_3$ from acetylation. Treatment with CPh_3Cl showed that ⅓ of the free OH

groups in commercial $COMe_2$-sol. cellulose diacetate were primary, and hence that Ac was equally easily eliminated from each of three positions 2, 3, and 6. A. G.

Thioanhydrides of cellulosexanthic acid. S. N. Danilov and D. S. Brochina (J. Gen. Chem. Russ., 1934, **4**, 995—1002).—BzCl and Na cellulosexanthate (I) in aq. Na_2CO_3 or C_6H_6 afford the *thioanhydride* of (I), which eliminates H_2S in acid, and regenerates (I) in alkaline solutions. R. T.

Asymmetric nitrogen atom. LX. Optical activity of ammonium salts as a means of detection of double decomposition in non-ionising solvents. E. Wedekind (Ber., 1934, **67**, [*B*], 2007—2009).—The optical activity of *l*-$NPhMePr^{\alpha}(CH_2Ph)\cdot NO_3$ in $CHCl_3$ (in which it is optically stable when alone) gradually diminishes after addition of an inactive NH_4 halide. The rate of decay of the optical activity of the corresponding inherently unstable halides is retarded by the addition of nitrate to a labile limiting val. The occurrence of an equilibrium active nitrate (optically stable)+halide $\rightleftharpoons$active halide (optically unstable)+nitrate is supported by the concurrence of fall in [α] with diminution of halogen titre. Similar results are obtained with active phenylbenzylmethylallylammonium nitrate (I) and inactive $NPhMe_2EtI$. The optical activity of (I) in $CHCl_3$ is not affected by EtI. H. W.

Action of secondary amines on epichlorohydrin. N. S. Drozdov and O. M. Tscherntzov (J. Gen. Chem. Russ., 1934, **4**, 969—974).—Epichlorohydrin (I) and aq. $NHEt_2$ at 28—30° give *diethylaminoepihydrin* (65% yield), b.p. 55—60°/15 mm., which when heated at 100° for 30 min. with MeOH–NH_3 gives 70% yields of $NH_2\cdot CH_2\cdot CH(OH)\cdot CH_2\cdot NEt_2$, b.p. 118—123°/15 mm. (I) and aq. $NHMe_2$ at 30° afford a *polymeride*, charring at 210°, of dimethylaminoepihydrin, whilst piperidine and (I) give *piperidinoepihydrin* (70% yield), b.p. 86·5—88°/15 mm., from which *γ-amino-α-N-piperidino-β-hydroxypropane*, b.p. 133°, is obtained as above. R. T.

Glutathione. Its reaction with alkali and some *N*- and *S*-derivatives. B. C. Saunders (Biochem. J., 1934, **28**, 1977—1981).—The abnormal reaction of glutathione (I) and CH_2PhCl in presence of NaOH is due to oxidation of (I) and dismutation of the product to give (I) and higher oxidation products together with H_2S and S. (I) with 1:2:4-$C_6H_3Cl(NO_2)_2$ in alkaline solution gives cryst. S-2:4-*dinitrophenylglutathione* (II), m.p. 211°, which with 2-$C_{10}H_7\cdot SO_2Cl$ gives *N-naphthalene-2-sulphonyl*-S-2:4-*dinitrophenylglutathione*, m.p. 158°. S-2:4-*Dinitrophenylcysteine*, m.p. 148—154°, is similarly prepared. C. G. A.

Esters of ethylene-αβ-dioxamic acid and its derivatives. J. van Alphen and (in part) H. den Otter (Rec. trav. chim., 1934, **53**, 1159—1166).—Dropwise addition of $(\cdot CH_2\cdot NH_2)_2$ hydrate to $R_2C_2O_4$ (R=Me or Et) in abs. EtOH affords a starch-like substance (not ethylenoxamide) and *Me*$_2$ (I), m.p. 168°, or *Et*$_2$ (II), m.p. 129°, *ethylene-αβ-dioxamate* $(CO_2R\cdot CO\cdot NH\cdot CH_2\cdot)_2$, converted by N_2H_4,H_2O in boiling EtOH into the *dihydrazide*, m.p. 295° (decomp. with resolidification) (block), which with the appropriate aldehyde gives its *dibenzylidene*, decomp. > 360°, *difurfurylidene*, m.p. > 360°, and *diisopropylidene*, decomp. 330° (block), derivatives. With 1 mol. of N_2H_4,H_2O (II) gives its *monohydrazide*, m.p. 179° (decomp. with resolidification), from which the *mono-benzylidene*, m.p. 229°, *-anisylidene*, m.p. 229°, *-piperonylidene*, m.p. 254°, and *-furfurylidene*, m.p. 247°, derivatives are obtained. (I) similarly affords its *monohydrazide*, decomp. 220°. With the appropriate NH_2R in boiling aq. EtOH (II) gives a *monoamide*, m.p. 211°, and *monomethylamide*, m.p. 207·5° [*hydrazide*, m.p. 305° (*benzylidene* derivative, m.p. 335°)]. J. W. B.

Reaction of aliphatic diazo-compounds with mercury salts. A. N. Nesmejanov and G. S. Povch (J. Gen. Chem. Russ., 1934, **4**, 958—961).—Et diazoacetate and $HgCl_2$ yield $CH_2Cl\cdot CO_2Et$, N_2, and $Hg[\cdot CCl(HgCl)\cdot CO_2Et]_2$. R. T.

Constitution of thiosemicarbazide compounds of nickel. K. A. Jensen (Z. anorg. Chem., 1934, **221**, 11—17).—The *compounds* $Ni(COSN_2H_3)_2$, $Ni(CS_2N_2H_3)_2$, and $[Ni(OEt\cdot CS\cdot N_2H_2)_3](NO_3)_2$ (I) have been prepared from $SH\cdot CS\cdot NH\cdot NH_2$, $SH\cdot CO\cdot NH\cdot NH_2$, and $OEt\cdot CS\cdot NH\cdot NH_2$, respectively. The similarity of these to thiosemicarbazide compounds previously obtained confirms the formula in which the metal is bound to S and the N_2H_4 group. The aq. solution of (I) gives with NH_3 the *compound* $Ni(OEt\cdot CS\cdot N_2H_2)_2$. $[Ni(SCN_3H_5)_2]SO_4$ has been obtained in two different modifications which may be *cis-* and *trans*-isomerides. M. S. B.

Thiosemicarbazide compounds of bivalent palladium and platinum. K. A. Jensen (Z. anorg. Chem., 1934, **221**, 6—10).—The following *compounds* have been prepared: (M=Pd or Pt; $T=CSN_3H_5$), $[MT_2Cl_2]$, $[MT_2]Cl_2$, $[MT_2]SO_4$, and $M(CSN_3H_4)_2$. $[PdT_2]Cl_2$ and $Pd(CSN_3H_4)_2$ have differently coloured *cis-* and *trans*-modifications. M. S. B.

Varying valency of platinum with respect to mercaptanic radicals. VIII.—See this vol., 182.

Mercury alkyl derivatives. M. C. Hart and H. P. Andersen (J. Amer. Chem. Soc., 1934, **56**, 2752—2753).—The following are prepared from HgAlk·OH and the acid or phenol in EtOH: *HgEt* salts of *o-*, m.p. 75—76°, and *p-*, m.p. 177—178°, $\cdot OH\cdot C_6H_4\cdot CO_2H$, PhOH, m.p. 115—116°, $\alpha\text{-}C_{10}H_7\cdot OH$, m.p. 78—79°, $m\text{-}C_6H_4Me\cdot OH$, m.p. 54·5—55·5°, $m\text{-}C_6H_4(OH)_2$, m.p. 191—192° (also formed from $m\text{-}OH\cdot C_6H_4\cdot OAc$), $m\text{-}OH\cdot C_6H_4\cdot OMe$, m.p. 72—73°, *p*-hydroxy-, m.p. 139—140°, and 4:4′-dihydroxy-, m.p. 201—203°, -diphenyl, $p\text{-}OH\cdot C_6H_4\cdot CO_2Me$ (?), m.p. 85·5—86·5°, $C_6H_2I_3\cdot OH$, m.p. 169—170°, $C_6H_2Br_3\cdot OH$, m.p. 107°, $C_6H_2Cl_3\cdot OH$, m.p. 60—61°, *o-* and $p\text{-}C_6H_4Br\cdot OH$, both m.p. 98—99°, chloro-*cyclo*hexyphenol, m.p. 79·5—80·5°, 5-chloro-2-hydroxydiphenyl, m.p. 101—102°, vanillin, m.p. 100—101°, 3-nitro-*p*-cresol, m.p. 89—90°, *o-*, m.p. 76—77°, and *p-*, m.p. 122—123°, $\cdot NO_2\cdot C_6H_4\cdot OH$, chlorothymol, m.p. 81—82°, $o\text{-}NH_2\cdot C_6H_4\cdot CO_2H$, m.p. 81—82°, $p\text{-}NH_2\cdot C_6H_4\cdot SO_3H$, 6-chloro-*m*-cresol, m.p. 77·5—78·5°, *o-*, m.p. 83—84°, and *p-*, m.p. 108°, $\cdot C_6H_4Cl\cdot OH$, phenolphthalein, m.p. 198—199°, *o*-cresolsulphone-

phthalein, m.p. 128—131°, phenolsulphonephthalein, m.p. 118—121°, and thymolsulphonephthalein, m.p. 145—155°; *HgMe* salts of *m*-$C_6H_4(OH)_2$, *o*-$OH{\cdot}C_6H_4{\cdot}CO_2H$, m.p. 119—120°, and *m*-cresol m.p. 84—86°; *HgPr* salts of *m*-$C_6H_4(OH)_2$, m.p. 161—162°, *o*-$OH{\cdot}C_6H_4{\cdot}CO_2H$, m.p. 75°, and *m*-cresol, m.p. 61—62°; *HgBu* salts of *m*-$C_6H_4(OH)_2$, m.p. 148°, *o*-$OH{\cdot}C_6H_4{\cdot}CO_2H$, m.p. 51—52°, and *m*-cresol; *Hg amyl* salts of *m*-$C_6H_4(OH)_2$, m.p. 132·5—133·5°, and *o*-$OH{\cdot}C_6H_4{\cdot}CO_2H$, m.p. 46—47°; *Hg hexyl* salt of *m*-$C_6H_4(OH)_2$, m.p. 128—129°. Few of the salts are bactericidal (towards *S. aureus*); the bacteriostatic properties are quite high (variation of R and R′ in HgR·OR′ has a very limited influence). H. B.

Conversion of open-chain molecules into cyclic compounds. E. Puxeddu (Rend. Seminar Fac. Sci. Cagliari, 1933, **3**, 61—63; Chem. Zentr., 1934, ii, 1437).—Theoretical. H. N. R.

Ring closure and radical formation. VI. 1:1:2:2-Tetraphenyl*cyclo*propane. G. Wittig and B. Obermann (Ber., 1934, **67**, [*B*], 2053—2060; cf. A., 1933, 944).—$OH{\cdot}CPh_2{\cdot}CH_2Bz$ is converted by MgPhBr into $COPh_2$ and COPhMe (whence $CPh_3{\cdot}OH$ and $CPh_2Me{\cdot}OH$, respectively). The mol. is ruptured by LiPh at 15—20°, whereas at −80° *αγγ-tetraphenylpropane-αγ-diol* (I), m.p. 112—113·5°, is produced. (I) is transformed by MeOH–HCl at room temp. into *αγ-dimethoxy-αγγ-tetraphenylpropane*, m.p. 174—175°, converted by K–Na in dioxan into *αγ-dipotassium-αγγ-tetraphenylpropane*, which yields *αγγ*-tetraphenylpropane, m.p. 135—136°, with MeOH and 1:1:2:2-*tetraphenyl*cyclo*propane* (II), m.p. 165·5°, with $C_2Me_4Br_2$. (II) can be distilled in vac., its solutions are stable to air, and it is not decomposed by boiling with AcOH or Br–CCl_4.

Me_2 glutarate is transformed by LiPh in Et_2O into *αα εε-tetraphenylpentane-αε-diol*, m.p. 111—112°, whence *αε-dimethoxy-αα εε-tetraphenylpentane*, m.p. 127·5—129·5°, converted by K–Na into *αε-dipotassium-αα εε-tetraphenylpentane*, which gives *αα εε-tetraphenylpentane*, m.p. 79—80°, with MeOH and ill-defined polymeric hydrocarbons with $C_2Me_4Br_2$ in dioxan or Et_2O. Similar results are obtained with the corresponding Na_2 and Li_2 derivatives and $CH_2(CH_2Br)_2$. Me_2 ββ-dimethylglutarate and LiPh in Et_2O give *αα εε-tetraphenyl-γγ-dimethylpentane-αε-diol*, m.p. 156—157°, converted by HCl–MeOH into *tetraphenyldimethylpentanemethylene oxide*, m.p. 149—150·5°, and by KPr^{β} and MeI into *αε-dimethoxy-αα εε-tetraphenyl-γγ-dimethylpentane*, m.p. 115—116°, whence *αα εε-tetraphenyl-γγ-dimethylpentane*, m.p. 88—89°. Attempts to prepare 1:1:2:2-tetraphenyl-4:4-dimethyl*cyclo*pentane resulted in resins. H. W.

Thermal polymerisation of *cyclo*pentadiene. K. Alder and G. Stein (Angew. Chem., 1934, **47**, 837—842).—A lecture. H. W.

Many-membered carbon rings. L. Ruzicka (Chem. and Ind., 1934, 2—8).—A lecture.

Raman spectra of *cyclo*pentene derivatives. Synthesis of Δ^1-benzyl*cyclo*pentene.—See this vol., 146.

Fulvenes in ionone series. E. P. Kohler and J. Kable (J. Amer. Chem. Soc., 1934, **56**, 2756—2757).—*cyclo*Pentadiene (I) and β-ionone in MeOH–NaOMe give 2-(γ-cyclo*pentadienylidene*-Δ^{α}-*butenyl*)-1:3:3-*trimethyl*-Δ^1-cyclo*hexene* (II), b.p. 111—113°/0·5 mm. (cf. Willstaedt, A., 1934, 641), which absorbs 10 H on complete reduction (H_2, PtO_2, EtOH) and is oxidised (O_3 in CCl_4) to geronic acid. α-Ionone and (I) similarly afford 6-(γ-cyclo*pentadienylidene*-Δ^{α}-*butenyl*)-1:5:5-*trimethyl*-Δ^1-cyclo*hexene* (III), b.p. 107—109°/5 mm., which also absorbs 10 H. (II) and (III), which are orange-coloured oils, are regenerated when piperidine solutions of their colourless H_2-derivatives are shaken with air. ψ-Ionone and (I) give the red κ-cyclo*pentadienylidene*-βζ-*dimethyl*-$\Delta^{\zeta\theta}$-*undecatriene* (IV), b.p. 139—141°/0·5 mm., which also affords a colourless dihydro-derivative and absorbs 12 H on complete reduction. (II)—(IV) give blue colours with $SbCl_3$ and undergo ready autoxidation; cryst. adducts could not be obtained with maleic anhydride. H. B.

Internal energy relationships among carbocyclic compounds. II. Stability and reactivity of cyclic polyolefines. O. Schmidt (Ber., 1934, **67**, [*B*], 2078—2080; cf. this vol., 73).—On the basis of the Heitler–London theory it is shown that C_6H_6 is the first cyclic olefine $[CH{:}CH]_n$ capable of existence and also the most stable, since the electron ring has the greatest possible distance from the outer C ring. H. W.

Synthesis of benzene hydrocarbons. A. Kirrmann and M. Graves (Bull. Soc. chim., 1934, [v], **1**, 1494—1498).—The condensation of C_6H_6 and alcohols by conc. H_2SO_4 is modified. Preps. of the following are described: $PhPr^{\beta}$; *p*-$C_6H_4Pr^{\beta}_2$, b.p. 85—86°/14 mm., 210° (corr.)/760 mm.; 1:3:4-$C_6H_3Pr^{\beta}_3$ (I), b.p. 113—114°/14 mm., 244° (corr.)/760 mm. [SO_3H derivative, $+H_2O$, m.p. 149° (rapid heating) (*Ba* salt, $+2H_2O$)]; 1:2:4:5-$C_6H_2Pr^{\beta}_4$, m.p. 118°, b.p. 133°/17 mm., 169°/70 mm. [resistant to CrO_3 and $KMnO_4$; with Br gives a *derivative* of (I), $C_{15}H_{22}Br_2$, m.p. 84°]; PhMe gives *p*-cymene and $C_6H_3MePr^{\beta}_2$. Alkyl sulphates are sparingly sol. in conc. H_2SO_4, by which they are slowly hydrolysed. R. S. C.

Preparation of cymene. E. Raymond (Bull. Soc. chim., 1934, [v], **1**, 1470—1478).—*p*-Cymene (I) is best (50%) prepared from pinene by bromination at −18° to −15° and dehalogenation of the fraction, b.p. < 195°, of the product by heating with 2% of I (35% yield without I). Chlorination leads to poor yields of (I). R. S. C.

Selenium and tellurium as carriers in bromination of benzene. A. A. O'Kelly (J. Amer. Chem. Soc., 1934, **56**, 2783).—C_6H_6 (70·3 g.) and Br (80% excess) in presence of 2 g. of Fe, Se, Te, and Te–Fe for 12 hr. (no heat) and then for 7 hr. (slight heating) give 46·2, 25·4, 30·7, and 46·2%, respectively, of PhBr and 4·6, 3·2, 6·9, and 4·6%, respectively, of $C_6H_4Br_2$. H. B.

Action of fluorine on aromatic organic compounds. II. Fluorination of hexachlorobenzene. L. A. Bigelow and J. H. Pearson (J. Amer. Chem. Soc., 1934, **56**, 2773—2774; cf. A., 1934, 62).—

C_6Cl_6 (I) is treated with F_2 in CCl_4 in a glass apparatus (*loc. cit.*) first at 0° and then at room temp., the product is freed (vac. distillation) from (I), then treated with F_2 (no solvent) in a Cu vessel (*loc. cit.*) at 0°, and finally fractionated. When emulsions of the fractions, b.p. 135—160°/1 mm. and 100—115°/7 mm., with H_2O are kept in the cold, *hexachlorotetrafluorocyclohexene*, m.p. 113—114°, and *hexachlorohexafluorocyclohexane*, m.p. 94—96°, respectively, are obtained. H. B.

Vapour-phase hydrolysis.—See this vol., 172.

Nitration of alkylbenzenes. III. Orientation of dinitro-*p-tert.*-butyltoluene. O. L. Brady and J. K. Lahiri (J.C.S., 1934, 1954—1957; cf. A., 1934, 286).—The orientation of 2 : 6-dinitro-4-*tert.*-butyltoluene (I) [obtained by nitration of *p-tert.*-butyltoluene (cf. A., 1897, i, 514; 1899, i, 424; 1917, i, 34)] is established by the following reactions. (I) is reduced by $(NH_4)_2S$ in boiling EtOH to 6-*nitro*-2-*amino*-4-tert.-*butyltoluene* [*hydrochloride* (II), m.p. 210° (decomp.); *Ac* derivative, m.p. 138—139°]. (II), by the diazo-reaction, gives 2-nitro-4-*tert.*-butyltoluene (III) (A., 1924, i, 1176) [reduced (Sn–HCl) to 2-amino-4-*tert.*-butyltoluene] and 6-*nitro*-2-*hydroxy*-4-tert.-*butyltoluene*, m.p. 128°. (III) is oxidised (AcOH–Ac_2O–H_2SO_4–CrO_3) below 10° to an *aldehyde diacetate*, hydrolysed to 2-*nitro*-4-tert.-*butylbenzaldehyde* (2 : 4-*dinitrophenylhydrazone*, m.p. 228°), obtained as a semi-solid mass which gave the Baeyer–Drewson indigo reaction. (II) is converted (Sandmeyer) into 6-*nitro*-2-*cyano*-4-tert.-*butyltoluene*, m.p. 83°, hydrolysed to 6-*nitro*-4-tert.-*butyltoluene*-2-*carboxylic acid*, m.p. 219°, oxidised [HNO_3 (3 c.c., *d* 1·5)–H_2O (12 c.c.) at 200° during 8 hr.] to 5-*nitro*-tert.-*butylbenzene*-3 : 4-*dicarboxylic acid*, m.p. 365° (decomp.), which forms an *anhydride*, m.p. 147—149°, insol. in cold 2*N*-Na_2CO_3. H. G. M.

Dichloro-*o*-xylenes. II. L. E. Hinkel, E. E. Ayling, and T. M. Walters (J.C.S., 1934, 1946—1948).—3 : 6-*Dichloro*-o-*xylene* (I), m.p. 29°, b.p. 234°/760 mm. [from 6-chloro-*o*-3-xylidine (A., 1934, 644)], is not identical with the compound, m.p. 68°, obtained from the chlorination of *o*-xylene (A., 1928, 995, 1238). Chlorination of (I) gives 3 : 4 : 5 : 6-tetrachloro-*o*-xylene, m.p. 226°. 3 : 6-*Dichloro*-4-*nitro*-o-*xylene*, m.p. 84° [from (I); also from 6-chloro-4-nitro-*o*-3-xylidine (A., 1934, 644)], is reduced to the corresponding amine (*Ac* derivative, m.p. 146°). 3 : 6-*Dichloro*-4 : 5-*dinitro*-o-*xylene*, m.p. 174°, is prepared from (I) and HNO_3, and is reduced to the corresponding diamine (*phenazine* derivative, m.p. above 250°). (I) with Br gives 3 : 6-dichloro-4 : 5-dibromo-*o*-xylene, m.p. 238°. 4 : 5-Dichloro-*o*-xylene (II), m.p. 76° (cf. A., 1928, 995), is synthesised from 1 : 2 : 5 : 4-$C_6H_2Me_2Cl{\cdot}NH_2$ (A., 1934, 644) and affords 4 : 5-*dichloro*-3 : 6-*dibromo*-o-*xylene*, m.p. 232°. 4 : 5-Dichloro-*o*-3-xylidine (A., 1934, 644) gives 4 : 5-dichloro-3-bromo-*o*-xylene, m.p. 111° (lit. 90°). Chlorination of 3-chloro-*o*-xylene (from *o*-xylidine) gives 3 : 4-dichloro-*o*-xylene (III) [cf. A., 1928, 995; also obtained from 3-chloro-*o*-4-xylidine (A., 1934, 644)]. Chlorination of 4-chloro-*o*-xylene (IV), f.p. −6·25°, b.p. 194°/755 mm. [lit. 191·5° (corr.) and 195°] (from *o*-4-xylidine), gives (II). (IV) with HNO_3, *d* 1·5, gives 4-chloro-5-nitro-*o*-xylene (A., 1891, 921; 1934, 644) and a solid, m.p. 111°. Nitration of (III) gives 3 : 4-dichloro-5 : 6-dinitro-*o*-xylene, m.p. 172°. H. G. M.

Highly-arylated aromatic compounds. IV. Tetraphenylbenzenes. W. Dilthey and G. Hurtig (Ber., 1934, 67, [*B*], 2004—2007; cf. A., 1934, 641; this vol., 213).—4 : 5-Diphenyl*cyclo*pentenolone is converted by tolane at 275° into a greatly resinified mass from which 1 : 2 : 4 : 5-*tetraphenylbenzene*, m.p. 262—263°, is isolated in small amount. It is also obtained from 2 : 3 : 5-triphenyl*cyclo*pentadienone and CH:CPh and is identical with the "hexaphenylbenzene" of Durand *et al.* (A., 1931, 207). COMe·CH_2Ph and benzil in MeOH–KOH afford 2 : 3 : 4-*triphenylcyclopentenolone* (I), m.p. 165°, transformed by CH:CPh into 1 : 2 : 3 : 4-tetraphenylbenzene, m.p. 190—191°, obtained also from (I) and CPh:C·CO_2H. (I) and tolane at 280° afford C_6HPh_5, m.p. 251° (corr.). Tetraphenyl*cyclo*pentadienone and tolane at 225—315° give C_6Ph_6, m.p. 426°, which can readily be halogenated, sulphonated, and hexanitrated. The corresponding hexa-amine can be diazotised. H. W.

Phenomena of isomerisation in the cracking of decahydronaphthalene with aluminium chloride. N. D. Zelinski and M. B. Turova-Poljak (J. Appl. Chem. Russ., 1934, 7, 753—756).—On heating with $AlCl_3$ at 175—210° *cis*-decahydronaphthalene is transformed into the *trans*-isomeride, and this into dimethyldi*cyclo*pentane; at the same time *cyclo*-pentane and -hexane hydrocarbons are formed. R. T.

Nitration of 2-bromonaphthalene. J. Salkind and F. Filinov (J. Gen. Chem. Russ., 1934, 4, 979—981).—2-*Bromo*-7-*nitro*-, m.p. 110—111°, and -1-nitronaphthalene are obtained by nitrating 2-$C_{10}H_7Br$. R. T.

Fractionation and purification of organic substances by chromatographic adsorption. IV. Polycyclic aromatic hydrocarbons. A. Winterstein and K. Schön. **V. Anthracene, chrysene, and pyrene.** A. Winterstein, K. Schön, and H. Vetter. **VI. 1 : 2-Benzpyrene.** A. Winterstein and H. Vetter (Z. physiol. Chem., 1934, **230**, 146—158, 158—169, 169—174).—IV. The following pairs of hydrocarbons are separable using Al_2O_3 (activated) as adsorbent: anthracene (I)–$C_{10}H_8$ (not adsorbed); (I)–chrysene (II); (I)–phenanthrene (III); (I)–pyrene (IV); (III)–(IV); (II)–(IV); (II)–1 : 2-benzpyrene (V); perylene–(V). Mixtures of $C_{10}H_8$, (I), and 2 : 3-benzanthracene, and of 1 : 2 : 5 : 6-dibenz- (VI), 1 : 2-benz-5 : 6-2′ : 3′-naphth- [prepared (cf. Cook, A., 1931, 612) from anthracene-2-carboxyl chloride and 2-$C_{10}H_7Me$ (Friedel–Crafts), pyrolysis of the resulting ketone, and adsorption on Al_2O_3], and 1 : 2 : 5 : 6-di-2′ : 3′-naphth-anthracenes are similarly separable. Inspection of the chromatograms in ultra-violet light shows (usually) varying coloured zones. The deeply coloured hydrocarbons are most readily adsorbed; thus, the yellow 1 : 2 : 6 : 7-dibenzanthracene (VII) is adsorbed more readily than the colourless (VI). The mixture of (VII) and 1 : 2 : 3 : 4-dibenz- and 1 : 2-1′ : 2′-naphth-anthracene obtained from phenanthrene and

o-C_6H_4Me·COCl with subsequent pyrolysis (Clar, A., 1929, 922), is readily separable; so is the mixture of (VII) and 1 : 2-2′ : 3′-naphthanthracene, m.p. 255—257° (lit. 265°), formed by the method of Clar *et al.* (*ibid.*, 689) from p-$C_6H_4(COCl)_2$ and o-C_6H_4Me·MgBr. 1 : 2-Benz-5 : 6-2′ : 3′- and -6 : 7-1′ : 2′-naphthanthracenes could not be separated, but the closely related anthrodianthrene and *anti*diperidibenzcoronene are separable.

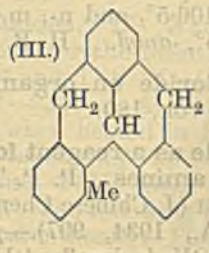
V (cf. A., 1934, 643). Adsorption of a "benzine" solution of technical anthracene (I) on activated Al_2O_3 gives 3 well-defined zones (visible only in ultraviolet light), from which by extraction with Et_2O and repetition of the process pure (I), m.p. 219° (corr.; Berl), naphthacene (2 : 3-benzanthracene) (II), m.p. 337° (corr.), and carbazole are isolated; the filtrate contains varying amounts [according to purity of (I)] of paraffin and $C_{10}H_8$ derivatives. The blue fluorescence of pure (I) is almost inhibited by 0·00001% and prevented by 0·000033% of (II). Small amounts of (II), 1 : 2-benzcarbazole, and a S-compound are similarly separated from chrysene (III); pure (III), m.p. 255—256° (corr.; Berl), is obtained in only 10—20% yield. Pyrene is shown to contain (II), 1 : 2 : 6 : 7-dibenzanthracene, 2 : 3-1′ : 2′-naphthanthracene (IV), and dibenzcoumarone (2 : 3-benzdiphenylene oxide). Crude picene contains (II), (IV), and (probably) 1 : 2-benzpyrene and 1 : 2-benz-6 : 7-1′ : 2′-naphthanthracene.

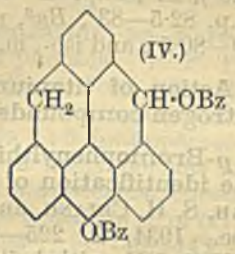
VI. 1 : 2-Benzpyrene (I), m.p. 177° (corr.; Berl) [quinone, m.p. 292—293° (corr.; Berl) (cf. Cook *et al.*, A., 1933, 601)], is prepared by dehydrogenation (Se at 320—340°) of 4′-keto-1′ : 2′ : 3′ : 4′-tetrahydro-1 : 2-benzpyrene, and purified by adsorption on Al_2O_3+Al_2O_3–C (whereby a little 4′-hydroxy-1 : 2-benzpyrene, m.p. 180°, is separated). (I) is carcinogenic. Addition of (I) (in $COMe_2$) to hot aq. 20% Na deoxycholate gives a solution containing 2 mg. of (I) per c.c. Absorption curves for (I) in various solvents are given. H. B.

Synthesis of alkylphenanthrenes. VIII. Attempted synthesis of 4 : 5-dimethylphenanthrene. R. D. Haworth and G. Sheldrick (J.C.S., 1934, 1950—1952).—8-Methyl-2-naphthyl CH_2Br ketone [from the Me ketone (I) and Br in $CHCl_3$] and $CHNa(CO_2Et)_2$ in C_6H_6 give, after hydrolysis with MeOH–KOH and decomp. of the resulting acid at 180°, β-(8-*methyl*-2-*naphthoyl*)*propionic acid*, m.p. 113—115° (*Me* ester, m.p. 87—88°, b.p. 185—190°/0·5 mm.), which is reduced (Clemmensen) to γ-(8-methyl-2-naphthyl)butyric acid (*Me* ester, b.p. 170—175°/0·3 mm.). This is cyclised to a product, b.p. 180—190°/0·5 mm., considered to be impure 1-*keto*-5-*methyl*-1 : 2 : 3 : 4-*tetrahydroanthracene* (II), which on treatment with MgMeI followed by dehydration and dehydrogenation (Se at 280—300°) gives 1 : 5-*dimethylanthracene*, m.p. 139—140° [*picrate*, m.p. 166—167°; *quinone*, m.p. 190°, which does not react with o-$C_6H_4(NH_2)_2$]. The formation of (II), instead of a phenanthrene derivative, is explained on steric grounds. (I) was prepared by Clemmensen reduction of β-*p*-anisoylpropionic acid, followed by cyclisation and dehydrogenation to 7-methoxy-1-methylnaphthalene; the OMe group then successively converted into OH, NH_2, CN, and COMe. H. G. M.

[**Di-radical formula of rubene and constitution of its dissociable peroxide.**] C. Dufraisse (Ber., 1934, 67, [*B*], 2018; cf. A., 1934, 882).—A question of priority (cf. Schönberg, *ibid.*, 997). H. W.

Triphenylmethanes with linked benzene rings. VIII. Reduction products of trimethylenetriphenylmethane triketone. R. Weiss and F. Müller (Monatsh., 1934, 65, 129—136).—The blue triketone $C_{22}H_{10}O_3$ (I) (A., 1925, i, 560) exists in its anthranol form, since with p-C_6H_4Me·SO_2Cl and boiling C_5H_5N it gives a *p-toluenesulphonyl* derivative, decomp. 220° [hydrolysed by KOH–EtOH to (I)]. Reduction of (I) with red P–HI (*d* 1·7) affords a brown, KOH-sol. $(OH)_3$-derivative, $C_{22}H_{12(14)}O_3$ + AcOH and +MeOH (II) (Ac_3 derivative, turns blue at 285°), and the *hydrocarbon* (III), m.p. 182°. With





Zn dust–*N*-KOH (O_2 excluded) and subsequent benzoylation (II) affords a Bz_2 derivative (IV), $C_{36}H_{22}O_4$, decomp. 200°. In the prep. of di-*o*-tolylphthalide (*loc. cit.*) is obtained a second *modification*, m.p. 176°, also reduced to CO_2H·C_6H_4·$CH(C_6H_4Me)_2$, identical with a specimen obtained by similar reduction of the form, m.p. 128°. J. W. B.

Action of sodiomalonic ester on diphenylthiocarbamide and carbodiphenylimide. V. E. Tischtschenko and N. V. Koschkin (J. Gen. Chem. Russ., 1934, 4, 1021—1026).—$CS(NHPh)_2$ (I) or $C(:NPh)_2$ (II) and $CHNa(CO_2Et)_2$ (III) in C_6H_6 yield the *substance* (IV) NPh:C(NHPh)·$CH(CO_2Et)_2$, m.p. 166—167°, giving on hydrolysis with NaOH–EtOH diphenylacetamidine, NPh:CMe·NHPh, m.p. 131—132°. The reaction is probably (I) ⟶ (II)+H_2S; (II)+(III) ⟶ (IV). R. T.

Reactions of unsaturated compounds. III. Addition of arylamines to butadiene. W. J. Hickinbottom (J.C.S., 1934, 1981—1984; cf. A., 1932, 1242; 1934, 644).—Butadiene (I) with excess of NH_2Ph and NH_2Ph,HCl (or HBr) at 220—260° during 4—25 hr. affords mainly α-p-*aminophenyl*-Δ^{β}-*butene* (II), b.p. 135—136°/24 mm. (*hydrochloride*; *sulphate*), the *Ac* derivative of which, m.p. 98—99°, is converted by Br in $CHCl_3$ into βγ-*dibromo*-α-p-*acetamidophenylbutane*, m.p. 127—128°, reduced (H_2–Pd) to p-$C_6H_4Bu^{\alpha}$·NHAc (which indicates that aryl is attached to the terminal C of the butenyl group), and oxidised ($KMnO_4$) to MeCHO (which indicates a βγ double linking) and p-NH_2·C_6H_4·CO_2H. The diazonium derivative of (II) with β-$C_{10}H_7$·OH gives an *azo*-derivative, m.p. 100—101°, and α-anilino-Δ^{β}-butene (III), purified through its *nitrosoamine*. The *Ac* derivative, b.p. 165—168°/28 mm., of (III) reacts slowly with Br and H_2 and is oxidised ($KMnO_4$) to MeCHO. $NHPh_2$ and 2 : 3-dimethylindole are also isolated. (I) with excess of p-C_6H_4Me·NH and

p-$C_6H_4Me{\cdot}NH_2$,HCl(or HBr) affords α-p-*toluidino*-Δ$^{\beta}$-*butene*, b.p. 135°/33 mm. [*platinichloride*, m.p. 200—201° (decomp.); *nitrosoamine*], and 4-*butenylamino*-3-*butenyltoluene*, b.p. 185°/30 mm. (*nitrosoamine*), and a small amount of di-*p*-tolylamine and 2 : 3 : 5-trimethylindole (*picrate*, m.p. 188—189°). The reactions described are distinct from those of the Diels–Adler diene syntheses because a catalyst is necessary to bring about reaction. The formation of indoles may be due to a βγ-reaction of (I). J. L. D.

Preparation of nitrogen-substituted sulphon-*o*-toluidides. G. H. Young (J. Amer. Chem. Soc., 1934, **56**, 2783—2784).—The following *N*-alkyl derivatives of *p*-toluenesulphon-*o*-toluidide are described (cf. A., 1934, 1342): Me, m.p. 87—87·5° (lit. 119—120°), *Pr*$^{\alpha}$, m.p. 72—72·5°, *Pr*$^{\beta}$, m.p. 92—92·5°, *Bu*$^{\alpha}$, m.p. 82·5—83°, *Bu*$^{\beta}$, m.p. 106—106·5°, and n-, m.p. 80—80·5°, and iso-, m.p. 95—95·5°, *-amyl*. H. B.

Action of titanium tetrachloride on organic nitrogen compounds.—See this vol., 180.

***p*-Bromophenylthiocarbimide as a reagent for the identification of aromatic amines.** P. P. T. Sah, S. H. Chiang, and H. H. Lei (J. Chinese Chem. Soc., 1934, **2**, 225—228; cf. A., 1934, 997).—*p*-$C_6H_4Br{\cdot}NH_2$ with boiling CS_2–EtOH during 3—4 hr. gives dibromodiphenylthiocarbamide, decomposed by boiling Ac_2O to *p*-bromophenylthiocarbimide (I), which gives sharply melting derivatives with many amines. The p-*bromophenylthiocarbamides* from the following amines are described: NH_2Ph, m.p. 150—151°; *p*-bromo-, m.p. 186—187°, *p*-chloro-, m.p. 189—190°, *o*-, m.p. 60—61°, *m*-, m.p. 163—164°, and *p*-nitro-aniline, m.p. 164—165°; *o*-, m.p. 147—148°, *m*-, m.p. 147—148°, and *p*-$C_6H_4Me{\cdot}NH_2$, m.p. 174—175°; *m*-bromo-*p*-toluidine, m.p. 158—159°; α-, m.p. 165—166°, and β-$C_{10}H_7{\cdot}NH_2$, m.p. 175—176°; *o*-, m.p. 131—132°, and *p*-aminophenol, m.p. 163—164°. J. L. D.

Identification of metanilic acid and sulphanilic acid. R. B. Forster (J.S.C.I., 1934, **53**, 358T).—These acids can be identified by conversion into the corresponding chlorobenzenesulphonic acid (diazo-reaction), arylamino salts of which have sharp m.p. *m*-$C_6H_4Cl{\cdot}SO_3Na$ with NH_2Ph,HCl in H_2O gives the *aniline* salt, m.p. 206—207°. Similarly prepared, the p-*toluidine*, p-*chloroaniline*, m-*xylidine*, α-*naphthylamine*, and *benzidine* salts have m.p. 199—200°, 195—196°, 151—152°, 207—208°, and > 320° (decomp.), respectively. NH_2Ph, m.p. 222—223°, p-$C_6H_4Me{\cdot}NH_2$, m.p. 207—209°, *p*-$C_6H_4Cl{\cdot}NH_2$, m.p. 210—211°, and benzidine *salts*, m.p. >320° (decomp.), of *p*-$C_6H_4Cl{\cdot}SO_3H$ are described. J. L. D.

***m*-Toluidine-6-sulphonic acid.** M. S. Shah, C. T. Bhatt, and D. D. Kanga (J.C.S., 1934, 2010—2011).—*m*-$C_6H_4Me{\cdot}NH_2$ with oleum at 125° gives only *m*-toluidine-6-sulphonic acid, the diazonium derivative of which with boiling H_2O gives *m*-cresol-6-sulphonic acid (cf. A., 1888, 280), identified by several derivatives (A., 1933, 1292). J. L. D.

Additive products of benzylamine and phenylhydrazine with the nickel salts of substituted acetic acids.—See this vol., 182.

Monoethyl-*o*-toluidine and rhodamines obtained therefrom. H. E. Fierz-David and J. P. Rufener (Helv. Chim. Acta, 1934, **17**, 1452—1459).—*o*-$C_6H_4Me{\cdot}NH_2$ (I) (380 g.), EtOH (195 g.=20% excess), and conc. H_2SO_4 (57 g.) are heated for 12 hr. at 200°. The bases are liberated by NaOH and distilled through a Frey column, whereby *o*-$C_6H_4Me{\cdot}NHEt$ (II), b.p. 95·5°/10 mm., is obtained in 66% yield. The preliminary fractions contain (I) and (II) whereas *o*-$C_6H_4Me{\cdot}NEt_2$ (III) is not produced. *d* of mixtures of (I) and (II) in varied proportion has been determined. The separation of (II) from (III) is not readily effected through the hydrochlorides. the sulphonic acids, or their salts. The solubilities of the sulphonic acids and their Na and K salts is recorded for 2 : 1 : 4-$R{\cdot}C_6H_3Me{\cdot}SO_3H$, where R= NH_2, NHMe, NMe_2, NHEt, NEt_2. Rhodamine-*B*, *-G*, and *-GP* have been transformed into their *Me*, *Et*, *Pr*$^{\alpha}$, *Pr*$^{\beta}$, *Bu*$^{\alpha}$, *Bu*$^{\beta}$, *amyl*, *hexyl*, *octyl*, *benzyl*, and cyclo*hexyl* esters. H. W.

Addition of methyl alcohol to methyl *o*-nitrostyrylcarbamate with formation of methyl α(?)-methoxy-β-*o*-nitrophenylethylcarbamate. F. Schenck (Ber., 1934, **67**, [*B*], 2035—2036).—The protracted action of NaOCl on *o*-nitrophenylcinnamamide in MeOH–H_2O leads to the formation of *Me* α(?)-*methoxy*-β-*o*-*nitrophenylethylcarbamate*, m.p. 121°, converted by dil. H_2SO_4 into *o*-nitrophenylacetaldehyde. The ester is considered to react in its tautomeric form, $NO_2{\cdot}C_6H_4{\cdot}CH_2{\cdot}CH{:}N{\cdot}CO_2Et$. H. W.

Preparation of arylcarbimides. D. V. N. Hardy (J.C.S., 1934, 2011).—*p*-Xenylamine (I) in boiling PhMe with $COCl_2$ affords (cf. A., 1931, 834) *p*-xenylcarbimide (II) and *s*-di-*p*-xenylcarbamide [by interaction of (I) and (II)], but the hydrochloride of (I) with $COCl_2$ gives only (II). Similarly, NH_2Ph,HCl affords only PhNCO. J. L. D.

Manufacture of derivatives of diazo-compounds.—See B., 1935, 14.

Action of chlorine, bromine, and iodine monochloride on aryl azoacetoacetates and related compounds. F. D. Chattaway and R. D. Ashworth (J.C.S., 1934, 1985—1988).—The following are described (cf. A., 1933, 705; 1934, 182): *Et* 2 : 4-*dinitrobenzeneazoacetoacetate* (I), m.p. 108°, 2 : 4-*dinitrobenzeneazo-benzoyl-* (II), m.p. 203°, and *-acetylacetone* (III), m.p. 176°, *Et* α-*bromo-* (IV), m.p. 122°, and α-*amino-glyoxylate*-2 : 4-*dinitrophenylhydrazone*, m.p. 169°. (I) with Br in AcOH–NaOAc at room temp. gives (IV), but in boiling AcOH it affords *Et* 2 : 4-*dinitrobenzeneazo-γ-bromoacetoacetate*, m.p. 141°. Cl_2 is without action on (I) in cold or boiling AcOH or $CHCl_3$, but in cold AcOH–NaOAc, Cl_2 gives *Et* α-*chloroglyoxylate*-2 : 4-*dinitrophenylhydrazone*, m.p. 120°, and in dry $CHCl_3$ it affords *Et* 2 : 4-*dinitrobenzeneazo-γ-chloroacetoacetate* (V), m.p. 143°. Similarly, (II) and (III) with Cl_2 in cold AcOH–NaOAc give ω-*chlorophenylglyoxal-*, m.p. 177°, and ω-*chloro*-α-*ketopropaldehyde*-2 : 4-*dinitrophenylhydrazone*, m.p. 159°, respectively. The action of ICl depends partly on the nature of the substituents in the Ph nucleus. Et 2 : 4 : 6-tribromo-, 2 : 4-dibromo-, *p*-bromo-, *p*-nitro-, or *o*-nitro-benzeneazoacetoacetate (which are not

easily acetylated) with ICl in AcOH afford *Et* 2 : 4 : 6-*tribromo-*, m.p. 104°, 2 : 4-*dibromo-*, m.p. 127°, p-*bromo-*, m.p. 114°, p-*nitro-*, m.p. 154°, and o-*nitrobenzeneazo-γ-iodoacetoacetate*, m.p. 128°, respectively, which also result when the corresponding γ-Cl- or -Br-compounds react with KI. The γ-I-compounds with KOAc afford pyrazoles (cf. A., 1932, 1125; 1933, 1156). (I) with ICl in cold AcOH gives (V), which is unchanged by excess of ICl. Et benzeneazoacetoacetate with ICl in AcOH gives *Et* α-*chloroglyoxylate*-p-*iodophenylhydrazone*, m.p. 176°, which is reduced (Sn–HCl) to p-$C_6H_4I{\cdot}NH_2$. Et p-chlorobenzeneazoacetoacetate similarly affords Et α-chloroglyoxylate-p-chlorophenylhydrazone (cf. A., 1932, 1125). α-Ketopropaldehyde-o-nitrophenylhydrazone with ICl in AcOH at 40° gives β-*iodo*-α-*ketopropaldehyde-o-nitrophenylhydrazone*, m.p. 174°. Similarly, the 2 : 4 : 6-tribromophenylhydrazone gives ω-chloro-α-ketopropaldehyde-2 : 4 : 6-tribromophenylhydrazone (cf. A., 1934, 998). The arylazo-acetyl- and -benzoylacetones do not react with ICl. ω-Bromo-α-ketopropaldehyde-o-nitrophenylhydrazone with KI in boiling EtOH gives the ω-*I*-compound, m.p. 189°. Similarly prepared are ω-*iodo*-α-*ketopropaldehyde*-2 : 4-*dibromo-*, m.p. 169°, and -2 : 4 : 6-*tribromo-phenylhydrazone* (VI), m.p. 150°. ββω-Tribromo-α-ketopropaldehyde-2 : 4 : 6-tribromophenylhydrazone with KI in AcOH at 100° gives (VI), which is similarly obtained from the βγ-*dibromo*-analogue, m.p. 134° (prepared by brominating α-ketopropaldehyde-2 : 4 : 6-tribromophenylhydrazone). The *N*-acetates of Et 2 : 4 : 6-tribromo- (VII) and 2 : 4 : 6-trichloro-benzeneazoacetoacetate (VIII) (cf. A., 1932, 377) with excess of Br in boiling AcOH give *Et* 2 : 4 : 6-*tribromo-*, m.p. 178°, and 2 : 4 : 6-*trichloro-benzeneazo-γγ-dibromoacetoacetate-N-acetate*, m.p. 141°, respectively, identical with the Ac derivatives of Et 2 : 4 : 6-tribromo- and 2 : 4 : 6-trichloro-benzeneazo-γγ-dibromoacetoacetate. *N*-Acetylation of (VII) and (VIII) prevents the replacement of Ac by Br (see above). J. L. D.

The azochromophore. VI. J. S. P. Blumberger (Chem. Weekblad, 1935, **32**, 6—8).—Absorption spectra of *peri*-hydroxyazo-dyes (I) of the type 1 : 8-aminonaphthol→α-$C_{10}H_7{\cdot}NH_2$ in neutral and alkaline solutions, in which a bathochromic colour change (chromophore inversion) takes place, show that the OH and N:N groups in (I) form a conjugated system similar to that present in o-hydroxyazo-dyes (A., 1933, 946). Absorption curves are given for the following dyes: 1 : 8-aminonaphthol-3 : 6-disulphonic acid (II)→α-$C_{10}H_7{\cdot}NH_2$, (II)→1 : 6-$NH_2{\cdot}C_{10}H_6{\cdot}SO_3H$ (III), 1 : 8-aminonaphthol-3 : 5-disulphonic acid→(III), 1 : 5- and 2 : 5-aminonaphthol-7-sulphonic acid→(III), 1 : 7-aminonaphthol-4-sulphonic acid→(III), 2 : 8-aminonaphthol-6-sulphonic acid→(III), p-$C_6H_4(NH_2)_2$ (IV)→1- and 2-naphthol-3 : 6-disulphonic acid, (IV)→1 : 4-$OH{\cdot}C_{10}H_6{\cdot}SO_3H$. S. C.

Amphoteric aromatic substitution. II. Reactions of benzoyl peroxide and benzeneazotriphenylmethane. D. H. Hey (J.C.S., 1934, 1966—1969; cf. A., 1926, 286, 612).—Bz_2O_2 with PhCl at 100° gives CO_2, BzOH, and 4-chlorodiphenyl. Similarly, Bz_2O_2 with $PhNO_2$ gives CO_2, 4- and 2-nitrodiphenyl [which indicates that the substituting agent functions as an anionoid reagent (cf. A., 1929, 1313)], and with EtOBz it affords CO_2, Et diphenyl-4- (I) and -3-carboxylate, which accords with the less definite distinction between the o- and p-directive influence of CO_2Et, as compared with the almost exclusively m-directing NO_2. Na benzenediazoate with EtOBz gives mainly (I), but also smaller amounts of the 3- and 2-CO_2Et-compounds (cf. A., 1924, i, 1295). Benzeneazotriphenylmethane (II) with boiling C_6H_6 gives $CHPh_3$, Ph_2, and CPh_4; and again (II) with PhCl gives CPh_4, $CHPh_3$, and 4-chlorodiphenyl, which indicates that decomp. of (II) involves the formation of free Ph radicals (cf. A., 1922, i, 772) which can react with a neutral aromatic compound (this vol., 78). (II) with $PhNO_2$ at 100° gives some $CHPh_3$, a phenol, and a substance, m.p. 240—241°. J. L. D.

Azides. II. 3 : 5-Dinitrobenzazide as a reagent for the identification of phenols. P. P. T. Sah and T. S. Ma (J. Chinese Chem. Soc., 1934, **2**, 229—233; cf. A., 1934, 997).—3 : 5-Dinitrobenzazide (I) when heated in PhMe affords 3 : 5-*dinitrophenylcarbimide*, m.p. 92—93°. (I) with many phenols in boiling PhMe gives *aryl* 3 : 5-*dinitrophenylurethanes* (II). The following phenols were tested [m.p. of (II) in parentheses]: PhOH (192—193°); o- (140—142°), m- (188—189°), and p-nitro- (200—201°), o- (182—183°) and p-chloro- (197—198°), o- (253—254°) and p-amino-phenol (266—267°); o- (205—206°), m- (209—210°), and p-cresol (184—185°); thymol (154—155°); α- (228—229°) and β-$C_{10}H_7{\cdot}OH$ (238—239°); p-cresol-o-aldehyde (227—228°); Me (180—181°), Et (145—147°), and benzyl salicylate (172—173°). J. L. D.

Bromination of benzoates of phenolic compounds. L. C. Raiford and J. E. Milbery (J Amer. Chem. Soc., 1934, **56**, 2727—2729).—During bromination of ArOBz [Ar=Ph, C_6H_4Me, p-$CHO{\cdot}C_6H_4$, 2 : 4-$(OMe)(CHO)C_6H_3$·], Br enters the p-position (if available) of Ar; o-substitution occurs less readily, whilst m-substitution was not found (cf. Claus and Hirsch, A., 1889, 389). In many cases, the HBr evolved caused hydrolysis to BzOH and ArOH (subsequently brominated); PhOBz thus gives p-$C_6H_4Br{\cdot}OBz$, s-$C_6H_2Br_3{\cdot}OH$, and BzOH. The methods of bromination used are: (i) a modification of Kauschke's (A., 1895, i, 280) using I as catalyst at < 60° in open vessels; (ii) Br in AcOH containing NaOAc and I at about 40° for 48 hr.; (iii) Br in hot AcOH containing NaOAc, I, and the catalyst described by Fierz-David (A., 1929, 273). The bromoaryl benzoates are also synthesised. 4-*Bromo*-2-*methyl-*, m.p. 67—68°, 2- and 3-*bromo*-4-*methyl-*, m.p. 71—72° and 75—76°, respectively, 2-*bromo*-4-*nitro-* (I), m.p. 131—132°, and p-*bromomethyl-* (II), m.p. 109—110°, *-phenyl benzoates* are new. A 1 : 1-*mixture*, m.p. 113—117°, of (I) and p-$NO_2{\cdot}C_6H_4{\cdot}OBz$ (III) is obtained by repeated crystallisation of the bromination product from (III). (II), obtained in 14% yield from p-$C_6H_4Me{\cdot}OBz$ by method (iii), is converted into p-*benzoyloxybenzylpyridinium bromide* (+H_2O), m.p. (anhyd.) 174—175°. *O*-Benzoylvanillin (IV) gives [method (ii) for 6 days] the 6-*Br*-derivative, m.p. 117—118° (hydrolysed to 6-bromovanillin), whilst nitration affords 70% of the 2- and 4% of the 6-NO_2-derivative. (IV) and PBr_5 at about 100° give 4-*benz-*

oyloxy-3-methoxybenzylidene bromide, m.p. 108·5—109·5°. *p*-Benzoyloxybenzaldehyde, m.p. 90° (lit. 72°) [*p-bromophenylhydrazone*, m.p. 179—180° (decomp.)], could not be brominated [method (ii); in contact with air *p*-OBz·C_6H_4·CO_2H results], indicating that in (IV) the active directing group is OMe, and the activity of OH is suppressed by acylation. Similarly, 4-o-, m.p. 103—104°, -m-, m.p. 95—96°, and -p-, m.p. 117—118°, *-chloro-*, 4-m-*bromo-*, m.p. 114—115°, and 4-p-*nitro-*, m.p. 199—200°, *-benzoyloxybenzaldehydes* could not be brominated; 4-o-, m.p. 215—216°, -m-, m.p. 217—218°, and -p-, m.p. 239—240°, *-chloro-* and 4-m-*bromo-*, m.p. 211—212°, *-benzoyloxybenzoic acids* are described. H. B.

Stereochemistry of dicyclic ring systems. X. Stereochemistry of hydrindane and its derivatives. II. Derivatives of *cis*-hydrindane with substituents in the six-membered ring. W. Hückel and E. Goth (Ber., 1934, 67, [*B*], 2104—2107; cf. Linstead *et al.*, A., 1934, 1002).—Catalytic hydrogenation of 5-hydroxyhydrindene (Pt sponge–AcOH; PtO_2–AcOH; colloidal Pt–H_2O) in all cases yields a similar mixture of isomerides in which cis-5-*hydroxyhydrindane* (I), m.p. 41° (*H succinate*, m.p. 81·5°; *normal succinate*, m.p. 90°; *phenylurethane*, m.p. 125°), greatly predominates and is accompanied by as-5-*hydroxyhydrindane* (II) (*phenylurethane*, m.p. 74°). Oxidation of (I) with CrO_3 in AcOH gives the corresponding *ketone* (III), b.p. 103°/17 mm. (semicarbazone, m.p. 208°), and cis-cyclo*pentane*-1 : 2-*diacetic acid*, m.p. 173°, also obtained in very small yield when (III) is oxidised with $KMnO_4$ or, together with an acid, m.p. about 100°, when (I) is dehydrated with $KHSO_4$ and the unsaturated *hydrocarbon*, b.p. 165—170°/730 mm., is oxidised with $KMnO_4$. Hydrogenation of 5-acetamidohydrindene (IV) (Skita) gives a mixture of products from which, after hydrolysis, *Bz* derivatives, m.p. 165° (V), 145°, and 143°, respectively, are isolated. (V) is hydrolysed to an *amine* (VI), b.p. 86°/12 mm., the *Ac* derivative, m.p. 107—108°, of which is obtained by the Willstätter hydrogenation of (IV). Treatment of (VI) with HNO_2 affords (II). Hydrogenation of 4-hydroxyhydrindene (Skita) does not give a homogeneous hydrindanol. Oxidation of 4-hydroxyhydrindane with CrO_3 in AcOH gives imperfectly homogeneous cis-*hydrindan*-4-*one* (VII), b.p. 100°/17 mm. (*semicarbazone*, m.p. 193°); the corresponding, non-cryst. oxime yields two *Bz* derivatives, m.p. 114° (*cis*-compound), and m.p. 92° (? *trans*-compound). Oxidation of (VII) with HNO_3 yields only $(\cdot CH_2 \cdot CO_2H)_2$. H. W.

4-Iodopyrocatechol. E. Fourneau and J. Druey (Compt. rend., 1934, 199, 870—872).—Iodopyrocatechol diacetate (I), b.p. 148—150°/0·8 mm., is prepared by diazotisation of 4-aminopyrocatechol diacetate and treatment with KI. Hydrolysis of (I) with HCl in MeOH yields 4-*iodopyrocatechol*, m.p. 92° and 50° (dimorphous), which gives a green coloration with $FeCl_3$, becoming red with Na_2CO_3 and reddish-violet with $NaHCO_3$. A. G. P.

Hydroxytriphenylmethanes. Condensation of aromatic aldehydes and phenols with phosphoric acid. I. Tănăsescu and T. Simonescu (J. pr. Chem., 1934, [ii], 141, 311—326).—PhCHO, PhOH (I), and cryst. H_3PO_4 at 100° (bath) give 4 : 4′-dihydroxytriphenylmethane (leucobenzaurin), m.p. 161°; *p*-OH·C_6H_4·CHO and (I) similarly afford 17% of tri-*p*-hydroxyphenylmethane (leucoaurin), m.p. 240°, and 35% of a phenolic substance; *o*-$C_6H_4(CHO)_2$ yields α-*p*-hydroxyphenylphthalide, m.p. 148°; *o*-NO_2·C_6H_4·CHO furnishes 2-*nitro*-4′ : 4″-*dihydroxytriphenylmethane* (about 70%), amorphous, m.p. about 92° [also prepared by diazotisation of the 4′ : 4″-$(NH_2)_2$-derivative] [*Ac*$_2$ and *Bz*$_2$, m.p. 155° (not sharp), derivatives; *Me*$_2$ *ether*], reduced (Zn dust, aq. EtOH, little $CaCl_2$) to the amphoteric 2-*amino*-4′ : 4″-*dihydroxytriphenylmethane*, m.p. 195° (not sharp) (*Bz*$_3$ derivative, m.p. 110°); *m*-NO_2·C_6H_4·CHO gives (cf. De Varda and Zenoni, A., 1891, 1346) about 50% of 3-*nitro*-4′ : 4″-*dihydroxytriphenylmethane*, m.p. 90—91° (*Bz*$_2$ derivative, m.p. about 89°; *Me*$_2$ *ether*, m.p. 70°), similarly reduced to 3-*amino*-4′ : 4″-*dihydroxytriphenylmethane* (+EtOH), m.p. 114° (decomp.) (*Bz*$_3$ derivative); *p*-NO_2·C_6H_4·CHO affords 4-nitro-4′ : 4″-dihydroxytriphenylmethane (II), m.p. 130° (previous sintering) (cf. Danckwortt, A., 1909, i, 938; King and Lowy, A., 1924, i, 646) (*Bz*$_2$ derivative; *Me*$_2$ *ether*), reduced to 4-*amino*-4′ : 4″-*dihydroxytriphenylmethane* (III), m.p. 110° (*Bz*$_3$ derivative). When a solution of (II) in 25% KOH is kept for 24 hr. and then acidified (HCl), 4-*nitro*-4′-*hydroxyfuchsone* (+H_2O), carmine-red with green reflex (*Bz* derivative) [reduced (as above) to (III)], is obtained. Nearly all the above compounds are amorphous. H. B.

Apiole. H. Windisch (Mercks Jahresber., 1934, 47, 56—57; Chem. Zentr., 1934, ii, 1171).—A method for the isolation of apiole and myristicin as their Br additive compounds, m.p. 118—120° and 126—129°, respectively, is described. H. N. R.

***cis*- and *trans*-Chlorohydrins of 1-methyl-Δ^1-*cyclo*pentene.** P. D. Bartlett and R. V. White (J. Amer. Chem. Soc., 1934, 56, 2785; cf. A., 1934, 1221).—2-Chloro*cyclo*pentanone and MgMeBr give 2-*chloro*-1-*methyl*cyclo*pentanol* (I), b.p. 50—57°/8 mm., whilst 1-methyl-Δ^1-*cyclo*pentene and HOCl afford an isomeride (II), b.p. 61—64°/7 mm., m.p. 35—37°, and Cl-containing material (which does not react with EtOH–alkali) (cf. Chavanne and de Vogel, A., 1928, 745). (I) is converted by KOH in Et_2O or aq. 33% NaOH into 2-methyl*cyclo*pentanone; (II) similarly gives 1 : 2-oxido-1-methyl*cyclo*pentane. H. B.

Preparation of *cyclo*hexanol. N. A. Orlov, M. F. Schostakovski, and V. V. Schabarov (J. Appl. Chem. Russ., 1934, 7, 760—763).—*cyclo*Hexanol is obtained in 96% yield by heating PhOH and H_2 at 265°/100 atm. for 7 hr. in presence of 4—6% of Ni_2O_3. R. T.

Esters of hydrogenated phenols. J. S. Salkind and M. G. Gerchikov (Plast. Massi, 1934, No. 3, 37—40).—The esterification of *cyclo*hexanol with AcOH, HCO_2H (85—90% yield with 95% acid in cold without catalyst for 1 day), and $H_2C_2O_4$, and of methyl*cyclo*hexanol with AcOH, is described. Ch. Abs. (*r*)

Reaction of magnesium dimethyl and diethyl with *cyclo*hexene oxide. P. D. Bartlett and C. M. Berry (J. Amer. Chem. Soc., 1934, 56, 2683—

2685).—The residue after removal of Et_2O from *cyclo*hexene oxide and Et_2O–$MgEt_2$ (Noller and Hilmer, A., 1932, 837) is heated at 100° (bath) and then hydrolysed (dil. HCl); *trans*-2-ethyl*cyclo*hexanol (I) (contaminated with some impurity) is thus obtained in 42% yield. Slightly impure *trans*-2-methyl*cyclo*hexanol is similarly prepared using $MgMe_2$. (I) is oxidised to 2-ethyl*cyclo*hexanone. No rearrangement occurs in the above reactions. H. B.

Preparation of amino-alcohols. I. J. T. Abrams and F. S. Kipping (J.C.S., 1934, 1988—1991).—$CH_2Bz{\cdot}CO_2Et$, Et α-benzoyl-propionate, -butyrate, and -*iso*butyrate (I) are prepared by Claisen's method [cf. J.C.S., 1909, **95**, 2042; criticisms (A., 1930, 212 and 1932, 944) are unfounded] and give [except (I)] with conc. aq. NH_3 the corresponding amides, m.p. 112—113°, 153° (lit. 145—146°), 155° (lit., 148—149°), respectively, which with Al–Hg in H_2O–EtOH give, respectively, β-hydroxy-β-phenyl-propionamide (II), m.p. 118—119°, and its α-*Me* (III), m.p. 134—135°, and α-*Et*, m.p. 134—135°, derivatives [and a *diastereoisomeride* (?), m.p. 128—131°, of the last]. (II) and (III) are converted by NaOBr below 0° into β-amino-α-phenyl-ethyl (cf. A., 1914, i, 677) and -propyl alcohol (IV) [also some *bromoamide* (?), m.p. 116—117°, which is converted by NaOH into (IV)], isolated as the hydrochlorides. J. L. D.

Ephedrine. II. New benzyl homologues. S. D. Wilson and L. H. Sun (J. Chinese Chem. Soc., 1934, **2**, 243—256).—$CH_2Ph{\cdot}CHBr{\cdot}COPh$ with excess of NH_2Me in C_6H_6 at room temp. during many hr. gives *Ph* α-*methylamino*-β-*phenylethyl ketone hydrochloride*, m.p. 225—226°, reduced (H_2–Pt–Pt oxide) in EtOH at 40—50° to dl-β-*methylamino*-α*γ*-*diphenylpropanol*, an oil (*hydrochloride*, m.p. 204—205°; *sulphate*, m.p. 184—185°; *picrate*, m.p. 172—173°), which is resolved (tartaric acid) into the d-, $[\alpha]_D^{25}$ +10·9° in 2% EtOH (*hydrochloride*, m.p. 194—195°; d-*tartrate*, m.p. 202—204°), and the l-*form*, $[\alpha]_D^{25}$ −11·0° (*hydrochloride*, m.p. 192—193°; d-*tartrate*, m.p. 175—176°). Similarly prepared, *Ph* α-*benzylamino*-β-*phenylethyl ketone hydrochloride* has m.p. 206—207°, and is reduced to dl-β-*benzylamino*-α*γ*-*diphenylpropanol* (*hydrochloride*, m.p. 220°; *sulphate*, m.p. 207—208°; *picrate*, m.p. 150—151°), which is resolved into the d-, $[\alpha]_D^{25}$ +9·2° in 2% EtOH (*hydrochloride*, m.p. 229—230°), and l-*form*, $[\alpha]_D^{25}$ −10·0° (l-*mandelate*, m.p. 156—157°), with *l*-mandelic acid. $CHMeBr{\cdot}COPh$ with $CH_2Ph{\cdot}NH_2$ (2 mols.) as above gives *Ph* α-*benzylaminoethyl ketone hydrochloride*, m.p. 189—190°, reduced to β-*benzylamino*-α-*phenylpropanol*, m.p. 72—73° (*hydrochloride*, m.p. 188—189°; *sulphate*, m.p. 184—186°; *oxalate*, m.p. 213—215°; *picrate*, m.p. 174—175°). J. L. D.

Vinylene homologues of "Michler's hydrol-blue." W. König and K. Seifert (Ber., 1934, **67**, [*B*], 2112—2120).—β-Ethoxyacraldehyde Et_2 acetal, $NPhMe_2$, and $ZnCl_2$ yield 1-*tri*-p-*dimethylaminodiphenylstyrylmethane* (I) $NMe_2{\cdot}C_6H_4{\cdot}CH{:}CH{\cdot}CH(C_6H_4{\cdot}NMe_2)_2$, m.p. 187° [*salt*, $(C_{27}H_{33}N_3)_2,ZnCl_2,8HCl,4H_2O$], converted by PbO_2 in dil. HCl–AcOH into tetramethylbenzidine and *pp'*-tetramethyldiaminophenylstyrylmethane chloride (II); *perchlorate*, decomp. 165°; *dichloropicrate*, decomp. 195°]. (II) is transformed by NH_3 into the *substance* (?) $NH[CH(C_6H_4{\cdot}NMe_2){\cdot}CH{:}CH{\cdot}C_6H_4{\cdot}NMe_2]_2$, m.p. 193°.

(II) shows an absorption max. at 689 mμ, that of Michler's hydrol in AcOH being at 609 mμ. When (I) is heated in AcOH from which all trace of oxidising agent has been removed, a small amount of (II) (as acetate) is formed, together with some tetramethylbenzidine. Leuco-crystal-violet undergoes a similar change in AcOH, forming Michler's hydrol acetate. H. W.

Resolution of some cyclanediols. M. Godchot, M. Mousseron, and R. Richaud (Compt. rend., 1934, **199**, 1233—1235).—*trans-cyclo*Pentane-1 : 2-diol with H_2SO_4 at −15° affords the di-sulphuric ester, the strychnine salt of which when fractionally crystallised, followed by hydrolysis, gives the optical *isomerides*, $[\alpha]_{589}^{22}$ ±33·60°. Similarly, *cis*-1-methyl*cyclo*hexane-3 : 4-diol (A., 1923, i, 1082) gives d- and l-*compounds*, $[\alpha]_{589}^{22}$ ±18·10°, and the *trans*-diol (A., 1923, i, 101), *isomerides*, $[\alpha]_{589}^{22}$ ±19·40°. J. L. D.

***p*-Fluorophenacyl alcohol and some of its esters.** R. M. Hann and J. P. Wetherill (J. Washington Acad. Sci., 1934, **24**, 526—528).—Condensation of $CH_2Cl{\cdot}COCl$ with PhF and $AlCl_3$ in CS_2 affords p-*fluorophenacyl chloride* (I), m.p. 48°, converted by fused NaOAc–AcOH–aq. EtOH into the *acetate*, m.p. 48·5—49°, hydrolysed by $BaCO_3$–H_2O at 100° to p-*fluorophenacyl alcohol*, m.p. 114° [o-, m.p. 74·5°, m-, m.p. 105°, and p-*nitrobenzoate*, m.p. 134°, from the $C_6H_4(NO_2){\cdot}CO_2H$ and (I) in *N*-NaOH]. J. W. B.

Structure of cholesterol. R. Robinson (Chem. and Ind., 1934, 1062—1063).—The suggestion (this vol., 81) that the Me group of cholesterol (I) now usually placed at C_{10} is better placed at C_9 was made by the author (A., 1932, 1245), but is not in accord with chemical evidence. The accepted C skeleton of (I) can be constructed without rearrangement from difarnesyl (tail to tail; 2 : 6 : 10 : 15 : 19 : 23-hexamethyltetracosane) by elimination of the C_{10}, C_{15}, and C_{23} side-chains and junction of C_7 and C_{10} to C_{23}, of C_{11} to C_{20}, and of C_{14} to C_{19}. Elimination of the C attached to C_{15} may occur as CO_2 from a β-keto-acid, the CO being C_{15}, which carries the OH of cholesterol and œstrin. R. S. C.

Condensation of aromatic amines with cholesteryl chloroformate. A. Verdino and E. Schadendorff (Monatsh., 1934, **65**, 141—152).—By condensation (sometimes in $COMe_2$) of cholesteryl chloroformate with the appropriate aromatic NH_2-compound are obtained the *cholesteryl* esters of phenyl-, m.p. 168°, *o*-, m.p. 160°, *m*-, m.p. 157°, and *p*-tolyl-, m.p. 182°; *o*-, m.p. 168°, *m*-, m.p. 185°, and *p*-nitrophenyl-, m.p. 202—208°; *o*-, m.p. 170—171°, *m*-, m.p. 126—127°, and *p*-bromophenyl-, m.p. 182—186°; *o*-carboxyphenyl-, m.p. 208° (*Et* ester, m.p. 191—194°); benzyl-, m.p. 148°, *p*-anisyl-, m.p. 137°, *o*-, m.p. 132°, and *p*-ethoxyphenyl-, m.p. 140° (clears at 180°); 3 : 4-dimethylphenyl-, m.p. 152°, *p*-hydroxyphenyl-, m.p. 211° to liquid crystals, sinters 178°; α-naphthyl-, m.p. 166° (decomp.), 5-nitronaphthyl-, m.p. 216—217°; β-anthraquinonyl-, m.p. 290° (decomp.), diphenyl, m.p. 193°, anilino-, m.p. 157°,

p-azobenzene-, m.p. 226°, and 2 : 3′-dimethylazobenzene-4′-, m.p. 183°, -carbamic acid; and phenyl-*o*-, m.p. 205°, and diphenyl-4 : 4′-, m.p. 270° (decomp.), -dicarbamic acid. J. W. B.

Cholesteryl salicylate.—See this vol., 152.

***iso*Cholesterol.** V. Humnicki (Bull. Soc. chim., 1934, [v], **1**, 1560—1563).—*iso*Cholesterol (from lanoline), m.p. 138—139°, $[\alpha]_D$ +59·1° [*chloride*, m.p. 93—94°; *cinnamate*, m.p. 150° after sintering from 135° (*tetrabromide*, m.p. 127—128°); *benzoate*, m.p. 175—177°; 6 colour reactions described], has the formula, $C_{26}H_{44}O$. It has a blue fluorescence in ultra-violet light. R. S. C.

Bombicesterol.—See this vol., 105.

Position of the hydroxyl group in ergosterol and stigmasterol. E. Fernholz and P. N. Chakravorty (Ber., 1934, **67**, [*B*], 2021—2026).—Dihydrocholesteryl acetate is oxidised with CrO_3 and the product is hydrolysed to β-3-hydroxy*allo*cholanic acid, m.p. 218°, the *Me* ester, m.p. 151°, of which is transformed by the successive action of MgPhBr, Ac_2O, and CrO_3 into β-3-*hydroxynor*allo*cholanic acid* (I), m.p. 226° (*Me* ester, m.p. 156°, and its *acetate*, m.p. 163°; *Na* salt). (I) is also obtained from ergostanyl acetate and from stigmastanyl acetate, which in addition yields an *acid*, m.p. 221°, in small amount. The position and steric arrangement of OH in ergosterol and stigmasterol are thus established and their relationships to cholesterol assured. H. W.

α- and β-Spinastenol. D. Larsen and F. W. Heyl (J. Amer. Chem. Soc., 1934, **56**, 2663—2665).—Reduction (H_2, PtO_2, AcOH) of α-spinasteryl acetate (A., 1932, 381), m.p. 187°, [α] −5·8° (all rotations are in $CHCl_3$ at 20±1° and λ=5461) [ozonolysis (method : Guiteras *et al.*, A., 1932, 611) of which shows the presence of a saturated side-chain; the 2 double linkings present are, therefore, in the nucleus], gives the *acetate* (I), m.p. 119°, [α] +11·6°, of α-*spinastenol*, m.p. 110°, [α] +24·2° (p-*nitrobenzoate*, m.p. 192°, [α] +6·6°), which contains 1 double linking (BzO_2H). Treatment of (I) with dry HCl in $CHCl_3$ at 0° and subsequent hydrolysis (5% EtOH–KOH) affords β-*spinastenol*, m.p. 127·5°, [α] +36·5° [*acetate* (II), m.p. 86·5°, [α] +24·3°], purified through its p-*nitrobenzoate*, m.p. 183°, [α] +37·3°. (II) is reduced (H_2, PtO_2, AcOH) to the *acetate*, m.p. 132°, [α] +16·3°, of the saturated *spinastanol*, m.p. 137°, [α] +27·8° (p-*nitrobenzoate*, m.p. 213·5°, [α] +24·4°; *phenylcarbamate*, m.p. 172°, [α] +16·4°). The above changes are analogous to those in the ergosterol series. α-*Spinasteryl* p-*nitrobenzoate*, m.p. 220°, [α] +5·2°, and *phenylcarbamate*, m.p. 177°, [α] −3·3°, appear to be new. H. B.

***allo*Pregnandiol, a new alcohol from urine of pregnancy.** M. Hartmann and F. Locher (Naturwiss., 1934, **22**, 856).—The mother-liquors from pregnandiol diacetate, m.p. 182—183° (corr.), $[\alpha]_D^{23}$ +35·3° in C_6H_6, obtained from urine of pregnancy, yield allo*pregnandiol diacetate*, m.p. 141—142·5° (corr.), $[\alpha]_D^{24}$ +18·8° in C_6H_6, which gives the free *diol*, m.p. 248—248·5° (corr.), oxidised by CrO_3 in 90% AcOH to *allo*pregnandione, m.p. 202—204° (corr.). R. S. C.

Preparation of inositol from inositol phosphates. S. Otolski (Arch. Chem. Farm., 1934, **2**, 61—64).—Inositolphosphoric acid (I) is heated with 3 vols. of H_2O for 5 hr. at 190°, 850 g. of CaO in 5 litres of H_2O are added, and the suspension is filtered. The residue of $Ca_3(PO_4)_2$ is washed with hot H_2O, the filtrate + washings are conc. to 1 litre, 7 litres of 85% EtOH added, the ppt. of inositol (II) is allowed to settle, the supernatant liquid decanted off, 500 c.c. of H_2O are added, and the solution is boiled with adsorbent C and filtered. 1 litre of 96% EtOH is added to the filtrate, the ppt. of crude (II) collected, washed with 20% EtOH, and dried at 110—120°. The product, containing 5% of mineral impurities, is recrystallised from 32% EtOH to yield pure (II) [237 g. per kg. of (I)]. R. T.

Synthesis of 1-cyano-1-methyl*cyclo*propane from diazomethane and α-methylacrylonitrile. D. Gotkis and J. B. Cloke (J. Amer. Chem. Soc., 1934, **56**, 2710—2712).—OH·CMe_2·CN is dehydrated [P_2O_5 at 10—15° (bath)] to CH_2:CMe·CN, b.p. 89—91°, which with Et_2O–CH_2N_2 affords (probably) 5-cyano-5-methyl-Δ¹-pyrazoline. This is decomposed thermally to 1-*cyano*-1-*methyl*cyclo*propane* (I), b.p. 127—127·5° (corr.)/761·5 mm., and a little unsaturated material (removed by oxidation with cold alkaline $KMnO_4$). (I) is hydrolysed [conc. H_2SO_4 or McMaster and Langreck's method (A., 1917, i, 334)] to 1-*methyl*cyclo*propane*-1-*carboxylamide*, m.p. 143—145° (corr.); with 100% H_3PO_4 at 140—155°, tiglic acid results. The additive compound from (I) and MgPhBr with liquid NH_3 gives Ph 1-methyl*cyclo*propyl ketimine, the hydrochloride, m.p. 103—106°, of which rearranges (cf. A., 1929, 703) to a pyrroline [picrate, m.p. 150—151° (decomp.); *platinichloride*]. (I) could not be prepared by methylation of cyano*cyclo*propane, from EtCN and (·CH_2Hal)$_2$, or from CH_2Hal·CH_2·CHMe·CN. H. B.

Sulphonation of benzoic acid. J. S. Reese (Textile Res., 1934, **4**, 183—188).—The velocities of reaction of BzOH with conc. H_2SO_4 at 150°, 175°, and 200°, and with fuming H_2SO_4 at room temp., are recorded. Ch. Abs. (*r*)

Preparation of cinnamic acid and *o*-phenylphenol derivatives. R. H. Clark, R. G. D. Moore, and M. McArthur (Trans. Roy. Soc. Canada, 1934, [iii], **28**, III, 97—102).—*m*-Iodocinnamic acid, m.p. 191·5° [improved prep.; lit., 182—183° (decomp.)] (*Et* ester, m.p. 36—37°), is converted through the *chloride*, m.p. 35·3°, and warm CH_2Ph·OH into *benzyl* m-*iodocinnamate*, m.p. 50°. Cinnamyl chloride (I) with warm *m*-C_6H_4I·CH_2·OH (prep. from *m*-C_6H_4I·CHO described) gives m-*iodobenzyl cinnamate*, m.p. 35°. (I) when heated with $CO(NH_2)_2$ gives *monocinnamylcarbamide*, m.p. 197°. Similarly obtained, m-*iodocinnamylcarbamide* has m.p. 207·5°. 5-Benzeneazo-2-hydroxydiphenyl with Zn in boiling AcOH–EtOH gives 5-amino-2-hydroxydiphenyl (cf. A., 1917, i, 390), which is converted with difficulty through the diazonium compound into the 5-I-compound. 2-Hydroxydiphenyl with ICl in AcOH at 100° gives 5-*iodo*-2-*hydroxydiphenyl*, b.p. 190—200°/10 mm. (*Ac* derivative, m.p. 82°). J. L. D.

Acetyldiphenylchloroacethydrazide. H. Aspelund and A. M. Augustson (Acta Acad. Aboensis math. phys., 1933, **7**, No. 10, 1—7; Chem. Zentr., 1934, ii, 1455).—Benzilic acid hydrazide and Ac_2O yield *acetylbenzilhydrazide*, m.p. (+$2H_2O$) 190—191°; this, with $CPh_2Cl{\cdot}COCl$, affords *acetyldiphenylchloroacethydrazide*, m.p. 94°, which with EtOH yields *acetyldiphenylethoxyacethydrazide*, m.p. 154°. EtOAc and N_2H_4,H_2O at 130° for 4 hr. give a good yield of 4-amino-3 : 5-dimethyl-1 : 2 : 4-triazole, m.p. 196°

H. N. R.

Preparation of β-benzylidene-α-*o*-nitrobenzylidene- and α-benzylidene-β-*o*-nitrobenzylidene-propionic acid. F. Schenck (J. pr. Chem., 1934, [ii], **141**, 299—300).—$CHPh{:}CH{\cdot}CH_2{\cdot}CO_2Na$, o-$NO_2{\cdot}C_6H_4{\cdot}CHO$, and Ac_2O at 125—130° (bath) give *γ-phenyl-α-o-nitrobenzylidene-Δ$^{\beta}$-butenoic* (*β-benzylidene-α-o-nitrobenzylidenepropionic*) *acid*, m.p. 180—181°. *γ-o-Nitrophenyl-Δ$^{\beta}$-butenoic acid*, m.p. 112—113° [from o-$NO_2{\cdot}C_6H_4{\cdot}CH_2{\cdot}CHO$ and $CH_2(CO_2H)_2$ at 100° (bath) and finally at 110°], and PhCHO similarly afford *γ-o-nitrophenyl-α-benzylidene-Δ$^{\beta}$-butenoic* (*α-benzylidene-β-o-nitrobenzylidenepropionic*) *acid*, m.p. 167—168°. H. B.

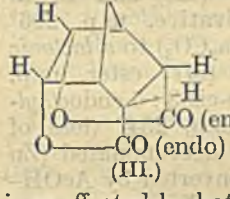
***o*-Phenyldiphenyls and "synchronised rotation."** A. M. Sadler and G. Powell (J. Amer. Chem. Soc., 1934, **56**, 2650—2653).—*o*-Iododiphenyl, o-$C_6H_4Br{\cdot}CO_2Et$ (I), and Cu-bronze at 270—275° give 2 : 2′-didiphenylyl, b.p. 193—195°/1 mm., m.p. 117—119°, and a product, b.p. 169—175°/1 mm., which when hydrolysed (KOH in 5% EtOH) affords *2-phenyldiphenyl-2′-carboxylic acid* (II), m.p. 143—144·5° (*strychnine*, m.p. 215°, $[\alpha]^{25}_{5461}$ −42 to −43° in $CHCl_3$, and phenylethylamine, m.p. 115—116°, $[\alpha]^{25}_{5461}$ −4·1° in EtOH, salts). o-$C_6H_4Ph_2$ is obtained when the Ag salt of (II) is heated. (II) could not be resolved; a model of (II) has a plane of symmetry when the plane of the 2-Ph group is perpendicular to the plane of the Ph_2 groups. 2-Iodo-2′-methyldiphenyl (III) [prepared by Mascarelli and Gatti's method (A., 1932, 607)] and (I) similarly afford *2-o-tolyldiphenyl-2′-carboxylic acid* (IV), m.p. 130·5—131·5° [*strychnine* (+EtOH), m.p. 210° (shrinks at 85°), $[\alpha]^{25}_{5461}$ −46·5° in $CHCl_3$, and phenylethylamine, m.p. 123—126°, $[\alpha]^{25}_{5461}$ −3·5° in $CHCl_3$, salts], which could not be resolved. (IV) possesses no mirror element of symmetry; non-resolution may be due to "synchronised rotation" (Maclean and Adams, A., 1934, 63). 2 : 2′-*Di*-(*o*-*tolyl*)*diphenyl*, m.p. 113—114°, is prepared from (III) and Cu at 265—285°. 2-Nitro-2′-methyldiphenyl (from o-C_6H_4IMe and o-$C_6H_4I{\cdot}NO_2$) has m.p. 64—65° (lit. 57—58°). *6-Nitro-2-methyldiphenyl*, b.p. 155°/3 mm., m.p. 105—106° (from 2-bromo-3-nitrotoluene and PhI), is reduced ($SnCl_2$, EtOH–conc. HCl) to the 6-NH_2-derivative, b.p. 144—145°/2 mm., m.p. 43—44° (*hydrochloride*), convertible (Sandmeyer) into *6-iodo-2-methyldiphenyl*, b.p. 135°/1 mm., m.p. 29—30°. (I), o-$C_6H_4I{\cdot}NO_2$, and Cu at 250—285° give (after hydrolysis) *2-nitrodiphenyl-2′-carboxylic acid*, m.p. 165—166·5°; Me 2-bromo-3-nitrobenzoate and PhI similarly afford *2-nitrodiphenyl-6-carboxylic acid*, m.p. 187—188°. H. B.

Geometrical inversion of the acids derived from coumarins. B. B. Dey, R. H. R. Rao, and T. R. Seshadri (J. Indian Chem. Soc., 1934, **11**, 743—749).—*o*-Coumaric acid (I) and its 5-NO_2- (II) and 4-OMe- (III) -derivatives (modified preps.), when heated, give the styrene and CO_2, but the Me and Et esters undergo ring-closure rapidly. Both acids and esters give the coumarin in light, the ease of reaction being (II)>(I)>(III). The following are described: *Me*, m.p. 137°, and *Et* *o-coumarate*, m.p. 86°; *Et* *5-nitrocoumarate*, m.p. 170—172°; 7-methoxycoumarin, m.p. 117—118° [from umbelliferone (modified prep.) or malic acid and *m*-OMe·C_6H_4·OH]; *Me*, m.p. 138°, and *Et* *4-methoxycoumarate*, m.p. 109°.

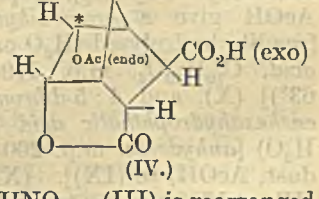
R. S. C.

***cyclo*Pentane-1 : 2-diacetic acid.** W. Hückel, E. Goth, and G. Demmler (Ber., 1934, **67**, [*B*], 2102—2103; cf. Linstead *et al.*, A., 1934, 1002).—Treatment of Et *cyclo*pentanoneacetate with $CH_2Br{\cdot}CO_2Et$ and Zn in C_6H_6 gives a mixture of OH-ester, unsaturated ester, oily acids, and other products. Fractionation and hydrolysis of the ester mixture leads to *cyclo*pentene-1 : 2-diacetic acid (I), m.p. 182—183°. Hydrogenation (Pt sponge in AcOH or Et_2O; PtO_2–MeOH) leads mainly to *cis-cyclo*pentane-1 : 2-diacetic acid, m.p. 172—173° (*monoanilide*, m.p. 129—131°; *dianilide*, m.p. 225—226°), whereas treatment in presence of Pd–C–EtOH or (as Na salt) with Pd–C–H_2O yields essentially *trans-cyclo*pentane-1 : 2-diacetic acid, m.p. 132—133·5° (*monoanilide*, m.p. 144—146°; *dianilide*, m.p. 236—237°). H. W.

Steric course of addition and substitution reactions. I. Stereochemistry of diene synthesis. K. Alder and G. Stein [with F. von Buddenbrock, W. Eckardt, W. Frercks, and S. Schneider] (Annalen, 1934, **514**, 1—33).—The investigation (A., 1933, 941) on the steric configurations of the *dicyclo*pentadienes is being extended to the determination of, *e.g.*, configurations in the camphor group. Preliminary work on the addition of maleic anhydride to *cyclo*-pentadiene and -hexadiene, and the occurrence of *exo*- and *endo*-isomerism in the adducts, is now reported. 4-Bromo-5-hydroxy-*cis*-3 : 6-*endo*methylenehexahydrophthalic acid (I) (*loc. cit.*) is converted by Zn–Cu and AcOH into *endo-cis*-3 : 6-*endo*methylene-Δ^4-tetrahydrophthalic acid (II), and by 25% MeOH–KOH followed by Ac_2O into the *dilactone* (III), m.p. 266°, of 4 : 5-dihydroxy-*cis*-3 : 6-*endo*methylenehexahydrophthalic acid. These results prove the *endo*-configuration (cf. III) of the CO_2H groups of (II). (III) can be distilled unchanged and



(III.)

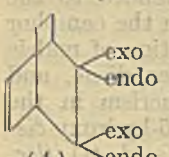


(IV.)

is unaffected by hot conc. HNO_3. (III) is rearranged by 25% MeOH–KOH to the *trans*-lactonic acid, m.p. 200° {*Ac* derivative (IV), m.p. 200° [*Me* ester, m.p. 83°, which differs from the *trans*-acetyl-lactonic ester (IV with H and OAc at C* interchanged) previously described (*loc. cit.*)]}. The anhydride of (II) and cold 50% H_2SO_4 give the 2 : 4-*lactone* (V), m.p. 203°, of 4-hydroxy-*cis*-3 : 6-*endo*methylenehexahydrophth-

alic acid; *trans*-3 : 6-*endo*methylene-Δ^4-tetrahydrophthalic acid similarly affords the 2 : 4-*lactone* (VI), m.p. 134°, of the 4-hydroxy-*trans*-acid, whilst β(*exo*)-*cis*-3 : 6-*endo*methylene-Δ^4-tetrahydrophthalic anhydride (*loc. cit.*) yields 4-*hydroxy*-exo-cis-3 : 6-endo*methylenehexahydrophthalic acid* (VII), m.p. 203° (decomp.) (*Ac* derivative *anhydride*, m.p. 112°), (V), and oily products. The *Me* ester, m.p. 85°, of (V) is converted by MeOH–NaOMe into (VI). (V) and (III) are obtained by debromination (method: Busch and Stöve, A., 1916, ii, 534) of the lactone of (I); the *trans*-bromolactone (*loc. cit.*) similarly gives (VI). (VII) undergoes the Wagner rearrangement when treated with 50% H_2SO_4 at 150° yielding (V) and (VI) [similarly produced from (V)]. Mé *cyclo*pentadiene-1-carboxylate [obtained by slow vac. distillation of its dimeride (Thiele, A., 1901, i, 182)] and maleic anhydride in C_6H_6 give endo-cis-3 : 6-endo-*carbomethoxymethylene-Δ^4-tetrahydrophthalic anhydride*, m.p. 151—152°, which with Br in H_2O affords two *bromohydroxy*-endo-cis-3 : 6-endo*carbomethoxymethylenehexahydrophthalic acid lactones*, m.p. 155—157° and 197°; these are both converted by 20% MeOH–KOH into the 1 : 5-*lactone*, m.p. 263° (loss of H_2O), of (*cis*)-4 : 5-dihydroxy-*endo-cis*-3 : 6-*endo*carboxymethylenehexahydrophthalic acid, which is dehydrated (Ac_2O) to the *dilactonic acid* [(III) with *endo*-CH_2=CH·CO_2H], m.p. 263° (*Me* ester, m.p. 170°).

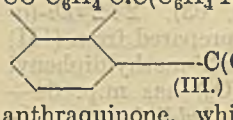
2 : 5-*endo*Ethylene*cyclo*hexanone (A., 1930, 472) is reduced (Wolff–Kishner; using semicarbazone) to 2 : 2 : 2-*dicyclooctane* (VIII), m.p. 169—170°, which undergoes ready autoxidation. (VIII) possesses a higher degree of symmetry than 1 : 2 : 2-di*cyclo*heptane (Komppa and Beckmann, A., 1934, 1105) and gives only one type of monosubstitution derivative. The di*cyclo*octene, like the di*cyclo*heptene (cf. A., 1933, 941), can give rise to *endo*- and *exo*-derivatives (cf. *A*). Distillation of *trans*-3 : 6-*endo*ethylenehexahydrophthalic acid gives the *cis*-anhydride only. *endo-cis*-3 : 6-*endo*Ethylene-Δ^4-tetrahydrophthalic anhydride (IX) (A., 1928, 1018) and Br in H_2O give 4-bromo-5-hydroxy-*endo-cis*-3 : 6-*endo*ethylenehexahydrophthalic acid (X), m.p. 119° [1 : 5-lactone, m.p. 165—166° (*Me* ester, m.p. 137—138°)], converted by MeOH–KOH into the corresponding *hydroxylactonic acid*, m.p. 257° (decomp.) (*Me* ester, m.p. 172°), which is dehydrated (Ac_2O) to the *dilactone* [(III) with *endo*-CH_2=CH_2·CH_2], m.p. 305°. (IX) and Br in AcOH give a *bromodihydro*-derivative, m.p. 206° [readily hydrolysed (H_2O or aq. Na_2CO_3) to a *lactonic acid*, $C_{10}H_{10}O_4$, m.p. 179—180° (*Me*$_1$ ester, m.p. 63°)] (X), and 4 : 5-*dibromo*-endo-cis-3 : 6-endo*ethylenehexahydrophthalic acid* (XI), m.p. 234° (loss of H_2O) [*anhydride*, m.p. 200—201°, debrominated (Zn dust, AcOH) to (IX)]. (XI) is converted by AcOH–HBr at 170° into the trans-*isomeride* (XII), m.p. 236—237°, and the exo-cis-*anhydride* (XIII), m.p. 223—224°. (XII) is debrominated (Zn dust, AcOH) to trans-3 : 6-endo*ethylene-Δ^4-tetrahydrophthalic acid*, m.p. 211° [also obtained from (IX) and MeOH–NaOMe]; (XIII) similarly gives exo-cis-3 : 6-endo-*ethylene-Δ^4-tetrahydrophthalic anhydride* (XIV), m.p. 157—158° [not depressed by (IX), m.p. 147°]. (XIV) and Br in AcOH give [cf. (IX) (above)] a quant. yield of (XIII); (IX) and (XIV) are both reduced (H_2, Pt-black, AcOH) to the same dihydro-derivative (A., 1930, 472). H. B.



(A.)

Formation of glycidamides [αβ-oxidopropionamides] by the action of hydrogen peroxide on αβ-ethylenic nitriles. J. V. Murray and J. B. Cloke (J. Amer. Chem. Soc., 1934, **56**, 2749—2751).—The compound previously obtained from α-phenylcrotononitrile and alkaline H_2O_2 is not α-phenylacetoacetamide (A., 1932, 739), since it differs from the known forms (Ogata and Ito, A., 1916, i, 654), and gives no colour with $FeCl_3$; it is probably *αβ-oxido-α-phenylbutyramide*. This view is supported by the formation of αβ-oxido-αβ-diphenylpropionamide (Kohler and Brown, A., 1933, 1297) from α-phenylcinnamonitrile, 10% H_2O_2, and 10% Na_2CO_3 in $COMe_2$ (general procedure). Similarly treated, *o*-C_6H_4Me·CN gives *o*-C_6H_4Me·CO·NH_2; CHPh:CH·CN affords CHPh:CH·CO·NH_2; *α-phenyl-Δ^α-hexenonitrile*, b.p. 118—118·5° (corr.)/3·5 mm. [obtained by prolonged interaction of CH_2Ph·CN and PrCHO in cold EtOH–NaOEt; hydrolysed (conc. H_2SO_4) to *α-phenyl-Δ^α-hexenoamide* (I), m.p. 139—140° (corr.)], yields a *compound*, $C_{12}H_{15}O_2N$, m.p. 145—146° (corr.); CH_2:CH·CH_2·CN furnishes CH_2:CH·CH_2·CO·NH_2. α-Phenylcrotonamide and (I) are unaffected. The oxido-amides are probably formed by a 1 : 4-addition to the system >C:C·C:N. H. B.

β-9-Anthronyl-β-*m*-nitrophenylpropionic acid and its derivatives. A. Vachon, P. E. Gagnon, and J. Kane (Canad. J. Res., 1934, **11**, 644—651; cf. A., 1933, 949).—*Me*$_2$ m-*nitrobenzylidenemalonate*, m.p. 99—100° (*Et*$_2$ ester, m.p. 75—76°), with anthrone and piperidine in MeOH gives *Me*$_2$ β-9-*anthronyl*-β-m-*nitrophenylethane-αα-dicarboxylate*, m.p. 188—189° (*Et*$_2$ ester, m.p. 135—137°), hydrolysed by 30% H_2SO_4–AcOH at 120—125° to β-*anthronyl*-β-m-*nitrophenylpropionic acid* (I), m.p. 206—207° (*chloride*, m.p. 147°; *Et* ester, m.p. 107—109°), oxidised by conc. H_2SO_4 at 140—150° to the *lactone* (II), m.p. 267—268°, of β-9-(9-*hydroxyanthronyl*)-β-m-*nitrophenylpropionic acid* +H_2O, m.p. 120° [isolated by treatment with EtOH–KOH, or obtained by $KMnO_4$–KOH oxidation of (I)], and 1 : 9-(1′-*hydroxy*-3′-m-*nitrophenyl*)*benzanthrone* (III), m.p. about 305°. Oxidation of (I) with $KMnO_4$–KOH gives *m*-NO_2·C_6H_4·CO_2H and anthraquinone, which is not obtained by similar oxidation of (III). J. W. B.



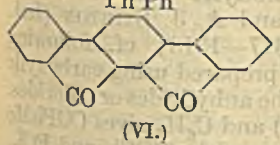
(III.)

Derivatives of substituted succinic acids. I. Action of alkaline sodium hypobromite on *s*-diphenylsuccinamide and 3 : 4-diphenylsuccinimide. J. A. McRae and A. S. Townshend (Canad. J. Res., 1934, **11**, 628—636).—With alkaline NaOBr at −10°, raised to 75—80°, (·CHPh·CO·NH_2)$_2$ (I) gives NH_3, PhCHO (II), and $CHPh_2$·CO_2H (III); no similar Ph migration occurs with NaOH alone. Reduction of α-(·CPh:N·OH)$_2$ with Na–EtOH gives both the *dl*- and *i*-forms of (·CHPh·NH_2)$_2$, affording NH_3 and (II) with NaOBr. In attempts to prepare

substituted derivatives of (I) the following have been obtained: condensation of $CH_2Ph{\cdot}CN$ with o-$C_6H_4Cl{\cdot}CHO$ gives *α-phenyl-o-chlorocinnamonitrile* (IV), m.p. 107°, converted in poor yield by aq. EtOH–KCN–AcOH into the crude dinitrile, hydrolysed by 80% H_2SO_4 to *s-o-chlorophenylphenylsuccinic acid*, m.p. 217°, and its *diamide*, m.p. 280°. With hot aq. EtOH–KCN (IV) gives (?) the *nitrile-acid* o-$C_6H_4Cl{\cdot}CH(CO_2H){\cdot}CHPh{\cdot}CN$, m.p. 135°. With HNO_3–90% H_2SO_4 at room temp. $(\cdot CHPh{\cdot}CN)_2$ gives *pp'-dinitrodiphenylsuccinamide*, m.p. 294° (decomp.), converted by NaOBr into NH_3 and a little of the succinamic acid. By similar methods are obtained *s-p-anisylphenylsuccinonitrile*, m.p. 204° (acid, m.p. 227°, and its *Et*$_2$, m.p. 102°, and *Et H*, m.p. 154°, esters; *imide*, m.p. 178°; *anhydride*, m.p. 114°). With NaOBr $\begin{matrix}CHPh{\cdot}CO\\CHPh{\cdot}CO\end{matrix}>NH$ affords the *succinamic acid*, m.p. 218° (decomp.), and diphenylmaleic anhydride. $(\cdot CHPh{\cdot}CO_2H)_2$ with PCl_5 gives the *i-chloride*, m.p. 190°. J. W. B.

Dissociable organic oxides. Ethyl 1 : 1′-diphenylrubene-3 : 3′-dicarboxylate; its dissociable oxide. C. Dufraisse and M. Loury (Compt. rend., 1934, **199**, 957—959).—*Et* 1 : 1′-*diphenylrubene*-3 : 3′-*dicarboxylate* (I) (prep. described) has m.p. 270°, and exhibits three absorption bands 200 Å. further towards the ultra-violet than those of the 1 : 1′ : 3 : 3′-Ph_4 compound. (I) with O_2 in light easily gives an *oxide*, m.p. 250°, which loses a little O_2, but much CO_2, at 190°. J. L. D.

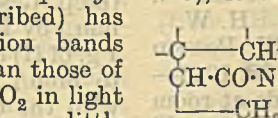
Highly arylated aromatic compounds. III. Highly phenylated benzenecarboxylic acids and the products of their transformation. W. Dilthey, I. Thewalt, and O. Trösken (Ber., 1934, 67, [*B*], 1959—1964; cf. A., 1934, 62, 641).—Addition of tetraphenylcyclopentadienone (I) to maleic anhydride in boiling C_6H_6 leads to *endocarbonyltetraphenyldihydrophthalic anhydride* (II), m.p. 223°, whereas in boiling PhCl *tetraphenyldihydrophthalic anhydride* (III), m.p. 243°, is produced. (II) passes into (III) in boiling PhCl. Treatment of (II) or (III) with boiling $PhNO_2$ or of (III) with S at 250—300° leads to *tetraphenylphthalic anhydride* (IV), m.p. 296°, converted by KOH–EtOH into *tetraphenylphthalic acid* (V), m.p. 286° (*K* salt). Accumulation of Ph groups greatly hinders the reactivity of CO_2H in (V) which does not dissolve in aq. NH_3 and is not esterified in the usual manner with EtOH. The *Me*$_2$, m.p. 258°, and *Et*$_2$, m.p. 205—206°, esters are obtained from (V) and CH_2N_2 in MeOH or from (I) and $(\text{:}C{\cdot}CO_2Me)_2$ or from (I) and $(\text{:}C{\cdot}CO_2Et)_2$, respectively. The esters cannot be hydrolysed. (IV) and C_6H_6 in presence of $AlCl_3$ afford *triphenylfluorenonecarboxylic acid*, m.p. 322° (*K* salt; *oxime*, m.p. 300°), or, under more drastic conditions, *diphenyldifluorenone* (VI), m.p. 396° (*dioxime*), also obtained from (IV) and molten $ZnCl_2$, conc. H_2SO_4, or PCl_5. (I) and Me phenylpropiolate at 170—175° yield *Me pentaphenylbenzoate* (VI),



(VI.)

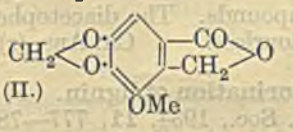
m.p. 342°. The corresponding *acid* (VII) is obtained from (I) and phenylpropiolic acid at 190° and is converted into (VI) by CH_2N_2. (VII) and PCl_5 in $POCl_3$ at 100° afford *tetraphenylfluorenone*, m.p. 298°. *Et tetraphenyl-o-toluate*, m.p. 205°, is derived from (I) and Et tetrolate at 200°; the corresponding *acid* has m.p. 302°. H. W.

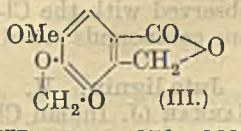
Bile acids. XLIV. M. Schenck (Z. physiol. Chem., 1934, **230**, 199—206).—The previously described (A., 1934, 1103) dioximinohydroxamic acid, $C_{24}H_{37}O_8N_3$ (I*a*, decomp. about 270°), is now prepared (I*b*, decomp. about 257°) by reduction (Zn dust, aq. NH_3) of the nitroketohydroxamic acid (cf. A., 1929, 1070) and subsequent treatment with an excess of NH_2OH,HCl in aq. EtOH–NaOH [whereby the NH_2OH salt (II), decomp. 263° (not sharp), of (I*b*) results]. (I*b*) [as (II)] undergoes the same rearrangement (*loc. cit.*) as (I*a*). The NH_2OH salt of (I*a*) and (II), but not (I*a*) and (I*b*), are converted by HNO_3 (*d* 1·4) into the blue NO-compound, $C_{24}H_{33}O_9N$ (A., 1928, 1007). The diketohydroxamic acid, $C_{24}H_{35}O_8N$ (modified prep.; cf. A., 1929, 1070), and HNO_3 (*d* 1·4) give bilianic acid, whilst the nitrolactamhydroxamic acid, $C_{24}H_{35}O_9N_3$ (A., 1934, 653), is similarly decomposed very slowly (definite products not isolable). The hydroxamic acid group is generally stable (towards HNO_3) in compounds containing the 7-$C{\cdot}NO_2$-group; such NO_2-hydroxamic acids probably contain the structure (*A*).


(*A*)

H. B.

Constitution and synthesis of cotarnic acid and synthesis of 5-methoxy-3 : 4-methylenedioxyphthalic acid (*iso*cotarnic acid). E. Späth, L. Schmid, and H. Sternberg (Ber., 1934, **67**, [*B*], 2095—2099).—Cotarnineanil is transformed by the successive action of MeI and NaOH into norcotarnone, m.p. 88—89°, hydrogenated (Pd–C) to *dihydronorcotarnone*, m.p. 50·5—51·5°, which is transformed by *C*-methylphloroglucinol into cotarnic acid (I), m.p. 242° (vac.; decomp.). Myristic acid is condensed with CH_2O in AcOH containing HCl to the *phthalides*


(II.)


(III.)

(II), m.p. 150—151°, and (III), m.p. 179—181°. (II) is smoothly oxidised by $KMnO_4$ to (I), whereas (III) yields *5-methoxy-3 : 4-methylenedioxyphthalic* (*isocotarnic*) *acid* (*anhydride*, m.p. 196—197°). H. W.

Lichen substances. XLVI. Stictic acid. II. Y. Asahina and M. Yanagita (Ber., 1934, **67**, [*B*], 1965—1969; cf. A., 1933, 823).—Treatment of stictic acid (I) with boiling AcOH gives the *compound* $C_{19}H_{14}O_9$,AcOH, m.p. about 265°, not an *Ac* derivative as previously indicated. Me stictate has m.p. about 270° (decomp.) after becoming discoloured at about 240° [not m.p. 167—168° (*loc. cit.*)]. Catalytic hydrogenation of (I) leads to hypostictic acid, converted by CH_2N_2 in $COMe_2$ into *Me hypostictate* (*Me hyposalazate Me ether*), m.p. 254° (decomp.) after

becoming discoloured at about 240°, which is hydrogenated (Pd–C in EtOAc) to *hypostictolide* (II), m.p. 265°, transformed by CH_2N_2 into hyposalazolide Me_2 ether, m.p. 283°. MeOH–KOH transforms (II) into the *substance* (III), m.p. 208°, methylated by CH_2N_2 to the substance $C_{18}H_{12}O_4(OMe)_4$, m.p. 111°, obtained from salazic acid. *Hæmatommic acid Me_1 ether* (IV), m.p. 195° (decomp.), is an intermediate product in the conversion of (I) into atranol by NaOH; when heated above its m.p. it loses CO_2 and passes into atranol Me_1 ether, m.p. 78°. (IV) and NH_2Ph in MeOH give the corresponding anil $C_{16}H_{15}O_4N$, m.p. 220—221° after becoming red at about 205°. Catalytic hydrogenation of (IV) leads to rhizonic acid, m.p. 208—209°. (I), suspended in $COMe_2$, is transformed by NH_2Ph into *distictanilide* $C_{44}H_{31}O_{16}N$, m.p. 251—252° (decomp.) [hydrolysed by cold, dil. AcOH to (I)] and *stictanil* (V), $C_{25}H_{19}O_8N$, m.p. 163—164° (decomp.) after softening and becoming discoloured at 135°. The dianil (*loc. cit.*) does not appear homogeneous. Treatment of (V) with MeI and subsequently with HCl gives norstictic acid.

H. W.

Oxidation of cinnamaldehyde. A. W. Pound and J. R. Pound (J. Physical Chem., 1934, **38**, 1045—1049).—In the oxidation of cinnamaldehyde at room temp., in addition to the oxidation to cinnamic acid which is the main reaction, there are also side reactions resulting in the formation of BzOH, HCO_2H, AcOH, CO_2, and possibly small quantities of other products.

M. S. B.

Condensation of vanillin substitution products with acetophenone. G. V. Gundy and L. C. Raiford (Proc. Iowa Acad. Sci., 1932, **39**, 175).—The Br- and Cl-substitution products of vanillin (A., 1931, 90) condense with COPhMe to give mono- and di-acetophenone *derivatives*. 3-*Bromo*- and 2 : 6- and 5 : 6-*dibromo-vanillylideneacetophenones* are yellow, whilst the corresponding 2 : 5-Br_2- and 2 : 5 : 6-Br_3-compounds are colourless. Similar differences are observed with the Cl-compounds. The diacetophenone compounds are all colourless. Ch. Abs. (*r*)

Jute lignin. V. Chlorination of lignin. P. B. Sarkar (J. Indian Chem. Soc., 1934, **11**, 777—785; cf. A., 1934, 1355).—Purified jute (I) or HCl-lignin (II) (assumed mol. wt. 816; contains 2 OMe) in CCl_4, $CHCl_3$, or AcOH with wet or dry Cl_2 gives octachlorolignin (III) (Cl 25·8%; mol. wt. in PhOH, 1080). Treatment with KOH greatly increases the rate of chlorination, probably by enlarging the pores. In H_2O (II) gives a more degraded Cl-compound. (III) is sol. in dil. alkali, yields no furfuraldehyde, evolves HCl at 135—140°, gives CH_2O when distilled with 12% HCl or 28% H_2SO_4, reduces Fehling's solution, gives CO_2 with hot 12% HCl (as also does fructose, but not glucose), and on rechlorination affords a Cl_{11}-derivative (Cl 32·7%). Chlorination causes loss of some CH_2O_2 and OMe; it occurs by direct substitution only (Cl : HCl ratio), indicating that the side-chain of (II) is saturated. In presence of catalysts or at 60° (II) gives a compound with 17·7% of Cl and a similar substance is formed from (III) by hot or cold, dil. NaOH.

R. S. C.

Lignin. IX. Lignin from barley straw. M. Phillips and M. J. Goss (J. Amer. Chem. Soc., 1934, **56**, 2707—2710).—The straw is extracted first with 2% aq. EtOH–NaOH at room temp. and then with 4% aq. NaOH at 100°. The *lignin* (I) (*penta-acetate*) from the aq. EtOH extract has the composition $C_{36}H_{31}O_6(OH)_5(OMe)_4$, and is methylated by Et_2O–CH_2N_2 to the *Me_3* derivative, $C_{36}H_{31}O_6(OH)_2(OMe)_7$, and by Me_2SO_4 and aq. NaOH to the *Me_5* derivative. Chlorination (method: A., 1927, 961) of (I) gives a *product*, $C_{36}H_{24}O_{11}Cl_{12}(OMe)_4$. The *lignin* (II) (*tetra-acetate*) from the aq. extract has the composition $C_{36}H_{26}O_8(OH)_4(OMe)_4$, and is methylated ($Et_2O$–$CH_2N_2$) to the *$Me_3$* derivative, $C_{36}H_{26}O_8(OH)(OMe)_7$. Distillation of (I) and (II) with 12% HCl gives CH_2O (cf. A., 1932, 1032), the formation of which is considered not to prove the presence of a CH_2O_2 group (cf. Freudenberg *et al.*, A., 1928, 1227).

H. B.

Alkaline oxidation of lignin. A. W. Walde and R. M. Hixon (J. Amer. Chem. Soc., 1934, **56**, 2656—2659).—Ammonia-lignin (I) from oat-hulls (prep. described) is oxidised completely (in 35—40 min.) by I in dil. NaOH (not in acid) at room temp.; 1 g. of (I) consumes 150—190 c.c. of 0·1*N*-I (according to prep.) and CHI_3 is produced. Oxidation of (I) with the calc. amount of 0·2*N*-I in *N*-NaOH gives [after acidification (*N*-H_2SO_4)] "*iodocarboxylignin*" (II) (OMe 7·4, N 3, and I 13·3%) (also obtained directly from oat-hulls after HCl hydrolysis) which is sol. in aq. Na_2CO_3. Methylation (Me_2SO_4) of (I) gives a methyl-lignin (OMe 26%), which is not oxidised to any appreciable extent by I in alkali; (II) similarly affords a *product* (OMe 22·2, I 10·2%), which is insol. in cold 10% NaOH, but is hydrolysed at 80—90° to a CO_2H-containing *product* (OMe 17·4, I 10·48%), mol. wt. about 1200 (assuming 1 atom of I is present). The amount of I consumed by lignins varies considerably according to the method of prep. (I) appears to contain ·CHMe·OH (cf. Harris *et al.*, A., 1934, 653) (which gives rise to CHI_3) and CHO (or other easily oxidised group) [since oxidation of (I) with Fehling's solution and subsequent treatment with NaOI still gives CHI_3]. Oxidation of (I) proceeds to a greater extent with alkaline NaOBr than with NaOI and gives CBr_4 and an alkali-sol. Br-containing *product*, decomp. < 100°; (II) is also oxidised further by NaOBr. Sol. products and much CO_2 are obtained from (I) and alkaline NaOCl.

H. B.

Electrolytic reduction of acetophenone.—See this vol., 176.

Condensation of carboxylic acids. P. H. Groggins, R. H. Nagel, and A. J. Stirton (Ind. Eng. Chem., 1934, **26**, 1317—1318; cf. following abstract).—Ketones can be prepared using carboxylic acids with $AlCl_3$ instead of the anhydrides or chlorides. AcOH with $AlCl_3$ (2·5 mols.) and C_6H_6 gives COPhMe in good yield, which is increased by $SOCl_2$ and PCl_3. Similar results are obtained from AcOH and PhMe or Ph_2, BzOH and PhCl, and $EtCO_2H$ and PhMe.

HCO_2H and PhCl give a 2% yield of *p*-C_6H_4Cl·CHO; a resin is the main product. J. L. D.

Friedel–Crafts reaction. Preparation of ketones and keto-acids. P. H. Groggins and R. H. Nagel (Ind. Eng. Chem., 1934, **26**, 1313—1316).—Interaction of Ac_2O with C_6H_6 containing $AlCl_3$ is not facilitated by Fe or Al, whereas $KClO_3$ and $SOCl_2$ markedly retard the reaction, which probably proceeds through the formation of AcCl from AcOH and $AlCl_3$; the second AcOH residue (from Ac_2O) is also partly available for reaction. 3 mols. of $AlCl_3$ are employed which probably (*a*) form AcCl and $AlCl_2$·OAc by double decomp., the latter of which with $AlCl_3$ gives AcCl and AlOCl; (*b*) AcCl and $AlCl_3$ form a salt which is the active acylating agent. AcCl affords less pure products than Ac_2O, but in as good yield, and $SOCl_2$, $KClO_3$, and Fe have no effect on the reaction. AcCl and PhMe give impure products with > 1 mol. of $AlCl_3$, but with Ac_2O the use of 3·3 mols. results in but little side-chain chlorination. Oxyhalogen compounds decrease the yields of 4′-methyl-(or chloro-)2-benzoylbenzoic acids. Cast iron vessels have no deleterious effect on the reaction or reaction product. J. L. D.

α-Hydrinden-4-one from δ-ketosebacic acid. W. Hückel and R. Schlüter (Ber., 1934, **67**, [*B*], 2107—2109).—Oxidation of 1-ketodecahydronaphthalene with $KMnO_4$ at 100° gives δ-ketosebacic acid, m.p. 116°, converted by distillation with Ac_2O into α-hydrinden-4-one (I) (*semicarbazone*, m.p. 255°; *oxime*, m.p. 136°). (I) is hydrogenated (Pd–C–EtOH) to *cis*-α-hydrindan-4-one (Bz derivative of oxime, m.p. 112°). H. W.

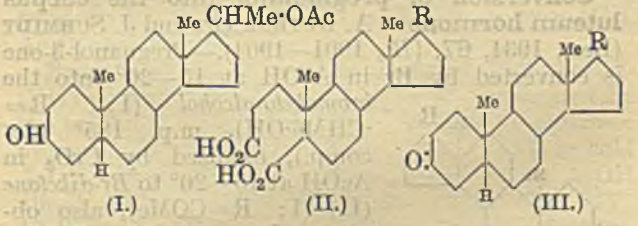
Acyl derivatives of phenyl*cyclo*hexane. D. Y. Chang (J. Chinese Chem. Soc., 1934, **2**, 216—220).—Phenyl*cyclo*hexane (I) with Ac_2O in boiling CS_2 containing $AlCl_3$ during 1 hr. affords *p*-acetylphenyl*cyclo*hexane (cf. A., 1929, 550). Similarly, (I) with $(EtCO)_2O$ and $(Pr^{\alpha}CO)_2O$ gives, respectively, p-*propionyl*-, b.p. 191—196°/20 mm. (*oxime*, m.p. 106°; *phenylhydrazone*, an oil), and p-*butyryl*-*phenyl*cyclo*hexane*, b.p. 208—214°/20 mm. [*oxime*, m.p. 112—113°; *phenylhydrazone*, m.p. 85° (decomp.)]. J. L. D.

Formation of benzanthrone from anthraquinone and glycerol. J. S. Turski (Przemysł Chem., 1934, **18**, 605—607).—The view that benzanthrone is formed by condensation of aldehyde with anthrahydroquinone is advanced. R. T.

Chlorobenzophenoneoximes. C. W. Porter and H. B. Wilcox (J. Amer. Chem. Soc., 1934, **56**, 2688—2689).—Oximation of *o*-C_6H_4Cl·COPh gives two oximes, m.p. 131° (I) and 96—97°, re-solidifying with m.p. 130—131° (II) (in pre-heated bath), separable by fractional crystallisation from aq. MeOH. When (II) is heated it changes rapidly into (I). Beckmann rearrangement of (I) and (II) gives *o*-C_6H_4Cl·CO·NHPh and *o*-C_6H_4Cl·NHBz, respectively. (I) and (II) are unaffected by 30% NaOH at room temp., but in the hot both afford the same indoxazen; *cis–trans* isomerisation may precede elimination of HCl. Indoxazen formation is no guide to the structure of the oxime (cf. Meisenheimer and Meis, A., 1924, i, 433). H. B.

Michael condensation. II. Reactivity of the addendum. R. Connor and D. B. Andrews (J. Amer. Chem. Soc., 1934, **56**, 2713—2716; cf. A., 1934, 72).—Three types of products formed in the Michael condensation are recognised: (1) normal product, *e.g.*, $(CO_2Et)_2CMe·CHMe·CH_2·CO_2Et$ from $CHMe(CO_2Et)_2$ (I) and $CHMe{:}CH·CO_2Et$ (II) in presence of a little NaOEt or piperidine (cf. Michael and Ross, A., 1931, 67); (2) rearrangement product, *e.g.*, $(CO_2Et)_2CH·CHMe·CHMe·CO_2Et$ from (I) and (II) in presence of 1 equiv. of NaOEt (cf. Michael and Ross, *loc. cit.*; Holden and Lapworth, *ibid.*, 1272); (3) rearrangement-retrogression products, *e.g.*, $CH_2Bz·CO_2Et$ and $CHPh{:}CMe·CO_2Et$, formed by a reversed Michael condensation from $CO_2Et·CHMe·CHPh·CHBz·CO_2Et$ [the rearrangement product (cf. 2) from (I) and $CHPh{:}CH·COPh$ (III)]. The addition of various compounds containing an active $\overset{*}{C}H_2$ to (III) under conditions (1) and (3) is studied; the reactivity of the addendum cannot be correlated with the no. of activating groups attached to C* or from the amount of enolisation. The reactivity of any given structure is decreased by introduction of substituents on C*; the effect of Me is much < that of higher alkyl groups. The original must be consulted for details. *Et αγ-dibenzoyl-β-phenylbutyrate*, m.p. 135—135·5° [from $CH_2Bz·CO_2Et$ and (III)], and *Et* 3 : 5-*diphenyl*-6-*ethyl*-Δ²-cyclo*hexenone*-6-*carboxylate*, m.p. 135—135·5° [from $CHEtAc·CO_2Et$ and (III) or Et γ-benzoyl-α-acetyl-β-phenylbutyrate and EtI in EtOH–NaOEt; in both cases intramol. dehydration is involved], appear to be new. H. B.

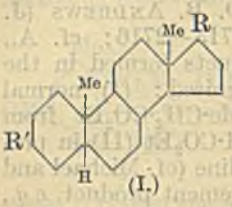
Pregnan-20-ol-3-one. A. Butenandt and J. Schmidt (Ber., 1934, **67**, [*B*], 1893—1896).—Partial hydrolysis of pregnan-3 : 20-diol diacetate by MeOH–KOH at 15—20° leads to the (20-)*monoacetate* (I), m.p. 170·5°, the constitution of which follows from



its energetic oxidation by CrO_3 to the *acetoxydicarboxylic acid*, m.p. 272° (II; R=·CHMe·OAc), hydrolysed to the OH-*acid*, m.p. 346° (II; R=·CHMe·OH), which is transformed by gentle oxidation into the keto-acid, m.p. 271° (II; R=Ac) obtained previously from pregnandiol. Cautious oxidation of (I) affords the *keto-acetate* (III; R=·CHMe·OAc), m.p. 142—142·5°, hydrolysed to *pregnan*-20-*ol*-3-*one* (III; R=·CHMe·OH), m.p. 152° (*semicarbazone*, m.p. 203—204°). The last-named compound is not identical with the similarly composed material from the corpus luteum. H. W.

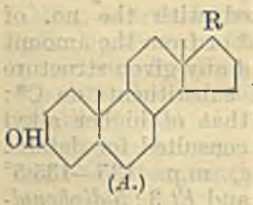
***allo*Pregnan-3-ol-20-one, a companion of the corpus luteum hormone.** A. Butenandt and L. Mamoli (Ber., 1934, **67**, [*B*], 1897—1901).—3-Hydroxybisnorcholenic acid is hydrogenated (Pt in AcOH) to 3-hydroxybisnor*allo*cholanic acid, m.p.

170°, the *Me* ester, m.p. 152·5°, of which is transformed by MgPhBr in Et_2O into the *carbinol* (I; R=·CHMe·CPh_2·OH; R′=OH), dehydrogenated and acetylated by boiling AcOH to the unsaturated *acetate* (II) (R=·CMe:CPh_2; R′=OAc), m.p. 238·5° [corresponding *alcohol*, m.p. 163·5°, re-acetylated to (II)]. Ozonisation of (II) affords $COPh_2$ and allo*pregnan*-3-*ol*-20-*one acetate*, m.p. 144·5°, hydrolysed to allo*pregnan*-3-*ol*-2-*one* (I; R=COMe; R′=OH), m.p. 194·5° (oxime, m.p. 224°), identical with the product derived from the corpus luteum (see following abstract). H. W.



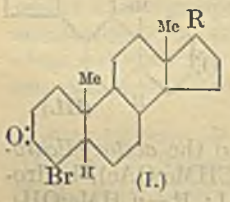
(I.)

Constitution of the hydroxyketone, $C_{21}H_{34}O_2$, from corpus luteum. E. Fernholz (Z. physiol. Chem., 1934, **230**, 185—189).—Me acetoxybisnor-*allo*cholanate (A., 1933, 1290) and MgPhBr give the *carbinol* (I) (*A*, R=·CHMe·CPh_2·OH), m.p. 207° (*monoacetate*, m.p. 197°). Distillation of crude (I) at about 1 mm. affords the *compound* (*A*, R=·CMe:CPh_2), m.p. 168° {*chloride*, m.p. 199°; *acetate* (II), m.p. 246° [*oxide* (III), m.p. 225°, from (II) and BzO_2H in $CHCl_3$]}. Dehydration of (I) with AcOH, Ac_2O, or AcOH–HCl gives (II), an isomeric *acetate*, m.p. 263°, and resin. Oxidation (O_3 in $CHCl_3$) of (II) affords (III) (trace) and the *acetate*, m.p. 145° (*semicarbazone*, m.p. 273°), of 3-*hydroxy*allocætiocholyl *Me ketone* (IV) (*A*, R=COMe), m.p. 195° [*oxime*, m.p. 227°; *semicarbazone*, m.p. 253° (decomp.)]. (IV) is probably identical with the hydroxyketone, $C_{21}H_{34}O_2$, isolated by Butenandt *et al.* (A., 1934, 1039, 1268) from corpus luteum (see preceding abstract). H. B.



(*A*.)

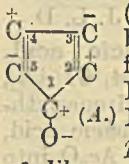
Conversion of pregnandiol into the corpus luteum hormone. A. Butenandt and J. Schmidt (Ber., 1934, **67**, [*B*], 1901—1904).—Pregnanol-3-one is converted by Br in AcOH at 15—20° into the *bromoketo-alcohol* (I; R=·CHMe·OH), m.p. 185° (decomp.), oxidised by CrO_3 in AcOH at 15—20° to *Br-diketone* (II) (I; R=COMe), also obtained by cautious oxidation of pregnandione. (II) in boiling C_5H_5N passes into the corpus luteum hormone, m.p. 121° or 128·5° [oxime, m.p. 244° (decomp.)]. H. W.



(I.)

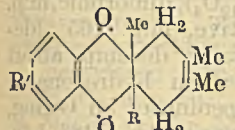
Corpus luteum hormones.—See this vol., 127, 128.

Heteropolarity. XXIV. Colour and halochromism of deeply coloured aromatic five-ring ketones. W. Dilthey, O. Trösken, K. Plum, and W. Schommer (J. pr. Chem., 1934, [ii], **141**, 331—349).—2 : 5-*Diphenyl*-3 : 4-*di*-p-*tolyl*, m.p. 218—219°, -3 : 4-*di*-p-iso*propylphenyl*-, m.p. 214°, -3 : 4-*di*-p-*diphenylyl*-, m.p. 258—259°, -3 : 4-*dianisyl*-, m.p. 222—223°, -3 : 4-*di*-p-*ethoxyphenyl*-, m.p. 198—199°, -3 : 4-*di*-p-*phenoxyphenyl*-, m.p. 219—220°, -3 : 4-*di*-p-*phenylthiolphenyl*-, m.p. 199°, -3 : 4-*di*-p-*bromophenyl*-, m.p. 244—245°, and -3-p-*chlorophenyl*-4-p-*dimethylaminophenyl*-, m.p. 230—231°, and 2 : 3 : 5-*triphenyl*-4-p-*diphenylyl*-, m.p. 215°, -4-*anisyl*-, m.p. 213—214°, and -4-p-*dimethylaminophenyl*-, m.p. 220—221°, -cyclo*pentadienones* are prepared from $CO(CH_2Ph)_2$, the appropriate benzil, and NaOMe in boiling EtOH. The colours of these ketones and tetraphenyl*cyclo*pentadienone (I) (A., 1931, 91) and their solutions in C_6H_6 and conc. H_2SO_4 are given. Introduction of positive groups into the *p*-positions of the 3- and 4-Ph groups is accompanied by a hypsochromic effect (which increases with the positivity of the auxochromes and is a max. for SPh). An analogous hypsochromic effect is observed by introduction of *p*-OMe or 4 : 4′-$(OEt)_2$ into benzil; the results parallel those with stilbenes (A., 1928, 627). Ph and SPh exert a bathochromic action on the halochromism, whilst Alk, OAlk, and NMe_2 cause a hypsochromic effect; these results are not similar to those shown by the substituted benzils or distyryl ketones. Since 3 : 4 : 5-*triphenyl*-2-*anisyl*cyclo*pentadienone* (II), m.p. 189—190°, dissolves in conc. H_2SO_4 to a greenish-blue solution, whilst (I) affords a violet-blue solution, C_2 is considered to be positive (see *A*); the OMe in (II) thus exerts a bathochromic effect. Alternative structures for the salts are discussed. Deoxybenzoin, Ph *p*-methoxystyryl ketone, and MeOH–NaOMe give αε-*diketo*-αβε-*triphenyl*-γ-*anisylpentane* (III), m.p. 155°, and (probably) αβ-*dibenzoyl*-β-*phenyl*-γ-*anisylpropane*, m.p. 143—144° (*oxime*, m.p. 218°). (III) is reduced (Zn dust, AcOH) to 1 : 2 : 3-*triphenyl*-4-*anisyl*cyclo*pentane*-1 : 2-*diol*, m.p. 126—127°, dehydrated (HCl in MeOH) to 3 : 4 : 5-*triphenyl*-2-*anisyl*cyclo*pentadiene*, m.p. 125—126°. This and *p*-NO·C_6H_4·NMe_2 with piperidine in C_5H_5N–EtOH give the p-*dimethylaminoanil*, m.p. 204—205°, of (II). 4 : 4′-*Diphenylthiolbenzil*, m.p. 104—105°, is prepared from Ph_2S, $(COCl)_2$, and $AlCl_3$ in CS_2. 4-Chloro-4′-dimethylamino-benzil, m.p. 143—144°, is obtained (cf. Jenkins, A., 1931, 1158) by oxidation (Fehling's solution) of the -benzoin. H. B.


(A.)

Additive reactions of alkylated naphthaquinones. L. F. Fieser and A. M. Seligman (J. Amer. Chem. Soc., 1934, **56**, 2690—2696).—3 : 7-Dimethyl-1 : 2-naphthaquinone (I) (improved prep.; cf. Weissgerber and Kruber, A., 1919, i, 315) and NH_2OH,AcOH in aq. MeOH give the 2-*oxime*, m.p. 222° (decomp.), since reduction (alkaline $Na_2S_2O_4$) does not afford 1-amino-3 : 7-dimethyl-β-naphthol (N-*Ac* derivative, m.p. 107·5°, obtained from the hydrochloride and Ac_2O in aq. NaOAc), but yields an unstable amine [? Ac_3 derivative, m.p. 245° (not sharp)]. Successive treatment of (I) with aq. $NaHSO_3$, dil. H_2SO_4 (boiling), aq. $K_2Cr_2O_7$, and aq. KCl gives *K* 3 : 7-*dimethyl*-1 : 2-*naphthaquinone*-4-*sulphonate* (+H_2O), whilst (I) and Ac_2O–conc. H_2SO_4 at 10° and finally at 60° afford 1 : 3 : 4-*triacetoxy*-2 : 6-*dimethylnaphthalene*, m.p. 161°, converted (aq. EtOH–NaOH) into 3-*hydroxy*-2 : 6-*dimethyl*-1 : 4-*naphthaquinone*, m.p. 194° (*acetate*, m.p. 75—76°; *Me ether*, m.p. 108°). (I) also reacts readily with EtOH–NH_2Ph and *p*-C_6H_4Me·SO_2H, but not with CH_2N_2. 2 : 6-Dimethyl-1 : 4-naphthaquinone (II) (*loc. cit.*) undergoes little or no reaction with Ac_2O–conc. H_2SO_4, $NaHSO_3$, NH_2Ph, or $ArSO_2H$;

with Et_2O–CH_2N_2 in C_6H_6 at 100° (sealed flask), 3 : 7 : 3′ : 7′-*tetramethyl*-2 : 2′-*dinaphthylmethane*-1 : 4 : 1′ : 4′-*diquinone*, m.p. 300°, results in 40% yield. 3 : 7-Dimethyl-β-naphthyl acetate is oxidised (CrO_3, AcOH) to 7-*acetoxy*-2 : 6-*dimethyl*-1 : 4-*naphthaquinone*, m.p. 171°, which with Zn dust and Ac_2O followed by NaOAc (if this is present throughout the reaction an unidentified substance, m.p. 149—150°, results) gives 1 : 4 : 7-*triacetoxy*-2 : 6-*dimethylnaphthalene*, m.p. 139°. βγ-Dimethylbutadiene (III) and (II) in EtOH at 100—105° (sealed tube) give the *tetramethyltetrahydroanthraquinone* (IV) (R=H, R′=Me), m.p. 75—77° (*semicarbazone*, m.p. 263°), reduced (Clemmensen) to the *tetramethylhexahydroanthracene* [(IV) with R=H, R′=Me, and both O=H_2], and dehydrogenated (S) to 2 : 3 : 6-trimethylanthraquinone, m.p. 232° [lit. 240° (corr.)]. (I) and (III) similarly afford a *tetramethyltetrahydrophenanthraquinone* (?), m.p. 106°, which undergoes deep-seated decomp. on attempted dehydrogenation. 2 : 3-Dimethyl-1 : 4-naphthaquinone and (III) give the *tetramethyltetrahydroanthraquinone* (IV) (R=Me, R′=H), an oil; 2-methyl-1 : 4-naphthaquinone affords an *adduct*, an oil, dehydrogenated to 2 : 3-dimethylanthraquinone, whilst thymoquinone yields 6 : 7 : 9-*trimethyl*-3-iso*propyl*-5 : 8 : 9 : 10-*tetrahydro*-1 : 4-*naphthaquinone* (?), an oil. H. B.


(IV.)

Alkannin. III. H. Raudnitz and E. Stein (Ber., 1934, **67**, [*B*], 1955—1959; cf. A., 1932, 396; Dieterle *et al.*, A., 1931, 1297; Betrabet *et al.*, A., 1933, 1165, 1217).—Technical alkannin dissolved in warm EtOH is treated with $Ni(OAc)_2$. The *Ni* salt is extracted successively with boiling EtOH and C_6H_6 to remove wax and decomposed with the necessary amount of 1% HCl–MeOH, whereby alkannin (I), $C_{17}H_{18}O_5$, is obtained as crystals, m.p. 109°. Since (I) is a derivative of naphthazarin (*loc. cit.*), 10 C are involved. A further C is present in OMe, the remaining 6 in a side-chain which contains a double linking, since (I) absorbs $7H_2$ in presence of Pt. Ozonolysis of (I) in AcOH leads to the formation of 0·7 mol. of $COMe_2$. Reductive acetylation of (I) gives *dihydroalkannin tetra-acetate*, m.p. 133—134°. (I) is therefore 5 : 8-dihydroxy-3(?)-methoxy-2-δ-methyl-Δ$^{\gamma}$-pentenyl-1 : 4-naphthaquinone. H. W.

1 : 4-Dihydroxy-9-anthrone and 1-hydroxy-4 : 9-anthraquinone. K. Zahn (Ber., 1934, **67**, [*B*], 2063—2078).—Reduction of α-acetoxyanthraquinone is accompanied by loss of an α-Ac residue and elimination of the vicinal *meso*-O; the following scheme is suggested: $C_6H_4<^{CO}_{CO}>C_6H_3\cdot OAc(2) \longrightarrow$ $<^{C(OH)}_{C(OH)}>C_6H_3\cdot OAc \longrightarrow <^{CH(OH)}_{CH(OH)}>C_6H_3\cdot OAc \longrightarrow$ $<^{CH(OH)}_{CH=}>C_6H_3\cdot O \longrightarrow <^{C(OH)}_{CH=}>C_6H_3\cdot OH \longrightarrow$ $<^{CO}_{CH_2}>C_6H_3\cdot OH$. Thus, diacetylquinzarin is converted by H_2 at 85—90°/40 atm. in presence of Ni or by $Na_2S_2O_4$ in H_2O–AcOH at 65° into 4-*hydroxy*-1-*acetoxy*-9-*anthrone* (I), m.p. about 208° (decomp.), hydrolysed to 1 : 4-*dihydroxy*-9-*anthrone* (II), m.p. 227° (decomp.). (I) or (II) is converted by hot Ac_2O in presence of NaOAc or C_5H_5N into 1 : 4 : 9-*triacetoxyanthracene*, m.p. 211—212°. (I) and BzCl in warm C_5H_5N afford 1-*acetoxy*-4 : 9-*dibenzoyloxyanthracene*, m.p. 240—241°, oxidised by CrO_3 in AcOH to 1-*acetoxy*-4-*benzoyloxyanthraquinone*, m.p. 195—196°. 5 : 8-Dichlorodiacetylquinizarin is reduced by $Na_2S_2O_4$ to 5 : 8-*dichloro*-4-*hydroxy*-1-*acetoxy*-9-*anthrone*, m.p. 222—223° after softening, whence 5 : 8-*dichloro*-1 : 4 : 9-*triacetoxyanthracene*, m.p. about 228°. Diacetylchrysazin yields 5-*hydroxy*-4-*acetoxy*-9-*anthrone*, m.p. 247—248°, whence 4 : 5-*dihydroxy*-9-*anthrone*, m.p. 292—293°, and 4 : 5 : 9-*triacetoxyanthracene*, m.p. 221—222°. Diacetylalizarin gives 4-*hydroxy*-3-*acetoxy*-9-*anthrone* (+1H_2O), m.p. 187—189°, whence 3 : 4-dihydroxy-9-anthrone and 3 : 4 : 9-*triacetoxyanthracene*, m.p. 193°. 4-Hydroxy-3-methoxy-9-anthrone, m.p. 203—205°, results from acetylalizarin 2-Me ether; 3-methoxy-4 : 9-diacetoxyanthracene has m.p. 189—191°. 1-Acetoxyanthraquinone is transformed into 4-*hydroxy*-9-*anthrone*, m.p. 239—240° (decomp.), converted by 1 or 2 mols. of *p*-$C_6H_4Me\cdot SO_3Me$ in $C_6H_4Cl_2$ containing $NaHCO_3$ into 4-*methoxy*-9-*anthrone*, m.p. 132—133°, and 4 : 9-*dimethoxyanthracene*, m.p. 86—87°, respectively. (I) is easily transformed by boiling MeOH–conc. HCl into 1-*hydroxy*-4-*methoxy*-9-*anthrone* (III), m.p. 156—157°, which gives 4-*methoxy*-1 : 9-*diacetoxyanthracene*, m.p. 178°, with Ac_2O and C_5H_5N. 1-*Hydroxy*-4-*ethoxy*-9-*anthrone*, m.p. 146—147°, and 4-*ethoxy*-1 : 9-*diacetoxyanthracene*, m.p. 160—161°, are described. (III) and 5-chloroisatin-2-*p*-chloroanil in C_5H_5N at 100° afford 2-[4-*methoxy*-9-*anthrone*]-2′-[5′-*chloroindole*]-*indigotin*. Oxidation of (II) or, preferably, of (I) with $FeCl_3$ leads to 1-*hydroxy*-4 : 9-*anthraquinone* (IV), decomp. about 200° after softening. 5 : 8-*Dichloro*-1-*hydroxy*-4 : 9-*anthraquinone* (V) has m.p. 257°. 1-*Acetoxy*-4 : 9-*anthraquinone* (VI), decomp. about 200°, is obtained from (I) by $FeCl_3$ and HCl in EtOH or from (IV), Ac_2O, and C_5H_5N.

Bromoanthrone is readily prepared from acetyl- (VII) or *phenylacetyl*-, m.p. 102—103°, -anthranol by the action of Br in hot AcOH. 10-*Chloro*-9-*anthrone*, decomp. 233°, is obtained from Cl_2 and (VII) in cold AcOH, whereas benzoylanthranol and Br in AcOH afford 10-*bromo*-9-*benzoylanthranol*, m.p. 214—215°. 10-*Bromo*-1 : 4-*diacetoxy*-9-*anthrone* (VIII), decomp. 183° after becoming discoloured, is transformed by boiling $COMe_2$–H_2O into 10-*hydroxy*-1 : 4-*diacetoxy*-9-*anthrone*, m.p. 140° in a pre-heated bath. (VI) is converted by Ac_2O containing conc. H_2SO_4 or $ZnCl_2$ into 1 : 4 : 10-*triacetoxy*-9-*anthrone*, m.p. 179°, also obtained from (VIII) and KOAc in boiling AcOH, and transformed by boiling Ac_2O containing KOAc or C_5H_5N into 1 : 4 : 9 : 10-tetra-acetoxyanthracene, m.p. 240—242°. 10-*Chloro*-1-*acetoxy*-4 : 9-*anthraquinone*, m.p. 196—197°, is described.

(VI) and butadiene in EtOH at 75—80° yield the *adduct* $C_{20}H_{16}O_4$, m.p. 181—182°, transformed by air in alkaline solution into 9-hydroxynaphthacenequinone and by boiling Ac_2O and KOAc into 9 : 11 : 12-*triacetoxy*-1 : 4-*dihydronaphthacene*, m.p. 225—227°. (VI) is transformed by boiling Δ$^{1:3}$-*cyclo*hexadiene into the *substance* $C_{20}H_{16}O_3$, m.p. 160—161°, whence

hydroxy-1 : 4-endo*ethylene*-1 : 4-*dihydronaphthacene-quinone*, which loses C_2H_4 when heated and yields 9-hydroxynaphthacenequinone.

(IV) is converted by Br in warm AcOH into 2 : 3-*dibromo*-1-*hydroxy*-2 : 3-*dihydro*-4 : 9-*anthraquinone*, decomp. about 157°, transformed by Ac_2O–conc. H_2SO_4 into the *Ac* derivative $C_{16}H_{10}O_4Br_2$, m.p. about 197° (decomp.), also obtained from (VI) and converted by KOAc in boiling AcOH–H_2O into 2(3)-*bromo*-1-*acetoxy*-4 : 9-*anthraquinone* (IX), m.p. 230°. The position of Br in (IX) follows from its reduction by HI and AcOH and subsequent acetylation by Ac_2O–C_5H_5N to a *bromotriacetoxyanthracene*, m.p. 203—204°, oxidised by CrO_3 and then hydrolysed by conc. H_2SO_4 to 2-bromoquinizarin, m.p. 232—233°. 2(3)-*Bromo*-1-*hydroxy*-4 : 9-*anthraquinone* has been prepared. 2 : 3 : 10-*Trichloro*-1-*hydroxy*-2 : 3-*dihydro*-4 : 9-*anthraquinone* (X), m.p. 178—179° (decomp.), and its *Ac* derivative, m.p. 146—148°, are described. 2(3) : 10-*Dichloro*-1-*hydroxy*-4 : 9-*anthraquinone* (XI), m.p. about 190°, from (X) and KOAc in boiling AcOH or in boiling PhCl, readily passes into 2-chloroquinizarin, is converted by Ac_2O in C_5H_5N into the *Ac* derivative, m.p. 230°, and by Ac_2O–H_2SO_4 into 2-chloroquinizarin diacetate. (XI) and boiling NH_2Ph afford 2(3) : 10-*dianilino*-1-*hydroxy*-4 : 9-*anthraquinone*, slow decomp. > 220°.

Quinizarin is transformed by $SOCl_2$ at 135—140° into 10-chloro-1-hydroxy-4 : 9-anthraquinone, converted by Ac_2O in C_5H_5N into the *Ac* derivative, m.p. 174—175°, hydrolysed by warm, conc. H_2SO_4 to 2 : 4-dichloro-1-hydroxyanthraquinone, m.p. 241—242°. H. W.

Constitution of tannins. IV. Absorption spectra of natural phlobatannins and synthetic flavpinacols. A. Russell, J. Todd, and C. L. Wilson (J.C.S., 1934, 1940—1945).—The absorption spectra of synthetic flavpinacols are entirely similar to those of typical natural phlobatannins, consisting of 2 sharply defined bands at λ 2700 and λ 2800—2900. The parent chalkones also show 2 bands in approx. the same positions, but have in addition a broad characteristic band in the violet region, differentiating the spectra very sharply from those of the flavpinacols. F. R. S.

Structure of the cardiac aglucones. W. A. Jacobs and R. C. Elderfield (Science, 1934, **80**, 533—534).—The Me and Et esters of the acid obtained by the degradation of digitoxigenin (this vol., 88) are identical with those of ætiocholanic acid. These results and those of Tschesche (A., 1934, 1354) show that the cardiac aglucones possess the sterol ring system. Revised partial formulæ for strophanthidin and related aglucones are given. L. S. T.

Uzarigenin. G. A. R. Kon (Chem. and Ind., 1934, 1008).—If the identity of the acid obtained by Tschesche (A., 1934, 1354) from uzarigenin (I) with *allo*ætiocholanic acid is finally established, it follows that the lactone ring of the cardiac aglucones is directly attached to the 5-membered ring IV in position C_{17}, and that, apart from the lactone ring, their C skeleton is identical with that of the sterols and bile acids. Tschesche's work confirms that of Bernal *et al.* (*ibid.*) and confirms the position of the CHO of strophanthidin which replaces a Me of (I) and must occupy C_{10}. The position of the OH groups in ring I follows naturally. H. W.

Saxatilic acid. G. Koller and A. Klein (Monatsh., 1934, **65**, 91—92).—Comparison of the Ac_3 and Ac_6 derivatives establishes the identity of saxatilic and salazic acids. H. W.

Constituents of red sandal-wood. Pterocarpin. H. Leonhardt and K. Fay (Arch. Pharm., 1935, **273**, 53—60).—Pterocarpin (I) (modified prep.), $C_{14}H_9O_2(OMe)(:O_2CH_2)$ (lit. $C_{14}H_{12}O_4$), dimorphic, m.p. 165° and 156—157° [*Br*-derivative, m.p. 165° (decomp.); 2 : 4-*dinitrophenylhydrazone*, decomp. about 305°], contains no OH, but, when hydrogenated (Pd–C) in EtOAc, affords, by opening of an O-ring, dihydropterocarpin, $C_{17}H_{16}O_5$, m.p. 141—142° [*Ac*, m.p. 96—97°, and *Bz* derivative, m.p. 128·5°; *Me ether*, m.p. 107—108° (*Br* derivative, m.p. 136—137·5°)]. KOH fusion of (I) gives *m*-$C_6H_4(OH)_2$, and O_3 affords an ozonide decomposed by H_2O. Homopterocarpin gives a 2 : 4-*dinitrophenylhydrazone*. R. S. C.

Artemisic and dihydroartemisic acids from *desmotropo*santonin. P. P. Bertolo (Atti Congr. naz. Chim., 1933, **4**, 396—401; Chem. Zentr., 1934, ii, 951—952).—The Et ester of dihydroartemisic acid (I) (*Ba* salt) yields an *Et*$_1$ *ether*, m.p. 68—70°, and a *monoacetate*, m.p. 72°. Both (I) and artemisic acid (II) yield 1 : 4-dimethyl-7-ethyl-β-naphthol on fusion with KOH; it is thus not possible to ascertain whether the acid obtained from *desmotropo*santonin is (I) or (II). H. N. R.

Constitution of resin phenols and their biogenetic relationships. I. Pinoresinol. H. Erdtman (Svensk Kem. Tidskr., 1934, **46**, 229—233).—Pinoresinol, $C_{20}H_{22}O_6$ (I) (not $C_{19}H_{20}O_6$, Zinke *et al.*, A., 1924, i, 1088), is best purified by the action of Ac_2O–C_5H_5N on its K salt to give an *Ac*$_2$ derivative (II), m.p. 165·5—167·5°, $[\alpha]_D$ +55·8°, hydrolysed and benzoylated to the Bz_2 derivative, m.p. 162—164° (*loc. cit.*, 159°), $[\alpha]_D$ +42·8° [*Br*$_2$-derivative, $C_{20}H_{18}O_4Br_2(OBz)_2$, $[\alpha]_D$ +37·1°]. Hydrolysis and methylation of (II) affords a *Me*$_2$ *ether*, m.p. 98—99°, $[\alpha]_D$ +66·0°, of (I), affording a l-*Br*$_2$-derivative, m.p. 171—172°, and (with HNO_3–AcOH) a $(NO_2)_2$-derivative, m.p. 210—212°, and oxidised by $KMnO_4$ to veratric acid, and by HNO_3 to trimethylveratrol (50% yield). The biogenetic relationships of (I) and other compounds of the coniferyl type as derivatives containing two guaiacol residues are discussed, (I) being represented by the partial formula $(>CR{\cdot}O{\cdot})_2(C_4H_8)$ [R=4 : 3-C_6H_3(OH)(OMe)], the two O atoms having ether linkings. All $[\alpha]_D$ vals. are in $COMe_2$. J. W. B.

Pyro- and hydro-abietic acids. A. Greth (Angew. Chem., 1934, **47**, 827—830).—Abietic acid (I), obtained from colophony by the action of acids, passes at 230° into a lævorotatory acid which has not attained the final stage of isomerisation by heat and is either an isomeric abietic acid or an intermediate acid between (I) and pyroabietic acids. At 250—260° the *d*- and *l*-pyroabietic acids are produced. (I), whether obtained by heat or by acid isomerisation, is hydrogenated (Pt-sponge) to *tetrahydroabietic acid* (II), m.p. 174—175°, $[\alpha]_D$ +15°. Pyroabietic acid affords

dihydropyroabietic acid, m.p. 170—171°, $[\alpha]_D$ +45° or +34·5°, and a H_4-acid, m.p. 170—171°, $[\alpha]_D$ +37·5° or +28°, provisionally regarded as identical with (II). The same acid appears to be isolable from the products of the hydrogenation of colophony at 300°/200 atm. The course of pyrogenation is discussed. H. W.

Constituents of ammoniacum resin. I. K. KUNZ, H. WEIDLE, and K. FISCHER (J. pr. Chem., 1934, [ii], **141**, 350—356; cf. Luz, A., 1896, i, 249; Casparis *et al.*, Pharm. Acta Helv., 1928, **3**, 25, 41).—The resin is extracted with Et_2O and the solution then extracted with 5% Na_2CO_3; the material obtained by acidification (HCl) of the alkaline extract is acetylated (Ac_2O) to *diacetylammoresinol* (I), $C_{28}H_{34}O_6$, m.p. 102°. (I) is hydrolysed by 2*N*-Na_2CO_3 in MeOH to the NaOH-sol. *acetylammoresinol*, m.p. 129—130°, and by 6% EtOH–KOH to *ammoresinol*, m.p. 109° [*Bz*$_2$ (II), m.p. 75°, and *di*-p-*chlorobenzoyl*, m.p. 93·5°, derivatives]. Reduction (H_2, PtO_2 or Pd–$BaSO_4$, AcOH) of (I) gives a *hexahydro*-derivative, m.p. 64°. (I) and (II) consume approx. 10 Br (6 for addition; 4 for substitution) in AcOH. (I) is OMe-free. Oxidation (H_2O_2, AcOH) of (I) affords γ-resorcylic acid (III); NaOH–KOH-fusion gives β-resorcylic acid (IV). Ozonolysis of (I) gives an aldehyde, $C_{14}H_{12}O_7$, degraded (no details) to (III) and (IV). H. B.

Poisonous substance in croton oil. II. Constitution of crotophorbolone. B. FLASCHENTRÄGER and F. F. VON FALKENHAUSEN (Annalen, 1934, **514**, 252—260; cf. this vol., 64).—*Crotophorbolone* (I) (previously designated anhydrophorbol), $C_{20}H_{26}O_5$, m.p. 228°, $[\alpha]_D^{20}$ +172° in MeOH [*Ac* (II), m.p. 116·5—117·2°, *Bz*, m.p. 172—173°, and p-*nitrobenzoyl*, m.p. 208·5—209°, derivatives], a little of an *isomeride*, m.p. 217° (decomp.), $[\alpha]_D$ −12·7° in MeOH, and small amounts of $COMe_2$ and CO_2 are obtained from phorbol (III) and very dil. H_2SO_4 in N_2 at 100° (bath). (I) reduces Fehling's solution, contains 3 OH (Zerevitinov) (2 are probably *tert.*, since they are not esterified), a CO (method: this vol., 228) (cryst. derivatives could not be prepared), 2 or 3 double linkings, and 3 or 4 rings. (I) is reduced (H_2, Pd–$BaSO_4$, AcOH) to a *hexahydro*-derivative, m.p. 239—241°, $[\alpha]_D^{19}$ +196° in MeOH, which does not reduce Fehling's solution, $KMnO_4$, or Br. The formation of (I) from (III) may involve a pinacol–pinacolin change. Crystallographic data [by STEINMETZ] for (I) and (II) and absorption spectra curves for (I) and (III) are given. H. B.

***Teramus labialis*.**—See this vol., 132.

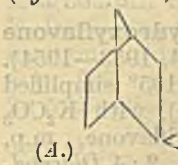
Crystalline principles from *Artemisia*.—See this vol., 268.

Constituents of *Buellia canescens*.—See this vol., 133.

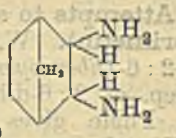
Anthelmintic constituent of leaves of *Calycopteris floribunda*.—See this vol., 246.

Grignard compound of pinene hydrochloride. Action of ethylene oxide. R. BOUSSET (Bull. Soc. chim., 1934, [v], **1**, 1305—1307; cf. A., 1930, 1591).—The Grignard compound (I) of pinene hydrochloride reacts with $(CH_2)_2O$ in Et_2O at −10°, the temp. being gradually raised and Et_2O replaced by Bu^{α}_2O, to give β-*camphanylethyl alcohol*, b.p. 135—136°/17 mm., m.p. 25°, $[\alpha]_{5460}$ −35·6° in C_6H_6, isolated as its *H phthalate*, m.p. 155°, $[\alpha]_{5460}$ −16·8° in C_6H_6, from which it is obtained by hydrolysis with aq. NaOH. (I) has almost no action on EtOAc, only traces of camphane, dibornyl, bornylene, and a *substance*, b.p. 120—130°/13 mm. [giving a *substance*, m.p. 249—250° (corr.), with $NH_2{\cdot}NH{\cdot}CO{\cdot}NH_2$], being isolated. J. W. B.

Steric course of addition and substitution reactions. III. *endo-exo*-Isomerism [of norbornyl compounds]. I. K. ALDER and G. STEIN [with E. ROLLAND and G. SCHULZE] (Annalen, 1934, **514**, 211—227).—The Me ester of 2 : 5-*endo*methylenehexahydrobenzoic acid (*endo*) (I) (this vol., 211) is converted (to the extent of 70—80%) by conc. MeOH–NaOMe into 2 : 5-*endomethylenehexahydrobenzoic acid* (exo) (II) (*A*, R=CO_2H, R′=H), m.p. 48° (*amide*, m.p. 187—188°; *anilide*, m.p. 130°); the change occurs through an intermediate enolic form (cf. Hückel and Goth, A., 1925, i, 402). The chloride of (I) with activated NaN_3 (Nelles, A., 1932, 1118) in C_6H_6 followed by hydrolysis (conc. HCl) gives *endo*norbornylamine (III) (*A*, R=H, R′=NH_2) (*hydrochloride*, m.p. 295°; *Ac* derivative, m.p. 124°)



(*A*.)



(V.)

(cf. Komppa and Beckmann, A., 1934, 1105); *endo*norbornylcarbamide has m.p. 191°. The chloride, b.p. 83—84°/12 mm., of (II) is similarly converted into *exo*norbornylamine (IV) (*A*, R=NH_2, R′=H) (*hydrochloride*, m.p. > 345°; *Ac* derivative, m.p. 139°); *exo*norbornylcarbamide has m.p. 186°. (III) and (IV) are both converted by HNO_2 into *exo*norborneol (*A*, R=OH, R′=H), m.p. 127° [the β-norborneol of Komppa and Beckmann (*loc. cit.*)]. The α-norborneol of Komppa and Beckmann is *endo*norborneol. In agreement with these authors and Bredt (cf. A., 1929, 571), and contrary to Vavon and Peignier (A., 1926, 1042) and Hückel *et al.* (A., 1930, 206), borneol and *iso*borneol are considered to have *exo*- and *endo*-OH, respectively. *trans*-3 : 6-*endo*-Methylenehexahydrophthaloyl chloride and NaN_3 (as above) give 1 : 2-*diamino*-[1,2,2]-*dicycloheptane* (V), b.p. 212°/767 mm. (*dihydrochloride*, m.p. > 350°; Ac_2 derivative, m.p. 272°). H. B.

Synthesis of thiocamphor and other cyclic thioketones. P. C. RAY (Nature, 1934, **134**, 1010).—Camphor in abs. EtOH yields *thiocamphor*, m.p. 145°, when treated simultaneously at 0° with dry H_2S and dry HCl. Thio*cyclo*hexanone and its tripolymeride have been synthesised by a similar method. L. S. T.

***p*-(or 2 : 5-)Diketocamphanecarboxylic acid and related acids.**—See B., 1935, 46.

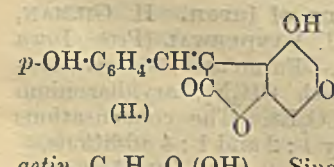
Nuclear condensations of furan. H. GILMAN, B. L. WOOLEY, and R. J. VANDERWAL (Proc. Iowa Acad. Sci., 1932, **39**, 176).—Furan and its derivatives have been condensed with CH_2N_2, aryldiazonium compounds, and $CHN_2{\cdot}CO_2Et$. The condensations are sometimes preceded by 1 : 2 and 1 : 4 additions. CH. ABS. (*r*)

Preparation and properties of furyl phenyl ketimine. J. B. Culbertson and B. Davis (Proc. Iowa Acad. Sci., 1932, **39**, 177).—*Furyl phenyl ketimine* (I) is prepared from furonitrile and MgPhBr. The *hydrochloride* is rapidly hydrolysed to furyl Ph ketone; the velocity of this hydrolysis and the basic strength of (I) are recorded. Ch. Abs. (*r*)

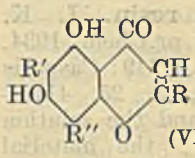
Hydropyran nucleus. II. Bromo-derivatives of tetrahydropyran. R. Paul (Bull. Soc. chim., 1934, [v], **1**, 1397—1405; cf. A., 1934, 1225).—With dry Br in Et_2O at −17° dihydropyran (I) affords 2 : 3-*dibromotetrahydro-* (II), b.p. 96—98°/9 mm. [contaminated with (III)], converted by distillation at 25 mm., or better by $NPhEt_2$, into 3-*bromo*-5 : 6-*dihydro-pyran* (III), b.p. 65°/25 mm. With HBr (I) gives 2-*bromotetrahydropyran*, b.p. 61°/16 mm. (resinifies in air). With NaOH in presence of $Pb(NO_3)_2$ (II) affords 3-bromo-2-hydroxytetrahydropyran (IV), m.p. 79—80° (reduces Fehling's solution or NH_3–$AgNO_3$), but with H_2O at room temp. is obtained the *ether* $(CH_2<^{CH_2\cdot CHBr}_{CH_2\cdot O}>CH\cdot)_2O$, m.p. 110° (block) (no reducing properties), also obtained by interaction of equimol. quantities of (II) and (IV). J. W. B.

Attempts to synthesise 5 : 6-dihydroxyflavone (primetin). W. Baker (J.C.S., 1934, 1953—1954).—2 : 6-*Dibenzoyloxyacetophenone*, m.p. 105° (simplified prep. of 2 : 6-dihydroxyacetophenone), with K_2CO_3 in PhMe gives 5-hydroxy-3-benzoylflavone, m.p. 177° (cf. Sugasawa, A., 1934, 1107). 2 : 4-*Diacetylresorcinol dibenzoate*, m.p. 123°, with KOAc–EtOH yields a small amount of 5-*hydroxy*-6-*acetylflavone* (I), m.p. 201°, also obtained from 5-acetoxyflavone and $AlCl_3$ in $PhNO_2$. Quinacetophenone and NaOAc–Ac_2O form 5-*O*-acetylquinacetophenone. (I) cannot be oxidised with H_2O_2 or BzO_2 to primetin. F. R. S.

Constitution of fukugetin. II. M. Murakami and T. Irie (Proc. Imp. Acad. Tokyo, 1934, **10**, 568—571; cf. A., 1933, 398).—Fukugetin (I) (*H sulphate*), $C_{24}H_{16}O_9$ (*loc. cit.*, $C_{22}H_{16}O_8$), with 50% KOH gives fukugenetin, garcinol (II), and 3 : 4-$C_6H_3Ac(OMe)_2$. (II), $C_{15}H_{10}O_5$ (lit., $C_{16}H_{12}O_5$) (derivatives give depressions of the m.p., when mixed with those of 5 : 7-dihydroxy-3-*p*-hydroxyphenylcoumarin), readily gives a H_2-derivative (catalytic reduction) and with Me_2SO_4–KOH affords, by opening of the lactone ring, "*pentamethylgarcinol hydrate*" (III), m.p. 142—143°, which is synthesised. *p*-OMe·C_6H_4·CHO and ω-chloro-2 : 4 : 6-trimethoxyacetophenone give the *substance*, $O<^{CH\cdot C_6H_4\cdot OMe}_{CH\cdot CO\cdot C_6H_2(OMe)_3}$, m.p. 115—116°, which yields successively β-p-*anisyl*-α-2 : 4 : 6-*trimethoxyphenyl-lactic acid*, amorphous, the *anhydride*, OMe·C_6H_4·CH:C(CO_2Ac)·$C_6H_2(OMe)_3$, m.p. 100—103°, and α-*carboxy*-2 : 4 : 6 : 4′-*tetramethoxystilbene*, m.p. 188—188·5°, the *Me* ester of which is (III). (II) is, therefore, 2-p-*hydroxybenzylidene*-4 : 6-iso*coumarone*.


(II.)

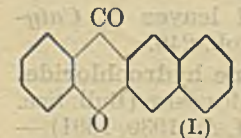
(I) affords by Ac_2O–NaOAc the *Ac*$_4$ derivative, m.p. 273—274°, and by Me_2SO_4 the *Me*$_4$ *ether*, m.p. 252—254°, of *anhydrofukugetin*, $C_{24}H_{10}O_4(OH)_4$. Since also (I) is sol. in KOH and pptd. therefrom by CO_2, it does not contain a CO_2H or lactone ring. By CH_2N_2 or Me_2SO_4 (I) gives the *Me*$_5$ *ether* (IV), m.p. 203° (*oxime*), which with hot 5% KOH–EtOH rapidly yields an iso-*derivative* (V), m.p. 136° (*dioxime*; *Ac* derivative, m.p. 158°), previously called (IV). With Me_2SO_4 (V) gives iso*fukugetin Me*$_6$ *ether*, m.p. 188°, stable to KOH, but giving with HCl (IV); the isomerisation of (IV) to (V) is due to change of $O<^{CH\cdot}_{CH\cdot CO}$ to ·CO·C(OH):CH·.


(VI.)

KOH fusion of (I) gives phloroglucinol, protocatechuic acid, and AcOH. (I) is, therefore, (VI) [R=3 : 4-$C_6H_3(OH)_2$; R′ and R″= H and $O<^{CH\cdot C_6H_4\cdot OH(p)}_{CH\cdot CO}$, respectively, or *vice versa*]. Garcinin is impure (I). R. S. C.

Constitution of hydroxy-derivatives of diphenylene oxide. K. Tatematsu and B. Kubota (Bull. Chem. Soc. Japan, 1934, **9**, 448—457).—The compound obtained by heating resorcinol with W_3O_8 (A., 1925, i, 809) is 2-*hydroxydiphenylene oxide* (I), m.p. 138—138·5° [*Ac* derivative, m.p. 111—111·5°; *Me ether*, m.p. 97—97·5°; $(NO_2)_2$-derivative, m.p. 216—217° (decomp.)], obtained by diazo-reaction from 2-aminodiphenylene oxide (II), m.p. 99—99·5° (lit., m.p. 94°; cf. Cullinane, A., 1931, 96) [*Ac* derivative (III), m.p. 176·5—177°]. Bromination of (I) affords 3-*bromo*-2-*hydroxydiphenylene oxide* (IV), m.p. 113—113·5° (*Me ether*, m.p. 147—148°). Bromination of (III) affords 3-*bromo*-2-*acetamidodiphenylene oxide*, m.p. 195—195·5°, hydrolysed to the corresponding *amine* (V), m.p. 129—130°, which gives (IV) by diazo-reaction. Replacement of NH_2 in (V) by H gives 3-bromodiphenylene oxide (Mayer *et al.*, A., 1922, i, 746). (V) affords (Sandmeyer) 2 : 3-*dibromodiphenylene oxide* (VI), m.p. 150—150·5°. 3-Nitro-2-aminodiphenylene oxide (VII) (A, 1924, i, 161) affords (diazo-reaction) 2-*bromo*-3-*nitrodiphenylene oxide*, m.p. 171—172°, reduced to 2-*bromo*-3-*aminodiphenylene oxide*, m.p. 172—172·5°, which gives (VI) (Sandmeyer). The constitutions of (IV) and (VII) were thus established [cf. Cullinane, *loc. cit.*, who supposes the NO_2 in (VII) to be in the 1-position]. H. G. M.

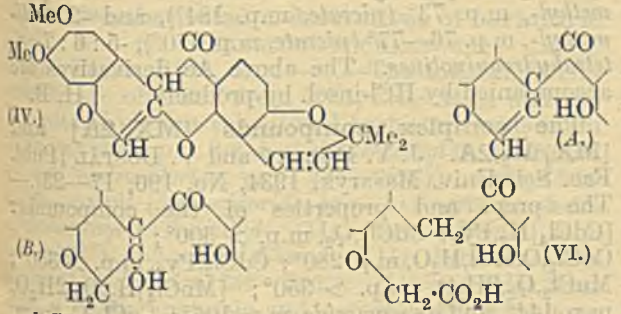
Pyrenium compounds. XXIV. 2 : 3-Benzoxanthone and 9-phenyl-2 : 3-benzoxanthenol. W. Dilthey and F. Quint (J. pr. Chem., 1934, [ii], **141**, 306—310; cf. A., 1934, 1227).—3-*Phenoxy*-β-*naphthoic acid*, m.p. 183—184° (obtained together with an acid, m.p. 132—133°, from NaOPh, 3 : 2-$C_{10}H_6I\cdot CO_2K$, and Cu-bronze), is converted by PCl_5 in C_6H_6 into 2 : 3-*benzoxanthone* (I), m.p. 201—202°, which is more yellow than the 1 : 2- and 3 : 4-isomerides. (I) and MgPhBr in EtO–C_6H_6 give 9-*phenyl*-2 : 3-*benzoxanthenol* (II), m.p. 157·5—158·5°[corresponding perchlorate, m.p. 271—272° (decomp.)], which affords green salts. The 2 : 3-benzo-group has a bathochromic action (cf. Dutta, A., 1934, 1013). (II) is reduced (Zn dust, AcOH) to 9-phenyl-2 : 3-


(I.)

benzoxanthen (Kaufmann and Egner, A., 1914, i, 39). The compound described as (II) by Gomberg and Schoepfle (A., 1917, i, 551) is 9-phenyl-1 : 2-benzoxanthenol. H. B.

Varying valency of platinum with respect to mercaptanic radicals.—See this vol., 182.

Poisonous constituents of the seeds of *Tephrosia vogelii*. K. W. Merz and G. Schmidt (Arch. Pharm., 1935, 273, 1—21; cf. A., 1932, 888).—These seeds, freed from protein (39%) and oil (10·5%) by ligroin, yield to $COMe_2$ a mixture containing dehydrodeguelin (I), allo*tephrosin* (II), $C_{23}H_{22}O_7$, m.p. 194—195°, and iso*deguelin* (III), $C_{23}H_{22}O_6$, m.p. 167—168°. The *Ac* derivative, m.p. 119·5—120·5°, of (II) loses AcOH at 180° to yield iso*dehydrodeguelin* (IV), m.p. 235—236°, colourless; with *p*-$C_6H_4Me{\cdot}SO_3Me$ it gives (I) and with 0·03*N*-KOH–aq. EtOH gives isoallo*tephrosin* (V), $C_{23}H_{22}O_7$, m.p. 202°. Hydrogenation (PtO_2) of (II) in AcOH gives impure *dihydro*allo*tephrosin*, the *Ac* derivative, m.p. 266°, of which with *p*-$C_6H_4Me{\cdot}SO_3Me$ affords dihydrodehydrodeguelin. (II) with $KMnO_4$–$COMe_2$ gives allo*tephrosindicarboxylic acid*, $C_{23}H_{22}O_{11}$, m.p. (+ ? H_2O) 122—124°, (anhyd.) 171°, hygroscopic, isomerised by H_2O_2–KOH to an *acid*, m.p. 210—211° (decomp.). With H_2SO_4–AcOH (1 : 2) at 60—65° (II) yields (I), but with boiling Ac_2O–NaOAc (IV), which with KOH–Zn dust affords deguelic acid (VI) [*Me* ester, m.p. 125—126°; *oxime*, m.p. 168—169° (decomp.)]. (II) and cold NH_3–EtOH give (V), the *Ac* derivative of which, when heated above the m.p., 193—194° (decomp.), gives AcOH and (IV). Hydrogenation of (V) gives *? acetyldihydro*isoallo*tephrosin*, m.p. 193—194°, and dehydration by H_2SO_4–AcOH gives (IV). (III), α 0° (*oxime*, m.p. 233—234°), gives by hydrogenation *dihydrodeoxydeguelin*, $C_{23}H_{26}O_5$, m.p. 153—154°, by $K_3Fe(CN)_6$ (IV), and by Ac_2O–C_5H_5N (I). Aërial oxidation of (III) in NaOH–$COMe_2$ affords (V), whilst in Et_2O–aq. NaOH a mixture is rapidly formed, wherefore it is concluded that (II) may be formed from (III) during isolation from the plant. The formula given is assigned to (IV) and it is considered that tephrosin and *iso*tephrosin are *cis*- and *trans*-7-



and (II) and (V) *cis*- and *trans*-8-hydroxydeguelins, and that deguelin and (III) are *cis-trans*-ring isomerides. The change of (IV) into (VI) is assumed to proceed by way of (*A*) and (*B*). R. S. C.

Ketonic acids with pyrrole nucleus. F. Ingraffia (Gazzetta, 1934, 64, 778—784).—The Mg derivative (I) of 2 : 4-dimethylpyrrole reacts with $COCl{\cdot}CO_2Et$ to give Et 2 : 4-dimethylpyrrole-5-glyoxylate, of which the acid (II) gives on decomp. 2 : 4-dimethylpyrrole-5-aldehyde. (I) with $COCl{\cdot}CH_2{\cdot}CO_2Et$ yields *Et* 3 : 5-*dimethyl*-2-*pyrroylacetate* (III), m.p. 95° (*semicarbazone*, decomp. about 170°); from (III), 5-acetyl-2 : 4-dimethylpyrrole, 3 : 5-*dimethyl*-2-*pyrrylphenylpyrazolone*, m.p. 141°, and, using NH_2Me, 3 : 5-*dimethyl*-2-*pyrroylmethylacetamide*, m.p. 156°, are prepared. E. W. W.

Mixed functional derivatives of 2 : 4-dimethylpyrrole. F. Ingraffia (Gazzetta, 1934, 64, 784—792).—(I) (preceding abstract) with $CH_2Cl{\cdot}COCl$ yields 5-chloroacetyl-2 : 4-dimethylpyrrole, which gives the following products: with KOH, 3 : 5-*dimethyl*-2-*pyrroylcarbinol*, m.p. 208° (*Ac* derivative, m.p. 108°), oxidised ($KMnO_4$) to (II); with KCN, 3 : 5-*dimethyl*-2-*pyrroylacetonitrile*, m.p. 195°; with aq. NH_3 and NH_2Me at 100°, 5-*aminoacetyl*-, m.p. 203° [*hydrochloride*; *picrate*, m.p. about 195° (decomp.)], and 5-*methylaminoacetyl*-2 : 4-*dimethylpyrrole*, decomp. 260° (*hydrochloride*), respectively. (I) and BzCl yield 5-benzoyl-2 : 4-dimethylpyrrole (A., 1915, i, 990) (*picrate*, m.p. 92°; *iodate*, m.p. 109°). E. W. W.

Reaction between phthalic anhydride and the magnesium derivative of 2 : 4-dimethylpyrrole. F. Ingraffia (Gazzetta, 1934, 64, 714—718).—This reaction yields 3 : 5-*dimethyl*-2-*pyrrylenephthalide* (I), m.p. 207° (4-*benzeneazo*-derivative, m.p. 76°), and 3 : 5-*dimethyl*-2-*pyrrylenephenylcarbinol*-o-*carboxylic acid* (II), $CO_2H{\cdot}C_6H_4{\cdot}C(OH){:}C{\cdot}CMe{>}CH$ (N:CMe), m.p. 188° (*Ag* salt); (I) with KOH gives (II). E. W. W.

Pyrrole derivatives. I. I. J. Rinkes (Rec. trav. chim., 1934, 53, 1167—1174).—2-Acetylpyrrole with Ac_2O–HNO_3 (*d* 1·51) at —10° to —15° gives a mixture of its 4- (I), m.p. 197°, and 5-NO_2- (II), m.p. 156°, -derivatives (cf. Ciamician *et al.*, A., 1886, 718). Me pyrrole-2-carboxylate with 1·5 mols. of HNO_3 also gives its 4- (III), m.p. 197°, and 5-NO_2-, m.p. 181—182° (*lit.* 178°), -derivatives, also obtained (after esterification) together with 2-*nitropyrrole* (IV), m.p. 55°, by Ac_2O–HNO_3 (1·25 mol.) on the corresponding acid. Nitration of pyrrole with Ac_2O–HNO_3 (1·25 mols.) at —10° gives (IV) (21% yield), but with 2 mols. of HNO_3, 2 : 4- (V), m.p. 149—150°, and 2 : 5-$(NO_2)_2$-, m.p. 173°, -derivatives [also by similar nitration of (IV)] are obtained. With HNO_3 (*d* 1·51) at —10° (III) gives (V). When heated with 25% HNO_3 (I) and (II) are converted, respectively, into 4 : 4′-, m.p. 219°, and 5 : 5′-, m.p. 176°, -*dinitro*-2 : 2′-*dipyrryldinitrosacyl* (cf. Holleman, A., 1892, 971), hydrolysed by hot aq. NaOH, respectively, to 4-, m.p. 217°, and 5-, m.p. 160—161°, -nitropyrrole-2-carboxylic acid. J. W. B.

Thiolpyrrolecarboxylic acids. K. Neisser (Ber., 1934, 67, [*B*], 2080—2083).—Et 2 : 4-dimethylpyrrole-3-carboxylate is transformed by $Cu(CNS)_2$ in boiling MeOH into *Et* 5-*thiocyano*-2 : 4-*dimethylpyrrole*-3-*carboxylate*, converted by cautious hydrolysis into *Et* 5-*thiol*-2 : 4-*dimethylpyrrole*-3-*carboxylate*, m.p. 107—108°, which loses H_2S and NH_3 under the action of aq. KOH. The product obtained by the action of CO_2 on the pyrrole-Grignard compound is pyrrole-2-carboxylic acid (I), m.p. 207°, and a dimorphous modification (II), m.p. 161°, incorrectly regarded as

pyrrole-3-carboxylic acid, since (I) and (II) do not give a depression in mixed m.p., and yield identical Me esters (III), m.p. 72·5—73°, and Me Br_3-esters, m.p. 208—210°; hydrolysis of the ester from (II) gives (I), and (I) is obtained when the solution of (II) in H_2O is seeded with (I). Cautious bromination of (III) gives *Me dibromopyrrole-2-carboxylate*, m.p. 164—165°. (III) is transformed by $Cu(CNS)_2$ in boiling MeOH into *Me 2-thiocyanopyrrole-5-carboxylate*, m.p. 107°, converted by cautious hydrolysis into *2-thiolpyrrole-5-carboxylic acid*, m.p. 173° (decomp.) [*Me* ester, m.p. 83—84°], not identical with the product obtained by Windaus *et al.* (A., 1934, 1415) from vitamin-B_1. H. W.

Fission of pyridine. H. Freytag (Ber., 1934, 67, [*B*], 1995—1998).—Addition of BzCl to C_5H_5N–H_2O followed by acidification of the solution leads to BzOH and glutacondialdehyde (I) [identified by the "fluorescence test" (II), which consists in adding p-$NH_2{\cdot}C_6H_4{\cdot}CO_2Et$ and HCl to the solution and extraction with amyl alcohol, thus giving a solution with green fluorescence]. The presence of (I) in C_5H_5N which has been exposed to moist air but not in freshly distilled C_5H_5N and also in the products of the action of NaOH and $CHCl_3$ on C_5H_5N is established by (II). H. W.

Influence of temperature on the formation of additive compounds.—See this vol., 182.

Indoleacetic acids. F. E. King and P.L'Ecuyer (J.C.S., 1934, 1901—1905).—2-Carboxyindole-3-acetic acid, obtained by hydrolysing the Et ester, gives at its m.p. skatole, but in quinoline at 195° loses 1 mol. of CO_2 to give indole-3-acetic acid in small yield. NHPh·NHMe (I) and α-ketoglutaric acid afford *2-carboxy-1-methylindole-3-acetic acid*, m.p. 234°, decarboxylated in quinoline to 1-methylindole-3-acetic acid (II). *Et 2-carboxy-1-methylindole-3-acetate*, m.p. 184°, at 190—200° gives *Et 1-methylindole-3-acetate*, b.p. 165°/1 mm., hydrolysed to (II) [best method of prep. for (II)]. (I) and acetonedicarboxylic ester form (HCl) *Et 3-carbethoxy-1-methylindole-2-acetate*, m.p. 90°, hydrolysed to *3-carboxy-1-methylindole-2-acetic acid*, m.p. 262°, or to *3-carbethoxy-1-methylindole-2-acetic acid*, m.p. 170°. The half-ester at 180—190° gives Et 1 : 2-dimethylindole-3-carboxylate, further hydrolysed to the acid. F. R. S.

Condensation of isatin and 1 : 3-indanedione. W. M. Fischer and A. Cirulis (Annalen, 1934, **514**, 261—267).—Isatin (I) (1 pt.) and 1 : 3-indanedione (II) (2 pts.) in MeOH at room temp. for 5 days give a little of a blue *compound*, m.p. 263° (insol. in aq. NaOH), and (mainly) the NaOH-sol. *2-keto-3 : 3-di(1′ : 3′-diketo-2′-indanyl)-2 : 3-dihydroindole*,

$$NH\langle^{C_6H_4}_{CO}\rangle C\left(CH\langle^{CO}_{CO}\rangle C_6H_4\right)_2$$

, m.p. 240—241° (decomp.) [Na_2 (anhyd. and $+5H_2O$) and Ag_2 salts; 1 : 2′ : 2′-Br_3-derivative, m.p. 175° (decomp.); *pentaphenylhydrazone*, m.p. 252° (decomp.); N-*Ac* derivative, m.p. 222° (decomp.), similarly prepared from *N*-acetylisatin and (II)], which is phototropic and dissolves in cold C_5H_5N to a yellow solution which comes red when heated. *N*-Benzoylisatin and (II) boiling AcOH give the same quinolylene phenylene ketonocarboxylic acid (III) as is obtained (Noelting and Herzbaum, A., 1911, i, 917) from (I) and (II) in alkali. Di-indone and (I) in boiling *N*-NaOH also afford (III); in AcOH, a *substance*, m.p. 310° (Cu block), results. H. B.

Synthesis of *Bz*-tetrahydroquinolines. II. U. Basu (Annalen, 1934, **514**, 292—298; cf. A., 1934, 1111).—6-Methyl-2-hydroxymethylene*cyclo*hexanone and Et β-aminocrotonate at 100° give *Et 2 : 8-dimethyl-5 : 6 : 7 : 8-tetrahydroquinoline-3-carboxylate*, b.p. 166°/11 mm. (*picrate*, m.p. 127°); the free *acid*, m.p. 214° (decomp.), distilled with soda-lime in a vac. affords *2 : 8-dimethyl-5 : 6 : 7 : 8-tetrahydroquinoline*, b.p. 227—228°/754 mm. (*picrate*, m.p. 118°; *platinichloride*, m.p. 182—183°; *mercurichloride*, m.p. 136°). *2 : 6-Dimethyl-5 : 6 : 7 : 8-tetrahydroquinoline-3-carboxylic acid* [*Et* ester, b.p. 170—171°/9 mm. (cf. *loc. cit.*)] similarly affords *2 : 6-dimethyl-5 : 6 : 7 : 8-tetrahydroquinoline*, b.p. 235—236°/752 mm. (cf. von Braun *et al.*, A., 1924, i, 553) (picrate, m.p. 146°; platinichloride, m.p. 185°); the 2 : 7-Me_2 derivative (*loc. cit.*) gives a *mercurichloride*, m.p. 151°, and a *hydrochloride*, m.p. 168—169°. 4 : 5-Dimethyl-2-hydroxymethylene*cyclo*hexanone similarly affords *Et 2 : 6 : 7-trimethyl-5 : 6 : 7 : 8-tetrahydroquinoline-3-carboxylate*, b.p. 172°/13 mm. [free *acid*, m.p. 135—136° (decomp.)]; *2 : 6 : 7-trimethyl-5 : 6 : 7 : 8-tetrahydroquinoline* (*picrate*, m.p. 105°; *platinichloride*, m.p. 187°) has b.p. 239—240°/752 mm. 2-Hydroxymethylene*cyclo*hexanone (I) and β-aminocrotononitrile at 100° give *3-cyano-2-methyl-5 : 6 : 7 : 8-tetrahydroquinoline* (II), m.p. 107—108° (*picrate*, m.p. 160—161°), and a *substance*, m.p. 235°; (II) is hydrolysed (75% H_2SO_4) to the 3-carboxylic acid (*loc. cit.*) (*platinichloride*, m.p. 120—121°). (I) and acetylacetoneimine at 100° afford *3-acetyl-2-methyl-5 : 6 : 7 : 8-tetrahydroquinoline*, m.p. 55° (*picrate*, m.p. 155°; *semicarbazone*, m.p. 195°); *3-acetyl-2 : 6-*, b.p. 165°/15 mm., m.p. 65° (*picrate*, m.p. 168°; *semicarbazone*, m.p. 215°), and *-2 : 7-dimethyl-5 : 6 : 7 : 8-tetrahydroquinoline*, b.p. 169—170°/16 mm. (*picrate*, m.p. 169°; *semicarbazone*, m.p. 214°), are similarly prepared. Benzoylacetoneimine and the appropriate hydroxymethylene*cyclo*hexanone give *3-benzoyl-2-methyl-*, m.p. 73° (*picrate*, m.p. 184°), and *-2 : 6-dimethyl-*, m.p. 76—77° (*picrate*, m.p. 170°), *-5 : 6 : 7 : 8-tetrahydroquinolines*. The above Ac derivatives are accompanied by HCl-insol. by-products. H. B.

The complex compounds $[MX_2,2A]$ and $[MX_4]H_2,2A$. J. V. Dubský and V. Dostál (Publ. Fac. Sci. Univ. Masaryk, 1934, No. 196, 17—23).—The prep. and properties of the compounds: $[CdCl_4]H_2,Py_2$; $CdCl_2,Q_2$, m.p. > 300°; $CdCl_2,Q,HCl,H_2O$, m.p. 280°; $CdCl_2,Py_2$, m.p. > 350°; $MnCl_2,Q_2,3H_2O$, m.p. > 350°; $[MnCl_4]H_2,Q_2,2H_2O$, m.p. 144°, and its *isomeride*, m.p. 105°; $CoCl_2,Q_2$, m.p. 248°; $[CoCl_4]H_2,Q_2,2H_2O$, m.p. 125°; $ZnCl_2,Q_2$, m.p. 235°; $[ZnCl_4]H_2,Q_2,2H_2O$, m.p. 124°; $ZnBr_2,Q_2$, m.p. 244°; $[ZnBr_4]H_2,Q_2,2H_2O$, m.p. 106—112°, are described (Py = C_5H_5N; Q = quinoline). R. T.

Preparation of quinoline derivatives. V. K. Dziewoński, J. Moszew, J. Maksymowicz, and P. Trzesiński (Bull. Acad. Polonaise, 1934, **A**, 190—195).—The structure of *4-m-toluidino-2-phenyl-5-methylquinoline*, m.p. 134—135° [*hydrochloride*, m.p.

173—175° (decomp.); *picrate*, m.p. 245—246°; *Ac*, m.p. 149—150°, and *NO*-, m.p. 144°, derivatives], obtained by heating COPhMe with *m*-$C_6H_4Me{\cdot}NH{\cdot}CS{\cdot}NHPh$ at 180—205° and finally at 300°, is proved by its hydrolysis with KOH–EtOH at 200° to 4-*hydroxy*-2-*phenyl*-5-*methylquinoline*, m.p. 281°, different from the known -7-Me isomeride, m.p. 270°. Condensation of $CH_2Ph{\cdot}COPh$ with $CS(NHPh)_2$ at 190—220° and then at 280° affords 4-*anilino*-2 : 3-*diphenylquinoline*, m.p. 196—197° [*hydrochloride*, m.p. 279°; *nitrate*, m.p. 185° (decomp.); *picrate*, m.p. 259—260°; and *NO*-derivative, m.p. 153—154° (decomp.)], similarly hydrolysed to 4-hydroxy-2 : 3-diphenylquinoline. J. W. B.

Direct introduction of amino-groups into aromatic and heterocyclic nucleus. II. Reaction of *iso*quinoline with alkali and alkaline-earth amides in liquid ammonia. F. W. Bergstrom (Annalen, 1934, **515**, 34—42; cf. A., 1934, 1110).—1-Amino*iso*quinoline (I), m.p. 122—123°, is obtained in 60—75% yield from *iso*quinoline (II) and an excess of KNH_2 (III) in liquid NH_3 at room temp.; the reaction mixture is freed from NH_3 and then treated with C_6H_6 and H_2O. $NaNH_2$ similarly gives 20—30% of (I) and resin. Little reaction occurs between (II) and $LiNH_2$, $Ca(NH_2)_2$, or $Mg(NH_2)_2$. $Ba(NH_2)_2$ reacts rapidly but somewhat less readily than (III); reaction is accelerated by $Ba(CNS)_2$. Of the complex ammono-salts investigated, only $BaKN,2NH_3$ and $K_2NaN,2NH_3$ react with (II) to give (I); dissociation probably occurs to some extent. H. B.

Preparation of 3 : 6-dicarboxybenzoyl-*N*-ethylcarbazole. V. A. Ignatiuk-Majstrenko and N. S. Tichonov (Anilinokras. Prom., 1934, **4**, 473—475).—$AlCl_3$ is added to a 1 : 4 : 20 mol. mixture of *N*-ethylcarbazole, *o*-$C_6H_4(CO)_2O$, and PhCl, the mixture heated at 50—70°, poured on ice, made acid with HCl, and PhCl removed by steam-distillation. The residue is dissolved in aq. NaOH, the solution filtered, 3-mono- (I) and 3 : 6-di-carboxybenzoyl-9-ethylcarbazole are pptd. by HCl, and separated by C_6H_6, which dissolves only (I). R. T.

New *N*-substituted *C*-derivatives of barbituric acid. E. Gryszkiewicz-Trochimowski (Arch. Chem. Farm., 1934, **2**, 1—8).—The following compounds are obtained from $NEt_2{\cdot}CH_2{\cdot}CH_2Cl$ and the Na salts of various substituted barbituric acids (I) in EtOH at the b.p.: 3-β-*diethylaminoethyl*-5 : 5-*diethyl*-, an oil (*hydrochloride*, m.p. 225—226°); -5-*ethyl*-5-*n*-*butyl*-, an oil (*hydrochloride*, m.p. 212—213°); -5-Δ¹-cyclo*hexenyl*-1 : 5-*diethyl*- (II) (*hydrochloride*, m.p. 150—151°); -5-*phenyl*-5-*ethyl*- (III) -*barbituric acid* (*hydrochloride*, m.p. 245—246°). (II) and (III) have only a feeble analgesic and narcotic action as compared with the corresponding (I), but greatly depress blood pressure. R. T.

Degradations of allantoins. H. Biltz and L. Loewe (J. pr. Chem., 1934, [ii], **141**, 284—298).—3-Methylallantoin (I) and Ac_2O–conc. H_2SO_4 give (probably) the 1 : 6-Ac_2 derivative, $\begin{matrix}NMe{\cdot}CO\\CO{\cdot}NAc\end{matrix}>CH{\cdot}NAc{\cdot}CO{\cdot}NH_2$, m.p. 230° (uncorr.); allantoin (II) similarly affords the 1 : 3-Ac_2 derivative, m.p. 247° (decomp.), hydrolysed (conc. aq. NH_3) to the 1-*Ac* derivative, m.p. 236° (decomp.), and thence to (II). (I) and boiling Ac_2O–C_5H_5N or Ac_2O at 160—170° (bomb) give 5-acetamido- (III) (A., 1926, 414) and a little 5-*diacetamido*-, m.p. 100° (uncorr.), -1-*acetyl*-3-*methylhydantoin*. (III) is converted by aq. basic Pb acetate at 100° into 5-acetamido-3-methylhydantoin (IV), re-acetylated (Ac_2O–conc. H_2SO_4) to (III). (III) or (IV) and conc. aq. NH_3 give NH_4 α-*acetamido*-ω-*methylhydantoate*, m.p. 178—180° (decomp), converted by basic Pb acetate into (IV) and by Ac_2O into (III). 1 : 8-Dimethylallantoin (V) or its Ac_2 derivative and boiling Ac_2O afford 5-*acetylmethylamino*-1-*acetyl*-3-*methylhydantoin*, m.p. 128—130°, whilst the 6-Ac derivative of (V) similarly gives 4-*ethoxy*-3 : 6-*diacetyl*-1 : 8-*dimethylacetylenediureine*, $CO<\begin{matrix}NAc{-}CH{=\!=}NMe\\NMe{\cdot}C(OEt){\cdot}NAc\end{matrix}>CO$, m.p. 155—156°, hydrolysed (EtOH–NH_3) to the 6-*Ac* derivative, m.p. 185° (decomp.); the OEt is probably introduced during crystallisation of the reaction product from EtOH. All m.p. are corr. unless stated otherwise. H. B.

Constitution of porphyrindine; magnetic proof of an organic bi-radical. R. Kuhn, H. Katz, and W. Franke (Naturwiss., 1934, **22**, 808—809).—Porphyrindine is paramagnetic and is a true bi-radical (cf. A., 1934, 718). This is in agreement with the constitution given by Piloty (A., 1903, i, 523). H. G. M.

Amidations with sodium and potassium amides in the alkaloid series. II. α- and α′-Aminoanabasine. M. I. Kabatschnik and M. M. Katznelson (Compt. rend. Acad. Sci. U.R.S.S., 1934, **4**, 47—50; cf. A., 1934, 538).—Anabasine and $NaNH_2$ in $NHMe_2$ at 135—145° afford 2-(2′-amino-3′-pyridyl)-, m.p. 109° (cf. A., 1934, 422), and 2-(2′-*amino*-5′-*pyridyl*)-*piperidine*, m.p. 85·5—90°, the diazonium compounds of which are converted into the 2′-*Cl*-compounds, m.p. 99·5—100° and 58·5—59·5°, respectively. These are oxidised ($KMnO_4$) to 2-chloropyridine-3- and -5-carboxylic acid, respectively. J. L. D.

Complex salts of 2 : 2′-dipyridyl with bivalent copper.—See this vol., 167.

Intermediate compounds between ferrocyanides and ferroammines.—See this vol., 181.

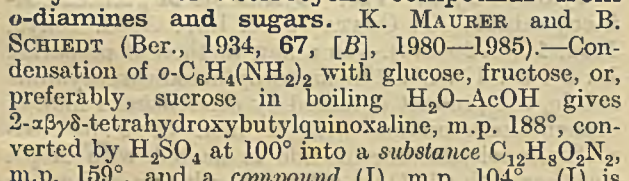
Cyanine dyes. VII. Synthesis of pentamethinecyanines. T. Ogata (Proc. Imp. Acad. Tokyo, 1934, **10**, 572—574).—In a new method of preparing 1 : 3 : 3 : 1′ : 3′ : 3′-hexamethylindodicarbocyanine iodide, the product obtained by condensing 1 mol. of diphenylformamidine with 1 mol. of 2 : 3 : 3-trimethylindolenine methiodide is heated with Ac_2O, together with $CH(OEt)_3$ or the K salt of a carboxylic acid. Similar preps. of 2 : 2′-diethylthiadicarbocyanine iodide are described. The course of the reaction is not clear. F. M. H.

Cyanine dyes containing an *iso*quinoline nucleus. (Miss) N. I. Fisher and (Miss) F. M. Hamer (J.C.S., 1934, 1905—1910).—1-Chloro*iso*quinoline, b.p. 160—165°/20—30 mm. (improved prep.) and MeI under pressure give 1-*iodoisoquinoline methiodide* (I), m.p. 228°; the *ethiodide*, m.p. 188—

189°, is similarly prepared. The ethiodide with NH_3 forms 1-*amino*-, m.p. 194°, and with NH_2Ph 1-*anilino*-isoquinoline *ethiodide*, m.p. 192—193°. 1-*Bromo*isoquinoline *ethobromide*, m.p. 128°, and 1-*iodo*isoquinoline n-*propiodide*, m.p. 116—117°, are similarly obtained. Quinaldine methiodide (I) and Na in EtOH give 1 : 2′-*dimethyl*-2 : 1′-*cyanine iodide*, m.p. 234°, and by use of the appropriate reagents 2′-*methyl*-1-*ethyl*-, m.p. 250°, 1 : 2′-*diethyl*-, m.p. 258°, 6 : 2′-*dimethyl*-1-*ethyl*-, m.p. 234°, and 2′-*methyl*-1-*ethyl*-5 : 6-*benz*-2 : 1′-*cyanine iodide*, m.p. 250°; 2′-*methyl*-1-*ethyl*-4 : 1′-*cyanine iodide*, m.p. 210° [from lepidine ethiodide and (I)], and 2 : 2′-*diethylthia*-, m.p. 246° (from 1-methylbenzthiazole ethiodide and 1-iodo*iso*quinoline ethiodide), 2-*ethyl*-2′-n-*propylthia*-, m.p. 237°, 2′-*methyl*-2-*ethyl*-3 : 4-*benzthia*-, m.p. 235° [from 2-methyl-β-naphthathiazole ethiodide and (I)], 2′-*methyl*-2-*ethyl*-5 : 6-*benzthia*-, m.p. 233°, and 2′-*methyl*-2-*ethylselena*-, m.p. 238° [from 1-methylbenzselenazole ethiodide and (I)], and 4 : 2′-*dimethyl*-3-*ethylthiazolo*-1-*cyanine iodide*, m.p. 235° [from 2 : 4-dimethylthiazole ethiodide and (I)], are obtained. The cyanines containing an *iso*quinoline nucleus are, in general, definitely weaker as photographic sensitisers than those containing a quinoline nucleus. M.p. are also decomp. points. F. R. S.

New phenazine synthesis. Phenazhydrins. I. G. R. Clemo and H. McIlwain (J.C.S., 1934, 1991—1993).—*cyclo*Hexane-1 : 2-dione and *o*-$C_6H_4(NH_2)_2$ condense (AcOH–NaOAc) to 1 : 2 : 3 : 4-*tetrahydrophenazine*, m.p. 92·5°, dehydrogenated with I in AcOH to phenazine. 1-*Methyl*-1 : 2 : 3 : 4-*tetrahydrophenazine* (I), b.p. 160—165°/20 mm., m.p. 37°, similarly prepared, is dehydrogenated to 1-*methylphenazine*, m.p. 108°, which is oxidised by H_2CrO_4 to phenazine-1-carboxylic acid. Oxidation (H_2CrO_4) of (I) yields an acid, $C_{11}H_{10}N_2(CO_2H)_2,H_2O$, m.p. 114—117°, subliming at 1 mm. to a dehydrated *acid*, m.p. 187°. Phenazhydrins between the phenazines and dihydrophenazines are obtained by heating with H_2 and platinised asbestos at 325°: *phenazhydrin*, $C_{13}H_{10}N_2$,$C_{13}H_{12}N_2$, between methylphenazine and its H_2-derivative, m.p. 116°, between phenazine and dihydrophenazine, m.p. 209° (decomp.), and between phenazine and methyldihydrophenazine, m.p. 157—160°. The constitution of the compounds is discussed. F. R. S.

Synthesis of heterocyclic compounds from *o*-diamines and sugars. K. Maurer and B. Schiedt (Ber., 1934, 67, [*B*], 1980—1985).—Condensation of *o*-$C_6H_4(NH_2)_2$ with glucose, fructose, or, preferably, sucrose in boiling H_2O–AcOH gives 2-αβγδ-tetrahydroxybutylquinoxaline, m.p. 188°, converted by H_2SO_4 at 100° into a *substance* $C_{12}H_8O_2N_2$, m.p. 159°, and a *compound* (I), m.p. 104°. (I) is



(I.) (II.) (III.)

optically inactive, does not reduce Fehling's solution, rapidly decolorises $KMnO_4$, yields a *hydrochloride*, m.p. 184°, and does not react with Ac_2O, BzCl, or ketonic reagents. The constitution (I) is supported by its transformation by MgPhBr into the *compound* (II), m.p. 149° [*hydrochloride*, m.p. 130° after softening at 122°; *picrate*, m.p. 139° (decomp.); *methiodide*, m.p. about 96° (decomp.); *Ac* derivative, m.p. 176°]. Similarly (I) and CH_2Ph·MgCl give the *substance* $C_{19}H_{16}ON_2$, m.p. 132° [*picrate*, m.p. 128° (decomp.); *Ac* derivative, m.p. 139°]. (II) gives a *methiodide*, m.p. 213° (decomp.) [corresponding *perchlorate*, m.p. 208° (decomp.), and *picrate*, m.p. 200°], oxidised by $K_3FeC_6N_6$ in alkaline solution to the *compound* (III), m.p. 181°, which is converted by MgPhBr into a *substance*, m.p. 264°, and a compound [*picrate*, m.p. 170° (decomp.)]. 3-Hydroxy-2-tetrahydroxybutylquinoxaline is transformed by dehydrating agents into a *substance*, m.p. 255°. H. W.

Photochemical formation of 6 : 7-dimethylalloxazine from lactoflavin. R. Kuhn and H. Rudy (Ber., 1934, 67, [*B*], 1936—1939).—The formation of 6 : 7-dimethylalloxazine by irradiation of lactoflavin in neutral or weakly acidic solution is established by treatment of the product with CH_2N_2, whereby 1 : 3 : 6 : 7-tetramethylalloxazine, m.p. 250° (corr.), is produced. H. W.

Synthetic compounds of the lactoflavin group. R. Kuhn and F. Weygand (Ber., 1934, 67, [*B*], 1939—1941).—Halogeno-*o*-nitro-benzenes and -xylenes are condensed in presence of *tert.*-bases (C_5H_5N) with the amines NH_2·CH_2·[CH·OH]$_3$·CH_2·OH obtained by reduction of the oximes of *l*-arabinose and *d*-xylose, and the products are reduced ($SnCl_2$) in presence of a large excess of alloxan, whereby leucoflavins are produced which are oxidised by air to the flavins. These behave similarly to lactoflavin with respect to solubility, formation of lumilactoflavin by irradiation in alkaline solution, absorption spectrum, dependence of fluorescence on p_H, and formation of a red radical when reduced in mineral acid solution. H. W

Synthesis of tetrahydroharman derivatives under physiological conditions. I. G. Hahn and H. Ludewig (Ber., 1934, 67, [*B*], 2031—2035).—Tetrahydroharman is obtained in almost quant. yield from tryptamine (I) and MeCHO at 25° and p_H 5·2, 6·2, or 7·0. Similarly (I) and CH_2Ph·CHO afford 3-benzyl-3 : 4 : 5 : 6-tetrahydronorharman [*hydrochloride* (II), m.p. 278° (decomp.)]. (I) and CH_2Ph·CO_2H afford *tryptamine phenylacetate*, m.p. 178° (decomp.), which passes at 180—190° into *phenylacet-tryptamide* (III), m.p. 144°. (III) with $POCl_3$ in boiling C_6H_6 gives 3-benzyl-5 : 6-dihydronorharman [*picrate*, m.p. 225° (decomp.)], from which (II) is obtained by reduction with Na and EtOH and addition of HCl. H. W.

γ-Triazines. XXV. Property of *o*- and *p*-nitrophenyliminoketotriazidines (*o*- and *p*-nitrobenzylideneguanylcarbamide) of giving platinioctachloride besides the normal platinihexachloride. First two complexes of quadrivalent platinum with co-ordination number eight. A. Ostrogovich and V. Bena Median. **XXVI. Dihydroxytriazinylformaldoxime and its salts.** A. Ostrogovich and V. Crasu. **XXVII. Syn-**

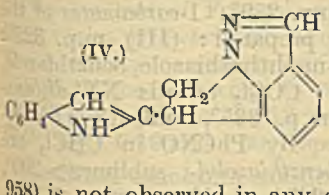
thesis of phenacetylbiuret and its transformation into dihydroxybenzyltriazine. A. Ostrogovich and I. Tanislau (Gazzetta, 1934, **64**, 792—800, 800—824, 824—832).—XXV. Iminoketo-*o*-nitrophenyltriazidine, $NH<\begin{matrix}CO—NH\\C(NH)\cdot NH\end{matrix}>CH\cdot C_6H_4\cdot NO_2$ (M), in *N*-HCl gives a normal *platinichloride*, $[PtCl_6](H\cdot M)_2$, m.p. 249—250°, which in 2*N*-HCl gives the abnormal $[PtCl_8](H\cdot M)_4$, new m.p. 229—230° (cf. A., 1929, 827). The *p*-isomeride similarly gives the normal, new m.p. 244—245° (cf. *loc. cit.*), and the abnormal *platinichloride*. Λ_v of the compounds is determined.

XXVI. N_2O_3 converts dihydroxymethyltriazine into *dihydroxytriazinylformaldoxime*, $N<\begin{matrix}CO—NH\\C(OH)\cdot N\end{matrix}>C\cdot CH{:}N\cdot OH$ (I) [*H sulphate*; *hydrochloride*; *Na* (+H_2O), Na_2 (+$2H_2O$), Na_3 (+H_2O), *K* (+H_2O), NH_4, and *Ag* (+H_2O) salts; *Ba* salt, $(C_4H_3O_3N_4)_2Ba$ (+$2H_2O$ or +$3H_2O$) (II); *Fe* salt, $(C_4H_3O_3N_4)_2Fe$ (+$2H_2O$); *Cu* salts, $C_4H_2O_3N_4Cu$ (+H_2O), and $(C_4H_2O_3N_4)_2Cu_2$ (+$4H_2O$)]. Crystallographic data for (I) and (II) are determined.

XXVII. $CH_2Ph\cdot COCl$ and biuret give *phenylacetylbiuret*, m.p. 199—200° (decomp.), converted by KOH into *dihydroxybenzyltriazine*, m.p. 251—252° (decomp.) [*hydrochloride*, m.p. 258—259° (decomp.); *Na*, m.p. 236—237°, *Ag*, m.p. 264—265°, and *Ba*, m.p. 254—256°, salts (all decomp.)]. E. W. W.

Constitution of dimeric indoles. O. Schmitz-Dumont (Annalen, 1934, **514**, 267—279).—Nitrosodi-3- (I) and -7- (II) -methylindoles are shown to be *N*- and not *C*-NO-derivatives by the methods of Lehmstedt (A., 1927, 1062) and Clauser (A., 1903, ii, 180), and by the formation of NO (with small amounts of N_2O and/or N_2) when (I) and (II) are warmed with AcOH. (I) is reduced (Zn dust, EtOH–conc. HCl) to di-3-methylindole (III) [Ac derivative, m.p. 178—179°, readily hydrolysed (aq. EtOH–KOH) (cf. Oddo, A., 1934, 419) to (III), thus indicating the presence of *N*- and not *C*-Ac]. (II) is converted by EtOH–KOH or –NaOEt in N_2 into a *compound*, $C_{18}H_{15}N_3$ [probably (IV)], m.p. 200°; with EtOH–NaOEt in air, a compound, m.p. 237—238°, results. The formation of oximino-2 : 3-di-7-methylindole (A., 1933, 958) is not observed in any experiment. Nitrosodiindole and EtOH–KOH or –NaOEt in N_2 give a compound analogous to (IV) and a substance, m.p. 227—230° (decomp.). Indole and 3- but not 2-methylindole are polymerised [to tri-indole and (III), respectively] when solutions in aq. EtOH–HCl are kept at 30°. The above results support the constitution previously assigned (A., 1933, 958) to di-indole, but not that of Oddo (*loc. cit.*). H. B.

(IV.)



Acetylation and ethylation of 1 : 9-dimethylspirodihydantoin and related experiments. H. Biltz and L. Loewe (J. pr. Chem., 1934, [ii], **141**, 241—245).—1 : 9-Dimethyl*spiro*dihydantoin (I) (simplified prep.; cf. A., 1917, i, 290) and boiling Ac_2O give the 3-*Ac*, m.p. 176°, and then the 3 : 7-Ac_2, m.p. 136°, derivatives; 1 : 3 : 9-trimethyl*spiro*dihydantoin similarly affords the 7-*Ac* derivative, m.p. 110—120° (decomp.) (all m.p. except this are corr.), whilst 3 : 7-dimethyl*spiro*dihydantoin (II) gives only a Ac_2 derivative, m.p. 178° (cf. A., 1926, 962). (I) is ethylated ($CHMeN_2$) to the 3 : 7-Et_2 derivative, m.p. 123°, whilst *spiro*dihydantoin similarly gives a Et_4 derivative, b.p. 120—140°/0·02 mm.; cryst. products could not be obtained from (II) and 1-acetyl-3-methyl- and 3-methyl-*spiro*dihydantoins. 3 : 7-Dimethylcaffolide (*isoapo*caffeine) similarly affords the 1-*Et* derivative m.p. 110°. H. B.

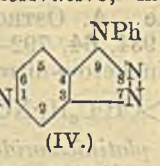
Action of acetic anhydride on uric acid glycols and their ethers. II. 9-Methyluric acid [glycol]. III. 3 : 9-Dimethyluric acid [glycol]. H. Biltz and L. Loewe (J. pr. Chem., 1934, [ii], **141**, 246—267, 268—283; cf. this vol., 96).—II. 9-Methyluric acid glycol is converted by short treatment with boiling Ac_2O into 1-*acetyl*-3-*methyl*spiro*dihydantoin* (I), decomp. 195°, and a trace of 1-*acetyl*-3-*methylallantoin* (II), m.p. 255° (decomp.) (all m.p. are corr. unless stated otherwise). (I) is acetylated further to the 1 : 9-Ac_2 derivative (III), m.p. 170°, and is methylated (Et_2O–MeOH–CH_2N_2) to tetramethyl*spiro*dihydantoin (IV). (I) and pure CH_2N_2 (cf. A., 1931, 853) give 9-acetyl-1 : 3 : 7-trimethyl-*spiro*dihydantoin, m.p. 185—186°. (II), obtained also from (I) and H_2O at 60—100°, is hydrolysed (conc. HCl) to, and prepared by acetylation of, 3-methylallantoin (V). (II) is reduced (HI) to 3-methylhydantoin. (I) is converted by boiling MeOH into *Me* 1-*acetyl*-3-*methylallantoin*-5-*carboxylate* (VI), m.p. 223—225° (decomp.), hydrolysed (conc. HCl or MeOH–HCl) to (V) and a little (VIII) (below); (I) is unaffected by boiling EtOH. (III) is hydrolysed (piperidine in·Et_2O) to a little (I) and is ethylated ($CHMeN_2$) to a mixture of 3-*methyltriethyl*-, m.p. 110—115°, and 1 : 9-*diacetyl*-3-*methyl*-7-*ethyl*-, m.p. 105—110°, -spiro*dihydantoin*. Impure 3-*methyl*-7-*ethyl*spiro*dihydantoin* has m.p. 115° (uncorr.). (I) is converted by EtOH–NH_3, dil. aq. NH_3, or aq. NH_4HCO_3 into 1-*acetyl*-3-*methylallantoin*-5-*carboxylamide* (VII) (+H_2O), m.p. 220° (decomp.), m.p. (anhyd.) 240—245° (decomp.), also prepared from (VI) and dil. aq. NH_3; (III) similarly gives 1 : 6-*diacetyl*-3-*methylallantoincarboxylamide*, m.p. 245°. The Ac group in (VI) and (VII) is removed only with difficulty; hydrolysis (aq. HCl) of (VII) affords (V) and (VIII). (III) is hydrolysed (conc. HCl at 100° or conc. aq. NH_3 at room temp.) to 3-*methyl*spiro*dihydantoin* (VIII) (+$0{\cdot}5H_2O$), m.p. 155° (loss of H_2O), re-solidifying with m.p. 180—190°, m.p. (anhyd.) 210° (decomp.) (sinters at 200°), which is acetylated to (III), methylated (CH_2N_2) to (IV), and converted by aq. basic Pb acetate at 100° into (V). The Ag salt, m.p. about 265° (decomp.; uncorr.), of (VIII) and MeI give 3 : 7-dimethyl*spiro*dihydantoin (IX), m.p. 297° (cf. A., 1917, i, 290), also methylated to (IV). 1 : 7-Dimethyl- and 1 : 3 : 9-trimethyl-*spiro*dihydantoins and (VIII) titrate as monobasic acids; *spiro*dihydantoin and its 1 : 9-Me_2 and 1 : 9-Ac_2 derivatives act as dibasic acids, whilst its 1 : 3 : 7-Me_3 derivative and (IX) have practically no acidic properties.

III. 3 : 9-Dimethyluric acid glycol Me_2 ether (4 : 5-dimethoxy-3 : 9-dimethyl-4 : 5-dihydrouric acid) is acetylated (boiling Ac_2O) slowly to the 7-*Ac* derivative, m.p. 223°, whilst the 5-Me_1 ether gives 4-*acetoxy*-5-*methoxy*-, m.p. 187—189°, and 4-*acetoxy*-5-*methoxy*-7-*acetyl*-, m.p. 145—148°, -3 : 9-*dimethyl*-4 : 5-*dihydrouric acid* and 5-*methoxy*-1 : 7-*diacetyl*-3-*methylhydantamide* (I), $\begin{matrix}CO\cdot NAc\\ NMe\cdot CO\end{matrix}>C(OMe)\cdot CO\cdot NHAc$, m.p. 170—173°, according to the time of reaction. (I) is hydrolysed by EtOH–NH_3 to 5-methoxy-3-methylhydantamide (A., 1921, i, 614), and is accompanied by a little 5-*methoxy*-7-*acetyl*-3-*methylhydantamide* (?), m.p. 212° (sinters at 205°). 3 : 9-Dimethyluric acid glycol [4 : 5-Ac_2 derivative, m.p. 158—160° (decomp.), prepared using cold Ac_2O–conc. H_2SO_4] and boiling Ac_2O give 3 : 9-*diacetyl*-1 : 7-*dimethyl*spiro*dihydantoin* (II), m.p. 137°, hydrolysed (EtOH–NH_3) to, and prepared also by acetylation of, 1 : 7-dimethyl*spiro*dihydantoin (III) (modified prep.; cf. *loc. cit.*). (II) is hydrolysed (boiling H_2O) to the 9-*Ac* derivative, m.p. 232—234° (decomp.), and a mixture of 6-*acetyl*- (IV), m.p. 197—200° (decomp.), and 3 : 6-*diacetyl*- (V), m.p. 180—185° (decomp.), -1 : 8-*dimethylallantoin*; the amounts of (IV) and (V) [hydrolysed (EtOH–NH_3) to (IV)] are diminished when hydrolysis is effected with 50% AcOH. (IV) and basic Pb acetate give 1 : 8-dimethylallantoin [also prepared similarly (cf. A., 1921, i, 893) from (III)], which is reduced (HI) to 1-methylhydantoin. The *spiro*dihydantoin ring system is very stable towards acids, but is readily converted into an allantoin by alkali. H. B

Syntheses of drugs. VIII. [Use of] complex compounds in the synthesis of drugs. I. Calcium theobromide–calcium nitrite. H. P. Kaufmann [with Küchler] (Arch. Pharm., 1935, **273**, 22—31).—The *salt*, $Ca^{"}[T_2Ca(H_2O)_2(NO_2)_2]''$ (T=theobromine), is prepared and its homogeneity demonstrated. The absorbability of drugs is changed by administration as complex compounds. R. S. C.

Compound of theophylline and di(hydroxyethyl)amine.—See B., 1935, 46.

Graebe–Ullmann carbazole synthesis and its application to *N*-substituted pyridinotriazoles. O. Bremer (Annalen, 1934, **514**, 279—291).—4-Bromo-4′-nitro-2′-aminodiphenylamine and $NaNO_2$ in EtOH–HCl give 5-*nitro*-, m.p. 222°, reduced ($SnCl_2$, AcOH–HCl) to 5-*amino*-, m.p. 171°, -1-p-*bromophenyl*-1 : 2 : 3-*benztriazole*. 4′-Nitro-2′-amino-4-methoxydiphenylamine, m.p. 144—145° [prepared (cf. Gallas and Alonso, A., 1930, 1571) by reduction (EtOH–NaHS) of the 2′ : 4′-$(NO_2)_2$-derivative], similarly affords 5-*nitro*-, m.p. 244—245°, and 5-*amino*-, m.p. 157°, -1-*anisyl*-1 : 2 : 3-*benztriazole*. -5-*Nitro*-, m.p. 171°, and 5-*amino*- (I), m.p. 117°, -1-p-*tolyl*-1 : 2 : 3-*benztriazole* are prepared. (I) heated in paraffin oil at 320—350° gives a good yield of 3-*amino*-6-*methylcarbazole*, m.p. 252°; 5 : 4′-diamino-1-phenyl-1 : 2 : 3-benztriazole similarly affords a trace of 3 : 6-diaminocarbazole, whilst the other NH_2-triazoles undergo decomp. 4-Chloro-3-nitropyridine (II) (Koenigs and Freter, A., 1924, i, 990) and NH_2Ph at 130° give 3-*nitro*-4-*anilinopyridine* (III), m.p. 118°, reduced ($Na_2S_2O_4$ in aq. $COMe_2$) to the 3-NH_2-derivative, m.p. 170°, converted by HNO_2 into


(IV.)

9-*phenyl*-3 : 4-*pyridino*-7 : 8 : 9-*triazole* (IV), m.p. 110°. The product obtained from (III) and $SnCl_2$–conc. HCl gives, with HNO_2, (IV) and its 6-*Cl*-derivative, m.p. 164—165°. (IV) and HNO_3 (*d* 1·4) in conc. H_2SO_4 at 50° afford the 4′-*NO*$_2$-, m.p. 222—223°, reduced ($SnCl_2$, conc. HCl) to the 4′-*NH*$_2$-derivative (V), m.p. 206—207°. The *Ac* derivative, m.p. 235—236°, of 3-*nitro*-4-p-*aminoanilinopyridine*, m.p. 163° [from (II) and p-$C_6H_4(NH_2)_2$ in EtOH–KOAc], is reduced (aq. EtOH–$Na_2S_2O_4$) to 3-*amino*-4-p-*acetamidoanilinopyridine*, m.p. 159°, converted (HNO_2) into 9-p-*acetamidophenyl*-3 : 4-*pyridino*-7 : 8 : 9-*triazole*, m.p. > 295°, which is hydrolysed (EtOH–conc. HCl) to (V). 3-*Nitro*-4-2′-*pyridylaminopyridine*, m.p. 131—132° [from (II) and 2-aminopyridine], is reduced (aq. $Na_2S_2O_4$) to the 3-*NH*$_2$-derivative, m.p. 148—149°, convertible into 9-2′-*pyridyl*-3 : 4-*pyridino*-7 : 8 : 9-*triazole*, m.p. 194°. 3-*Nitro*-4-(6′-*methoxy*-8′-*quinolylamino*)*pyridine*, m.p. 203° [from (II) and 8-amino-6-methoxyquinoline], which, like (III), does not give a *N*-NO-derivative, is reduced ($Na_2S_2O_4$, aq. $COMe_2$) to the 3-*NH*$_2$-derivative, m.p. 163—164° (darkening) (p-*dimethylaminobenzylidene* derivative, m.p. 234—235°). (IV) heated in paraffin oil at 320—350° affords 5-carboline, m.p. 231—232° (picrate, m.p. 250°) (Robinson and Thornley, A., 1924, i, 1349), in nearly quant. yield; the other pyridinotriazoles undergo resinification. H. B.

Syntheses of drugs. IX. Benzthiazolecarbamides. H. P. Kaufmann [with P. Schultz and (in part) Wurl] (Arch. Pharm., 1935, **273**, 31—52).—p-$NH_2\cdot C_6H_4\cdot NHAc$ and $(SCN)_2$ (from NH_4SCN and Br) in AcOH give 1-*amino*-5-*acetamidobenzthiazole* (I), m.p. 239°, hydrolysed (dil. H_2SO_4) to the 1 : 5-$(NH_2)_2$-compound (II), m.p. 207°, which (diazo-reactions) affords 5-*chloro*-1-*aminobenzthiazole* (III), m.p. 198°, and 5-p-*aminobenzeneazo*-1-*aminobenzthiazole*, m.p. 245° [reduced by Sn–HCl to (II)]. 1-Amino-5-ethoxybenzthiazole (IV) and HCNO in $CHCl_3$ give the 1-*carbamate*, m.p. 289°; 1-*carbamates* of the following are similarly prepared: (III), m.p. 325°; (II), m.p. about 315°; α-naphthathiazole, benzthiazole, and (I), m.p. > 300°. $COCl_2$ affords NN′-*di*(*benzthiazolyl*-1-)*carbamide*, m.p. 325°, and its 5 : 5-Cl_2-derivative, m.p. 241°. By PhCNO in $CHCl_3$ are obtained N-*phenyl*-N′-*benzthiazolyl*-, sublimes > 200°, -5-*ethoxy*-, m.p. about 243°, -5-*chloro*-, m.p. > 325°, and -6-*nitro*-*benzthiazolyl*-1-*carbamide*, m.p. > 300°, and -α-*naphthathiazolyl*-1-*carbamide*, m.p. > 325°. Allyl thiocyanate yields N-5-*ethoxybenzthiazolyl*-1-N′-*allylcarbamide*, m.p. 185°. PhCNS gives N-*phenyl*-N′-*benzthiazolyl*-1-*thiocarbamide*, m.p. 207°, and its 5-*Cl*-derivative, m.p. 174°. The carbamides have very slight anæsthetic action, but (IV) is intermediate between cocaine and novocaine. R. S. C.

Cactus alkaloids. XII. Constitution of anhalamine. E. Späth and F. Becke (Ber., 1934, **67**, [*B*], 2100—2102).—Anhalamine (I) is treated with EtI and NaOEt and the product is acted on successively with Ag_2O and $KMnO_4$, whereby 4 : 5-dimethoxy-3-ethoxy-*o*-phthalic anhydride, m.p. 106—

107° after softening, is produced. (I) is therefore 8-hydroxy-6 : 7-dimethoxy-1 : 2 : 3 : 4-tetrahydro*iso*-quinoline. H. W.

Alkaloids of *Anabasis aphylla*. XI. Hofmann degradation of aphyllidine. A. Orekhov and S. Norkina [with T. Maximova] (Ber., 1934, 67, [*B*], 1974—1979; cf. A., 1932, 405).—Aphyllidine (I) is transformed by MeI in MeOH into the methiodide, m.p. 223—225°, $[\alpha]_D$ +9·8° in H_2O, converted by boiling KOH–MeOH into de-*N*-methylaphyllidine (II), m.p. 120—121°, $[\alpha]_D$ −18·1° in MeOH, the methiodide, m.p. 224—225°, of which passes when treated with KOH–MeOH into a mixture of bases (III), b.p. 230—238°/5 mm. Dissolution of (III) in HCl and treatment with $NaClO_4$ gives the sparingly sol. *perchlorate*, m.p. 180—182°, of the optically inactive *de*-N-*dimethylaphyllidine* (IV), b.p. 240—242°/5 mm. The corresponding *methiodide*, m.p. 121—122°, passes when treated with AgOH and then distilled into NMe_3 and hemiaphyllidene. Although a double linking has been shown to occur in (I), catalytic hydrogenation (PtO_2) of (II) leads only to *dihydrode*-N-*methylaphyllidine*, m.p. 118—120°, the *methiodide*, m.p. 234—235° (decomp.), of which is degraded to an oil of indefinite b.p., from which *dihydrode*-N-*dimethylaphyllidine*, b.p. 218—220°/5 mm., is obtained through the *perchlorate*, m.p. 209—210° [*methiodide* (V), m.p. 194—195°]; it is not hydrogenated (PtO_2) at 15—20°. It can also be obtained by hydrogenation (PtO_2) of (IV). Treatment of (V) with AgOH and subsequent distillation yields NMe_3 and *dihydrohemiaphyllidine*, b.p. 206—207°/8 mm., hydrogenated to *hexahydrohemiaphyllidine*, b.p. 206—207°/8 mm. (I) and CNBr in anhyd. C_6H_6 afford the *compound* $C_{16}H_{22}ON_3Br$, m.p. 116—117°, readily transformed (Zn dust–AcOH or H_2–Pd–$CaCO_3$) into the corresponding *cyanoamide*, hydrolysed with difficulty by 70% H_2SO_4 at 165—170° to a *substance*, m.p. 260—265°. H. W.

Composition of amorphous quinine iodobismuthates. G. Vita and L. Bracaloni (J. Pharm. Chim., 1934, [viii], **20**, 512—516; cf. B., 1932, 622).—The composition of quinine iodobismuthate prepared by the method of François and Seguin (A., 1925, i, 1084) varies with the ratio Bi/quinine in the reactants. The products corresponding with ratios 2·05 and 0·78 have the following % compositions: Bi, 25·8 and 21·01; quinine, 14·12 and 22·42; I, 57·4 and 56·2; H_2O, 0·19 and 1·30, respectively. A. E. O.

Modified cinchona alkaloids. I. *apo*Quinine and *apo*quinidine. T. A. Henry and W. Solomon (J.C.S., 1934, 1923—1929).—Quinine is demethylated by $AlCl_3$ (cf. Oberlin, A., 1927, 681) to crude "*apo*quinine," m.p. 175°, $[\alpha]_D^{18}$ −177° in MeOH, which is an equimol. mixture of $C_{19}H_{22}O_2N_2$ and $C_{19}H_{23}O_2N_2Cl$, preserved in a dihydrochloride, m.p. 225°, $[\alpha]_D^{20}$ +204·1° in H_2O, and a zincichloride, m.p. 242°. From the mixture by crystallisation from MeOH–$COMe_2$, chlorodihydro*apo*quinine (*H sulphate*, m.p. 205°, $[\alpha]_D^{15}$ −206·7° in H_2O) is obtained, and by crystallisation of the dianisoyl-*d*-tartrate, impure *apo*quinine acid dianisoyltartrate may be prepared. Pure quinine and 60% H_2SO_4 yield *apo*quinine, froths at 184°, $[\alpha]_D^{20}$ −281° in 0·1*N*-H_2SO_4, or −214·8° in EtOH, isolated as the hydrochloride, m.p. 265° $[\alpha]_D^{20}$ −154·5° in H_2O (cf. Jarzynski *et al.*, A., 1933, 1312), and a second component, possibly a stereoisomeride. The salts of *apo*quinine are *dihydrochloride*, m.p. 261°, $[\alpha]_D^{20}$ −224·4° in H_2O, *hydrobromide*, m.p. 284°, *dihydrobromide*, m.p. 255°, $[\alpha]_D^{15}$ −180·9° in H_2O, *H sulphate*, soft platelets, sinters 90° or 170—190°, and hard plates, m.p. 203—208°, $[\alpha]_D^{20}$ −193·6° in H_2O, and *acid dianisoyl*-d-*tartrate*, m.p. 235·5°. *apo*Quinine Me ether, m.p. 183—185° (no decomp.), $[\alpha]_D^{15}$ −201·2° in EtOH, forms a *hydrochloride*, m.p. 249—251°, $[\alpha]_D^{15}$ −196° in H_2O, and the Et ether, m.p. 195—197° (no decomp.), $[\alpha]_D^{15}$ −199·7° in EtOH, gives a *hydrochloride*, m.p. 247—250°, $[\alpha]_D^{15}$ −191·7° in H_2O.

Quinidine (99·5% pure) and 60% H_2SO_4 form dextrorotatory apo*quinidine* (70%) and isoapo*quinidine*, m.p. 245° (no decomp.), $[\alpha]_D^{15}$ +25·6° in 0·1*N*-H_2SO_4 or −12·6° in EtOH (*hydrochloride*, m.p. 255°, $[\alpha]_D^{15}$ −40·2° in H_2O; *dihydrobromide*, m.p. 280° $[\alpha]_D^{15}$ +18·6° in H_2O; and *H sulphate*, decomp. 235—240°, $[\alpha]_D^{15}$ +17·6° in H_2O), and not cupreidine as stated by Ludwiczakówna (A., 1933, 1312). M.p. are also decomp. points except where stated. F. R. S.

Eserine. III. Synthesis of *d*- and *l*-eserethole methiodide. T. Hoshino and T. Kobayashi (Proc. Imp. Acad. Tokyo, 1934, **10**, 564—567; cf. A., 1934, 667).—The substance, m.p. 79—80° [picrate, m.p. 150—151° (lit., 139—140°, 140—141°)], previously called *dl*-eserethole (A., 1934, 1236, 667), is $C_{16}H_{24}ON_2$ (macro-analyses are faulty), dl-*methyleserethole*. The following corrected data are given: H *d*-tartrates of *l*-, m.p 166—167°, $[\alpha]_D^{22}$ −73·9°, and *d*-dinoreserethole, m.p. 164—165°, $[\alpha]_D^{22}$ +235·1°, and of *l*- (I), m.p. 190—191°, $[\alpha]_D^{22}$ −53·3°, and *d*-noreserethole (II), m.p. 188—189°, $[\alpha]_D^{28}$ +202·1°. (I) and (II) with MeI in cold Et_2O give *l*- (III) and *d*-eserethole (IV) methiodide, m.p. 168—169°, respectively (mixed m.p. about 155°). The methopicrates of (III) and (IV) have m.p. 189° (mixed m.p. about 173°), the corresponding *dl*-derivative (V) having m.p. 190—191°. The picrate, m.p. 184—185° (*loc. cit.* and *ibid.*, 89), is dl-*noresereth-ole picrate*, the other product, m.p. 192—193°, being (V). The criticisms of Robinson *et al.* (*loc. cit.*) are refuted. R. S. C.

Organic arsenic compounds. XVII. Polymeric phenylarsenoxide and reactions of *m*-phenylenediarsinic acid. W. Steinkopf, S. Schmidt, and H. Penz (J. pr. Chem., 1934, [ii], **141**, 301—305).—Reduction (SO_2) of $PhAsO_3H_2$ in dil. H_2SO_4 gives PhAsO, m.p. 142—145° (lit. 119—120° to 145—147°), and (probably) the *dimeride*,

AsPh$<^{O}_{O}>$AsPh, m.p. 210—220° (converted by conc. HCl into $PhAsCl_2$). *m*-$C_6H_4(AsO_3H_2)_2$ is converted (usual method) into m-*phenylenedi*(*dichloroarsine*), m.p. 43·5° (previous sintering), which with MgMeBr gives m-*phenylenedi*(*dimethylarsine*), b.p. 140—141°/12 mm. This and CNBr in Et_2O afford m-*phenylenedi*(*dimethylarsine hydroxybromide*), *m*-$C_6H_4(AsMe_2Br{\cdot}OH)_2$, m.p. 161—162°. H. B.

Arsenical derivatives of organic sulphides. S. M. Scherlin and A. J. Jakubovitsch and (in part) L. Exemplarsky (Bull. Soc. chim., 1934, [v], **1**, 1367—1373).—$AsCl_3$ reacts with diazotised *p*-$NH_2{\cdot}C_6H_4{\cdot}SEt$ to give p-*ethylthiolphenylarsinic acid* (I), not melting

at 200°, reduced by SO_2–HCl to p-*ethylthiolphenyldichloroarsine*, m.p. 39·5—40°, re-oxidised by $CCl_3{\cdot}NO_2$ in EtOH–NaOH to (I). Oxidation of (I) with warm 30% H_2O_2, or with $KMnO_4$–AcOH, affords p-*ethylsulphonylphenylarsinic acid*, not melting at 280°, converted by SO_2-reduction into the corresponding *dichloroarsine*, m.p. 116—118·5°. With aq. H_3PO_2 the Na salt of (I) affords pp′-*diethylthiolarsenobenzene*. Similar diazotisation of p-$NH_2{\cdot}C_6H_4{\cdot}SCN$ in presence of $AsCl_3$ in MeOH–H_2SO_4 gives a 50% yield of *p*-thiocyanophenylarsinic acid, reduced by SO_2–HCl to p-*thiocyanophenyldichloroarsine*, b.p. 193—195°/7—8 mm., m.p. 55—56°; and with $AsPhCl_2$ in place of $AsCl_3$, *phenyl*-p-*thiocyanophenylarsinic acid*, m.p.138—139° (decomp.), is obtained, but reduction of this affords only $AsPhCl_2$ (oxidised to $PhAsO_3H_2$).

J. W. B.

Furan arsenicals. H. Gilman and W. H. Kirkpatrick (Proc. Iowa Acad. Sci., 1932, **39**, 176).—Furan arsenicals may be prepared from furan mercurials and $AsCl_3$, and from furan Grignard reagents and As halides. Ch. Abs. (*r*)

Methyl ester of phenylphosphorous acid. A. E. Arbuzov (J. Gen. Chem. Russ., 1934, **4**, 898—900).—$PPhCl_2$ and NaOMe yield a mixture of $PPh(OMe)_2$, b.p. 101—102°/15 mm. (*CuBr* salt, m.p. 139·5—140°), and *PPhMe·OMe*, b.p. 139—140°/15 mm. R. T.

Diphenyl- and di-*o*-tolyl-guanidinium polyselenides. R. L. McCleary and W. C. Fernelius (J. Amer. Chem. Soc., 1934, **56**, 2499).—Treatment of the solution from diphenylguanidine and H_2Se in air-free EtOH with Se (excess) gives *di*(*diphenylguanidinium*) *tetraselenide*, $C_{26}H_{28}N_6Se_4$, decomp. 152—156°; *di*(*di*-o-*tolylguanidinium*) *tetraselenide*, $C_{30}H_{36}N_6Se_4$, decomp. 170—174°, is similarly prepared. These are readily decomposed by dil. acids to H_2Se and amorphous black Se. H. B.

Lecithins of egg-yolk. Y. Yokoyama (Proc. Imp. Acad. Tokyo, 1934, **10**, 582—585).—The prep. of α- (I) and β-lecithin (II) from egg-yolk is described. (I) yields oleic (III) (72), clupanodonic (2), and *iso*palmitic (IV) (m.p. 57—57·5°; 26%) acids. (II) gives (III) and (IV) only. With Br (I) affords the *di*isopalmitate, cryst., *dioleate tetrabromide* ($3HgCl_2$-derivative, cryst.), and *oleate clupanodonate dodecabromide*, m.p. 180° (decomp.). (II) gives similarly the *oleate* isopalmitate *dibromide* ($3HgCl_2$-derivative, cryst.) and *dioleate tetrabromide*, m.p. about 2°. Photomicrographs are given. R. S. C.

Kephalin of egg-yolk. U. Nishimoto (Proc. Imp. Acad. Tokyo, 1934, **10**, 578—585).—Details are given for the purification of kephalins from egg-yolk and the prep. therefrom of *palmitodibromostearo*- (3X : $2HgCl_2$-derivative, m.p. 138—139°) and *-octabromoarachido-α-kephalin*, m.p. 173—175°, hygroscopic, and *palmitodibromostearo*- (3X : $2HgCl_2$-derivative, m.p. 132—133°), *palmito-octabromoarachido*-, m.p. 174—176·5°, and *dioctabromoarachido*-β-*kephalin*, m.p. 191—193°. Photomicrographs are given. R. S. C.

Hydrolysis of blood-albumin.—See this vol., 230.

Determination of copper in organic compounds.—See this vol., 186.

Colorimetric test for compounds containing CH, CH_2, or CH_3 contiguous to negative groups. M. Goswami, A. Shaha, and B. Mukerjee (J. Indian Chem. Soc., 1934, **11**, 773—775).—28 compounds containing CH, CH_2, or CH_3 adjacent to a negative group (usually CO) give red or brown colours with slightly alkaline, alcoholic picric acid. CH_2O, PhCHO, etc. give no colour. Bitto's reagents give similar colours. R. S. C.

Cyanide–formaldehyde reaction, and new volumetric analytical applications.—See this vol., 183.

Detection of diazonium salts and of primary amines with resorufin. H. Eichler (Z. anal. Chem., 1934, **99**, 348—350).—Slightly acid solutions of diazonium salts give with the brightly fluorescent resorufin (I) brown insol. products not fluorescing when made alkaline. Aromatic NH_2 groups may be detected by diazotising and then testing the solutions with (I). Free HNO_2 in diazo-solutions may be detected with Magdala-red (cf. A., 1934, 269). Fluorescein behaves like (I), but with certain diazonium salts only. J. S. A.

Micro-determination of carbonyl groups. F. von Falkenhausen (Z. anal. Chem., 1934, **99**, 241—257).—5—15 mg. of substance are allowed to react quantitatively at 100° with a weighed excess of $NHPh{\cdot}NH_2$,HCl in 67% aq. C_5H_5N; excess of $NHPh{\cdot}NH_2$ (I) is then decomposed by mixing with Fehling's solution+C_6H_6 at 100°, and the vol. of N_2 so evolved is measured in a micro-gas burette. An empirical correction for spontaneous decomp. of (I) must be introduced. The method fails with certain ketones. J. S. A.

Sensitive and specific reaction for ergosterol. J. Brückner (Biochem. Z., 1934, **274**, 465).—An addendum (A., 1934, 910). This reaction is obtained only when "acetonum puriss. Merck," and not when "acetonum pro analysi Merck" is used, and must depend on the presence of some impurity in the former solvent. P. W. C.

Acidimetric method for determining salicylic acid and its salts. C. N. Thomas (Praktika, 1933, **8**, 281—286; Chem. Zentr., 1934, ii, 811).—The free acid is extracted from acidified solutions of salts with Et_2O, and after removal of solvent is dissolved in H_2O and titrated with NaOH, using thymol-blue, until the pure yellow colour changes to bright green. A. G. P.

Exact analysis and characterisation of saponins. F. Ulzer and W. Haas (Pharmaz. Mh., 1934, **15**, 95—97; Chem. Zentr., 1934, ii, 1171).—Saponins may be characterised by the reducing power of the sugar obtained on hydrolysis with HCl. Other useful characteristics are the OH content, sap. val., and acidity. H. N. R.

Oxidation of rotenone by copper in an alkaline medium. R. M. Whittaker and I. Glickman (Rec. trav. chim., 1934, **53**, 1145—1150).—Application of the method used by Gnadinger *et al.* (B., 1929, 996) for pyrethrin to determine small amounts (0·01—0·02 g.) of rotenone (I) (*x* mg.) in 95% EtOH [free from other reducing substances (II), $CHCl_3$, or CCl_4]

is described. The (I) solution is treated as in a modified Folin's determination (A., 1926, 648) for glucose (III), and the solution compared colorimetrically with a similarly treated standard (III) solution (y mg.); then $y=0{\cdot}6195-0{\cdot}006858x+0{\cdot}008371x^2$. The accuracy is 0·2%. Owing to the presence of (II) the method is not applicable to the determination of the (I) content of derris root. J. W. B.

Argentometric determination of 2-thiolbenzthiazole. M. I. Uschakov and A. S. Galanov (Z. anal. Chem., 1934, **99**, 185—195).—The 2-thiolbenzthiazole (I) is dissolved in aq. NH_3, and excess of $AgNO_3$ added. Aq. NH_3 is added to dissolve other Ag salts, and the Ag salt of (I) then filtered off, dried at room temp., and weighed. Volumetrically, an excess of 0·1N-$AgNO_3$ is added to (I) in EtOH–NH_3 solution, followed by an equal vol. of Et_2O. Excess of $AgNO_3$ is titrated back with NH_4CNS. Alternatively, (I) may be titrated directly with $AgNO_3$, using dichlorofluorescein as adsorption indicator. J. S. A.

Detection of scopolamine and atropine in the presence of phenol. O. Frey (Wiss. Mitt. österr. Heilmittelstelle, 1934, **12**, 3—4; Chem. Zentr., 1934, ii, 1500).—The alkaloids are first extracted with Et_2O from alkaline solution. H. N. R.

Electrometric titration of lecithin and kephalin.—See this vol., 170.

Electrometric titration of zein and iodozein.—See this vol., 170.

Titration constants of some amides and dipeptides in relation to alcohol and formaldehyde titrations of amino-nitrogen.—See this vol., 170.

Biochemistry.

Carbon dioxide balance between maternal and fœtal bloods in goats. A. B. Keys (J. Physiol., 1934, **80**, 491—501).—Fœtal blood has a greater CO_2 capacity, alkali reserve, and CO_2 content, but is less acid than maternal blood. Ch. Abs. (*p*)

Solubility of oxygen in red blood-corpuscles. E. F. Yang (Chinese J. Physiol., 1934, **8**, 365—382).—The solubility of O_2 in blood-cells, after conversion of hæmoglobin into cyanohæmoglobin (I) by NO_2' and CN', follows Henry's law and is not affected by the p_H. The coeff. of O_2 absorption for horse-, sheep-, dog-, and cow-cells are 0·0228, 0·0259, 0·0272, and 0·0298, respectively. Since the val. for (I) solution is only slightly < that of H_2O, the high coeff. for the cells must be due to the presence of lipins. H. G. R.

Solubility of nitrogen in corpuscles. E. F. Yang (Chinese J. Physiol., 1934, **8**, 383—397).—The coeff. of the absorption of N_2 for the cells of horse, dog, and sheep are 0·0100, 0·0151, and 0·0120, respectively. Some dialysable substance in blood (I) gives a high and variable val. for the coeff. in whole (I) and in serum. H. G. R.

Hæmoglobin and blood-cell relations as determined by iron and oxygen capacity methods. G. O. Broun and A. P. Briggs (J. Lab. Clin. Med., 1934, **19**, 886—892).—Average vals. for men and women, are, respectively, hæmoglobin 16·6, 14·0 g. per 100 c.c.; cell vol. 46·57, 40·3%. Ch. Abs.

Osmotic behaviour of red cells. I, II. E. Ponder (Cold Spring Harbor Symp. Quant. Biol., 1933, **1**, 170—177, 178—183).—I. The erythrocyte vol. is unchanged in an isotonic solution of NaCl, KCl, or glucose. In a hypertonic solution they shrink <, and in a hypotonic solution they swell <, calc.

II. Erythrocytes from different animals have different crit. vols. Human or rabbit cells are more resistant to distension than ox or sheep cells. The cell membrane is regarded as a fluid or semi-fluid film the permeability of which is governed by a few layers of mols. Ch. Abs.

Osmotic properties of the erythrocyte. V. Rate of hæmolysis in hypotonic solutions of electrolytes. M. H. Jacobs and A. K. Parpart (Biol. Bull., 1932, **63**, 224—234).—Within certain limits the rate of hæmolysis (I) of ox-blood and the concn. of the solution are related by simple osmotic laws. The permeability const. for H_2O in these limits is $\frac{1}{2}$—$\frac{1}{3}$ of that for non-electrolytes. Retardation of (I) by dil. solutions of electrolytes increases rapidly with the valency of the cations present. Ch. Abs. (*p*)

Osmotic pressure and mol. wt. of the hæmoerythrin of *Sipunculus*. A. Roche and J. Roche (Compt. rend., 1934, **199**, 1678—1680).—Determination of the mol. wt. of the hæmoerythrin by the method of Adair (A., 1925, ii, 965) ($M=10RT/\pi_0$; π_0=val. of the osmotic pressure/concn. extrapolated to infinite dilution) is approx. 66,000, *i.e.*, of the same order as that of the hæmoglobins. Dialysis of the cryst. pigment at 0° increases the mol. wt., probably due to aggregation. J. W. B.

Prosthetic group of *Limulus* hæmocyanin. J. B. Conant, F. Dersch, and W. E. Mydans (J. Biol. Chem., 1934, **107**, 755—766).—The prosthetic group (I) formed by decomp. of the hæmocyanin by alkali, followed by purification by dissolution in AcOH, is a black substance containing 14% Cu and 6% S. (I) with aq. NH_3 yields a Cu-free, colourless, amorphous polypeptide (II) from which tyronine and *l*-leucine were isolated. (II) is probably composed of 3 mols. of serine + 1 each of leucine and tyrosine. (I) is the Cu salt of (II) (viz., $C_{24}H_{35}O_{10}N_5Cu$) united to a S-containing substance, probably $C_7H_{15}O_5N_2S_2$. The same kind of (I) is also present in octopus hæmocyanin (cf. A., 1931, 497, 753). A. E. O.

Ammonia formation and respiration in the erythrocytes of birds. A. A. Baev (Compt. rend. Acad. Sci. U.R.S.S., 1934, **4**, 69—73).—Pigeon erythrocytes in Ringer's solution containing glucose liberate 40×10^{-6} g. of NH_3-N per c.c. of cells per hr. when respiration is restricted by small amounts of HCN, CO, and phenylurethane, or a N_2 atm., the

normal rate being 0·25—2×10^{-6} g. per hr. The restriction has a similar effect on dephosphorylation. Most of the NH_3 is formed in the first hr. The $N:H_3PO_4$ ratio is variable (0·5—0·25). J. L. D.

Influence of bone-marrow extract of normal and splenectomised animals on the synthesis of hæmoglobin. V. Baena (Biochem. Z., 1934, **274**, 358—361).—The view that bone-marrow extract (I) contains a factor which accelerates the synthesis of hæmoglobin *in vitro* is confirmed, and it is shown that (I) of splenectomised has a greater effect than (I) of normal animals. This confirms the view that the spleen exerts an inhibitory action of the function of the marrow. P. W. C.

Detection of true nucleal substance in thrombocytes. K. Voit and H. Kempa (Z. Biol., 1934, **95**, 635—638).—Thymonucleic acid is detectable in the blood-platelets of men and horses by Feulgen's nucleal reaction (A., 1924, i, 905). F. O. H.

Blood-proteins of children. Distribution of total nitrogen in whole blood, red blood-cells, and serum-proteins from the same specimen. A. Bernhard, J. S. Leopold, and I. J. Drekter (Amer. J. Dis. Children, 1934, **47**, 1256—1260).—The N contents of whole blood (I), red cells (II), and serum (III) are recorded. Vals. for (I) and (II) are < and for (III) > in adults. Ch. Abs. (*p*)

Refractometric determination of serum-proteins. M. Paić and V. Deutsch (Compt. rend., 1934, **199**, 1306—1308).—A modification of Reiss' method is described. Changes in *n* with temp. of serum are substantially the same as those for H_2O. A. G. P.

p_H of heat-inactivated serum. P. L. du Noüy and V. Hamon (Compt. rend. Soc. Biol., 1934, **117**, 337—338).—When heated above 56° the p_H falls to a min., usually at 60°, after which it fluctuates feebly, in some cases rising again. The mean initial fall is 0·05. R. N. C.

Hydrolysis of blood-albumin by autoclaving in 2% potassium carbonate solution. V. S. Sadikov, V. Rozanova, and G. Novoselova (Compt. rend. Acad. Sci. U.R.S.S., 1934, **4**, 217—221).—Hydrolysis for 2 hr. at 180° with 2% K_2CO_3 yields a small proportion of free NH_2-acids, with a predominance of heterocyclic and *cyclo*peptide material, the latter being removed by extraction with Et_2O and $CHCl_3$. 24·14% of the total N was lost as NH_3 and amines. H. G. R.

Clearing agent for blood. Application to determination of blood-sugar. M. Paget and Dupont (Compt. rend. Soc. Biol., 1934, **117**, 881—882).—Blood is deproteinised by a mixture of suitable concns. of $K_4Fe(CN)_6$ and $Zn(OAc)_2$. The clear solution contains the sugar, which reduces Baudouin's solution. R. N. C.

Indirect bilirubin of serum and its extraction by chloroform. Techniques proposed by de Castro, and by Kerpola and Leikola. B. Varela-Fuentes, C. Viana, and P. Recarte (Compt. rend. Soc. Biol., 1934, **117**, 903—908).—Extraction with $CHCl_3$ of the indirect bilirubin of both normal and icteric sera is incomplete, even when continued to exhaustion. It becomes completely extractable if Na_2SO_4 solution is added to the serum. There are no definite grounds for postulating two different indirect bilirubins. R. N. C.

Micro-determination of cholesterol in whole blood, serum, and plasma. J. Kamlet (J. Lab. Clin. Med., 1934, **19**, 883—884).—0·2 c.c. is dried on filter-paper at 35—40° for 20—30 min., and extracted for 2 hr. at room temp. with $CHCl_3$ (10 c.c.). The Liebermann–Burchard procedure is then used. Ch. Abs.

Control of blood-cholesterol by the kidney. H. Miyazaki (J. Chosen Med. Assoc., 1934, **24**, 263—277).—Injection of 2 c.c. per kg. of renal venous blood-serum of a normal rabbit into another rabbit causes a fall in blood-cholesterol; arterial blood or auricular venous blood-serum causes no change. The action is due to a hormone secreted from the epithelium of the kidney tubules. The hormone reduces hypercholesterolæmia in experimental nephritis or nephrectomy. Ch. Abs.

Determination of uric acid in human, bovine, and avian blood. G. H. Pritham and A. K. Anderson (J. Lab. Clin. Med., 1934, **19**, 892—896).—Any method involving isolation of uric acid is satisfactory for human or avian blood. Benedict's direct method and Folin's method for unlaked blood are satisfactory; for bovine blood Folin's direct method is preferred. Ch. Abs.

Electrodialysis as method of separation and determination of bases in biological fluids. II. Determination of total bases in blood, serum, and erythrocytes. N. P. Meschkova and S. E. Severin (Z. physiol. Chem., 1934, **230**, 114—121).—The cathode fluid obtained from protein-free (using a limited amount of $CCl_3{\cdot}CO_2H$) blood (2 c.c.), erythrocytes (2 c.c.), and serum or plasma (1 c.c.) is treated with 0·01*N*-H_2SO_4 (excess of which is then determined iodometrically). The error is ± 2%. H. B.

Electrolytes in the serum of the rat. P. K. Smith and A. H. Smith (J. Biol. Chem., 1934, **107**, 673—680).—Vals. are recorded for the concn. of CO_2, Cl, inorg. PO_4''', Ca, Mg, K, Na, and protein in the serum of albino rats. The Ca, Mg, and PO_4''' are > and the Na, HCO_3', and protein < in man. C. G. A.

Physical chemistry of the blood. D. D. Van Slyke (Cold Spring Harbor Symp. Quant. Biol., 1933, **1**, 184—189).—Plasma and lymph contain about 18 times as much $Na^{\cdot}$ as $K^{\cdot}$; cellular tissues have a relative excess of $K^{\cdot}$. $Na^{\cdot}+K^{\cdot}$ (I) in blood and tissue cells is a little > in blood-plasma. 0·33—0·75 of (I) in the cell is neutralised by complex acids which are buffered and indiffusible colloids. The ratio cell-: serum-Cl' is < 1 by an amount which ∝ the amount of base as hæmoglobinate in the cells. Ch. Abs.

Blood-calcium and -magnesium of the cow in health and disease. W. M. Allcroft and H. H. Green (Biochem. J., 1934, **28**, 2220—2228).—The normal range of serum-Ca and -Mg in 139 clinically healthy cows is 8·65—11·65 mg. and 1·85—3·17 mg. per 100 ml., respectively. No marked change occurs

in cases of *Brucella abortus* infection, but in advanced generalised tuberculosis hypomagnesæmia (I) occurs. (I) is associated with lactation tetany (II) and hypocalcæmia with milk fever. The Ca/Mg ratio is not the determining factor of (II). C. G. A.

Relation between the ossification of the skeleton and the state of the blood-calcium of fish. M. Fontaine (Compt. rend., 1934, **199**, 1452—1454).—The proportion of blood-Ca which is adsorbable on $BaSO_4$ is greater for fish with much ossified cartilage than for those with little, and within the latter class greater for those with much cartilage than for those with little. R. S. C.

Blood-iodine. II. Normal iodine content of human blood. C. B. Davis, G. M. Curtis, and V. V. Cole (J. Lab. Clin. Med., 1934, **19**, 818—830).—I is a const. constituent of human blood (normally 12×10^{-6} g. per 100 c.c.). Vals. in summer are > in winter. Ch. Abs.

Blood-iodine content of normal and thyrotoxic individuals. Iodine-tolerance test. H. J. Perkin, B. R. Brown, and J. Lang (Canad. Med. Assoc. J., 1934, **31**, 365—368).—Blood is heated with K_2CO_3 in a Ni crucible at 260° for 5 hr. The ash is extracted with EtOH, filtered, and the filtrate evaporated to dryness. The residue is dissolved in H_2O, I′ is oxidised to IO_3', and the latter determined by treatment with KI and titration with $Na_2S_2O_3$. Ch. Abs. (*p*)

Is thrombin a calcium compound? O. Kastl (Biochem. Z., 1934, **274**, 452—460).—The view of Loucks and Scott (A., 1930, 802) that thrombin (I) is a "Ca–tissue-juice" compound, inactivatable by decalcification with $H_2C_2O_4$, is not confirmed. Moreover, the method employed by these authors is now known not to lead to complete decalcification. (I) preps. obtained from sera rigorously decalcified by the more recent techniques of Kramer–Tisdall and of Schimmelpfeng have the same activity as (I) from Ca-containing serum. P. W. C.

Effect of hydrogen ions and thrombase on the coagulation of fibrinogen.—See this vol., 165.

Opacification reaction in the serum of sensitised rabbits. P. Vallery-Radot, G. Mauric, and A. Hugo (Compt. rend. Soc. Biol., 1934, **117**, 1091—1093).—The opacifying power (I) of rabbits' serum is affected to different degrees in different animals by sensitising with horse-serum. There is no connexion between (I) and the appearance or non-appearance of anaphylactic shock. R. N. C.

Opacification reaction and precipitins in the sensitised rabbit. P. Vallery-Radot, G. Mauric, and A. Hugo (Compt. rend. Soc. Biol., 1934, **117**, 1093—1095).—There is no parallelism between the sensitised state and the appearance of precipitins. R. N. C.

Reversibility of certain metalloprotein precipitations by the action of sodium thiosulphate. Serological behaviour of the complexes from hæmolytic and syphilitic sera. H. Diacono (Compt. rend., 1934, **199**, 1686—1687).—The pptd. metalloprotein complexes formed by addition of 0·1% $HgCl_2$ or $CuSO_4$ to hæmolytic and syphilitic sera contain the antibodies (only the alexin being destroyed), and are completely sol. in 10% $Na_2S_2O_3$, the solution so obtained exhibiting the same biological properties as the original serum. J. W. B.

Excretion of antibody through the urine. O. Suzuki (Sei-i-Kwai Med. J., 1933, **52**, No. 9, 31—40, 41—62).—Excretion through the urine and intestinal fluid is the main cause of loss of antibody from the serum. Ch. Abs.

Inactivation of the third component of alexin by yeast. O. Bier (Compt. rend. Soc. Biol., 1934, **117**, 720—722).—Guinea-pig serum (I) peptonised with physiological salt solution and treated with a yeast suspension at 37° lost the third component of the alexin. Under the same conditions (I) peptonised with KI remained active. A. L.

Magnetic properties of animal fibrous tissues. H. G. Clamann (Z. Biol., 1934, **95**, 639—640).—Whilst celluloid and cocoon-fibres are paramagnetic, wood, aq. and dry gelatin, neck-fibres, tendons, liver, bone, spleen, hair, fibrin, muscle, and powdered fibrinogen are diamagnetic. F. O. H.

***X*-Ray spectrographic structure investigations on biological objects and human tissues.** E. Saupe (Kolloid-Z., 1934, **69**, 357—363).—A lecture. E. S. H.

***X*-Ray diffraction studies on nerve.** F. O. Schmitt, G. L. Clark, and J. N. Mrgudich (Science, 1934, **80**, 567—568).—*X*-Ray photographs indicate a fundamental similarity between the fine structure of the axis cylinder of nerve and other fibres such as hair, tendon, and muscle. Details of the patterns are discussed in relation to their possible chemical significance. L. S. T.

Cyto-chemistry of incinerated nerve-cells. J. Kruszynski (Bull. Acad. Polonaise, 1934, **B**, 105—116).—Paraffin sections (≯ 3 μ) of nerve-tissue (fixed with 85—90% EtOH) are mounted in the usual manner, and the slide is heated to give the ash-picture ("spodogram") of the cell-structure formed by its mineral constituents. Subsequent treatment with 2% H_2SO_4, 10% H_2PtCl_6, Na_2HPO_4, or NH_4SCN indicates the distribution of Ca, K, Mg, and Fe, respectively. F. O. H.

Chromosome behaviour in terms of protein pattern. D. M. Wrinch (Nature, 1934, **134**, 978—979).—An attempt to correlate the properties of chromosomes and the facts of genetics with protein structure. L. S. T.

New fixing-mixtures revealing the morphology of chromosomes. G. A. Levitski (Compt. rend. Acad. Sci. U.R.S.S., 1934, **4**, 143—144).—A no. of new CH_2O fixing-mixtures are described. H. N. R.

Approximate determination of proteins of muscle. E. C. Smith (J.S.C.I., 1934, **53**, 351—354T).—The minced muscle is extracted 6 times at 0° with 10% aq. NH_4Cl. Myosin (I) is determined by pptn. from the extract by dilution with 19 parts of H_2O, a correction being applied for the amount of (I) remaining in solution [12% of the total (I)]. Collagen in the residue after extraction is converted

into gelatin (II) by autoclaving at 121° for 2 hr. (II) is extracted with boiling H_2O, and the residue is digested with trypsin to remove and determine residual intracellular protein. The final residue consists of elastin (cf. B., 1927, 264). Typical analyses of rabbit- and ox-muscle are given. E. C. S.

Determination of lactic acid in muscle. C. P. Stewart, J. P. Dickson, and R. Gaddie (Biochem. J., 1934, **28**, 1945—1948).—AcCHO should be removed by distillation prior to treatment with $CuSO_4$+CaO for removal of sugar, otherwise the lactic acid content found by oxidation with $KMnO_4$ to MeCHO will be too high. $CuSO_4$+CaO convert AcCHO into a substance oxidised by $KMnO_4$ to MeCHO (2 : 4-dinitrophenylhydrazone, m.p. 161°; not 148° as in lit.) and other substances which combine with $NaHSO_3$. A. E. O.

Combined or free potassium in muscle. E. Ernst and J. Fricker (Pflüger's Archiv, 1934, **234**, 360—368).—An aq. $COMe_2$ extract of a frog's gastrocnemius (I), rendered rigid by heat or electrically stimulated, contains a proportion of the muscle-K > that extracted from a similar (I) frozen immediately after excision, suggesting that muscle-K is converted into a more diffusible form by heat-rigor (II) or fatigue (III). The increases in diffusible K correspond with 0·10% of total alkali calc. as NaCl in (II), and 0·05% in (III). R. N. C.

Pentose polynucleotide of the pancreas. E. Jorpes (Biochem. J., 1934, **28**, 2102—2108).—The substance has a pentanucleotide structure containing 3 mols. of purine pentose nucleotides and 2 mols. of pyrimidine nucleotides. It contains 2 mols. of guanylic acid (I) per mol. of adenylic acid. The titration curve of pancreas nucleic acid (II) is similar to that of thymus (II), showing that the substance is not a mixture of (I) with yeast (II). H. G. R.

Determination of adenine in the presence of guanine. E. Jorpes (Biochem. J., 1934, **28**, 2097—2101).—Guanine is oxidised by $KMnO_4$ in acid solution, determinations of purine-N being made before and after the reaction by pptn. with Cu H sulphite reagent. H. G. R.

Vitreous body. I. W. S. Duke-Elder, E. B. Robertson, and H. Davson (Biochem. J., 1935, **29**, 72—75).—The vitreous body (I) does not show uptake of H_2O at p_H 8, nor does swelling occur in presence of 1% Na oleate or Na laurate. This does not eliminate swelling of (I) as the cause of intraocular pressure in glaucoma simplex, as the behaviour of (I) is different *in vivo* and *in vitro*. C. G. A.

Polysaccharide of the vitreous humour. K. Meyer and J. W. Palmer (J. Biol. Chem., 1934, **107**, 629—634).—A polysaccharide of high mol. wt. has been obtained from the vitreous humour of cattle eyes by pptn. with $COMe_2$ and fractionation from acid EtOH. It has an acid equiv. approx. 450 and a dissociation const. $4{\cdot}58\times10^{-5}$ at 32°. It contains a uronic acid, an NH_2-sugar, and a pentose. Galactose is absent. C. G. A.

Determination of copper in the aqueous humour. I. I. Nitzescu and I. Georgescu (Compt. rend. Soc. Biol., 1934, **117**, 1135—1137).—Cu is determined either by the C_5H_5N–thiocyanate (I) or the chromotropic method (II). In (I), the liquid, after centrifuging, is incinerated (wet) with HNO_3 and H_2SO_4, and the clear neutral solution treated with NH_4CNS and C_5H_5N. The green $Cu(C_5H_5N)_2(CNS)_2$ complex is extracted with $CHCl_3$ and determined colorimetrically. In (II) the Cu is titrated with nitrosochromotropic acid, a colorimeter being employed to determine the end-point. Aq. humour contains 0·14—0·18 mg. Cu per litre. R. N. C.

Antiscorbutic action of the eye lens and its reductone and thiol content. H. von Euler and M. Malmberg (Z. physiol. Chem., 1934, **230**, 225—230; cf. A., 1933, 1090).—The no. of mg. of ascorbic acid (I), determined by titration with 2 : 6-dichlorophenol-indophenol at p_H 2·5 [at p_H 5·5—6·5, (I)+SH-compound is found], in 1 g. (unless stated otherwise) of lens (II) from the following are: human, 0·2; human (cataract), 0—0·5 per (II); ox (III), 1 per (II); *Salmo salar*, 1·04; *Gadus minutus*, 0·53; *G. callarius*, 0·48; *G. merlangus*, 0·45; *Labrus exoletus*, 0·32. The presence of (I) in (III) is confirmed by biological tests. (III) appear to contain a substance which is toxic to guinea-pigs. Administration of $C_{10}H_8$ and 2 : 4-$(NO_2)_2C_6H_3$·OH to rabbits does not affect the (I) content of the (II). H. B.

Variations in glycogen and accompanying substance of active and hibernating snails. L. Semichon (Compt. rend. Soc. Biol., 1934, **117**, 774—775).—The glycogen (I) content of the vesicular cells of conjunctive tissue of snails approaches zero during hibernation, whilst the hyaline substance accompanying (I) remains more const. F. O. H.

Galactogen. VII. Galactogen and glycogen contents of starved snails. VIII. Detection of galactogen in animals and man. F. May (Z. Biol., 1934, **95**, 606—613, 614—634).—VII. During starvation of vineyard snails, galactogen (I) is converted into glycogen (cf. A., 1933, 380).

VIII. (I) occurs in the eggs [36% of the total polysaccharides (II)] of snails (*Limacidæ*), in the sexual glands (51·8%) of fresh-H_2O mussels (*Anodonta*), in carp's roe (1·2, 9·84%), in adult (but not young) rabbits (7%) after removal of ovaries, uterus, brain, mammary glands, and liver [all of which are free from (I)], and in human placenta (approx. 1%). Traces of (I) occur in the carp before maturation of the ova; organs other than the ovaries are approx. free from (I). The nature and function of (II) in the organism are discussed. F. O. H.

Liver-glycogen. Blood-sugar level. M. C. Hrubetz and L. B. Dotti (J. Biol. Chem., 1934, **107**, 731—733).—Correlation coeffs. are calc. for liver-glycogen, liver-wt., and body-wt. Blood obtained by decapitation has a sugar content significantly > blood obtained by venesection. A. E. O.

Spreading of complex proteins.—See this vol., 161.

Substance resembling acetylcholine in adrenals and other organs. F. Plattner (Pflüger's Archiv, 1934, **234**, 258—263; Chem. Zentr., 1934, ii,

1149).—Repeated evaporation of solutions does not cause loss of acetylcholine (I). The (I) of a cat adrenals is not increased by stimulation of the splanchnic nerve. The brain, pituitary, and lachrymal glands contained $1—4\times10^{-6}$ g. of the substance per g. Smaller amounts occur in spleen and liver. A. G. P.

Choline or acetylcholine content of human placenta. E. Strack, H. Geissendörfer, and E. Neubaur (Z. physiol. Chem., 1934, **229**, 25—36).—Only a small amount of choline is present in the placenta before parturition, but this is considerably increased on interruption of the blood-flow, and the choline content becomes greater the longer the placenta remains in the uterus. J. H. B.

Hydrocarbon in basking shark. I. M. Tsujimoto (J. Chem. Soc. Japan, 1934, **55**, 702—741).—Isolation is described of an unsaturated *hydrocarbon*, "zamene," $C_{18}H_{36}$, d_4^{20} 0·8006, n_D^{20} 1·4500, I val. 78·4. Ch. Abs. (*p*)

Hydrocarbons of pig liver. H. J. Channon, J. Devine, and J. V. Loach (Biochem. J., 1934, **28**, 2012—2025).—The unsaponifiable matter from 63 kg. of pig liver yielded 52 g. of a sterol-free oil which was fractionated by Et_2O and MeOH into an insol. fraction (I) of I val. 266 and a sol. fraction (II) of I val. 140. (I) yielded 70% of an unsaturated hydrocarbon (29 mg. per 100 g. of liver), $C_{45}H_{76}$ or $C_{50}H_{84}$, from which the bromide and hydrochloride were prepared. 10% of (I) consists of a saturated hydrocarbon not yet obtained pure and a further 10% of a compound containing O. (II) contains a third hydrocarbon with one double linking reacting with I. C. G. A.

Body-fats of the pig. IV. Progressive hydrogenation as an aid in the study of glyceride structure. T. P. Hilditch and W. J. Stainsby (Biochem. J., 1935, **29**, 90—99).—The increase of fully saturated glycerides in pig, ox, and sheep depôt-fats and cow milk-fats, in which the total content of saturated fats progressively increases, is very similar to that displayed by pig back-fat (I) artificially hydrogenated to varying stages of saturation. (I) contains about 15% of tri-C_{18}-glycerides, other than tristearin, which is absent, probably consisting mainly of stearodioleins. The monopalmito-compounds are largely, or solely, β-palmitoglycerides. Palmito-di-unsaturated compounds (chiefly palmitodiolein) constitute 42—57% of the fat, and palmitostearo-oleins 21—36%. C. G. A.

Abdominal fat of the Western range horse. H. A. Schuette, T. M. Garvin, and E. J. Schwoegler (J. Biol. Chem., 1934, **107**, 635—639).—The acids of the glycerides of the abdominal fat contain the following: palmitic 26·28%, stearic 4·50%, oleic 46·86%, linoleic 11·88%, and linolenic 4·48%. No heptadecoic acid was present. C. G. A.

Toxic components of fish liver-oils. K. Kawakami and I. Yamamoto (Bull. Inst. Phys. Chem. Res., Tokyo, 1934, **13**, 86—88).—Liver-oil toxins are of three kinds, *A*, *B*, and *C*. *A* occurs in the saponifiable fraction and causes nutritive disturbances. *B* and *C* occur in the unsaponifiable fraction. *B* causes cramp in rats, when injected subcutaneously; it is obtained in highly conc. form, b.p. 120—140°/5 mm. (C 75·45, H 10·65%), free from vitamin-*A*, and unaffected by fuming HNO_3 at 130°. The *B* contents of 14 oils are given. The toxic action of *A* is destroyed by hydrogenation (I), but that of *B* is unaffected by (I), oxidation, or saponification. *C* is narcotic. *Paralithodes camschatica* liver-oil contains *C* and possibly *A*; the body-fat of sardines contains only *A*. Cod-liver oil contains *A*, *B*, and C. R. S. C.

Fatty acids of the phosphatides of ox adrenals. W. C. Ault and J. B. Brown (J. Biol. Chem., 1934, **107**, 607—614).—The fatty acids of the phospholipins of ox adrenal have been fractionated by way of the Me esters, and pure palmitic, stearic, and arachidic acids isolated. Some myristic acid may be present. The principal unsaturated acids are oleic and arachidonic, the latter being present to the extent of 22%. C. G. A.

Lecithin and kephalin of egg-yolk.—See this vol., 228.

Flavin content of animal tissues under different conditions. A. J. Charit and N. W. Khaustov (Biochem. J., 1935, **29**, 34—37).—The tissue is washed with H_2O, extracted with aq. MeOH (1 : 3), and the solution extracted with $CHCl_3$. The MeOH solution is compared colorimetrically with a standard K_2CrO_4 solution. The method is not applicable to blood and tissues containing yellow pigments. The distribution of flavin in the tissues of the rabbit and cat is determined, and agrees with the results of Euler and Adler (A., 1934, 544). A small decrease occurs in the liver-flavin (I) of rats deficient in vitamin-*A*; neither avitaminosis-*C* nor a rich protein diet influences the (I) of rats. H. D.

Constitution of pectenoxanthin. E. Lederer (Compt. rend. Soc. Biol., 1934, **117**, 411—413).—The cryst. material, $C_{40}H_{54(\pm2)}O_3$, has the properties of a xanthophyll; it contains 11 double linkings and 2 OH. It is very similar to β-carotene, but does not act as provitamin-*A*. H. G. R.

Carotenoids of three *Ascidiæ* (*Halocynthia papillosa*, *Dendrodoa grossularia*, *Botryllus Schlosseri*). E. Lederer (Compt. rend. Soc. Biol., 1934, **117**, 1086—1088).—*H. papillosa* contains a hypophasic ester of astacene (I), m.p. 228—230° (large band at 500 mμ in C_5H_5N), and a xanthophyll, *cynthiaxanthin*, m.p. 188—190° (bands at 517, 483, 452 mμ in CS_2), which resembles zeaxanthin closely, but differs in adsorbability. *D. grossularia* contains an epiphasic ester of (I), m.p. 230° (large band at 500 mμ in C_5H_5N). *B. Schlosseri* contains capsorubin, capsanthin, and pectenoxanthin. Carotenes are present only in traces in all three species. R. N. C.

Yellow pigment of the thalamo-subthalamic region. G. Roussy and M. Mosinger (Compt. rend. Soc. Biol., 1934, **117**, 1054—1056).—A yellow pigment of the lipochrome type is present in varying quantities in certain parts of the thalamus and hypothalamus in adult man. R. N. C.

Origin of the colours in the plumage of birds. C. V. Raman (Proc. Indian Acad. Sci., 1934, **1**, **A**, 1—7).—Observations on the feathers of a jay, *Coracias indica*, show that the tints may range over the whole

spectrum; a simple Tyndall effect explanation is thus insufficient. Possible explanations are discussed. N. M. B.

Micro-chemistry of the pigmentation of the ear-lobes of the cock. R. Louvier (Compt. rend. Soc. Biol., 1934, **117**, 328—330).—The situation and staining reactions of the typical granular pigmentation (due to purine bases) are described. F. O. H.

Occurrence of iron in the milk glands of the rat and the mouse. A. Schultz (Arch. Gynäkol., 1934, **155**, 479—489; Chem. Zentr., 1934, ii, 977).—Microscopical examination shows the presence in the milk glands of rats and mice of Fe, which disappears during pregnancy and lactation. R. N. C.

Chemical constitution of bone salts of healthy and rachitic animals. (A) R. Klement. (B) J. Marek, O. Wellmann, and L. Urbányi (Z. physiol. Chem., 1934, **229**, 22—24, 24).—(A) Polemical against Marek *et al.* (A., 1934, 1133).
(B) A reply. J. H. B.

Chemical composition of teeth. I. Determination of fluorine: fluorine content of normal teeth. J. H. Bowes and M. M. Murray (Biochem. J., 1935, **29**, 102—107).—F as determined by the Zr–alizarin method constitutes 0·02% of the human enamel in the London area. The teeth of rats fed on a diet not designed to be F-free contained 0·02—0·03% of F. C. G. A.

Copper content of teeth. E. Tiede and H. Chomse (Ber., 1934, **67**, [*B*], 1992—1995).—The supposition that the discoloration observed in the residue (I) obtained by strongly igniting teeth in air is due to the presence of minute amounts of Cu is supported by the prep. of similar materials from hydroxyapatite containing Cu (100,000 : 1). Further, addition of (I) to pure ZnS leads to ZnS–Cu phosphors. Electrolysis of a solution of (I) in 7% HNO_3 gives Cu, $1{\cdot}2\times10^{-5}$ g. of which is obtained from 1 g. of ox tooth. H. W.

Luminescence of teeth. E. Tiede and H. Chomse (Ber., 1934, **67**, [*B*], 1987—1992).—Addition of traces of activating metals to hydroxyapatite (I), $Ca_{10}(OH)_2(PO_4)_6$, followed by ignition of the products at 430° or 710° does not lead to preps. with luminescent properties comparable with those of natural teeth (II). Addition of small amounts of glycine, tyrosine, hippuric acid, leucine, gelatin, or collagen from teeth to (I) gives materials the luminescence of which is greatly increased by heating at 430° and then very closely resembles that of (II). The colour depends less on the added substance than on the temp. and experimental conditions. Extraction of (II) with alkaline glycerol does not remove org. matter sufficiently to inhibit luminescence; this effect is produced by H_2O_2–NH_3. Treatment of (II) with 8% HCl removes inorg. matter, leaving collagen, which fluoresces and phosphoresces even when dried. Fatty matter in (II) is not concerned with luminescence. H. W.

Bromine in tissues. T. F. Dixon (Biochem. J., 1934, **29**, 86—89).—The Br content of blood and pituitary is variable and is thought to be dependent on food intake. There is no evidence of a Br-containing pituitary hormone, nor that Br metabolism is a factor in mental disease. C. G. A.

Deterioration of shells when stored in oak cabinets. J. R. Nicholls (Chem. and Ind., 1934, 1077—1078).—Traces of AcOH emitted from oak attack shells on which they are absorbed by moisture collected on hygroscopic sea-salt. C. W. G.

Composition of amniotic fluid. A. R. Tankard, D. J. T. Bagnall, and F. Morris (Analyst, 1934, **59**, 806—808).—The *d*, acidity, p_H, and f.p., and the % of total solids, ash, Cl, albumin, and urea, are given. E. C. S.

Modes of stimulation of gastric secretion. B. P. Babkin (Nature, 1934, **134**, 1005).—A summary. L. S. T.

Influence of temperature on the conductivity of milk. E. Messner (Compt. rend. Soc. Biol., 1934, **117**, 897—899).—Empirical equations are given for calculating the sp. conductivity at 25° from that observed at any different temp. R. N. C.

Combination curves, hydrogen-ion regulating powers, and equivalents of lactalbumin and its non-identity with serum-albumin. S. E. Woods (Biochem. J., 1934, **28**, 2034—2038).—Titration curves show that lactalbumin (I) is not identical with serum-albumin (II). (I) requires less acid to bring it to a given p_H than either (II) or ovalbumin. Above p_H 10·5 the buffering power of (I) is > that of (II). C. G. A.

Extraction from urine of a substance possessing the biological properties of Oriel's "substance *P*." H. Thiers (Compt. rend. Soc. Biol., 1934, **117**, 940—943).—Oriel's method is modified. Urine is acidified, shaken with ⅓—½ its vol. of Et_2O, and left for ½ hr. The Et_2O is evaporated at 50° and coagulated mucus removed by centrifuge. The liquid is treated with 5 vols. of EtOH, and then with Na_2CO_3 until alkaline to phenolphthalein. The ppt. is separated by filtration after 10 min., washed with EtOH, dried at 37°, dissolved in H_2O with a drop of NaOH, and the insol. residue is removed. The solution is pptd. at alkaline p_H with 5—6 vols. of EtOH, and the ppt. washed with EtOH and dried. R. N. C.

Extraction from bile of a substance possessing the biological properties of Oriel's "substance *P*." H. Thiers (Compt. rend. Soc. Biol., 1934, **117**, 943—944).—Bile is treated with 4 vols. of 95% EtOH and 1 vol. of 20% $CCl_3{\cdot}CO_2H$, and the ppt. removed. The clear liquid is made alkaline to phenolphthalein with Na_2CO_3, and the ppt. washed with EtOH, dried, dissolved in 0·1*N*-NaOH, and the insol. residue removed by centrifuge. The solution is pptd. with 5 vols. of 95% EtOH. The ppt. is sol. in H_2O or artificial serum, and has the biological properties of Oriel's "substance *P*." R. N. C.

Determination of bile-salts in body-fluids based on bile-salt hæmolysis. S. S. Lichtman (J. Biol. Chem., 1934, **107**, 717—730).—The hæmolytic activity of bile-salts (I) on a standard suspension of sheep's red cells previously stabilised by treatment with PO_4''' buffer is determined in presence of Na citrate, which enhances hæmolysis by (I), but inhibits

the hæmolytic activity of soaps, thus rendering possible the determination of the (I) content of body-fluids. The order of activity of (I) is Na deoxycholate (II) (the standard) > taurocholate > glycocholate > cholate. The activity of mixtures of (I) is strictly additive. Vals. are given for the (I) content of normal blood, urine, and bile and for cadaver gall-bladder bile. The first two fluids contain 0·5—4·0 mg. of (II) (or its equiv.) per 100 c.c. A. E. O.

Colloidal solution of acid bilirubin. Preparation and properties. B. Varela-Fuentes and P. Recarte (Compt. rend. Soc. Biol., 1934, **117**, 900—902).—A colloidal solution of bilirubin (I) is obtained from a filtered, saturated $COMe_2$ solution by a process of repeated dilution and vac. evaporation. It is stable in the dark, and contains only traces of $COMe_2$, removal of which ppts. the (I). Various properties are recorded. Small quantities of alkali convert (I) into H_2O-sol. bilirubate. R. N. C.

Bilirubin excretion of the liver. T. Okada (Trans. Japan. Path. Soc., 1933, **23**, 567—571).—The bile of the newborn infant consists chiefly of bilirubin I, and that of the adult of bilirubin I and II. Ch. Abs.

Clinical tests for bilirubin in urine. E. G. Godfried (Biochem. J., 1934, **28**, 2056—2060).—Hunter's test (A., 1931, 863) for bilirubin is modified. To the urine acidified with AcOH are added $BaCl_2$ and $(NH_4)_2SO_4$ and the ppt. is washed with H_2O. Abs. EtOH, saturated aq. $(NH_4)_2SO_4$, 6% Na_2HPO_4, and diazo-reagent are added. When the colour has developed $CHCl_3$ is added. The lower layer contains the azobilirubin, and is compared with a standard Co solution. H. D.

Action of light on lyochromes. W. Koschara (Z. physiol. Chem., 1934, **229**, 103—111).—Aquoflavin (I) may be isolated from the lyochrome concentrate of urine by chromatographic analysis. It is eluted by H_2O or aq. NaOAc. Irradiation of (I) in alkaline solution with ultra-violet light (II) gives aquolumiflavin (III) insol. in $CHCl_3$. (III) is eluted by 5% aq. C_5H_5N. Irradiation of uroflavin in alkaline solution gives, as by-product, a $CHCl_3$-insol. pigment resembling (III). Neither visible light nor (II) acts on the leuco-form of lactoflavin in alkaline solution. Irradiation of the pigments in aq. Na_2CO_3 in air yields products resembling deuteroflavin. In aq. NaOH the pigments are irreversibly bleached. H_2SO_3, inactive in the dark, reduces uroflavin in the light to the leuco-compound. Other H_2-donators are also effective. J. H. B.

Chromogen of melanuria. L. Linnell and H. S. Raper (Biochem. J., 1935, **29**, 76—85).—The chromogen (I) of human melanuria can be separated from urine by pptn. with Pb or Hg acetate. Administration of 5 : 6-dihydroxyindole (II) to rabbits causes excretion of a melanogen in the urine the properties of which suggest identity with (I). 5 : 6-Dihydroxyindole-2-carboxylic acid does not produce melanuria. (I) appears to be a simple derivative of (II), possibly a sulphate or glycuronate. The synthesis of the K_2 *disulphate* of (II) is described. C. G. A.

Composition of glomerular urine. XII. Concentration of chloride in glomerular urine of frogs and *Necturi*. B. B. Westfall, T. Findley, and A. N. Richards (J. Biol. Chem., 1934, **107**, 661—672).—The sensitivity of Isaac's colorimetric method for Cl′ is sufficiently increased by use of *s*-diphenylcarbazide to enable determination to be made of 0·001 mg. of NaCl with an accuracy of 3% in urine or plasma. The [Cl′] of the glomerular urine and blood-plasma is approx. equal in both frogs and *Necturi*. C. G. A.

Excretion of copper in urine and fæces and its relation to the copper content of the diet. S. L. Tompsett (Biochem. J., 1934, **28**, 2088—2091).—The average daily intake of Cu is 2·0—2·5 mg., which is balanced by the total excretion. Human urine contains 0·08—0·48 mg. of Cu per litre. H. G. R.

Routine determination of fat in fæces. E. C. Wood and T. W. Simpson (Analyst, 1934, **59**, 817—818).—The material is acidified with HCl, dried with Na_2SO_4, and extracted with light petroleum. Fatty acids and neutral fats are determined consecutively in the extract. Free fatty acids and soaps may be differentiated by repeating the determination on a new sample, omitting the addition of HCl. Specimen analyses are given. E. C. S.

Application of emission spectrum analytical methods to problems of social medicine. Walther Gerlach and Werner Gerlach (Angew. Chem., 1934, **47**, 825—827).—A lecture. H. W.

Energy requirement of an acromegalic giant. A. W. Rowe (Science, 1934, **80**, 482—483).—Respiratory data demonstrate an established level of hypofunction. L. S. T.

Cholesterolæmia in experimental infectious anæmia in the horse. G. Guillot and J. Guilhon (Compt. rend. Soc. Biol., 1934, **117**, 320—321).—In colts inoculated with infectious anæmia the blood-cholesterol remained normal until the onset of fever, when it increased steadily until death. R. N. C.

Respiration of red blood-corpuscles of normal subjects and in various forms of anæmia. W. Deutsch (Biochem. J., 1934, **28**, 2002—2011).—Since no formation of methæmoglobin (I) is observed when red blood-cells (II) are mixed with liver extract and examined spectroscopically or by respiration of (II), the (I) test cannot replace the clinical determination of hæmopoietic potency. Saline extracts of fresh rat-liver produce a slight and limited loss of O capacity when mixed with hæmoglobin (III), without production of (I). The stimulating effect (IV) of the "respiratory supplement" on the respiration of (II) in pernicious and secondary anæmias is highest at the time of reticulocyte crisis, and then falls to the val. for normal blood. (IV) is independent of the (III) content of (II). C. G. A.

Effect of inorganic iron with and without ultra-violet irradiation on prevention and cure of nutritional anæmia. E. J. Andes and H. D. Beard (Amer. J. Physiol., 1934, **108**, 91—98).—Irradiation (I) accelerated the curative action of low

but not of high dosages of Fe. (I) affects the erythrocyte rather than hæmoglobin regeneration. CH. ABS. (*p*)

Active principle of liver extract in recovery from anæmia due to bleeding. T. ASAO (Aichi Ig. Zasshi, 1933, **40**, 313, 863).—The third fraction of the Et_2O extract of liver (Levene, Sueyoshi) was the most effective in curing anæmia in rabbits. An extract of erythrocytes was similarly active. Brain extract was inactive. The active substance was absent from fish-liver. CH. ABS. (*p*)

Italian work on liver therapy. H. I. GOLDSTEIN (Science, 1934, **80**, 561).—Concerning priority. L. S. T.

Bence-Jones protein in serum. D. M. KYDD (J. Biol. Chem., 1934, **107**, 747—753).—Bence-Jones protein (I) begins to be pptd. when $[PO_4'''']$ reaches 1·98*M*, whereas globulin is pptd. at 1·48*M*. The various sections of the discontinuous solubility curve are extrapolated logarithmically to zero and the various individual serum-protein contents determined (cf. A., 1933, 293). (I) from urine is identical with (I) from serum. (I) exists in the serum of myelomatous individuals and may or may not appear in the urine. A. E. O.

Hormones in cancer. IX. Resistance factor in normal urine affecting carcinoma 256. F. BISCHOFF and L. C. MAXWELL (J. Pharm. Exp. Ther., 1934, **52**, 378—382).—Injection of crude callicrein preps. (I) increased the no. of takes of carcinoma 256 in rats and the rate of tumour growth. Purified preps. of (I) failed to produce these effects. H. D.

Influence of vitamin-*A* and -*D* on the frequency of tumours in mice. E. HARDE and N. KOBOZIEFF (Compt. rend. Soc. Biol., 1934, **116**, 848—849).—Increased dietary Ca and vitamin-*A* and -*D* decreased the appearance of tumours. CH. ABS. (*p*)

Action of ascorbic acid on tumour metabolism. D. L. WOODHOUSE (Biochem. J., 1934, **28**, 1974—1976).—Injection of ascorbic acid, although having no effect on the induction period for the production of tar warts in mice, exerted a stimulating effect on the proliferation of the tumours. A. E. O.

Blood changes following snake-venom treatment of cancer. J. VELLARD and M. MIGUELOTE-VIANNA (Compt. rend., 1935, **200**, 98—100).—The lethal dose of *Lachesis atrox* venom for the normal rat is 4 mg. and for the cancerous rat 1·5 mg. In man repeated small injections (0·1—1 mg.) cause intense lysis of red blood-cells and leucocytes, decrease of fibrinogen and complement, and increase of the coagulating power of the serum. Hepatic and renal troubles may also occur. C. G. A.

Stabilisation and purification of specific anti-cancer bodies. T. LUMSDEN and T. F. MACRAE (Biochem. J., 1934, **28**, 1968—1973).—Anti-cancer sera can be highly conc. by fractional pptn. of the euglobulin (J. Path. Bact., 1932, **35**, 441) and subsequent adsorption on $Al(OH)_3$ and elution at p_H 7·5, when 40—50% of the antibodies (I) are eluted. (I) are pptd. in solutions containing 12% EtOH, but $COMe_2$ is ineffective as a precipitant. Antibody preps. are stabilised (for many months) by rapid drying and subsequent storage, both at low temp. A. E. O.

Influence of potassium and calcium chlorides and sodium, potassium, and calcium acetates on the flocculation of hydrosols (organ extracts) by human serum. M. L. CHEVREL-BODIN and M. CORMIER (Compt. rend. Soc. Biol., 1934, **117**, 764—765).—With normal and cancer sera as controls, the flocculation of syphilitic sera when mixed with an (EtOH) extract of ox-heart at p_H 6·8 is sp. in presence of $Na^{\cdot}$ or $K^{\cdot}$, but not of $Ca^{\cdot\cdot}$. F. O. H.

Fat-soluble vitamins and dental caries in children. C. D. M. DAY and H. J. SEDGWICK (J. Nutrition, 1934, **8**, 309—328).—Feeding of vitamin-*A* and -*D* had no influence on the progress of caries. A. G. P.

Effect of diet on the course of experimental coccidiosis in chickens. E. E. JONES (J. Amer. Vet. Med. Assoc., 1934, **38**, 193—206).—Vitamin-*A* in the diet did not affect the course of infection of *E. tenella*. Infected chickens maintained live wts. nearer to those of controls when fed a high-protein than when fed a low-protein (I) diet. Immunity to reinfection developed more rapidly in chickens receiving (I). A. G. P.

Therapeutic effect of total ablation of normal thyroid on congestive heart failure and angina pectoris. VIII. Relationship between serum-cholesterol values, basal metabolic rate, and clinical aspects of hypothyroidism. D. R. GILLIGAN, M. C. VOLK, D. DAVIS, and H. L. BLUMGART (Arch. Int. Med., 1934, **54**, 746—757).—After removal of the thyroid, serum-cholesterol (I) increases to 300 mg. per 100 c.c. as the basal metabolic rate decreases. (I) is significantly decreased by thyroid medication and may be used as an index of hypothyroidism. H. G. R.

Fur dermatitis. S. A. WOODHEAD (Analyst, 1934, **59**, 815).—A fur, suspected of causing dermatitis, contained no dye, but contained 0·78% of H_2SO_4 and 12·43% of solids sol. in boiling H_2O, of which 4·89% was NaCl. E. C. S.

Blood-potassium in different forms of diabetes mellitus. F. RATHERY and J. BERTOLIATTI (Compt. rend. Soc. Biol., 1934, **117**, 875—878).—Plasma-K (I) and total blood-K (II) were normal in simple diabetes (III). (I) was raised in cases of (III) with foot-gangrene or hepatic lithiasis, but not with cervical abscess. Insulin had scarcely any effect on (II), even after several months. In some cases of diabetic coma (IV) results were too variable to indicate a definite relation between (II) and (IV). In bronzed (III), (II) was normal. R. N. C.

Lumbar and sub-occipital cerebrospinal fluids in experimental poliomyelitis in monkeys. P. MOLLARET and B. ERBER (Compt. rend. Soc. Biol., 1934, **117**, 1098—1100).—Fatal forms of poliomyelitis (I) in monkeys produce increases in albumin (II) and leucocytes (III) in the cerebrospinal fluid (IV); Cl remains normal, and the pptn. curve for colloidal benjoin (V) broadens. The modifications begin 48 hr. before the appearance of symptoms, at

which point they attain their max., and remain thus until death. In curable (I), the modifications are similar. The increased (II) persists longer than (III), and suboccipital (IV) becomes normal again before lumbar (IV). The same modifications appear in abortive (I). Anti-(I) vaccination produces a broadened (V). R. N. C.

Lumbar and sub-occipital cerebrospinal fluid in experimental yellow fever in *Macacus rhesus*. P. Mollaret and G. J. Stefanopoulo (Compt. rend. Soc. Biol., 1934, **117**, 1101—1103).—Animals with yellow fever (I) show an increased lymphocyte reaction of the cerebrospinal fluid, but albumin and the colloidal benjoin pptn. curve are scarcely changed. The same modifications appear in animals with nervous (I), and immunised animals inoculated with either form. R. N. C.

Protein exchange in relation to hepatic function. R. Messina (Arch. Farm. sperim., 1934, **58**, 280—302).—Persons with normal liver function (I) show a serum-albumin (II) > -globulin (III). In cases of atrophic cirrhosis (IV) and luetic hepatitis (V), (II) falls and (III) rises until the (II)/(III) ratio is inverted. The change is more marked in (V) than in (IV), and increases with (I) deficiency, but the inverted (II)/(III) ratio always remains near unity. Total serum-protein is diminished in (IV). The blood-sugar curve is higher and more prolonged in (I) deficiency. R. N. C.

Metabolism in hepatic diseases. VI. Blood-sugar. Y. Kin (J. Chosen Med. Assoc., 1934, **24**, 208—220).—Of 37 hepatic patients, 15 had blood-sugar (I) > 0·12% and 5 < 0·07%, the former being associated with jaundice or liver abscess. In coma (I) rises, but cerebrospinal fluid-sugar fluctuates. Ch. Abs.

Lipin antigens of organs in sero-diagnosis. New antigen of seroflocculation in leprosy. M. C. Rubino (Compt. rend. Soc. Biol., 1934, **117**, 894—897).—Aq. EtOH extracts of spinal marrow, liver, and CH_2O-treated corpuscles, suspended in 0·9% NaCl solution after evaporation of EtOH, exhibit a sp. flocculating effect with leprosy sera (I). If diluted without evaporating the EtOH, the specificity of the effect for (I) disappears or is diminished, showing that (I) flocculates a sp. group of lipins. The group is absent from kidney extracts; brain extracts show a diminished effect, due probably to the presence in large quantities of stabilising lipins. R. N. C.

Adrenal cortex and electrolyte metabolism. R. L. Zwemer (Endocrinol., 1934, **18**, 161—169).—Oral administration of Na salts prolongs the life of adrenalectomised cats. Ch. Abs.

Blood chemistry of adrenal insufficiency in cats. R. L. Zwemer and R. C. Sullivan (Endocrinol., 1934, **18**, 97—106).—Adrenalectomy is followed by early loss of Na, lowered CO_2 capacity, and increase in K and non-protein-N. Before death, blood-sugar and -Cl are lowered; -P and -Mg are raised. Injection of extract of adrenal cortex into adrenalectomised animals reverses the chemical changes occurring in adrenal insufficiency. Ch. Abs.

Nitrogen and sulphur metabolism in Bright's disease. V. Metabolic study of a patient with œdema of unknown origin. G. P. Grabfield, M. Driscoll, and M. G. Gray (Arch. Int. Med., 1934, **54**, 764—769).—Non-nephritic, non-cardiac œdema was accompanied by a negative S balance together with some retention of N. The diuresis produced by urea comes from within the cells. H. G. R.

Glycogen. I. Nasal polypus. S. Horie (Sei-i-kwai Med. J., 1933, **52**, No. 9, 1—30).—The distribution of glycogen in the various cells has been investigated. Ch. Abs.

Phosphoric acid exchange in the blood of the pregnant woman. E. Momigliano (Arch. Ist. Biochim. Ital., 1934, **6**, 351—408).—The inorg. (I), total acid-sol. (II), and total PO_4''' (III) in the blood are increased in pregnancy (IV), but the increase is not always œ the stage of (IV); P_2O_7'''' (V) is unchanged. Reducing hexose phosphoric esters are present in the placental tissues, indicating enzymic control of sugars and PO_4''' in their transplacental passage. (I), (II), and (III) are all increased during the expulsive period of parturition (VI), but the increases are independent of uterine contraction. In several cases where cæsarian section was carried out, no difference was found in uterine arterial and venous P. During puerperium, (I) only is increased, the other fractions oscillating irregularly and variably. (I), (II), and (V) in the fœtal blood are considerably increased, particularly in the umbilical artery, but lipin-PO_4''' is decreased, whilst (III) is the same for fœtus and mother. R. N. C.

Diagnosis of pregnancy from the urine. W. Hoffmann (Deut. med. Woch., 1934, **60**, 822—824; Chem. Zentr., 1934, ii, 1148).—The growth of wheat or barley (I) is accelerated by urine (II) of pregnant women, and retarded or prevented by (II) of non-pregnant women. Flowering is not affected; in summer-(I) the H_2O-treated controls flower earlier. The effects are not destroyed by boiling the (II), nor by removing the nutritional salts by dialysis. R. N. C.

Influencing of the antidiuretic and chlorine-releasing action of the posterior pituitary hormone by the blood-serum of pregnant and non-pregnant women. (Posterior pituitary theory of pregnancy toxicosis.) W. Bickenbach and H. Rupp (Arch. Gynäkol., 1934, **155**, 572—584; Chem. Zentr., 1934, ii, 792—793).—Mixtures of pituitrin (I) with sera of pregnant or non-pregnant women generally weaken or suppress the antidiuretic and Cl-releasing actions of (I), the pregnancy sera showing the greater effect. Sera of pre-eclampsia show the same property. R. N. C.

Experimental renal insufficiency produced by partial nephrectomy. III. Diets containing whole dried liver, liver residue, and liver extract. A. Chanutin (Arch. Int. Med., 1934, **54**, 720—745).—A low-protein diet causes albuminuria and polyuria, with little retention of N and a delay of hypertension, whereas a high-protein diet causes an increased excretion of dil. urine (I). The amount of protein excreted has no relation to the vol. of (I). H. G. R.

Examination of urine in renal disorders. H. Gibbons III (Arch. Int. Med., 1934, **54**, 758—763).—The method shows the rate at which cells and casts are excreted in the urine (I). Tables are given showing the cells, casts, and protein in normal and pathological (I). H. G. R.

Colorimetric test for renal function using intravenous iodine preparations. R. H. Herbst and G. O. Baumrucker (J. Urol., 1934, **32**, 131—140).—After injection of Neoskiodan, I in urine is determined colorimetrically by oxidation with KNO_3–H_2SO_4 and extraction with $CHCl_3$. The method is applicable to any substance of the uroselectan group. Ch. Abs. (*p*)

Effect of rickets on the structural characteristics of bone. G. L. Clark and J. N. Mrgudich (Amer. J. Physiol., 1934, **108**, 74—79).—The *X*-ray diffraction pattern of rat humerus shows crystals oriented lengthwise in normal animals. In rachitic animals the collagen is broken down and no longer holds crystals in this position. Ch. Abs. (*p*)

Comparison of the antirachitic action of methyl phosphates, glycerophosphates, and lecithin. R. Lecoq and M. L. Barban (Compt. rend. Soc. Biol., 1934, **117**, 671—673).—The PO_4''' in CaMe phosphate has an antirachitic activity (I) < that in Ca glycerophosphates, but with Mg the reverse is the case. The fatty acids and choline do not decrease the (I) of the glycerophosphate in egg-lecithin. A. L.

Antirachitic action of glycophosphates. M. L. Barban (Compt. rend. Soc. Biol., 1934, **117**, 999—1001).—The glycophosphates of Na and Mg have a similar antirachitic activity, but that of the Ca salt is less. Their activities, however, are < that of the corresponding Me phosphates. A. L.

Chlorine and phosphorus contents of the brains of normal and starved guinea-pigs and of those suffering from chronic and acute scurvy. Magnesium content of striated muscle. A. Michaux (Compt. rend., 1934, **199**, 1460—1462).—The Cl and P contents of the brain of normal and starved guinea-pigs (I) are the same, but increase during serious attacks of chronic or acute scurvy; the P content is affected only in prolonged cases. The Mg content of striated muscle of (I) does not decrease during scurvy, unless the muscle is very hæmorrhagic. R. S. C.

Blood-lipase and other conditions in tuberculosis. S. Ryu (J. Chosen Med. Assoc., 1934, **24**, 305—313).—In severe tuberculosis blood-lipase is reduced. Ch. Abs.

Calcium, potassium, ultrafilterable calcium content, and the ratio of calcium to potassium in the blood in pulmonary tuberculosis. A. de M. Sarmento and M. J. B. da Costa (Compt. rend. Soc. Biol., 1934, **117**, 741—744).—Fibrous tuberculosis is associated with reduced vals. for ultrafilterable serum-Ca (I). Ultrafilterable serum-K (II) and (I) increase in amount as the disease progresses. Pulmonary tuberculosis, on the other hand, is associated with increased vals. for (I), (II), and ultrafilterable (I), the last decreasing, and the ratio (I)/(II) increasing as conditions improve. As exudative tuberculosis develops, ultrafilterable (I) vals. increase. A. L.

Apparatus for measuring the gaseous metabolism of dogs. F. Földes (Biochem. Z., 1934, **275**, 66—73).—A simple valveless apparatus for use under physiological conditions is described. The error is ± 3 to $\pm 4\%$. W. McC.

Metabolism of ducks (*Anas platythyncha*, L.). II. Gas metabolism and respiratory quotient. T. C. Shen and S. M. Ling. III. Carbohydrate metabolism. S. M. Ling and T. C. Shen (Chinese J. Physiol., 1934, **8**, 307—333, 335—349).—II. After feeding, O_2 consumption and CO_2 production increase due to a conversion of carbohydrate into fat: R.Q. increases, reaching a max. in about 5 hr.

III. Liver-glycogen runs parallel with the R.Q. and a linear relationship was found between the glycogen (I) and the wt. of the liver (II). Of the total carbohydrate ingested, 54% is utilised for energy production, 24% for fat, and 22% is stored as (I), whilst 12% of the last amount is temporarily accumulated in (II). H. G. R.

Ability of fresh-water fish to extract oxygen at different hydrogen-ion concentrations. A. H. Wiebe, A. M. McGavock, A. C. Fuller, and H. C. Markus (Physiol. Zool., 1934, **7**, 435—448).—In normal ranges of p_H the initial O_2 content of the H_2O did not influence the O_2 content at death. Beyond normal p_H ranges O_2 concn. at death increased with the initial O_2. Ch. Abs. (*p*)

Effect of oxygen tension on oxygen consumption of a developing egg (*Orthoptera*). J. H. Bodine (Physiol. Zool., 1934, **7**, 459—463).—With O_2 tensions (I) of 25—160 mm. Hg, O_2 consumption (II) of *M. differentialis* is independent of (I). With (I) < 25 mm., (II) declines rapidly. Eggs in diapause are stimulated to higher (II) by 380—760 mm. (I). Ch. Abs. (*p*)

Iron content and oxidation rates of a developing egg (*Orthoptera*). J. H. Bodine and J. E. Wolkin (Physiol. Zool., 1934, **7**, 464—469).—The total Fe in eggs of *M. differentialis* is unchanged during development, but embryo-Fe (I) increases at the expense of yolk-Fe. During diapause O_2 consumption (II) is low and (I) is const. On resumed growth (I) increases with (II). The degree of saturation of the Fe is less in diapause than in active growth. Ch. Abs. (*p*)

Calculation of the permeability of the cell surface to oxygen. N. Rashevsky (Physical Rev., 1933, [ii], **44**, 322).—An attempt to calculate the permeability of the [living ?] cell surface to O_2 from O_2-pressure–O_2-consumption curves at low pressures has been made. L. S. T.

Micro-determination of calorific value of foods. V. S. Ivlev (Biochem. Z., 1934, **275**, 49—55).—The food is oxidised with excess of 0·1*N*-$K_2Cr_2O_7$ (3 vols.) and 0·1*N*-$Ag_2Cr_2O_7$ (1 vol.) in H_2SO_4 and the excess of $H_2Cr_2O_7$ is determined. Since protein (I) is not completely oxidised, a correction must be applied. Since the amount of heat produced on consumption of 1 g. of O_2 varies little when the proportions of food constituents [fat, carbohydrate, (I)] change, a

general " cal. coeff." is used to calculate the calorific val., but where the (I) content is unknown a N determination (micro-Kjeldahl) is made. W. McC.

Balanced diets, net energy values, and specific dynamic effects. H. H. MITCHELL (Science, 1934, 80, 558—561).—A discussion. L. S. T.

Permeability and ion concentration in muscle excitation. E. ERNST and J. FRICKER (Pflüger's Archiv, 1934, 234, 399—405).—Perfusion of a Laewen–Trendelenburg frog prep. with Ringer's solution with indirect stimulation of one gastrocnemius (I) does not alter muscle-K. With a solution with increased K : Ca ratio, which raises the permeability (II), muscles give off K on stimulation. In a KCl-rich perfusion solution, the stimulated (I) always contains less K than the unstimulated (I). Stimulation does not increase muscle-(II). R. N. C.

Permeability of frog's muscle under the influence of different substances involved in muscle metabolism. F. BECKMANN (Pflüger's Archiv, 1934, 234, 469—475).—The permeability (I) of the frog's abdominal muscle is steadily and reversibly increased by lactic acid, fructose, and Na fructose diphosphate, malonate, glycerophosphate, propionate, and citrate (II). The increase in (I) $\propto$ the increased output of $AcCO_2H$ (III) from breakdown in the muscle of all these substances except (II). (III) also increases (I). R. N. C.

Seasonal variations of the permeability and metabolism of the muscle of the cold-blooded animal. (Effect of creatine on the frog's muscle.) B. KATZ (Pflüger's Archiv, 1934, 234, 492—509).—The effect of creatine (I) on the muscle (II) is dependent on the season, and on the general metabolic condition of the (II) cells. In normal frogs, (I) is either ineffective or produces a passing relaxation of (II), and a marked increase in resting respiration, whilst in frogs with low carbohydrate reserve after hibernation, or in normal animals treated with toxic doses of insulin, (I) produces a contraction of (II), probably accompanied by an increased synthesis of creatinephosphoric acid. R. N. C.

Action of monophosphate on the blood and the circulation in physical work. A. KRESTOVNIKOV, A. KORJAKINA, E. KOSSOVSKAJA, P. RETELSKAJA, and S. SCHIROBOKOV (Arbeitsphysiol., 1934, 8, 13—19).—Administration of small doses of NaH_2PO_4 immediately prior to physical work causes a smaller rise of blood-lactic acid (I). Inorg. PO_4''' shows only an insignificant increase compared with controls (II); total P is not raised by small doses. Blood-sugar shows no increase over that of (II). The alkali reserve is also unaffected. NaH_2PO_4 decreases production of leucocytes, but increases that of lymphocytes; there is no parallelism between the changes due to NaH_2PO_4 in the white-cell and chemical composition of the blood. NaH_2PO_4 accelerates resynthesis of (I) after work. R. N. C.

Influence of phosphate on the distribution of water and salts in muscular work. A. DANILOV, A. KORJAKINA, E. KOSSOVSKAJA, A. KRESTOVNIKOV, and A. FOMIČOV (Arbeitsphysiol., 1934, 8, 1—12).—Oral administration of NaH_2PO_4 increases the O_2 consumption in muscular work. The average losses of body-wt. and of H_2O through sweating are diminished. Diuresis is reduced more by small doses than by large doses. Blood-hæmoglobin in most cases decreases. Blood-Cl is unaffected, but sweat-Cl falls, whilst urinary Cl rises. Large doses of NaH_2PO_4 administered 9—10 hr. before the work period have no effect. R. N. C.

Chemical reactions in muscle. J. K. PARNAS, P. OSTERN, and T. MANN (Biochem. Z., 1934, 275, 74—86; cf. A., 1934, 1027, 1394).—Inorg. phosphate undergoes esterification in the absence of adenosinetriphosphoric acid in frog-muscle pulp poisoned with $CH_2I{\cdot}CO_2H$. In such pulp phosphocreatine is synthesised from added phosphoglyceric acid (I), but not from added phosphate, and added creatine is phosphorylated. From (I) $AcCO_2H$ is produced. A frog heart, poisoned with $CH_2I{\cdot}CO_2H$, is kept beating by addition of (I). Many of the chemical changes which occur in muscle are depicted in a scheme which is in harmony with the views of Embden, Meyerhof, Lohmann, and the authors. The interacting substances frequently behave as sp. phosphate donators and acceptors. W. McC.

Mechanism of poisoning [of muscle] with iodoacetic acid. P. OSTERN (Biochem. Z., 1934, 275, 87—89; cf. A., 1934, 1394).—In muscle pulp $CH_2I{\cdot}CO_2H$ affects neither the production of hexose diphosphate and adenylic acid (I) from adenosinetriphosphoric acid (II) and glycogen nor the resynthesis of (II) from (I) and phosphocreatine, but it prevents the production of phosphoglyceric acid from fructose-diphosphoric acid. W. McC.

Decrease of glycolysis and increase of readily hydrolysable acid-soluble phosphorus in blood after prolonged fatiguing work. Z. DISCHE and K. SACHS (Biochem. Z., 1934, 274, 346—357).—The glycolytic power of the blood of an adult dog after exhaustive work decreases, but of a growing dog may increase or decrease considerably. The concn. of readily hydrolysable acid-sol. P always increases, but not in amount corresponding with the decrease of glycolysis. The relationship of phosphorylation (I) of sugar, dephosphorylation of and subsequent (I) to adenosinetriphosphoric acid, and the velocity of glycolysis is discussed. P. W. C.

Influence of cortical hormone and ascorbic acid on the chemistry of active muscle. V. BAENA (Biochem. Z., 1934, 274, 362—366).—The time required for complete exhaustion of rats in a treadmill under standard conditions (cf. A., 1934, 332) is greater when the animals receive both adrenal-cortex hormone (I) and ascorbic acid (II) and the decrease of glycogen at exhaustion is $<$ when they receive (I) alone. The increase of residual N in fatigued muscle is almost completely inhibited by administration of (I)+(II). P. W. C.

Blood-lactic acid and oxygen consumption during and after muscular work in man. O. BANG (Arbeitsphysiol., 1934, 7, 544—554).—The O_2 supply (I) during hard work of short duration, and at first during more prolonged work, is insufficient.

The greater part of the accumulated lactic acid (II) in the muscles is removed as soon as cessation of work increases (I), (II) being partly oxidised and partly reconverted into glycogen. A small part of (II) diffuses into the blood, from which it is afterwards taken up by the resting muscle or oxidised and resynthesised in the liver. This quantity of (II) is not always large enough to alter the O_2 consumption (III). The increased (III) during and after work depends chiefly on oxidation in the working and recovering muscles, and has no immediate quant. relation with blood-(II). R. N. C.

Formation of pyruvic acid from lactic acid in muscle. E. Aubel and E. Simon (Compt. rend. Soc. Biol., 1934, **117**, 658—659).—Chopped muscle in presence or absence of O_2 is capable of converting lactic acid into $AcCO_2H$. A. L.

First type of formation of lactic acid in the tissues in oxido-dynamic metabolism of hexoses: glucose and maltose. M. Wierzuchowski and F. Sekuracki (Compt. rend. Soc. Biol., 1934, **117**, 915—918).—Continuous intravenous injection of glucose or maltose results in an increase in the lactic acid (I) of the afferent and efferent blood-vessels of the liver, muscles, intestines, and head-tissues, the (I) being produced in all these except the liver, which retains it. Galactose does not produce this effect. This type of (I) formation is termed "hepatopetal." R. N. C.

Second type of formation of lactic acid in the organism during the combustion of hexoses, accompanied by specific dynamic action: fructose. M. Wierzuchowski and F. Sekuracki (Compt. rend. Soc. Biol., 1934, **117**, 919—922).—Continuous intravenous injection of 0·9% NaCl, inositol, Na lactate, or MeCHO does not alter the "hepatopetal" cycle of lactic acid (I) circulation. Fructose causes a formation of (I) which occurs chiefly in the liver, and is hence termed "hepatofugal." R. N. C.

Cellulose in the diet of rats and mice. C. M. McKay [with C. C. Ku, J. C. Woodward, and B. S. Sehgal] (J. Nutrition, 1934, **8**, 435—447).—Rats receiving a diet containing 10—20% of cellulose (I) produced normal growth. The digestibility of crude fibre from beet pulp, bran, and regenerated (I) was 40, 20, 20%, respectively. Feeding of (I) increases fæcal dry matter to an extent > can be ascribed to the amount ingested. A. G. P.

Exogenous melituria in man. B. G. Edwards and M. R. Everett (J. Nutrition, 1934, **8**, 253—267).—Ingestion of toast results in urinary excretion of an unknown product which is neither dextrin (I) nor anhydro-sugar (II). After ingestion of glucose syrups (III) urine contains an unknown non-fermentable, reducing saccharide of low mol. wt., which occurs in the "*iso*maltose fraction" of (III). (I) and (II) have no relation to the hydrolysable sugar of normal urine. Uroketose is probably a product of intermediate metabolism. A. G. P.

Nutritive value of lactose. A. E. Koehler and S. E. Allen (J. Nutrition, 1934, **8**, 377—383).—The gain in wt. of rats receiving a lactose diet was, for a short time, slightly >, and subsequently definitely <, that with a glucose or sucrose diet. A loss of 40—50% of ingested lactose may occur in so far as wt. or energy relationships are concerned. A. G. P.

Quantitative changes of glycogen in the liver of the fœtus and of the new-born infant. S. Mitani (Trans. Japan. Path. Soc., 1933, **23**, 245—247). Ch. Abs.

Available carbohydrate of fruits. Determination of glucose, fructose, sucrose, and starch. E. M. Widdowson and R. A. McCance (Biochem. J., 1935, **29**, 151—156).—The glucose (I), fructose (II), sucrose (III), and starch (IV) contents of 41 varieties of fresh fruit have been determined. All fruits (except bananas) contain negligible amounts of (IV). Most fruits contain approx. equal amounts of (I) and (II). Cherries, grapes, figs, tomatoes, pomegranates, and mulberries contain no (III), whilst (III) is the chief sugar present in apricots and peaches. (II), but not (I), is partly destroyed by boiling 5% HCl. A. E. O.

(A) Absorption by intact organs of glucose, maltose, and galactose injected at constant rate into the blood-stream. (B) Assimilation by the organs of fructose introduced into the blood-stream at constant rate. M. Wierzuchowski and H. Fiszel (Compt. rend. Soc. Biol., 1934, **117**, 1019—1022, 1022—1025).—(A) A comparison is made of the carbohydrate content of the femoral blood-vessels, the portal and hepatic veins, and the carotid artery and jugular vein of dogs during fasting (I) and during the continuous separate injection of glucose (II), maltose (III), and galactose (IV) at const. rate. During (I) the liver produces considerable quantities of (II), whilst the other organs, particularly the head, absorb it. In the head 13%, and in the muscles 48%, of (II) taken up is converted into lactic acid. Whereas during injection of (II) and (III) the muscles absorb the greatest amount of (II) and the intestine least, during (IV) the absorption in the head is greatest and that in the intestine least.

(B) The (II) balance of the blood-vessels of fasting dogs is unaffected by the introduction of physiological salt solution, Na lactate, MeCHO, and inositol into the blood-stream. When fructose (V) is injected, the organs arranged in order of decreasing absorption of (V) are the liver, the muscles, the intestine, and the head. The liver produces (II) at its normal rate, and whilst the head absorbs (II) it does not stop the circulation of (V). A. L.

Balance of water in the organs during the injection of carbohydrates and related substances. M. Wierzuchowski and H. Fiszel (Compt. rend. Soc. Biol., 1934, **117**, 1025—1028).—A comparison is made of the hæmoglobin content of the blood-vessels of the liver (I), muscles (II), intestine (III), and head (IV) of dogs during fasting (V) and during the separate continuous injection (under amytal anæsthesia) of 2 g. per kg. per hr. of physiological salt solution, Na lactate, MeCHO, inositol, glucose, maltose, and galactose (VI). During (V) and with all the injections except (VI) the hæmoglobin content of the blood from (I), (II), and (III) is

increased; that from (IV) is almost unchanged. In general the increase is < that during (V). No relationship could be established between the actual vals. obtained and the amount of assimilation or the lactic acid production of the organs. A. L.

Specific dynamic action and oxidation of hexoses introduced into the circulation of amytal-anæsthetised dogs. M. Wierzuchowski (Compt. rend. Soc. Biol., 1934, **117**, 909—912).—The sp. dynamic actions, mol. heats of oxidation, and R.Q. for glucose, fructose, and maltose in dogs are of the same order, and are not altered in amytal anæsthesia. R. N. C.

Intravenous assimilation of hexoses in narcosis provoked by amytal. M. Wierzuchowski and H. Fiszel (Compt. rend. Soc. Biol., 1934, **117**, 913—915).—Narcosis (I) raises slightly the % of glucose (II) and maltose (III) assimilated from the blood, the non-assimilated (III) being excreted partly as (II). With fructose (IV), the % assimilated is reduced by (I). Exposure of the blood-vessels and withdrawal of samples of blood during (I) reduces the % assimilation considerably for (II) and (III), but only slightly for (IV). Galactose is assimilated only moderately, (I) showing the same effects as for (II) and (III), whilst inositol is not assimilated. R. N. C.

Carbohydrate metabolism of the liver. IV. Sugar output in amytalised cats. C. Tsai and C. L. Yi (Chinese J. Physiol., 1934, **8**, 399—409).—The concn. of hepatic sugar (I) was > that of the portal (I) and of the arterial (I). During amytalisation the (I) output does not materially increase, and the fall in liver-glycogen is due to inhibition of glycogen formation. H. G. R.

Carbohydrate metabolism at high altitudes. II. Action of adrenaline (and content of K and Ca in the blood). V. F. Madon and E. Sapegno (Atti R. Accad. Lincei, 1934, [vi], **20**, 119—125; cf. A., 1932, 885).—With individuals acclimatised on high mountains, the rapidity of action of adrenaline on the equilibrium conditions of the carbohydrates is increased, as is that of the reaction of the organism to the consequent hyperglycæmia. No definite modification in the concns. of $K^{\cdot}$ and $Ca^{\cdot\cdot}$ in the serum is detectable. T. H. P.

Biological oxidation of inositol. B. C. Guha and N. Das (Current Sci., 1934, **3**, 157—158).—Oxidation of inositol *in vitro* at p_H 7·4 and 37·3° is effected by brain, heart muscle, kidney, and (more slowly) liver tissue of adult albino rats fed on a standard mixed diet. J. W. B.

Control of carbohydrate metabolism by the kidney. H. Miyazaki (J. Chosen Med. Assoc., 1934, **24**, 1—22).—The epithelial cells of the urinary tubes secrete a hormone, of the nature of sterol, which controls carbohydrate metabolism by increasing the combustion of glucose by the tissue. Ch. Abs.

Significance of coupled reactions of lower aliphatic compounds for carbohydrate and fat degradation. R. Meier and K. Ballowitz (Z. physiol. Chem., 1934, **230**, 122—138).—Oxidation (O_2) of glyceraldehyde (I) to CO_2 in phosphate buffer (p_H 7·4) in absence or presence of Cu (cf. Wind, A., 1925, ii, 1174) proceeds with a R.Q. of 0·2—0·3. The rate of oxidation of (I) in (II) + 0·0004*M*-$CuSO_4$ is increased by addition of $(CHO)_2$ (III) and is max. with 20 mols. (30—40 mols. cause almost complete inhibition); the R.Q. is 0·37 and 1·14 with 1 mol. and 16 mols., respectively, of added (III). (III) alone is not oxidised in (II). The amount of CO_2 produced is not ∝ added (III). Similar increased oxidation occurs when $CHO{\cdot}CO_2H$ (IV) or $AcCO_2H$ (V) is added to (I). (III) or (IV) also causes increased oxidation of $CO(CH_2{\cdot}OH)_2$. Oxidation of (I) is retarded by $EtCO_2H$, $PrCO_2H$, $OH{\cdot}CHMe{\cdot}CH_2{\cdot}CO_2H$ (VI), or valeric acid. Glyceric, crotonic, and glycollic (VII) acids, $(CH_2{\cdot}OH)_2$ (VIII), glycerol (IX), and crotonaldehyde have no effect. Oxidation of (I)+(III) is unaffected by added EtOH or (IX), but oxidation of (I)+(V) is retarded by (IX) (not by EtOH). Oxidation of AcCHO is increased by (V) and retarded slightly by (VII), (VIII), or (VI). Oxidation of fructose is greatly retarded by (III), (IV), or (V). Biological oxidations of carbohydrates are undoubtedly influenced by the formation of trioses as intermediate products. H. B.

Effect of a high-fat meal on the respiratory quotient and heat production of normal and obese individuals. B. D. Bowen, F. R. Griffith, jun., and G. E. Sly (J. Nutrition, 1934, **8**, 421—434).—The post-absorptive R.Q. was in obese < in normal subjects. The sp. dynamic action of the fat was similar in both cases, but was greater in obese diabetic individuals. A. G. P.

Seasonal variation in butter-fat. II. Seasonal spectroscopic variation in the fatty acid fraction. R. G. Booth, S. K. Kon, W. J. Dann, and T. Moore (Biochem. J., 1935, **29**, 133—137).—Fatty acids (I) from summer butter-fat (II) always show an absorption at 230 mμ > twice as intense as that of (I) from winter (II) (cf. A., 1933, 1087). This increase ∝ increased inhibiting power (III) of the fat in the $SbCl_3$ reaction for vitamin-*A*, but the substances responsible for (III) are much more sensitive to oxidation and irradiation than those responsible for increased absorption. A. E. O.

New spectroscopic phenomenon in fatty acid metabolism. Conversion of "pro-absorptive" into "absorptive" acids in the cow. W. J. Dann, T. Moore, R. G. Booth, J. Golding, and S. K. Kon (Biochem. J., 1935, **29**, 138—146).—When cod-liver, sardine, rape, or linseed oil is fed to cows in the winter, the resulting butter-fat (I), although somewhat less in relative amount, shows absorption at 230 mμ much > in summer. *In-vivo* conversion of "pro-absorptive" into "absorptive" fatty acids has taken place, not accompanied by a fall in the I val., *i.e.*, not caused by oxidation of unsaturated "pro-absorptive" acids (II). Prolonged boiling of (II) from these oils with EtOH–KOH also results in a similar increase in absorption, but similar treatment shows that "absorptive" winter (I) contains no "pro-absorptive" acids. Ingested foreign fats are very rapidly secreted in the milk. A. E. O.

Fat metabolism. V. Degradation of unsaturated fatty acids in man. P. E. VERKADE and J. VAN DER LEE (Z. physiol. Chem., 1934, **230**, 207—215).—After ingestion of tri-Δ'-undecenoin (which may cause mild nephritis) together with adequate carbohydrate, sebacic acid is excreted in the urine; direct oxidation at the double linking thus occurs. Definite decomp. products were not isolated after ingestion of olive and rape oils. H. B.

Fat metabolism in fishes. IV. Mobilisation of depôt-fat in the salmon. V. Fat of the salmon in its young fresh-water stages. J. A. LOVERN (Biochem. J., 1934, **28**, 1955—1960, 1961—1963).—IV. Compared with other fish-fats, salmon body-fats exhibit low palmitoleic acid (I) content and high content of C_{22} acids, and low degree of unsaturation of C_{20} acids. Mobilisation of the depôt-fat (II) is almost non-selective in the females, but in the males acids of low mol. wt. are preferentially mobilised and the (I) content falls steadily. Ova-fat is more unsaturated than (II), and a high degree of selectivity is displayed in its formation.

V. In the parr stage, the fat of the young salmon is of the fresh-water type (III), but the fat of the smolt appears to be at a transitional stage between (III) and the special fat of the adult salmon. A. E. O.

Variation in nutritive properties of skimmed milk with habituation to milk-assimilation. P. MAZÉ, P. J. MAZÉ, jun., and R. ANXIONNAZ (Compt. rend. Soc. Biol., 1934, **117**, 751—752).—Rats fed for a long period on a complete diet including normal or skimmed milk (I) are able to synthesise the vitamins (II) necessary for fertility when fed on diets containing (I) but deficient in (II), which apparently occur as precursors in (I). Oxidation (Cl) or ultra-violet irradiation partly corrects the deficiency of (I). F. O. H.

Assimilation of albumin by normal dogs and dogs with Eck fistulæ. S. LIVIERATO, M. VAGLIANO, and A. DERVENAGA (Compt. rend. Soc. Biol., 1934, **117**, 1088—1090).—Dogs with Eck fistulæ show increases in total non-protein-, urea-, NH_2-acid-, and NH_3-N (I) after ingestion of ovalbumin. Normal dogs show only a slight increase of (I). R. N. C.

Effect of feeding carrot on rat serum-protein. A. L. BLOOMFIELD (J. Exp. Med., 1934, **59**, 687—698).—On exclusively fresh carrot diet serum-protein falls; a similar effect is produced by carrot powder only after addition of H_2O and agar. CH. ABS.

Synthesis of creatinine and creatine during protein starvation. G. MOUROT (Compt. rend., 1934, **199**, 1341—1343).—Examination of creatinine (I) excretion during protein starvation confirms the synthesis of considerable amounts of (I) under these conditions. Creatine disappearing from the organism (rat) appears as (I) in the urine. A. G. P.

Measurement of creatinine clearance. R. F. HANZAL and J. M. HAYMAN, jun. (Proc. Soc. Exp. Biol. Med., 1934, **31**, 730—733).—After administration of creatinine, dil. urine and blood-plasma are treated with picric acid and centrifuged. The clear liquids are mixed with NaOH and compared colorimetrically. CH. ABS. (*p*)

Metabolism of *l*- and *dl*-cystine in growing dogs maintained on diets of various protein content. J. A. STEKOL (J. Biol. Chem., 1934, **107**, 641—648).—*l*-Cystine-S is practically completely oxidised and excreted as inorg. SO_4'' in the urine of pups maintained on Cowgill's diet. Much of the S is retained by pups on other diets. *dl*-Cystine fed to pups on low-protein diets is not so well retained, much of the S appearing in the urine as neutral S. *l*-Cystine may be used as an indicator of the min. protein requirement for growth and maintenance of dogs. C. G. A.

Effect of fasting, refeeding, and variations in the cystine content of the diet on the composition of the tissue-proteins of the white rat. W. C. LEE and H. B. LEWIS (J. Biol. Chem., 1934, **107**, 649—659).—Neither fasting nor subsequent refeeding results in significant change of the composition of the muscle or kidney of growing or adult rats, or the proteins of these tissues. The N and S of the livers increased after fasting, but the change is not due to alteration of the composition of the liver-proteins. The S of all tissues is higher in young rats receiving adequate cystine (I) than in those receiving a deficiency of (I), although the composition of the proteins is the same in each group, the excess being due to non-protein-S. C. G. A.

Urea formation in the liver. H. A. KREBS (Z. physiol. Chem., 1934, **230**, 278—279; cf. A., 1932, 1059).—The conclusions of London *et al.* (A., 1934, 1392) are not in agreement with their results. H. B.

[Urea formation in the liver.] E. S. LONDON (Z. physiol. Chem., 1934, **230**, 279).—A reply to Krebs (preceding abstract). H. B.

Factors in cellular multiplication. P. JOYET-LOVERGNE (Compt. rend., 1934, **199**, 1339—1341).—The function of glutathione and vitamin-*A* in the growth, reproduction, regeneration, and proliferation of cellular tissue is discussed. A. G. P.

Effect of variations in the diet on absorption of food in absence of pancreatic digestion. M. B. HANDELSMAN, L. A. GOLDEN, and J. H. PRATT (J. Nutrition, 1934, **8**, 479—495).—After exclusion of pancreatic juice from the intestine dogs absorbed large proportions of ingested foods including fats, although fæcal N and fat were abnormally high. Gains in body-wt. resulting from increased diets are influenced by factors other than the amounts of ingested fat, carbohydrate, and protein. A. G. P.

Action of prolonged administration of food grown with and without artificial manuring. A. SCHEUNERT, M. SACHSSE, and R. SPECHT (Biochem. Z., 1934, **274**, 372—396).—Rats fed on a diet of which the materials had received artificial manuring during growth were superior in fertility and length of life to others receiving food grown without such fertilisers. P. W. C.

Method of partial regression in analysis of comparative feeding trial data. II. E. W. CRAMPTON and J. W. HOPKINS (J. Nutrition, 1934, **8**, 329—339).—Interpretation of statistical analyses is discussed. A. G. P.

Inorganic salts in nutrition. X. Electrolyte balance in the serum of rats receiving a diet deficient in inorganic constituents. A. H. Smith and P. K. Smith. **XI. Changes in composition of the whole animal induced by a diet poor in salts.** A. E. Light, P. K. Smith, A. H. Smith, and W. E. Anderson (J. Biol. Chem., 1934, **107**, 681—688, 689—695).—X. Animals receving only 0·32 milli-equiv. of base per day maintain a normal electrolyte balance in the serum, but cease to gain wt., take in less food, and excrete NH_3 in the urine instead of fixed base.

XI. In rats on salt-poor diets (I) there is loss of fat, little or no change of ash content, slight increase of protein, and slight loss of Ca, Mg, and P. There is no appreciable loss of Na or Cl. Compared with animals of the same age on an adequate diet rats on (I) have lower Ca, P, and Ca : P ratio. C. G. A.

Significance of phosphatase determinations in the adult fowl. D. W. Auchinachie and A. R. G. Emslie (Biochem. J., 1934, **28**, 1993—2001).—It is suggested that the plasma-phosphatase activity of normal hens may be little affected by egg-laying, but that marked changes may be expected in cases of vitamin-*D* or Ca deficiency. Anomalies are discussed. C. G. A.

Results of ingestion of cod-liver oil and yeast on calcium and phosphorus metabolism of women. H. A. Hunscher, E. Donelson, B. N. Erickson, and I. G. Macy (J. Nutrition, 1934, **8**, 341—346).—Retention of Ca and P was not consistently affected by feeding cod-liver oil or yeast. A. G. P.

Salivary glands and calcium metabolism. T. Matsuo (Trans. Japan. Path. Soc., 1933, **23**, 254—257).—Serum-Ca was increased by extirpation of the parotid gland, and decreased by injection of parotid venous blood-serum. Ch. Abs.

Calcium metabolism of the fœtus. T. Matsuo (Trans. Japan. Path. Soc., 1933, **23**, 257—261).—Fœtal blood is higher in Ca than the blood of the mother or of the umbilical cord. Ch. Abs.

Calcium in the fœtal liver of the calf in embryonic development. G. Roussel and Z. Gruzewska (Compt. rend. Soc. Biol., 1934, **117**, 863—864).—Liver-Ca rises to max. in the 4th and 8th months of gestation, afterwards falling to normal. R. N. C.

Iron metabolism. III. T. Kosuzi, K. Umeda, E. Lee, S. Tachibana, and C. Lee (Trans. Japan. Path. Soc., 1933, **23**, 203—205).—Oral administration of Fe compounds accelerates the metabolism through the entero-hepatic circulation. Ch. Abs.

Relation between salts and acidosis. G. Suzuki (Aichi Ig. Zasshi, 1933, **40**, 1152).—No relationship was apparent between acidosis (I) alkalosis, and serum-Cl′. Production of (I) by lowered NaCl consumption results from smaller intake of Na rather than of Cl′. In the Gerson and other treatments (I) is due to the low carbohydrate and high fat contents of diet and not to absence of NaCl. Ch. Abs. (*p*)

Effect of feeding raw rock phosphate on the fluorine content of the organs and tissues of dairy cows. C. Y. Chang, P. H. Phillips, and E. B. Hart (J. Dairy Sci., 1934, **17**, 695—700).—All tissues examined contained F, max. proportions occurring in bones (I) and teeth (II). Ingestion of F (in rock phosphate) increased the storage of F in (I) and (II) (16—25 times normal) and in internal organs, tendons, and hair (twice normal). A. G. P.

Iodine metabolism. III. T. Yuzuriha (Trans. Japan. Path. Soc., 1933, **23**, 96—100).—In the control of I metabolism the reticulo-endothelial system and the thyroid are synergetic; the former is the more important. Ch. Abs.

Heavy water in the animal body. E. J. McDougall, F. Verzár, H. Erlenmeyer, and H. Gaertner (Nature, 1934, **134**, 1006—1007).—Using H_2^1O as indicator, it has been shown that H_2O injected into fasting rats is distributed throughout the body in 1 hr. L. S. T.

Dosage above the pharmacopœial maximum. A. F. Hurst (Lancet, 1934, **227**, 1379—1383).—A lecture. L. S. T.

Hypoglycæmic action of yeast extracts, especially the relation of yeast extracts to true hormones. I. Influence of yeast extract on normal and adrenaline blood-sugar balance. II. Relation between the effect produced on blood-sugar by yeast extract and insulin : influence of the thyroid. K. Maehara (Folia Endocrinol. Japon., 1934, **9**, 34—35, 36).—I. Aq. and acid (0·5% HCl) EtOH extracts of yeast lower the blood-sugar level. Adrenaline hyperglycæmia is retarded.

II. Insulin hypoglycæmia is increased by injection of extracts. Hypoglycæmia resulting from injection of extracts is checked by feeding thyroid and increased by thyroidectomy. Ch. Abs. (*p*)

Blood-sugar variations in rabbits poisoned by ingestion of carbon tetrachloride. P. M. Dervillée and R. Castagnou (Compt. rend. Soc. Biol., 1934, **117**, 365—367).—Ingestion of CCl_4 produced considerable hypoglycæmia during the first day, followed by slow recovery if the animal survived. R. N. C.

Modifications of blood-sugar and liver-glycogen in splenectomised animals. D. Zorzi (Arch. Farm. sperim., 1934, **58**, 253—269).—Blood-sugar in rabbits rises irregularly to a max. at the end of the 1st month after splenectomy (I), thence falling very gradually to normal at the end of the 5th month. The alimentary glycæmic curve (II) is normal 5 days after (I); at 20 days from (I) it falls to a min. at the 2nd hr. after feeding, afterwards rising to its original val. At 30 days from (I) the fall is still greater and is preceded by a slight rise, which is more pronounced at 60 days, (II) afterwards tending to return to normal. (II) provoked by injection of adrenaline or glucose is not altered by (I). Liver-glycogen falls in the first few days from (I), afterwards rising to > normal. R. N. C.

Effect of hepatic denervation on the stability of liver-glycogen. P. Demant (Compt. rend. Soc. Biol., 1934, **117**, 323—326).—Hepatic denervation reduces liver-glycogen (I) and the hyperglycæmia (II)

provoked by ingestion of glucose. Splanchnic section reduces (I) but raises (II); (I) disappears entirely if the adrenal nerve supply is interfered with. Glycosuria does not occur. R. N. C.

Influence of hepatic stimulation on exogenous and endogenous hypercholesterolæmia in the rabbit. M. Eck and J. Desbordes (Compt. rend. Soc. Biol., 1934, **117**, 681—683).—Hypercholesterolæmia (I) induced in rabbits by administration of a lipin-rich diet was increased by injection of the extract of *Cynara scolymus* (II). (I) induced endogenously by adrenaline injection was reduced by (II). A. L.

Choline and the "cholesterol" fatty liver. H. J. Channon and H. Wilkinson (Biochem. J., 1934, **28**, 2026—2033).—Feeding choline (I) does not cure the "cholesterol" fatty liver of rats previously fed on a diet containing fat and 2% of cholesterol. (I) has no obvious effect in causing a decrease of any of the lipoid constituents except the glyceride fraction. C. G. A.

Lecithin, kephalin, and duration of hæmorrhage. J. Roskam and S. Comhaire (Compt. rend. Soc. Biol., 1934, **117**, 802—804).—Injection of lecithin, free from kephalin (I) and allied substances, into rabbits increases the duration of bleeding by 30—50%, whilst injection of (I) decreases it by approx. 30% (cf. A., 1922, i, 697). F. O. H.

Influence of hydrogen- and hydroxyl-ion concentration on intestinal tonus. M. Tiffeneau and D. Broun (Compt. rend. Soc. Biol., 1934, **117**, 1002—1004).—The inhibiting action of adrenaline and atropine on the isolated guinea-pig intestine increases as p_H decreases, and inversely. On the other hand, the accelerating effect of acetylcholine, pilocarpine, histamine, anterior pituitary extract, and $BaCl_2$ decreases as p_H decreases, and inversely. A. L.

Chemical transmitter at synapses in a sympathetic ganglion. W. Feldberg and J. H. Gaddum (J. Physiol., 1934, **81**, 305—319).—The superior cervical ganglion of a cat, perfused with Locke solution containing eserine, liberated acetylcholine (I) on stimulation of the cervical sympathetic. Liberation of (I) forms the mechanism by which nerve impulses pass the synapse. Ch. Abs. (*p*)

Chemical transmitter of vagus effects to the stomach. H. H. Dale and W. Feldberg (J. Physiol., 1934, **81**, 320—334).—Acetylcholine (I) acts as the chemical transmitter of vagus effects to the stomach. Following injection of eserine and stimulation of the vagi to cause contractions of the stomach wall (II) the (I) content of venous blood from (II) increases by 400%. Ch. Abs. (*p*)

Appearance of an acetylcholine-like substance in the portal blood of the cat. I. Donomae (Pflüger's Archiv, 1934, **234**, 318—324).—On injection of eserine (I) or prostigmine, an acetylcholine-like action in the portal blood can be demonstrated by contraction of leech muscle in Ringer's solution, or by its depressor effect, inhibited by atropine. Larger quantities of (I) produce the same effect to a small extent in the vena iliaca. R. N. C.

Appearance of an acetylcholine-like substance in the perfusion-liquid from perfusion of the isolated small intestine of the cat. W. Feldberg and H. Kwiatkowski (Pflüger's Archiv, 1934, **234**, 333—341).—Perfusion of the isolated intestine with physiological NaCl solution gives no result, but if eserine (I) is added an acetylcholine (II)-like substance, destroyed by alkali but not by acid, and possibly (II) itself, can be detected in the emergent liquid. On re-perfusion with NaCl the effect decreases after 20—25 min. (II) added to the perfusing solution without (I) is destroyed in the intestine, so that the action of (I) is to inhibit the tissue-esterase without causing (II) production. Nicotine has no effect on (II) production. R. N. C.

Substance sensitising muscle to acetylcholine formed in the vagus nerve by electrical excitation. L. Binet and B. Minz (Compt. rend. Soc. Biol., 1934, **117**, 1029—1031).—Electrical excitation of a piece of the vagus nerve isolated from a dog causes the liberation of a thermostable and oxidisable substance which sensitises the dorsal muscle of the leech to the action of acetylcholine. A. L.

Biological significance of the linkings in adenosinetriphosphoric acid. J. H. Gillespie (J. Physiol., 1934, **80**, 345—359).—The action of the acid on heart and uterus of guinea-pigs is > that of any of its derivatives. Removal of PO_4''' from the mol. affects its activity < deamination. Scission of pentose from the purine base destroys biological activity. Ch. Abs. (*p*)

Micro-determination of ethyl alcohol in organs. O. Mollestad (Biochem. Z., 1935, **275**, 136—146).—By using a special flask in which solid matter is finely ground the procedure of Widmark (A., 1922, ii, 789) is made applicable to the determination of EtOH in organs. W. McC.

Alcohol. II. Concentration in blood. M. Schmidt (J. Ind. Hyg., 1934, **16**, 355—365).—Typical curves of the changes in blood-EtOH (I) after ingestion of EtOH (0·6 c.c. per kg. body-wt.) by habitual users (II) and abstainers (III) are given. Max. vals. (0·04—0·08%) of (I) are attained more rapidly with (II) than with (III) (average times of approx. 36 and 48 min., respectively), whilst a return to normal levels generally occurs within 4—5 hr. for both (II) and (III). The psychological effects of EtOH are related to (I). F. O. H.

Concentrations of ethyl alcohol in the blood and its rate of oxidation in the organism. E. Le Breton (Compt. rend. Soc. Biol., 1934, **117**, 707—709).—The equations of Widmark for determining the quantity of EtOH oxidised by man can be applied to the rat, but not to the rabbit. Vals. of β (decrease in [EtOH] per min.) and r (total [EtOH]/[EtOH] in blood) are const. for the individual animal and the species, respectively. A. L.

Rate of diffusion of ethyl alcohol in the organism. E. Le Breton (Compt. rend. Soc. Biol., 1934, **117**, 704—707).—Determinations are made of the decrease (I) with time in [EtOH] after injection of animals with EtOH, and when (I) becomes const. for unit time equilibrium (II) is assumed to be

attained. The time taken for (II) to be reached is used as a basis for the comparison of the rates of diffusion of EtOH in rats, mice, and rabbits according to the method of administration. The order of decreasing [EtOH] in the organs is always the same, namely, blood, brain, carcase, liver. A. L.

Influence of diet on the rate of oxidation of ethyl alcohol. E. Le Breton (Compt. rend. Soc. Biol., 1934, **117**, 709—712).—Rabbits receiving EtOH after ingestion of Witte peptone or alanine oxidise more EtOH per kg. of body-wt. than fasting animals or those having received glucose. A. L.

Barbiturates. II. Methods of barbital research. T. Koppanyi, J. M. Dille, W. S. Murphy, and S. Krop (J. Amer. Pharm. Assoc., 1934, **23**, 1074—1079).—Improved methods of extraction from urine, blood, and tissues are described. Colorimetric methods of determination using $Co(OAc)_2$ and LiOH, $Ba(OH)_2$, or NH_2Pr^{β} are equally sp., the only other $CHCl_3$-sol. substances showing positive tests being theobromine, theophylline, thymine, and lecithin. The micro-test (using LiOH) can be performed only in $CHCl_3$ solution. A. E. O.

Hæmatological changes produced by poisoning with barbiturates. R. E. Carratalá (Semana méd., 1934, II, 402—405).—Chemical changes include decreased Ca, Mg, and P and increased $NaHCO_3$ in the blood. Ch. Abs. (*p*)

(A) **Prolongation of narcosis by piperidinomethylbenzdioxan and related derivatives.** D. Bovet and A. Simon. (B) **Central analgesic and sedative action of the aminomethylbenzdioxans, aminocoumarans, and phenoxyethylamines.** D. Bovet, A. Simon, and F. Depierre (Compt. rend. Soc. Biol., 1934, **117**, 958—960, 961—963).—(A) Preliminary injection of piperidino- (I) and diethylamino-methylbenzdioxan (II) prolong the narcosis in rabbits produced by paraldehyde and Na 5-*cyclo*hexyl-1-methylbarbiturate. The duration of anæsthesia produced by Na tetraethylbarbiturate in sticklebacks is increased by (II) and particularly by allyaminomethylbenzdioxan (III). The aminocoumarans are also active in this respect, especially the *O*-OMe-derivatives; $NEt_2 \cdot CH_2 \cdot CH_2 \cdot OPh$ is inactive, although $NEt_2 \cdot CH_2 \cdot CH_2 \cdot O \cdot C_6H_4 \cdot OMe$ is active.

(B) (I) and its related derivatives, particularly the coumarans, possess comparable analgesic properties; diethylaminophenetole is, however, inactive. (I) diminishes the emetic action of *apo*morphine and digitalis. (I) and (III) injected into rabbits at the base of the fourth ventricle cause a pronounced narcosis indicating that their action is of central origin. A. L.

"Adrenolytic" action of a dioxan derivative (933F). Z. M. Bacq and H. Fredericq (Compt. rend. Soc. Biol., 1934, **117**, 806—808).—The typical reactions of adrenaline in the organism are inhibited by administration of 933F (2-piperidylmethylbenzdioxan hydrochloride), the action of which is better described as "adrenolytic" than as "sympathicolytic." F. O. H.

Phenolsulphonates in the urine of dogs. Y. Garreau (Compt. rend. Soc. Biol., 1934, **117**, 683—685).—Examination of the urine of dogs, injected with PhOH, for phenolsulphonates gave negative results. A. L.

Denervated kidney. II. Action of sodium salicylate on uric acid, allantoin, sodium chloride, and total nitrogen excretion in dogs. M. G. Gray and G. P. Grabfield (J. Pharm. Exp. Ther., 1934, **52**, 383—389; cf. A., 1934, 324).—Section of the renal nerves (I) depresses the increased excretion of N, has no effect on the allantoin output, and decreases the uric acid output produced by Na salicylate (II). (I) has no effect on the changed vol. : [Cl'] relationship produced by (II). H. D.

Action of various hyperthermic agents on the respiration of cells of starfish tissues. P. Creac'h (Compt. rend. Soc. Biol., 1934, **117**, 367—368).—Respiration is increased by basic vital stains (I) of rH >8, and decreased by (I) of rH <8, and acid indigo stains. It is scarcely affected by 2 : 4-$C_6H_3(NO_2)_2 \cdot OH$ (II), but increased by reduced (II), whilst Me-blue reduces it. R. N. C.

Action of vital stains and nitrophenols on the respiration of oyster-tissues and blood-cells of *Sipunculus*. M. Chapheau (Compt. rend. Soc. Biol., 1934, **117**, 370—371).—Vital stains of rH >8 increase the respiration, whilst those of rH <8 have no effect. 2 : 5- (I) and 2 : 4-$C_6H_3(NO_2)_2 \cdot OH$ (II), when reduced, increase the respiration of the blood-cells of *Sipunculus*; unreduced (I) is ineffective, and unreduced (II) acts only very slowly. Oyster-tissues are not affected by (I) or (II), either normal or reduced. R. N. C.

Elimination of theobromine and caffeine from the circulation. R. A. Hatcher and N. T. Kwit (J. Pharm. Exp. Ther., 1934, **52**, 430—436).—Immediately after the injection of caffeine (I) or theobromine (II) the concns. of (I) and (II) in the blood fall rapidly and more slowly after 5 min. The concns. of (I) and (II) 30 min. after administration are the same whether given intravenously or orally. H. D.

Action of certain alkaloids on the physiological polarity of infusoria. A. Serfaty (Compt. rend. Soc. Biol., 1934, **117**, 1077—1079).—The polarity is reversed by choline, pilocarpine, and atropine in decreasing order of potency. R. N. C.

Curarising poisons and muscular fatigue. O. Dehennot (Compt. rend. Soc. Biol., 1934, **117**, 318—320).—Curare has no effect on the fatigue of frogs' muscles, sparteine raises the fatiguability (I) in doses < the min. curarising dose (II), whilst KCl does not affect it in doses < (II). Eserine in (II) increases (I) in respect to indirect excitation (III); with direct (III) variable results are obtained. Results are compatible with the hypothesis of acetylcholine formation by nervous (III). R. N. C.

[Pharmacology of] morphine, codeine, and derivatives. VII. Dihydromorphine (paramorphan), dihydromorphinone (dilaudid), and dihydrocodeinone (dicodide). N. B. Eddy and J. G. Reid (J. Pharm. Exp. Ther., 1934, **52**, 468—493).—The effects of hydrogenation and methylation of the phenolic OH, and of the introduction of the keto-CO in morphine and codeine are in accordance

with the rules which hold for the other alkaloids studied (A., 1934, 805). H. D.

Morphine acidosis. N. Rakieten, H. E. Himwich, and D. Dubois (J. Pharm. Exp. Ther., 1934, **52**, 437—444).—Dogs given 25 mg. per kg. body-wt. of morphine sulphate showed a decrease of blood-p_H of approx. 0·2 unit accompanied by an increased serum-CO_2, -*d*, and -total solids, and a decreased alkaline reserve. No changes were produced in the lactic acid, total base, or [Cl'] of the blood. H. D.

Changes in the physical and chemical characteristics of the blood-sera of opium addicts. R. N. Chopra and S. N. Mukherji (Current Sci., 1934, **3**, 201—202).—In opium addicts, the p_H of blood-serum is near the lower limit of normal Indian adults and the buffer action is lowered. η is diminished and σ is increased. The albumin fraction and euglobulin content are increased, whilst pseudoglobulin and total proteins are < normal. L. S. T.

Blood-sugar of opium addicts. S. Cho (Folia Pharmacol. Japon., 1934, **17**, No. 2, 230—242).—Vals. are normal, but rise slightly during abstinence. Adrenaline produces greater hyperglycæmia in addicts during abstinence. Pilocarpine has the usual effect; atropine sometimes lowers and again slightly raises blood-sugar. Ch. Abs.

Effects of intravenous injections of colloids. I. Deposition of acacia in the liver and other organs and its excretion in urine and bile. M. Andersch and R. B. Gibson (J. Pharm. Exp. Ther., 1934, **52**, 390—407).—In rabbits 50% of the total acacia (I) injected intravenously was recovered in the livers; in dogs about 30%. (I) is removed from the liver very slowly. Injection of (I) into the gall-bladder decreases the excretion of bile acids and bilirubin (II) and (II) is replaced by a yellow pigment. H. D.

Poisonous constituents of the seeds of *Tephrosia vogelii*.—See this vol., 221.

Toxic principle of poison ivy. G. A. Hill, V. Mattacotti, and W. D. Graham (J. Amer. Chem. Soc., 1934, **56**, 2736—2738).—The bark (I) of *Rhus toxicodendron* is extracted with boiling 95% EtOH for 4 days; slow cooling of the conc. extract ppts. wax and gum (removed by filtration). Saturation of the residual extract with NaCl and extraction with xylene gives urushiol (II), b.p. 210°/0·5 mm. (Majima, A., 1922, i, 262). (I) gathered in winter is practically free from (II). The Me_2 ethers of (II) and dihydrourushiol are non-toxic (cf. *ibid.*, 263). H. B.

Toxic properties of greasewood. Physiological action of oxalic acid and its soluble salts. V. A. Willson (J. Amer. Vet. Med. Assoc., 1934, **38**, 76—81).—Toxicity is due to Na and K oxalates (Na : K=4 : 1). Ch. Abs. (*p*)

Chemotherapeutic testing of nitro-derivatives. V. Fischl (Z. Immunität., 1934, **82**, 146—153).—Of 60 NO_2-compounds tested for chemotherapeutic effect on trypanosomes in mice, 2 : 5-$C_6H_3(NO_2)_2$·OH, Victoria-yellow, picric (I), picramic (II), and picrolonic (III) acids, and sun-yellow showed very weak effects on *T. recurrens*. (II) was also slightly effective against *T. nagana*. (I) and (III) were the only effective compounds on staphylococci and *B. coli*. These compounds all contained two NO_2-groups (IV) and a phenolic OH, the 2 : 5-positions for (IV) being specially favourable for activity. R. N. C.

Chemical nature and biological activity of methylphenarsazine dihydroxide and its derivatives. V. M. Karasik and M. M. Lichatschev (Compt. rend. Acad. Sci. U.R.S.S., 1934, **4**, 161—163).—Methylphenarsazine dihydroxide (I) (the Ac derivative of which has no trypanocidal action) causes augmented reflex action and convulsions in white mice and frogs. Replacement of Me by Et and, especially, by Pr increases the effect. Dimethylphenarsazine hydroxide (II) is much more toxic than (I) and exerts a central paralytic action. The nitrate of (II) is less toxic than (II), but more rapid in its action. H. N. R.

Comparative toxicity of sodium and diethylamine derivatives of 3-acetamido-4-hydroxyphenylarsinic acid. R. Pottier and F. van den Branden (Compt. rend. Soc. Biol., 1934, **117**, 830—832).—The ratio of the toxicities to rabbits of intravenously administered Na salt and $NHEt_2$ derivative of stovarsol is 1 : 1·25. F. O. H.

Anthelmintics. I. Effect of hydrogen peroxide and some oxygenated terpene hydrocarbons on *Ascaris lumbricoides*. L. W. Butz and W. A. LaLande, jun. (J. Amer. Pharm. Assoc., 1934, **23**, 1088—1094).—H_2O_2 and the products obtained by the oxygenation of α-pinene, turpentine, and *d*-limonene are very toxic to *A. lumbricoides*. The active constituents of the oxygenated hydrocarbons are probably not peroxides or ketones. A. E. O.

Anthelmintic constituent of leaves of *Calycopteris floribunda*. A. N. Ratnagiriswaran, K. B. Sehra, and K. Venkataraman (Biochem. J., 1934, **28**, 1964—1967).—A yellow flavone, *calycopterin*, $C_{19}H_{18}O_8$ (I), with anthelmintic properties was isolated in 0·1% yield by $COMe_2$ extraction of the dried leaves of *C. floribunda*, Lamk. (I) contains 4 OMe and 2 OH, and yields Ac_2, m.p. 129°, Bz_2, m.p. 165°, and Me_2 derivatives, m.p. 131° (sintering at 127°). Demethylation with HI yields the parent hexahydroxyflavone, *calycopteretin*, $C_{15}H_{10}O_8$, m.p. 310° (sintering at 294°) [Ac_6 derivative, m.p. 212° (sintering at 207°)], not identical with gossypetin, myricetin, or quercetagetin. Boiling aq. KOH on (I) in H_2 yields *p*-OH·C_6H_4·CO_2H; hence (I) must be represented as $OH\cdot(OMe)_3C_6<\begin{matrix}O—C\cdot C_6H_4\cdot OH(p)\\ CO\text{-}C\cdot OMe\end{matrix}$. A. E. O.

Elimination of water from the human body. G. von Hevesy and E. Hofer (Nature, 1934, **134**, 879).—The *d* of H_2O prepared from urine after the intake of dil. H_2^3O has been determined after different intervals of time have elapsed. Using H_2^3O as indicator, it is found that 30 min. after the beginning of the intake of H_2O, some of it (approx. 0·2%) is found in the urine. Most of the H_2O, however, leaves the body slowly. Approx. 9 days elapse before half is eliminated. The average time a mol. of H_2O spends in the human body is 13±1·5 days, and this

is explained by assuming that most of the H_2O taken becomes completely mixed with the total H_2O of the body. L. S. T.

Fibrillation in the chicken embryo heart *in vitro*. I. Effects of excess potassium, calcium, magnesium, and sodium, and of high and low osmotic pressures. II. Character and mechanism of the fibrillation. P. D. F. Murray (Proc. Soc., 1935, B, 116, 434—451, 452—478).

Control of cyanide action: cyanohydrin equilibria *in vivo* and *in vitro*. E. K. Marshall, jun., and M. Rosenfeld (J. Pharm. Exp. Ther., 1934, 52, 445—461).—The protective val. of aldehydes and ketones against CN' poisoning varies directly with their rate of cyanohydrin formation (I) and inversely with the magnitude of their cyanohydrin equilibrium const. (II). Initial respiratory stimulation (III) varies directly with (II) and inversely with (I). Prolonged (III) is produced by cyanohydrins with small (II). $AcCO_2H$ is particularly effective in (III). H. D.

Antitoxic effect of glutathione in cyanide poisoning. M. T. Régnier (J. Pharm. Chim., 1934, [viii], 20, 501—512).—In the guinea-pig, the injection of glutathione (0·5 mol.) has a direct and immediate effect in arresting asphyxia due to HCN (1 mol.). The effect is not due to formation of SCN'. A. E. O.

Nitrite–thiosulphate combination as a remedy for cyanide poisoning in sheep. H. Bunyea, J. F. Couch, and A. B. Clawson (J. Washington Acad. Sci., 1934, 24, 528—532).—Prompt intraperitoneal injection of $NaNO_2$–$Na_2S_2O_3$ is generally an effective antidote for sheep poisoned by administration (*per os*) of 2·75 × min. lethal dose of KCN. The safest therapeutic dose is 1 g. of $NaNO_2$ for 35—40 kg. body-wt.; doses of 0·095 g. per kg. body-wt. may themselves prove fatal, and 0·05 g. per kg. doses are dangerous. Increase of the $Na_2S_2O_3$ (1—3 g.) is possibly advantageous, and is not itself toxic. J. W. B.

Bibliography of the more important heavy metals occurring in food and biological material, 1921—1933 (Soc. Public Analysts, 1934, 30 pp.).—Very brief abstracts are included in many cases under each of the 13 metals.

Determination of traces of lead in biological materials, with special reference to bone. G. R. Lynch, R. H. Slater, and T. G. Osler (Analyst, 1934, 59, 787—806).—After wet oxidation, the Pb is extracted with diphenylthiocarbazone, and determined colorimetrically as PbS. Special precautions must be taken to exclude Bi, if present. The Pb content of 20 normal bones was 14·5—146·0 p.p.m. of fresh tissue, that of the teeth of 5 normal persons 42·5—247·5 p.p.m. The method has been applied to marrow, organs, blood, urine, and fæces. E. C. S.

Absorption and distribution of mercury in animals. A. Stock and F. Cucuel (Angew. Chem., 1934, 47, 801—806; cf. A., 1934, 862, 1257).—The traces of Hg present in various tissues of normal guinea-pigs (I) are increased by exposure for 10—24 hr. to Hg-saturated (6—7 mg. per cu.m.) air. A high content ($21—88 \times 10^{-6}$ g. per g.) of Hg subsequently occurs in the lungs (II) and kidneys (III), whilst that of the liver (IV), heart, spleen, brain, etc. is generally < the blood level ($5·7—20·0 \times 10^{-6}$ g. per g.); relatively small amounts occur in the urine. Curves are given for the accumulation of Hg in (II), (III), and the remainder (V) of (I) and also for the diminution in Hg content after cessation of administration. The retention of Hg by (III) persists for several weeks. The blood-N indicates a toxic action of Hg on (III). Absorption of Hg through the alimentary tract is < that through (II) and produces a rapid rise in the Hg content of (III), those of (IV) and (V) increasing slightly and remaining approx. const., respectively. F. O. H.

Detection of mercury in bullet wounds. G. Guareschi (Deut. Z. ges. gerichtl. Med., 1934, 23, 89—96; Chem. Zentr., 1934, ii, 102).—Material cut from around the wound is treated with HNO_3, diluted with H_2O, filtered, and tested for Hg with $SnCl_2$. A microscopical method of detection is also applicable. H. J. E.

Amino-aciduria and ammoniuria in the course of acute uranium nephritis in the dog, rabbit, and rat. R. Devèze (Compt. rend. Soc. Biol., 1934, 117, 1111—1112).—$UO_2(NO_3)_2$ nephritis produces in all species an increased NH_2-acid excretion. NH_3 excretion varies with the species, being scarcely affected in the rat, increased in the rabbit, and decreased in the dog. R. N. C.

Organic-aciduria in the course of acute uranium nephritis in the dog, rabbit, and rat. R. Devèze (Compt. rend. Soc. Biol., 1934, 117, 1113—1114).—Excretion of org. acids is increased in all three species in $UO_2(NO_3)_2$ nephritis, the increase being largely due to lactic acid. Hippuric acid excretion is diminished. R. N. C.

Renal origin of albuminuria in nephritis produced by uranium nitrate. R. Weekers (Compt. rend. Soc. Biol., 1934, 117, 817—818).—Perfusion of nephritic kidneys with normal or nephritic blood produces the same degree of albuminuria (I). Hence the blood plays no part in (I) due to $UO_2(NO_3)_2$. F. O. H.

Variations in blood-gases after Röntgen irradiation of the spleen. I. Variations after irradiation of various regions of the body with small and large doses. T. Abe (Tôhoku J. Exp. Med., 1934, 23, 394—414).—Changes in blood-O_2 and -CO_2 depend on the site and size of the dose. Ch. Abs. (*p*)

Blood-sugar modifications in hyperthermal and radioactive media. M. Sendrail, R. Molinery, and J. Aversenq (Compt. rend. Soc. Biol., 1934, 117, 322—323).—Hypoglycæmia (I) is widespread among miners in galleries in volcanic rocks, where the air is affected by deep mineral hot springs charged with H_2S and Rn. The greatest (I) was shown by diabetics. R. N. C.

Possible action of cosmic rays on living organisms. R. B. Engelstad and N. H. Moxnes (Nature, 1934, 134, 898).—The only detectable differ-

ence in mice is a greater mean wt. of animals shielded from cosmic rays. L. S. T.

Enzyme reactions from the viewpoint of heterogeneous catalysis. W. FRANKENBURGER (Ergebn. Enzymforsch., 1934, **3**, 1—22; Chem. Zentr., 1934, ii, 952—955).—A theoretical discussion. A parallel is drawn between the heterogeneous catalysis of gas reactions and enzyme reactions. H. N. R.

Enzymic histochemistry. K. LINDERSTRØM-LANG and H. HOLTER (Ergebn. Enzymforsch., 1934, **3**, 309—334; Chem. Zentr., 1934, ii, 1144).—Distribution of proteinase, peptidase, carbohydrase, deamidase, and esterase among various organs and tissues is examined. A. G. P.

Proportionality studies on catalase. G. W. MARKS (J. Biol. Chem., 1934, **107**, 623—627).—p_H curves are given for the catalases (I) from *Amphiroa aspergillum forma nana*, *Corallina officinalis* (II), and *Pikea californica*. For (I) from (II) the quantities of H_2O_2 decomposed $\propto$ (I) concn. and are independent of H_2O_2 concn. over a p_H range 4·5—10·0. Sharp changes occur in the slopes of some of the curves. C. G. A.

Inhibitors of catalase reaction. D. KEILIN and E. F. HARTREE (Nature, 1934, **134**, 933—934; cf. A., 1934, 1136).—NaN_3 is a strong inhibitor of catalase. 0·018*M*-Dimethylglyoxime treated by the method of Sevag and Maiweg gives approx. 0·024*M*-NH_2OH, which is a known catalase inhibitor. L. S. T.

Peroxidase specificity. M. DIXON (Biochem. J., 1934, **28**, 2061—2064).—Pyrocatechol, guaiacol (I), guaiacum, and pyrogallol are readily oxidised by S_2O_8'' in the presence of milk-peroxidase (II) but not when (II) is replaced by horseradish-peroxidase (III) or hæmatin. Bz_2O_2 oxidises all the usual peroxidase reagents with (II) or (III) except (I). H. D.

Peroxidase. A. K. BALLS and W. S. HALE (J. Biol. Chem., 1934, **107**, 767—782).—A method of determining peroxidase (I) based on iodometric titration of residual H_2O_2 is described. The increase in (I) content during dialysis of sliced horseradish roots (cf. A., 1929, 1106) depends on the absence of air in the H_2O used. p_H optima for various substrates were determined. In the enzymic oxidation of pyrogallol (II), aerated (II) may replace H_2O_2, hence it is possible to determine (I) in presence of catalase if (II) is also present. (I) is able to combine with almost any amine or phenol, but successful oxidation takes place only when the substrate may yield a quinone at a min. oxidation–reduction potential rather > that necessary to reduce *o*-chlorophenol-indophenol at p_H 7, *i.e.*, the substrate must be an *o*- or *p*-disubstituted C_6H_6 derivative, with either one substituent OH, or both NH_2. In presence of H_2O_2, (I) is either destroyed or irreversibly bound in the attempt to oxidise an unfavourable substrate. The possibility of "oxidative synthesis" by the action of (I) is mentioned. A. E. O.

Biological oxidation–reduction potential. Potential determinations in the system alcohol-dehydrogenase–acetaldehyde. J. LEHMANN (Biochem. Z., 1934, **274**, 321—328).—The reversibility of the oxido-reduction process in the system EtOH–dehydrogenase (prep. from washed dried yeast)–MeCHO is demonstrated in a series of potential (I) determinations at 30°. The equimol. (I) at p_H 7·45 amounts with the normal H_2 electrode (II) to $E_0' = -0·090$ volt, or with a (II) of the p_H of the enzymic system to $E = 0·356$ volt. P. W. C.

Xanthine-oxidase. XII. Oxidation of nucleosides. M. DIXON and R. LEMBERG (Biochem. J., 1934, **28**, 2065—2079).—Xanthine-oxidase oxidises inosine (I), inosinic acid (II), adenosine (III), muscle adenylic acid (IV), and cozymase, due to the liberation of hypoxanthine (V) by other enzymes. Oxidation of (I) is brought about by a nucleosidase, sp. towards the purine part of the mol., which liberates free (V). The action on (III) is shown to be deamination by a third enzyme to form (I) with subsequent formation of (V). Since (II) and (IV) behave like (I) and (III), respectively, the presence of a phosphatase is indicated. H. G. R.

Effect of *X*- and γ-rays on indophenol-oxidase. R. E. HAVARD (Brit. J. Radiol., 1934, **7**, 296—304).—Indophenol-oxidase was not affected by irradiation under the conditions examined. CH. ABS. (*p*)

[Nature of] the respiratory co-enzyme of red blood-cells. H. THEORELL (Biochem. Z., 1934, **275**, 11—18; cf. A., 1934, 1136; Warburg *et al.*, *ibid.*, 109).—Cataphoresis cannot be used to purify the co-enzyme (I), but it indicates that (I) is an acid (probably a phosphoric acid) which dissociates in two stages. (I) contains no conjugated OH groups. W. McC.

Acid groups of the respiratory co-enzyme. H. THEORELL (Biochem. Z., 1934, **275**, 19—29).—Measurements in the cataphoresis apparatus show that the co-enzyme is a tetrabasic acid, probably a diphosphoric ester, 2 H being liberated at each stage of dissociation. W. McC.

[Nature of] mixtures of respiratory enzymes with substrates. H. THEORELL (Biochem. Z., 1934, **275**, 30—36).—At p_H 7·4 the intermediate respiratory enzyme (I) and the co-enzyme (II) react with the substrate (III) (hexosemonophosphoric acid), but (I) does not react with (II). All the components of the system [yellow enzyme, (I), (II), (III)], and hence (presumably) all combinations of them are negatively charged. W. McC.

Active group of the yellow enzyme. H. THEORELL (Biochem. Z., 1934, **275**, 37; cf. A., 1934, 1136).—No yellow enzyme (I) is produced when lactoflavin is added to the inactive constituent of (I). The constituents of (I) are separated by adding 3 vols. of MeOH to aq. (I), the protein constituent, which contains no P, being pptd. 1 mol. of the active yellow constituent contains 1 P. The active group of (I) is probably a monophosphoric ester, a nucleotide in which the purine base is replaced by dimethylalloxazine (Karrer, *et al.*, A., 1934, 1233). W. McC.

Reduction of nitric oxide by oxidising enzymes. O. MEYERHOF and W. SCHULZ (Biochem. Z., 1934, **275**, 147—161).—Yeast maceration juice (I) in presence of oxidisable substrates (II) (especially

hexose phosphates) and the yellow respiratory enzyme (III) in presence of hexose monophosphate reduce NO to N_2O, (II) being oxidised at the same or at a greater rate than by atm. O_2. With (I) CO_2 is produced and the R.Q. is the same as when atm. O_2 is the oxidising agent, but the O_2 uptake is 1½ times as great with NO as with O_2. Reduction of NO occurs only with such (II) as are enzymically oxidised with O_2. The extent of reduction varies considerably with the (II) used. W. McC.

Reduction of glutathione by the Warburg–Christian system. N. U. Meldrum and H. L. A. Tarr (Biochem. J., 1935, **29**, 108—115).—Glutathione (I) is reduced both aërobically and anaërobically by the Warburg–Christian enzyme–co-enzyme system (II), derived from brewer's top yeast, baker's yeast, or rat's blood, in presence of hexosemonophosphoric acid (III), less readily with phosphohexonic acid and fructosediphosphoric acid, and not by diphosphoglyceric acid, glucose, or fructose. (I) acts as O carrier when (III) is oxidised by (II) in presence of O_2; the velocity of oxidation ∝ the amount of (I), the limiting factor being the rate of reoxidation of (I). Cystine (IV) also acts as O carrier in the same system, the rate being independent of (IV) concn. as the limiting factor here is the rate of reduction of (IV). C. G. A.

Salts of base from co-enzyme preparations. O. Warburg and W. Christian (Biochem. Z., 1934, **275**, 112—113; cf. this vol., 121).—The base (I), m.p. 125°, yields a *picrolonate*, m.p. 220° (decomp.), a *hydrochloride* (II), m.p. 224°, and a *platinichloride*, m.p. > 300° (decomp.). 1 mol. of (II) reduced with Pd+H_2 takes up 3 H_2. (I) is obtained from (II) by shaking with Ag_2CO_3; it has mol. wt. about 120 (Rast's method gives 154). 100 litres of horse blood yield 10—20 mg. of (I). W. McC.

Michaelis constant for fumarase. F. B. Pereira and A. Da Cruz (Compt. rend. Soc. Biol., 1934, **117**, 723—726).—Results of determinations of fumarase activity at 37°, 22°, and 5° indicate that there is no change with temp. in the val. for the substrate concn. below which diminution in enzyme activity takes place. The dissociation const. of the fumarase–fumarate complex is only slightly affected by change of temp. (0·0017 at 22° and 0·0035 at 37° and 5°). A. L.

Temperature coefficient of fumarase. K. P. Jacobsohn and A. Da Cruz (Compt. rend. Soc. Biol., 1934, **117**, 726—728).—The Arrhenius const. for the hydration of fumaric acid by fumarase is the same as that for the reverse reaction, viz., 10,000. A. L.

Amylosynthease. XXIV. Reaction velocity. M. T. Minagawa (J. Agric. Chem. Soc. Japan, 1934, **10**, 550—553).—Dextrin is polymerised with difficulty by yeast extract, but relatively easily if amylase is previously removed from the extract. Amylosynthease, purified by pptn. with $(NH_4)_2SO_4$, polymerises α- and β-dextrins (from starch by taka-diastase and various amylases) with equal facility. Ch. Abs. (*p*)

Amylase of batate (*Ipomœa batatas*). K. V. Giri (Biochem. Z., 1934, **275**, 106—111; cf. A., 1934, 1136).—The amylase (I) is purified at about 0° by dialysis of extracts of batate and adsorption of (I) on $Al(OH)_3$. The degree of adsorption is independent of the concn. of (I), but increases with increasing purity of (I). The optimum p_H for adsorption is 3·7—4·2. (I) contains carbohydrate but no protein. W. McC.

Development of amylase during germination of barley. H. Lüers and W. Rümmler (Woch. Brau., 1935, **52**, 9—12).—Using barley extract, with or without papain digestion, liquefying and dextrinising action could not be demonstrated, and the appearance of an amylokinase during germination could not be confirmed. Destruction of saccharogen-amylase (*S*) by heating extracts to 70° had little effect on liquefying power, but decreased dextrinisation markedly, suggesting that the two reactions are due to different factors. Investigation of *S* activity, in normal and papain-digested extracts, suggested that 3 factors are active during germination, and not *S* and dextrinogen-amylase only. I. A. P.

Biochemical micro-methods. VI. Photometric determination of amylase and maltase. B. J. Krijgsman (Z. physiol. Chem., 1934, **230**, 190—198).—The amylase content of saliva is determined by an adapted Rona and van Eweyk's method (A., 1925, i, 1264); the max. error is 2·5%. The method previously described (A., 1933, 845) for determination of blood-sugar is adapted for the maltase activity of yeast and pancreas extracts using maltose as substrate; the max. error is 2·8%. H. B.

Degradation of glycogen in muscle. II. Effect of muscle compounds on the activity of amylase. III. Action of amylase in presence of myosin. S. J. von Przyłecki and B. Filipowicz (Biochem. Z., 1934, **275**, 56—61, 62—65; cf. A., 1932, 193).—II. The degradation of starch or glycogen (I) by amylase (II) is only slightly or not at all affected by addition of nucleic acid, nucleotides (guanylic, adenylic, xanthylic acids), or muscle extract (rabbit). Hence the reactions which lead to great and rapid increase in degradation of (I) are not the cause of the increased activity of (II), which results rather fron spatial changes (III). (III) bring (I) and (II) into direct contact or separate them.

III. The degree of activation of ptyalin (IV) by myosin (V) is slight at the isoelectric point (VI), but increases with the distance from (VI). (V) does not adsorb (IV). Polysaccharoproteins (VII) are degraded with much greater difficulty than are free polysaccharides (VIII). Hence hydrolysis of (VIII) decreases following production of (VII) at physiological p_H and salt concn. W. McC.

Presence of a kinase of amylase in trypsin preparations. T. Chrząszcz and J. Janicki (Biochem. J., 1934, **28**, 1949—1954).—Trypsin (I) increases both the saccharifying and dextrinising functions of barley, the effect on the latter being very marked. Inactivated (I) partly protects the amylase against inactivation by shaking. A. E. O.

Influence of aëration on the diastatic activity of barley during steeping. R. H. R. Rau and V. Subrahmanyán (Proc. Indian Acad. Sci., 1934, **1**, B,

1—9).—Steeping of barley diminishes the diastatic activity (I) (due to anaërobiosis) for approx. 24 hr., whilst continuous steeping for 2—4 days in presence or absence of air increases (I). The development of (I) is independent of the capacity for germination. F. O. H.

Dilatometric studies in the enzymic hydrolysis of polysaccharides. I. Inulin. M. Sreenivasaya, H. B. Sreerangachar, and N. K. Iyengar. **II. Hydrolysis of starch by malt diastase.** H. B. Sreerangachar and M. Sreenivasaya (Proc. Indian Acad. Sci., 1934, **1**, B, 43—47, 101—105).—I. For equal substrate concns., hydrolysis of inulin (I) [determined by dilatometer (A., 1932, 880) or by the rate of liberation of fructose (II)] at 30° and p_H 3·8 in citrate buffer by inulinase (*Penicillium* extract) is > that of starch (A., 1934, 109). Liberation of (II) is accompanied by a relatively high contraction in vol., viz., 7·9 cu.mm. per millimol. of (II), a val. independent of the concn. of (I).

II. The hydrolysis of sol. starch (0·05—2·0%) by malt diastase at 30° and p_H 5·3 in PO_4''' buffer gives a dilatometric contraction which ∝ the amount of maltose liberated (3·9 cu.mm. per millimol.) and also ∝ the diminution in α (6·8 cu.mm. per 1°). F. O. H.

Lucerne emulsin. K. Hill (Ber. Verh. sächs. Akad. Wiss. Leipzig, Math-Phys. Kl., 1934, **86**, 115—128; Chem. Zentr., 1934, ii, 1142—1143).—Prep. of the emulsin is described and its specificity examined in respect of mannose, α- and β-galactose. Comparison is made with almond emulsin. A. G. P.

Emulsin. XVII. Action of ozone on almond-emulsin. B. Helferich, S. Winkler, E. Schmitz-Hillebrecht, and H. Bach (Z. physiol. Chem., 1934, **229**, 112—116; cf. A., 1934, 1402).—When emulsin is progressively inactivated by O_3, its tryptophan is destroyed at about the same rate. The activity towards β-*d*-glucoside, -*iso*rhamnoside, and -galactoside is lowered to about the same extent in a treated prep, but the activity towards α-*d*-mannoside (I) to a greater degree, indicating that a different enzyme is responsible for (I) hydrolysis, as previously shown. J. H. B.

Relation between the re-synthesis of adenosinetriphosphoric acid and the reaction of pyruvic acid and dihydroxyacetonephosphoric esters. Z. Dische (Naturwiss., 1934, **22**, 855).—Theoretical. R. S. C.

Phosphorylated intermediate product of carbohydrate fission and its enzymic equilibrium. O. Meyerhof and W. Kiessling (Naturwiss., 1934, **22**, 838).—d-α-(2-)*Phosphorylglyceric acid* (I) (*Ba* salt, $[\alpha]_D$ +24·3°), is isolated from the crude β-(3-)acid (II), prepared enzymically. *dl*-(I) and *dl*-(II) are obtained from glycerol-β- and -α-phosphoric acids, respectively, and Br. With dialysed muscle extract the biologically inactive *d*-(I) and *l*-(II) are unaffected, whereas the active *l*-(I) and *d*-(II) enter into equilibrium with each other, *k* for *l*-(II)/*d*-(II) being 3·0 at 28° [75% of (II)]. R. S. C.

Relation between phosphorylation and oxido-reduction in fermentation and glycolysis. A. Schäffner and E. Bauer (Naturwiss., 1934, **22**, 855—856).—The co-enzyme of horse's blood-cells can be replaced by that of yeast for phosphorylation (I). (I) is connected with a dehydrogenation, since Warburg's intermediate enzyme is necessary for it to occur. R. S. C.

Production of an optically active phosphoglyceric acid by glycolysis in muscle. G. Embden, H. J. Deuticke, and G. Kraft (Z. physiol. Chem., 1934, **230**, 12—28).—Treatment of minced rabbit muscle (I) with 0·5*M*-Na *dl*-lactate containing 0·4% of wheat-starch and 2% of $NaHCO_3$ at 11—13° gives (−)-β-phosphoglyceric acid (II), $[\alpha]_D$ −11·91° in H_2O, +11·39° (as Na_3 salt), isolated as the cryst. *Ba* salt (+H_2O). (II) is hydrolysed (dil. H_2SO_4) with difficulty to *d*-(−)-glyceric acid (*Ba* salt) and H_3PO_4. (II) is also produced from (I) and $Na_2C_2O_4$ or NaF; the amount is much increased by addition of Na hexose diphosphate [which is probably an intermediate in the above production of (II)]. H. B.

Significance of phosphoglyceric acid for glycolysis in muscle. G. Embden and H. J. Deuticke (Z. physiol. Chem., 1934, **230**, 29—49).—Phosphoglyceric acid (I) (as Na salt) is converted by minced rabbit muscle (II) into H_3PO_4 and $AcCO_2H$ (III). Little lactic acid (IV) is formed when glycerophosphoric acid (V) (as Na salt) is added to (II), but addition of (I)+(V) produces much; (V) is the H-donator in the change (III) ⟶ (IV). (II) does not effect the change (III) ⟶ (IV); subsequent addition of (V) accelerates reaction. AcCHO is not considered to be an intermediate. The following scheme for the production of (IV) is given: (i) hexose-diphosphoric acid is synthesised from polysaccharide, hexose, or hexosemonophosphoric acid and H_3PO_4; (ii) $PO_3H_2{\cdot}O{\cdot}CH_2{\cdot}CO{\cdot}[CH(OH)]_3{\cdot}CH_2{\cdot}O{\cdot}PO_3H_2$ ⟶ $OH{\cdot}CH_2{\cdot}CO{\cdot}CH_2{\cdot}O{\cdot}PO_3H_2$ (VI)+ $CHO{\cdot}CH(OH){\cdot}CH_2{\cdot}O{\cdot}PO_3H_2$ (VII); (iii) dismutation of (VI) and (VII) to (I) and (V); (iv) $CO_2H{\cdot}CH(OH){\cdot}CH_2{\cdot}O{\cdot}PO_3H_2$ ⟶ $AcCO_2H+H_3PO_4$; (v) $OH{\cdot}CH_2{\cdot}CH(OH){\cdot}CH_2{\cdot}O{\cdot}PO_3H_2+AcCO_2H$ ⟶ $OH{\cdot}CHMe{\cdot}CO_2H$+(VII). H. B.

Action of fluoride and bromoacetic acid on intermediary processes in glycolysis in muscle. G. Embden and H. J. Deuticke (Z. physiol. Chem., 1934, **230**, 50—62; see preceding abstracts).—Minced rabbit muscle (I) treated with NaF and $NaHCO_3$ converts added hexose diphosphate (II) into phosphoglyceric acid (III), but specifically inhibits the conversion of (III) into $AcCO_2H$ (IV) and H_3PO_4; reduction of (IV) by glycerophosphoric acid (V) to lactic acid is similarly unaffected, but less "hydrolysis" of (V) occurs [than with normal (I)]. (I) treated with $CH_2Br{\cdot}CO_2Na$ does not convert (II) into triosephosphoric acids and also retards the above reduction of (IV); conversion of (III) into (IV) occurs. H. B.

Isolation of glycerophosphoric acid from fluoride-poisoned muscle. G. Embden and T. Ickes (Z. physiol. Chem., 1934, **230**, 63—68).—Glycerophosphoric and phosphoglyceric acids (see above) are formed from minced rabbit muscle, NaF+$NaHCO_3$, and Na hexose diphosphate; separ-

ation is effected through the differing solubilities of the Ba salts. H. B.

Intermediate stages in glycolysis in striped muscle. G. Embden and H. Jost (Z. physiol. Chem., 1934, **230**, 69—89).—Minced rabbit muscle (vertebral and leg) with *dl*-β-phosphoglyceraldehyde (I) (Fischer and Baer, A., 1932, 364) in 2% $NaHCO_3$ saturated with CO_2 at 37° gives a preponderance of (+)-lactic acid (II) after a short reaction time. More prolonged reaction leads to an excess of (−)-lactic acid (III), probably owing to hydrolysis of unreacted (I) to AcCHO, which is then converted (as is shown experimentally) into (III). These results are contrary to those of Barrenscheen and Beneschovsky (A., 1933, 1202); they also show that *d*-(I) is an intermediate in glycolysis in muscle. (II) is similarly produced from $AcCO_2H$+glycerophosphoric acid (IV) or phosphoglyceric acid+(IV); *dl*-glyceraldehyde affords (III). Dihydroxyacetonephosphoric acid (Langheld, A., 1912, i, 415) and $CO(CH_2{\cdot}OH)_2$ are not converted into lactic acid (V) even in presence of (I). The above results support the scheme suggested above for the production of (V) from carbohydrates. H. B.

Action of fluoride on intermediary processes in glycolysis in yeast. E. Lehnartz (Z. physiol. Chem., 1934, **230**, 90—95; cf. Neuberg and Kobel, A., 1933, 982; Meyerhof and Kiessling, A., 1934, 328).—Phosphoglyceric acid, $[\alpha]_D^{20}$ −11·3° in H_2O [Ba salt (+1·5H_2O)], identical with that isolated from muscle (see above), is obtained during fermentation of glucose with dry brewer's yeast in presence of phosphate, Na hexose diphosphate, NaF, and MeCHO (absence of this leads to a diminished yield). H. B.

Anaërobic glycolysis in kidney. H. Jost (Z. physiol. Chem., 1934, **230**, 96—108).—(+)-Lactic acid is formed from minced ox kidney (I) and the following substances in 2% $NaHCO_3$ saturated with CO_2 at 37°: *dl*-β-phosphoglyceraldehyde (provided a small concn. is used), phosphoglyceric acid (II), glycerophosphoric acid (III)+(II), $AcCO_2H$ (IV), (III)+(IV). (−)-Lactic acid is similarly obtained from AcCHO and glyceraldehyde. (I), unlike muscle, contains a substance [probably (III)] capable of acting as a H-donator to (IV). The production of lactic acid (V) from carbohydrate (VI) in the kidney is considered to involve the same changes as in muscle (Embden and Jost, above). (V) is not similarly produced from $CO(CH_2{\cdot}OH)_2$. Preliminary work on the possibility of the production of (V) from (VI) by way of non-phosphorylated compounds [*e.g.*, (IV)] is discussed. H. B.

Effect of potassium on the glycolysis of brain tissue with reference to the Pasteur effect. C. A. Ashford and K. C. Dixon (Biochem. J., 1935, **29**, 157—168).—Addition of K salts (but not Na salts) reversibly increases aërobic glycolysis (I) and O_2 uptake, and irreversibly inhibits anaërobic (I) by brain slices. *dl*-Glyceraldehyde inhibits the raised (I) occurring in the presence of 0·1*N*-KCl, whilst pyruvate does not modify the action of K$^{\cdot}$. The oxidative removal of lactic acid (II) is not affected by K$^{\cdot}$. The mechanisms of (II) production in O_2 and N_2 are probably different; the former is activated and the latter inhibited by K$^{\cdot}$. A. E. O.

Phosphatases. II. Liberation of phosphoesterases from liver. E. Bamann, E. Riedel, and K. Diederichs (Z. physiol. Chem., 1934, **230**, 175—184).—Of the methods studied, natural autolysis of fresh liver (I) gives an autolysate containing max. amounts of the phosphoesterases [(II) (max. activity at p_H 5·5) and (III) (max. activity at p_H 9·5)]; liberation of (II) and especially (III) is incomplete. Dehydration of (I) with $COMe_2$ causes loss of enzymes. Neutral solutions of (II) and (III) do not lose their activity when kept at 6°; (II) is stable in 0·025*N*-AcOH, whilst (III) is stable in 0·025*N*-NH_3. Lyo- and desmo-complexes in (III) are characterised. H. B.

Phosphatases. III. Separation of the two isodynamic phosphoesterases of animal organs by a selective inactivating process. E. Bamann and K. Diederichs (Ber., 1934, **67**, [*B*], 2019—2021).—The alkaline phosphoesterase of pig's liver is stable only in neutral or weakly alkaline solution and becomes inactivated in the presence of acid. The reverse is true of acid phosphoesterase. The difference in behaviour is so pronounced that it is possible to obtain the individual enzymes from mixtures of them by selective inactivation. H. W.

Composition and properties of esterases. H. Kraut and W. von Pantschenko-Jurewicz (Biochem. Z., 1934, **275**, 114—135; cf. A., 1928, 671; Willstätter, *et al.*, A., 1934, 913).—Liver-esterase (I) is purified by adsorption on $Pb_3(PO_4)_2$ (which first adsorbs impurities) and elution with dil. AcOH. (I) and other enzymes are "symplexes" (II) consisting of an active constituent "agon" (III) and a carrier "pheron" (IV). (II), (III), and (IV) are subject to the law of mass action; in the case of (I) large excess of (IV) must be present to maintain (III) in (II) and removal of free (IV) destroys the activity by disturbing the equilibrium. Free (III) changes into an inactive "anagon" incapable of re-forming (II), but other enzymes may have agons which are also active when free. Free (IV) [in (I) at least] is not a true protein. New (I) is produced when (I) rich in (IV) is added to pancreatic lipase (V) rich in (III), and new (V) is produced when (I) rich in (III) is added to (V) rich in (IV). Hence (I) and (V) have the same (III) but different (IV). Differences in specificity amongst esterases are a function of (IV). Activation of (V) with albumin is due to synthesis of a new (II) with excess of (III). In the same manner explanations are provided for many properties of enzymes and (possibly) for those of vitamins and hormones. W. McC.

Fixation of enzymes by cells. I. Protoplasmic fixation of liver-esterase. E. Bamann and J. N. Mukherjee. **II. Isolation of esterase from liver.** E. Bamann, J. N. Mukherjee, and L. Vogel (Z. physiol. Chem., 1934, **229**, 1—14, 15—21).—I. Only about 1% of liver-esterase (I) is immediately sol. in glycerol (II). Extraction of (I) by H_2O–(II) mixtures from the fresh organ progresses slowly and ceases when 30—40% of (I) is dissolved. The rest, bound to high-mol. carriers, is liberated by

autolysis at alkaline reaction. Solutions of (I) are more readily obtained from $COMe_2$-dried preps. H_2O or (II)–H_2O dissolve 45—65% of the (I) present, the rest being liberated by acid or alkali without autolysis. Distilled H_2O containing CO_2 is less efficient than CO_2-free H_2O.

II. A rapid quant. isolation is attained by subjecting the fresh minced organ to autolysis in alkaline medium for 3—4 days (which renders 50—60% of the esterase sol.), and subsequent treatment with dil. AcOH. The enzyme may be purified by dialysis. J. H. B.

(A) **Reversible inactivation of papain and cathepsin.** (B) **Activation phenomena of papain and cathepsin.** A. Purr (Biochem. J., 1935, **29**, 5—12, 13—20).—(A) The proteinase activity of papain (I) extracts is completely inactivated by alloxan (II), AcCHO (III), milk xanthine-oxidase+hypoxanthine+milk peroxidase in the presence of O_2, and by H_2O_2. Cathepsin (IV), from rats' livers, is inactivated by (II), (III), and $CH_2I{\cdot}CO_2H$ (V); reactivation by cysteine or H_2S is not obtained after inactivation by (V); in this case EtOH reactivates. A parallelism exists between the disappearance of ·SH from (I) or (IV) and inactivation except with (V). Large quantities of inactive (IV) are prepared by extraction of liver with $COMe_2$ and Et_2O, and extraction of the residue with 85% glycerol.

(B) Vitamin-*C*+Fe$^{\cdot\cdot}$ (VI) fails to activate purified preps. of (I), whilst both (VI) and $AcCO_2H$+Fe$^{\cdot\cdot}$ (VII) activate an impure (I). Pure (I) is activated by fixed ·SH+·S·S· proteins (VIII) (A., 1923, i, 167), (VI), (VII), and succinic acid + Fe$^{\cdot\cdot}$ in the presence of (VIII). The activation by (VI) and (VII) results from the reduction of ·S·S· to ·SH. ·S·S· glutathione activates (I) in presence of (VI). The activation phenomena of (IV) are similar except that (VIII)+(VII) does not increase activity. H. D.

Absorption of ultra-violet radiation by crystalline pepsin. F. L. Gates (J. Gen. Physiol., 1934, **18**, 265—278).—Pure cryst. pepsin (I) in 0·1*N*-NaOAc buffer at p_H 5 gives progressive changes in the ultra-violet absorption curve (II), especially in higher λ, on irradiation for increasing periods. Increasing the λ of the radiation has similar effects. There is no significant difference between the (II) of active and heat-inactivated (I). The log. % of (I)-activity as determined by the Anson–Mirsky method (A., 1932, 1166) $\propto$ time of exposure. An essential agreement obtains between the determined activity and that deduced on the assumption of a one-quantum relationship, and the destruction curve (III) coincides with (II). However, considerably more energy must be absorbed at 250·9 and 271·9 mμ to produce 50% inactivation than at 235·7 mμ. The (III) of (I) is similar to that of urease. H. D.

Temperature coefficient of inactivation of crystalline pepsin by ultra-violet radiation. F. L. Gates (J. Gen. Physiol., 1934, **18**, 279—282).—The temp. coeff. of inactivation of pepsin by ultra-violet radiation at 253·7 mμ is 1·02. H. D.

Isolation of crystalline trypsinogen and its conversion into crystalline trypsin. M. Kunitz and J. H. Northrop (Science, 1934, **80**, 505—506).—Details are given of the isolation of cryst. trypsinogen (I) from the mother-liquor obtained from the chymotrypsinogen crystallisation (A., 1934, 1260) and its conversion into cryst. trypsin by treatment with conc. aq. $MgSO_4$ at p_H 7·0—8·0. (I) is a protein with no proteolytic activity. The activation reaction is autocatalytic. L. S. T.

Development of rennin-like and proteolytic activity of trypsin-kinase. M. Guillaumie (Compt. rend. Soc. Biol., 1934, **117**, 354—357).—The rennin-like activity (I) of trypsin-kinase develops at a faster rate than the proteolytic activity (II), the rate for (I) depending on the quantity of enterokinase (III) present. The max. (I) attained is independent of the quantity of (III), and when attained it is unaltered by the addition of sufficient (III) to bring (II) to its max. R. N. C.

Activity of extracts of the pancreas of *Scyllium catulus* with added enterokinase. M. Guillaumie (Compt. rend. Soc. Biol., 1934, **117**, 747—750).—The proteolytic action (I) of extracts of the pancreas of dogfish (II) is increased by addition of enterokinase (III) preps. from dogs, rabbits, or (II). With low concns. of (III), (I) $\propto$ (III) concn. Following attainment of max. activity, the milk-curdling action diminishes more rapidly than (I). F. O. H.

Enzymic liberation of arginine from proteins. F. Lieben and H. Lieber (Biochem. Z., 1934, **275**, 38—48).—Arginine (I) liberated from proteins (caseinogen, gelatin, serum-albumin) by enzymes (pepsin, trypsin, papain) is best determined by pptn. with flavianic acid or, colorimetrically, by a modification of the method of Lang (A., 1932, 834). By means of sulphosalicylic acid (II), (I) is separated into a fraction of high mol. wt. pptd. by (II) and another (III) which contains free (I) and peptides of low mol. wt. The arginase method determines free but not combined (I). Sources of error in other methods of determination are indicated and figures are given for the amounts of (I) obtained. The vals. decrease if alkaline digestion is prolonged, possibly because resynthesis and racemisation then occur. W. McC.

Behaviour of animal proteolytic enzymes with plant proteins. V. S. Sadikov and V. N. Menschikova (Compt. rend. Acad. Sci. U.R.S.S., 1934, **4**, 138—142).—The process of isolation of proteins changes their behaviour towards enzymes; the native proteins of many seed meals are unattacked by animal proteolytic enzymes. The results cannot be ascribed to the presence of oil, since completely defatted soya-bean meal behaves similarly. The action of dil. HCl and Na_2CO_3 on the meals under different conditions is described. H. N. R.

Relative actions of pancreatin on caseinogen and gelatin. P. Efendi (J. Physiol. U.S.S.R., 1934, **17**, 45—51).—Caseinogen ("acid protein") is digested better by 0·5% pancreatin than is gelatin ("basic protein"). Ch. Abs. (*p*)

Ultrafiltration of urease using membranes of graded porosity. P. Grabar and A. Riegert (Compt. rend. Soc. Biol., 1934, **117**, 712—714).—

Urease is completely retained by a membrane having pores of 30 mμ diam. A. L.

Sugar fermentation. C. Neuberg and M. Kobel (J. Bact., 1934, **28**, 461—471).—The mechanism of the enzymic changes is discussed. A. G. P.

Influence of p_H on the rate of yeast growth in a synthetic medium containing asparagine. C. Taxner (J. Inst. Brew., 1935, **41**, 27—30).—To a basal mineral-salt medium (without N) an extract of malt rootlets was added to supply "bios," and p_H was adjusted to the required val. with NaOH and lactic acid, the p_H changes during the periods investigated being relatively small. Glucose was added daily to maintain a concn. of 2%, and asparagine was added whenever N fell below 0·005% in the medium. The initial p_H (I) was of greater effect on the yeast growth than that reached later. The optimum (I) for growth was 3·57—3·87, there being here a lag, however, compared with growth at more alkaline vals., the increased growth being shown later. The cultures were continuously aërated. I. A. P.

Assimilation of nitrogen by brewers' yeast. R. H. Hopkins (J. Inst. Brew., 1935, **41**, 30—33).—The yeast growth obtained by Taxner (preceding abstract) was somewhat > that obtained in brewers' wort (I), and enormously > that usually given in synthetic media. This is only partly due to the conditions of p_H, aëration, and sugar concn. employed, and to the presence of "bios." The low [N] maintained is also effective in increasing growth. It appears necessary to distinguish between "potentially assimilable N" (II) and "immediately assimilable N" (III). For max. growth, it seems that (III) should be maintained at a low val. With excessive (III), growth is rapid at first, but later declines. In (I), (II) reaches a relatively high val., but, in effect, steadily supplies (III) only in small quantities. I. A. P.

Dehydrase system of yeast. R. Sonderhoff (Ergebn. Enzymforsch., 1934, **3**, 163—184; Chem. Zentr., 1934, ii, 1141—1142).—Dehydrase activity of yeast is discussed. A. G. P.

Rôle of ferrous and ferric ions in the fermentation and oxidation processes of yeasts. A. Malkow (Zentr. Bakt. Par., 1934, **91**, II, 161—163).—Addition of $Fe^{...}$ to cultures resulted in formation of greater dry-wt. of yeast and less EtOH than when an equal wt. of $Fe^{..}$ was used. Fermentation in presence of $Fe^{...}$ is independent of aëration. A. G. P.

Effect of liver extract on fermentation by yeast. K. Zipf and K. Rathert (Biochem. Z., 1934, **275**, 90—96).—In liver extracts anti-anæmic activity (I) ∝ power (II) to stimulate fermentation by yeast. The substances responsible for (I) and (II) seem to be identical or closely related, since they very often occur together and have similar properties [stable to heat and to mild acid hydrolysis, not pptd. by $Pb(OAc)_2$, pptd. by 70% aq. EtOH, not adsorbed by animal C]. W. McC.

Action of dinitrophenols on respiration of yeasts and lactic bacilli. L. Genevois and R. Saric (Compt. rend. Soc. Biol., 1934, **117**, 368—369).—Dinitrophenols produce no increase of respiration of either yeasts or *B. Delbrücki*. R. N. C.

Results of irradiating *Saccharomyces* with monochromatic ultra-violet light. II. Influence of modifying factors. III. Absorption of ultra-violet energy by yeast. R. H. Oster (J. Gen. Physiol., 1934, **18**, 243—250, 251—254; cf. A., 1934, 1262).—II. Old yeast-cells (I) are more resistant to ultra-violet irradiation (II) than young proliferating cells; the temp. coeff. of the rate of destruction is 1·1. No toxic substances are liberated by cells killed or damaged by (II) nor is any effect on the subsequent growth of (I) produced by the (II) of the malt–agar medium.

III. An approximation to the ultra-violet absorption curve (III) of the absorbing substance responsible for the death of (I) is obtained by plotting the incident energies required to cause the death of 50% of (I) against λ. A min. energy requirement between 260 and 270 mμ and one below 230 mμ are found. The curves obtained resemble the (III) of cytosine and uracil. H. D.

Extraction of zymoflavin by methylal. L. Genevois and L. Espil (Bull. Soc. chim., 1934, [v], **1**, 1498—1502).—Fresh yeast is shaken with methylal (I) for 30 min. and the liquid decanted. The paste is extracted with H_2O [saturated with (I)] and filtered. The (I) is removed by evaporation at 30°. Sugars are removed from the resulting aq. solution by yeast. The solution is then conc. in vac. and some NH_2-acids (II) are pptd. by $Pb(OAc)_2$. The product contains zymoflavin (III) and some (II) and other impurities. (III) is not affected by substitution of the NH_2 or SH of (II). The fluorescence of (III) is const. between p_H 3 and 10; it is destroyed by $Na_2S_2O_4$, by which (III) can thus be determined. R. S. C.

Potentiometric determination of oxido-reduction processes in fermenting yeast extract. F. Lipmann (Biochem. Z., 1934, **274**, 329—340).—The author's earlier work (A., 1934, 451) on potentiometric determinations in Lebedev's maceration extract is extended, vals. for oxido-reduction potential being given using Pt electrodes in a vac., in air, and in pure O_2 in presence of traces of a series of indicators, and the results being discussed in reference to the fermenting system. P. W. C.

Potentiometric experiments on the formation of reducing substances during fermentation. F. Lipmann (Biochem. Z., 1934, **274**, 412—422).—The potential (I) during fermentation is measured with polished Pt electrodes, a const. air stream being passed and a trace of thionine or methylene-blue being added. (I) decreases slowly in slow fermentations (glucose alone), quickly in rapid fermentations (glucose+hexose diphosphate), to a min. of +0·03 to 0·04 volt (p_H 6·4). (I) decreases most quickly on adding glucose+phosphoglyceric acid whilst with glucose+$AcCO_2H$ it falls but only after a latent period, and with glyceric acid phosphate (concn. 0·0015*M*) the fermentation begins with almost max. velocity. After complete utilisation of the $PO_4^{...}$ (I) increases and the whole process may be repeated.

By addition of AsO_4''', (I) falls and does not again increase as long as glucose is present. In presence of F', (I) falls on addition of substrate at the same rate and to the same level as under normal conditions whilst in presence of $CH_2Br{\cdot}CO_2H$ the addition of substrate is almost without action on (I). P. W. C.

Chloric acid: only a limited plant poison. H. Kunz-Krause (Pharm. Zentr., 1935, **76**, 3—4).—The growth of *S. glutinus*, Fresenius, on 5% $KClO_3$ solution is instanced. E. H. S.

Oxytrophy and nutrition of flagellated leucophytes. A. Lvov and H. Dusi (Ann. Inst. Pasteur, 1934, **53**, 641—653).—The nutrition of *Polytoma uvella*, *Euglena gracilis*, *Astasia Chattoni*, and *Chilomonas paramecium* indicates that the necessity for fatty acids (I) having $< C_7$ (A., 1933, 536, 647) is related to the presence of plastids and the absence of chlorophyll. (I) can be replaced by starch. F. O. H.

Relation of certain amino-acids to carbon dioxide and mycelium production of *Fusarium oxysporum*. A. K. Anderson and K. Emmart (Plant Physiol., 1934, **9**, 823—829).—Glycine (I), leucine (II), tyrosine (III), and aspartic acid (IV) failed to increase the CO_2 production of the fungus. (I) and (IV) were utilised for CO_2 production, which was retarded by (II) and (III). (I), (III), and, notably, (IV) were more effective than glucose for mycelium production. A. G. P.

Carotenoids of some fungi. E. Lederer (Compt. rend. Soc. Biol., 1934, **117**, 1083—1185; cf. A., 1934, 220).—Torulene (I), m.p. 183—185° (blue colour with $SbCl_3$ with a strong band at 657 mμ and a weaker one at 435 mμ), is present in red *Torulæ* (II), and also in *Sporobolomyces* (III) and *Lycogala epidendron*; β-carotene (IV) is present in all these except (III). The acid pigment (V) of (II) shows faint bands at 583, 543, and 500 mμ in CS_2, and at 530, 494, and 460 mμ in light petroleum and MeOH; it is present in (II) and (III), and also in *Puccinia coronifera*, together with the three carotenes. *Tremella mesenterica* contains (IV) alone, whilst *Coleosporium senecionis* contains the three carotenes without (V). The absorption curve of (I) in C_6H_{14} is given. R. N. C.

Decomposition of polyuronides by fungi and bacteria. II. Decomposition of alginic acid by bacteria and formation of the enzyme alginase. S. A. Waksman and M. C. Allen (J. Amer. Chem. Soc., 1934, **56**, 2701—2705; cf. A., 1933, 1082).—Alginic (=polymannuronic) acid (I) (from *Fucus vesiculosus*) is not decomposed to any appreciable extent by *Aspergillus*, *Trichoderma*, or *Fusarium* (cf. *loc. cit.*). (I) is hydrolysed by sp. bacteria (II) (from soil and sea-water) to simpler groups of uronic acids (III) (not pptd. by Ca), which are then decomposed further or oxidised to CO_2; simple (III) are not formed to any appreciable extent. (II) grown on liquid media (containing $NaNO_3$) produce enzymes which hydrolyse (I), starch, and other polysaccharides; the alginase (max. action at p_H 7 and 40° in presence of 2% NaCl) converts (I) into (III). The hydrolysable and non-hydrolysable fractions of (I) are both attacked (the former somewhat more readily) by (II). Crude algin contains (I) and a lignin-like complex [pptd. in the culture medium as a humus-like complex during the action of (II)]. H. B.

Maintenance of vigorous mould stock cultures. H. C. Greene and E. B. Fred (Ind. Eng. Chem., 1934, **26**, 1297—1299).—The maintenance of morphological and physiological characters of 10 moulds on malt–agar, potato–agar, sterilised bread, and sterilised soil (I) media has been studied. Little variation was observed except with *Aspergillus sydowi*, in which the wt. of dried mycelium produced under standard conditions varied by 34%. Cultures on (I) showed reasonable constancy. The prep. of stock soil cultures is described. E. C. S.

Conversion of guanidine into urea by moulds. T. Chrzaszcz and M. Zakomorny (Biochem. Z., 1934, **275**, 97—105; cf. A., 1934, 1263; Ivanov *et al.*, A., 1931, 524).—Guanidine (I) is degraded by many different species (II) of mould with production of urea and NH_3, the amounts of urea varying greatly according to (II) and to the kind of nutrient medium. In some cases the urea produced is rapidly degraded further. Although the degradations often proceed concurrently they are entirely separate functions of the moulds. Low concn. (0·1%) of glucose accelerates the degradation of (I) leading to greater accumulation of urea, but higher concn., EtOH, and $Ca(OAc)_2$ restrict urea accumulation. In the production of urea from peptone by moulds (I) is probably an intermediate. Possibly in the production of urea from arginine the precursor of urea is (I). W. McC.

Respiration and metabolism of moulds. S. Michael (Biochem. Z., 1934, **274**, 397—407).—An apparatus is described for following the acid formation (I), O_2 utilisation, and CO_2 elimination of a mould (*A. niger*) during growth. In a medium maintained neutral with $CaCO_3$, the $CO_2 : O_2$ ratio is approx. 1. In the early period only 3% of the glucose used is utilised for respiratory purposes, the chief reaction being an oxidation to gluconic acid. The ratio of respired CO_2 to CO_2 set free from $CaCO_3$ is therefore very small, but increases considerably as citric and oxalic acids are formed. In a non-neutral medium the R.Q. falls during (I) to about 0·7, but returns to 1 as (I) slackens. P. W. C.

Growth and nitrogen assimilation of *Aspergillus niger* under the influence of growth regulators and of vitamin-*B*. E. Bünning (Ber. deut. bot. Ges., 1934, **52**, 423—444).—Dry-matter production (I) by *A. niger* is accelerated by growth-substance-*B* (synthesised by the fungus) but not by -*A*. Both substances accelerate the degeneration of mycelium, favour the resorption of NO_3', and restrict that of $NH_4^{\cdot}$. In NH_4NO_3 media the latter effect results in increased p_H in the nutrient and a more rapid formation of conidia (III). Vitamin-B_1 affects the growth of *A. niger* only in initially neutral media, in which a small beneficial action is recorded. Vitamin-B_2 causes a 30—40% increase in (I). Both vitamins influence N assimilation, the reaction of media, and (III) formation in the same manner as the growth-substances. A. G. P.

Mould tissue. VI. Factors influencing amount and nature of fat produced by *Aspergillus fischeri*. E. A. Prill, P. R. Wenck, and W. H. Peterson (Biochem. J., 1935, **29**, 21—33).—Different strains of *A. fischeri*, incubated with an inorg. salt medium + glucose for 10 days, showed variations in the fat content (I), sterols (II), lipin-P (III), and the I val. of the fatty acids (IV). A given strain shows an increase in the fat content by increasing the glucose in the medium, and a decrease in (II) and (IV). Increasing the [NH_4NO_3] decreases the yield of mould per g. of glucose utilised, (II), and (IV). Increasing the p_H of the medium from 2 to 8 increases growth, % of fat, and (II). Raising the temp. decreases the % of fat, whilst aëration increases the mould growth. Continued incubation of the mould after all the glucose has been utilised decreases the % of fat and (III), but (IV) is unchanged. H. D.

Influence of a buffer on the activity of *Aspergillus*. V. Bolcato (Giorn. Chim. Ind. Appl., 1934, **16**, 552—555).—Fe and N compounds inhibit the formation of citric acid by *Aspergillus*, $H_2C_2O_4$ and CO_2 being formed instead. Addition of Na citrate destroys this inhibitive action. D. R. D.

Influence of calcium on the development of *Aspergillus niger* in a medium deficient in potassium. C. Pontillon (Compt. rend. Soc. Biol., 1934, **117**, 647—650).—The presence of Ca activates the utilisation of carbohydrate by *A. niger* grown on a medium deficient in K. A. L.

Influence of anti-oxidants, of methylene-blue, and of 2 : 4-dinitrophenol on the growth and energy output of *Aspergillus niger*. R. Bonnet and R. Jacquot (Compt. rend., 1934, **199**, 1334—1336).—The growth and composition of the organism were not affected by various agents influencing the O_2 exchange. A. G. P.

Classification of acetic acid bacteria and oxidising bacteria isolated from fruits. Method of classifying oxidising bacteria. I. T. Asai (J. Agric. Chem. Soc. Japan, 1934, **10**, 621—629).—Cell membranes of oxidising organisms give no blue colour with neutral or acidified solutions of I in KI. Ch. Abs. (*p*)

Physiological characteristics of propionic acid bacteria. E. R. Hitchner (J. Bact., 1934, **28**, 473—479).—The catalase activity of these organisms is < is usually supposed. Succinic acid (I) as a sole source of C is not utilised by any of the species, but volatile acids may be produced from (I) by some strains in media containing fermentable carbohydrates, *e.g.*, glucose. A. G. P.

***Lactobacillus bifidus*.** J. E. Weiss and L. F. Rettger (J. Bact., 1934, **28**, 501—521).—*L. bifidus* may constitute 90—95% of the intestinal flora of breast-fed infants. Growth conditions, sugar-fermenting ability, and tolerance to indole and PhOH of the organisms are examined. A. G. P.

Activator of lactic acid fermentation. A. K. Savin (Mikrobiologiya, 1933, **2**, 266—276).—Extracts of French beans contain a H_2O-sol., dialysable, heat-resistant substance which stimulates the production of lactic acid by *L. caucasicus* in milk-serum. Ch. Abs. (*p*)

***B. xylinum* cultures in lactic acid.** M. Cozic (Compt. rend. Soc. Biol., 1934, **117**, 371—372).—The lactic acid (I) is oxidised to $AcCO_2H$ (II). The anaërobic equilibrium potential (III) between (I) and (II) with *B. xylinum* is equal to (III) between glycerol and dihydroxyacetone, and to the Wurmser–Mayer-Reich (III) between (I) and (II) with lactic bacteria (cf. A., 1933, 850). R. N. C.

Comparative dissimilation of xylose and glucose by *Escherichia coli* and *Citrobacter anindolicum*. O. L. Osburn and C. H. Werkman (Proc. Iowa Acad. Sci., 1932, **39**, 134—135).—Differences in the proportions of the end-products (H_2, CO_2, AcOH, HCO_2H, lactic and succinic acids) of the fermentation of the two sugars are recorded. No evidence was obtained of the formation of $AcCO_2H$ at any stage of the dissimilation. The xylose mol. splits into fractions other than those containing 2 and 3 C. Ch. Abs. (*p*)

Dehydrogenase activity of *B. coli communis* on higher aliphatic acids. II. F. P. Mazza and A. Cimmino (Atti R. Accad. Lincei, 1934, [vi], **20**, 113—118; cf. A., 1934, 221).—Methylene-blue (I) may act as H-acceptor in this dehydrogenation, but the process is then far slower than the aërobic process. If the concn. of (I) is > 0·001 mol., dehydrogenation of stearic acid is inhibited, owing to adsorption of (I) on the surface of the bacteria and consequent prevention of contact with the substrate. The dehydrogenase (II) is inactivated by heating sooner than the enzymes effecting the normal oxidations of *B. coli*, and probably requires no oxygenase to catalyse its action. (II) resembles the dehydrogenases of succinic, lactic, and acetic fermentations, but is more sensitive to the action of CO; in its resistance to PhMe (II) resembles Quastel and Wooldridge's formic (II) (A., 1925, i, 1217). T. H. P.

Toxin of *Bacillus proteus*. H. Randolph (J. Lab. Clin. Med., 1934, **19**, 870—875).—Broth filtrates contain a sol. exotoxin capable of producing an antitoxin in rabbits. Ch. Abs.

Biological oxidation of carbohydrates. IV. Phosphorus requirements of percolating filters. S. H. Jenkins (Biochem. J., 1935, **29**, 116—132).—The amount of PO_4''' required to ensure rapid oxidation of a sugar solution depends on the size and shape of the filter medium, sufficient being required (together with adequate N supply) to establish a continuous film of the organism, but not enough to cause choking. When the film is established less PO_4''' and N are necessary. Excess of PO_4''' passes the filter unchanged, no org. P compounds being produced. The org. P compounds in beet press-water are only slowly available to the filter organisms. Unless adequate available N is present the full effect of PO_4''' is not evident. The increase of acidity of the effluent with increase of PO_4''' is due to removal of NH_3 from NH_4Cl with production of HCl, and not to org. acids. C. G. A.

Flavin transformation by bacteria. L. B. Pett (Nature, 1935, **135**, 36).—A bacterial species

which changes the green fluorescence (I) of a lactoflavin solution to blue has been isolated. The green (I) is restored by shaking in air. The EtOH extract of the dried bacteria gives only a blue (I). The blue fluorescent material can be extracted from $CHCl_3$ by alkaline H_2O and the blue (I) disappears at $p_H < 5$. Brewers' yeast, *Clostridium acetobutylicum*, and *Mycoderma cerevisiæ* do not effect a similar change in flavin solutions. L. S. T.

Histo-chemistry of pigments of organisms producing septicæmia. I. *Bacillus perfringens*. E. Dalous, J. Fabre, H. Pons, and Boulicaud (Compt. rend. Soc. Biol., 1934, **117**, 765—767).—The histochemical reactions of the brown pigment produced by *B. perfringens* indicate a melanin- and thioamino-type containing only traces of Fe. F. O. H.

Origin of the pigment in *Azotobacter chroococcum*. E. Ungerer (Z. Pflanz. Düng., 1934, **A**, **36**, 287—290).—Tyrosine occurs in the bacterial cell. Pigmentation is associated with the appearance of NH_3 and increased p_H in the medium. A. G. P.

Nitro-effect. O. Acklin (Wasser u. Gas, 1934, **24**, 323—333; Chem. Zentr., 1934, ii, 1176).—Chiefly theoretical. The connexion between nitro-reduction and other biological processes is discussed. The determination of the nitro-effect is described. H. N. R.

Comparative toxicity of sulphuric and acetic acids for *R* and *S* varieties of mammalian tubercle bacilli. A. Saenz, M. Sadettin, and L. Costil (Compt. rend. Soc. Biol., 1934, **117**, 308—311).—Cultures of *B. tuberculosus R* and *S* of human, bovine, or BCG origin were all killed by 5% AcOH, but tolerated H_2SO_4 in concns. < 20%. R. N. C.

Comparative toxicity of sulphuric and acetic acid solutions to the *R* and *S* varieties of avian tubercle bacilli. A. Saenz, M. Sadettin, and L. Costil (Compt. rend. Soc. Biol., 1934, **117**, 1072—1075).—H_2SO_4 is practically non-toxic, but AcOH destroys both strains in concns. > 5%. R. N. C.

Activation of the filterable form of tubercle bacilli by acetone extracts of Koch's bacilli. H. D. Boer (Compt. rend. Soc. Biol., 1934, **117**, 772—774).—The results of Nègre *et al.* (A., 1933, 1334) are confirmed. F. O. H.

Antigenic fixatives of tubercle bacilli. I. Lipin-containing extracts of heat-killed bacilli. M. A. Machebœuf and G. Lévy [with M. Chambaz] (Ann. Inst. Pasteur, 1934, **53**, 591—597).—Amongst the various lipin fractions from heat-killed tubercle bacilli (A., 1934, 564, 929), only two (one sol. in hot or cold EtOH, the other only in hot EtOH) fix complement in presence of tubercular sera to a marked extent. Further fractionation by solvents indicates that the fixation is due to a substance (containing approx. 5% P but no glycerol) sol. in Et_2O and $CHCl_3$ but insol. in $COMe_2$, common to both. F. O. H.

Endotoxin of typhus bacilli prepared by repeated freezing. (A) Preparation. B. Zablocki and J. Morzycki. **(B) Physico-chemical and antigenic properties.** J. Morzycki and B. Zablocki (Compt. rend. Soc. Biol., 1934, **117**, 789—791, 792—794).—(A) Cultures of typhus bacilli are repeatedly kept at −10° for 18 hr. and then at 37° for 6 hr., the final product being centrifuged and filtered through a Chamberland candle. Small doses (0·1—0·5 c.c.) of the filtrate produce marked toxic reactions in men, guinea-pigs, rabbits, and mice.

(B) The preps. are fairly thermostable and contain no protein or cholesterol and only traces of N; their immuno-properties and the ability to produce antibodies (agglutinins and precipitins) are, however, well marked. The residue from filtration contains living but morphologically changed bacilli. F. O. H.

Antigenic power and properties of staphylococcus anatoxin. J. Travassos (Compt. rend. Soc. Biol., 1934, **117**, 717—719).—Staphylococcus toxin modified by CH_2O is grouped with the Ramon anatoxins. A. L.

Preparation of diphtheria anatoxin. M. Isabolinski, I. Levzov, and V. Batanov (Z. Immunität exp. Ther., 1934, **82**, 16—25; Chem. Zentr., 1934, ii, 789).—Treatment of the toxin with 0·5—3% aq. SO_2 or HCl in aq. NaCl at 40° for 15—30 days produces an anatoxin having p_H 7·8—8·2. A. G. P.

Chemistry of anti-bodies and serum-proteins. I. Nitrogen distribution and amino-acids. II. Protein–carbohydrate groups. L. F. Hewitt (Biochem. J., 1934, **28**, 2080—2087).—I. No marked difference was observed in the Hausmann no., or in the cystine, tyrosine, or tryptophan content of cryst. albumin, the globulin fractions, and diphtheria toxin–antitoxin floccules.

II. It was not possible to distinguish between serum-globulin (I) and diphtheria or streptococcus antitoxin by determination of carbohydrate (II) groups. Both (I) and serum-albumin can be fractionated into portions of different (II) content, that of the more sol. fractions being greater. H. G. R.

Synthesis of a growth factor by a micro-organism. W. Schopfer (Compt. rend., 1934, **199**, 1656—1658).—Although the growth of *Phycomyces blakesleeanus* (I) on a synthetic medium (glucose, asparagine, $MgSO_4$, KH_2PO_4) is inhibited by the complete absence of vitamin-B_1 (II), growth readily occurs if a small amount of culture of (I), grown on a medium containing (II), is added, a similar effect being produced by similarly grown cultures of other fungi of the same species. (I) can thus synthesise a growth factor which is not (II), since it can also accelerate the growth of *Saccharomyces cerevisiæ* which is not sensitive to (II), vitamin-B_2, or lactoflavin. J. W. B.

Enzymes of bacteria and bacterial metabolism. A. I. Virtanen (J. Bact., 1934, **28**, 447—460).—A review. A. G. P.

Action of carbon dioxide on putrefactive micro-organisms. F. M. Chistyakov (Mikrobiologiya, 1933, **2**, 192—210).—Of 35 species of putrefactive bacteria examined, only 5 were not adversely influenced by CO_2. Ch. Abs. (*p*)

Influence of cations on bacterial viability. C. E. A. Winslow (Quart. Rev. Biol., 1934, **9**, 259—274).—Stimulation by low and inhibition by

high concns. of cations results from influence on diffusion, the effects being paralleled by the position of the cation in the electromotive series (Na, K, low). The action of anions is mainly exerted through their effects on p_H. CH. ABS. (*p*)

Tropical soil microbiology. II. Bacterial numbers in the soil of the Malay peninsula. A. S. CORBET (Soil Sci., 1934, **38**, 407—416; cf. A., 1934, 453).—Bacterial counts indicate that the no. of soil organisms is controlled by temp. and H_2O content. Decomp. of org. matter in these soils is mainly fungal. A. G. P.

Preservation of stock cultures of micro-organisms. A. C. THAYSEN (J. Inst. Brew., 1934, **40**, 469—471).—Cultures of a no. of micro-organisms, prepared by methods previously described (B., 1924, 485), have remained in a viable condition for 12 years. I. A. P.

Determination of reducing sugars in bacteriological media. E. J. MCCREARY and H. G. SMITH (Proc. Iowa Acad. Sci., 1932, **39**, 171—173).—The work of Magee and Smith (A., 1930, 643) is confirmed. Use of Lloyd's reagent for clarification causes less variation in results than that of basic Pb acetate or $Zn(OH)_2$. Discrepancies are reduced by dilution of the solution prior to clarification. Clarifying agents affect results by absorption of glucose and also by removal of interfering substances. $CuSO_4$ removes all non-sugar reducing agents from blood filtrates, but not from beef broth. CH. ABS. (*p*)

Agglutination of various bacteria by lemon juice. P. LASSEUR and M. A. RENAUX (Compt. rend., 1934, **199**, 1454—1456).—This is shown to be due to the low p_H of the juice. R. S. C.

Catalase of filtrates of bacterial cultures after lysis by bacteriophage. I. LOMINSKI (Compt. rend. Soc. Biol., 1934, **116**, 839—841).—Catalase content of filtrates through Chamberland L.3 candles of cultures of *Staphylococcus* after lysis cc initial nos. of bacteria. CH. ABS. (*p*)

Preparation of graded collodion membranes and their use in study of filterable viruses. J. H. BAUER and T. P. HUGHES (J. Gen. Physiol., 1934, **18**, 143—162).—Collodion membranes (I) were prepare using as a stock collodion a solution of Parlodion shreds in EtOH, Et_2O, $COMe_2$, and C_5H_{11}·OH. The pore size (II) was varied by addition of H_2O or glacial AcOH. Average (II) were calc. by application of Poiseuille's law. In the filtration of yellow-fever virus (III) adsorption of proteins was eliminated by passing a hormone broth at p_H 8 first. Suspensions of (III) passed through (I) of (II) equal to 70, 55, and 50 mμ showed clearly decreasing infective powers. The min. (II) for the filtration of sheep and monkey oxyhæmoglobin (IV) and ovalbumin (V) were 8 and 6·2 mμ, respectively. Using Svedberg's vals. for the mol. sizes, a pore : particle ratio of 1·5 : 1 for both (IV) and (V) was obtained. H. D.

Action of antiseptics on the poliomyelitic virus *in vivo* and *in vitro*. G. HORNUS and P. HABER (Compt. rend. Soc. Biol., 1934, **117**, 656—658).—The poliomyelitic virus is very resistant to antiseptics. Among several substances examined, "solganal," "uclarsyl," and isamine-blue proved active. A. L.

Gram staining method. P. LASSEUR and M. BENOIT (Compt. rend., 1934, **199**, 1680—1682).—The no. of plastids (*B. mesentericus* and *B. subtilis*) stained by the Gram method decreases from p_H 2 to p_H 12 when the p_H in the pretreatment is varied using MacIlvaine's buffer, and from p_H 8 to p_H 12 when Na_2CO_3 buffers are used. With a Davis buffer (citric acid + alkali citrate) the no. stained increases slightly from p_H 2·2 to p_H 6·5, the increase being more marked with H_2SO_4 (12% at p_H 1·7 to 82% at p_H 5·3). Uniform staining occurs if the dimensions are 0—2 μ; very old plastids (2·5—3 μ) are not coloured, but the cytoplasm, after rupture of the membrane, is stained. J. W. B.

Bacterial staining with potassium permanganate; spore staining. F. SANDER (Z. Hyg., 1934, **116**, 334—336).—Use of H_2SO_4–$KMnO_4$ for staining is described. A. G. P.

Detection of gold in spirochætes and trypanosomes. V. FISCHL, J. KOTRBA, and E. SINGER (Z. Hyg., 1934, **116**, 69—71).—A spectrographic method is described. A. G. P.

Use of drugs *in vitro*. E. SINGER and V. FISCHL (Z. Hyg., 1934, **116**, 356—360).—The intake of As from atoxyl solutions by spirochætes, trypanosomes, and other micro-organisms is increased by previous digestion of the solution with liver extract. Digestion with glutathione produces much greater activation. Ascorbic acid–thiourea mixtures are lethal to spirochætes. A. G. P.

Antiseptic properties of esters of rhodamine-*G*. Rôle of surface tension and phenomena of photosensitisation. D. BOVET (Helv. Chim. Acta, 1934, **17**, 1460—1465).—The absorption spectra of a series of esters of rhodamine-*GP*, -*G* (I), and -*B* [prep. (Fierz-David) not yet described] are recorded. The antiseptic action of esters of (I) towards staphylococci increases progressively from the Me to the heptyl ester and then declines markedly. The effect is parallel to that exerted by the substances on the surface tension. The simpler esters have a marked photosensitising action (II) and are more active in the light than in the dark; this phenomenon is not presented by the higher members. The (II) of two substances which are very similarly constituted and have almost identical absorption spectra may differ widely. H. W.

Bactericidal action of colloidal solutions. M. PRICA (Z. Hyg., 1934, **116**, 385—396).—Colloidal solutions of SiO_2 such as may be obtained in H_2O left in contact with fine sand for some months are toxic to *B. coli*, *B. paratyphosus*, and *S. pyogenes aureus*. Colloidal $Fe(OH)_3$ and $Al(OH)_3$ have a similar action. The natural purification of H_2O is discussed from this aspect. A. G. P.

Callicrein. IX. Detection and occurrence of callicrein in urine. H. KRAUT, E. K. FREY, E. WERLE, and F. SCHULTZ (Z. physiol. Chem., 1934, **230**, 259—277; cf. A., 1930, 1069, 1624; 1932, 547).—Dialysis of human urine (I) through Cellophane against H_2O removes heat-stable depressor substances

from the callicrein (II), which is then assayed using dogs [the (I) of which contains much (II)] (cf. Weese, A., 1933, 1335). Purified (II) is inactivated by short heating at 60°; human (I) does not lose all its (II)-activity even after 30 min. at 90—95°, probably owing to the presence of thermo-stabilisers (removable by dialysis). The (II) in dialysed human (I) is inactivated much more readily by serum (III) (different types of which contain varying amounts of inactivator) or extracts of the lymph (IV) or parotid glands of the ox. The (I) of dogs is not inactivated by (IV) or pancreas (dog); (III) largely inactivates the undialysed (I). Dialysed (I) of cats is inactivated by (III) but not (IV). The amount of (II) in the (I) of adults varies from 0·04 to 0·6 unit per c.c. (mean val. 0·22); 56—550 units are excreted daily. Much less (II) is excreted by infants, children, and old people. The horse excretes little (II). H. B.

Villikinin content of different parts of the intestine. G. de Ludany (Compt. rend. Soc. Biol., 1934, **117**, 974—975).—Villikinin (I) previously isolated from the duodenum is present also, but in smaller amount, in the mucosa of the large intestine, the ileum, and the stomach. (I) is not destroyed by trypsin or pepsin; it diffuses easily, and is not adsorbed by animal C. A. L.

Renal activity. VII. Effect of adrenal cortex. Y. Mizune (Sei-i-kwai Med. J., 1933, **52**, No. 9, 63—79).—Acceleration of renal activity is demonstrated by determining urinary : blood-urea-N in rabbits fed with urea with or without injection of interrenin, and by a renal function test with phenol-sulphonephthalein. Ch. Abs.

Ovarian stimulation by adrenal extracts. L. E. Casida and A. A. Hellbaum (Endocrinol., 1934, **18**, 249—253).—Adrenal (but not blood, serum, liver, or ovary) extracts (I) from non-pregnant mares and geldings, and (I) from pregnant mares caused the formation of large follicles or corpora lutea in rats. Ch. Abs.

Variation in blood-calcium fractions caused by adrenaline. C. Rosso (Clin. pediatr., 1934, **16**, No. 3).—Intravenous injection of adrenaline causes transition of colloidal Ca into an ultrafilterable form. Ch. Abs. (*p*)

Antagonism of potassium and magnesium ions in adrenaline secretion. R. Hazard and L. Wurmser (Compt. rend. Soc. Biol., 1934, **117**, 864—866).—KCl injected intravenously excites the adrenal glands to secrete; $MgCl_2$ inhibits the effect. R. N. C.

Muscle-phosphorus compounds in adrenal insufficiency. E. Lundsgaard and A. T. Wilson (J. Physiol., 1934, **80**, 29—30P).—Inorg. PO_4''', phosphagen, pyrophosphate, and hexose phosphate in muscles of adrenalectomised cats were substantially normal. Ch. Abs. (*p*)

Variations in blood-calcium fraction caused by parathyroid hormone. A. Cabitto (Clin. pediatr., 1934, **16**, No. 3).—The total Ca (I) is increased except when the initial level is high. Ultrafilterable Ca varies with (I). Changes in colloidal Ca are independent of (I). Ch. Abs. (*p*)

Action of parathormone. H. K. Goadby and R. S. Stacey (Biochem. J., 1934, **28**, 2092—2096).—Parathormone increases excretion of P in urine independently of the concn. of inorg. P in the plasma. H. G. R.

Oral and duodenal administration of single large doses of pure thyroxine. Comparison of calorigenic effects with those of monosodium thyroxine and thyroxine in alkaline solution. W. O. Thompson, P. K. Thompson, S. G. Taylor III, and L. F. N. Dickie (Arch. Int. Med., 1934, **54**, 818—828).—Oral and duodenal administration of thyroxine has no effect on the basal metabolic rate (I) in myxœdema, 10 mg. of the Na_1 salt increase the (I) 7, 20, and 32 points when administered orally, orally in alkaline solution, and intravenously in alkaline solution, respectively. H. G. R.

Biological demonstration of the thyroid hormone in the blood of pregnancy. Limitation of the activity of the thyrotropic hormone of the anterior pituitary, according to investigations on thyroid-deficient animals. P. Thiessen (Arch. Gynäkol., 1934, **156**, 454—458; Chem. Zentr., 1934, ii, 963).—The increase in metabolism produced in rats by injection of pregnancy serum is not due to the thyrotropic hormone in the serum, as it occurs in thyroidectomised animals. R. N. C.

Effect of the epithelial cell and colloidal substance of the thyroid gland on excretion of iodine in urine. G. Tanaka (Folia Endocrinol. Japon., 1933, **9**, 32—33).—Normal excretion of I was increased by injection of KI. The effect was accentuated by injection of aq. extracts of epithelial cells and restricted by extracts of colloidal substance. Ch. Abs. (*p*)

Effects of extracts of thyroid gland obtained by treatment with acid alcohol on iodine excretion in urine. G. Tanaka (Folia Endocrinol. Japon., 1933, **9**, 33—34).—I excretion was retarded and decreased by small doses and frequently unaffected by larger doses of the extract. Ch. Abs. (*p*)

Effect of the thyrotropic hormone on the ketonic substances in the blood. F. Silberstein, F. Gottdenker, and E. Hohenberg (Klin. Woch., 1934, **13**, 595—596; Chem. Zentr., 1934, ii, 793).—Injection of 1000 units of the thyrotropic hormone (I) in cats produces a rise in blood-ketones (II), lasting several hr. Injection of 500 units causes a rise, followed by a fall below normal. (II) is similarly but not uniformly influenced by (I) after administration of oil. R. N. C.

Endocrine glands and calcium metabolism. H. Zwarenstein (Biol. Rev. Cambridge Phil. Soc., 1934, **9**, 299—331).—Thyroidectomy, hyper- and hypo-thyroidism, administration of thyroid gland or thyroxine did not affect the serum-Ca (I) level. Adrenaline had no const. action. The adrenal cortex, pituitary, thymus, and possibly ovaries are concerned in Ca metabolism (II). Administration of insulin with or without glucose increased (I). Pancreatectomy had no consistent effect on (II). Ch. Abs. (*p*)

Inactivation of growth hormone. I. Inadequate refrigeration. II. Exposure to air. H. S. Rubinstein (J. Lab. Clin. Med., 1933, **19**, 63—66, 404—405).—The potency of anterior pituitary extracts is lowered by inadequate refrigeration or atm. oxidation. Ch. Abs.

Iodine metabolism. VII. Effect of the midbrain and the pituitary on iodine metabolism. A. Sturm (Z. ges. exp. Med., 1934, **93**, 490—501; Chem. Zentr., 1934, ii, 792).—Cessation of the functions of the tuber cinereum, lower hypothalamus region, infundibulum, and posterior pituitary produced no change in total I metabolism. Destruction or removal of the anterior pituitary (I) produced hyperiodæmia and hyperioduria for a week, followed by a slowly progressing hypoiodæmic phase due to stoppage of the activity of the thyroid following the interruption of the thyrotropic effect of (I). R. N. C.

Effect of pituitary extracts on the viscosity of blood, and its antagonistic effect on insulin. K. A. Tzoni (Praktika, 1933, **8**, 249—252; Chem. Zentr., 1934, ii, 1148).—Simultaneous injection of pituitary extract and insulin in rabbits produced an antagonistic effect of the two hormones on the viscosity of the blood. R. N. C.

Lactic acid content of the muscle of hypophysectomised toads. A. D. Marenzi (Compt. rend. Soc. Biol., 1934, **117**, 1035—1036).—The lactic acid content (I) of the gastrocnemius of normal toads (II), of those deprived of the posterior (III), and of those deprived of the anterior pituitary gland (IV) was 10·24, 11·06, and 10·35 mg. per 100 g. of muscle, respectively. (I) after 2 min. electrical excitation of the sciatic nerve was in (II), (III), and (IV), 129, 88, and 53 mg. per 100 g., respectively. After implantation of both glands and (III) alone, (I) increased to 126 and 106 mg., respectively. A. L.

Melanophore hormone. IV. Isolation of the hormone. F. G. Dietel (Klin. Woch., 1934, **13**, 796—797; Chem. Zentr., 1934, ii, 792).—The hormone is stable to $Ba(OH)_2$, which destroys oxytocin and vasopressin. To obtain a highly-purified prep. posterior pituitary powder is extracted at room temp. with 50 times its wt. of aq. $Ba(OH)_2$, insol. material removed, and the solution acidified with H_2SO_4 and filtered after 2 hr. The filtrate is boiled down to ¼ vol. at neutral reaction, any ppt. removed, and 5 vols. of $COMe_2$ are added; the ppt. containing the hormone is collected after 24 hr., dried, taken up in H_2O, and evaporated to dryness. The residue is extracted thrice with boiling EtOH and the extract conc. The amorphous residue is sol. in H_2O; the solution is not pptd. by $CCl_3{\cdot}CO_2H$ or o-$SH{\cdot}C_6H_4{\cdot}CO_2H$, and the Pauly reaction is negative. The anterior lobe appears to contain inhibiting or sensitising substances. R. N. C.

Effect of the posterior pituitary hormone on the water and chlorine excretion of the pregnant organism with reference to the hormonal theory of the origin of eclampsia. H. Rupp and W. Bickenbach (Arch. Gynäkol., 1934, **156**, 420—427; Chem. Zentr., 1934, ii, 963).—Injection of posterior pituitary extract reduces Cl excretion, which is increased in eclampsia. Pituitrin can be used to produce a lasting H_2O and Cl retention in pregnancy. R. N. C.

Synergism between œstrin and pituitrin. E. Møller-Christensen (Lancet, 1934, **227**, 1388—1389).—The injection of œstrin into infantile guinea-pigs gives rise to increased sensibility of the uterus to pituitrin *in vitro*. L. S. T.

Biological assay of folliculin. H. Hinglais and M. Hinglais (Compt. rend. Soc. Biol., 1934, **117**, 1005—1008).—Using the technique of Allen and Doisy $0{\cdot}1\times10^{-6}$ g. of folliculin is equiv. to $\frac{1}{25}$ of the Allen and Doisy rat unit and not ⅓ as has been previously thought. A change of the international unit is suggested. A. L.

Folliculin content of normal and ectopic testicles. R. Courrier (Compt. rend. Soc. Biol., 1934, **117**, 1117—1120).—The folliculin content (I) of horse-testicles is > that of ox-, but < that of hog-testicles (II). Normal and ectopic (II) show similar (I). R. N. C.

Absorption and excretion ratios of folliculin in man. T. Kemp and K. Pedersen-Bjergaard (Endokrinol., 1934, **13**, 156—167; Chem. Zentr., 1934, ii, 1147).—Normal growing persons excrete daily < 10 mouse units per litre of folliculin (I) in the urine, and 30—70 units in the fæces, which probably originates from food. After peroral administration about 6% is eliminated in the urine, and after subcutaneous injection about 3%. Blood-(I) at the end of pregnancy is 5·6—7·6% of that of the urine, (I) being distributed equally between corpuscles and plasma. R. N. C.

Metaplasia of uterine epithelium produced by chronic œstrin administration. H. Selye, D. L. Thomson, and J. B. Collip (Nature, 1935, **135**, 65—66).—The effect has been observed in castrated female rats injected with oil solutions of œstrone. L. S. T.

Regeneration of testes degenerated by menformone, spontaneously and by use of the gonadotropic hormone. S. E. de Jongh and E. Laqueur (Nederl. Tijdschr. Geneesk., 1934, **78**, 3030—3035; Chem. Zentr., 1934, ii, 1147).—Young rats' testes (I), the hormone production of which is stimulated by the gonadotropic hormone of pregnancy urine (II), are not or very little > those of untreated animals. Menformone (III) causes shrinkage of (I), recovery of wt. being more rapid under administration of (II). (II) has a more marked effect on the Leydig cells (IV) than on (I). Prolonged treatment with (III) causes a temporary decrease in the no. of (IV). R. N. C.

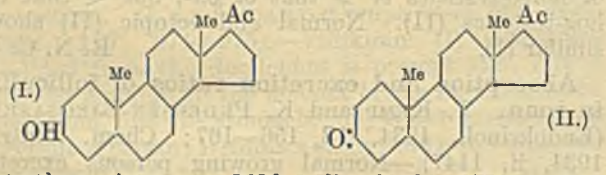
Constituents in normal urine producing the hyperglycæmia previously attributed to prolan. B. L. Davis, jun., J. C. Hinsey, and J. E. Markee (Endocrinol., 1934, **18**, 382—386).—Hyperglycæmia in rabbits following injection of urine extracts is due to urinary constituents other than prolan. Ch. Abs.

Emmenin. J. B. Collip, J. S. L. Browne, and D. L. Thomson (Endocrinol., 1934, **18**, 71—74).—Emmenin is a hydrolysable complex containing

trihydroxyœstrin. It does not appear to be ovary-stimulating, and its active principle may be converted into a more potent form in presence of ovarian tissue. CH. ABS.

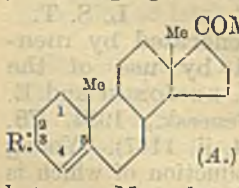
Hormonal function of the unfertilised egg. A. WESTMAN (Arch. Gynäkol., 1934, **156**, 550—565; Chem. Zentr., 1934, ii, 962).—Luteinisation of granulosa cells of rabbit follicles is not dependent on a hormonal action of unfertilised eggs. A. G. P.

Preparation of the corpus luteum hormone from stigmasterol. E. FERNHOLZ (Ber., 1934, **67**, [*B*], 2027—2031).—3-Hydroxybisnorcholenic acid is degraded to the OH-ketone (I), the dibromide of which is oxidised and debrominated to the diketone (ii), m.p. 129°, $[\alpha]_D^{20}$ +200° in $CHCl_3$ (dioxime, m.p. 246—248° when rapidly heated), identical with the corpus luteum hormone. Dehydrogenation of (I) to (II) by CuO at 310° is described. (II) is converted



into the variety, m.p. 121°, $[\alpha]_D^{20}$ +200° in $CHCl_3$, when air is aspirated through its solution in H_2O–EtOH–Et_2O. The reverse transformation is effected by crystallisation from MeOH. H. W.

Preparation of the corpus luteum hormone from stigmasterol; constitution of the corpus luteum hormone. A. BUTENANDT and U. WESTPHAL (Ber., 1934, **67**, [*B*], 2085—2087; cf. A., 1934, 1268).—The OH-ketone (I) (*loc. cit.*) is cautiously treated with Br in AcOH and the product is directly oxidised with CrO_3; mild treatment of the oily substance (II) thus obtained with AcOH and Zn dust yields Δ^4-pregnene-3 : 20-dione (III) (*A*; R=O) identical with the natural corpus luteum hormone and with that obtained from pregnandiol. The Δ^4 position of the double linking follows from the optical behaviour of (III) and from the oxidation of (I) to a diketone. More drastic treatment of (II) with Zn and AcOH leads to the *deoxy-hormone*, $C_{21}H_{32}O$ [(?) *A*; R=H_2], m.p. 105°, $[\alpha]_D^{20}$ +96·4°, which is physiologically inactive. H. W.



Polymorphous modifications of the corpus luteum hormone. A. BUTENANDT and J. SCHMIDT (Ber., 1934, **67**, [*B*], 2088—2091).—It is considered that there is only one corpus luteum hormone, $C_{21}H_{30}O_2$, which exists in several polymorphous forms. Whether the modification (I), m.p. 121°, or the form (II), m.p. 128·5°, is obtained from the gland, from stigmasterol, or from pregnandiol is a matter of accident. (I) and (II) can be interconverted by crystallisation from suitable solvents, they have identical analytical composition, absorption spectra, and optical activity, yield identical derivatives, and, according to the Clauberg test, have the same physiological activity, identical with that of the natural hormone. H. W.

Pregnan-20-ol-3-one. *allo*Pregnan-3-ol-20-one, a companion of the corpus luteum hormone. Conversion of pregnandiol into the corpus luteum hormone.—See this vol., 215, 216.

Male hormone as obtained from urine. T. F. GALLAGHER and F. C. KOCH (Endocrinol., 1934, **18**, 107—112).—Testicular hormone (I) in urine extracts is purified by removal of acids and phenols and by distillation at > 150°. The residue is fractionated with aq. EtOH, light petroleum, and CCl_4, and then again distilled at 150—200°. The distillate (10,000 units per g.) differs chemically, but not biologically, from (I) from ox testis. CH. ABS.

Vitamins of olive oil. F. S. GÉRONA (Bull. Mat. Grasses, 1934, **18**, 281—286).—The characteristic absorption from the red, blue, indigo, and violet regions of the normal spectrum indicates that the vitamin contents of dark cod-liver oil (I) and olive oil (II) are > that of clear cod-liver oil and that (II), unlike (I), contains vitamin-*B*. Normal residue oil and (II) heated to 150° contain no vitamin-*A*, -*B*, or -*D*. F. O. H.

Production of vitamins by a pure culture of *Chlorococcum* grown in darkness on a synthetic medium. M. F. GUNDERSON and C. E. SKINNER (Plant Physiol., 1934, **9**, 807—815).—Vitamin-*A*, or the provitamin, was produced in considerable amounts on a mineral salt–glucose medium. Smaller amounts of -B_1 and -B_2 but no -*C* were formed. A. G. P.

Purification of biosterol (vitamin-*A*) and a crystalline derivative thereof. S. HAMANO (Bull. Inst. Phys. Chem. Res., Tokyo, 1934, **13**, 89).—*Theragra chalcogramma* liver-oil yields vitamin-*A* (C.L.O.U. 8300); the maleic anhydride *adduct*, $C_{30}H_{36}O_8$, of the Ac derivative thereof has m.p. 261—262°. R. S. C.

Vitamin-*A*. I. M. HEILBRON (Chem. and Ind., 1934, 1063).—A correction (A., 1934, 1269). R. S. C.

Vitamin-*A* content of herring. A. SCHEUNERT and M. SCHIEBLICH (Z. Unters. Lebensm., 1934, **68**, 409—411).—Herring roe contains vitamin-*A*, the hard roe > the soft. The -*A* content is not diminished by smoking. E. C. S.

Relative biological efficiencies of the vitamin-*A* and carotene of butter. R. G. BOOTH, S. K. KON, and A. E. GILLAM (Biochem. J., 1934, **28**, 2169—2174).—The carotene (I) and vitamin-*A* (II) contents of the butters of Shorthorn and Guernsey cows have been determined spectrophotometrically and the (II) activities biologically. Although the total biological activity is the same for butters of both breeds, the contributions from (I) and (II) vary considerably with the breed, from which it is calc. that (II) is 6 times as potent as (I). C. G. A.

Fat-soluble vitamins. XLI. Carotene and vitamin-*A* content of colostrum. J. SEMB, C. A. BAUMANN, and H. STEENBOCK. **XLII. Absorption and storage of vitamin-*A* in the rat.** C. A. BAUMANN, B. M. RISING, and H. STEENBOCK (J. Biol. Chem., 1934, **107**, 697—703, 705—715).—The carotene (I) and vitamin-*A* (II) content of fat

prepared from colostrum is much higher than that of fat from ordinary milk, but decreases rapidly during the first week of milk secretion. The blood-stream may function as a significant storage reserve for (I).

XLII. The (II) content of new-born rats is very low but is increased slightly by raising the (II) intake of the mothers during pregnancy, and markedly by raising their (II) intake during lactation. 95% of the total (II) in the rat is stored in the liver, and (II) storage is greater when (II) is fed to normal animals than when it is fed to (II)-depleted rats. The min. daily dose of (II) necessary to produce storage is 25—50 blue units. Absorption and storage mostly take place within 6 hr. after ingestion. Loss of (II) due to destruction in the digestive tract is large, but fæcal elimination of (II) is small. A. E. O.

Vitamin-*A* and carotene. XII. Elimination of vitamin-*A* from the livers of rats previously given massive doses of vitamin-*A* concentrate. A. W. Davies and T. Moore (Biochem. J., 1935, 29, 147—150).—Rats with sufficient vitamin-*A* (I) stored in their livers to last theoretically for 100 years lose the greater part of their stored (I) in 12 weeks when restricted to a (I)-free diet. A stable storage level of 400 B.U. per g. is then reached. Carotene (in vegetables) is an efficient substitute for preformed (I) in diets suitable for the building up of a large (I) store in the rat's liver. A. E. O.

Influence of vitamin-*A* on the metabolism of rats and guinea-pigs. A. Chevallier and H. Baert (Compt. rend. Soc. Biol., 1934, **116**, 1037—1039).—Absence of vitamin-*A* from diet increases basal metabolism especially in young animals. Ch. Abs. (*p*)

Carotene and vitamin-*A* requirements of white Leghorn chicks. W. O. Frohring, and J. Wyeno (J. Nutrition, 1934, **8**, 463—477).—The min. requirement of chicks approx. 8 weeks old was 65 units per day. Vitamin-*A* deficiency did not induce "slipped-tendon." A. G. P.

Vitamins. XIX. Assimilation of carotene and vitamin-*A* in presence of mineral oil. R. A. Dutcher, P. L. Harris, E. R. Hartzler, and N. B. Guerrant (J. Nutrition, 1934, **8**, 269—283).—The vitamin-*A* potency of butter-fat is depressed in the presence of mineral oil (I), the effect varying with the proportion of (I) used. The potency of cod-liver oil was not affected by (I). Fæcal excretion of carotene is relatively high when (I) is fed. A. G. P.

Determination of vitamin-*A* values by a method of single feeding. H. C. Sherman and E. N. Todhunter (J. Nutrition, 1934, **8**, 347—356).—Rats depleted of stored vitamin-*A* receive a single feeding of test material. Subsequent wt. curves are compared with those obtained by feeding carotene. The area of growth curves for males was > that for females. Fresh kale contained 200 units per g. A. G. P.

Fate of the antirachitic factor in the chicken. III. Effective levels and distribution of the factor from cod-liver oil and from irradiated ergosterol in certain tissues of the chicken. W. C. Russell, M. W. Taylor, and D. E. Wilcox (J. Biol. Chem., 1934, **107**, 735—746).—To produce normal bone ash and body-wt. in chickens at 8 weeks of age, ≮ 144 times as much vitamin-*D* (I) must be fed in the form of irradiated ergosterol (II) as in the form of cod-liver oil (III). Storage of (I) in the liver is the same for each source of (I). The (I) content of the blood and long bones of cockerels is the same whether (I) is supplied as (III) (1% of the ration) or as (II) equiv. to 24% of (III). Pullets fed with (II) did not show the persistence in laying exhibited by birds receiving (III) under identical conditions. The antirachitic potency of the egg-yolk from birds receiving (III) was much < that from birds receiving (II). As regards body-wt., feathering, and general appearance, 1% of (III) is equiv. to the (I) content of 24% of (III) supplied as (II). (I) from either source is not lost by excretion in the bile. A. E. O.

Relative efficiencies of irradiated ergosterol and irradiated yeast for the production of vitamin-*D* milk. W. E. Krauss, R. M. Bethke, and W. Wilder (J. Dairy Sci., 1934, **17**, 685—693).—The transference of vitamin-*D* from ingested irradiated ergosterol to milk was approx. two thirds of that from irradiated yeast. A. G. P.

Relation between vitamin-*E* and sex hormones. G. Spagnol (Rev. sud-amer. endocrinol. inmunol. quimioterap, 1934, **17**, 553—565).—Hormone production is independent of vitamin-*E* (I), but (I) is necessary for physiological processes produced by hormones. Ch. Abs. (*p*)

Utilisation of energy-producing nutriment and protein as affected by individual nutrient deficiencies. II. Effects of vitamin-*B* deficiency. F. J. McClure, L. Voris, and E. B. Forbes (J. Nutrition, 1934, **8**, 295—308).—Deficiency of vitamin-*B* resulted in depressed appetite but no change in wt.-increase per unit of food, decreased fat and energy gains, lower body temp., slightly increased digestibility of protein but not of energy foods, lowered efficiency of utilisation of metabolisable energy, increased energy out-go in heat and urine, increased C : N ratio in urine, and depression of oxidative processes of the organism. A. G. P.

Alimentary unbalance caused by Senegal gum. R. Lecoq (Compt. rend. Soc. Biol., 1934, **117**, 994—996).—Pigeons fed on an adequate diet relatively high in vitamin-*B* developed polyneuritis when Senegal gum (I) was added to the diet. The galactose in (I) was probably responsible. A. L.

Optical investigation of the antineuritic vitamin(-B_1). A. Smakula (Z. physiol. Chem., 1934, **230**, 231—239).—The absorption spectrum (I) of vitamin-B_1 (II) shows max. at 260 and 245 mμ (cf. Windaus *et al.*, A., 1932, 310; Peters and Philpot, A., 1933, 645). The (I) of the fission product $C_7H_{11}O_5N_3$ (III) (Windaus *et al.*, A., 1934, 1415) has max. at 261 and 225 mμ and is identical with that of 6-hydroxy-2-methylpyrimidine. The (I) of the fission product $C_6H_7O_2NS$ (IV) (*loc. cit.*) has max. at 257 and 198 mμ; (IV) probably contains a pyrrole ring. Superposition of the (I) of (III) and (IV) gives a curve similar to that of (II); (II) contains

2 chromophores separated by a saturated hydrocarbon group. The (I) of the following are also given: hydrolysis product (probably $C_{12}H_{15}O_2N_3S$) of (II); Me pyrrole-2-carboxylate; 2-thiopyrrolidone; Me 4-thiol-3 : 5-dimethylpyrrole-2-carboxylate; glyoxaline; 2-methylglyoxaline-4-carboxylic acid; Et glyoxaline-4-acetate; pyrrole; 6-hydroxy-4-ethoxy-2-methylpyrimidine; 4 : 6-dihydroxy-2-methylpyrimidine; C_5H_5N; thiophen. H. B.

Brain respiration, a chain of reactions as revealed by experiments on catatorulin effect. R. A. Peters, H. Rydin, and R. H. S. Thompson (Biochem. J., 1935, **29**, 53—62).—Minced brain tissue of pigeons (I) prepared while kept warm showed a rate of oxidation in Ringer's solution+lactate or $AcCO_2H$ > when prepared in the cold. Addition of glutathione to the cooled (I) was without influence. Vitamin-B_1 (II) had its greatest effect on warm (I). Avitaminous (I) was incubated for 2½ hr. in Ringer solution+P_2O_7'''' (II). Addition of lactate produced an increased O_2 uptake only when (II) was present. H. D.

Relation of pyruvic acid in brain to certain tissue poisons. R. A. Peters, H. Rydin, and R. H. S. Thompson (Biochem. J., 1935, **29**, 63—71).—Fluoride (I) and iodoacetate (II) reduce O_2 uptake equally. Each largely reduces the catatorulin effect [extra O_2 uptake in presence of added vitamin-B_1 (III)], both together eliminating it. (I) decreases the pyruvate (IV) accumulation by avitaminous brain and (II) increases it. Glutathione produces only partial restoration of the vitamin effect in presence of (II). Disappearance of (IV) in presence of (III) results from some other change, the poisons influencing a preparatory stage for oxidation. C. G. A.

Effects of the composition of the diet on the vitamin-B_1 and -B_2 requirements of the growing rat. N. B. Guerrant and R. A. Dutcher (J. Nutrition, 1934, **8**, 397—420).—Addition of fats to the ration slightly retarded the depletion of vitamin-B_1 in rats, but did not affect that of -B_2. The -B_2 requirement increased with the amount of mineral salts ingested. Addition of fibre to the diet economised the utilisation of -B_1 and -B_2. Sucrose increased and dextrin lowered the -B_1 and -B_2 requirements. The latter were not influenced by the level of dietary protein. A. G. P.

Synthetic vitamin-B_2. R. Kuhn and F. Weygand (Ber., 1934, **67**, [*B*], 2084—2085).—The compound $C_{17}H_{20}O_6N_4$, obtained from *l*-arabinose as Ac_4 derivative, has the same growth-promoting action as natural vitamin-B_2, whereas the substance $C_{15}H_{16}O_6N_4$ is inactive (cf. this vol., 94). H. W.

Non-identity of vitamin-B_2 and flavins. C. A. Elvehjem and C. J. Koehn, jun. (Nature, 1934, **134**, 1007—1008).—Vitamin-B_2 and flavins are not identical. L. S. T.

Photochemical formation of 6 : 7-dimethylalloxazine from lactoflavin.—See this vol., 224.

Synthetic compounds of the lactoflavin group.—See this vol., 224.

Inanition as a factor in vitamin-B_2 deficiency. D. G. Remp and F. C. Bing (J. Nutrition, 1934, **8**, 457—462).—Mice receiving a vitamin-B_2-deficient diet consumed approx. 60% of the normal caloric intake. The body-wt. remained unchanged, neutral fats disappeared from the body, but phospholipins were unaffected. Bones developed subnormally, nos. of red blood-cells declined, and the concn. of hæmoglobin and of serum-protein was < normal. -B_1 and -B_2 are necessary to maintain normal appetite. A. G. P.

Colour test for vitamin-*C*. J. H. Roe (Science, 1934, **80**, 561).—When ascorbic acid is boiled with HCl furfuraldehyde (I) is formed and CO_2 is liberated. The pink colour produced with (I) and NH_2Ph can then be used for its determination. Pentoses, pentosans, hexoses, and hexosans interfere. L. S. T.

Ascorbic acid and thiosulphate in urine. M. van Eekelen (Nature, 1935, **135**, 37).—S_2O_3'' is present in the urine (I) of diabetics and of cats and, to a smaller extent, in that of dogs and normal persons. Its interference with the determination of ascorbic acid in (I) by the 2 : 6-dichlorophenol-indophenol method can be prevented by its removal with $Hg(OAc)_2$ or Ba salts. L. S. T.

Ascorbic acid content of the intestine of the guinea-pig. S. S. Zilva (Biochem. J., 1935, **29**, 100—101).—Ascorbic acid injected into the jugular vein or given *per os* (as a mixed diet) to scorbutic guinea-pigs is selectively absorbed by the tissues of the intestinal tract, particularly in the small intestine. C. G. A.

Vitamin-*C* in Indian food-stuffs. B. C. Guha and A. R. Ghosh (Current Sci., 1934, **3**, 210).—The guava, the mango (I) (langra variety), and the lichi are the richest sources of vitamin-*C* (II); they contain 1·04, 0·69, and 0·48 mg. of (II) per g., respectively. Different varieties of (I) differ in their (II) contents. The (II) of *kancha-mung* (*Phaseolus mungo*) is increased 7·8 times by germination. The process of development of these fruits appears to involve progressive reduction in (II) content. L. S. T.

Chinese citrus fruit. VI. Vitamin-*C* content of Tsun Chü and Chao Kan. P. P. T. Sah and T. S. Ma (J. Chinese Chem. Soc., 1934, **2**, 257—259; cf. A., 1933, 755; 1934, 1042).—Tsun Chü is > twice as rich as Chao Kan in vitamin-*C*, and is equal in antiscorbutic activity with Fu Chü and Hsiu Mi Chü. J. L. D.

Vitamin-*C* content of Peiping summer fruit and vegetables. P. P. T. Sah, T. S. Ma, and H. C. Chang (J. Chinese Chem. Soc., 1934, **2**, 260—265; cf. A., 1934, 1042).—The vitamin-*C* (I) content of many summer fruits and vegetables is recorded. Prolonged boiling of vegetables rich in (I) results in a large loss in nutritional properties. J. L. D.

Isolation of vitamin-*C* from Chinese iris. Y. F. Chi and B. E. Read (J. Chinese Chem. Soc., 1934, **2**, 271—273).—The yield (isolation described) is small, although titrimetric determinations indicate a high vitamin-*C* content. J. L. D.

Vitamin-*C* and the adrenal gland in dogs. H. M. Vars and J. J. Pfiffner (Proc. Soc. Exp. Biol. Med., 1934, **31**, 839—841).—Adrenalectomised dogs receiving cortical hormone survived 15—33

months without developing scurvy on a diet which was scorbutic to guinea-pigs. Feeding of large amounts of vitamin-*C* (I) did not affect the requirement of cortical hormone. The adrenal gland is not concerned with the synthesis or metabolism of (I). Ch. Abs. (*p*)

Is the ascorbic acid content of adrenals and liver under control of nervous system? A. B. L. Beznák and Z. Hariss (Biochem. J., 1934, **28**, 2039—2043).—No significant change (*i.e.*, within ±15%) is produced in the ascorbic acid content of the adrenals (I) and liver (II) on stimulation or degeneration of the splanchnic nerve of the cat or by perfusion of (I) and (II) with solutions of adrenaline or acetylcholine. H. D.

Effect of ascorbic acid on the thyroid and adrenals of guinea-pigs. D. Marine, E. J. Baumann, and S. H. Rosen (Proc. Soc. Exp. Biol. Med., 1934, **31**, 870—873).—Oral administration of ascorbic acid produced smaller thyroid glands in guinea-pigs receiving a goitrogenic diet and anterior pituitary extract than in control animals. Ch. Abs. (*p*)

Enzymic reduction of dehydroascorbic acid. E. Pfankuch (Naturwiss., 1934, **22**, 821).—In juice expressed from potato (I), the vitamin is in the form of dehydroascorbic acid (II), owing to the activity of oxidases. If cysteine (III) (about 0·3%) is added to (I), (II) is reduced to ascorbic acid (IV). The reduction is enzymic. In the presence of much (III), (IV) must be titrated in presence of a citrate buffer of p_H 5·3—5·5, after addition of $HgCl_2$ and KCl. A. J. M.

Biological genesis of vitamin-*C*. J. Mosonyi (Z. physiol. Chem., 1934, **230**, 240—244).—The increase in the ascorbic acid (I) content of the adrenals of rats after administration of γ-hydroxyhexane-βε-dione (II) (Henze *et al.*, A., 1933, 88, 377) is approx. the same as when the same amount of (I) is given. (II) is considered to be an intermediate in the biological synthesis of (I). H. B.

Proportions of chloroplast numbers and chlorophyll concentration in *Elodea densa*. H. von Euler, B. Bergman, and H. Hellström (Ber. deut. bot. Ges., 1934, **52**, 458—462).—The chorophyll (I) content per chloroplast (II) and the no. of (II) per cell are practically const. A. G. P.

Development of chlorophyll and carotenoid pigments in etiolated plants. R. J. Norris (Bull. Basic Sci. Res., 1933, **5**, 23—32).—Exposure of etiolated plants to artificial light resulted in the formation of chlorophyll (I) and xanthophyll (II) in const. proportions. Carotene (III) decreased at first, but after 4—5 hr. increased more rapidly than (I) and (II). With increasing O_2 in the atm. (III) developed still more rapidly, but formation of (I) and (II) reached a max. with 20% O_2. The proportion of all pigments increased with rising $[CO_2]$ in the atm. up to 3—5%, but subsequently declined. Ch. Abs. (*p*)

Chlorophyll fluorescence and assimilation of carbonic acid. I. Fluorescence behaviour of green plants. H. Kautsky and A. Hirsch. **II. Apparatus for comparative measurement of changes of fluorescence of living leaves. Influence of temperature on the fluorescence curve.** H. Kautsky and H. Spohn (Biochem. Z., 1934, **274**, 423—434, 435—451).—I. Change of intensity of chlorophyll fluorescence on irradiation is a general characteristic of green leaves of many plants and is probably related to assimilation of CO_2 by the leaves.

II. A detailed description of the apparatus is given. The velocity of increase of fluorescence on irradiation is probably determined by the intensity of the irradiating light, and is not altered by change of temp., whereas the velocity with which fluorescence falls away after irradiation varies greatly with the temp. P. W. C.

Chlorophyll spectrum.—See this vol., 145.

Colloid chemistry of chlorophyll.—See this vol., 165.

Biochemistry of chlorophyll-defective barley mutants. H. von Euler and R. Weichert (Svensk Kem. Tidskr., 1934, **46**, 301—306; cf. A., 1932, 550).—Three new mutants (I) [normal (II) and chlorophyll-defective (III)] contain the base $C_{11}H_{14}N_2$ (A., 1933, 877) not found in ordinary barley or other green plants. For two (I) the catalase content (IV) of (II) considerably exceeds that of (III) in samples grown in light, but there is less difference in etiolated samples. For the third, (IV) in (III) is > in (II). The dehydrase content (V) of barley seedlings on the 4th day is > on the 6th—9th days. In a mutant irradiated with *X*-rays (V) in (III) is 100% > in (II). W. McC.

Respiratory rate and enzyme activity as related to the hardened condition of plants. S. T. Dexter (Plant Physiol., 1934, **9**, 831—837).—Respiratory rates of wheat and cabbage seedlings decrease continuously during storage (I) at 2°, irrespective of their sugar content or condition of hardiness. Oxidase activity was unchanged. In cabbage, catalase activity (II) was not affected by (I) for 5 days, although plants hardened and had increased proportions of sugar. In wheat (II) decreased in lighted and increased in darkened conditions. A. G. P.

Temperature characteristics for metabolism of *Chlorella*. II. Rate of respiration of cultures of *C. pyrenoidosa* as function of time and temperature. C. S. French, H. I. Kohn, and P. S. Tang. **III. Catalytic decomposition of hydrogen peroxide by *C. pyrenoidosa*.** C. S. French (J. Gen. Physiol., 1934, **18**, 193—207, 209—213; cf. A., 1934, 1262).—II. The O_2 consumption (I) of *C. pyrenoidosa* in Knop's solution in the dark decreases with time; the R.Q. also falls from an initial val. of 0·95 to a const. val. 0·65; hence it is concluded that two substances, *A* and *B*, are responsible for (I). The plot of rate of (I) against (I) is linear in the initial stages only; a similar curve for CO_2 consumption (II) runs parallel to this; curves of (I) and (II), corr. for the oxidation of *A* only, coincide, indicating an R.Q. equal to 1 for this component. The R.Q. of *B* is 0·65. The Arrhenius const. of (I) of *A* is 3500 g.-cal. above 11·5° and 19,500 g.-cal. below, whilst that of *B* is 5600 with no critical temp.

III. The decomp. of H_2O_2 by *C. pyrenoidosa* at p_H 6·72 is unimol. only in the initial stages. The plot of log. initial $d[H_2O_2]/dt$ against $1/t$ is linear, giving an Arrhenius const. of 10,500 g.-cal. H. D.

Respiration of conjugating *Spirogyra* with special reference to fat metabolism. N. L. Pal (New Phytol., 1934, **33**, 241—273).—During conjugation CO_2 evolution and the R.Q. decline. The O_2 intake rises in the early stages, but decreases later. Oil globules appear only in conjugating filaments. Starch is present at all times except the final stage of zygote formation, when it is converted into fats and oils. Light energy is essential to the latter process, which is reversed in darkness. A. G. P.

Metabolism of plant and insect waxes. A. C. Chibnall and S. H. Piper (Biochem. J., 1934, **28**, 2209—2219).—A general scheme for the metabolism of waxes is based on the hypotheses (1) that the primary alcohols are formed by the reduction of the corresponding acids, and the paraffins, *sec.*-alcohols, and ketones by indirect decarboxylation of the corresponding $n+1$ acid, and (2) that the saturated, keto-, and OH-acids are formed from unsaturated acids synthesised from shorter products. C. G. A.

Physiology of sugar accumulation in sugar-beet. I. Transformation of sugars in leaf scions. II. Influence of different sugars on photosynthetic energy. A. L. Kursanov and M. N. Kazakova (Trans. Centr. Sci. Res. Inst. Sugar Ind. U.S.S.R., 1933, No. 12, 3—13, 13—26).—I. A 3% solution of glucose (I) filtered through leaf scions is partly converted into fructose (II). Some synthesis of sucrose (III) occurs. A 3% solution of (II) is partly transformed into (I) under these conditions and (III) is also formed. Solutions of (III) (8%) were not affected by this treatment.

II. The action of sugar solutions on photosynthetic activity indicates that in beet sugars are translocated in the simple forms, and sugar storage is limited by insufficiently rapid photosynthesis. Ch. Abs. (*p*)

Seasonal cycle of nitrogenous and carbohydrate materials in fruit trees. II. Cycles of alcohol-soluble materials and of carbohydrate fractions and lignin in wood, bark, leaves, and portions of terminal shoots of apple trees under two cultural systems—grass plus annual spring nitrate, and arable without nitrogenous fertiliser. E. S. Smith (J. Pomology, 1934, **12**, 249—292).—Seasonal variations in all constituents are recorded, those for bark (I) and wood being similar. Grassland trees receiving $NaNO_3$ had higher proportions of reducing sugars in spring and summer and, in general, higher carbohydrate : N ratios. Other constituents were not appreciably affected by differences in cultural treatment. Carbohydrates are translocated principally through (I). Sucrose in shoots acts as a primary reserve (II) rather than a medium of translocation. Complete disappearance of starch in winter does not occur. Hemicellulose is probably not a (II), but has a structural function. A. G. P.

Variations in enzymic content of different varieties of sugar-beet at the germination period. S. R. Riskina (Trans. Central Sci. Res. Inst. Sugar Ind. U.S.S.R., 1933, No. 12, 36—43).—The increase in enzyme content of germinating seed (1—8 days) is irregular, but characteristic of seed type. Variations in forage-beet are less irregular than in sugar-beet. Ch. Abs. (*p*)

Substance in fleshy fruits inhibitory to germination. A. Köckemann (Ber. deut. bot. Ges., 1934, **52**, 523—526).—The Et_2O-extract of apples, pears, tomatoes, etc. contains a H_2O-sol., heat-resistant substance (" blastokolin "), which is decomposed by hot NaOH and by H_2O_2, and inhibits the germination of seeds. A. G. P.

Metabolic changes in geotropically stimulated seedlings. P. Metzner (Ber. deut. bot. Ges., 1934, **52**, 506—522).—The hypocotls of *Helianthus* seedlings, after keeping horizontal for some time, exhibited changes in the composition of expressed saps. Sap from the under side had higher *d*, osmotic pressure, $[H^+]$, and reducing sugar content than that of the upper side. A. G. P.

Action of salts of beryllium, zirconium, and palladium on the geotropic sensitivity of roots. V. Bambacioni-Mezzetti (Atti R. Accad. Lincei, 1934, [vi], **20**, 125—128).—0·1% $PdCl_2$ solutions (in tap-H_2O) completely paralyse the geotropic sensitivity of roots of *Vicia sativa*; some roots resume growth subsequently and then show irregular curvature. 0·1% $ZrCl_4$ solutions inhibit geotropic curvature for 8 hr.; most of the roots dry without the plants dying, but some, after 24—48 hr., show geotropic and ageotropic curves. 0·1% $BeCl_2$ solutions have less effect. Apparently geotropic curvature depends less on the faculty of growth than on unequal distribution of the growth hormones. T. H. P.

Absorptive function of roots and concentration of culture media. P. Mazé, P. J. Mazé, jun., and R. Anxionnaz (Compt. rend. Soc. Biol., 1934, **117**, 753—754).—Maize plant roots immersed in aq. KI, KCl, or NaCl absorb these salts to an extent $\propto$ their concn. in the media. Hence the absorptive power of roots varies with the properties and composition of the protoplasm (cf. B., 1933, 1027). F. O. H.

Factors in elongation and expansion [of plants] under reduced light intensity. F. E. Clements and F. L. Long (Plant Physiol., 1934, **9**, 767—781).—The supply of H_2O is the dominant factor in stem elongation, and that of light in dry-matter production. A. G. P.

Variations in composition of protein of ripening wheat grains. A. Kiesel and M. Kastrubin (Z. physiol. Chem., 1934, **230**, 216—224).—The total, protein, and H_2O-sol. N, gliadin (I), globulin, glutenin, and H_2O-sol. protein (II) of the dry, and the H_2O content of the fresh, grains are determined at various intervals during growth. The composition of (I) and (II) obtained at the various stages varies. EtOH-sol. and -insol. (I) appear to have the same chemical composition. H. B.

Root stock effects with cherries. Seedand phyton propagation. M. B. Cummings, E. W. Jenkins, and R. G. Dunning (Vermont Agric. Exp.

Sta. Bull., 1933, No. 352, 36 pp.).—Effects of the stock on the development of tree and fruit and on the sugar and acid contents and p_H of fruit are examined. A. G. P.

Production of ethylene by some ripening fruits. R. Gane (Nature, 1934, **134**, 1008).—The gas given off by ripe apples contains small amounts of C_2H_4. In the absence of O_2 its production ceases or is much diminished. L. S. T.

Carbohydrate–nitrogen ratios with respect to the sexual expression of hemp. P. J. Talley (Plant Physiol., 1934, **9**, 731—748).—Staminate plants have higher % of total carbohydrates, polysaccharides, sugars, and reducing sugars, but lower N, than pistillate plants. A. G. P.

Phytohormones. H. von Euler, D. Burström, and G. Günther (Svenk Kem. Tidskr., 1934, **46**, 250—256).—The retarding action of egg-yolk and malt extracts and of urine on the root-growth of barley mutants grown in saline solution is as pronounced with chlorophyll-defective mutants (albina 1) as with those (I) of normal chlorophyll content. No retardation is caused by ovalbumin, pollen extract, methylene-blue, flavin, or the base $C_{11}H_{14}N_2$ present in (I). No differentiation is observed in the effect of factor-*Z* (yeast extract) on the growth of large or small plants of *Antirrhinum atardata* (Stubbe). Extraction of factor-*Z* from Stockholm brewer's yeast (cf. Borchardt *et al.*, A., 1934, 1035) and from barley embryos (best source) is described. J. W. B.

Electrical behaviour of large plant cells. W. J. V. Osterhout (Cold Spring Harbor Symp. Quant. Biol., 1933, **1**, 125—130).—Phase-boundary potentials and potentials in living tissues due to Donnan constraints are usually small. Oxidation–reduction potentials do not account for the electrical behaviour of cells. Diffusion potentials have been studied for multi-nucleate cells. The non-aq. surface appears to be a mixture of substances, some of which may be removed and still leave a non-aq. layer. Anæsthesia may be produced by removing certain substances from the cell. Ch. Abs.

Osmotic pressure in relation to permeability in large plant cells and in models. W. J. V. Osterhout (Cold Spring Harbor Symp. Quant. Biol., 1933, **1**, 166—169).—The plant cell maintains a higher osmotic pressure inside by manufacture of sugar or sol. salts, and by accumulation of inorg. salts such as KCl. Ch. Abs.

Permeability of protoplasm to alcohols. H. Zehetner (Jahrb. wiss. Bot., 1934, **80**, 505—560).—Comparison is made of the penetration of EtOH and H_2O into cells and the mechanism of the process is discussed. A. G. P.

Balance of ionic sodium and calcium and cell-permeability. M. V. Homès (Compt. rend. Soc. Biol., 1934, **117**, 796—797).—Aq. NaCl or $CaCl_2$ penetrates sections of turnip root to an extent such that the final [Cl′] is the same with both salts. With aq. NaCl+$CaCl_2$ in varying proportions, max. penetration of Cl′ and min. toxicity (as indicated by the survival period of the tissue) occur with $Na^{\cdot} : Ca^{\cdot\cdot}$ = approx. 19 : 1. F. O. H.

Influence of humic acid on the absorption of mineral salts by plants. A. V. Blagovestschenski and A. A. Prosorovskaja (Biochem. Z., 1934, **274**, 341—345).—Humic acid preps. from peat stimulate the growth of flax seedlings in H_2O culture, increasing considerably the dry wt. and % of N, but decreasing the % of P (increase of protoplasm but not of nuclear material). Tables show the N, P, and K contents of stalks and roots as a % of the dry wt. with varying nutrition. P. W. C.

Phosphorus metabolism in the leaves of mistletoe. E. Michel-Durand (Compt. rend., 1934, **99**, 1653—1655).—Determination of P in the ignited residue of the EtOH- and Et_2O-sol. [lipin-P (I)], and the EtOH-sol. Et_2O-insol. [residual sol. P (II)] fractions of the dried leaves of mistletoe, and of the 10% $CCl_3{\cdot}CO_2H$ extract (III) [total sol. P (IV)], the phytin pptd. by $Ca(OAc)_2$ from (III) [phytin-P (V)], and in the Mg phosphates from the (III) filtrate [mineral P (VI)] of the fat-freed leaves, gives an approx. measure of the relative types of P present at different periods between May and September (results tabulated), sol. org. P (VII) being given by (IV)—(V)—(VI), and the residue from (III) giving residual insol. P (VIII). During this period (I) diminishes slightly during leaf fall, (I)+(II) shows a slight increase, (IV) a slight continuous decrease, (VIII) remains const., (V) and (VI) exhibit a parallel and marked decrease, whereas (VII) undergoes a corresponding increase, (V), (VI), and (VII) being the most affected by the fall of the leaves. J. W. B.

Forms of nitrogen in infusions of maize, timothy, red clover, tobacco, and red top. W. S. Eisenmenger (J. Agric. Res., 1934, **49**, 375—378).—Analytical data show the N partition in the various infusions. In all cases NH_3-, protein-, and proteose-N were present. A. G. P.

Chemical composition of certain aquatic plants. H. J. Harper and H. A. Daniel (Bot. Gaz., 1934, **96**, 186—189).—The N, P, and Ca contents of a no. of species are recorded. The influence of algæ on the classification of natural waters is discussed. A. G. P.

Seasonal variation of hydrocyanic acid in *Molinia cœrulea*, Moench. A. Juillet and R. Zitti (Compt. rend., 1934, **199**, 1150—1152).—Details are recorded of the distribution of HCN in the various parts of the plants and of its variation with the course of the season. Desiccation and preservation cause marked diminution of the cyanogenetic complex. The quantity of HCN disengaged by an organ is not modified by addition of emulsin to the macerated mass, whereas contusion, previous to maceration which precedes distillation, does not permit the action of the enzyme on all the glucoside. H. W.

Drift of the potassium and calcium content with age in plants. A. H. K. Petrie (Austral. J. Exp. Biol., 1934, **12**, 99—110).—The total K in *Lolium perenne* rises to a max. at maturity or during senescence and then declines, whilst Ca rises until late senescence without appreciable subsequent decline. The relative amount of K declines during the life-cycle; that of Ca declines during adolescence,

subsequently remaining const. or slightly rising. The mechanisms involved in the drifts of K and Ca are discussed. W. O. K.

Significance of manganese in plants. N. C. Nag (Trans. Bose Res. Inst., 1932—1933, **8**, 179—194).—The Mn content of the leaves of various species of Coniferæ increases markedly during female flower production; the cones also have a high Mn content. In *Abies balsamia* the Mn content rises from 155·0 p.p.m. in October to 430·5 during female inflorescence. The Mn content of chlorotic leaves is < that of normal green leaves. P. G. M.

Symptoms of malnutrition manifested by sugar cane grown in culture solutions from which certain essential elements are omitted. J. P. Martin (Hawaiian Planters' Rec., 1934, **38**, 3—31).—The effects of deficiencies of N, P, K, Fe, Mn, Mg, and Ca on the development of the various plant organs and on chlorosis are recorded. *Pythium* root rot was severe in plants deprived of P and of S, but very slight where N was omitted. Ch. Abs. (*p*)

Boron deficiency in sugar cane. J. P. Martin (Hawaiian Planters' Rec., 1934, **38**, 95—107).—Normal growth occurred in the presence of 0·22 p.p.m. of B (as H_3BO_3) in media. Depressed growth with distorted and chlorotic leaves due to B deficiency resemble symptoms of " pokkah bœng " disease. Ch. Abs. (*p*)

Effect of boron on development of sugar-beet in water cultures. M. A. Belovsov (Trans. Centr. Sci. Res. Inst. Sugar Ind. U.S.S.R., 1932, No. 8, 50—59).—The presence of H_3BO_3 (0·5—10·0 mg. per litre) favourably affects the growth of beet. Absence of B prevents growth. Concns. > 25 mg. per litre are injurious. The injurious action of heavy metals is counteracted by addition of H_3BO_3 to the medium. Ch. Abs. (*p*)

[Report on] botany research [sugar-cane]. H. Evans (Mauritius Rept. Agric. Sugar Cane Res. Sta., 3rd Ann. Rep., 1932, 29—46).—Cane arrows, cut and placed in H_2O, wilt in 12 hr. because the vessels are blocked with reddish-brown substance produced by oxidase and peroxidase. Reducing agents ($H_2C_2O_4$ or SO_2), also H_3PO_4 and H_2SO_4, prolong life, but are toxic later. Invert sugar is less effective. Germination of cane cuttings is increased by soaking in aq. $Ca(OH)_2$ (I) for 8—12 hr. Cane borer larvæ in cuttings are killed by (I) alone or containing $MgSO_4$. Ch. Abs. (*p*)

Pathological effects of deficiency or excess of certain ions on citrus leaves. J. Dufrenoy and H. S. Reed (Ann. Agron., 1934, **4**, 637—653).—Salts of Zn and Fe have a sp. effect on the assimilatory function of leaves. Cytological examination of leaves of Zn-deficient trees is recorded and discussed in relation to mosaic disease. A. G. P.

Biology of halophytes. I. Physiology of germination. E. Schratz (Jahrb. wiss. Bot., 1934, **80**, 112—142).—Retarded germination caused by NaCl solutions and sea-H_2O is due to the high concn. of salts rather than to any sp. action of NaCl. A. G. P.

Reversal of direction of translocation of solutes in stems. P. W. Zimmermann and M. H. Connard (Contr. Boyce Thompson Inst., 1934, **6**, 297—302).—By a system of in-arch grafting and pruning, salts and elaborated foods may be made to move both upwards and downwards in stems. A. G. P.

Chemotropic sensitivity of dicotyledonous seedlings. J. Kisser and I. Beer (Jahrb. wiss. Bot., 1934, **80**, 301—335).—Deviation of seedling stems following the application of salt solution to an incision on one side of the stem depends on the concn. of the solution used and the period of treatment. High concns. caused a positive curvature (I) in all cases as a result of mechanical and osmotic effects. With small concns. negative (I) observed is due to unequal growth following chemotropic response. The latter was most marked with LiCl, NH_4Cl, and $MnCl_2$, less with NaCl and KCl, and did not occur with $CaCl_2$, $SrCl_2$, $BaCl_2$, or $MgCl_2$. A. G. P.

Salt concentration and reversibility of ice formation as related to the hardiness of winter wheat. S. T. Dexter (Plant Physiol., 1934, 9, 601—618).—Withdrawal of H_2O by ice formation in wheat crowns is not a fully reversible process, but reversibility increases as hardiness (I) develops. The proportion of H_2O remaining unfrozen (II) decreases with the freezing temp. Increasing (I) of plants with the advancing season is associated with a decline in sol. salt content of the tissues and a marked decrease in the salt concn. of (II). A. G. P.

Accumulation of electrolytes. VII. Organic electrolytes. I. A. G. Jacques (J. Gen. Physiol., 1934, **18**, 235—242; cf. A., 1934, 1049).—The cation : anion ratio of the inorg. constituents of the saps of *Rheum rhaponticum*, *Rumex acetosella*, and *Oxalis corniculata* varied between 1·8 and 5·3. H. D.

Elementary composition of some cultivated plants. G. Bertrand and V. Ghitescu (Compt. rend., 1934, **199**, 1269—1273).—Complete analyses are recorded of rape, lucerne, buckwheat, and oats. A. G. P.

Relationships of soils to manganese deficiency of plants. G. W. Leeper (Nature, 1934, **134**, 972—973).—A method for determining the available Mn is described and a mechanism for absorption by plants suggested. Healthy soils contain > 100 p.p.m. Mn deficiency diseases occur with < 15 p.p.m. L. S. T.

Determination of small quantities of aluminium in plants.—See this vol., 186.

"Stony" concretions in the trunk of *Chlorophora excelsa*, Bth. L. Adriaens (Bull. Agric. Congo Belge, 1934, **25**, 86—90).—Brown concretions in the cavity and trunk wood contain Mn and 70—94% of $CaCO_3$. Ch. Abs. (*p*)

Composition of juice of oranges from girdled and normal trees. C. G. Church (Calif. Citrograph, 1933, **18**, 348—349).—Juice of fruit from girdled trees had higher proportions of sol. solids, total and reducing sugars. Sucrose and citric acid contents were normal. Ch. Abs. (*p*)

Bog-moss. I. Chemical composition of *Sphagnum fimbriatum*, Wils. (Himemizugoke). M. Shikata and M. Watanabe (Proc. Imp. Acad.

Tokyo, 1934, **10** 470—471).—The composition is compared with that of wood-pulp. J. L. D.

***Amanita* toxin.** J. RENZ (Z. physiol. Chem., 1934, **230**, 245—258).—The most active prep. of the toxin (I) is obtained by adsorption of inactive substances from the MeOH extract (of *Amanita phalloides*, Fr.) on SiO_2 gel and $Al(OH)_3$, subsequent pptn. with phosphotungstic acid (II), fractional decomp. of the ppt. with basic Pb carbonate in H_2O, and final dialysis. (I), thus obtained, gives no ppt. with (II) or $Hg(OAc)_2$ (cf. Raab, A., 1932, 785) except in presence of KCl, NaCl, or NH_4Cl, but is pptd. by Ba or K Bi iodide. (I) gives Pauli's diazo-reaction, reduces $KMnO_4$ (not Fehling's solution), could not be reduced (H_2, PtO_2, MeOH), does not react with CH_2N_2, and gives no colour with ninhydrin. Appropriate acylation of (I) in C_5H_5N affords the *Bz*, *M* about 800 (hydrolysed with difficulty), anisoyl, m.p. about 175° [readily hydrolysed (EtOH–NaOEt or –KOH) without much loss of activity], and (probably) the ON-Ac_2 derivative (III), m.p. 190—195° (decomp.; sinters at 158°) [not hydrolysed by 2*N*-H_2SO_4 at 30°; hydrolysis with conc. acid or MeOH–KOH gives an inactive product]; these are amorphous H_2O-insol. [except (III)] powders. (III) and conc. KOH in N_2 at 130° give $NHMe_2$ and NH_3. H. B.

Differentiation of the toxin ricin and of an allergen in castor-oil seeds. Preparation of ricinallergen. P. GRABAR and A. KOUTSEFF (Compt. rend. Soc. Biol., 1934, **117**, 700—701, 702—704).—Seeds of *Ricinus zanzibariensis* contain the toxin ricin (I) and the allergen ricinallergen (II), whilst the rind of the seeds contains only (II). (I) is destroyed by heating to 60° and by EtOH, (II) remaining unaffected. (I) and (II) may be separated from one another and from the dried and oil-free seeds by ultrafiltration or pptn. with $(NH_4)_2SO_4$. A method for separating a non-toxic prep. of (II) is described. A. L.

Pharmacologically valuable constituents of *Bixa orellana*, L. F. W. FREISE (Pharm. Zentr., 1935, **76**, 4—5).—Proximate analyses of the fruit, husk, and seeds are given and also the medical application of preps. of the fruit pulp, whole seeds, seed husk, unripe fruits and their husks, and of the fresh leaves. E. H. S.

***Entandrophragma palustris*, Staner.** L. THON (Bull. Agric. Congo Belge, 1934, **25**, 21—25).—The bark contains resin, fluorescent material sol. in HCl, pyrocatechol, an alkaloid, a tannin (catechuic type), and certain phlobaphens. CH. ABS. (*p*)

[Constituents of] *Ceanothus velutinus*. L. W. RICHARDS and E. V. LYNN (J. Amer. Pharm. Assoc., 1934, **23**, 332—336).—The leaves of *C. velutinus* present microscopically a peculiar structure, not found in other species, which may be related to the characteristic balsamic coating. They furnish 0·14—0·21% of an oil which consists chiefly of Et and cinnamyl cinnamates, with smaller amounts of salicylaldehyde, terpenes, and esters of an unidentified *alcohol* (*diphenylurethane*, m.p. 56°; *phthalate*, m.p. 204—205°) with cinnamic and probably valeric acids. The root bark furnishes 0·1% of an *alkaloid*, $C_{23}H_{26}O_4N_2$, m.p. 270° (decomp.), which yields an unstable *hydrochloride*, completely decomposed at 240°. The symptoms of a dermatitis caused by the leaves are described. A. E. O.

Pigment of "Adsuki bean." C. KURODA and M. WADA (Proc. Imp. Acad. Tokyo, 1934, **10**, 472—474).—A purple-coloured material, decomp. at 235° (Pb salt), and substances, m.p. 157° and decomp. at 235°, which are found in the testa (isolation described) give, with alkali, *s*-$C_6H_3(OH)_3$ and protocatechuic acid. A phlobatannin-like substance, decomposed by alkali to *s*-$C_6H_3(OH)_3$ and gallic acid, is also isolated. J. L. D.

Anthocyanin plant colours and yield in maize. R. A. BRINK (J. Amer. Soc. Agron., 1934, **26**, 697—703).—Relationships between inheritable yielding capacity and the presence of plant pigments are examined. A. G. P.

Indian acorn oils. S. V. PUNTAMBEKAR and S. KRISHNA (J. Indian Chem. Soc., 1934, **11**, 721—726).—The oil from the acorn kernels of *Quercus incana*, Roxb., yields palmitic (17·1), oleic (and isomeric) (82), and (?) lignoceric (0·9%) acids, and contains a small amount of (?) sitosterol, m.p. 126—128°. R. S. C.

Chinese citrus fruit. VII. Isolation of essential oils from Fu Chü and Chao Kan. P. P. T. SAH and H. Y. FANG (J. Chinese Chem. Soc., 1934, **2**, 266—270; cf. A., 1933, 755).—C_6H_6 containing some $CHCl_3$ extracts an essential oil and a *substance*, m.p. 60° (which contains no N), from Fu Chü (I) and Chao Kan (II). The oil from (I) contains *d*-limonene (III), and has a high sap. val. and N content, whereas that from (II) is about 94% (III). J. L. D.

Essential oil in the ripe Fu Chü [tangerine] fruit. W. S. TAO and C. M. CHU (J. Chinese Chem. Soc., 1934, **2**, 282—287).—Light petroleum or Et_2O extracts from the skins an essential oil (3·8—4·9%) which contains mainly *d*-limonene and some aldehyde. J. L. D.

Constitution of the primary alcohols, fatty acids, and paraffins present in plant and insect waxes. A. C. CHIBNALL, S. H. PIPER, A. POLLARD, E. F. WILLIAMS, and P. N. SAHAI (Biochem. J., 1934, **28**, 2189—2208).—Analysis by use of the data given previously (this vol., 264) of many plant and insect waxes shows that the alcohols are mixtures of the even-no. members from C_{24} to C_{36}, the acids mixtures of even-no. *n*-fatty acids from C_{24} to C_{34}, and the paraffins mixtures of the odd-no. members from C_{25} to C_{37}. Even-no. paraffins do not occur. The approx. composition of the various waxes is indicated. C. G. A.

Odorous principles of green tea. III. Acids of raw tea oil. S. TAKEI, Y. SAKATO, and M. ONO (Bull. Inst. Phys. Chem. Res. Japan, 1934, **13**, 1161—1168; cf. A., 1934, 571).—The oil from fresh tea-leaves contains AcOH, $EtCO_2H$, $PrCO_2H$, valeric, *n*-hexoic (I), and palmitic (II) acids. The oil from manufactured green tea contains only (I), (II), and heptoic acid, and *o*-OH·C_6H_4·CO_2Me. R. S. C.

Crystalline principles from Indian species of *Artemisia*. ANON. (Pharm. J., 1935, **134**, 3—5).—From various species of *Artemisia* were isolated santonin, β-santonin (A., 1934, 1225), and *ψ-santonin*, m.p. 184—186°, $[\alpha]^{20}$ −172·5° in $CHCl_3$. F. O. H.

Marrubiin content of some *Labiatæ*. J. BALANSARD (Compt. rend. Soc. Biol., 1934, **117**, 1014—1015).—Marrubiin (I) is present in a large no. of indigenous *Labiatæ*. The active principle, m.p. 188—189°, of *Tenerium scordium* is, however, not (I). A. L.

Heteroside of *Primula acaulis*, Jacq. A. GORIS and H. CANAL (Compt. rend., 1934, **199**, 1675—1677).—The isolation of pure *primulaveroside* (I), $C_{18}H_{22}O_{11}(OMe)_2+H_2O$ and anhyd., m.p. 179·5—180° (corr.), $[\alpha]_D$ −57·74° in H_2O, from the rhizomes of *P. acaulis*, and its separation from the volemitol present, are described. Enzymolysis of (I) with the sepal powder of *P. officinalis*, L. (II), affords primeverose and Me 2-hydroxy-5-methoxybenzoate (structure confirmed by synthesis). (I) is accompanied by traces of a ketonic *substance* [2 : 4-*dinitrophenylhydrazone*, m.p. 230° (decomp.)]. (I) occurs with primeveroside in (II). J. W. B.

Glucoside and a hydrolysing enzyme in the bark of *Periploca græca*, L. T. SOLACOLU and HERRMANN (Compt. rend. Soc. Biol., 1934, **117**, 1138—1140).—*Periplocymarin* (I), m.p. 149—152°, occurs in the bark (II) with periplocin (III), from which it is formed by loss of 1 mol. of glucose. The ratio (I) : (III) in (II) is approx. 0·02%. (II) also contains an enzyme which hydrolyses (III) to (I). R. N. C.

Polysaccharides of *Iridæa laminarioides*. T. TADOKORO and K. YOSHIMURA (J. Chem. Soc. Japan, 1934, **55**, 617—621).—Hydrolytic products of a 35% EtOH extract included pentose, methylpentose, and arabinose. A hot-H_2O extract contained in addition galactose, glucose, and fucose. CH. ABS. (*p*)

Spruce holocellulose and composition of its easily hydrolysable fraction. E. F. KURTH and G. J. RITTER (J. Amer. Chem. Soc., 1934, **56**, 2720—2723).—The holocellulose (I), isolated from the sawdust by a slight modification of the method previously described (B., 1934, 12), contains all the Ac (cf. Hägglund, A., 1934, 819), all CO_2-forming material, about 12% of the OMe, and nearly all the pentosans of the extracted (EtOH–C_6H_6 and hot H_2O) wood (II). Hydrolysis (2·5% H_2SO_4) of (I) or (II) gives HCO_2H [0·56% based on (I)] and AcOH (about 1·95%). Hydrolysis (1% H_2SO_4) of (I) removes a fraction (hemicellulose) [=10·3% of (II)] of the following composition: mannose (17·7%), glucose (8%), galactose (7·8%), arabinose (12·5%), and xylose (20·9%) anhydrides; OMe (3·2%); uronic anhydride (14·6%); volatile acids (8%). The residue [=61% of (II)] from the hydrolysis appears to be identical with the Cross and Bevan cellulose. H. B.

Substitution staining with free dye-acids and -bases. R. C. MCLEAN (New Phytol., 1934, **33**, 316—317).—Solutions in xylene of the free acids of eosin and erythrosin are utilised for staining cellulose in plant sections. Liquefied tissue, cork, and pith cells are unstained. The free base of methylene-blue is similarly used for staining liquefied membranes. A. G. P.

Chemical composition of ripe Huang Yen Chü [*Citrus* species]. W. S. TAO, S. Y. YAO, and C. T. LIU (J. Chinese Chem. Soc., 1934, **2**, 274—281; cf. A., 1934, 818).—In Chu Hung Chü the acid, reducing sugar, pentosan, and cellulose contents are > in the variety Shih Chü. J. L. D.

Structure of proteins. M. A. LISITZUIN (Bull. Appl. Bot. Genetics, Plant Breeding U.S.S.R., 1934, **A**, No. 9, 5—16).—Globulins of peas, beans, and soya beans are examined and classified as "proto-acids." CH. ABS. (*p*)

Protein. XIII. Proteins of soya bean. T. HIBINO (J. Chem. Soc. Japan, 1934, **55**, 655—692).—The isolation of albumin, glycinin (I), and glutelin is described. The hydrolysis of (I) at different temp. and p_H yields varying proportions of sol. protein, proteose, and peptone and of insol. substances. Min. amounts of sol. matter are obtained at 120° at the isoelectric point. The reaction at 150° is reversible. CH. ABS. (*p*)

Protein content of barleys at different stages of maturity. K. G. SCHULZ and G. KUNISCH (Woch. Brau., 1934, **51**, 321—323).—The protein content (I) of barley is influenced by the rainfall during the principal period of development of the plant, by the nature of the previous crop, and by the soil. In most of the samples examined, a low proportion of available H_2O (judged from soil and rainfall statistics) gave high (I), and *vice versa*. I. A. P.

Chemical properties of proteins of *Iridæa laminarioides*. T. TADOKORO and K. YOSHIMURA (J. Chem. Soc. Japan, 1934, **55**, 525—527).—Two proteins are examined, (i) a chromoprotein, sol. in salt solutions and 30—35% EtOH, with N-containing products of hydrolysis unlike those of phycoerythrin, (ii) sol. in hot H_2O and 2% NaOH, similar to prolamine. CH. ABS. (*p*).

Proteins of the seeds of the tobacco plant. G. ILJIN (Biochem. Z., 1934, **273**, 350—353).—The fat-free seed (I) contains 7·8% of albumin, 8·5% of globulin (II), and 2·75% of glutenin. The N content of (I) is > that of (II) from other plants. The P contents of the separate proteins differ considerably, whilst the S contents are similar. W. McC.

Phosphorus in vegetable proteins. I. Globulins of *Lathyrus sativus* and *Vicia sativa*, var. *augustifolia*. Y. V. S. RAU (Proc. Indian Acad. Sci., 1934, **1**, B, 73—79).—Data are given for the N, P, and S contents and the N distribution in the globulin and albumin of *L. sativus* (khesari) and in the globulin of *V. sativa* (akta). The latter contains no P, a small fraction [separated by $(NH_4)_2SO_4$] containing approx. 10% P being probably an albumin. F. O. H.

Preparation of white zein from yellow corn. I. D. MASON and L. S. PALMER (J. Biol. Chem., 1934, **107**, 131—132).—Fat and pigments are extracted with $C_2H_4Cl_2$ from 95% EtOH solution. H. G. R.

Feulgen's nucleal reaction. A. Eichhorn and R. Franquet (Compt. rend. Soc. Biol., 1934, **117**, 326—328).—The results of staining cell nuclei, chromosomes, etc. of various plant tissues are discussed (cf. A., 1933, 105). No interaction between nucleolus and chromosomes during mitosis is evident. F. O. H.

Distribution of non-protein-nitrogen in the Alaska pea. S. L. Jodidi (J. Franklin Inst., 1934, **218**, 581—591).—The acid-amide-N (7·58—8·13%) of Alaska pea seeds grown on untreated soil is increased to 9·02 and 10·89—11·43% by fertilising with $NaNO_3$+$(NH_4)_2SO_4$ and KCl, respectively; the NH_2- and peptide-N vals. are 8·43—8·59, 9·72, 6·04—7·92, and 39·08—41·83, 33·28, 36·06—37·64%, respectively. The bearing of the data on the vals. of nutritive non-protein-N is discussed (cf. A., 1932, 312). F. O. H.

Occurrence of organic bases, especially of cadaverine in potato tubers. K. Yoshimura (Biochem. Z., 1934, **274**, 408—411).—From 20 kg. of fresh materials the following bases were isolated: adenine (as picrate) 0·2 g.; trigonelline (as chloride) 0·2 g.; cadaverine (as chloride) 0·1 g.; choline as aurichloride 0·5 g. Histidine and arginine were also present. P. W. C.

Preparation of aqueous extracts of soluble nitrogen from plant tissues. O. W. Davidson, H. E. Clark, and J. W. Shive (Plant Physiol., 1934, **9**, 817—822).—Boiling the material with H_2O for 20 min. followed by washing on a filter cloth was as effective as cold-H_2O extraction after grinding with sand. Loss of N from cyanogenetic material in peach was minimised by the boiling method. A. G. P.

Variations of the quantity of tannin during the development of the gall-nuts of the oak. H. Grossu-Herrmann (Compt. rend. Soc. Biol., 1934, **117**, 1127—1131).—Tannin in *Dryophanta folii* gall-nuts rises to a max. in midsummer, falling to a min. in early autumn. In *Cynips hungarica* the tannin reaches its max. in late summer. In both species the max. occurs simultaneously with max. morphological development. R. N. C.

Quantity of oil in linseed and hemp seed during different periods of maturation and germination as well as in birch and lime trees during different phases of winter. J. Dmochowski (Polish Agric. Forest. Ann., 1934, **32**, 35—77).—During normal maturation the oil (I) of linseed and hemp increases to a max. as the seeds dry. No increase occurs during drying of shelled seed under germinating conditions. (I) declines and disappears in 24 hr. H_2O is necessary for transformation of oil. In birch and lime trees changes in (I) and H_2O content during winter and spring are inversely related. Ch. Abs. (*p*)

Nature of rust-resistance in wheat. VI. Effect of hydrogen-ion concentration, phenolic compounds, and host extracts on germination of urediniospores of *Puccinia graminis tritici*, form 21. J. A. Anderson (Canad. J. Res., 1934, **11**, 667—686).—The optimum p_H for spore germination (*G*) was 5·8—6·5. Among a no. of compounds examined the min. concn. inhibiting *G* was lowest in buffered solutions of quinol, followed in increasing order by *o*-cresol, anisic and benzoic acids, pyrocatechol, guaiacol, and PhOH. In unbuffered solutions the influence of p_H accentuates the effects. Expressed juices from wheats exhibited inhibitory effects which showed varietal differences. No relationship was apparent between the inhibitory action of the juice and the resistance of the variety to rust infection. A. G. P.

Effect of mildew and rust infection on dry weight and respiration of excised clover leaflets. C. E. Yarwood (J. Agric. Res., 1934, **49**, 549—558).—Infection decreased the dry wt. and markedly increased respiration (I) in clover leaflets. Dusting with S increased the (I) of healthy and infected leaflets. A. G. P.

Chemistry of vegetable tumours. IV. Peroxidase in the tumours. G. Klein and W. Ziese (Biochem. Z., 1933, **267**, 22—25; cf. A., 1933, 315).—The peroxidase content (I) of tumours (II) in horseradish roots (III) is much (up to 100%) > that of roots of the healthy plant and the (I) of the thick upper parts of (III) is > that of the small branches of the roots. Young (II) have lower (I) than old. W. McC.

Nature of injury to forage legumes by the potato-leaf hopper. H. W. Johnson (J. Agric. Res., 1934, **49**, 379—406).—Yellow and reddened leaves of lucerne and clover caused by leaf hopper injury have higher contents of dry matter, reducing sugars, sucrose, starch, total hydrolysable matter, and EtOH-sol. N, but lower total N, than normal green leaves. Also the osmotic pressure of the sap is increased. Similar changes are produced artificially by girdling the stems. Coloration of leaves of infested plants is due to excessive accumulation of carbohydrates in areas in which vascular tissues are injured by the insects. A. G. P.

Photodynamic action of methylene-blue on the virus of a plant disease. H. H. Storey (Ann. Appl. Biol., 1934, **21**, 588—589).—The virus of streak disease in maize is inactivated by exposure to light in the presence of methylene-blue and O_2. A. G. P.

Fungi associated with blight diseases of certain cultivated leguminous plants. A. Sattar (Trans. Brit. Mycol. Soc., 1934, **18**, 276—301).—Growth of *Ascochyta pinodella*, *A. pisi*, *Mycosphaerella pinoides*, and *Phyllosticta rabieri* was fairly rapid in the p_H range 4·0—8·8 (optimum, 7·0), declined rapidly between 4·0 and 3·0, and ceased between 3·0 and 2·4. Ch. Abs. (*p*)

Virus causing foliar necrosis of the potato. F. C. Bawden (Proc. Roy. Soc., 1934, **B**, **116**, 375—395).—A new potato virus "*D*" (I) is described. In some species this causes foliar necrosis and in others top-necrosis. (I) confers a resistance to further infection with virus "*X*" and *vice versa*, the extent of which depends on the species of the host. H. G. R.

Photodynamic action of methylene-blue on plant viruses. J. M. Birkeland (Science, 1934, **80**, 357—358).—In general, plant viruses such as tobacco virus and streak virus are more resistant to

the photodynamic action of methylene-blue (I) than are animal viruses or bacteriophage. Ringspot virus, however, in presence of (I) is quickly inactivated by exposure to electric light. L. S. T.

Serum reaction as an aid in the study of filterable viruses of plants. H. P. Beale (Contr. Boyce Thompson Inst., 1934, **6**, 407—435).—Serological reactions of tobacco mosaic virus are examined and a method is described for determining the antigenic content of saline extracts of virus. A. G. P.

Action of high-frequency sound waves on tobacco mosaic virus. W. M. Stanley (Science, 1934, **80**, 339—341).—The data given indicate that the inactivation of the virus by supersonic radiation (A., 1934, 822) is associated with expulsion of dissolved gas and with the presence of extraneous matter in the untreated juice. Intense high-frequency sound waves have practically no effect on virus purified under a high vac. L. S. T.

Spreading in a unimolecular film. Method for biological problems. E. Gorter (Amer. J. Dis. Children, 1934, **47**, 945—957).—Technique of du Nouy and Langmuir is applied to determinations of lipase activity, fat, and lipins in blood, and protein in solutions. Ch. Abs. (*p*).

Accurate, adjustable gas-mixing apparatus for p_H measurements of biological liquids. H. Schade and H. von Pein (Z. ges. exp. Med., 1934, **76**, 540—548; Chem. Zentr., 1934, i, 1530). L. S. T.

Determination of the p_H of normal and malignant tissues with the glass electrode and vacuum tube null indicator. H. M. Partridge, J. A. C. Bowles, and A. Goldfeder (J. Lab. Clin. Med., 1934, **19**, 1100—1105). Ch. Abs. (*p*)

Electrical method for checking physiological salt solution. J. H. Graham (Amer. J. Pharm., 1934, **106**, 325—327).—The concn. of physiological NaCl solution (0·85%) is best checked by determination of its sp. conductivity. J. W. B.

Determination of iron in biological materials. T. G. Klumpp (J. Biol. Chem., 1934, **107**, 213—223).—Knecht and Hibbert's $TiCl_3$ method (A., 1903, ii, 217, 509) is modified and adapted to determination of Fe in blood, food, fæces, and urine. C. G. A.

Micro-detection of insoluble calcium salts in tissues. G. Gömöri (Virchow's Archiv, **286**, 682—689; Chem. Zentr., 1934, i, 3500).—The solubilities of Ag_3PO_4 and Ag_2CO_3 are < those of the corresponding Ca salts. Immersion of tissue in 1·5% aq. $AgNO_3$ for 6—10 days results in transformation of Ca into Ag salts the presence of which is detectable by the hypophosphite test. The prep. is fixed in aq. $Na_2S_2O_3$ and Ca is removed by sulphosalicylic acid. A. G. P.

Identification of glass splinters. N. A. Marris (Analyst, 1934, **59**, 686—687).—The probable identity of two samples of glass, one of which was in the form of minute splinters, was established by determination of *n* and *d*, and by observation of the fluorescence in ultra-violet light. E. C. S.

Blood-iodine. III. Reservoir burette. F. J. Phillips and G. M. Curtis (J. Lab. Clin. Med., 1934, **19**, 896—898).—A 0·2-c.c. Kahn pipette, graduated in 0·001 c.c., is attached to the reservoir tube of a Koch burette by means of a 3-way stopcock. Ch. Abs.

Iodometric determination of sugar in presence of thiocyanate. D. Krüger and E. Tschirch (Biochem. Z., 1934, **274**, 34—41).—The influence of p_H and concn. of KI, Cu, and CNS′ on the titration of Cu is investigated and the most suitable composition of the required solutions is outlined. P. W. C.

Galactosuria test of Fiessinger. Application of the method of Fleury and Marque to the determination of galactose in urine. R. Hazard, M. Herbain, and C. Vaille (J. Pharm. Chim., 1935, [viii], **21**, 61—71).—The KI-HgI_2 method of Fleury and Marque (A., 1929, 292) may be used for the determination of galactose in urine. W. O. K.

Determination of phenol. G. Barac (Compt. rend. Soc. Biol., 1934, **117**, 259—261).—A modification of the method of Theis and Benedict (A., 1924, ii, 708) is used for the determination of PhOH in blood or urine. A. L.

Colorimetric micro-determination of cholesterol. S. Görtz (Biochem. Z., 1934, **273**, 396—412).—By combining the advantages of the methods of Rappaport and Engelberg (Klin. Woch., 1931, 700) and Milbradt (A., 1933, 624) a simple procedure for determining cholesterol in biological fluids, *e.g.*, 0·1 c.c. of blood, is obtained. AcCl is used to produce the strong, very persistent colour. The average error is about 2%. W. McC.

Biochemical gravimetric methods. IV. Micro-determination of cholesterol by the torsion balance. L. Jendrassik and A. Borrétás (Biochem. Z., 1934, **274**, 367—371).—A simplified method is described in which the pptn. is carried out at room temp. with dil. EtOH solutions of digitonin (I) and the ppt. collected on a Seitz asbestos filter and weighed. The method gives accurate vals. for blood-serum. By heating cholesterol a substance arises which is no longer precipitable by (I), but is still detected colorimetrically. P. W. C.

Determination of lactic acid by the method of Mendel and Goldscheider. R. Nordbö (Biochem. Z., 1934, **275**, 162).—In the process described in A., 1934, 1050, the colour comparison is made after keeping the solution for 60 min. in ice-H_2O.

Nephelometric investigation of protein solutions. II. E. M. Mystkowski (Biochem. Z., 1934, **274**, 461—464; cf. A., 1934, 1306).—A table summarises the varying degrees of turbidity, determined nephelometrically, of an electro-dialysed solution of ovalbumin as compared with a commercial prep. at varying p_H and in presence of NaCl, $CaCl_2$, $MgCl_2$, $MgSO_4$, and Na_2SO_4. P. W. C.