BRITISH CHEMICAL ABSTRACTS

A.-PURE CHEMISTRY

JUNE, 1934.

General, Physical, and Inorganic Chemistry.

Fine structure of H_a . H. KOPFERMANN (Naturwiss., 1934, 22, 218).—The fine structure of H_a is more easily observed in the spectrum of pure H^2 than in that of the isotopic mixture. A. J. M.

Fine structure analysis of H_a^1 and H^2_a . R. C. WILLIAMS and R. C. GIBBS (Physical Rev., 1934, [ii], 45, 475—479).—The interval between the main components of the doublet is 0.308 for H_a^1 and 0.321 cm.⁻¹ for H_a^2 . Relative intensities of components are in approx. agreement with theory. N. M. B.

Bands in the extreme ultra-violet emission spectrum of the H¹H² molecule. C. R. JEPPESEN (Physical Rev., 1934, [ii], 45, 480—484).—Data for twelve bands for a 3:2 H¹–H² mixture, belonging to the $2p^{1}\Pi_{cd}$ —1s¹ Σ system of the H¹H² mol., are tabulated. Analysis gives rotational and vibrational consts. in agreement with those from the isotope effect. There is a large electronic isotope shift of 135 cm.⁻¹ The apparent vibrational perturbation in the v=3level of the $2p^{1}\Pi_{cd}$ state is 4·3, compared with 10·4 cm.⁻¹ for H¹H¹. N. M. B.

Stark effect for the hydrogen isotopes. J. S. FOSTER and A. H. SNELL (Nature, 1934, 133, 568). L. S. T.

Spectrum of the HD and the D_2 molecules. G. H. DIEKE and R. W. BLUE (Nature, 1934, 133, 611-612).—The mol. spectra of samples ranging from pure H¹ to practically pure H² obtained under high dispersion are discussed. L. S. T.

Stark effect for the helium line 5876 Å. with high resolution. R. RITSCHL (Physikal. Z., 1934, 35, 313—316).—The Stark effect of the He line 5876 Å. has been investigated, using a special positiveray tube, with a Fabry-Perot etalon, and a Zeiss triprism apparatus. The behaviour of the strong and weak components is identical. A weak component displaced towards the red occurs, which is polarised perpendicular to the direction of the field. There are also two components displaced towards the violet to an extent depending on the square of the field strength, polarised perpendicular and parallel to the field.

A. J. M.

Fine structure of the He II line 1640 Å. V. M. TSCHULANOVSKI and M. P. MOCHNATKIN (Compt. rend. Acad. Sci. U.R.S.S., 1934, 1, 471-473).—The spectrum of He in the interior of a hollow C cathode has been photographed. The 1640 Å. line shows two groups of fine-structure lines, the intensities of which are not in complete agreement with theory.

J. W. S.

Interferometric measurements of the absorption of helium. H. GERRITSEN (Physica, 1934, 1, 401-414).—Intensity distribution curves for the He lines 2'P-3'P, 2'P-4'D, 2'P-5'D, and 2'S-3'P have been measured and the ratio of the Einstein absorption coeffs. is derived. H. J. E.

Anomalous dispersion near band lines of the lithium molecule. R. LADENBURG and S. LEVY (Z. Physik, 1934, 88, 449–460).—Anomalous dispersion due to Li₂ vapour at 1000° was investigated in the red, and gives the nuclear moment of Li⁷ as 5/2.

A. B. D. C. Carbon bands at 2313 A. (Possible existence of C_3 as an equilateral triangle.) T. HORI (Z. Physik, 1934, 88, 495—510).—Possible emitters of these bands are a diat., symmetrical or unsymmetrical linear triat., or an equilateral triangular mol.; the last model is preferred. A. B. D. C.

Rotation structure of the nitrogen molecule bands in the Schumann region. V. M. TSCHULA-NOVSKI (Compt. rend. Acad. Sci. U.R.S.S., 1934, 1, 473-478).—New measurements have been made of the N₂ spectrum in the far ultra-violet region and are discussed theoretically. J. W. S.

Predissociation in the first positive group of N_2 and its bearing on the electronic level diagram of the nitrogen molecule. A. VAN DER ZIEL (Physica, 1934, 1, 353—362). H. J. E.

New band system of nitrogen. A. VAN DER ZIEL (Physica, 1934, 1, 513—517).—A new band system between 2000 and 2800 Å., degraded to the violet, has been measured. The transition is probably $1,^{3}\Sigma_{g}^{-} \longrightarrow 1,^{3}\Sigma_{u}^{-}$. H. J. E.

Anomalous dispersion of excited gases. VIII. Transition probabilities for the red-yellow neon line (s - p) and the half life period of the *p*-state. R. LADENBURG and S. LEVY (Z. Physik, 1934, 88, 461-468). A. B. D. C.

Occurrence of neon spark lines in the light from the negative glow. II. M. J. DRUYVESTEYN (Physica, 1934, 1, 427—428; cf. A., 1931, 539).— Ne III lines were observed in a glow discharge, showing electrons to be present with > 78% of the cathode fall of potential. H. J. E.

Nuclear spin of sodium. J. JOFFE (Physical Rev., 1934, [ii], 45, 468–474).—Measurements of alternations of intensities in absorption for the (0, 2) band in the ${}^{1}\Pi$ — ${}^{1}\Sigma$ transition gave an average val. of 1.71, agreeing with the theoretical val. 1.67, corresponding with a nuclear spin of 3/2. N. M. B.

Intensity ratio of the lines 2P-1S and $2P_2-1S$ in the arc spectrum of alkali earths. F. J. CHAMULEAU (Physica, 1934, 1, 518-520).—Observed and calc. vals. agree for Ca, Sr, and Ba. H. J. E.

Spectra of chlorine, Cl III, Cl IV, and Cl V. I. S. BOWEN (Physical Rev., 1934, [ii], 45, 401-404; cf. A., 1928, 210).—Full data, classifications, and term vals. for about 200, 50, and 20 new lines of Cl III, Cl IV, and Cl V, respectively, are tabulated.

N. M. B.

Vibrational states of Rb₂ and Cs₂. E. MATU-YAMA (Nature, 1934, 133, 567—568).—Expressions for the frequencies of the heads of the bands of Rb and Cs are given and discussed. L. S. T.

Nuclear moment of elements. S. FRISCH and V. A. MATVEEV (Compt. rend. Acad. Sci.–U.R.S.S., 1934, 1, 460–464).—Careful study of the Ag I 3280 and 3382 Å. lines reveals no fine structure, the line breadth indicating a max. val. of 2×10^{-4} magneton for the magnetic moment of the Ag nucleus. The Mg II 2802 and 2795 Å. lines also show only slight broadening under extreme conditions. J. W. S.

Nuclear moments of the antimony isotopes. S. TOLANSKY (Nature, 1934, 133, 531—532; cf. A., 1933, 2).—Greater resolution of the lines of the Sb II spectrum shows that the nuclear mechanical spins of both Sb¹²¹ and Sb¹²³ are 5/2, but the nuclear magnetic moments are in the ratio 1.36:1, Sb¹²¹ having the greater val. L. S. T.

Tellurium arc spectrum. O. BARTELT (Z. Physik, 1934, 88, 522–531). A. B. D. C.

Ultra-violet resonance spectrum of iodine molecules. K. ASAGOE (Sci. Rep. Tokyo Bunrika Daigaku, 1934, A. 2, 9—16).—Data are tabulated for lines or groups of lines in the range $\lambda\lambda$ 2360—1850, with I vapour weakly excited with a small transformer; they may be explained on the excitation of I₂ mols. by a resonance line of I at λ 1830·4, or by collision of the second kind with excited I atoms in the ${}^{4}P_{5/2}$ state. N. M. B.

Depolarisation of the fluorescence of iodine vapour by collision with helium atoms. S. MROZOWSKI (Bull. Acad. Polonaise, 1933, A, 346— 358).—The fluorescence of I vapour has been investigated in the presence of He at 0—20 mm. pressure. The results are discussed. J. W. S.

Mean life of a spectroscopic term and width of spectral lines. I. I. AGARBICEANU (Compt. rend., 1934, 198, 1484—1486). B. W. B.

New form of discharge in mercury vapour. H. BECK (Physikal. Z., 1934, 35, 338-340).—In certain discharge tubes, with cathodes of Fe or Ni, the discharge in Hg vapour gave a no. of symmetrically placed "pearls" of light on the cathode. These are not due to impurities in the cathode. The conditions for obtaining this form of discharge are described. Liquid Hg must be present. A. J. M.

Dependence of the form of the 2537 A. mercury line on the direction of observation of the resonance radiation. (MISS) M. MORACZEWSKA (Bull. Acad. Polonaise, 1934, A, 18-21).—The intensity distribution in the resonance line (I) depends on that in the exciting line when (I) is viewed parallel to the direction of the exciting light, but is independent of the exciting line when viewed at right angles.

H. J. E.

Resonance line 2537 and intensity increase of the mercury triplets in the presence of highly dried hydrogen. H. SCHNITGER (Z. Physik, 1934, 88, 353-354).—Collisions of the second kind of H₂ are particularly efficient in changing $2^{3}P_{1}$ to $2^{3}P_{0}$ Hg. A. B. D. C.

Intensity of the Hg spectral lines emitted from a quartz mercury-vapour lamp in the near infrared region. M. SHODA (Japan. J. Physics, 1934, 9, 27-33; cf. *ibid.*, 1933, 8, 91).—The linear proportionality between log. intensity per unit current and log. (terminal voltage—min. voltage of Hg lamp) holds for the near infra-red regions. Complicated relationships may exist between the proportionality factor and the wave-length. J. W. S.

Proof of the axiality of light emission from the Lyman line 1025 Å. R. FRERICHS and H. BOMKE (Physikal. Z., 1934, 35, 349–350). A. J. M.

Long-wave infra-red radiation of high-frequency sparks. A. M. LEVITSKI (Physikal. Z., 1934, 35, 361—367).—The relative energy of metal particles in the spark was measured, and the temp. of the spark calc. The energy of the long-wave infrared radiation was also measured under the same conditions. The infra-red rays are mainly radiated from the neighbourhood of the electrodes. It is not temp., but removal of electrons from the electrodes, which is the more important factor in the radiation of infra-red rays from high-frequency sparks. A. J. M.

"Mottled hydrogen." A. GÜNTHER-SCHULZE (Z. Physik, 1934, 88, 273—274).—A reply to Gerlach (this vol., 237). A. B. D. C.

Night-sky auroral green radiation. H. GARRI-GUE (Compt. rend., 1934, 198, 1398—1400).—The intensity variations of the non-polar line 5577 Å. (I) compared with the results of Cabannes and Dufay (this vol., 232) for the blue 4420 Å. line (II) indicated that the source of (I) was at a lower altitude than that of (II). (Cf. A., 1928, 1165.) B. W. B.

Dirac vector model in complex spectra. J. H. VAN VLECK (Physical Rev., 1934, [ii], 45, 405– 419).—Mathematical. The use of the Dirac model in place of Slater's determinantal wave functions for calculations of at. spectral terms and in mol. spectra is examined. N. M. B.

Theory of stepped grating. G. WOLFSOHN and J. A. VREESWIJK, jun. (Physica, 1934, 1, 333-342). H. J. E.

Widths of X-ray lines from alloy targets. L. G. PARRATT (Physical Rev., 1934, [ii], 45, 364– 369).—Ionisation curves of the $K\alpha$ doublet from targets of alloys of Ni, Fe, Mn, Cr, and Ti show that line widths depend on the physical or chemical state of the target. Widths for element A alloyed with B may be > or < for pure A. N. M. B.

Form of the X-ray emission bands of metals. H. JONES, N. F. MOTT, and H. W. B. SKINNER (Physical Rev., 1934, [ii], 45, 379-384).-Mathematical. Variations in the optical transition probabilities for transitions from the conduction to the Kand L levels are examined. An explanation of the form of the X-ray emission bands (see O'Bryan and Skinner, below) is given. N. M. B.

Measurements of K absorption limits for the elements 37 Rb to 50 Sn. E. C. INGELSTAM and B. B. RAY (Z. Physik, 1934, 88, 218-225).

A. B. D. C.

Yield of fluorescence X-rays from the K shells of thirteen elements. D. K. BERKEY (Physical Rev., 1934, [ii], 45, 437-440).—Measurements by the Compton ionisation method for the fluorescence yield are given for Co, Ni, Cu, Zn, As, Se, Sr, Mo, Ag, Cd, Sn, Sb, and Te, and show a max. of 0.79 for Mo, falling rapidly for the heavier elements.

N. M. B.

Faint lines in the L spectrum of the elements 73 Ta to 90 Th. I. S. KAUFMAN (Physical Rev., 1934, [ii], 45, 385–388).—Data for weak diagram and satellite lines in the region of the $L\beta_2$ and $L\gamma_1$ lines of the X-ray spectra are tabulated. N. M. B.

Characteristic X-rays from metals in the extreme ultra-violet. H. M. O'BRYAN and H. W. B. SKINNER (Physical Rev., 1934, [ii], 45, 370—378).— Identifications and transitions for soft X-ray bands in the region 50—500 Å. from Li, Be, C, Na, Mg, Al, Si, and Ba targets are obtained from photometric curves. The energy spread of the bands is calc. from the Sommerfeld theory of metals, and leads to a unique determination of the no. of conduction electrons per atom in a metal. N. M. B.

Inner conversion in X-ray spectra. H. M. TAYLOR and E. H. S. BURHOP (Nature, 1934, 133, 531).—A criticism (cf. this vol., 341). L. S. T.

Continuous X-ray spectrum from a thin target. W. DUKELSKY (Nature, 1934, 133, 566— 567). L. S. T.

Double refraction of X-rays. H. SEEMANN (Physikal. Z., 1934, 35, 329—336).—A comprehensive experimental investigation is described. A. J. M.

Filter method for determination of the width of the Compton lines for scattering at solids and gases. E. O. WOLLAN (Physikal. Z., 1934, 35, 353— 360).—The method uses three absorption filters, enabling the intensity of the Compton lines for scattering at solids and gases to be determined. The latter gives a measure of the electron velocity distribution in free atoms and mols. A. J. M.

Klein-Nishina formula for X-ray scattering in the wave-length region 15–20 Å. J. READ and C. C. LAURITSEN (Physical Rev., 1934, [ii], 45, 433– 436).—Measurements of the absorption coeff. per electron in C and Al of X-ray beams indicate that the Klein-Nishina formula for the scattering coeff. per electron is accurate to 1%. N. M. B.

Scattering of X-rays by carbon. P. C. MUKHER-JEE (Z. Physik, 1934, 88, 247–250).—Scattering by C obtained from combustion of C_6H_6 , camphor, and animal charcoal showed central scattering which is attributed to small C particles; these particles have a lattice const. 3.61 Å. compared with 3.41 Å. for graphite. A. B. D. C.

Probability of double jumps in X-ray spectra. E. G. RAMBERG (Physical Rev., 1934, [ii], 45, 389— 391).—Mathematical. N. M. B.

Compensation of electronic energy and energy of repulsion in the molecule of hydrogen. J. SAVARD (Compt. rend., 1934, 198, 1480—1482).— The relation between energy of formation and ionisation potential previously derived (cf. A., 1933, 993; this vol., 11, 347) is applied and confirmed in the case of H_2 . B. W. B.

Doppler displacements in the spectrum of hydrogen canal rays. (MISS) A. J. MCPHERSON (Physical Rev., 1934, [ii], 45, 485–487; cf. this vol., 1).—H canal rays of uniform energy were obtained by accelerating the H ions formed in a low-voltage are through a short electric field. The spectrum was observed at H_s and H_y , in the direction of motion, and the Doppler displacements of the lines H_{31} , H_{21} , H_1 from atoms accelerated as H_3^+ , H_2^+ , and H_1^+ agree with calc. vals. in the range 7000—17,000 volts. A min. velocity for excitation of radiation in the neutral H atom moving in H_2 was found at about 40 volts. A He–H₂ mixture showed only the H_{21} , H_1 Doppler lines. N. M. B.

Diffraction of electrons in the halogens. F. L. ARNOT (Proc. Roy. Soc., 1934, A, 144, 360– 377).—The angular distributions of the elastically scattered electrons in the vapours of I, Br, CHBr₃, and CCl_4 have been measured for several energies of the incident electron beam. All the curves show diffraction effects. Those for Br and CHBr₃ are similar, indicating that the scattering by CHBr₃ is mainly due to the Br atoms. The curves for I, Br, and CCl_4 are similar to those previously obtained for Xe, Kr, and A, respectively (A., 1931, 1347).

L. L. B. Polarisation of electrons by free atoms. E. RUPP (Z. Physik, 1934, 88, 242-246).—Electrons of 20-160 kv. were scattered twice through 90° by Tl vapour, and showed polarisation.

A. B. D. C. Scattering of slow electron beams by graphite. M. KOHLER and M. VON LAUE (Naturwiss., 1934, 22, 238).—For X-ray interference the odd orders are forbidden, but this is not so for beams of slow electrons according to the dynamic theory of electron interference. The scattering of slow electrons at single crystals of graphite is taken as an example (A., 1933, 1222). A. J. M.

Continuous electron radiation in gas discharges. W. FINKELNBURG (Z. Physik, 1934, 88, 297—310).—The continuous spectrum of high electron density discharges is radiation of electrons in the field of ions. A. B. D. C.

Recoil of radiation scattered by free electrons. I. WALLER (Z. Physik, 1934, 88, 436-448).— Theoretical. A. B. D. C.

Velocity distribution of diffusing electrons. F. BLANK (Z. Physik, 1934, 88, 532-535).—The velocity distribution was measured for electrons moving through He in a homogeneous electric field. A. B. D. C.

Negative-energy electrons. Y. NISHINA and S. Томолада (Japan. J. Physics, 1934, 9, 35—40).— Theoretical. J. W. S.

Magnetic electron and the correspondence principle of T. de Donder and J. M. Whittaker. J. GÉHÉNIAU (Compt. rend., 1934, 198, 1580-1582).—Mathematical.

Wave-statistical theory of electron spin. K. C. KAR and K. K. MUKHERJEE (Phil. Mag., 1934, [vii], 17, 993-1003).—Mathematical.

New source of positive electrons. D. SKOBELT-ZYN and E. STEPANOWA (Nature, 1934, 133, 565, 646).—A weak Ra source (Ra salt) placed within a Wilson chamber in a magnetic field emits a considerable no. of positive electrons in addition to the β -particles of the natural spectrum. The observed distribution of velocities is 100-300, 300-600, 600-900 kv., 8, 16, and 6 positrons (I), respectively. The calc. no. of emitted (I) is < 0.02-0.04 for each disintegrating atom of Ra-C. It is improbable that the observed (I) are due to the internal conversion of y-rays, and a new mechanism, presumably connected with β -disintegration, appears to be involved in their production. Later experiments show that a large part of (I) is due to the action of the β -rays on the glass wall surrounding the radioactive source.

L. S. T.

At. wt. of uranium lead from Great Bear Lake, N.W.T., Canada, pitchblende. J. P. MARBLE (J. Amer. Chem. Soc., 1934, 56, 854–856).—The val. obtained is 206.054. E. S. H.

New isotope of argon. P. ZEEMAN and J. DE GIER (Proc. K. Akad. Wetensch. Amsterdam, 1934, 37, 127—129; cf. A., 1933, 1099).—Positive-ray analysis of A shows a weak line at 38 which varies in intensity proportionally to the A 36 and 40 lines when other gases are added. Its prolongation towards the axis also suggests that it belongs to an inert gas. It is concluded that A³⁸ exists.

J. W. S.

Calcium isotope with mass 41 and the radioactive half-period of potassium. J. KENDALL, W. W. SMITH, and T. TAIT (Nature, 1934, 133, 613-614).—A correction (cf. A., 1933, 658). The calc. half-period of K⁴¹ is of the order 1×10^{11} years. L. S. T.

Classification of atomic masses. A. JAQUEROD (Compt. rend., 1934, 198, 1478—1480).—At. nuclei are regarded as built of H atoms, and the packing divergences of isotope masses from the products mass no. \times at. wt. of H are plotted against mass no. With few exceptions, the isotopes of all elements fall successively on three straight lines in the groups Li to Zn, Zn to Xe, and Xe to U. The results are applied to calculate the isotopic ratios of K, Ca, and Cu. B. W. B.

Action of cathode rays on mixtures. G. VON HEVESY and A. FAESSLER (Z. Physik, 1934, 88, 336—341).—Radioactive indicators were used to study evaporation of PbO and Rb₂SO₄ under bombardment of cathode rays. A. B. D. C. Origin of the actinium series of radioactive elements. II. A. V. GROSSE (J. Physical Chem., 1934, 38, 487-494).—Aston's recent measurements (A., 1933, 762) of the mass spectra of radiogenic Pb are shown to support the actino-U theory (A., 1933, 110). Other theories contradict well-known radiaactive data. The anomaly of the Great Bear Lake pitchblende is explained as due to alteration.

M. S. B.

Radioactivity of neodymium and samarium and of mixtures containing both. L. ROLLA and L. MAZZA (Atti R. Accad. Lincei, 1933, [vi], 18, 472-478).-The discrepancies in the lit. relating to the radioactivity (I) of Nd and Sm are discussed, and measurements of (I) of the oxides prepared from various fractions, obtained by different methods of separation, of a mixture containing Pr, Nd, Sm, and Gd are described. All the specimens of Sm_2O_3 exhibited approx. the same (I), irrespective of the method of prep., whilst Nd2O3 exhibited a small and variable (I), due probably to the presence of an extraneous metal; the vals. observed for mixtures of Sm_2O_3 and Nd_2O_3 were intermediate between those of the separate oxides. Pr_6O_{11} was completely inert. The existence of a radioactive element 61 is H. F. G. improbable.

Radioactive series and the classification of light elements. G. PETIAU (Compt. rend., 1934, 198, 1320—1323).—By considering transmutation of the light elements (Z=3-15) series analogous to the three radioactive series are deduced. From the position corresponding with the Ac series a fork in the latter series leading to elements 85 and 87 is thought to exist. A scheme of formation of the light elements is put forward, which permits the formulation of the laws of artificial transformations by means of α -rays. W. R. A.

Optimum frequency of collection of radium emanation. H. TELLEZ-PLASENCIA (Anal. Fis. Quím., 1933, 31, 510—512).—The degree of efficiency F with which use is made of a source of Rn for radiotherapy varies as the total quantity emitted by the source during a given period and to the quantity collected at periodic intervals throughout the period. F passes through a max. when plotted against the length t of the intervals at which the Rn is collected; the calc. max occurs at approx. t=7 days.

H. F. G.

Distribution of radium-A, -B, and -C between the gas phase and the walls in a mixture of radon and ammonia. A. LUYCKX (Bull. Soc. chim. Belg., 1934, 43, 179—188).—A bulb with a mica window was filled with Rn–NH₃ mixture, and the α -ray activities of Ra-A, -B, and -C were measured. Covering the mica with a mica screen stopped rays from the gas phase, but the ZnS scintillations were only slightly reduced, showing that the Ra-B and -C were almost entirely (> 97%) on the wall (*i.e.*, the mica window). By calculation about 50% Ra-A remains in the gas (cf. this vol., 470). D. R. D.

Decay constant of radium-C'. J. C. JACOBSEN (Nature, 1934, 133, 565–566).—Using Geiger counters the half-period of Ra-C' has been determined to be of the order 2×10^{-4} sec. L. S. T. Calculation of the ionisation produced by radon in a spherical volume. P. C. CAPRON (Bull. Soc. chim. Belg., 1934, 43, 25-34).—Theoretical.

H. F. G.

Energies of α - and γ -rays. H. A. WILSON (Proc. Roy. Soc., 1934, A, 144, 280—285).—The energies of disintegration of the radioactive atoms, cale. from the α -ray energies, may be arranged in pairs of which the sums are multiples of 3.8504×10^5 electron volts. This const. probably represents some general at. quality. L. B.

Absorption of α -rays. G. MANO (Ann. Physique, 1934, [xi], 1, 407—531).—Experimental and theoretical data on the absorption of α -rays by matter are surveyed. The retardation of α -rays in gases is investigated for air, H₂, He, Ne, and A. Results are compared with the theory based on wave mechanics. Experimental retardation curves agree with the Bethe–Bloch equation provided a suitable empirical val. is chosen for E, the term representing the mean excitation energy. Vals. of E for H₂ and He correspond with calc. vals., but are higher for heavier elements, and ∞ the at. no. N. M. B.

Complex radiation excited in light elements by α -particles. P. SAVEL (Compt. rend., 1934, 198, 1404—1407).—The method previously described (A., 1933, 659) was applied to Li, N₂, Na, and Mg excited by Po α -rays, N₂ being compressed into a brass box for examination. γ -Rays were emitted by all, and neutrons by all except N₂. Energies of emitted particles and requisite excitation energies are tabulated. It is suggested that nuclear excitation of Li and N occurred without capture of α -particles or transmutation (process I), γ -ray emission following, and that the excitations of Na and Mg were similar to Curie and Joliot's new type (this vol., 234), the latter being attributed to process I, followed by nuclear transmutation with emission of proton or neutron and γ -rays. B. W. B.

Theory of β -rays. I. E. FERMI (Z. Physik, 1934, 88, 161—177).—Assuming the presence of neutrinos (particles of mass \Rightarrow that of an electron, but without charge), the emission of these and β -rays is treated quantitatively by a method similar to light emission by an excited atom. A. B. D. C.

 γ -Rays on bombardment of boron with protons. L. KURTSCHATOV, G. SCHTSCHEPKIN, A. VIBE, and V. BERNASCHEVSKI (Compt. rend. Acad. Sci. U.R.S.S., 1934, 1, 486—489).— γ -Rays are produced simultaneously with α -particles when B is bombarded with protons, and measurements with a screened Geiger-Müller counter indicate that every disintegration is accompanied by the emission of 1 γ -quantum of energy 2×10^6 e.v. This is in agreement with the results of Rutherford and Oliphant (A., 1933, 883).

J. W. S. γ -Radiation of radium; number of emitted quanta; internal absorption. E. STAHEL and W. JOHNER (J. Phys. Radium., 1934, [vii], 5, 97— 103).—Using an ionisation chamber filled with MeI, measurements show the emission of 1.18 quanta of γ -radiation, and 0.35 quantum of characteristic K radiation excited by internal absorption of γ -rays per 100 atoms of Ra decomposed. The coeff. of absorption of γ -rays of wave-length 0.065 Å. in Pt is 21 cm.⁻¹ N. M. B.

Induced radioactivity of the lighter elements. C. D. ELLIS and W. J. HENDERSON (Nature, 1934, 133, 530-531).-Induced radioactivity in Al, B, and Mg (this vol., 470) has been confirmed and extended. With Ra-C' a-particles reduced to 6.1 cm. range, the relative yields of positrons (I) during the entire decay from Al, B, and Mg are approx. 30, 10, and 7, respectively, and since the periods are $3\frac{1}{4}$, 14, and $2\frac{1}{4}$ min. the initial effects are in the ratio 6:0.5:2. With all materials there is an effect, due to an impurity always present, with a period of approx. 1 min. and of initial activity comparable with that of B. The probability of a 7×10^6 volt α -particle producing a radio-P atom by impact on Al is approx. 1 in 5×10^6 . The yield of (I) increases 15 times as the energy of the α -particle increases from 5.5 to 7×10^6 volts. With Th-C' α -particles measurements have been extended to 8.3×10^6 volts when the probability of excitation appears to be reaching a max. Results support the view that an α -particle colliding with an Al nucleus has a certain chance of being captured, and from this arises a phenomenon analogous to radioactive branching, the alternatives being the immediate emission of either a proton or a neutron. The latter emission produces the radioactive isotope of P which emits (I). The branching ratio is of the apparent order of 50 to 1 in favour of proton emission. There are few, if any, (I) of low energy from Al, and (I) over the range 1 to $2\frac{1}{2} \times 10^6$ volts have been detected. Some γ -radiation appears to arise from the annihilation of L. S. T. (1).

Artificial radioelement from nitrogen. L. WERTENSTEIN (Nature, 1933, 134, 564–565).—After bombardment with α -rays (I) from Rn, Pt, Ag, Pb, Ca, and Ni show an activity decaying exponentially with a half-period of 1.2 min. The effect disappeared when the range of (I) was reduced by a few mm. of air. The effect is due to the recoil of a new radioelement produced by (I), and since it occurs only in N₂ and not in a vac., or in H₂ or O₂, it consists in a transmutation of N₂ of the Joliot type, the probable reactions being $_7N^{14}+_2\alpha^4=_9F^{17}+_0n$ and $_9F^{17}=_8O^{17}+_9o$

L. S. T.

Artificial production of radioactive substances. C. C. LAURITSEN, H. R. CRANE, and W. W. HARPER (Science, 1934, 79, 234-235).-After deuton bombardment (I) of targets of LiF, Be, H3BO3, C, Mg, and Al examination by a Geiger counter revealed a large no. of counts during the first few min. after (I). Cgave the largest effect with a half-life period of approx. 10 min., and B slightly less with a half-life period of approx. 20 min. The other substances gave appreciable effects, which may, however, be due to C con-tamination of the target surface. Expansion photographs showed that the activity consisted mainly of positrons and some γ -rays. The decay period and the max. energy of the positive electrons from C indicate that the active isotope in this case is the same as in the case of B bombarded by α -particles (this vol., 234), viz., N¹³. When C is bombarded by deutons, > 1% of the transformations give the radioactive N^{13} as a product, whilst the remainder give C^{13} . L. S. T.

Disintegration of the diplon. P. I. DEE (Nature, 1934, 133, 564).—The disintegration particles resulting from the bombardment (I) of "heavy" $(NH_4)_2SO_4$ with diplons show opposite pairs of tracks of approx. 14·3 cm. and 1·6 cm. range, the shorter track being due to $H^3: {}_1H^2+{}_1H^2-{}_1H^1+{}_1H^3$ (cf. this vol., 471). The neutrons emitted by (I) appear to constitute an approx. homogeneous group of max. energy of approx. $1\cdot8\times10^6$ volts, a val. in fair agreement with the reaction ${}_1H^2+{}_1H^2-{}_2He^3+{}_0n^1$ (loc. cit.). L. S. T.

Magnetic moment of the neutron. I. TAMM and S. ALTSCHULER (Compt. rend. Acad. Sci. U.R.S.S., 1934, 1, 455-460).—From the hyperfine structure of at. spectra it is concluded that the most probable val. of the magnetic moment of the neutron is $-\frac{1}{2}$ nuclear magneton (cf. A., 1933, 767). J. W. S.

"Neutrino." H. BETHE and R. PEIERLS (Nature, 1934, 133, 532).—A discussion. L. S. T.

Proton emission of aluminium bombarded by highest energy α -rays. O. HAXEL (Z. Physik, 1934, 88, 346—352).—Four proton groups were observed, their range decreasing with the α -ray range. The results indicate presence of excited Si nuclei.

A. B. D. C.

Path of a secondary cosmic-ray charged particle in the earth's magnetic field. I. S. BOWEN (Physical Rev., 1934, [ii], 45, 349—351).— Conclusions on decrease in ionisation in equatorial regions and on east-west dissymmetry of Geiger tube counts are reached from an analysis of secondary cosmic-ray paths. N. M. B.

Mechanism of cosmic-ray counter action. C. D. ANDERSON, R. A. MILLIKAN, S. NEDDERMEYER, and W. PICKERING (Physical Rev., 1934, [ii], 45, 352-363).—Conclusions are reached from a study of photographs obtained with Geiger-counter-controlled exposures. N. M. B.

Cosmic-ray ionisation at high altitudes. A. H. COMPTON and R. J. STEPHENSON (Physical Rev., 1934, [ii], 45, 441-450).—A criterion for the nature of cosmic rays in terms of atm. pressure and ray intensity. Graphical analysis of records made in a stratosphere balloon show the presence of two range groups corresponding with protons or possibly positrons and with neutral rays or rays having a large e/m ratio. Photons cannot constitute > a negligible part of primary cosmic rays. N. M. B.

Highly filtered cosmic rays. W. KOLHÖRSTER (Z. Physik, 1934, 88, 536—549).—Absorption coeffs. were measured for radiation filtered through the equiv. of 500 m. of H_2O . A. B. D. C.

Simple method for the determination of the spin and statistics of the deuton. T. SEXL (Naturwiss., 1934, 22, 205).—A generalisation of Mott's. theorem (A., 1930, 974) enables the spin and statistics of the deuton and other nuclei to be determined (cf. A., 1933, 955). A. J. M.

Experimental proof of the spin maintenance law. R. DÖPEL, K. GAILER, and E. WIGNER (Physikal. Z., 1934, 35, 336—337).—Many experiments, mainly concerned with ortho- and para- H_2 , are quoted, supporting the spin maintenance law. Strict accuracy of the law is not to be expected for Hg. A. J. M.

Waves and photons. II. Pauli's approximation. A. PROCA (J. Phys. Radium, 1934, [vii], 5, 121-125).—Mathematical. As a first approximaton of the mechanics previously initiated (cf. this vol., 344) the photon is described by a wave function of two components only. Results satisfy Maxwell's equations and indicate that a photon corresponds with circularly polarised light. Negative energy of a particle is interpreted as an indication of sense of rotation of certain fields which are associated with the particle, and, for a light corpuscle, correspond with the Maxwell electromagnetic fields. N. M. B.

Extension of the Dirac vector model to include several configurations. R. SERBER (Physical Rev., 1934, [ii], 45, 461-467).—Mathematical.

N. M. B. Magnetic moments of atomic nuclei. H. KALLMANN and H. SCHÜLER (Z. Physik, 1934, 88, 210—213).—Magnetic moments of nuclei built of α -particles, even nos. of neutrons, and odd nos. of protons are accounted for. A. B. D. C.

Representation of nuclear moments of atoms by nuclear vectors. H. SCHÜLER (Z. Physik, 1934, 88, 323—335).—All known nuclear magnetic moments can be given by five vectors representing respectively the angular momentum of the nuclear core consisting of α -particles and an even no. of neutrons, the spin and orbital angular momentum of neutrons and of protons. The nuclei fall into two classes : those with α -particles, an even no. of neutrons, and a proton, and those with α -particles and an odd no. of neutrons.

A. B. D. C.

Value of e/m. R. T. BIRGE (Nature, 1934, 133, 648). L. S. T.

Resemblance in the form of excitation functions. L. S. ORNSTEIN and J. A. SMIT (Physica, 1934, 1, 455–464).—Theoretical. Data for He, Hg, and Na are discussed. H. J. E.

Mitogenetic radiation.—See this vol., 555.

Atmospheric O¹⁶O¹⁸ bands in the solar spectrum. D. I. EROPKIN and V. N. KONDRATEEV (Compt. rend. Acad. Sci. U.R.S.S., 1934, 1, 445– 449).—The atm. absorption spectra has been studied over the region 6930—6880 Å. with the sun 3° above the horizon. From the relative intensities of the *B* and *B'* O₂ bands, the ratio O¹⁶: O¹⁸ is calc. as 595:1 (cf. A., 1931, 539). J. W. S.

Absorption spectrum of oxygen in the far ultra-violet. D. CHALONGE and E. VASSY (Compt. rend., 1934, 198, 1318—1320).—The H-tube spectrum was photographed at distances from 400 to 600 m. at Lauterbrunnen and Jungfraujoch. The continuous spectrum predicted by Herzberg was observed. The convergence limit was determined by Birge's method, and the dissociation potential calc. as 5.09 volts. W. R. A.

Ultra-violet absorption bands of oxygen (Schumann-Runge bands). J. CURRY and G. HERZBERG (Ann. Physik, 1934, [v], 19, 800—808).— The Schumann bands of O_2 were investigated using high dispersion. The oscillation quanta of the ground state deviate considerably from the linear curve.

A. J. M.

Ultra-violet absorption of oxygen and of ozone. N. T. ZE and C. S. PIAW (Naturwiss., 1934, 22, 237).—There is similarity between the ultra-violet absorption bands of O_2 under pressure, determined by Finkelnburg and Steiner (A., 1933, 5), and the absorption bands of O_3 (A., 1927, 607; 1932, 869; 1933, 444). The absorption bands of compressed O_2 occur in triplets; for each triplet there is a single corresponding O_3 band, of which the wave-length coincides with the middle band of the O_2 triplet.

A. J. M.

Existence of O_4 in liquid oxygen. GUILLIEN (Compt. rend., 1934, 198, 1486—1488).—A const. mass of liquid O_2 was diluted up to 17.7 times with liquid N_2 (cf. Liveing and Dewar, A., 1895, ii, 471) and changes (I) in absorption band intensities were measured. The infra-red and red bands (due to O_2), $\lambda > 6500$, became narrower and diminished in intensity towards a finite limit on dilution. The ultra-violet and visible bands (II), $\lambda < 6500$, diminished in intensity without change of width and are attributed to O_4 , which gives quant. agreement with (I), and corresponds with a slight displacement observed in the calc. $\lambda\lambda$ of (II). The proportion of O_4 in liquid O_2 was 51% (cf. Lewis, A., 1924, ii, 811).

B. W. B. ${}^{1}\Pi \longrightarrow {}^{1}\Delta$ band of NH and the corresponding ND bands. G. H. DIEKE and R. W. BLUE (Physical Rev., 1934, [ii], 45, 395—400; cf. Pearse, this vol., 129).—A comparison and analysis of the NH¹ 3240 Å. band and the corresponding NH² 3235 Å. band are given. The zero lines are 30755.61 and 30849.00, respectively; the shift is due to the zero-point vibrational energy of half a quantum. The Adoubling in the NH² is < in the NH¹ band by a factor 3.511. N. M. B.

Band spectrum of PN and its significance. W. JEVONS (Nature, 1934, 133, 619-620). L. S. T.

Ultra-violet hand system of AsN. J. W. T. SPINKS (Z. Physik, 1934, 88, 511-514).

A. B. D. C.

Band spectrum of aluminium chloride. P. C. MAHANTI (Z. Physik, 1934, 88, 550-558).—The dissociation energy of the lower state of AlCl is 3.76 volts. A. B. D. C.

Ultra-violet absorption spectrum of carbon suboxide gas. R. M. BADGER and R. C. BARTON (Proc. Nat. Acad. Sci., 1934, 20, 166–169).—Data for eighteen bands, and curves showing max., were obtained in the range $\lambda\lambda$ 3200–2500, approx. A continuum with a max. at about λ 2600 overlies the bands. The calc. separation of the rotation lines is 0 013 Å., approx. N. M. B. Influence of pressure on the flame spectra of hydrogen and carbon monoxide. W. A. BONE and F. G. LAMONT (Proc. Roy. Soc., 1934, A, 144, 250-256).—Using an apparatus for the maintenance of continuous flames of combustible gases in air or O_2 at high pressures, a study has been made of the effect of increasing pressure up to 100 atm. on the flame spectra of H₂ and CO and a series of CO+H₂ mixtures, burning in O₂. Although in some of the spectrograms of CO+H₂ flames at atm. pressure the banded spectrum of burning CO underlying its continuous spectrum is faintly discernible, in those obtained at higher pressures it is swamped by the intensity of the continuous spectrum. L. B.

Electron-isomerism of organic compounds with multiple linkings. A. BURAWOY (Z. wiss. Phot., 1934, 32, 289—294; cf. A., 1932, 791; 1933, 228).—The author's previous work indicates that the chromophores corresponding with the different absorption bands of a compound are formed in electron-isomeric mols., and that the R and Kbands correspond with a double linking in a biradical compound and conjugated system, respectively. Intensities of bands are discussed, with regard to the determination of configurations. J. L.

Absorption curves for potassium chloride and bromide on the short-wave side of their infra-red frequencies. A. MENTZEL (Z. Physik, 1934, 88, 178—196).—The transmission of KCl was observed between 20 and 45 μ , and of KBr between 16 and 53 μ . The observed extinction coeffs. decreased more rapidly with decreasing wave-length than the dispersion theory predicts; these coeffs. for KCl, KBr, and NaCl plotted against λ/λ_0 , where λ_0 is the characteristic frequency, all fall rapidly after $\lambda/\lambda_0=0.25$. Subsidiary max. were observed at 42.5, 41, and 33 μ for KCl, at 35 μ for KBr, and at 34 μ for NaCl.

A. B. D. C. Ultra-violet absorption of [solid and dissolved] sodium chloride. R. TREHIN (Compt. rend., 1934, 198, 1492—1494; cf. A., 1932, 107).—The optical density (I) of rock-salt was > that of its aq. solution and the latter was > that of pure NaCl solution. For an equal concn., (I) was > in glycerol than in aq. solution. B. W. B.

Kinetics of additive colouring of alkali halides. I. S. ARZYBYSCHEV (Z. Physik, 1934, 88, 260-264). —The colouring is due to electrons from halide ions that have passed into the liquid metal; this gives levels sufficiently high for the electrons to pass into the conductivity band of the crystal. A. B. D. C.

Absorption spectra of cobalt halide solutions. R. J. MACWALTER and S. BARRATT (J.C.S., 1934, 517-524).—The visible absorption spectrum of CoCl₂ in H₂O at conens. up to saturation at 100°, and in aq. HCl, EtOH, and C_5H_5N , and that of CoBr₂ and CoF₂ has been measured. In red Co solutions the band at 5100 Å. is attributed to Co^{*}. In the blue solutions a complex band is observed at wave-lengths increasing with the wt. of the anion, attributed to complex anions. The relative amounts of the red and blue forms have been calc. Solutions of $CoCl_2$ in C_5H_5N are anomalous in the position of the band and the effect of H_2O . H. J. E.

Spectra and photochemical decomposition of metallic carbonyls. I. Spectral data. H. W. THOMISON and A. P. GARRATT (J.C.S., 1934, 524— 528).—Ni(CO)₄ (I) vapour (at p=1-200 mm.) and Fe(CO)₅ (II) vapour (at p=1-15 mm.) gave continuous absorption only, commencing at 3950, 4100 Å., respectively. That of (I) in C₆H₁₄ or CCl₄ solution was the same. (II) in the same solvents gave a continuum at $\lambda < 5500$ Å., attributed to Fe₂(CO)₉ present as an impurity. The photo-dissociation mechanisms operative in the region of continuous absorption are (I)+ $\hbar\nu \longrightarrow$ Ni(CO)₃+CO, Ni(CO)₃ \longrightarrow Ni+3CO : (II)+ $\hbar\nu \longrightarrow$ Fe(CO)₄+CO; Fe(CO)₄+(II) \longrightarrow Fe₂(CO)₉. H. J. E.

Photochemistry and absorption spectrum of acetone. E. J. BOWEN and H. W. THOMPSON (Nature, 1934, 133, 571).—The absorption spectrum of COMe₂ has been examined using pressures from 0.5 to 200 mm. in columns up to 1 m. long. At pressures > a few mm. a region of continuous absorption extends from approx. 3200 to 2400 Å. with a max. at approx. 2800 Å. At lower pressures this splits up into four groups, with centres at approx. 3150, 2900, 2710, and 2570 Å., each containing approx. 25 diffuse bands. The bands are 2.5 Å. wide with a uniform separation of approx. 4Å. With increasing pressure the bands widen and the groups extend to give a continuous spectrum. This type of spectrum is similar to that found in other Y-shaped mols. The diffuseness of the bands can be attributed to an unresolved close packing of the rotation lines; there is no need to assume a process of pre-dissociation involving the splitting of C·H or C·C. L. S. T.

Absorption of ultra-violet light by some organic substances. XXXI. W. GABRYELSKI and L. MARCHLEWSKI. XXXII. L. MARCHLEWSKI and W. URBANCZYK (Bull. Acad. Polonaise, 1933, A, 397–408, 409–415; cf. A., 1933, 661).—XXXI. The absorption spectra of glucose, galactose, and maltose in 0.002–0.5N aq. NaOH have been studied between 2100 and 3600 Å. Solutions above 0.002N show strong bands near 2690 and 3100 Å., which develop slowly in the case of dil. NaOH solutions, and disappear on neutralising. The change in absorption is attributed to the formation of the aldehydic forms of the carbohydrates, which require a $p_{\rm H} > 10$ for their production.

XXXII. Solutions of *l*-arabinose and rhamnose in aq. NaOH show similar results to hexoses.

J. W. S.

Absorption of ultra-violet light by some organic substances. XXXIII. L. MARCHLEWSKI and J. PIZŁO. XXXIV. W. GOSŁAWSKI and L. MARCHLEWSKI. XXXV and XXXVI. (MISS) G. HERTZÓWNA and L. MARCHLEWSKI (Bull. Acad. Polonaise, 1934, A, 22–41, 42–44, 45–59, 60–63).— XXXIII. Solutions of C_5H_5N in H_2O or EtOH gave similar absorption spectra with three max., whereas in CHCl₃ or Et₂O there was only one absorption max. Salts of C_5H_5N with HNO₃, H_2SO_4 , or HCl also gave only one max. Similar variations with solvent were found for quinoline, isoquinoline, NH_2Ph , and the toluidines.

XXXIV. The absorption spectrum of phloroglucinol (I) and its Me_3 ether in EtOH are similar, showing (I) to be present largely as $(OH)_3$ -compound and not in the keto-form.

XXXV. Absorption data for the following acids are recorded and discussed: phthalic, *iso*phthalic, terephthalic, *o*-benzoylbenzoic, phenyl-acetic and -propionic, benzoyl-, xyloyl-, mesitoyl-, and phenetoylacrylic, pyrogallolcarboxylic, gallic, carminic, and the Me esters of the first three.

XXXVI. In EtOH solution absorption max. occur for glucosazone at 3830, 2570 Å., for maltosazone at 3910, 2590 Å., for arabinosazone at 3835, 2560 Å., and for rhamnosazone at 3880, 2565 Å. H. J. E.

Ultra-violet absorption spectra of aromatic substances. II. A. HILLMER and P. SCHORNING (Z. physikal. Chem., 1934, 168, 81—106; cf. this vol., 345).—The change caused in the ultra-violet absorption spectra of C_6H_6 , PhOH, pyrocatechol, and their Me and methylene ethers by introduction of Pr^a or a side-chain containing a C.C linking, CO, OH, bridge 0, or several of these has been studied. The spectra of some polynuclear compounds have been determined. The effect of the solvent on the spectrum of the solute has been studied with a few solutes. R. C.

Ultra-violet absorption spectrum of aniline vapour. J. SAVARD (Bull. Soc. chim., 1933, [iv], 53, 1404—1408).—220 bands from 2980 to 2632 Å. have been measured, and are represented by equations. The energy of dissociation into NHPh and H is cale. to be -108 kg.-cal. The activated mol. exists in three electronic states. F. L. U.

Continuous absorption spectra of polyatomic molecules. IV. Y. HUKUMOTO (Sci. Rep. Tôhoku, 1934, 23, 62—75; cf. A., 1933, 336).—The continuous absorption spectra in the ultra-violet have been investigated for the following compounds : C_2H_2Br , $CH_2Cl\cdot CHCl_2$, C_2Cl_6 , MeCN, EtCN, $CH_2Cl\cdot CN$, AcCl, AcBr, EtCOCl, and PrSH. The relationship between the dissociation energy of the C-halogen linking and the structure of the mol. is discussed and the conclusions are compared with those deduced from Raman and infra-red spectral data. M. S. B.

Optical absorption of substituted benzenes. IV. Toluene halides and relations between band displacement and dipole moment. H. CONRAD-BILLROTH (Z. physikal. Chem., 1934, **B**, 25, 139– 150).—Absorption data for monohalogen derivatives of C_6H_6 and PhMe have been used to check the rule for the calculation of the position of the absorption bands of polysubstituted derivatives of C_6H_6 from the displacement, Q, of the band of the monosubstituted derivative relative to the spectrum of C_6H_6 (cf. A., 1933, 445). The rule fails for MeOBz and Me toluate and when \cdot CN and \cdot NC are present. The graph of \sqrt{Q} against the dipole moment for symmetrical substituents is a straight line not passing through the origin (cf. A., 1930, 136). R. C.

Absorption spectra of some hydrocarbons in the Schumann violet. E. P. CARR and H. STÜCK-LEN (Z. physikal. Chem., 1934, B, 25, 57-70).- Hexane, heptane, Δ^{α} -heptene, Δ^{α} -and Δ^{β} -pentene, and CMe₂:CHMe vapours exhibit a broad dissociation band at <1530 Å. The unsaturated compounds have a second dissociation band at 1740 Å. and groups of narrower bands nearer the red varying in position according to the position of the C:C linking in the mol. With C₆H₆ the first dissociation band is absent and the second displaced somewhat towards the red and resolved; there is also a group of intense narrow bands between 1720 and 1800 Å. representing a deformation vibration spectrum. R. C.

Optical absorption of some carbon compounds in the Schumann ultra-violet. G. SCHEIBE and H. GRIENEISEN (Z. physikal. Chem., 1934, B, 25, 52-56).—Measurements have been made with hydrocarbons, ketones, and ethers. R. C.

Absorption spectra of chlorophylls-a and -b at room and liquid nitrogen temperatures. F. P. ZSCHEILE, jun. (Nature, 1934, 133, 569).—Absorption max. of Et₂O solutions of chlorophyll-a and -b photographed at -196° are recorded and compared with those obtained by a spectro-photoelectric method (this vol., 272) at room temp. At -196° the bands are much narrower than at room temp. and their max. are shifted. L. S. T.

Absorption in the visible spectrum of solutions of litmus and red-cabbage colouring matter. I. G. POPESCU (Bul. Soc. Romane Fiz., 1934, 36, 1-10).—Absorption curves are given for neutral, acid, and alkaline aq. solutions, and for solutions in EtOH and in Et_2O . N. M. B.

Rotation-vibration spectrum of water vapour. W. WEIZEL (Z. Physik, 1934, 88, 214-217).—The dipole moment varies appreciably only for vibrations normal to the symmetry axis, a first approximation giving no variation with vibrations parallel to this axis; this explains the absence of certain bands from the spectrum. A. B. D. C.

Temperature radiation from glowing oxides and oxide mixtures in the infra-red. G. RITZOW (Ann. Physik, 1934, [v], 19, 769-799).-The emission from electrically heated oxides and oxide mixtures has been investigated in the region $1-10 \mu$, the dependence of the emission on wave-length, temp., nuclear size, and composition being determined. The emission of all white oxides (I) was relatively small, but const., at a given temp., between 1μ and 5μ , but increased rapidly above this wave-length. The emission of the coloured oxides (II), CeO₂ and Cr₂O₃, between 1μ and 7μ was considerably > from (I) at the same temp. and wave-length. For all oxides, the emission increased with rise of temp. For nuclear sizes between 20 and $0.5 \,\mu$, the emission decreased as the nuclear size decreased for all temp. and wavelengths. The addition of a small amount of (II) to (1) gives a mixture with a lower emission than either alone, but with larger amounts of (II) the emission is > that of (I). A. J. M.

Two types of diamond. (SIR) R. ROBERTSON, J. J. FOX, and A. E. MARTIN [with W. T. GORDON, B. ROBINSON, and G. P. THOMSON] (Phil. Trans., 1934, A, 232, 463-535).—Diamonds showing a laminar structure (I) differ in certain properties from ordinary diamonds (II). (II) have an infra-red absorption band at 8 µ and are opaque to ultraviolet light < 3000 Å., whilst (I) have no band at 8μ and are transparent up to 2250 Å. With (II) the conductivity induced by light is very small, high voltages having to be applied to detect a current, whilst (I) give an appreciable current without an applied voltage. (I) are activated by light of 2300 Å. and afterwards give a current in the dark and a large current when re-illuminated with light > 5000 Å. These activated diamonds are deactivated by light of 2400-5000 Å. X-Ray examination indicates that (I) have a mosaic structure; they are also more optically isotropic than (II), but the sp. gr., n, dielectric const., and Raman effect are the same for both types. It is considered that the difference between (I) and (II) is not due to impurities, but to different conditions resulting during their formation from the plastic state. H. S. P.

Application of Raman effect and infra-red absorption spectra to the distinction between the five isomeric hexanes. A. ANDANT, P. LAMBEET, and J. LECOMTE (Compt. rend., 1934, 198, 1316— 1317).—Raman and infra-red frequencies for the isomerides are tabulated. W. R. A.

Raman spectrum of heavy water. R. W. WOOD (Physical Rev., 1934, [ii], 45, 392–394; cf. this vol., 129).—Excitation of 18% heavy H₂O by λ 2536 of Hg gave the usual $\Delta \nu$ =3445 band and a new $\Delta \nu$ =2623 band probably due to H²OH¹. With 80% heavy H₂O the latter band was shifted slightly to shorter wave-lengths and was stronger than the former, which was shifted slightly towards the red. From the shift it is concluded that mols. containing only one H² atom give bands $\Delta \nu$ =2623 and 3500, whilst H₂O mols. give a single band $\Delta \nu$ =2517.

N. M. B.

Raman spectra of HCl in non-ionising solvents. W. WEST and P. ARTHUR (J. Chem. Physics, 1934, 2, 215-216).—Raman data, 2797-2860 cm.⁻¹, for 0·2 mol. fraction of HCl at -65° excited by Hg λ 4047 are given for solutions in SiCl₄, PCl₃, CHCl₃, HCl, liquid SO₂, EtBr, and AcCl, and frequency displacements are considered in relation with electric moments of the solvent and ionisation processes in HCl mols. N. M. B.

Raman effect in hydroxy-compounds. L. MEDARD (Compt. rend., 1934, 198, 1407—1409).— Purified specimens of H_2SO_4 , HNO₃, MeOH, EtOH, Pr^aOH, Pr^bOH, Bu^aOH, and Bu^vOH all gave wide bands of varying intensity from 3000 to 3600 Å., with max. between 3360 and 3440 Å., frequently asymmetrical, attributed to OH. B. W. B.

Raman effect and constitution of molecules. VI. Raman frequencies in CH_2Cl_2 and their polarisations. Polarisation of wings of Rayleigh lines. B. TRUMPY (Z. Physik, 1934, 88, 226–234).— New displacements were observed at 898 and 1060 cm.⁻¹ Observed polarisations agree with Placzek and Teller's theory. A. B. D. C.

Raman spectra of cyclopentene, cyclopentenyl alcohols, cyclopentanol, and 1-cyanocyclopentene. L. PIAUX (Compt. rend., 1934, 198, 14961499)—The Raman spectra of the above compounds were determined (cf. Godchot, A., 1933, 448), the alcohols being cyclopentenyl-substituted MeOH, EtOH, and PrOH. 1-Cyanocyclopentene, b.p. 58— 60°, was prepared by dehydration of cyclopentanonecyanohydrin with SOCl₂ and C_5H_5N . The effects of substitution and conjugation on the various frequencies are discussed. B. W. B.

Anomalies in the absorption spectrum of visual purple. S. HECHT and A. M. CHASE (Proc. Nat. Acad. Aci., 1934, 20, 238—243).—An initial increase of absorption occurs at the blue end of the spectrum during the bleaching, by light, of those extracts of visual purple which afford an intermediate yellow stage (I). During the bleaching of retinal extracts from spring and summer frogs only traces of (I) appear, whereas extracts from hibernating winter frogs have a pronounced (I). J. G. A. G.

Fluorescence excited by circularly polarised light of $\lambda = 3131$ Å. S. M. MITRA (Current Sci., 1934, 2, 347).—The fluorescence of dyes in glycerol is unpolarised. C. W. G.

Polarisation of the fluorescence of dyes as a function of the wave-length of the exciting light. A. JABLONSKI (Bull. Acad. Polonaise, 1934, A, 14—17).—The % polarisation of the fluorescent light from Cellophane impregnated with trypaflavine, euchrysine, rhoduline-yellow, or *iso*quinoline-red diminishes with decreasing wave-length of the exciting light (5000—3500 Å.). H. J. E.

Luminescence excited in calcium tungstate by an electric current. A. GÜNTHER-SCHULZE and M. GERLACH (Z. Physik, 1934, 88, 355-357).—A current of 1—10 ma. traversing a thin film of CaWO₄ gives rise to the characteristic fluorescence. Powdered ruby shows the same effect. A. B. D. C.

Effect of electric discharge on the phosphorescence of alkaline-earth sulphides. R. COUSTAL (Compt. rend., 1934, 198, 1403-1404).—A brush discharge taken from the surface of phosphorescing alkaline-earth sulphides in contact with either pole immediately, but temporarily, quenched phosphorescence (I). When (I) had been excited by light from a Hg arc, vivid luminescence appeared before extinction. B. W. B.

Fluorescence of fluorspars at low temperatures. S. KREUTZ (Bull. Acad. Polonaise, 1933, A, 573— 574).—Observations relating to four fluorspars of different origin are tabulated. In three specimens the colour of the fluorescence at liquid air temp. differed from that at 20°, and in all four the intensity was much greater at the lower temp. F. L. U.

Photo-electric limit of tantalum carbide. A. ENGELMANN and H. TEICHMANN (Z. Physik, 1934, 88, 275).—The limit is 265 mµ before, and 310 after, degassing. The photo-electric effect is similar to that of heavy metals. A. B. D. C.

Photo-electric effect of crystal semiconductors. II. Proustite, pyrargyrite, bournonite, and molybdenite. G. ATHANASIU (J. Phys. Radium, 1934, [vii], 5, 132-140; cf. this vol., 474).—Photoelectric curves for the four minerals are given; for the first, second, and fourth, sensitivity max. correspond with radiations 0.580, 0.620, and 0.800— 0.900 μ , respectively; for the first and second the max. photo-electric effect is produced by radiation corresponding with the region of strong optical absorption. Photo-electric and photo-conductance effects are compared. It is concluded that radiation giving max. photo-electric effect at room temp. is identical with that giving max. photo-conductance at low temp. (-100° to -150°). Among other crystals examined, a strong thermo-electric effect was found for hessite, sylvanite, and nagyagite. N. M. B.

Mechanism of the selenium electrolytic photocell. R. AUDUBERT and J. ROULLEAU (Compt. rend., 1934, 198, 1489—1490).—The photo-potential (I) of a Se–Pt cell was of the same order in solutions of KI in several org. liquids as in H_2O , which is therefore not necessary for the development of (I) (cf. A., 1931, 999). In aq. solutions of various electrolytes (I) was less in oxidising than in reducing media; hence it is attributed to the capture of photo-electrons by cations, a mechanism which agrees with the observed light-response functions. B. W. B.

Metallic photo-resistance in a current of water. Q. MAJORANA (Atti R. Accad. Lincei, 1933, [vi], 18, 347-352; cf. this vol., 353).—Experiments with the metal (Pt) immersed in running H_2O show that the photo-resistance effect does exist, although in absence of H_2O it is associated with thermal effects. Hysteresis (35-45°) occurs between the illumination and resistance cycles. H. F. G.

Metallic photo-resistance at high frequencies. Q. MAJORANA (Atti R. Accad. Lincei, 1933, [vi], 18, 433-437; see preceding abstract).—With increase of the frequency of interruption of the light (up to 16,000 per sec.) the effect diminishes more rapidly than does the ordinary photo-electric effect.

H. F. G. Ionisation potentials and dissociation energies of non-polar molecules. J. SAVARD (Physica, 1934, 1, 321-323).—In a mol. of the type A_2 the dissociation energy, D, $=2n(I_m-I_a)$ e.v., and in a mol. of the general type AB_p , $D=2n\times I_m-\Sigma n_a I_a$ e.v. $(I_m=$ ionisation potential of the mol., $I_a=$ ionisation potential of atom A, 2n=no. of binding electrons of one shell and $n_a=$ no. of electrons furnished by the atom A for this shell). In a radical such as Me or CN the ionisation potential of the free radical = that of the C atom. In a mol. of the type R·R the binding energy between the two radicals, B, $=2(I_m-I_a)$ e.v. Examples are given. H. J. E.

Electrical strength of alkali halides and the influence of mixed crystal formation and foreign substances. A. VON HIPPEL (Z. Physik, 1934, 88, 358-365).—General conditions are deduced for formation of cryst. insulators. A. B. D. C.

High-frequency resistances. W. GRAFFUNDER (Ann. Physik, 1934, [v], **19**, 689—706).—The constancy of capacity of various resistances used in high-frequency work was tested against Pt resistances. The majority showed considerable variation. The capacity of liquid resistances was also investigated. A. J. M. Absorption measurements in liquids in the range of short electric waves. II. J. MALSCH (Ann. Physik, 1934, [v], 19, 707-720; cf. A., 1932, 470).—A critique of work on this question. Recent work leads to results which cannot be explained according to any theory involving anomalous dispersion. A. J. M.

Electrical conductivity of thin cupric sulphide films. H. DEVAUX and J. CAYREL (Compt. rend., 1934, 198, 1339—1342).—Dried CuS films (100— 200 Å. thick) formed on Cu^{II} salt solutions by surface H_2S attack gave $\rho=10^{-1}-4\times10^{-1}$ ohm cm. when fresh, ρ increasing with age (cf. A., 1929, 989).

B. W. B. Conductivity of paraffin wax. W. JACKSON (Naturwiss., 1934, 22, 238-239).—The sp. conductivity of paraffin wax, m.p. 45-55°, increases to a max. at temp. from 0° to 16°, then decreases to 35°, after which it rapidly rises. The max. at 16° is connected with the dielectric after-effect.

A. J. M.

Dipole moments and physico-chemical properties. I. A. E. VAN ARKEL (Chem. Weekblad, 1934, 31, 139—141).—An outline is given of the theory, and the results of measurements with various groups of org. compounds are summarised briefly.

H. F. G.

Measurements of the dipole moments of nitrous oxide and ethyl nitrite in the vapour phase. E. CZERLINSKY (Z. Physik, 1934, 88, 515–521).—The moment of N₂O is 0.14×10^{-18} , and of EtO·NO 2.38×10^{-18} . Possible structures are discussed. A. B. D. C.

Dielectric constant. XII. G. DEVOTO (Gazzetta, 1934, 64, 76-83; cf. A., 1933, 1230).-Dielectric const. measurements are recorded for aq. solutions of betaine, thiobetaine, NH_2 ·CHMe·CH₂·CO₂H, NH_2 ·CHMe·CH₂·CO₂H, NH_2 ·CeH₄·AsO₃H₂, dimethylpyrone, pyrocatechol, resorcinol, quinol, NH_2 ·CO·CH(OH)·CH₂·CO·NH₂, MeOAc, CH₂Ac·CO₂Et, MeNO₂, NH_2 OH, and H_3BO_3 . The polar nature of some of these compounds is discussed. O. J. W.

Calculation of the dipole contribution to the cohesion energy of organic compounds. A. E. VAN ARKEL (Physica, 1934, 1, 343—352; cf. A., 1933, 888).—Theoretical. The dipole contribution to the cohesion energy in approx. spherical mols. is cale. In the C·Cl linking the centre of the dipole is < 0.4 Å. from the C atom. This distance is also small with C·Br, C·I, C·F, C·NO₂, and C·Me. In isomerides with the dipole groups attached to a different no. of C atoms, the order of the b.p. may be cale. from the vector sum of the dipoles on each C. In isomerides with the dipole groups on the same no. of C atoms (as in C₆H₆ derivatives) the mutual influence of the dipoles must be considered.

H. J. E.

Dielectric properties of acetylenic compounds. I. Symmetrical dialkylacetylenes. H. H. WENZKE and R. P. ALLARD (J. Amer. Chem. Soc., 1934, 56, 858-860).—A zero moment has been obtained for the Bu^a₂ compound in heptane and for the *n*-diamyl compound in C_6H_6 at 25°. The at. polarisation is somewhat > that of the more saturated hydrocarbons of the same mol. wt. E. S. H.

Dipole moment and dielectric constants of solvents. H. MULLER (Physikal. Z., 1934, 35, 346–349).—The polarisation of CH_2Cl_2 and $PhNO_2$ in C_6H_{14} and CS_2 at various temp. (-80° to 41°) has been measured. Small effects due to the solvent may lead to very erroneous vals. for the at. polarisation. Correct vals. can be obtained only when working with gases. A. J. M.

Molecular polarisations of nitrobenzene in various solvents at 25°. H. O. JENKINS (J.C.S., 1934, 480-485; cf. this vol., 240).—The mol. electrical polarisation and apparent dipole moment (I) of PhNO₂ in C₆H₆, dekalin (II), CCl₄, n-C₆H₁₄, cyclohexane, CS₂, and CHCl₃ has been measured. The val. of (I) varies with the solvent. The total polarisation of the solute at infinite dilution is related linearly with the reciprocal of the dielectric const. of the solvent. This holds for non-polar (C₆H₁₄) and for polar (CHCl₃) solvents, small deviations occurring for C₆H₆, (II), and CCl₄. H. J. E.

Dielectric polarisation of benzene, carbon disulphide, hexane, and nitrobenzene. A. PIEKARA (Bull. Acad. Polonaise, 1933, A, 305–318).—The mol. polarisation (I) of C_6H_6 has a min. val. at about the f.p. and is higher in the region of supercooling. (I) for CS_2 and C_6H_{14} increase with rising temp., but not so rapidly as with C_6H_6 . The dielectric const, ε , and (I) of liquid PhNO₂ show no abnormality in the region of supercooling. ε of solid PhNO₂ at 250 m. is much < found by Mazur (A., 1931, 148) at 800 m. This may be due to anomalous dispersion.

J. W. S.

Induction in the benzene molecule. E. NÆS-HAGEN (Z. physikal. Chem., 1934, B, 25, 157—160).— By measurement of dipole moment with monosubstituted Ph₂ derivatives induction effects in the C_8H_6 mol. have been demonstrated. R. C.

Dielectric constants of ethyl behenate and molecular volumes of ethyl behenate and hexacosane in the liquid and solid states. R. BUCKING-HAM (Trans. Faraday Soc., 1934, 30, 377–386).— Changes of dielectric const., ε , and *d* between the m.p. and room temp. show that Et behenate exists in ≤ 4 modifications. The irreversible transition $\alpha \longrightarrow \beta$ at 43° is accompanied by a sharp fall of ε , a sharp rise of *d*, and a change in the inclination of the H·C chain. Phase changes also occur at 45° (irreversible) and 30° (reversible). The ester grouping oscillates in the α modifications, but motion is largely restricted in the β forms. The transition point $\alpha \longrightarrow \beta$ of hexacosane is 42° and the β form probably exists in two modifications. J. G. A. G.

Dispersion of inert gases. T. LARSÉN (Z. Physik, 1934, 88, 389–394).—Dispersion measurements between 5780 and 2300 Å. fit a Sellmeyer formula of three terms, two of which correspond with the resonance lines. A. B. D. C.

Paramagnetic rotatory power and the law of magnetisation of tysonite in the direction of the optic axis. J. BECQUEREL, W. J. DE HAAS, and J. VAN DEN HANDEL (Physica, 1934, 1, 383-400, and Compt. rend., 1934, 198, 1400–1403).—Measurements between 1.3° and 20.4° abs. with the Hg line 5460.7 Å. are recorded. H. J. E.

Magneto-optical Kerr effect. A. PIETZCKER (Z. Physik, 1934, 88, 311–322).—Measurements are given showing the proportionality of the Kerr effect to magnetisation of the ferromagnetic mirror.

A. B. D. C.

Isomorphism and chemical constitution : constitution of formic acid and formates. (SIR) P. C. RAY (Nature, 1934, 133, 646-647).—Sarkar now concludes that the difference between HCO_2H (I) and its higher homologues is due to the different structure of (I) in which the H attached to C is the ionisable atom. Undissociated (I) and its esters are not reducing agents. Reduction is due to the formate ion (II) owing to the presence of a lone pair of electrons in the C atom. The structure of (II) is almost identical with that of NO_2' . *Mixed crystals* of $Ba(NO_2)_2$, $Ba(CO_2H)_2$, and H_2O ; $Sr(CO_2H)_2$ and $Sr(NO_2)_2$; $Cd(CO_2H)_2$, and $Cd(NO_2)_2$ have been prepared. The double salts $Mg(CO_2H)_2, 2(CH_2)_6N_4, 10H_2O$ and $Mn(CO_2H)_2, 2(CH_2)_6N_4, 10H_2O$, isomorphous with the corresponding nitrites, have also been prepared.

L. S. T.

Significance of the hydrides of the carbonyls of iron and cobalt. A. A. BLANCHARD and M. M. WINDSOR (J. Amer. Chem. Soc., 1934, 56, 826—827).— It is maintained that the electron pattern of Ni(CO)₄ is repeated in all the volatile carbonyls, the addition of H furnishing the electrons required to complete the pattern. E. S. H.

Diamagnetic susceptibility of the hydrogen molecule. K. HONDA and T. HIRONE (Z. Physik, 1934, 88, 414).—A correction (cf. A., 1933, 890).

A. B. D. C.

Magnetic properties of manganous sulphate and of certain rare earths. S. VELAYOS (Anal. Fís. Quim., 1933, 31, 597—606).—Magnetic data for $MnSO_4$, $Gd_2(SO_4)_3$, Gd_2O_3 , and Dy_2O_3 are recorded; the magneton nos. are 28.99, 38.62, 38.78, and 51.73, respectively, the deviations from integral vals. being in the opposite sense to those calc. on the basis of the quantum theory. H. F. G.

Wave mechanics and structural chemistry. N. V. SIDGWICK (Nature, 1934, 133, 530).—The conclusions of wave mechanics and of structural chemistry can be reconciled if an isomeric (tautomeric) reaction in which the atoms have nearly the same relative positions after as before has a small heat of activation and occurs with great rapidity. L. S. T.

Lattice energies of the ammonium halides and the proton affinity of ammonia. W. E. BLEICK (J. Chem. Physics, 1934, 2, 160—163).—Lattice energies, in kg.-cal., calc. by the method of Born and Mayer (cf. A., 1932, 564) are: NH₄Cl, 161·6; NH₄Br, 154·0; NH₄I, 145·5. From these, by means of a thermal cycle the energy change at 0° abs. of the reaction NH₃ (gas) + H⁺ (gas) \longrightarrow NH₄⁺ (gas), which may be called the proton affinity of NH₃, is -206·4, giving 191·4 for the lattice energy of NH₄F, for which asymmetrical lattice the Born method fails. N. M. B. Probability of the spontaneous decomposition of linear triatomic molecules. T. KONTOROVA and V. SOROKIN (J. Chem. Physics, 1934, 2, 216; cf. Rosen, this vol., 7).—Mathematical. N. M. B.

Parachors of the hexafluorides of the sulphur group. E. B. R. PRIDEAUX (Chem. and Ind., 1934, 351).—The interpretation of the parachor data for SF_6 (this vol., 477), SeF_6 , TeF_6 , and PCl_5 is considered. D. R. D.

Parachor of esters of orthoformic acid. T. HUANG and K. SUNG (J. Chinese Chem. Soc., 1934, 2, 1-5).—The following vals. are found for the parachors of the trialkyl orthoformates : Me 249.5, Et 366.8, Pr^{α} 481.4, Pr^{β} 484.7, Bu^{β} 598.3, Bu^{α} 599.9, *iso*amyl 713.9, all within 1% of the vals. calc. from Sugden's consts. D. R. D.

Confirmation of crystal wave-length measurements and determination of $h/e^{4/3}$. P.KIRKPATRICK and P. A. Ross (Physical Rev., 1934, [ii], 45, 454– 460).—The potential necessary for producing general radiation capable of reflexion from calcite at a known Bragg angle 0 is V' sin $0=2035\cdot3\pm0\cdot2$ international volts, where V' is electron potential fall, using Ag K α_1 radiation. Discrepancies of available data are discussed. Results yield $h/e^{4/3}=(1\cdot7559\pm0\cdot0002)\times10^{-14}$, or, using recent auxiliary consts., $1\cdot7563$, and h= $(6\cdot546\pm0\cdot006)\times10^{-27}$, assuming $e=(4\cdot770\pm0\cdot005)\times$ 10^{-10} . N. M. B.

Photometric measurement of the reflexion of X-rays. P. DE LA CIERVA and J. LOSADA (Anal. Fis. Quím., 1933, 31, 607—615).—Full details are given of the method, in which a line of the Al X-ray spectrum is employed. The results obtained with NaCl, CaCO₃, and FeS₂ are in close agreement with those derived by the ionisation chamber method. H. F. G.

Connexion between the thermal and mechanical rupture of atomic linkings in metals. F. REGLER (Ann. Physik, 1934, [v], **19**, 637—664).—The width of X-ray interference lines for diffraction at a metal increases with the application of mechanical strains of all kinds, and also with rise of temp. The width of the radial interference lines is a measure of the potential energy of the crystal lattice. Each lattice of a metal can be associated with a certain definite amount of potential energy, the breakdown of at. linkings occurring if energy is acquired > this amount. Plasticity, hardening, and recrystallisation can be explained on the theory. A. J. M.

Stacking of spheres. W. J. POPE (Chem. and Ind., 1934, 361—362).—There are only four regular ways of stacking spheres: (1) cubic stacking, each sphere making contact with six others; (2) bodycentred cubic stacking, in which (1) is expanded so as to allow an additional sphere at the centre of each cube, each sphere making eight contacts. The void is $31\cdot25\%$. The other two methods each give a void space of $25\cdot95\%$. (3) Face-centred cubic stacking. (1) is expanded to allow another sphere at the centre of each cube face. This has full cubic symmetry and the variant (4) obtained by displacing triangular arrangements of cubes has hexagonal symmetry. Atoms of most cryst, metals are arranged in conformity with (3) and (4). C. I. Properties of substances having structural number 56. H. SPINDLER (Compt. rend., 1934, 198, 1409—1410).—ZnS (structural no. 40; cf. A., 1933, 1229) fused at 2000° under pressure, but ZnSe and CdS (structural nos. 56) were suddenly volatilised from the furnace without melting, a behaviour attributed to structural pecularities common to all compounds with such structural no., of which examples are given.

B. W. B.

Crystallisation of vitreous substances. P. MONDAIN-MONVAL (Compt. rend., 1934, 198, 1413— 1415).—Vitreous S and Se were shown by dilatometric and other observations to crystallise only at temp. above -29° and 32° , respectively (cf. A., 1930, 281). The transitions monoclinic \longrightarrow rhombic S and red \longrightarrow black Se also ceased below the same temp.

B. W. B.

Reciprocal exchange action. S. SCHUBIN and S. VONSOVSKI (Compt. rend. Acad. Sci. U.R.S.S., 1934, 1, 449–454).—Interchange action in a crystal lattice is discussed mathematically. J. W. S.

Measurement of lattice constants. V. KUNZL and J. KÖFFEL (J. Phys. Radium, 1934, [vii], 5, 145— 151).—An extended account of work already noted (A., 1933, 450).

X-Ray examination of electrolytically deposited silver. G. R. LEVI and M. TABET (Atti R. Accad. Lincei, 1933, [vi], 18, 463-467).—The particles of Ag deposited from a AgBr bath rich in $Na_2S_2O_3$ are isodiametrical, and growth proceeds in a direction perpendicular to the faces of the octahedra. H. F. G.

Lattice array faults in cuprous iodide. K. NAGEL and C. WAGNER (Z. physikal. Chem., 1934, B, 25, 71-80).—The conductivity of CuI in I vapour at 40-300° increases with the pressure of I vapour. This is attributed to electron-deficiency conduction (cf. A., 1933, 888), which has been confirmed by thermo-e.m.f. measurements with Pt CuI Pt. With I v.p. of 46 mm. at 200° the partial conductivity of Cu is 1.8×10^{-4} ohm⁻¹, cm.⁻¹, or five times that of CuI in a high vac. Since both electron and Cu^{*} partial conductivity rise with the pressure of I vapour the excess of I in the lattice is interpreted by electron-deficiency points and empty positions in the Cu[•] partial lattice. The rate of formation of a CuI film on Cu in I vapour at 200° is determined by the velocity of diffusion of the components through the film, and this diffusion is due to migration of Cu[•] and electrons from metal towards vapour. R. C.

Periodic structure in ice. S. C. BLACKTIN (Nature, 1934, 133, 613).—A periodic structure formed in natural ice is described. L. S. T.

Structure of the β -form of solid carbon monoxide. L. VEGARD (Z. Physik, 1934, 88, 235–241). —This form of CO is very similar to that of β -N₂; it has approx. hexagonal closest spherical packing, the deviation being due to mol. rotation. A. B. D. C.

Crystal structure of $3I_2O_5$, H_2O . J. GARRIDO (Anal. Fís. Quím., 1933, 31, 616-617).—The monoclinic holohedral crystals have a:b:c=0.901:1:0 891, and $\beta=112^{\circ}53'$. H. F. G. X-Ray studies on the hydrous oxides. IV. Titanium dioxide. H. B. WEISER and W. O. MILLIGAN (J. Physical Chem., 1934, 38, 513—519).— X-Ray analysis and thermal dehydration isobars of hydrous TiO₂, freshly pptd. at room temp. or prepared by oxidation in air of Ti₂O₃.xH₂O, indicate that no definite hydrates have been prepared. On ageing under H₂O for some weeks, or on heating the freshly formed material at 184°, anatase crystals are obtained. The results indicate that pptd. TiO₂ consists of the anhyd. oxide (anatase modification) with adsorbed H₂O. Rutile is formed by hydrolysing TiCl₄ and Ti(NO₃)₄ at b.p. and anatase by hydrolysing Ti(SO₄)₂. By igniting the pptd. TiO₂ at 1000° the product is mainly rutile. M. S. B.

Constitution of perowskite and related compounds. H. RHEINBOLDT (J. pr. Chem., 1934, [ii], 139, 318–321).—A crystal structure for perowskite, CaTiO₃, is proposed, in which Ca and Ti are surrounded by 12 and 6 O, respectively, and O by 4 Ca and 2 Ti. KMgF₃ and similar compounds are similarly formulated. R. S. C.

Guanidine *d*-tartrate. Crystallographic study. A. SWARYCZEWSKI (Bull. Acad. Polonaise, 1933, A. 359-365).—Guanidine *d*-tartrate,

 $(CN_3H_5)_2(C_4H_6O_6),1.5H_2O$, crystallises in monoclinic form with a:b:c=0.7056:1:0.3366 and $\beta 104^\circ 57'$. Optical data for the crystal over the wave-length range 4360—6560 Å. are given. X-Ray investigation shows the inter-planar distances to be 9.88, 14.77, and 4.78 Å. for the 100, 010, and 001 planes, respectively. Since d is 1.473 and the mol. wt. 295.4, the unit cell contains 2 mols. J. W. S.

Investigation of the dihydrazide molecule by means of X-rays. M. WOLF (Physica, 1934, 1, 417-424).—The long spacing (I) in compounds of the type $[CH_2]_n(CO\cdot NH\cdot NH_2)_2$ increases by 1.29 Å. for each C atom added to the chain, up to 24 C. In most dihydrazides with an even no. of C atoms a side spacing of 2.62 Å. was observed. In the odd dihydrazides side spacings of 3.62, 4.00 Å. were recurrent. The intensity of the different order reflexions of (I) for all members of a series is the same function of the reflecting angle. A mol. model is suggested. H. J. E.

X-Ray study of the structure of liquid benzene, cyclohexane, and their mixtures. H. K. WARD (J. Chem. Physics, 1934, 2, 153–159).—C₆H₆ and cyclohexane give X-ray diffraction peaks corresponding with preferred spacings of 4.68 and 5.09 Å., respectively, interpreted as the effective thickness of the respective rings. Mixtures give two independent peaks indicating emulsion-type solutions, the disperse phase being too small to show a Tyndall effect.

N. M. B.

Structure of cellulose and its derivatives. M. MATHIEU (Compt. rend., 1934, 198, 1434—1436).—If the plane of the sugar rings in cellulose is parallel to the a and b axes (cf. Andress, A., 1929, 630; 1930, 280), the strongest X-ray interference is reflected at 11° 22'; if it is parallel to the b and c axes (cf. Astbury, A., 1931, 152), the angle is 10° 50'. By superimposing the diagram on that of NaCl, 11° 19' is found, confirming the former view. If the distance between the planes is calc. in accordance with this angle, it is substantially the same in cellulose and its mercerised, $(NH_2)_2$ -, Me, and perchloric acid derivatives, suggesting that the substituents are in the plane of the ring. In alkalicelluloses the distance is greater, suggesting substituents between the planes of the rings. E. W. W.

Large Barkhausen discontinuities and their propagation in Ni-Fe alloys. R. E. REINHART (Physical Rev., 1934, [ii], 45, 420-424; cf. Sixtus, A., 1933, 216).—Propagation velocity as a function of circular and longitudinal field, torsion, and tension for a 10% Ni-Fe wire is investigated. N. M. B.

Permeability of nickel and iron at very short wave-lengths, $\lambda=4$ to 10 m. J. MULLER (Z. Physik, 1934, 88, 143—160).—The dependence of permeability on frequency was obtained for various points on the magnetisation curve by means of a bolometer. A. B. D. C.

Equation of state and elementary carrier of magnetism in nickel. L. NÉEL (J. Phys. Radium, 1934, [vii], 5, 104—120).—A model is proposed, based on Lenz's law, for a ferromagnetic substance, and allowing the calculation of the effect of mol. field fluctuations. The properties of the model are compared with those of Ni, and quantum-mechanical corrections are embodied. Results indicate that the magnetic properties of Ni are due to a variable no. of carriers having resultant spin S=1/2, the no. being a function of the magnetisation. At saturation and at weak magnetisation there is 0.607 and 0.867 carrier, respectively, per atom of Ni. N. M. B.

Recovery of electrical resistance and hardness of zinc, magnesium, and other low-melting metals from the effects of cold-working. G. TAMMANN and K. L. DREYER (Ann. Physik, 1934, [v], 19, 680—688).—The change of resistance of Zn wires by twisting at various temp., and the recovery from the effect, were measured. The recovery was also investigated for Tl, Pb, Sn, and Cd. The recovery of the hardness of Mg, Zn, Pb, Sn, and Cd was examined. A. J. M.

Experimental proof of the resistance change of thin layers of metals on charging. A. DEUBNER (Naturwiss., 1934, 22, 239).—The change of resistance of thin layers of Ag on charging to potentials of 1000— 5000 volts has been measured. It varies linearly with the charging potential, and is of the expected order of magnitude. A. J. M.

Variation of resistance of nickel, iron, and bismuth in alternating magnetic fields of sonic frequencies. J. MULLER (Z. Physik, 1934, 88, 277—294).—The change with Fe and Ni passes through a max. with increasing field before saturation is reached, but with Bi it varies linearly with transverse field strength. A. B. D. C.

Change of resistance of single crystals of gallium in a magnetic field. II. W. J. DE HAAS and J. W. BLOM (Physica, 1934, 1, 465-474; cf. this vol., 135).—The dependence of the resistance on the angle between the lines of force of the magnetic field and the crystal axes has been measured between 155° and 49.8° abs. At each temp. there is a field strength at which the resistance has the same val. with either of the two mutually perpendicular shorter axes parallel to the field. This field strength decreases with falling temp. H. J. E.

Theory of optical absorption in alkali metal crystals. W. H. WATSON (Canad. J. Res., 1934, 10, 335-341). R. S.

Spontaneous variation in light transmission of thin silver foils. A. JAGERSBERGER and F. SCHMID (Z. Physik, 1934, 88, 265—269).—Variation of optical transparency of sputtered Ag films was observed up to 150 days after formation; it is attributed to structural changes, degassing, and chemical effects.

A. B. D. C.

Metallic dispersion in the near infra-red. C. HURST (Proc. Roy. Soc., 1934, A, 144, 377–381).– Theoretical. The equations for the index of refraction and the coeff. of absorption of a metal in the near infrared, developed by Kronig on a quantum-mechanical basis (A., 1929, 871), are formally identical with the dispersion equations obtained by Drude by classical methods. L. L. B.

Refractive indices [of metals] for electron waves. J. WINTER (Compt. rend., 1934, 198, 1352– 1354).—Theoretical. B. W. B.

Metastability of elements and compounds as a consequence of enantiotropy or monotropy. XVIII. The lead oxide problem. E. COHEN and N. W. H. ADDINK (Z. physikal. Chem., 1934, 168, 188—201).—The red form of PbO, d_4^{30} 9.34₉, is stable below 488.5°, and the yellow form, d_4^{30} 9.63₂, m.p. 884 \pm 1°, stable above. Complications encountered by previous workers are ascribed to neglect of the effect of the solid-liquid interfacial tension in pyknometric *d* determinations of solids. R. C.

Allotropic transition of bismuth at 75°. S. AOYAMA and G. MONNA (Sci. Rep. Tôhoku, 1934, 23, 52-61).—Data obtained from thermal analysis, dilatometry, thermal expansion, and thermo-e.m.f. do not support the view that Bi exists in two modifications with a transition point at 75°. M. S. B.

Acoustical studies. III. Rates of excitation of vibrational energy in carbon dioxide, carbon disulphide, and sulphur dioxide. IV. Collision efficiencies of various molecules in exciting the lower vibrational states of ethylene, together with some observations concerning the excitation of rotational energy in hydrogen. W.T. RICHARDS and J. A. REID (J. Chem. Physics, 1934, 2, 193-205, 206-214; cf. this vol., 135).—III. Measurements of the velocity of sound in CO₂, CS₂, and SO₂ at 30° and various pressures and frequencies are tabulated, and their relation with energy terms is examined.

IV. Sound velocity data in C_2H_4 are given for various pressures, temp., and frequencies. Collisions with A, He, and N₂ have no appreciable effect on the vibrational energy of the C_2H_4 mol.; collisions with H₂ mols. are about ten times as effective as $C_2H_4-C_2H_4$ collisions in producing transitions in the lower vibrational states. H₂ shows a dispersive region at ultrasonic frequencies. It is supposed that $C_2H_4-H_2$ collisions are about twenty times as effective as H_2-H_2 collisions in exciting the rotational energy of H₂ mols. N. M. B. Rendering visible ultrasonic waves in liquids. H. R. ASBACH, C. BACHEM, and D. HIEDEMANN (Z. Physik, 1934, 88, 395–398; cf. this vol., 354). A. B. D. C.

Heat content of gases from 0° to 1900°. G. B. TAYLOR (Ind. Eng. Chem., 1934, 26, 470).—Vals. are tabulated for the heat required to raise the temp. of 1 g.-mol. of H₂, O₂, N₂, CO, CO₂, CH₄, C₂H₂, and H₂O gases from 0° to temp. up to 1900°. They are calc. by integrating Bryant's sp. heat equation $C_p = A + BT + CT^2$. A. G.

Thermal properties of condensed helium. R. KAISCHEW and F. SIMON (Nature, 1934, 133, 460).-The heat of fusion is 6.75 g.-cal. per g.-atom at 4.0° abs. and 5.1 g.-cal. at 3.4°. d for solid He in equilibrium with the liquid phase is 0.23 at 4.0° and 0.22 at 3.6. d and compressibility (I) of liquid He at 2.4° and 4.5° agree well with recent data (this vol., 136), but (I) falls appreciably at higher pressures. (I) for solid He is approx. 1.5×10^{-3} atm.⁻¹ at 3.7° and 115 atm. C_v for solid He between 2.7° and 3.7° at d 0.23 agrees with a Debye function $\Theta = 32.5^{\circ}$ which gives a zero point energy of 73 g.-cal. per g.atom compared with a thermal energy of only 1 g.cal. at 4°. Adiabatic expansion measurements have also been made. L. S. T.

Behaviour of condensed helium near absolute zero. F. SIMON (Nature, 1934, 133, 529; cf. preceding abstract).—A discussion. L. S. T.

Effect of pressure on the m.p. of o-, m-, and p-xylene. J. C. SWALLOW and R. O. GIBSON (J.C.S., 1934, 440-442; cf. this vol., 255).—Data are tabulated for the effect of pressures up to 2750 kg. per sq. cm. on the m.p. of o-, m-, and p-xylene, and on the first crystallisation temp. and eutectic temp. of a mixture of 70% o- and 30% p-xylene.

H. J. E.

Determination of specific heats of liquids. N. DE KOLOSOVSKI and V. V. UDOVENKO (Compt. rend., 1934, 198, 1394—1395; cf. A., 1933, 1006).— Mol. heats (I) and mol. entropy-temp. coeffs. (II) at 29° were determined for: PhEt, PhPr^g, PhBr, PhCHO, m-C₆H₄Me·NO₂, NPhMe₂, NPhEt₂, m- and o-C₆H₄Me·NO₂, and quinoline. With the exception of CCl₄, (II) increased with mol. complexity and (II)/(I) was approx. const. for all org. liquids so far examined. B. W. B.

Exact measurement of the specific heats of metals at high temperatures. V. Specific heats and thermal hysteresis of beryllium. F. M. JAEGER and E. ROSENBOHM (Rec. trav. chim., 1934, 34, 451—463).—Cryst. Be when heated above 500° or 600° undergoes internal change and shows a strong retardation in the heat development (I) on cooling. The Be returns to its original condition after some months at room temp. X-Ray examination after heating shows changes in the structure which are discussed. With powdered Be (I) is normal owing probably to thin films of BeO surrounding the particles preventing internal change. H. S. P.

Measurements of the latent heat of thallium connected with the transition, in a constant external magnetic field, from the superconductive to the non-superconductive state. W. H. KEESOM and J. A. KOK (Physica, 1934, 1, 503-512).— The latent heats at $2\cdot11^{\circ}$, $1\cdot91^{\circ}$ abs. were $0\cdot000276$, $0\cdot000346$ g.-cal. per mol., respectively. On passing the magnetic threshold val. no irreversible entropy change occurs. H. J. E.

Abnormal thermal effects produced by certain minerals and chemical substances. I. Measurements with the adiabatic calorimeter. W. SWIENTOSŁAWSKI and (MISS) E. BARTOSZEWICZ (Bull. Acad. Polonaise, A, 1934, 69—72).—No continuous heat evolution was observed from As₂O₃ or Bi, the method being sensitive to $1-5 \times 10^{-5}$ g.-cal. per g. hr. (cf. A., 1933, 212, 335). H. J. E.

Physico-chemical constants of cyclic hydrocarbons. F. M. VIVALDI (Anal. Fís. Quím., 1933, 31, 645-648).—The densities, sp. deviations, parachors, and Raman spectra of 1-ethylcyclo-pentene and -hexene, ethylcyclo-pentane and -hexane are recorded. The results are in general accordance with the theoretical vals. and with those in the lit. for related compounds. The Raman lines at 1440 and 1200 cm.⁻¹ are present in each case, whilst that at 800 cm.⁻¹ is displaced in conformity with the law that the product of the no. of C atoms in the ring and the square of the frequency is const.; the line at 993 cm.⁻¹ is exhibited by the unsaturated compounds. H. F. G.

Principle of Le Chatelier and Braun. M. PLANCK (Ann. Physik, 1934, [v], 19, 759-768).— Theoretical. The limitations of the principle are discussed, and an expression is derived to cover all cases. A. J. M.

Determination of the fundamental pressure coefficient of helium. W. H. KEESOM, (MISS) H. VAN DER HORST, and K. W. TACONIS (Physica, 1934, 1, 324—332).—The fundamental coeff. of the normal (ice-point pressure 1000 mm.) He thermometer, $\alpha_{n\rm He} = 0.0036607_2$. The fundamental temp. coeff. of the Avogadro state, $\alpha_{\rm A}$, =0.00366107. The temp. of the ice point on the Kelvin scale, $T_{0^{\circ}\rm C.}$, =273.144. H. J. E.

Line co-ordinate charts for v.p.-temperature data. F. E. E. GERMANN and O. S. KNIGHT (Ind. Eng. Chem., 1934, 26, 467–470).—183 org. compounds give straight lines when 1/T is plotted against log p. Nomographs are given connecting the v.p. and temp. for all these substances over the range 500—900 mm.; the v.p. are accurate to 2 mm. and the temp. to 0.25°. A. G.

Thermodynamic relation. D. TEODORESCU (Bul. Soc. Romane Fiz., 1934, 36, 19—21).—From the linear variation, in an org. series, of temp. and max. v.p. (cf. Lucatu, this vol., 246), a relation between the latter and the Clapeyron equation is deduced, and verified by calculating the heat of vaporisation of heptane from that of hexane. N. M. B.

Vapour pressure and mol. wt. of chromium carbonyl. M. M. WINDSOR and A. A. BLANCHARD (J. Amer. Chem. Soc., 1934, 56, 823—825).—The v.p. has been determined between room temp. and 125°. The mol. wt. by the v.d. method corresponds with the formula $Cr(CO)_6$. E. S. H. **V.p. of silicobromoform.** W. C. SCHUMB and F. A. BICKFORD (J. Amer. Chem. Soc., 1934, 56, 852—854).—SiHBr₃ has m.p. -73.5° , b.p. 111.8°, log $P = -1819.5/T \times 7.6079$. E. S. H.

V.p. of solid and liquid heavy hydrogen. G. N. LEWIS and W. T. HANSON, jun. (J. Amer. Chem. Soc., 1934, 56, 1001-1002).—The triple point of H_2^2 is at 18.66° abs. E. S. H.

V.p. of liquid and solid deutocyanic acid. G.N. LEWIS and P. W. SCHUTZ (J. Amer. Chem. Soc., 1934, 56, 1002).—There is scarcely any difference between the v.p. of H¹CN and H²CN; the equations lead to 259° and 261° abs., respectively, for the f.p. E. S. H.

Properties of heavy water. H. S. TAYLOR and P. W. SELWOOD (J. Amer. Chem. Soc., 1934, 56, 998-999).—The ratio of d of heavy to light H_2O at 25° is 1·1079 and the difference in n_D^{20} is -0.00462. The f.p. of $H_2^{2}O$ is $3\cdot82^{\circ}$ and the viscosity at 20° 12·6 millipoises. $H_2^{2}O$ readily takes up H_2O from the air and from the glass walls of the apparatus.

E. S. H.

Mass of the normal litre, compressibility, and deviation from Avogadro's law of propylene gas. T. BATUECAS (J. Chim. phys., 1934, 31, 165–183).— The wt. of the normal litre of C_3H_6 prepared by three different methods is 1.9149 ± 0.0001 , and from vals. at reduced pressure the deviation from Avogadro's law is given by $1+\lambda=1.0204$. The at. wt. of C is 12.005 from the limiting density of C_3H_6 , taking the g.-mol. vol. as 22.414 and 6H as 6.047. Parallelisms between the compressibilities of members of the hydrocarbon series are discussed. J. G. A. G.

System magnesium-antimony. G. GRUBE and R. BORNHAK (Z. Elektrochem. 1934, 40, 140— 142).—The system has been studied in detail by thermal analysis. Horizontal eutectic lines occur at 629° (6% Mg) and 579° (86% Sb), without appreciable mixed crystal formation. The only compound is Mg₃Sb₂ (m.p. 1228°), for which the $\alpha \Longrightarrow \beta$ transformation occurs at 930° ±2° (40—44% Sb). The results are compared with those for the system Mg-Bi. H. F. G.

Alloys of magnesium research. I. Constitution of the magnesium-rich alloys of magnesium and nickel. J. L. HAUGHTON and R. J. M. PAYNE (Month. J. Inst. Metals, 1934, 1, 165—173).— Mg and Mg₂Ni form a simple eutectiferous system, the solubility of Ni in Mg being < 0.1% at 500°; the eutectic is at 507° and 23.5% Ni. A careful re-determination of the m.p. of pure Mg gave $649\pm$ 0.5°. A. R. P.

Solid solution of aluminium in silver. S. KOKUBO (Sci. Rep. Tôhoku, 1934, 23, 45-51).-d for a 4.5% Al-Ag alloy is < that cale. from X-ray data on the basis of a simple substitution of Al atoms for those of Ag in the Ag lattice. The discrepancy is attributed to pinholes and Al₂O₃ in the alloy, and not to chemical combination between Al and Ag.

M. S. B. Transformations in the copper-palladium alloys. R. TAYLOR (Month. J. Inst. Metals, 1934, 1, 11-30).—Alloys with 0-55 at.-% Pd have been

examined by thermal, micrographic, and electrical. resistance methods. Transformations in the solid state occur within the ranges (A) 10-30 and (B) 35-50 at.-% Pd. In A the change from random to regular orientation is preceded by a lattice distortion; the first stage occurs at a max. of 570° for the 22 at.-% Pd alloy and the second stage at a max. of 500° for the 15 at.-% Pd alloy. The min. sp. resistance (R) for the ordered state occurs at 15 at.-% Pd and the max. change in R due to transformation at 25 at.-% Pd. In B the change from a randomly oriented face-centred cubic lattice to an ordered body-centred cubic lattice is complete at 40 at.-% Pd, but only partial in alloys near this composition, although it may be rendered more complete in these alloys by heat and mechanical treatment; in no case does the change occur at const. temp., but the temp. is highest and the range smallest at 40 at.-% Pd. Min. val. of R in the ordered state occurs at 47 at.-% Pd, and the R curve of the face. centred cubic alloys shows two breaks, at 32.5 and 42 at.-% Pd, respectively. A. R. P.

Physical properties of platinum-rhodium alloys. J. S. ACKEN (Bur. Stand. J. Res., 1934, 12, 249—258).—The m.p., hardness, d, electrical resistivity, temp. coeff. of resistance, and thermo-electric force against Pt has been measured for Pt–Rh alloys containing 10—80% Rh. The microstructure of each alloy appears to be that of a solid solution. The suitability of alloys containing 20—40% Rh for use in windings of high-temp. resistance furnaces is discussed. J. W. S.

X-Ray investigation of hydrogen-charged palladium-gold alloys. H. MUNDT (Ann. Physik, 1934, [v], 19, 721-732).—These alloys are exactly similar to the Pd-Ag alloys (A., 1933, 341). A saturated solution of small H concn. is first formed, giving an expansion of the lattice. Subsequently a second solution is produced with a lattice corresponding with a higher H content. With increasing Au content the lattices of the two conjugate solutions approach each other in size, and the concn. region for co-existence diminishes, until at 45% Au the alloy becomes homogeneous. Up to 40% Au in alloys containing no H, there is a small deviation from the additive law, a contraction of the lattice being observed. A. J. M.

Heat content and specific volume of ironcarbon alloys. G. TAMMANN and G. BANDEL (Arch. Eisenhüttenw., 1933—1934, 7, 571—578).— Recent data for the heat content, sp. heat, d, and sp. vol. of Fe-C alloys at temp. up to 1600° are summarised in tables and graphs. A. R. P.

Crystal structure of the Heusler alloys. A. J. BRADLEY and J. W. RODGERS (Proc. Roy. Soc., 1934, A, 144, 340—359).—An alloy has been prepared of the composition $(CuMn)_9Al_4$, in which the atoms occupy the same positions as in Cu_9Al_4 . The annealed and slowly cooled alloy is non-magnetic, but on quenching from 800° it becomes strongly ferromagnetic. The structure is now body-centred cubic, with a facecentred superlattice. A comparison of X-ray photographs of the same specimen of the ferromagnetic alloy made with radiations from Fe, Cu, and Zn anticathodes shows that the relative intensities of the weaker reflexions vary with the wave-length of the radiation. In this way it is possible to distinguish the Mn from the Cu atoms. The ideal structure of the ferromagnetic alloy is given. L. L. B.

Constitution of copper-iron-silicon alloys. D. HANSON and E. G. WEST (Month. J. Inst. Metals, 1934, 1, 95—116).—The system has been examined up to 8% Si and 8% Fe. Addition of Si to Fe-Cu alloys reduces the solid solubility of Fe and, with about 5% Si, causes the separation of FeSi which tends to segregate to the top of the ingot. FeSi appears to form pseudo-binary systems with the α , β , γ , δ , and ε phases of the Si-Cu system. In the ternary system the range of existence of the α +FeSi field decreases rapidly with fall in temp., indicating the possibility of producing pptn.-hardening effects in alloys with > 4.5% Si.

A. R. P.

Vapour pressure of potassium amalgams. H. H. VON HALBAN, jun. (Nature, 1934, 133, 463).— Dil. K amalgams show a lowering of the v.p. of the Hg > that which corresponds with Raoult's law (I), but when the surface is continually renewed by suitable movement the v.p. rises very nearly to the val. required by (I), and then returns to the lower val. soon after the motion ceases. Impurities in Hg produce the same effect. These results explain previous observations on the dependence of the sensibility and threshold of the photo-effect of K amalgams on concn.

L. S. T.

Electrical conductivity and phase diagram of binary alloys. X. System magnesium-bis-muth. G. GRUBE, L. MOHR, and R. BORNHAK. XI. System lithium-magnesium. G. GRUBE, H. VON ZEPPELIN, and H. BUMM (Z. Elektrochem., 1934, 40, 143-150, 160-164).-X. The system has been studied by means of conductivity measurements and thermal analysis. Between 0 and 14.3 at.-% Bi the primary solid phase consists of γ mixed crystals; the eutectic for α and γ mixed crystals occurs at 14.3% Bi and 551°. Between 14.3 and 31.5% Bi a mixed crystals separate, and this phase undergoes a transition at 680°, β mixed crystals separating between 31.5 and 40% Bi. For the pure compound the transition temp. is 700°. The m.p. of Mg₃Bi₂ is 823° (not 715° as previously reported). β -Mg₃Bi₂ separates between 40 and 43.5% Bi, and the α form between 43.5 and 95.7% Bi. The α -Mg₃Bi₂-Bi eutectic lies at 260° and 95.7% Bi. The results of conductivity measurements with alloys containing 30 and 35% Bi are not reproducible, but the reason is obscure; no other transition could be detected. Photomicrographs are reproduced.

XI. Between 0 and $16\cdot3\%$ Li mixed crystals separate, and between $16\cdot3$ and $21\cdot8\%$ Li mixed crystals and the eutectic (587.5°, $21\cdot8\%$ Li) with Li_2Mg_5 . The phase diagram passes through a very flat max. at about 592° and then falls smoothly to the m.p. of Li. Alloys containing $\Rightarrow 15\%$ Li exhibit only the hexagonal Mg lattice, and those containing 35-40% Li a cuble body-centred lattice; the 15-35% Li alloys exhibit both types. The lattice const. of the cubic type is const. between 20 and 31% Li, and falls abruptly between 31 and 40% Li. H. F. G.

Interpretation of paramagnetic properties of alloys. L. NEEL (Compt. rend., 1934, 198, 1311-1313).—Theoretical. A formula is given for the B.B. susceptibility of an alloy, in which case the straight line of the Curie–Weiss law is replaced by a curve. Where fluctuations of mol. field can be neglected the formula agrees with experiment. The results extend and confirm the views of Slater and of Stoner.

W. R. A.

Density of propionic acid solutions in water. B. N. CHUCKERBUTTI (Current Sci., 1934, 2, 340). $-d_4^{-35}$ has a max. at 51.2% acid by vol. C. W. G.

Effect of temperature on the viscosity of binary mixtures with abnormal viscosities. L. E. SWEARINGEN and L. B. HECK (J. Physical Chem., 1934, 38, 395-400).—The viscosity-composition curves for the systems AcOH-H₂O and C₅H₅N-AcOH have a max. at a fixed composition even at 80°. For PhNO₂-Bu^oOH the curve has a min. the composition of which depends on the temp. M. S. B.

Dielectric polarisation of hexane-nitrobenzene mixtures. I. Behaviour of the polarisation near the separation temperature. II. Dipole moment and association of nitrobenzene. A. PIEKARA (Bull. Acad. Polonaise, 1933, A, 319-332, 333-345).—I. The dielectric consts. and d of mixtures have been measured at 0-30°, and the corresponding mol. polarisations calc. For mixtures which separate into two layers at lower temp. the dielectric const. shows an inflexion point at the crit. solution temp. and abnormal vals. just above it, where the solution is opalescent. The interpretation of these results is discussed.

II. From the mol. polarisation of solutions of PhNO₂ in C₆H₁₄ and the mol. polarisation of PhNO₂ in the solid state, its dipole moment is cale. as 3.96×10^{-18} e.s.u. The inaccuracy of vals. derived from the temp. coeff. of the mol. polarisation is discussed. The degree of association of PhNO₂ in C₆H₁₄ solutions has been deduced. J. W. S.

Structure of alcohol solutions of lithium chloride. G. W. STEWART (J. Chem. Physics, 1934, 2, 147—152).—X-Ray diffraction measurements for conc. solutions of LiCl in EtOH, Pr^aOH, and Bu^aOH suggest that Li⁺ and Cl' react with the mols. of the solvent to form a liquid of cybotactic or quasi-cryst. structure. N. M. B.

Vapour pressures of mixtures of light and heavy hydrogen. G. N. LEWIS and W. T. HANSON, jun. (J. Amer. Chem. Soc., 1934, 56, 1000-1001).--Preliminary determinations are in accordance with Raoult's law. E. S. H.

Vapour pressures of nitric and sulphuric acids. J. H. PERRY and D. S. DAVIS (Chem. and Met. Eng., 1934, 41, 188—189).—The total and partial pressures for aq. HNO_3 (20—100%) and the H_2O pressure for aq. H_2SO_4 (10—95%) at different temp. are given in the form of alinement charts. D. K. M.

Partial pressures of formic and acetic acids above some aqueous solutions, and their partial molal free energies at 1 0 molal concentration. W. A. KAYE and G. S. PARKS (J. Chem. Physics, 1934, 2, 141-142).—From measurements at 25° the partial molal free energies are calc. N. M. B.

Liquid-vapour equilibria of mixtures of aromatic and non-aromatic hydrocarbons. M. MIZUTA (J. Soc. Chem. Ind. Japan, 1934, 37, 60–61B).—The addition of petrol to a mixture of C_6H_6 and PhMe decreases the efficiency of separation by distillation; an azeotropic mixture contains 0.7 mol. fraction of C_6H_6 in the liquid phase. The distillation of mixtures of PhMe with petrol fractions of about the same b.p. has been studied. A. G.

Equilibrium in systems composed of sulphur dioxide and certain organic compounds. H. W. FOOTE and J. FLEISCHER (J. Amer. Chem. Soc., 1934, 56, 870—873).—V.-p. measurements are recorded for the binary systems formed by SO₂ with NH₂Ph, NHPhMe, NHPhEt, NPhEt₂, NHPh₂, $p \cdot C_{6}H_{4}Me \cdot NH_{2}$, $C_{10}H_{8}$, Ph₂, Ph₂O, α - and β - $C_{10}H_{7}$ ·OH, and [·CH₂·OH]₂ between — 20° and 30°. The existence of the following solid compounds is established : NH₂Ph,SO₂, NHPhMe,SO₂, m.p. 31°; NHPhEt,SO₂, m.p. 29°; $p \cdot C_{6}H_{4}Me \cdot NH_{2}$,SO₂. E. S. H.

Ternary heteroazeotropic system ethyl alcoholcarbon disulphide-water. W. SWIENTOSŁAWSKI and E. WARDZIŃSKI (Bull. Acad. Polonaise, 1933, A, 462-471; cf. A., 1932, 1226).—The heteroazeotropic mixture has b.p. $41\cdot345^{\circ}$ and contains CS₂ $94\cdot36$, EtOH $6\cdot55$, and H₂O $1\cdot09\%$. F. L. U.

Classification of zeotropic and azeotropic mixtures. W. SWIENTOSŁAWSKI (Bull. Acad. Polonaise, 1933, A, 472-476; cf. preceding abstract). F. L. U.

Distillation of dilute aqueous solutions of hydrochloric and nitric acids. P. JAULMES (J. Chim. phys., 1934, 31, 227-235).—A steamdistillation method shows that the conen. of acid, C, in the vapour is approx. ∞C^2 in solution, but the volatility increases more rapidly than C^2 at conen. > 1N. The results are discussed with reference to the effect of ions on the volatility of the non-ionised acid. J. G. A. G.

Method of constructing the W, S, χ surface of binary systems. G. VAN LERBERGHE (Physica, 1934, 1, 475–480).—Theoretical. H. J. E.

Physical properties of ternary systems. Specific gravities, refractive indices, and changes in volume on dissolution of the system methyl alcohol, *iso*butyl alcohol, water at 60° F. D. M. SMITH (Ind. Eng. Chem., 1934, 26, 392—395).—Data are presented for the whole range of ternary mixtures, and the most accurate method of interpolating between the experimental points is described.

A. G. Velocity of gas exsorption of liquids. II. A. GUYER and B. TOBLER (Helv. Chim. Acta, 1934, 17, 550—555; cf. this vol., 483).—" Evasion coeffs.," expressing the amount of dissolved gas leaving 1 sq. cm. of the surface of a solution under standard conditions, have been determined for C_2H_2 , CO_2 , H_2S , SO_2 , and NH_3 . E. S. H.

Principles of gas exsorption. A. GUYER and B. TOBLER (Chem. Fabr., 1933, 7, 145—148).— Exsorption of gases is defined to include desorption and the degassing of a solution when the osmotic pressure of the gas in solution is > its partial pressure in the gaseous phase. The rate of removal of gases which do not react with the aq. solvent (H_2 , CH_4 , C_2H_2) increases slightly with increasing rate of diffusion, whilst the rate of removal of gases such as SO_2 and NH_3 depends mainly on the degree of interaction with the solvent. H_2S occupies an intermediate position. E. S. H.

Mechanism of activated diffusion through silica glass. R. M. BARRER (J.C.S., 1934, 378-386). -The logarithms of the diffusion rates of He, H₂, O2, N2, A, and air through SiO2 glass are linearly related to 1/T in the range 17—1000°. The energies of activation, E, for diffusion vary from 5700 g.-cal. per mol. for He to approx. 48,000 for A. Owing to the formation of a new cryst. surface phase (I) with increasing time of heating, the permeability decreases and E increases for all gases except He and H₂. The diffusing gases migrate in two ways : He, H₂, and Ne pass through the "lattice" of the SiO₂ glass at high temp., whilst O2, N2, and A migrate mainly through slip-planes the width of which is diminished in process (I). At low temp. He, H₂, and Ne exhibit slip-plane diffusion, and there is evidence that migration proceeds from the adsorbed layer of gas and not directly from the gas phase (cf. A., 1933, 565). The gases migrate as undissociated mols., and E arises from dynamic polarisation due to van der Waals cohesion and to exchange forces leading to gas-solid repulsions. Vals. of E cale. from the laws of interaction of H₂₀ He, and A are consistent with those observed, when probable vals. of pore diameter are chosen, and indicate "lattice" migration for He and H_2 . J. G. A. G.

Solubility of sodium arsenate in 93.5% ethyl alcohol. A. Wøhlk (Dansk Tidsskr. Farm., 1934, 8, 107).—The solubility at room temp. of Na₂HAsO₄ is 0.02465%. R. P. B.

Anomalous valency effect of strong electrolytes in aqueous solutions. J. B. CHLOUPEK, V. Z. DANEŠ, and B. A. DANEŠOVA (Coll. Czech. Chem. Comm., 1934, 6, 116—125; cf. A., 1933, 26, 351).— The solubility of $Ca(IO_3)_2$ in presence of other salts indicates that the anomalous valency effect is shown only by ions of valency > 2. D. R. D.

Calculation of the solubility of certain salts in water at high pressures from data obtained at low pressures. R. E. GIBSON (J. Amer. Chem. Soc., 1934, 56, 865—870).—The d and compressions of solutions of KI have been determined. Assuming that H_2O in an aq. solution behaves like H_2O under hydrostatic pressure, and that the sp. compression of a salt in solution is equal to that in the solid state, an equation expressing the properties of H_2O as a function of pressure may be adapted to the computation of the effect of pressures up to 10 kilobars on the solubility of salts, from measurements made at 1 kilobar.

E. S. H.

Solubility of carbamide in water. Heat of fusion of carbamide. F. W. MILLER, jun., and H. R. DITTMAR (J. Amer. Chem. Soc., 1934, 56, 848—849).— The solubility of $CO(NH_2)_2$ in H_2O has been determined between 70° and 132·7°. The solutions are ideal when the mol. fraction of $CO(NH_2)_2$ is > approx. 0.6. The calc. heat of fusion of $CO(NH_2)_2$ is 3470 g.-cal. per mol. E. S. H.

Calcium sulphate in sea-water. I. Solubilities of dihydrate and anhydrite in sea-waters of various concentrations at 0-200°. R. HARA, Y. TANAKA, and K. NAKAMURA (Tech. Rep. Tôhoku, 1934, 11, 87-109).-The solubilities have been determined interferometrically. The solubility at 60° of $CaSO_4$ prepared from the dihydrate at 600-650° is > the normal val. by up to 30%, and does not attain the normal val. within 13 days. Quant. data relating to the brine concn., amount of CaSO4 which may be removed, and temp. of secondary evaporation are given for the process in which CaSO₄ is removed from brine by heating at about 200°. The transition temp. di- \implies mono-hydrate varies between 52° and 95°, according to [CI]; in aq. solution the transition temp. is 98° (lit. 107°). All the solubility curves pass through a max. at [Cl] about 3.0-4.5%. H. F. G.

Solubility in the quaternary system NH_4NO_3 -NaCl, and the effect of added ammonia. L. HACKSPILL, A. P. ROLLET, and LAUFFENBURGER (Compt. rend., 1934, 198, 1231—1233).—The system (cf. Le Chatelier, A., 1921, ii, 248; Rengade, *ibid.*, 93) is represented at 20° by a projected pyramidal space model. Addition of NH_3 increases the solubilities of NH_4Cl and NH_4NO_3 . Conditions for the separation of pure NaNO₃ and NH_4Cl are indicated. B. W. B.

Action of alkaline copper solution on silk fibroin. VII, VIII. Dissolution phenomena in the system fibroin-copper-amine-alkali. Y. TAKAMATSU (J. Soc. Chem. Ind. Japan, 1934, 37, 107-110B).—The addition of NH_3 or $[\cdot CH_2 \cdot NH_2]_2$ to the system fibroin-Cu-KOH probably does not increase the solubility of fibroin, but greatly increases its rate of dissolution. A fibroin-Cu-amine compound is first formed and subsequently converted into a fibroin-Cu-KOH compound. A. G.

Solubility of phenols in proteins. E. A. COOPER and (MISS) TREADGOLD (J. Physical Chem., 1934, 38, 259-267).-The increase in the partition coeff. of C₆H₂(NO₂)₃·OH between protein and H₂O, when the protein sol or gel is coagulated by the phenol itself, is very much < previously observed for unsubstituted phenols and cresols and their halogen derivatives. Practically no change takes place in the partition coeff. of CCl₃·CH(OH)₂ on coagulation of the protein, so that the phenomenon is not common to all OH compounds. Proteins pptd. from colloidal solution by addition of a colloid of opposite electric charge, e.g., gelatin by dialysed Fe, or by formation of an insol. salt, e.g., edestin chloride, do not exhibit this increased solvent power for PhOH. Experiments with red cells and ovalbumin indicate that the increased partition coeff. is real, and not due to calculation errors as a result of the movement of H_2O from one phase to another. The imbibed H₂O may, however, diminish the solubility of PhOH in proteins, thus accounting, in the case of sols and gels, for the low partition coeff. which rises to the normal figure when H_2O is expelled on coagulation. M. S. B.

Precipitation. I. Precipitation of silver chloride, bromide, and iodide. B. TEŽAK (Bull. Soc. Chim. Yougoslav., 1933, 4, 137—143).—The turbidityconcn. curve of the system AgNO₃-KX (X=Cl, Br, I) has two well-defined max., corresponding with certain optimum relative concess of the substrates. It is inferred that the first stage of the process consists in the formation of particles of colloidal dimensions, which then undergo aggregation to yield micro- and macro-crystals of AgX. R. T.

Adsorption of the vapours of certain dichlorohydrocarbons by activated charcoal. IV. J. N. PEARCE and J. F. EVERSOLE (J. Physical Chem., 1934, 38, 383–393).—The adsorption of the vapours of [CH₂Cl]₂ (I), CHMeCl₂ (II), CHMeCl·CH₂Cl (III), and $CH_2(CH_2CI)_2$ (IV) on charcoal has been determined between 0° and 136°. Within the pressure range employed the adsorption is expressed by the simple Langmuir equation for adsorption on a plane surface. Both the natural and Langmuir isotherms have been plotted for these vapours and for the Cl-derivatives previously studied at temp. corresponding with the b.p. of the pure liquids. The Langmuir equation applies, but not the Freundlich equation. At very low pressures the amount of vapour adsorbed is greatest for the compound of greatest mol. wt., largest mol. vol., and highest b.p. Similar relations hold with increase in the no. of Cl atoms in the mol. At higher pressures the reverse is the case. The influence of the no. and position of the Cl atoms is discussed. The heats of adsorption in g.-cal. calc. from the slopes of the isosteres are (I) 11,500, (II) 10,965, (III) 13,160, and (IV) 13,700. M. S. B.

Adsorption of ethylene, ethane, and hydrogen in relation to hydrogenation of ethylene. R. KLAR (Z. physikal. Chem., 1934, 168, 215–226). The adsorption at about $0-200^{\circ}$ of H_2 , C_2H_6 , C_2H_4 , and mixtures of C_2H_4 and C_2H_6 on a Ni catalyst pre-pared from NiC_2O_4 and therefore containing NiO and CO has been examined. In the adsorption of C_2H_4 there is both van der Waals adsorption, which is practically instantaneous, and activated adsorption, which is slower. The rate of hydrogenation of C_2H_4 on the catalyst was a max. at about 130°, the fall at higher temp. being ascribed to rapid diminution in the concn. of adsorbed C₂H₄. The catalyst was poisoned by H_2 , probably owing to the latter being stabilised on the surface as a CO complex. With this catalyst the active-adsorbed C₂H₄ plays the chief part in the hydrogenation, and the acceleration of the activated adsorption with rise in temp. is responsible for the initial rise in reaction velocity with temp. R. C.

Adsorption of hydrogen by copper poisoned with cyanogen. C. W. GRIFFIN (J. Amer. Chem. Soc., 1934, 56, 845—847).—Measurements at 0° show that C_2N_2 decreases the adsorption of H_2 , especially at low pressures. The effect of C_2N_2 is compared with that of CO. E. S. H.

Adsorption of water vapour by magnesium oxide. F. ISHIKAWA and K. SANO (Sci. Rep. Tôhoku, 1934, 23, 129—138).—MgO first adsorbs H_2O vapour and the adsorption equilibrium is established before chemical combination to Mg(OH)₂ takes place. The velocity of adsorption of H_2O vapour from air at $21.5\pm0.5^{\circ}$ has been determined. The adsorption isotherm at 51° may be expressed by Freundlich's formula. The relation between temp., pressure, and amount adsorbed (a c.c.), for the temp. range $9-42^{\circ}$, is given by log p/aT=2.9483-2179.77/T.

M. S. B. Sorption of vapours by alumina. II. Benzene. L. A. MUNRO and F. M. G. JOHNSON (Canad. J. Res., 1934, 10, 321–332; cf. A., 1926, 347).—The amount of C_6H_6 sorbed per g. of Al_2O_3 gel varies with the extent of dehydration of the gel. Expressed as g. sorbed per g. of "active" Al_2O_3 , a const. val. is obtained for gels of different H_2O content. The plot of log x/m against log p is a straight line and Patrick's equation (cf. A., 1920, ii, 417) holds at lower relative pressures. Comparison with the data for H_2O does not bring out any notable differences such as might be expected if chemical forces were operative. R. S.

Adsorption of wool-violet (4BN) by lead sulphate and the influence of the adsorbed dye on the speed of kinetic exchange. I. M. KOLTHOFF, W. von FISCHER, and C. ROSENBLUM (J. Amer. Chem. Soc., 1934, 56, 832-836).—At saturation 1 ion of the dye is adsorbed by 1.5 ions of Pb^{**} when the supernatant liquid is neutral, thus permitting the sp. surface of PbSO₄ to be measured. In acid solution the amount of dye adsorbed increases. Adsorption is of the exchange type, and the replaced SO₄^{**} causes pptn. of some PbSO₄ from the supernatant liquid. When coarsely-cryst. PbSO₄ is shaken in 0.01N-HNO₃, recrystallisation occurs; this process is prevented by adsorbed wool-violet. E. S. H.

Aminolysis and adsorption. K. WUNDERLY (Helv. Chim. Acta, 1934, 17, 523-531).—Animal C adsorbs more HCl or NaOH than sugar C and is the more powerful aminolytic agent. Adsorption isotherms of aspartic acid and alanine on animal C and sugar C and of phenylalanine, serine, leucine, and hydantoic acid on animal C have been determined. E. S. H.

Adsorption of calcium and copper from ammoniacal medium by silica gel. I. M. KOLT-HOFF and V. A. STENGER (J. Physical Chem., 1934, 38, 475–486).—Ca(OH)₂ is much more strongly adsorbed by SiO₂ gel than NaOH or KOH, owing to the slight solubility of Ca silicate. The presence of NH_3 up to 0.3N increases the adsorption of $Ca(OH)_2$ because the former, by its solvent effect on the gel, widens the pores, and the NH₄ silicate formed reacts chemically with $Ca(OH)_2$ in the interior of the gel. Addition of NH_4 salts decreases the p_H and increases the solubility of Ca silicate, thus decreasing the adsorption of $Ca(OH)_2$. Cu" from dil. aq. NH_3 is adsorbed as a complex ammino ion. A silicate is formed at the surface, $Cu(NH_3)_2(H_2O)_2SiO_3$, and this, on keeping, loses NH_3 and becomes $Cu(NH_3)(H_2O)_3SiO_3$. On electrodialysis this loses its last NH3, the gel changing colour from blue to green. NH4Cl decreases the adsorption of the ammino ion. M. S. B.

Adsorption of alkali hydroxides by silica gel in the presence of ammonia and ammonium salts. I. M. KOLTHOFF and V. A. STENGER (J. Physical Chem., 1934, 38, 249—258).—In the adsorption of KOH and NaOH by SiO₂ gel a primary adsorption of OH' takes place. The surface of the gel is thus ionised and a secondary adsorption of the alkali ions occurs. The adsorption of strong alkali hydroxides cannot be determined exactly, owing to the solvent action on the gel. Since the adsorption is ionic, NH, is much less readily adsorbed than NaOH or KOH of the same concn. K salts increase the adsorption of KOH, but NH₄ salts do not affect that of NH₃. The amount of total base adsorbed from a mixture containing NH₄[•] and K[•] is primarily a function of the OH[•] concn., but the ratio in which NH₃ and KOH are adsorbed is mainly determined by the ratio of NH₄[•] to K[•] in the solution, and the secondary adsorption of NH₄[•] is actually stronger than that of K[•].

M. S. B.

III. Com-Absorption of dyes by cellulose. parison of the absorption of benzopurpurin 4B with that of sky-blue FF. J. HANSON and S. M. NEALE. IV. Absorption of related dyes of the disazobenzidine class with reference to their molecular structure. L. H. GRIFFITHS and S. M. NEALE (Trans. Faraday Soc., 1934, 30, 386-394, 395-403; cf. A., 1933, 1241).-III. The equilibrium wt. (w) of benzopurpurin 4B (I) absorbed by sheet viscose (II) rises rapidly with added NaCl, and a given increase in [NaCl] produces a rise of w > that effected by a proportional increase in the final concn. of dye in the bath. The rate of absorption of (I) by (II) accords with the diffusion theory, and with increasing [NaCl] the apparent diffusion coeff. rises rapidly to a max. The absorption equilibrium of sky-blue FF is attained approx. twice as rapidly as that of (I), but (I) is thrice as strongly absorbed, and in the absence of NaCl both dyes are feebly absorbed, but (I) has the stronger affinity.

IV. The absorption of the dyes by viscose is $2-3\cdot5$ fold that by bleached cotton, but the ratio is affected by the substituents. Substitution in the *o*-position of the benzidine nucleus does not greatly affect the substantivity, *S*, of the product, but a ten-fold decrease occurs with *m*-substitution. The no. and position of SO_3H groups attached to the $C_{10}H_8$ nucleus affect *S*, and in the cases examined the vals. of *S* for the dyes with four SO_3H are < for those containing only two such groups, whilst substitution of NH_2 for OHincreases *S*. J. G. A. G.

Electrolytic adsorption of iron by viscose rayon and other fibres. K. TANEMURA, H. KOHNO, and K. NISHIMURA (J. SOC. Chem. Ind. Japan, 1934, 37, 89–90B).—Viscose rayon, silk, cotton, and wool behave similarly. Adsorption is a max. at $p_{\rm H}$ 2·5—3·0 for FeCl₃ and at $p_{\rm H}$ 4·0—5·5 for FeSO₄, the adsorbed ions being $[mFc_2O_3,nCl,xH_2O]FeO$ and $[HFcO_2,Cl,H_2O]FeO'$, respectively. The ions Fe'' and $[HFeO_2,Cl,H_2O]FeO_2'$ and negatively-charged $Fe(OH)_3$ sol are not adsorbed. A. G.

Imbibition of liquids by porous bodies. (MILE.) P. BERTHIER (Compt. rend., 1934, 198, 1607– 1609).—The theory of Guye and Saini (Helv. phys. Acta, 1929, 2, 445), relative to the heights of ascent of liquids in porous bodies is extended to the case of descent and checked by experiments with filter-paper. B. W. B.

Adhesion tension of liquids against strongly hydrophilic solids. A series of liquids against barytes. F. E. BARTELL and H. Y. JENNINGS (J. Physical Chem., 1934, 38, 495-501).—A receding contact angle method for determining adhesion tension is described, and also an improved method for preparing membranes from finely-divided powders by tamping. The adhesion tension of $C_2H_2Br_4$, $1-C_{10}H_7Br$, C_6H_6 , C_7H_{16} , and BuOAc against barytes is given. Comparison of the vals. for these liquids against several hydrophilic solids shows that corresponding vals. are of nearly the same magnitude. Hence it is concluded that surfaces of strongly hydrophilic solids are covered with an adsorbed film of H_2O and, as a result, their measured free surface energy vals. are of the same order of magnitude. M. S. B.

Alteration of the surface properties of stibnite as revealed by adhesion tension studies. F. E. BARTELL and C. W. WALTON, jun. (J. Physical Chem., 1934, 38, 503—511).—Determinations of the adhesion tension of liquids against stibnite (cf. preceding abstract) show that whilst stibnite itself is hydrophobic, oxidation by heating causes it to become progressively more hydrophilic, although the appearance of the surface, the particle size of powder, and the pore radii remain unaltered. A condition may be reached in which there are no preferential wetting properties. Treatment with H_2S restores the original hydrophobic surface. Two qual. tests for studying the condition of the powders are described, viz., the "drop on powder test" and the "degree of packing on settling test."

M. S. B.

Adsorption at the surface of solutions. III. Surface structure of solutions of lower aliphatic alcohols. J. A. V. BUTLER, A. WIGHTMAN, and W. H. MACLENNAN. IV. Adsorption constants in solutions containing two solutes. F. R. HIMSWORTH and J. A. V. BUTLER (J.C.S., 1934, 528-532, 532-535).—III. The surface tensions of aq. solutions of MeOH and Pr^aOH have been determined at 25°. The Gibbs adsorption decreases at higher concn. of alcohol, and although the data for aq. MeOH are consistent with a single adsorbed layer at the surface, those for aq. Pr^aOH suggest a more elaborate surface structure, e.g., a complete layer of Pr^aOH mols. which are associated with H₂O mols. in nearly the same proportion and in the same way as in the bulk of the solution.

IV. The surface tensions of ternary mixtures of H_2O containing 0—1.5 g.-mol.-% of Bu^oOH (I) with either 0-4 g.-mol.-% of EtOH (II) or EtCO₂H (III) have been determined at 25°. (I) and (II) do not affect each other's adsorption consts. when present together in the surface layer, but the observed vals. for H_2O -(I)-(III) are < those calc. from the consts. of the binary solutions, showing that (III) decreases the adsorption of (I) to an extent > that corresponding with the area it occupies. This is the reverse of what might be expected if ester formation occurred. J. G. A. G.

Phase boundary potentials of monolayers of long-chain fatty acids. N. W. H. ADDINK and E. K. RIDEAL (J. Chem. Physics, 1934, 2, 144).—The behaviour of the stable and metastable liquid expanded and condensed states of myristic acid has been investigated. The changes in the properties of a compressed liquid expanded film suggest a micellar structure for the film, and are interpreted on the view that during the fall of potential with time, H_2O is squeezed out from the space between the chains. N. M. B.

Electrokinetic potentials and mineral flotation. H. B. BULL, B. S. ELLEFSON, and N. W. TAYLOR (J. Physical Chem., 1934, 38, 401-406).-The cataphoretic velocity of a no. of minerals suspended in pure H₂O has been determined by the use of a microcell. Carbonates, Pb oxides, and PbSO4 carry a positive charge. The effect of the addition of electrolytes on the electrokinetic potential (I) of galena, quartz, and sphalerite has been examined. The floatability of galena varies directly as the potential on the par-ticles in the case of Ag', Pb", Cd", Co", Ba", and Mg", and the order of toxicity of the nitrates, Ag>Pb>Cd> Co, is exactly that of the ability of the cation to reduce (I) of galena. This, in combination with earlier work on flotation (B., 1929, 521), shows that peptisation rather than flocculation is necessary for good flotation, when followed by the addition of suitable collecting agents. M. S. B.

Cryoscopic study of aliphatic alcohols. T. J. WEBB and C. H. LINDSLEY (J. Amer. Chem. Soc., 1934, 56, 874—878).—A fairly rapid procedure for determining f.-p. depressions of aq. non-electrolytes with an accuracy of about 0.1% is described. Data are recorded for nine aliphatic alcohols and for CH₂Ph·OH over the conen. range 0.01—0.2 or 0.5M. E. S. H.

Cryoscopic studies in anhydrous acetic acid. W. C. EICHELBERGER (J. Amer. Chem. Soc., 1934, 56, 799-803).—The f.-p. apparatus described gives an accuracy of 0.0001° with AcOH as solvent. NH₄NO₃ (0.005-0.05M) behaves as though present in at least binary ion pairs; 0.1M-H₂SO₄ behaves as though highly associated in the Bjerrum sense. Both electrolytes deviate widely from the predictions of the Debye-Hückel limiting law. E. S. H.

Non-electrolyte solutions. G. SCATCHARD (J. Amer. Chem. Soc., 1934, 56, 995–996).—Polemical (cf. Chem. Rev., 1931, 8, 321; Hildebrand and Wood, this vol., 146). E. S. H.

Non-electrolyte solutions. J. H. HILDEBRAND (J. Amer. Chem. Soc., 1934, 56, 996).—Polemical (cf. preceding abstract). E. S. H.

Physical chemistry of amino-acids, peptides, and related substances. I. Apparent molal volume and the electrostriction of the solvent. E. J. COHN, T. L. MCMEEKIN, J. T. EDSALL, and M. H. BLANCHARD (J. Amer. Chem. Soc., 1934, 56, 784-794).—Analysis of the apparent mol. vols. of NH₂-acids and peptides in terms of the internal CH₂ and CO·NH groups, and of the NH₂ and CO₂H groups shows that the dimensions of the internal groups are identical with those of the same groups in the liquid state. On the assumption that the smaller mol. vols. of the terminal groups are due to electrostriction, the apparent mol. vols. of the uncharged NH2 and CO2H have been determined from the mol. vols. of fatty acids, amides, amines, and hydantoic acid. The vals. obtained indicate that $CO(NH_2)_2$ and hydantoic acid are not zwitterions and that a large proportion of the mols. of m-NH2.C6H4.CO2H are zwitterions. Separation of the charged groups from each other in a zwitterion increases electrostriction. E. S. H.

F.p. of aqueous solutions. V. Potassium, sodium, and lithium chlorates and perchlorates.

G. SCATCHARD, S. S. PRENTISS, and P. T. JONES (J. Amer. Chem. Soc., 1934, 56, 805–807; cf. this vol., 25).—Data are recorded for f.p. and electrical conductivity. Discussion is reserved. E. S. H.

F.p. of aqueous solutions. VI. Potassium, sodium, and lithium formates and acetates. G. SCATCHARD (J. Amer. Chem. Soc., 1934, 56, 807— 811).—Data are recorded for concus. from about 0.001M to about 1.1M. Correlation of the results with those obtained for other salts shows that the polyat. anions can be divided into two classes, which deviate in opposite ways from the noble gas type ions. The deviations of OAc' and HCO₂' are explained by the concus. of the ionic charge near the surface. This effect and the presence of dipoles are unimportant factors in the case of NO₃', ClO₃', and ClO₄'.

E. S. H.

Cryoscopic determination of the total hydration of the ions of lithium chloride. F. BOURION and E. ROUYER (Compt. rend., 1934, 198, 1490—1492; cf. this vol., 361).—The hydration in 0.5*M*- and 1.0*M*-LiCl corresponds with LiCl,15.0 aq. and LiCl,17.8 aq., respectively. B. W. B.

Cryoscopic technique. G. SARTORI (Gazzetta, 1934, 64, 21—32).—Hovorka's method has been modified and rendered suitable for the study of more dil. solutions. Measurements with solutions of K molybdo-(I) (0.012—0.067*M*) and tungsto-quinate (II) (0.010—0.108*M*) are described. For (I) the results are closely in accordance with theory, but for (II) they are somewhat scattered. The vals. of *a* and *b* in the equation $t=a-bm^{\frac{1}{4}}$ are 5.547 and 2.318 for (I) and 5.521 and 1.781 for (II), respectively. H. F. G.

Calculation of partial molal solute quantities as functions of the volume concentration, with special reference to the apparent molal volume. F. T. GUCKER, jun. (J. Physical Chem., 1934, 38, 307-317).—A simple method of calculating the apparent molal vol., $\phi(V_2)$ as a function of c- is described. The ratio c/m is a sp. property of the individual solute depending on $\phi(V_2)$ and varying from 1 to < 0.8. A general equation has been developed for calculating any partial molal solute quantity G_2 from the corresponding apparent property $\phi(G_2)$ as a function of c, and also a special equation applicable when ϕ is a linear function of $c^{\frac{1}{2}}$. These equations are applied to the calculation of the partial mol. vol. of NH₄NO₃, and the val. agrees with that of Adams and Gibson (A., 1933, 120) calc. from curves of apparent sp. vol. plotted against the square root of the wt. fraction, but the vol. concn. method is probably simpler and more in accordance with theory. M. S. B.

Computation of the partial volumes of the components in aqueous solutions. R. E. GIBSON (J. Physical Chem., 1934, 38, 319—326).—Partial vols. of NaCl, Na₂SO₄, KCl, KI, and LiNO₃ in solution have been calc. from vol. concn. (c_2) data using Gucker's function f (cf. preceding abstract). Except for LiNO₃ the vals. are trustworthy to within 1%, and the use of a deviation curve gives still higher accuracy. If the plot of f against $\sqrt{c_2}$ is so strongly curved that higher powers of $\sqrt{c_2}$ have to be used, either wt. or vol. concn. may equally well be employed. M. S. B. Dielectric constants of aqueous solutions of electrolytes at 30 cm. wave-length. H. STIPS (Z. Physik, 1934, 88, 197–209).—MgSO₄ and CuSO₄ solutions obey the Debye–Falkenhagen theory at high dilution, but at higher concess. the const. appears to increase linearly with the conductivity.

A. B. D. C.

Physical characterisation of dissolved ions from f.p. and conductivity of very dilute aqueous solutions of tetra-alkylammonium halides. J. LANGE (Z. physikal. Chem., 1934, 168, 147-187).-Conductivity and f.-p. measurements have been made at concns. of about 0.001 - 0.03N. At the highest dilutions the Debye-Hückel equations for the conductivity coeff., f_{μ} , and the osmotic coeff., f_0 , are valid, but at lower dilutions the vals. of $(1-f_0)$ and $(1-f_{\mu})$ differ from the theoretical vals. by amounts which are proportional to the concn., but vary from one salt to another. These divergences cannot be accounted for either by the effect of the Debye-Hückel parameter a or by incomplete dissociation; some as yet unknown physical function is required for the characterisation of dissolved ions. There is some form of physical interaction of ions not covered by any of the present theories which has a dominant effect on the behaviour of certain strong electrolytes in dil. aq. solution.

R. C.

Magnetic susceptibilities of the ions of uranium in aqueous solution. R. W. LAWRENCE (J. Amer. Chem. Soc., 1934, 56, 776–783).—Data are recorded for UO_2 ", U"", UO", and U" at different [H"]. Derived magnetic moments in Bohr magnetons are 2.97 for U"", 2.73 for UO_2 ", and 3.22 for U". E. S. H.

Chemical and physico-chemical properties of polonium. HI. Determination of diffusion coefficient of polonium in solution. Theoretical study and results. General conclusions. M. SERVIGNE (J. Chim. phys., 1934, 31, 211-226).—The diffusion coeffs. at 18° in 0·1N-HCl, $-HNO_3$, $-H_2C_2O_4$, and $-H_2SO_4$ are 0·78, 0·80, 1·06, and 0·47, respectively; it is inferred that the complex Po oxalate ion is univalent and that the complex Po chloride and nitrate ions are bivalent. (Cf. this vol., 484.) J. G. A. G.

Accelerated diffusion in dye solutions. S. LENHER and J. E. SMITH (J. Amer. Chem. Soc., 1934, 56, 999—1000).—The rate of diffusion in aq. solution of Na *p*-sulphobenzeneazobenzeneazo-6-benzamido- α naphthol-3-sulphonate is affected greatly by [NaCl] in the solution into which diffusion occurs. E. S. H.

Theory of Brownian movement. Distribution function f(v, x, t) and the diffusion equation. J. A. KRUTKOV (Compt. rend. Acad. Sci. U.R.S.S., 1934, 1, 393-398).—Mathematical. W. R. A.

Linear problem in the theory of the Brownian motion. J. A. KRUTKOV (Compt. rend. Acad. Sci. U.R.S.S., 1934, 1, 479-485).—Mathematical.

J. W. S.

So-called colloidal iron sulphide. J. CASARES (Anal. Fís. Quím., 1933, 31, 638-644).—When an excess of Na₂S solution is added to a solution of FeSO₄ and the mixture is oxidised by a current of air or by H_2O_2 , an intensely green solution, or, with more conc. solutions, a green ppt., is formed; on further oxid-

ation, black and then red substances are produced. The green compound is probably $Na_2Fe_2S_4$ or $NaFeS_2$, substances of approx. these compositions being pptd. when NaCl is added to the green solutions. The colour of certain natural waters containing S is probably caused by the presence of such compounds in colloidal solution. H. F. G.

Specific inductive power of colloidal solutions. T. NANTY and M. VALET (Compt. rend., 1934, 198, 1308).—Particulars are given of a very sensitive null arrangement for use with feebly-conducting solutions. W. R. A.

Optical investigation of sols of cellulose derivatives. I. Light-scattering capacity of cellulose ester sols. R. SHINODA (J. Cellulose Inst. Tokyo, 1934, 10, 54—62).—The scattering of light by solutions of cellulose nitrate increases at first rapidly and then slowly with increasing concn. It increases slightly with falling temp., and considerably if H_2O is added to a COMe₂ solution. It is not affected by the N content (11.85—12.29%). A. G.

Osmotic pressure of gum acacia solutions. E. C. DODDS and R. T. M. HAINES (Biochem. J., 1934, 28, 499–503).—Aq. gum acacia solutions (2-6%)have an osmotic pressure (I) \propto the concn. The presence of NaCl (0.9%) reduces (I) for the 6% solution from 78.4 cm. H₂O to about 12.0 cm. Sterilisation by heat increases (I) by \Rightarrow 50%, whilst saturation with thymol produces a 5% diminution. W. O. K.

Emulsions. II. Proteins and allied substances as emulsifiers for organic bases. R. M. WOODMAN (J.S.C.I., 1934, 53, 115-116T; cf. this vol., 363) .-- Proteins and allied substances generally yield the dual types of emulsions with the org. bases used; an aq. medium of dried egg is an exception, giving only oil-in-H₂O types, possibly because of its lecithin content. Instability and gel formation sometimes make verification of type difficult or impossible. The preponderance of the evidence in these systems (and in former experiments with protein emulsifiers and phenolic liquids) appears to indicate that the mechanism of dual emulsion formation with proteinlike emulsifiers is due to the formation of protein complexes with one or both liquid phases, these complexes being able to act as alternative or opposite-type emulsifiers to other emulsifiers present (e.g., protein itself).

Coagulation of colloids. VII. Some anomalous variations of viscosity during the coagulation of ferric hydroxide and antimony sulphide sols. S. S. JOSHI and A. S. NANJAPPA (J. Indian Chem. Soc., 1934, 11, 133—143; cf. this vol., 253).—Rates of change of viscosity of $Fe(OH)_3$ and Sb_2S_3 sols have been measured in the "slow" region of coagulation by various electrolytes. J. S. A.

 $p_{\rm H}$ of sols after coagulation with electrolytes. S. RAYCHOUDHURY, A. SEN, and A. CHATTERJEE (J. Indian Chem. Soc., 1934, 11, 13–21).—The $p_{\rm H}$ of Fe(OH)₃, As₂S₃, and Al(OH)₃ sols after coagulation depends on the nature of the added electrolyte, but bears no simple relation to its coagulating power. The same is true of [Cl'] in the case of Fe(OH)₃ and Al(OH)₃ sols. R. S.

Relation of the dispersion of gold sol to the intensity of reduction as influenced by $p_{\rm H}$ and a one-way effect produced in gold chloride by changes of p_{π} through certain ranges. (MISS) W. ASHBY (J. Physical Chem., 1934, 38, 427-447).-The effect of variation in the amount of K₂C₂O₄, glucose, and CH₂O on the colour of Au sol, and on the rate and temp. of reduction, has been studied. The relation of alkalinity to the formation of Au sol with CH_2O and $K_2C_2O_4$ has been determined. The use of Na₂HPO₄ instead of NaOH or Na₂CO₃ results in greater consistency in the production of Au sol by reduction processes, owing to the buffering action by which it maintains the optimum $p_{\rm H}$ val. throughout the reaction. The colour and quality of the sol do not depend on the character of the reducing agent, as generally supposed, but on the use of an amount of reducing agent near to the min. with the appropriate degree of alkalinity. There is a time lag in the rate of change of colour of $AuCl_3$ on making alkaline, but not on acidification. The causes of this behaviour are discussed. M. S. B.

Chromium oxychloride hydrosols. A. W. THOMAS and F. C. VON WICKLEN (J. Amer. Chem. Soc., 1934, 56, 794—798).—The change of $p_{\rm H}$ with age is attributed to the tendency of basic Cr^{···} salts to polymerise in aq. solution. E. S. H.

Formation of organic jellies. I. S. PRAKASH (Allahabad Univ. Studies, Sci. Sec., 1933, 10, 257– 283).—Published work on methods of prep. is reviewed. E. S. H.

Heat capacity measurements on gelatin gels. II. W. F. HAMPTON and J. H. MENNIE (Canad. J. Res., 1934, 10, 452-462).—Measurements of the heat capacity (c) of 9-100% gelatin gels at -180° to 25° show that freezing occurs at conen. > 61%. The c-composition curves are linear at lower conen., but irregular at higher conen., which suggests that above 61% all the H₂O is bound. For the H₂O in gels of > 70% c is > 1 between 0° and 25°. This invalidates previous calculations of amounts of bound H₂O. A. G.

Constitution of lithium urate gel. H. HENSTOCK (Trans. Faraday Soc., 1934, 30, 403-406).—Li urate gel is not formed from the Li₁ salt, but by neutralising uric acid (I) with LiOH. It is suggested that in the sol the LiOH mol. reacts without loss of H by (I), which is in the more soluble enol form, but returns to the keto-form in the gel, the LiOH forming a chelate ring. At 100° the ring is ruptured with elimination of H₂O, and anhyd. Li urate is formed. J. G. A. G.

Molecular weight, molecular volume, and hydration of proteins in solution. M. KUNITZ, M. L. ANSON, and J. H. NORTHROP (J. Gen. Physiol., 1934, 17, 365–373).—The H_2O of hydration per g. dry wt. of hæmoglobin, isoelectric gelatin, and cryst. gelatin calc. (a) from osmotic pressure and diffusion measurements and (b) from viscosity measurements is (a) 0-0.14, 5.8, 0.54; (b) 0.13, 5.9, 0.49. A. L.

Refractivity of heat-denatured ovalbumin. H. A. BARKER (J. Biol. Chem., 1934, 104, 667—673).— The sp. refractive increment of ovalbumin [(n solution -n solvent)/concn. (in g. per 100 c.c.)] is 0.00185 ± 0.00002 . The refractivity increases during denaturation in alkaline solution. W. O. K.

Colloid-colloid reactions. IV. Protective effect of gum arabic and proteins. W. PAULI, E. RUSSER, and G. SCHNEIDER (Biochem. Z., 1934, 269, 158-174; cf. A., 1932, 996).-When 90% of the ash-forming content is removed from gum arabic sol (I) by electrodialysis, (I) loses its protective power (II) towards highly purified Congo-blue and Au sols. (II) is restored by addition of MgO, ZnO, or the ash (which contains MgO), but not by neutralisation with NaOH or $Ca(OH)_2$. Positive colloids [night-blue, Fe(OH)₃] give colloid-colloid flocculation (III) with purest (I), exhibit (II) towards electrolytes (IV), and, in the region of nuclear aggregation, have sensitising effects (V) dependent on the charge and concn. of the sols. Neutral salts do not protect (I) against (III). With purest (I) and pure lyophobic negative colloids there is neither (V) nor (III), only (IV) being protocted against pptn. W. McC.

Combination of formaldehyde with aminoacids and proteins.—See this vol., 635.

Plant colloids. XXXV. Solution state of isohexosans.—See this vol., 637.

Regularities of chemical structure. (MLLE.) S. VEIL (J. Phys. Radium, 1934, [vii], 5, 141—144).— Regularities in structure have been observed in the pptn. of Ag_3AsO_4 , Ag_3PO_4 , HgI, and SrCO₃ in a gelatin medium, in the electrolytic pptn. of colouring matter, and in the crystallisation by diffusion of alkali carbonates in gelatin. The regularities, as for Liesegang rings, are governed by the sq. root law (cf. A., 1932, 994). N. M. B.

Condition of silver chromate, silver iodide, and lead iodide in gelatin. B. M. NAIK, H. N. DESAI, and B. N. DESAI (J. Indian Chem. Soc., 1934, 11, 45-57).—The conductivity of the mixtures varies immediately after mixing, but does not alter with the subsequent colour change, which is attributed to the agglomeration of a highly disperse ppt. The amount of Ag_2CrO_4 , PbI₂, and AgI remaining in the ionised condition has been examined. R. S.

Influence of acidity of gelatin on the Liesegang rings of silver chromate and silver iodide. B. N. DESAI and B. M. NAIK (J. Indian Chem. Soc., 1934, 11, 59—64; cf. A., 1932, 807).—The best rings of Ag₂CrO₄ were obtained in gelatin of $p_{\rm H}$ 5·0—5·25, but equally good rings of AgI appeared over the whole range investigated. The distance between successive rings of AgI first decreases and then increases, whilst the distances between the same successive rings vary inversely as $p_{\rm H}$. R. S.

Anodic oxidation in a gelatin medium. (MLLE.) S. VEIL (Compt. rend., 1934, 198, 1396—1398).— When gelatin is subjected to a p.d. between embedded oxidisable electrodes, the anodic oxidation products (I) (e.g., of Fe with p.d. of 4 volts) migrate towards the cathode and form a sharp boundary (II) to the swollen cathode zone (cf. A., 1933, 1005). Anodes of Ag, Ni, Al, Pb, and Cu behave similarly. The positive polarity of (I) appears to be reversed by the occurrence of chemical reactions at (II). B. W. B. Diffusion of soluble iron compounds in vitro. Effect of acids, bases, and electrolytes. J. F. BROCK and F. H. L. TAYLOR (Biochem. J., 1934, 28, 447-455).—The rate of diffusion of Fe^{III} NH₄ citrate through cellophane membranes is increased by H^{*} and decreased by OH^{*}. H. D.

Donnan equilibrium and its application to chemical, physiological, and technical processes. T. R. BOLAM (Kolloid-Beih., 1934, 39, 139-258).-A comprehensive survey of published work.

E. S. H.

Chemical energetics. F. MICHAUD (J. Chim. phys., 1934, 31, 197-210).—Theoretical. The laws and concepts of chemistry are discussed with reference to thermodynamics and certain postulates.

J. G. A. G.

Activities of life and the second law of thermodynamics. F. G. DONNAN and E. A. GUGGENHEIM (Nature, 1934, 133, 530; cf. *ibid.*, 174). L. S. T.

Activities of life and the second law of thermodynamics. (SIR) J. H. JEANS (Nature, 1934, 133, 612).—A reply to criticism (cf. preceding abstract). L. S. T.

Law of displacement of chemical equilibrium. H. LE CHATELIER (Compt. rend., 1934, 198, 1329– 1330; cf. A., 1933, 783).—A reply to criticism (Posthumus, this vol., 490). B. W. B.

Dissociation constant of hypochlorous acid, deduced from the potentiometric neutralisation curve. A. RIUS and V. ARNAL (Anal. Fís. Quím., 1933, 31, 497-509).—The dissociation const. of HOCl at 25° is 1.46×10^{-7} . H. F. G.

Ionisation constant of deutacetic acid. G. N. LEWIS and P. W. SCHUTZ (J. Amer. Chem. Soc., 1934, 56, 1002—1003).—Conductivity measurements for 0.0722M- and 0.1444M-deutacetic acid in 97% H₂O at 25° yield the val. $K=0.59\times10^{-5}$. E. S. H.

Dissociation constants of chlorophenyl- and phenetyl-boric acids.—See this vol., 669.

Ionisation constant and heat of ionisation of the bisulphate ion from electromotive force measurements. W. J. HAMER (J. Amer. Chem. Soc., 1934, 56, 860—864).—The dissociation const. of HSO₄', determined from e.m.f. measurements of the cells H₂|NaHSO₄(m_1),Na₂SO₄(m_2),NaCl(m_3)|AgCl| Ag⁺, can be calc. at any temp. between 0° and 60° with an accuracy of 1% from log K = -1387.6/ $T+1.15612 \log T-0.00001355T-0.000038182T^2+$ 3.27632. Formulæ are derived for calculating the heat of ionisation of HSO₄' and the differences in sp. heats of the ions and undissociated HSO₄'. E. S. H.

Thermodynamic dissociation constant of a weak base. E. J. ROBERTS (J. Amer. Chem. Soc., 1934, 56, 878–879).—The const. for BOH may be derived from e.m.f. measurements of the cell Tl(Hg)| $TlClO_4(m_1),BClO_4(m_2),BOH(m_3)|H_2$. E. S. H.

Applicability of the Debye-Hückel theory to non-aqueous solutions. A. J. BRODSKI and F. I. TRACHTENBERG (Compt. rend. Acad. Sci. U.R.S.S., 1934, 1, 490-493).—The distribution of LiCl between H_2O and *iso*amyl alcohol has been studied over the range 8.6—0.15 mol. per kg. aq. solution, and the activity coeff. of LiCl in the alcohol cale. from the data. The results indicate that the Debye-Huckel theory is applicable to this class of solution.

J. W. S.

Statistical "interaction between ions and molecules" in media of small dielectric constant. 0. HALPERN and P. GROSS (J. Chem. Physics, 1934, 2, 184—187).—The general theory is discussed with reference to Debye's theory of the salting-out effect. Formulæ for the free energy of interaction between ions and dipoles are deduced, and applied to the ionic equilibrium in a medium of low dielectric const.

N. M. B.

Electrolytes in media of small dielectric constant. P. GROSS and O. HALPERN (J. Chem. Physics, 1934, 2, 188—192; cf. preceding abstract).—Conductivity data for tetraisoamylammonium nitrate in H_2O -dioxan mixtures can be interpreted by considering the activity coeff. arising from ion-dipole interaction. N. M. B.

Ionic solvation and its determination. G. BABOROVSKY (Z. physikal. Chem., 1934, 168, 135— 140).—After a review of the methods of determining ionic hydration nos. the val. of the method of H_2O transport as a means of determining the sum of the amount of chemically held H_2O and the more firmly bound part of the H_2O of physical hydration is reaffirmed. R. C.

Ionic solvation and its determination. H. ULICH (Z. physikal. Chem., 1934, 168, 141—146; cf. preceding abstract).—A definite dividing line may be drawn between chemical solvation, which is equiv. to formation of a complex ion with the solvent, and physical solvation, *i.e.*, the longer-range effect of the ion on the solvent, diminishing asymptotically, on the basis of hydrodynamic considerations. In the electrolytic transport of H_2O the streaming due to the mechanical action of the moving ions on the H_2O mols. in their vicinity cannot be neglected. R. C.

Hydrolysis of beryllium benzenesulphonates. V. CUPR and J. SIRUČEK (Coll. Czech. Chem. Comm., 1934, 6, 97—100).—Measurements of $p_{\rm H}$ with aq. Be o-nitrotoluene-*p*-sulphonate by means of a quinhydrone electrode indicate that 0.25-0.1N solutions are slightly less acidic than those of the corresponding acids, whilst in more dil. solution the acidity is comparable with that of BeSO₄ and BeCl₂. D. R. D.

Polyhalides. III. S. K. RAY (J. Indian Chem. Soc., 1934, 11, 115—124; cf. A., 1933, 904).—Equilibrium consts. for the formation of trihalide ions are calc from the solubility of Br and I in solutions of Na, K, Sr, Ba, Zn, and Cd chlorides and bromides. Br gives no const. corresponding with Br₃'. J. S. A.

Complex formation in salt solutions. I. R. W. MONEY and C. W. DAVIES (J.C.S., 1934, 400-403).— Added $(NH_4)_2C_2O_4$ depresses, in the normal manner, the solubility of $BaC_2O_4, 2H_2O$ at 25°; there is no tendency to form complex ions. The solubility of $MnC_2O_4, 2H_2O$ (I) in $MnCl_2$, $K_2C_2O_4$, and $Na_2C_2O_4$ solutions at 25° is much > that calc. from the complete dissociation theory, and the data lead to a dissociation const. of the weak salt, (I), in agreement with vals. from the conductivity. (I) affords no complex cations, but forms a complex anion, $Mn(C_2O_4)_2''$, of which the instability const., $[MnC_2O_4][C_2O_4'']/[Mn(C_2O_4)_2'']$, is 0.037. J. G. A. G.

Application of the polarographic method to the study of complex ions. G. SARTORI (Gazzetta, 1934, 64, 3-16).—The deposition potentials at the dropping Hg cathode of Cd, Zn, Ni, and Co from solutions of the sulphates and of the pyrophosphates and oxalates in presence of alkali chlorides are recorded. The dissociation consts. of the ions of the type (MA₂)" are very small (10⁻⁶ to 10⁻⁸ for the Cd and Zn salts, 10⁻¹⁰ and 10⁻¹⁴ for the Ni and Co salts, respectively). The influence of chloride additions is discussed. H. F. G.

Salt effects of sulphonephthalein indicators. E. A. GUGGENHEIM and T. D. SCHINDLER (J. Physical Chem., 1934, 38, 543—556).—Indicator-buffer equilibria are discussed. $K_c = C_{\rm T} . C_{\rm HA}/C_{\rm HI} . C_{\rm A}$, where $C_{\rm HI}, C_{\rm I}, C_{\rm HA}$, and $C_{\rm A}$ are concess of indicator acid and base and buffer acid and base, respectively, has been determined colorimetrically for bromothymol-blue (I) and bromocresol-green (II) with acetate and phosphate buffers. It can be shown theoretically that the salt effect, which varies with K_c , is linear in phosphate buffers, but parabolic in acetate buffers, the salt effect being very pronounced at low equiv. salt concens. in the latter case. The thermodynamic const. $K_{\rm HI}$ for (II) is 1.03×10^{-5} with an accuracy of 1-2% and for (I) 3.58×10^{-8} with an estimated accuracy of 2-3%. M. S. B.

Formation and dissociation of alkali metal peroxides. M. CENTNERSZWER and M. BLUMENTHAL (Bull. Acad. Polonaise, 1933, A, 499–522).—An account of work previously published (A., 1932, 228, 468). F. L. U.

Thermal dissociation of manganese dioxide. M. BLUMENTHAL (Bull. Soc. chim., 1933, [iv], 53, 1418—1422).—The temp. corresponding with different pressures of O_2 have been determined. Pyrolusite and amorphous and cryst. preps. of MnO_2 contain active centres which cause a lowering of the temp. for previously unheated specimens. There is evidence of limited miscibility between MnO_2 and Mn_2O_3 . Heats of dissociation are calc. F. L. U.

Dissociation pressure of cobalto-cobaltic oxide. M. WATANABE (Sci. Rep. Tôhoku, 1934, 23, 89—012).— The dissociation pressure of Co_3O_4 has been determined at 855—960°. Co_3O_4 and CoO form solid solutions and below 928° two such solutions co-exist over a considerable range. At 960° the system is divariant throughout. For the reaction $\text{Co}_3\text{O}_4=3\text{CoO}+0.5\text{O}_2$, $\Delta H=$ $38,972-0.75T+0.00025T^2$; $\Delta F^\circ=38,972+1.73T 0.00025T^2-36.07T$; and for $3\text{Co}+2\text{O}_2=\text{Co}_3\text{O}_4$, $\Delta H_{298}=-20,6074$ g.-cal. and $\Delta F^\circ=-181,355$ g.-cal. M. S. B.

Dissociation of the nitrites of alkaline-earth metals. M. CENTNERSZWER and W. PIEKIELNY (Bull. Acad. Polonaise, 1933, A, 389—396).—The dissociation of the alkaline-earth nitrites corresponds with $3M(NO_2)_2 = 2MO + M(NO_3)_2 + 4NO$. The dissociation pressures of $Ca(NO_2)_2$, $Sr(NO_2)_2$, and $Ba(NO_2)_2 = 760$ mm. at 316°, 380°, and 362°, respectively. At higher temp. the nitrates dissociate like the corresponding nitrites. J. W. S.

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Phase equilibria in the system Na_2O-TiO_2 . E. W. WASHBURN and E. N. BUNTING (Bur. Stand. J. Res., 1934, 12, 239).—The compounds Na_2TiO_3 (m.p. 1030°), $Na_2Ti_2O_5$ (m.p. 985°), and $Na_2Ti_3O_7$ (m.p. 1128°) have been detected in the system Na_2O-TiO_2 . J. W. S.

System CS_2 - CBr_4 . A. E. KORVEZEE (Rec. trav. chim., 1934, 53, 464-470).—The two three-phase lines have been determined for both monoclinic and cubic CBr_4 . From these measurements and the v.p. of the pure components, the fusion diagram of the system has been derived. The agreement between theory and experiment is good. H. S. P.

Combination of calcium in the systems CaO-TiO₂ and CaO-SiO₂-TiO₂. I. PARGA-PONDAL and K. BERGT (Anal. Fís. Quím., 1933, 31, 623-637).— The free and combined CaO in mixtures heated at temp. between 900° and 1400° have been determined. In the binary system CaO,TiO₂ is formed slowly at 900°, but readily at 1300°, and this yields $3CaO,2TiO_2$ at 1400°; at higher temp. compounds with larger proportions of CaO appear to exist. In the ternary system no titanates richer in Ca than those found in the binary system exist, but small quantities of TiO₂ favour the reaction between CaO and SiO₂. No ternary compounds have been detected. H. F. G.

Isotherms of some ternary systems of metal perchlorates in aqueous solution at 30°. R. M. CAVEN and G. BRYCE (J.C.S., 1934, 514—517).—Contrary to Weinland and Ensgraber, the systems $NH_4(Na,K)ClO_4-Al(ClO_4)_3-H_2O$ and $NH_4ClO_4 Cu(ClO_4)_2-H_2O$ at 30° afford no evidence of double-salt formation. NH_4ClO_4 crystallises from mixtures of NH_4ClO_4 , $Th(ClO_4)_4$, and H_2O at room temp.

₂O at room temp. J. G. A. G. minium oxide-alumin

System aluminium-aluminium oxide-aluminium carbide. E. BAUR and R. BRUNNER (Z. Elektrochem., 1934, 40, 154—158).—M.-p. observations have been made with the binary and ternary mixtures. Al and Al₂O₃ form a compound, 2Al,3Al₂O₃ (m.p. 2051°), the eutectic with Al₂O₃ being at 2016°. In the system Al₂O₃-Al₄C₃ there is a eutectic at 2007°; in mixtures containing $\geq 40\%$ of Al₄C₃ there appear to be only two solid phases, viz., Al₂O₃ and, perhaps, a carbide-oxide. Al₄C₃ mixed with 25% of Al melts at 2650°; there are at least two carbides, of which one, perhaps Al₉C₃, has m.p. about 2500°. In the ternary system there is possibly a ternary compound. The results are discussed in relation to the reduction of Al₂O₃ by C at high temp. H. F. G.

Influence of manganese on the equilibrium diagram of the Fe-Fe₃C-FeS alloys. T. SATÔ (Tech. Rep. Tôhoku, 1934, 11, 122—154).—Increase of the Mn content (between 0.45 and 1.9%) causes an extension, in the direction of low C and low S content, of the range over which two liquid phases co-exist. In absence of Mn the crit. point on the monotectic reaction surface lies at 1300°, 1.07% C, and 8% S, whereas when 1.9% of Mn is present it lies at about 1355°, 0.53% C, and 7.2% S. Increase of the Mn content thus raises the temp. at which the S-rich phase separates as slag, and, since separation occurs upon the austenite grains, causes increased fusion of the surface of the grains and consequently a diminution of

red-shortness. Numerous photomicrographs are reproduced. H. F. G.

Equilibrium in the thermal dissociation of salicylic acid. H. HIRSBRUNNER (Helv. Chim. Acta, 1934, 17, 477—504).—The v.p. and heats of sublimation of pyrogallol and benzoic, salicylic, gallic, and terephthalic acids have been determined. Analytical and manometric investigations over the range $200-250^{\circ}$ (approx.) show that thermal dissociation occurs to about 90—96% and is a reaction of the first order. The heat of formation determined from the equilibrium consts. agrees with that determined calorimetrically. Attempts to prepare salicylic acid from PhOH by the action of CO_2 at 230°/80 atm. were unsuccessful.

Circular reaction and stationary equilibrium. E. BAUR (Helv. Chim. Acta, 1934, 17, 504–510).— A discussion of the failure to synthesise salicylic acid from PhOH and CO_2 (cf. preceding abstract).

E. S. H. Thermodynamic studies of sodium bromide and potassium bromide. F. ISHIKAWA and K. TACHIKI (Sci. Rep. Tôhoku, 1934, 23, 103—114).— The e.m.f. of the following cell has been determined for different concess, of amalgam : X-Hg|XBr(solid)| saturated EtOH-XBr|AgBr|Ag (X=Na or K). The free energies and heats of formation in g.-cal. of XBr from the metal and liquid Br have been cale. For NaBr $\Delta P_{20}^{*} = -83,105$ and $\Delta H_{298} = -86,241$. For KBr the vals. are -90,455 and -94,211, respectively. M. S. B.

Cuprous iodide and cuprous bromide cells with reference to the potential difference between copper and its amalgam. F. ISHIKAWA, S. YAMA-ZAKI, and T. MUROOKA (Sci. Rep. Tôhoku, 1934, 23, 115—128).—The e.m.f. and temp. coeff. of the cell $H_2|HX$ aq., CuX(solid)|Cu(Hg), where X may be Br or I, have been determined. From these data, in conjunction with Oku's results (A., 1928, 1192) for the p.d. between Cu and Cu(Hg), various thermodynamic vals. have been calc. M. S. B.

Latent energy in cold-worked iron and copper as estimated by determination of heats of solution. R. W. FRANCE (Trans. Faraday Soc., 1934, 30, 450-460).—The heats of dissolution of cold-worked and annealed Fe in HCl and Cu in Br solution have been determined; the rates of dissolution are also discussed. R. S. B.

Heat capacities of magnesium, zinc, lead, manganese, and iron carbonates at low temperatures. C. T. ANDERSON (J. Amer. Chem. Soc., 1934, 56, 849—851).—The heat capacities of magnesite, smithsonite, cerussite, rhodochrosite, and siderite have been determined from about 55° abs. to about 300° abs. The corresponding entropies are 15.7, 19.7, 31.3, 20.5, and 22.2, respectively.

E. S. H.

Heat capacities and entropies of potassium bromate and iodate from 15° to 300° absolute. Entropies of bromate and iodate ions. J. E. AHLBERG and W. M. LATIMER (J. Amer. Chem. Soc., 1934, 56, 856—858).—From the data recorded the calc. entropies of KBrO₃ and KIO₃ are 35.65 and 36.20 e.u., respectively, from which 37.4 ± 1.0 and 26.9 ± 1.0 e.u. are derived for the entropies of BrO_3' and IO_3' , respectively. E. S. H.

Thermal activity of lanthanum and of thorium minerals. A. SANIÉLÉVICI (J. Chim. phys., 1934, 31, 184—191).—The heat evolved by La_2O_3 is not of at. origin, since LaF_2 shows no thermal activity. The behaviour of La_2O_3 varies with the conditions and is attributable to hydration and adsorption of gases. J. G. A. G.

Thermochemistry of aqueous solutions of zinc, aluminium, and manganese sulphates. J. PER-REU (Compt. rend., 1934, 198, 1410—1412).—Heats of dissolution of $ZnSO_4,7H_2O$, $Al_2(SO_4)_3,18H_2O$, and $MnSO_4,5H_2O$ (I) have been determined at 17°, and of (I) and $MnSO_4,7H_2O$ at the transition point, 9°. Heats of dilution are also recorded. B. W. B.

Anomalous electrolytes. III. Electrolyte character of triarylammonium and tetra-arylhydrazinium compounds. P. WALDEN and E. J. BIRR (Z. physikal. Chem., 1934, 168, 107-123; cf. A., 1933, 907).—Conductivities have been measured in PhNO₂ and PhCN at dilutions up to 50,000 litres at 25°. Tri-p-tolylammonium perchlorate (I) and diphenyl-p-anisylmethyl perchlorate (II) give conductivity-dilution curves similar to those of the strongest binary tetra-alkylammonium salts and together with tetra-p-tolylhydrazinium perchlorate (III) obey Kohlrausch's square-root law. Judging by the conductivity ratio (I), (II), and NEt_4ClO_4 at a dilution of 5000 litres are approx. equally strong, (III) is not as strong, and phenylbenzylethylaminoxide picrate and the compounds of SbCl₅ with tri-*p*-tolylamine and tetra-p-tolylhydrazine are weak. In solutions of (I) and (II) the coloured component migrates to the cathode. It is inferred that in these solutions coloured and practically unsolvated N(C7H7)3, N2(C7H7)4, and CAr₃ ions are present, and the approx. mobilities have been calc. $N_2(C_7H_7)_4$ apparently dissociates somewhat into $N(C_7H_7)_2$ and $N(C_7H_7)_2$. R. C.

Conductivities of aluminium bromide and chloride in non-aqueous solution. E. WERTY-POROCH and A. SILBER (Z. physikal. Chem., 1934, 168, 124-134).-AlCl₃ and AlBr₃ dissolve only slightly in MeCHO and some other aliphatic aldehydes and form insol. substances. In CHMe:CH·CHO, PhCHO, and CHPh:CH·CHO they form reddishyellow solutions, which are supposed to contain additive compounds with conjugated double linkings. The conductivity relations indicate that the AlBr₃ compounds are salt-like. In AlCl₃ solutions in COMe₂, COMeEt, and mesityl oxide (I) solvolysis of the conducting substance occurs on dilution and the mol. conductivity, λ , is small; the additive compounds are not salt-like. In (I) and COMe2 the AlBr3 solvates decompose on dilution, whereas in COMeEt and COPhMe they are salt-like. In HCO₂H both salts have a high λ and behave like normal binary electrolytes, whilst in AcOH the solvates decompose on dilution and λ falls. R. C.

Glass electrodes. P. GROSS and O. HALPERN (J. Chem. Physics, 1934, 2, 136-140).—Regarding a glass electrode as a difficultly sol. electrolyte which absorbs H_2O and dissolved salts, a general formula is derived for the potential, the variations of which are discussed. N. M. B.

Periodic potential changes of iron in chromicsulphuric acid solutions. M. KARSCHULIN (Z. Elektrochem., 1934, 40, 174—180).—The potential of electrolytic Fe in a mixture of aq. $K_2Cr_2O_7$ (7.5%) and H_2SO_4 varies regularly in periods of a few sec. when the conen. of H_2SO_4 is between certain limits (e.g., 5%). The frequency of the periods increases as the conen. of H_2SO_4 increases. Similar results were obtained in mixtures of 2.7% aq. CrO₃ and 3.1— 4.3% H_2SO_4 . With dilution of the mixture the frequency of the periods decreases. An explanation is advanced based on the diffusion of $H_2Cr_2O_7$ through the FeSO₄ film adsorbed at the Fe surface.

E. S. H.

Polarographic studies with the dropping mercury cathode. XXXVIII. Reduction of some aliphatic amines, quinoline, and saccharin. J. PECH (Coll. Czech. Chem. Comm., 1934, 6, 126–136). —Reduction potentials against Hg_2Cl_2 are: NH_4 -1.787, $NH_2Me^* - 1.972$, $NH_2Me_2^* - 1.977$, $NHMe_3^*$ -1.682, $NMe_4^* - 2.6$ volts. NH_2 ·CH₂·CO₂H, creatine, $CO(NH_2)_2$, asparagine, caffeine, theobromine, and uric acid free from O₂ are not reducible; uric acid solution in air gives an unknown reducible substance. Quinoline and saccharin are reducible; the latter may be determined by this method; the former goes through stages which may be di- and tetra-hydroquinoline. Indole is reduced in acid solution, but its behaviour is anomalous. D. R. D.

Thermodynamics of the electrocapillary curve. II. Variation of the electrocapillary curve with composition. F. O. KOENIG (J. Physical Chem., 1934, 38, 339-363).-From the general equation previously deduced for the electrocapillary curve (I) (this vol., 258), special equations expressing the variation of (I) with the composition of the two phases in contact have been derived. The general equations for the effect of variations of the reference electrode and of the metallic phase α on (I) are relatively simple, but no simple general expression can be obtained for the more complex variations of the non-metallic phase β . The chief special cases have therefore been considered separately. The surface densities of certain components of the electrical double layer can be approx. calc. from the shift of (I) due to variations in the composition of α or β .

M. S. B.

Behaviour of the surface of the solution of electrolyte against electronic impacts. Y. YAMA-GUCHI and T. SHIBA (Bull. Chem. Soc. Japan, 1934, 9, 109—120).—When a glow discharge takes place between a metallic cathode and the surface of a solution, a film consisting chiefly of the oxides or hydroxides of the cations is formed. If the surface is covered with a film of oil, finely-divided metal powders are obtained. In the first case the action is considered to be due to the decomp. of H_2O by electron impacts, and in the second to the formation of an electric double layer which discharges the cations. By using a hot cathode it was found that

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the dissociation of the H_2O is caused by electrons of energy 23.8 e.v., the theoretical val. being 23.1 e.v. H. S. P.

Cells with liquid-liquid junctions. V. Standards of hydrogen-ion measurements and the second dissociation constant of phosphoric acid. E. A. GUGGENHEIM and T. D. SCHWINDLER (J. Physical Chem., 1934, 38, 533—541).—Measurements have been made at 25° on the cell Hg|HgCl, 0·1N-KCl|3·5N-KCl|solution $S|H_2$, where S is a solution of varying [H'], and the equation $E=E_0+E_D+RT/F$ log $C_{\rm H}$ ·f_{\rm H}. has been applied in order to calculate the val. of E_0 . From this val. combined with electrometric measurements of phosphate buffers the val. of 5·97×10⁻⁸ has been obtained for the thermodynamic dissociation const. $K_{\rm H,PO4}$, with an estimated accuracy of 2—3%. Vals. of E_0 and $f_{\rm H}$ have also been calc. at 0°, 18°, and 37°. Vals. thus obtained for $f_{\rm H}$ - are in satisfactory agreement with those based on the convention of setting $f_{\rm CI}=f_{\rm KCI}$ in 0·1M-KCl.

M. S. B.

Oxidation-reduction potentials of ascorbic acid. J. S. FRUTON (J. Biol. Chem., 1934 105, 79— 85).—Ascorbic acid behaves reversibly between $p_{\rm H}$ 5.5 and 7.5 and at $p_{\rm H}$ 7.0 has a potential of -0.081volt. The method employed obviates the use of metallic electrodes. H. G. R.

Oxidation-reduction potentials of cytochrome-C. D. E. GREEN (Proc. Roy. Soc., 1934, B, 114, 423-435).—Cytochrome-C forms a reversible oxidation-reduction system, intermediate between methylene-blue and the indophenols. At $p_{\rm H}$ 7.0, E'_0 is +0.123 volt. The change from the reduced to the oxidised form involves a single equiv. H. G. R.

Reduction potential of cysteine-cystine mixtures. J. C. GHOSH and S. C. GANGULI (Biochem. J., 1934, 28, 381-383).—An O₂ or oxide film (I) on the Hg surface is responsible for setting up potentials (II) in cystine-cysteine mixtures which follow the equation $E=E_0-(RT/F)p_{\rm H}-(RT/F)$ log [cysteine] (J.C.S., 1923, 123, 2943). Removal of (I) by cathodic reduction gives rise to (II), which obey the thermodynamic equation. A. E. O.

Electrochemical character of insulin. E. A. HARVEY, F. O. HOWITT, and E. B. R. PRIDEAUX (Trans. Faraday Soc., 1934, 30, 407-413).—From the electrometric titration of insulin hydrochloride with acid and alkali it appears that 6/7 of the potential acidic and basic groups are linked as peptide chains, but the curve has no inflexion at the isoelectric point. Insulin inactivated by acid-alcohol treatment affords different titration characteristics, but vals. similar to those for active insulin are obtained by restoration with alkali at $p_{\rm H}$ 12 and 0°. J. G. A. G.

Formaldehyde, alcohol, and acetone titrations. Zwitterion conception.—See this vol., 634.

Influence of magnetic fields on electrolysis. M. PRASAD and N. B. CHOKSEY (Current Sci., 1934, 2, 345).—Application of a magnetic field at right angles alters the current flowing between Pt electrodes in an aq. solution of an electrolyte. C. W. G.

Passivity. XXII. W. J. MULLER (Z. Elektrochem., 1934, 40, 119-125).-The protective film theory provides in all cases a qual., and in some cases a quant., explanation of activation and passivity phenomena. A film of which the pores do not exceed 10^{-4} sq. cm. per sq. cm. of surface, and is not itself attacked by the electrolyte, prevents spontaneous or anodic dissolution of the metal. If the pores exceed 10^{-2} sq. cm. per sq. cm., the metal becomes active. At a sufficiently high anodic potential, dissociation at a higher valency or evolution of O_2 occurs. The conditions governing the formation of films are described. Concepts such as those of the c.d. required to produce passivity, degree of passivity, activation time, etc. are regarded as superseded by the view stated above. H. F. G.

Polarity and chemical reactions. H.B. WATSON (J.S.C.I., 1934, 53, 92–94T).—A summary of results and views previously published. J. W. B.

Mechanism of self-propagating reactions. K. K. ANDREEV and J. B. CHARITON (Compt. rend. Acad. Sci. U.R.S.S., 1934, 1, 402-406).—The initiation of a self-propagating system results from the formation of a centre or group of centres localised in time and space. W. R. A.

Reactions between solids. A. ALBERTO (Ann. Acad. Brasil. Sci., 1933, 5, 223-229).-Published work, principally that of Tammann, is critically reviewed. H. F. G.

Wave-mechanical effects and the reactivity of the hydrogen isotopes. C. E. H. BAWN and G. OGDEN (Trans. Faraday Soc., 1934, 30, 432-443).— The different reaction velocities of the H isotopes are due to differences in (a) zero point energy, and (b) the permeability for energy barriers; (b) alone may be sufficient to account for separation by electrolysis and diffusion. The effect of (a) on heats of reaction and equilibrium consts. is discussed.

R. S. B.

Chlorine-hydrogen reaction with heavy hydrogen. L. FARKAS and A. FARKAS (Naturwiss., 1934, $\overline{22}$, 218—219).—H² reacts one third as rapidly with Cl₂ as H1, in the photochemical Cl2-H2 reaction. During the course of the reaction, which was carried out with a mixture of H2 and H2, the proportion of H2 present increases owing to the more rapid removal of H₂. The difference in rate occurs in the first part of the chain (Cl+H₂=H²Cl+H²), there being no difference in rate in the second part $(H^2+Cl_2=$ $H^2Cl+Cl).$ The faster reaction with H¹ is due to its greater zero point energy compared with that of H_{2}^{2} . Most of the methods for separating H_{2}^{2} depend on this fact. A. J. M.

Calculation of theoretical combustion temperature allowing for dissociation. H. TULGINSKY (Rev. univ. Mines, Métall., 1933, 76, 494—502; Chem. Zentr., 1933, ii, 2956).—The combustion temp. calc. for CO in the stoicheiometric proportion of air is 2430°, or 2095° when corr. for dissociation of CO_2 and H_2O . H. J. E.

Decomposition of nitrous oxide. M. VOLMER and H. BRISKE (Z. physikal. Chem., 1934, B, 25, 81– 89).—The velocity equation for the complete decomp., taking into account the effect of the products of decomp., has been derived and verified from experimental data. Recalculation shows the probability of deactivation per collision to be approx. 1. R. C.

Thermal decomposition of nitrous oxide at pressures up to 40 atmospheres. E. HUNTER (Proc. Roy. Soc., 1934, A., 144, 386—412).—The velocity of thermal decomp. of N₂O at 840—999°/0·1— 40 atm. has been measured by observing the rate of pressure increase of the gas at const. temp. and vol. in a SiO₂ bulb. The observed reaction is the resultant of three quasi-unimol. reactions which become independent of pressure at approx. 0·08, 5, and 30 atm., respectively. The average activation energy of the reaction rises rapidly from 50,500 g.-cal. per g.-mol. at zero pressure to 6 atm. Above 6 atm. it becomes less dependent on pressure, and is practically independent above 30 atm. L. L. B.

Supposed intervention of steam in hydrocarbon combustion. W. A. BONE and J. BELL (Proc. Roy. Soc., 1934, A, 144, 257—266).—Evidence regarding the effects of P_2O_5 -drying on the slow combustion of typical hydrocarbon $+O_2$ mixture is discussed. New experiments with $C_2H_2+O_2$ and $C_2H_4+O_2$ mixtures are described, and the conclusion is reached that intensive P_2O_5 -drying increases, rather than diminishes, the reactivities of hydrocarbon $+O_2$ mixtures, both in slow and in explosive combustion. The oxidation is, in general, direct, and there is no intervention of steam. L. B.

Spontaneous ignition temperatures of hydrocarbon-air mixtures. S. COFFEY and T. BIRCHALL (Chem. and Ind., 1934, 245-247).—For petrol-air mixtures two spontaneous ignition ranges have been observed at 320-335° and above 420°. Successive additions of antiknocks gradually narrow the lower ignition range (I), until it finally disappears. (I) is widened by proknocks and by kerosene. Results resemble those of Townend and Mandelkar (A., 1933, 1016). H. J. E.

Spontaneous ignition temperatures of hydrocarbon-air mixtures. D. T. A. TOWNEND and L. L. COHEN (Chem. and Ind., 1934, 53, 267—268).— In a 6.5 vol.-% petrol-air mixture at pressures between 1.15 and 1.45 atm. two ignition ranges have been observed. Between 1.45 and 1.6 atm. there are three ignition ranges. At pressures >1.9 atm. ignition occurs at all temp. >284°. With "ethyl" petrol similar phenomena were observed, but at higher pressures. The "bluish" flame described by Coffey and Birchall (preceding abstract) may be due to the "cool" type of ignition. H. J. E.

Primary thermal dissociation. Velocity constants for propane, *n*-butane, and *isobutane*. R. E. PAUL and L. F. MAREK (Ind. Eng. Chem., 1934, 26, 454-457).—The following velocity coeffs. were obtained for the decomp. of hydrocarbons passed through heated tubes of Cu or SiO₂: $\log_{10} k=16\cdot60-$ 74,850/2·3RT (C₃H₈ at 550-650°), 17·05-73,900/ 2·3RT (*n*-C₄H₁₀ at 530-625°), and 14·89-66,040/ 2·3RT (CHMe₃ at 550-610°). The vals. of the coeff. were not affected by the nature of the surface, by the ratio of surface to vol., or by dilution with N₂. A. G. Thermal decomposition of gaseous ethylene iodide. T. IREDALE and L. W. O. MARTIN (J. Physical Chem., 1934, 38, 365—376).—The decomp. of $C_2H_4I_2$ at 65° and 75° in a glass vessel seems to be heterogeneous and largely autocatalytic. I adsorbed on the glass may be the catalyst. There is a short induction period which disappears when traces of I are present at the beginning of the reaction and when the catalytic surface is greatly increased. Immediately after the induction period the reaction is of zero order, then unimol. and finally bimol. A chain mechanism is possible. M. S. B.

Influence of temperature on the velocity of ionic reactions. A. von KISS and P. VASS (Z. anorg. Chem., 1934, 217, 305–320).—The velocity of the reaction $S_2O_3''+CH_2Br\cdot CO_2'=CH_2(S_2O_3)\cdot CO_2''$ +Br' has been measured between 5° and 55° in very dil. solutions without the addition of salts, and in aq. NaNO₃, Na₂SO₄, Mg(NO₃)₂, and MgSO₄ of different concn. The Brönsted-Debye-Hückel relation is followed between 25° and 55° and for ionic strength 0.0025-0.010. In salt concn. below 0.5N and in more conc. aq. Na₂SO₄ and NaNO₃, the van 't Hoff temp. coeff. is independent of ionic strength. The temp. coeff. usually decreases with rise of temp. and for the kinetic activity coeff. the temp. coeff. is approx. 1. Log k varies linearly with 1/T, but not with the salt concn. Without salt addition the mean work of activation of the reaction for 5-55° is 15,510 g.-cal., but diminishes a little with rise in temp. The activation work is not affected by neutral salts in dil. solution, but conc. aq. $MgSO_4$ and $Mg(NO_3)_2$ raise it, whilst NaNO₃ and Na₂SO₄ lower it a little. There is good agreement between calc. and experimental vals. of k. M. S. B.

Chain mechanism for autoxidation reactions. H. L. J. BACKSTROM (Naturwiss., 1934, 22, 170-171).-Autoxidation reactions can frequently be explained as a series of dehydrogenations. For the photochemical autoxidation of aldehydes, the following scheme of reactions is proposed : RCHO + hv = $\cdot CHR \cdot O + RCHO = \cdot CHR \cdot OH + \cdot CR:O;$ ·CHR·O·: $\cdot CR:0+0_2 = RCO\cdot0\cdot0;$ $RC0 \cdot 0 \cdot 0 \cdot + RCH0 =$ $RCO \cdot O_2 H + \cdot CR:O$. The sensitising action of aromatic ketones can be similarly explained as due to dehydrogenation of the aldehyde and formation of acyl radicals: $P_2CO+h_2=\cdot CP_2\cdot O\cdot$; $\cdot CP_2\cdot O\cdot + RCHO = \cdot CP_2\cdot OH + \cdot RCO$. In the autoxidation of sulphite solutions, the dependence of the velocity of autoxidation on p_{π} can be explained only by supposing that HSO₃' ions play a part in the reaction, and not only SO₃' ions (cf. A., 1931, 917). The mechanism is \cdot SO₂·O'+O₂=·O·O·SO₂·O'; ·O·O·SO₂·O'+HSO₂·O'= HO₂·SO₂·O'+·SO₂·O'. A. J. M.

Influence of pressure on organic reactions in the liquid phase. E. W. FAWCETT and R. O. GIBSON (J.C.S., 1934, 386—395).—The change in velocity of about fifty liquid org. reactions on increasing the pressure to 3000 atm. has been studied at temp. up to 180°. Reactions investigated include the condensation of anhydrides with aromatic hydrocarbons, of amines with aldehydes and ketones, of aldehydes with alcohols and ethers (acetal formation), of amines

with alkyl halides (formation of quaternary NH4 salts), of acids with ethylenic hydrocarbons (forming saturated esters), of MeCHO with Et malonate and acetoacetate, and of PhCN with phenols, the polymerisation of aldehydes, unsaturated hydrocarbons, etc., and many miscellaneous condensation reactions. In all cases, reactions which do not occur at ordinary pressure in absence of catalysts cannot be made to proceed by increasing the pressure, but whenever a reaction does occur at 1 atm., whether in presence or absence of a catalyst, its velocity is increased considerably (usually 5—10 times) by raising the pressure to 3000 atm. The equilibrium $\gamma \delta$ -isoheptenoic acid = 88-dimethyl-8-valerolactone is displaced towards the right by an increase of pressure, as would be expected from the decrease in vol. which occurs on formation of the lactone. Whilst at 1 atm. the main product of the combination of [•CH,Cl], and C_5H_5N is β -chloroethylpyridinium chloride, at higher pressures a second mol. of C5H5N is added on, forming ethyldipyridinium dichloride, decomp. without melting. NHMePh and PhCHO react to form 4:4'dimethylaminotriphenylmethane, m.p. 100—101°. 8:8'-Dichloro-5:5'-diquinolyl, m.p. 296°, could not be made to form any quaternary NH4 salts.

D. R. D.

Influence of pressure on the rate of formation of cetylpyridinium halides. E. W. FAWCETT and R. O. GIBSON (J.C.S., 1934, 396–400).—The velocity of combination of $C_{16}H_{33}Br$ with C_5H_5N increases with increase of pressure and rise of temp. (cf. preceding abstract). Quant. formation of $C_5H_5N, C_{16}H_{33}Br$ does not occur, probably owing to a side reaction $C_{16}H_{33}Br+C_5H_5N=C_{16}H_{32}+C_5H_5NHBr$. The yield is increased by clevation of temp., but is independent of pressure. Similar results were obtained with $C_{16}H_{33}Cl$ at 110°, but the influence of temp. was not studied. The curves obtained cannot be expressed in terms of the ordinary reaction-velocity equations.

D. R. D. Relative reaction velocities of alcohols with phenylcarbimide. T. L. DAVIS and J. McC. FARNUM (J. Amer. Chem. Soc., 1934, 56, 883–885).— PhNCO (1 equiv.) is allowed to react with ROH (1 equiv.) +R'OH (1 equiv.) in dry C₆H₆ at 26° and the amounts of NHPh·CO₂R and NHPh·CO₂R' are determined in the resulting mixture by the f.-p. method. The relative velocities are calc. from the data and are : MeOH (=1), EtOH (0.96), PraOH (0.78), BuaOH (0.97), Bu^gOH (0.69), *n*-amyl alcohol (0.9), Pr^βOH (0.3), sec.-BuOH (0.32), Bu^γOH (0.003), tert.-amyl alcohol (0.0072). H. B.

Relative reaction velocities of amines with phenylcarbimide. T. L. DAVIS and F. EBERSOLE (J. Amer. Chem. Soc., 1934, 56, 885-886).—PhNCO (I'equiv.) is allowed to react with NH₂R (1 equiv.) +NH₂R' (1 equiv.) in dry Et₂O at 0° and the resulting mixture of NHPh·CO·NHR and NHPh·CO·NHR' analysed thermally. The relative velocities are : NH₃ (=1), NH₂Et (9·72), NH₂Pr^a (8·22), NH₂Bu^a (9·17), *n*-amylamine (9·17), NH₂Ph (0·53). The ratio, relative velocity of ROH (compared with MeOH) to relative velocity of NH₂R (as above) (R=Et, Pr^a, Bu^a, *n*-amyl), is practically const. H. B.

Stability to acids of some high-molecular aliphatic sulphuric esters. W. SECK (Fettchem. Umschau, 1934, 41, 61-65).-The kinetics of the hydrolysis (at 100°) of the sulphuric esters (R.O.SO.H \equiv R·OH+H₂SO₄) of (1) ricinoleic acid, (2) *i*-hydr. oxystearic acid, (3) octadecyl alcohol, and (4) octadecane-ak-diol (di-ester) in 0.05N solution in presence of $0.5-2N-H_2SO_4$ have been studied. Under these conditions the reaction is approx. unimol., and the velocity coeffs. afford a measure of the stability of the esters. Hydrolysis of esters of (2) is slower than of (1), whilst that of esters of (3) and (4) is inappreciable in 1 hr., although salting-out occurs unless aq. PrOH is used as solvent in order to maintain a homogeneous solution. E. L.

Mechanism of precipitation processes. XIV. Kinetics of fractional precipitation. Z. KARAOG-LANOV and B. SAGORTSCHEV (Z. anorg. Chem., 1934, 217, 385—395; cf. A., 1933, 917).—When to a solution of two substances a reagent capable of forming an insol. compound with each is added in amount sufficient to react with only one of them, the resulting ppt. contains both compounds in a proportion depending on the rate of pptn. (I), and on the ratio (II) of their solubility products. The proportion of the less sol. compound varies inversely with (I) and directly with (II). It is also increased on keeping in contact with the liquid. These conclusions are verified for a no. of ppts. commonly encountered in analysis. F. L. U.

Cannizzaro reaction. A. WEISSBERGER and R. HAASE (J.C.S., 1934, 535—536).—The velocity of the Cannizzaro reaction in 0.2N-NaOH-EtOH with PhCHO and nine derivatives increases as k for the acid increases, except that, probably owing to steric hindrance, the velocity with three o-derivatives is < that expected. R. S. C.

Thermal decomposition of nitrogen pentoxide at low pressures. E. F. LINHORST and J. H. HODGES (J. Amer. Chem. Soc., 1934, 56, 836-841).— The reaction at $35-65^{\circ}$ varies from a first-order reaction at about 0.05 mm. to the second order at < 0.001 mm. The glass surface of the reaction vessel has no effect at pressures > 0.005 mm., but at lower pressures increasing surface retards the reaction slightly. The mechanism is discussed. E. S. H.

Oxidation of allyl alcohol. W. H. HATCHER and C. T. MASON (Canad. J. Res., 1934, 10, 318–320; cf. A., 1928, 249).—The velocity up to the stage of half reaction ∞ [H^{*}], but subsequently falls owing to the slow rate of oxidation of the three mols. of HCO₂H which remain. R. S.

Thermal analysis of explosive compounds [alkali and alkaline-earth picrates]. T. TUCHOL-SKI (Acta phys. polon., 1932, 1, 351—355; Chem. Zentr., 1933, ii, 2801).—Thermal analysis shows a change in the commencement of explosion with at. wt. of the cation. The temp. immediately before the explosion are always > the initial temp. (given in parentheses). For the picrates these are Li 342° (321°), Na (302·5°), K 333° (331°), Rb 336° (335°), Cs 302° (301·5°), Ca 325·9° (318·3°), Sr $348\cdot2^{\circ}$ (343°), and Ba $342\cdot5^{\circ}$ ($325\cdot5^{\circ}$). L. S. T.

Ionisation by explosion of solid explosives. S. KALANDYK (Acta phys. polon., 1932, 1, 295-308; Chem. Zentr., 1933, ii, 2801) .- The charges resulting from the explosion of K hexoate, K, Cu, Fe, and Ca picrates, and cellulose nitrate (I) are of the same order of magnitude as those from gaseous explosions $(2CO+O_2)$. In the case of the picrates no dependence on the ionisation potential of the metal could be established. The charge appears to increase with the intensity of explosion. The negative charge is approx. double that of the positive. With an increase in potential the increase in charge is > proportional to that of the potential. This is attributed to the irregular distribution of the flame. The duration of the current during explosion and the slow combustion of (I) have been followed. The latter does not depend on p.d. L. S. T.

Detonation of lead azide. A. MICHEL-LEVY and H. MURAOUR (Compt. rend., 1934, 198, 1499—1501).— The micro-photographic method previously described (this vol., 376) was used to study the transmission of detonation (I) around a circle of separated PbN₆ grains, about 2 mm. apart. Photographs show that (I) in each grain was initiated by the shock wave from the preceding grain, and not by flying particles or hot gases. B. W. B.

Combustion in a vacuum of compressed mercury fulminate. H. MURAOUR and W. SCHUMACHER (Compt. rend., 1934, 198, 1161—1162).—Although combustion is not propagated along a train of fine crystals of Hg fulminate (I) when touched by a redhot wire in vac., it is propagated, but without detonation, if (I) has been compressed (d 1·4). Explosives are divisible into three classes according to their behaviour in this respect: (1) no propagation of combustion, e.g., pieric acid, guncotton; (2) propagation when compressed, but without detonation, e.g., (I); (3) detonation, e.g., PbN₆, Ag fulminate, m-NO₂·C₆H₄·N₂·ClO₄ (very violent), Pb trinitroresorcinoxide (feeble). C. A. S.

Properties of the chlorides of sulphur. VII. Changes of density on heating or irradiation. A. H. SPONG (J.C.S., 1934, 485–492; cf. A., 1931, 438).—The velocity of the reaction $S_2Cl_2+Cl_2 \Longrightarrow$ 2SCl₂ at 0° to 5°, which occurs after heating SCl₂ at 100° and cooling rapidly, or (more rapidly, due to production of a catalyst by the light) after irradiating with ultra-violet light at 20° and cooling, has been measured by density measurements with floats. The reaction is of the first order. With S_2Cl_2 small density changes occur under similar conditions, the reactions being $3S_2Cl_2 \Longrightarrow S_3Cl_4+S_3Cl_2$ and $S_3Cl_4 \Longrightarrow S_2Cl_2+$ SCl₂. Normal S_2Cl_2 is probably a mixture of a Yshaped mol. with a chain-form mol. H. J. E.

Rate of dissolution of marble in acids. W. JACER (Bull. Acad. Polonaise, 1934, A, 73-80; cf. A., 1931, 1242).—The rate of dissolution in HNO_3 and $HCIO_4$ has been measured. In each the rate has a max. val. at a concn. between 4 and 6 g.-mol. per litre, the results resembling those for HCl. H. J. E.

Velocity of dissolution of marble in acids. W. JACEK (Bull. Acad. Polonaise, 1933, A, 374-380; cf. A., 1931, 1242; 1932, 1211).—The velocity of dissolution of marble in HBr at low conen. is almost equal to that in HCl of equal conen., but at higher conen. is a little more rapid. The velocity is a max. with about $6\cdot 3N$ -HBr, and decreases considerably with increasing conen. above this figure. J. W. S.

Velocity of dissolution of aluminium, lanthanum, and cerium and their amalgams in hydrochloric acid. R. MULLER [with F. E. Schweitzer] (Z. Elektrochem., 1934, 40, 126-132).-Whereas the velocity coeff. of the dissolution of Al in HCl at 25° rises from 2.89 to 71.43 as [HCl] is increased from 0.5N to 4N, that of the dissolution of Al amalgam (6% Al) falls, from 67.75 to 9.66, under the same conditions; further, the induction period is almost const. for the amalgam. In 4N anhyd. EtOH-HCl the coeff. for Al is 40.05. The Al thus reacts, not with undissociated HCl mols., but with HCl-H,O (or HCl-EtOH) complexes. La, and particularly Ce, react with HCl much more vigorously than does Al, yielding velocity coeffs. some 50 times as great, and exhibit the same anomalous behaviour, La amalgams behaving normally; Ce is very sparingly H. F. G. sol. in Hg.

Rate of [dis]solution of magnesium in acids. M. KILPATRICK and J. H. RUSHTON (J. Physical Chem., 1934, 38, 269-306).-Rates of dissolution of Mg in aq. acids have been determined by (1) weighing the metal, (2) measuring the vol. of H₂ evolved, (3) titrating, and (4) measuring the amount of acid (3) Intraining, and (4) inclusioning the shown by an indicator. The last was used in the study of the H_2O reaction. The results were reproducible and in agreement for different samples of Mg. The general kinetic equation is $v = k_1 C_{H_{10}} + k_2 C_{H_{10}} + k_3 C_A + \dots$ etc., where A is an acid other than H_3O' or H_2O . For strong acids the primary reaction is with H₃O[•]. For weak acids the rate of reaction is not ∞ H[•], but the increase in rate is ∞ to the concn. of acid. The effect of surface speed of the metal and viscosity of the liquid has been investigated. Temp. coeffs. are given for the H₂O, H₃O, and mol. AcOH reactions. The results have been discussed in relation to the diffusion theory and the Brönsted-Kilpatrick theory, and they are definitely not in agreement with the old diffusion theory, but may be considered in terms of a modified diffusion theory based on the extended theory of acids. Any modification must, however, account for the H_2O reaction. There is a general relationship between velocity coeff. and acid strength. M. S. B.

Dependence of inflammation temperature on size of metal particles. G. TAMMANN and W. BOEHME (Z. anorg. Chem., 1934, 217, 225—236).— The variation of inflammation temp. with crosssection has been determined for strips of electrolytic Fe, Mn, Mg, Ce, and Ce–Fe alloy. The inflammation temp. increases hyperbolically with increasing cross-section of the strips to a limiting temp. Fe particles torn off by grinding steel on a carborundum wheel have been examined microscopically and curves obtained showing the distribution of the burnt particles according to size and also of unburnt particles. The causes of the differences are discussed. The inflammation temp. of pyrophoric particles of Fe and Ni has been determined in air and O_2 , and of Co in air. Os powder forms OsO_2 immediately on contact with air and then glows at a higher temp. (approx. 500°) forming OsO_4 . On heating an Fe wire of diameter 0.2 mm. in air with a current of 2.5 amp. thickening takes place and the wire inflames. The addition of Ni, Si, or Al to Fe diminishes the rate of thickening of the oxide skin and raises the inflammation temp. of narrow strips considerably, but of broad strips much less. Au does not affect the inflammation temp. The influence of shape and of the fusibility and volatility of the metal and its oxide is discussed. M. S. B.

Exothermic phenomenon of soft steel piece in nitric acid solution and its significance. Y. YAMAMOTO (Bull. Inst. Phys. Chem. Res. Japan, 1934, 13, 17—19).—The initial rise in temp. of steel immersed in HNO₃ solution is due to surface oxidation. The larger temp. increase which follows is attributed to the heat of oxidation of H₂ liberated by dissolution of the steel. After the max. temp. is reached, the corrosion velocity decreases sharply. The temp. rise and corrosion both increase with increasing [HNO₃] up to a certain limit (47% HNO₃), after which they fall rapidly. R. S.

Kinetics of the sol-gel transformation. II. Influence of sol concentration and temperature on the coagulation of inorganic jellies. H. L. DUBE (Z. anorg. Chem., 1934, 217, 284—288).—The sols examined were FePO₄, ZrO₂, and Al₂O₃. In the equation log $S=\log R+p \log c$, p remains const. with increasing sol. concn., whilst log R gradually increases from negative to positive. Rise in temp. produces the same effect, except that in certain circumstances p may change slightly. M. S. B.

Corrosion at contact with glass. R. B. MEARS and U. R. EVANS (Trans. Faraday Soc., 1934, 30, 417-423).—The probability of corrosion of steel rods at the points of contact with glass or steel rods resting on them in 0.05*N*-Na₂CO₃ solution decreases with stirring, increases with the diameter of the resting rod, is approx. independent of the time after 10 min., and is greater for steel-steel than for steel-glass contacts. Differential aëration accounts for these results.

R. S. B.

Influence of films on corrosion. W. MACHU [with W. J. MÜLLER] (Oesterr. Chem.-Ztg., 1934, 37, 46-50, 64-68).—A summary of published work (cf. A., 1932, 1238). E. S. H.

Active oxides and oxide hydrates. LXXI. Dehydration of copper sulphate pentahydrate in relation to its mode of preparation and exposure to light. S. ŠKRAMOVSKÝ, R. FORSTER, and G. F. HUTTIG (Z. physikal. Chem., 1934, B, 25, 1-26).— The rate of dehydration, v, at 70° of CuSO₄,5H₂O (I) in a current of N₂ containing H₂O vapour under 7.6 mm. partial pressure has been investigated by means of a new type of apparatus registering the change in wt. automatically. v is independent of the degree of dispersity of the (I), remains const. practically throughout each stage of the dehydration, and is proportional to the wt. of (I) and the vol. of the container. With increasing rate of gas flow v rises

and attains a const. val. (I) cryst. from H_2O gives on isothermal dehydration first CuSO₄,3H₂O (II), which after some time begins to change to CuSO4,H20 (III). The length of the flat portion corresponding with (II) on the dehydration curve is reduced by raising the dehydration temp. or adding nuclei of (III) and is short with (I) cryst. from aq. H₂SO₄. The flat portion is absent with (I) cryst. from EtOH. Addition of (II) accelerates the decomp. giving (II), and (III) accelerates the formation of (III). (I) cryst. from EtOH then exposed to light approximates in behaviour on dehydration to (I) cryst. from H₀, The dehydration curves of $K_2Cu(SO_4)_2, 6H_2O$ and (NH₄)₂Cu(SO₄)₂,6H₂O show the existence of M₂Cu(SO₄)₂,2H₂O. (I) probably exists in two iso. meric forms according as it is crystallised from H_oO or EtOH. **R.** C.

Kinetics of reaction between silver bromide and photographic sensitisers. B. H. CARROLL and D. HUBBARD (Bur. Stand. J. Res., 1934, 12, 329—344). —The reactions of AgBr with (a) Na₂SO₃ and (b) allylthiocarbamide have been followed by determining the change in [Br']. The solubility of AgBr in (a) and (b), and the adsorption of KBr by AgBr have been measured. Reaction (a) is autocatalytic and appears to take place by decomp. of dissolved material at the surface of Ag₂S. Reaction (b) is also autocatalytic, but the mechanism is doubtful. E. S. H.

Mechanism of metallic corrosion. U. R. EVANS and T. P. HOAR (Trans. Faraday Soc., 1934, 30, 424– 432).—Whether passivity or corrosion occurs at an anode (or naturally) may be determined by the formation of a solid hydroxide or a sol. salt as an anodic product. The bearing on the control of corrosion of the type of anodic and cathodic polarisation curve is discussed (cf. Whitby, this vol., 36).

R. S. B.

Measurement of corrosion.—See B., 1934, 364.

Mechanism of acetylation of cellulose fibres. E. ELOD and H. SCHMID-BIELENBERG (Z. physikal. Chem., 1934, B, 25, 27-51).-The rate of acetylation of dry or air-dry natural cellulose fibres depends on the speeds of inter- and intra-micellar diffusion of the reaction mixture within the fibre. The reaction velocity in the air-dry state decreases in the order cotton > ramie > hemp and flax because the tendency to parallel orientation of the micelles increases and therefore the rate of intermicellar diffusion decreases in this order. Intermicellar swelling with H₂O or glacial AcOH increases the reaction velocity and when this swelling is a max. the differences in reactivity between the various fibres are absent, which points to equality in micellar surfaces and similarity in micellar structure. The rate of intramicellar diffusion, which seems to be the same for all the fibres, may be increased by intramicellar swelling before or during acetylation, this type of swelling being promoted by high AcOH content of the acetylating mixture. It is calc. that 40% of the OH groups are in the micelle surfaces. Lowering the temp. of acetylation or shortening the time by preliminary swelling increases the mol. wt. of the resulting acetate. Acetates obtained from the different fibres under comparable conditions are of

similar mol. wt., indicating that the principal valency chains in the micelles of the different fibres are of similar length. R. C.

Stability of cellulose nitrates ; hydrolysis and oxidation by dilute nitric acid. DESMAROUX (Compt. rend., 1934, 198, 1419—1421).—The extents of simultancous hydrolysis, esterification, and oxidation of cellulose nitrate (I) (13.4% N) by prolonged heating with 25% aq. HNO₃ were compared. The osmotic pressure of residual (I) increased with the time of heating. B. W. B.

Relation between the rates of some acid-catalysed reactions and the acidity function, H_0 . L. P. HAMMETT and M. A. PAUL (J. Amer. Chem. Soc., 1934, 56, 830–832).—The logarithms of the rates of hydrolysis of sucrose, EtOAc, and CN·NH₂ in solutions of various strong acids up to 7*M* vary linearly with the acidity function. E. S. H.

Inversion of sucrose in heavy water. E. A. MOELWYN-HUGHES and K. F. BONHOEFFER (Naturwiss., 1934, 22, 174).—The velocity of inversion of sucrose, catalysed by H_2SO_4 , in H_5O is > in H_2O . The reaction proceeds according to the first-order equation, and the velocity is approx. proportional to $[H^2']$. A. J. M.

Kinetics of catalytic hydrogenation. G. M. SCHWAB and W. BRENNECKE (Z. physikal. Chem., 1934, B, 24, 393—406).—The rate of hydrogenation of Et cinnamate in EtOH solution under 200—700 mm. H₂ pressure is independent of the latter and is given by -dc/dt = kc/(1+bc), where c is the ester concn., and b and k are consts. The temp. coeff. corresponds with a heat of activation of approx. 11 kg.-cal. With gradual poisoning of the catalyst the active centres are put out of action in order of decreasing activity. Cu has no catalytic action, but dissolved in Ni in amounts \Rightarrow about 33 at.-% increases its activity. R. C.

Colloidal condition of cholesterol, cholesteryl ester, and lecithin. IX. Nature of catalysis by cholesterol. I. REMESOV (Biochem. Z., 1934, 269, 63-68; cf. this vol., 153).—HCN and $UO_2(NO_3)_2$ have no sp. effect on the catalytic action (I) of cholesterol (II). (I) is inhibited by Hg, HgCl₂, and Hg(NO₃)₂ and is therefore "peroxidative." Saturated derivatives of (II) (dibromide, β -cholestanol) have no (I). W. McC.

Mechanism of macropolymerisation reactions. W. CHALMERS (J. Amer. Chem. Soc., 1934, 56, 912-922).—Theoretical. The stepwise theory of macropolymerisation is considered in detail and rejected in favour of a "polymerisation-chain" mechanism, which comprises (i) a primary activation of the monomeric compound and (ii) a subsequent process of concatenation (made possible by the existence of free terminal linkings on all the intermediate stages). The linking of monomeric units proceeds initially at a rate which is almost instantaneous compared with that of activation; for very large chain-lengths, the rate becomes increasingly slow. Initiation and propagation of the chain are considered from the viewpoint of energetics and of the phenomenon of negative catalysis. It is suggested that in catalytic processes

SS

the "trigger" mol. is formed by addition of the catalyst to one unsaturated atom; the resultant complex thus possesses a free linking. H. B.

Enolisation as directed by acid and basic catalysts. II. Enolic mechanism of the haloform reaction. P. D. BARTLETT (J. Amer. Chem. Soc., 1934, 56, 967—969).—The rate-controlling factor in the reaction of $COMe_2$ (I) with alkaline NaOBr and NaOI at 0° is the enolisation of (I). The rate is ∞ [OH'] and is the same in both cases. The rate of enolisation is several hundred times that of the reaction of (I) with alkaline NaOCI; the latter is controlled by a bimol. reaction between CH₂:CMe·OH and OCI'. The halogenation of (I) is interpreted electronically. H. B.

Autoxidation reactions. VII. Dative or coordination peroxide theory of autoxidation. N. A. MILAS (J. Physical Chem., 1934, 38, 411-418). —Further data are cited in support of the theory and in refutation of Stephens' criticism (A., 1933, 361). M. S. B.

Autoxidation. IV. Mechanism of addition of oxygen. H. N. STEPHENS (J. Physical Chem., 1934, 38, 419–426).—A reply to Milas (cf. preceding abstract). M. S. B.

Absorption of oxygen by linseed oil in presence of catalysts of different oxidation-reduction potentials. B. F. CHOW (J. Amer. Chem. Soc., 1934, 56, 894—898; cf. this vol., 261).—An empirical equation relating the rate of O₂ absorption of linseed oil to the potential of the catalyst [K₃Fe(CN)₆ (I); K₃Mo(CN)₈ (II); K₃W(CN)₈ (III)] is developed. Inhibition of the O₂ absorption [using (I)] is found with acetoxime (IV), α -aminoisobutyric acid, dl-serine, arginine, histidine, cinnamic acid, NH₂·CH₂·CH₂·OH, m- and p-NO₂·C₆H₄·NH₂, p-NH₂·C₆H₄·CO₂H; (IV) has the max. effect. NPhMe₂ is a catalyst (cf. loc. cit.). A "secondary " O₂ absorption is found with (II) and (III) at $p_{\rm H} \leq 9$.

Poisoning and activation of aluminium and cadmium when dissolving in hydrochloric acid. K. JABŁCZYŃSKI and T. PIERZCHALSKI (Z. anorg. Chem., 1934, 217, 298-304).-The action of 1.4N-HCl on Al, unlike that on Zn (A., 1932, 1004), is retarded by HCNS, the max. effect being obtained with 0.0005N-HCNS. In 0.05N there is no effect. This is explained by supposing that the reaction takes place in three stages, one being poisoned by HCNS and another activated. $CS(NH_2)_2$, KCN, CS_2 , KCl, K_2SO_4 , and FeCl₃ are accelerators, whilst $CO(NH_2)_2$ has no action. HCNS accelerates the dissolution of Cd in 7N-HCl, the effect being a max. at 0.0025N, the action between Cd and HCl probably taking place in two stages. $CS(NH_2)_2$ and I have also an accelerating action, but KCN and $CO(NH_2)_2$ have no effect. From these and previous results it is concluded that the dissolution process of metals in acids depends not only on diffusion, but also on special chemical reactions taking place either in the solution or at the surface of M. S. B. the metal.

Current problems in catalysis. E. B. MAXTED (J.S.C.I., 1934, 53, 102-105T).---A crit. review of the evidence relating to the heterogeneity of catalyst surfaces. R. S.

Catalytic activity and ferromagnetism. J. A. HEDWALL and E. GUSTAVSON (Svensk Kem. Tidskr., 1934, 46, 64—65).—The catalytic activity of Ni for the reaction $2N_2O=2N_2+O_2$ increases suddenly at the Curie point (360°). The sudden application of a magnetic field of 2000 gauss to the catalyst has no effect. R. P. B.

Activated adsorption and para-ortho-hydrogen conversion on charcoal. R. BURSTEIN and P. KASHTANOV (Nature, 1934, 133, 571-572).—The halfval. period of the para-ortho conversion measured at 20° decreases practically linearly when the amount of H_2 adsorbed at 500° increases. Adsorption of 0.17 c.c. of H_2 per g. of charcoal reduces the velocity nearly to zero, and further adsorption of H_2 has no effect. The change in catalytic activity produced by the activated adsorption cannot be explained merely by a decrease in the van der Waals adsorption, which is practically unaffected by a previous activated adsorption of 0.17 c.c. of H_2 . L. S. T.

Heavy hydrogen. I. A. FARKAS and L. FARKAS. II. Ortho-para conversion. A. FARKAS, L. FARKAS, and P. HARTECK (Proc. Roy. Soc., 1934, A, 144, 467–480, 481–493).—I. The concn. of H_2^2 in a mixture of H isotopes (0.002 c.c.) is determined with an accuracy of 0.2% by a method based on their different sp. heats. The equilibrium in the mixture $H_2^1+H_2^2$ balanced with H^1H^2 is rapidly established at the surface of a hot Ni wire. The equilibrium const. is about 4, in agreement with theory, and the establishment of the equilibrium is used to determine the mols. of H_2^1 , H_2^2 , and H^1H^2 in a sample of H_2 . H_2^1 and H_2 can be separated by pumping the gas at low pressures through a fine nozzle. If a $H_2^1-H_2^2$ mixture diffuses through a Pd tube, the $H_2^1: H_2^2$ ratio of the diffusing gas is the greater the lower is the temp., but above 300° this ratio is equal to that of the original gas.

II. The ortho-para conversion of H_2^2 , catalysed by charcoal, has been measured by thermal conductivity methods. The heterogeneous ortho-para conversion at 20.4° abs. proceeds at nearly the same rate for H_1^1 and H_2^2 under the experimental conditions. The reconversion of ortho- H_2^2 into normal H_2^2 by the paramagnetic mol. O_2 is $\frac{1}{10}$ that of the corresponding reaction for H_2^1 , indicating that the magnetic moment of the H^2 nucleus is about 1/5 of that of the proton.

L. L. B.

Para-ortho-hydrogen transformation catalysed by ions of the iron group. Relation of magnetic ionic moment to concentration. H. SACHSSE (Z. physikal. Chem., 1934, B, 24, 429-436).—The rates of transformation in 0.001-1*M* aq. solutions of Mn, Fe^{II}, Co, Ni, and Cu sulphates are independent of the previous history of the solutions and show that the magnetic moments of the cations are independent of the concn. over the whole concn. range. In this group of metals the order of magnetic cross-sections is the reverse of the order of Goldschmidt ionic radii. R. C.

Recombination of oxygen and hydrogen atoms on metallic surfaces. S. J. ROGINSKI and A. B. SCHECHTER (Compt. rend. Acad. Sci. U.R.S.S., 1934, 1, 310-312).—The process of recombination of atoms on metallic filaments was proved by the change of resistance of the filament and the concn. of atoms determined by the diffusion method of Wrede. Results for Pt and Pd over a temp. range 150-900° are given. Recombination is accompanied by a stage involving an energy of activation of 2000 g.-cal. W. R. A.

Electrical condition of hot surfaces during the adsorption of gases. V. Charging up of hot surfaces. J. C. STIMSON. VI. Gold surface catalysing the combustion of carbon monoxide. G. I. FINCH and B. W. BRADFORD (Proc. Roy. Soc., 1934, A, 144, 307-320, 320-339; cf. A., 1931, 1006).--V. Measurements of the rates of attainment of steady potential by Au, Ni, Pt, C, and Cu surfaces after earthing indicate that the rate of charging up of a surface is a linear function of its instantaneous potential. The effect of temp. is very marked. The hot surface probably emits positive electricity over the temp. range investigated (up to 850°).

VI. Moist or dry $2CO + O_2$ mixtures were circulated over an electrically insulated heated Au gauze surface connected with a Lindemann quadrant electrometer. The reaction velocity, the rate of charging up, and the equilibrium potential of the surface were recorded. It is found that (1) the structure of the surface most suitable for the promotion of the combustion of dry CO differs from that required for moist CO; (ii) the reaction velocity in the moist is > in the dry reacting system, but with rising temp. the differences between the rates in the two systems diminishes, until at about 550° approx. equality is reached; and (iii) that changes in the catalytic activity of the surface are paralleled by changes in the rate of electrical charging. L. L. B.

Catalytic activity of solid mercuric chloride in the reaction between hydrogen chloride and acetylene, compared with the catalytic activity of gaseous mercuric chloride. J. VAN DALFSEN and J. P. WIBAUT (Rec. trav. chim., 1934, 53, 489– 496).—The reaction between HCl and C_2H_2 has been investigated at temp. of 100° and 200—260°, in presence of HgCl₂ on SiO₂ gel (I), of cryst. HgCl₂ (II), and of HgCl₂ vapour (III). (II) shows very low catalytic activity compared with (I), whilst (III) is practically inactive. H. S. P.

Influence of various metallic oxides as catalysts in promoting oxidation of methane by means of copper oxide. A. ARNEL (J.S.C.I., 1934, 53, 89–92T; cf. Campbell and Gray, *ibid.*, 1930, 49, 477T).—A 5% CH₄–N₂ mixture was passed at various temp. through a column of CuO impregnated with various metallic oxide catalysts, and the temp. of initial and complete oxidation were determined graphically. The optimum proportion of CoO was approx. 4 wt.-% and caused oxidation to begin at 220° and to be complete at 620°. The other catalysts and corresponding temp. were 4% CeO₂ (255°, 555°), 4% Cr₂O₃ (< 200°, 640°), 1% Fe₂O₃ (< 200°, 510°), 4% Fe₂O₃ (270°, 505°), 4% U₃O₈ (< 200°, 710°). The temp. necessary for complete oxidation with 4% Fe₂O₃ was 200° < that

required by CuO alone. In the case of CoO and Fe_2O_3 the concn. of the catalyst had a relatively small influence on the catalytic activity.

Equilibrium studies in reactions between carbon disulphide and hydrogen. E. TERRES and E. SASSE (Angew. Chem., 1934, 47, 238–243).—By using suitable catalysts the products of the reaction between CS_2 and H_2 at 500–900° can be restricted to CH_4 and H_2S . The reverse reaction proceeds reasonably rapidly over Pt; for the direct reaction Pt can be used above 800° and Mo above 600°. The same equilibrium is reached from both sides and the vals. of the const. agree reasonably with those calc. by the Nernst equation for the reaction $4H_2+CS_2=$ $CH_4+2H_2S+49,760$ g.-cal. A. G.

Catalytic vapour-phase hydration of ethylene. -See B., 1934, 392.

Determination of the value of a gas for tungsten lamps by observation of tungsten sputtering. A. P. STVOLIN (J. Tech. Phys. U.S.S.R., 1932, 2, 1034—1052).—Traces of O_2 or H_2O cause oxide formation at 1400—2600°; N_2 and A catalyse the reaction. H_2O yields W_2O_5 ; O_2 yields WO_3 . Pressure increases oxide formation. CH. ABS.

Course of reactions in the solid state. W. JANDER (Angew. Chem., 1934, 47, 235-238).—A review. At the temp. at which reaction begins at the interface of two solids, or at a slightly lower temp., other properties change; e.g., the catalytic effect or sorptive power is increased. When several reaction products are possible, as with CaO and SiO₂, the same compound (2CaO,SiO₂) is generally formed initially and this is converted into other compounds under favourable conditions. A mechanism is proposed. A. G.

Behaviour of iron catalysts with illuminating gas and similar gases between 250° and 450°.— See B., 1934, 390.

Catalytic oxidation of toluene in the vapour phase. J. K. CHOWDHURY and S. C. CHOUDHURY (J. Indian Chem. Soc., 1934, 11, 185-196).-The catalytic activities of NiO, V2O5, Al and Sn vanadates with and without the addition of Al2O3 or SiO2 gel have been compared in regard to the formation of BzOH at various temp. The efficiency of reduced NiO and of V_2O_5 or Sn vanadate can be increased by respective F. L. U. addition of Al_2O_3 and SiO_2 gel. Catalysts for destructive hydrogenation. I. Hydrogenation of naphthalene in the presence of molybdenum sulphide. M. S. NEMTSOV and G. V. SIPOVSKI (Compt. rend. Acad. Sci. U.R.S.S., 1934, 1, 494-500).—Almost complete reduction of MoS₃ to MoS_2 occurs during the hydrogenation of $C_{10}H_8$ in presence of MoS_3 . MoS_2 is a much less efficient catalyst, and the rate of decomp. of the tetrahydronaphthalene (I) decreases considerably. To avoid reduction of MoS₃ it would be necessary to bring H₂S into the reaction at 100 atm. pressure, so the method 18 of little technical val. A method suggested is to hydrogenate $C_{10}H_8$ to (I) in presence of MoS₂ at a low temp., and then to decompose (I) at a higher temp. in absence of a catalyst. It is essential to have no catalyst present at the higher temp., since the

reduction equilibrium is reversed and there is a tendency to re-form $C_{10}H_8$. J. W. S.

Aërogel catalysts. Thoria; preparation of catalyst and conversions of organic acids into ketones. S. S. KISTLER, S. SWANN, jun., and E. G. APPEL (Ind. Eng. Chem., 1934, 26, 388–391).—As catalysts aërogels have the advantages of large surface, free space, and capillary diameter. ThO₂ aërogels were prepared in two ways and were more efficient catalysts for the conversion of aliphatic acids into ketones than other forms of ThO₂ and than other oxides. A. G.

Cellulose deterioration. I. Autoxidation of mannitol. D. J. SALLEY (J. Physical Chem., 1934, 38, 449–463).—The oxidation of mannitol by gaseous O₂ in presence of FeCl₃ and NaOH is auto-accelerating. The effect of variation of concn. of reactants and of temp. has been investigated. The reaction is accelerated by light. The quantum yield determined by the difference between the light and the dark reaction, and the absence of inhibiting effect by known oxidation inhibitors, indicate that the oxidation has not a chain mechanism. Quinol, which normally acts as an inhibitor, is in this case an accelerator. The presence of thermally decomposing H_2O_2 accelerates the rate of absorption of O_2 from the gas phase by aq. mannitol in the dark. A comparison is drawn between the oxidation of alkali-cellulose and of alkaline mannitol solutions by atm. O2, and the application to the deterioration of cellulose and to bleaching processes is M. S. B. indicated.

Theory of the separation of H^1 and H^2 by electrolysis of water. R. H. FOWLER (Proc. Roy. Soc., 1934, A, 144, 452—466).—The theory of the separation of H^1 and H^2 by the electrolysis of H_2O is discussed. The requirements of a steady state are applied to the various possible mechanisms of the H_2 electrode. The separation may be due to different overpotentials, as proposed by Polanyi, or to different combination rates for mol. formation on the surface; or both these factors may be operative.

L. L. B.

Electrolytic preparation of sodium perborate. II. F. KAWAMURA and H. MOHRI (J. Electrochem. Assoc., 1934, 2, 10—14).—Cathodic reduction (I) in a bath containing alkali borate and carbonate is diminished by addition of KCl, H_2SiF_6 , and Na_2SiO_3 . A little Na_2CrO_4 and Turkey-red oil lessens (I). Superposition of a.c. on d.c. does not favour the formation of NaBO₃. The optimal temp. is 10—12° and optimal c.d. 10—15 amp. per sq. dm. at 6 volts.

CH. ABS.

Electro-deposition of nickel from alkaline electrolytes. M. BALLAY (Compt. rend., 1934, 198, 1494—1496).—Pptn. from ammoniacal solutions of Ni salts is prevented by citric, glycollic, and lactic acids and their alkali salts, but not by malic or tartaric acids, glucose, maltose, or glycerol. An electrolyte containing 20.8 g. Ni, 6.3 g. NH₄, 6.0 g. Cl, and 150 g. neutral Na citrate per litre gave good deposits at $p_{\rm H}$ 3.6—9.8 and c.d. 2—10 amp. per sq. dm., at 40°. The current efficiency varied considerably with $p_{\rm H}$, rising to 94.2% at $p_{\rm H}$ 9.6. B. W. B.

Cuprous oxide rectifier. T. ASADA (Japan, J. Physics, 1934, 9, 1-25).-The voltage-current characteristics of some Cu₂O-coated Cu plates, of which a superficial layer of the Cu₂O had been reduced to Cu, have been investigated, singly and in the form of full-wave rectifiers. An amplifying system for a microphotometer is described, in which the light beam falling on a Cs photo-cell is made intermittent, the photocurrent being amplified with valves and rectified with a full-wave Cu₂O rectifier of known characteristic. J. W. S.

Structure of electrolytic deposits of copper formed in presence of colloids.—See B., 1934, 365.

Oxide coating of aluminium. W. C. VON GEEL and H. EMMENS (Physica, 1934, 1, 415-416).-Anodic oxidation of Al forms a cryst. oxide layer (I), using low c.d., and an amorphous oxide layer (II) with high c.d. Al covered with (II) may be oxidised a second time under conditions producing (I), which then forms under (II). The current efficiency is then 100%, whereas when (I) is formed directly in absence of (II) it is always < 100%. The ions pass through (II) in order to form (I). H. J. E.

Alkaline storage battery. IV. Alkali zincate battery with nickel mesh cathode. 2. S. TANAKA and K. Iwasa (J. Electrochem. Assoc., Japan, 1933, 1, 253-256).-- A porous Fe or Ni-Fe plate prevents the formation of a deposit at the lower end of the anode. For preliminary treatment of the anode, amalgamation is most effective. The best electrolyte is 6-7N-KOH containing ZnO (KOH: ZnO=12-15). CH. ABS.

Electrolytic desensitisation. E. BAUR (Z. Elektrochem., 1934, 40, 184-188).-The desensitising action of FeSO4, CuSO4, MnSO4, KI, quinol, and metol on the reaction of UO₂SO₄ with HCO₂H under the influence of light is also observed when the aq. system is electrolysed in the dark. The mechanism is discussed. E. S. H.

Theory of electrolysis of melts. P. DROSSBACH (Z. Elektrochem., 1934, 40, 180-182).-Theoretical. E. S. H.

Conjugated systems. X. Electrolytic reduction of β -vinylacrylic acid.—See this vol., 631.

Heterogeneous chemical reactions in the silent electric discharge. VII. S. MIYAMOTO (Bull. Chem. Soc. Japan, 1934, 9, 139-149).-The reduction of inorg. solids by H_2 in the silent electric discharge has given the following results: $LiNO_3 \longrightarrow LiOH$, has given the following results: $LiNO_3 \longrightarrow LiOH$, $LiNO_2$, NH_3 , and NO_2 ; $Be(NO_3)_2 \longrightarrow Be(OH)_2$, NH_4 salt, NO_2' , NO_2 , and NO; $Hg(NO_3)_2 \longrightarrow HgO$, Hg^1 salt, NH_4 salt, NO_2' , and NO_2 ; $HgNO_3 \longrightarrow HgO$, Hg, NH_4 salt, NO_2' , NO_2 , and NO; $Pb(NO_3)_2 \longrightarrow$ $Pb(OH)_2$, NH_4 salt, NO_2' , (Pb), NO_2 , and NH_3 ; $Bi(NO_3)_3 \longrightarrow Bi(OH)_3$, NH_4 salt, NO_2' , (Bi), NO_2 , and NO_3 , $Al(NO_3)_3 \longrightarrow Al_2O_3$, NH_4 salt, NO_2' , and NO_2 ; $NH_4NO_3 \longrightarrow NO_2'$, NH_3 , and NO_2 . H. S. P.

H. S. P.

Relative reactivities of the hydrogen isotopes with chlorine. G. K. Rollefson (J. Chem. Physics, 1934, 2, 144-145).-It is shown from a relation governing the reaction of mixtures of H2, Cl₂, and CO, illuminated by light absorbed by the Cl_2 , that H; mols. are less reactive than H_2 in the formation of HCl, since, for the former, the heat of activation is slightly higher. N. M. B.

Destruction of nuclei by developing agents. LUPPO-CRAMER (Z. wiss. Phot., 1934, 32, 302-308) .--The degree to which the latent image is removed by solutions of p-C₆H₄(NH₂)₂ or its hydrochloride was tested on many different makes of plates. The most active concn. is generally about 1 : 1000. The weaker action of more conc. solutions is attributed to the adsorption of Br' necessary for rebromination of the Ag nuclei. Chloroquinol is, unexpectedly, similar in behaviour. J. L.

Premature image reversal. LUPPO-CRAMER (Z. wiss. Phot., 1934, 32, 295-301).-Various conditions under which reversal is obtainable before full exposure (i.e., that required for D_{max} .) is reached are discussed. AgI emulsions, lightly fogged, will show reversal with subsequent small exposures. If these emulsions are specially treated (nuclei removed with rhodamine), the effect occurs even without the preliminary fogging. In no case is the effect observed with physical development, which acts only on the surface of the grains. J. L.

Blackening of photographic layers by electrons and electron-excited fluorescence. B. vox Bor-RIES and M. KNOLL (Physikal. Z., 1934, 35, 279-289).—A no. of results are collected and discussed. For both long (10^2 — 10^{-2} sec.) and short (10^{-5} — 10^{-8} sec.) exposures to electron beams the blackening follows the Bunsen-Roscoe law. The sensitivity of various emulsions towards blackening by electron beams was investigated. The blackening produced by the fluorescence of various substances under the influence of an electron beam was studied, and the substances arranged in order of intensity of blackening produced. The sensitivity of various types of emulsion was also investigated as for the electron beam itself. A. J. M.

Theory of ideal colour-sensitivity of photographic emulsions. II. Ideal colour filter. J. E. DE LANGHE (Z. wiss. Phot., 1934, 32, 283-288; cf. A., 1933, 791).-Mathematical. The transmission of an ideal filter is calc. The results are not in agreement with those of previous workers. J. L.

Quantum theory of the latent photographic image. T. H. JAMES (J. Chem. Physics, 1934, 2, 132-135).—The process of photographic exposure is explained as a true photochemical reaction. The apparent failure of the Einstein equivalence law for short exposures is not real, and an equation is derived, valid for red light to X-rays and for emulsions from Azo to Eastman portrait, on the assumption that absorption of one quantum by a sensitivity centre of the grain produces an activated but unstable state which renders the grain as a whole developable. A preliminary treatment of the Herschel effect is given. N. M. B.

Photochemical oxidation and absorption spectra of solutions containing tervalent antimony. W. BRULL [with H. SCHLAGEL] (Z. anorg. Chem., 1934, 217, 401-416).-Solutions of Sb₂O₃ in HCl or tartaric acid and of SbCl, in saturated NaCl
are photochemically oxidisable, even by O_2 . In the solutions named the effect is produced in ordinary glass vessels in sunlight, whilst in others (e.g., Sb_2O_3 in H_2SO_4) light of shorter wave-length is required. In most cases a peroxide is formed as an intermediate stage. The oxidation has been studied in relation to the nature of the solution, concu., wave-length and intensity of light. The velocity of the "dark" reaction is very small. F. L. U.

Chain mechanism in autoxidation of sodium sulphite solutions. H. L. J. BACKSTRÖM (Z. physikal. Chem., 1934, B, 25, 122-138).-The rate, v, of the photochemical autoxidation is given by $v = 0.041 I^{0.53} / (c + 0.005 + 0.0041 I^{0.53})$, where c is the concn. of inhibitor (EtOH) and I the light intensity. In the oxidation catalysed by Cu the fall of v at high $p_{\rm II}$ cannot be accounted for by pptn. of the Cu (cf. A., 1925, ii, 567). In the photochemical oxidation in presence of EtOH v is a max. at a $p_{\rm fr}$ at which > half the sulphite is present as ${\rm HSO}_3$. Hence in the reaction chain an active intermediate product must occur which can react with either HSO3' or the inhibitor. In both the catalysed and photochemical oxidations the primary process is the formation of SO_3' (A., 1931, 917). The first step of the reaction with O_2 is probably $SO_3' + O_2 = SO_5'$. The SO_5' dehydrogenates the HSO₃', re-forming SO_3' , and so on. The inhibiting action of the alcohol is connected with its induced oxidation, probably $SO_5' + R \cdot CH_2 \cdot OH = SO_4' + R \cdot CHO + H_2O$, the chain being broken by R. C. subsequent reaction of the SO4'.

Formation of benzene by the photochemical polymerisation of acetylene at high temperatures. R. LIVINGSTON and C. H. SCHIFLETT (J. Physical Chem., 1934, 38, 377–381).—The presence of C_6H_6 in the products of the photochemical polymerisation of C_2H_2 above 270° has been confirmed by its absorption spectrum. M. S. B.

Photochemical transformation of trans-stilbene. A. SMAKULA (Z. physikal. Chem., 1934, B, 25, 90—98).—The quantum yield, E, in the trans-cis change in light of the wave-length of the absorption band of the C:C linking is 1, whereas in light of wave-lengths causing vibrational excitation it is 30% smaller. Hence the primary process involves loosening the C:C linking by electron excitation, permitting rotation. In light corresponding with absorption bands of other linkings E is 0.4. On irradiation cisstilbene changes into another substance. R. C.

Action of light on di-iodo-hydrocarbons: di-iodoethylenes. G. EMSCHWILLER (Compt. rend., 1934, 198, 1151—1154).—as-Di-iodoethylene, from NaOH and CHI₂:CH₂I, is a colourless liquid, d^{15} 2·94, b.p. 61°/18 mm., or about 165°/760 mm. with decomp. and, after a short interval, detonation. With HI it forms CMeI₃. Kaufmann's supposed CH₂:CI₂ (cf. A., 1922, i, 213) was a mixture of [:CHI]₂ and C₂I₂. It is decomposed by ultra-violet light : 2CH₂:CI₂ \longrightarrow C₂H₂+C₂I₂+(H, I); 2C₂I₂ \longrightarrow C₂+CI₄ (cf. A., 1897, i, 389); CH₂:CI₂+(H, I) \longrightarrow CMeI₃; with small quantities of CH₄ and C₂H₄. Although [:CHI]₂ is not oxidised in ultra-violet light CH₂:CI₂ is completely oxidised with formation of HCO₂H, a trace of C₂HO, I, and gas consisting of CO 57, CO_2 23, and C_2H_2 20% (cf. this vol., 375). C. A. S.

Chlorine-sensitised photochemical oxidation of chloroform in carbon tetrachloride solution. A. T. CHAPMAN (J. Amer. Chem. Soc., 1934, 56, 818— 823).—The photochemical chlorination of CHCl₃ in CCl_4 is inhibited completely by O_2 ; when Cl_2 is present as a photosensitiser $COCl_2$ and HCl are formed, with an org. peroxide. The rate of oxidation for small light absorption is proportional to the light intensity and $[Cl_2]$, but independent of $[O_2]$ and $[CHCl_3]$. The yield increases 16% per 10° rise in temp. The average quantum yield using monochromatic radiation is 1.70 equiv. of acid per einstein absorbed. E. S. H.

Photokinetics of bromine substitution. IV. Bromination of naphthalene under the influence of light. V. Bromination of alkylnaphthalenes under the influence of light. J. KOZAK and F. PAZDÓR (Bull. Acad. Polonaise, 1933, A, 477-488, 489-498).--IV. The photo-reaction is unimol., with a temp. coeff. 1.57 per 10° between 5° and 30°. The velocity for a given rate of absorption of energy is greatest in blue light.

V. The velocity of photo-bromination of various Me and Et derivatives of $C_{10}H_8$ has also a max. in the blue, but with Br-substitution reactions of these substances and of PhMe there is also a secondary max. in the yellow. Br-addition reactions, e.g., with CHPh.CH- CO_2H , show only the max. in the blue.

F. L. U. Chain mechanism in autoxidation of aldehydes. H. L. J. BACKSTROM (Z. physikal. Chem., 1934, B, 25, 99-121).-The ketone-sensitised oxidation of aldehydes responds to inhibitors in the same way as the ordinary photochemical oxidation, showing the substances propagating the chains to be the same for both. The primary photochemical process in the ketone-sensitised oxidation of alcohols seems to be the "lifting" of the C:O linking of the absorbing mol. : $X_2CO + h\nu = \cdot CX_2 \cdot O \cdot$. This substance is then able to dehydrogenate the alcohol, giving first a semipinacone radical, ·CX2·OH. In the sensitised oxidation of aldehydes it dehydrogenates the aldehyde mol. to ·CR:O, which propagates the chain. The ordinary photochemical autoxidation of an aldehyde may be supposed to be initiated by lifting the C:O linking in an aldehyde mol., which then reacts with an unchanged mol. This theory is supported by the observation that on irradiation of solutions of aromatic ketones in aldehydes in absence of O_2 pinacones separate, and from pure PhCHO benzoin is formed. Bowen and Tietz' results for the rate of photochemical autoxidation of MeCHO vapour (A., 1930, 234) can be explained by the theory. The rate of photo-chemical autoxidation of liquid PhCHO in presence of inhibitors is proportional to a power of the light intensity varying from 0.5 to 0.9, depending on the inhibitor, and the rate at which an inhibitor is destroyed varies from one inhibitor to another.

R. C. Oxidation of mannitol by oxygen photosensitised by hydrogen peroxide. D. J. SALLEY (J. Physical Chem., 1934, 38, 465–473).—The oxidation of mannitol by O_2 , photosensitised by H_2O_2 ,

has been investigated for different concns. of mannitol and H_2O_2 . At a const. initial $[H_2O_2]$ variation of the mannitol concn. causes an increase in the rate of absorption of O_2 and a simultaneous decrease in H_2O_2 decomp., but at sufficiently high mannitol concn. the rates of these two reactions become independent of the mannitol concn. A max. of 202 is absorbed for each H_2O_2 disappearing, which indicates that the photosensitised oxidation is not a chain process. The results are discussed in relation to Haber and Willstätter's theory of alcohol and aldehyde oxidation. In the presence of NH₂Et, which is an inhibitor of the photolysis of H_2O_2 , the rate of decomp. of H_2O_2 in the mannitol-H₂O₂ mixture is increased, whilst absorption of O_2 apparently decreases, probably owing to the destruction of H_2O_2 with partial evolution of O_2 . M. S. B.

Ultramicroscopic observations on light-sensitive crystals. II. G. SCHAUM and K. SCHAUM (Z. wiss. Phot., 1934, 33, 13—32; cf. A., 1932, 821).— The behaviour of crystals of AgBr during illumination, irradiation with α -, β -, and γ -rays, and treatment with developers has been studied by dark-ground illumination. Differences due to an excess of Br' or Ag' have been noted. The observations generally confirm those which have been obtained by ordinary microscopical methods. F. L. U.

Temperature coefficient of the rate of combination of hydrogen and oxygen under α -radiation. C. H. SCHIFLETT and S. C. LIND (J. Physical Chem., 1934, 38, 327–337).—The combination of H_2 and O_2 under α -radiation has been studied between -185° and 500° with Rn mixed with the reacting gases and with Rn in an α -ray bulb, with and without circulation of the gases. -M/N, the no. of mols. of H₂ and O₂ reacting per ion pair produced both in H_2 and O_2 , remains const. at 4.5 up to 25° , and then rises slowly to 20 at 400°. Between 400° and 500° the vals. are not reproducible owing to the thermal reaction, and above 500° the reaction is explosive. The temp. coeff., 1-02-1-05, is of the same order as the temp. coeff. of the photochemical reaction. The results indicate that in the lower temp. range the reaction is of the stably quantised type, whilst at higher temp. there is a chain mechanism involved. H₂O vapour acts as an ionic catalyst of 100% efficiency.

M. S. B.

Decomposition of gaseous hydrogen sulphide by α -particles. W. MUND, M. SCHOUWENAARS, and K. DEVRIENDT (Bull. Soc. chim. Belg., 1934, 43, 49— 72).—At low pressures (60 mm.) and low intensities of irradiation, the decomp. of H₂S by α -particle irradiation proceeds with an ionic yield, *I*, of about 2·12. With increase of pressure from 60 to 1400 mm., *I* increases by about 30%. At high intensities *I* diminishes, by an amount which is apparently proportional to the square of the intensity. The presence of $\geq 10\%$ of H₂ in the gas does not cause any marked decrease of *I*. H. F. G.

Insulating films formed under electron and ion bombardment. R. L. STEWART (Physical Rev., 1934, [ii], 45, 488–490).—Minute traces of org. vapours in evacuated tubes give rise, on surfaces subjected to electron or canal-ray bombardment, to insulating layers attributed to C compounds formed by polymerisation; they are not explained by the simple ion-deposition theory. The properties and effects of these films are discussed. N. M. B.

Transmutations by means of electric rays. XV. Electrosynthesis of zinc diethyl. XVI. Transmutation from the viewpoint of modern atomic theory. M. Z. JOVIČIČ (Glas, 1932, Sept., 5 pp.; Chem. Zentr., 1933, ii, 2790).—XV. Under the influence of an electric discharge at reduced pressure various org. and inorg. substances yield condensation products; a loss in wt. is mainly accounted for as newly-formed O_2 . With ZnEt₂ up to 20% of the C and H disappears. The action of the electric rays is "to modify the C and H of hydrocarbons with the consequent formation of O_2 ."

XVÎ. Nascent H under the influence of electric rays can be changed in such a way that by loss of its electron a new substance is formed, which by combination with electronegative substances can give rise to new syntheses, e.g., $H^4+C^{12}=O^{16}$. L. S. T.

Reaction mechanism of oxidation-reduction processes. J. WEISS (Nature, 1934, 133, 648-649).—Theoretical. A simple mechanism for such processes in solution involving the assumption of electron transfers mainly with ions, and possibly H, with the gain or loss of electrons occurring singly, is outlined. L. S. T.

Reactions between acids and salts. C. BERGELL (Allgem. Oel- Fett-Ztg., 1934, 31, 145-151).—A review, with special reference to fatty acids.

E. S. H. Fruitless attempts to enrich the heavy hydrogen isotope in water. A. GUNTHER-SCHULZE and F. KELLER (Z. Elektrochem., 1934, 40, 182—183).— A negative result was obtained in attempts to concentrate H₂O by evaporation or electrolysis of H₂O under various conditions. E. S. H.

Separation of the isotopes of hydrogen by the chemical decomposition of water. Mechanisms underlying the reducing action of dissolving metals. E. D. HUGHES, C. K. INGOLD, and C. L. WILSON (J.C.S., 1934, 493-498; cf. this vol., 375).-The isotopic composition of the H₂ evolved when various metals, alloys, and couples dissolve in aq. H₂²O (containing, where necessary, added acid or alkali) has been determined. In all cases, the evolved gas contains a smaller proportion of H₂ than the original liquid. The greatest separation is given by a 50% Zn-Cu couple dissolving in dil. H2SO4. According to the val. of the separation coeff., the metals are divided into three classes, for which the mechanism of the reaction is different and is probably as follows : (A) Ca, Mg, Al (when dissolving in acids), Mn, Zn, Cr, Fe, Co, etc., the electrons of which combine directly with H (e.g., $Ca+2H = Ca^{*}+H_2$); (B) K, Na, and Li, which combine directly with H_2O through its O atom, H. being subsequently eliminated between two combined H_2O mols. (e.g., $K+H_2O=K\cdot OH_2$, $2K\cdot OH_2=2KOH+$ H_2 ; (C) Al and Si dissolving in alkali, the OH' combining directly with the Al or Si. The mechanism of dissolution of any given metal may vary with the $p_{\mathbb{H}}$. With Cr, Fe, Ni, and Co, the isotopic separation is <

would be expected; these metals act as hydrogenation catalysts, and it is suggested that they catalyse isotopic interchange between the H_2 and the H_2O . When CaH₂, CaC₂, and Al₄C₃ dissolve in aq. H_2^2O (con-taining H₂SO₄ in the last instance), the evolved gas (H₂, C₂H₂, and CH₄, respectively) contains less H₂² than the original H_2O . D. R. D.

Natural separation of the isotopes of hydrogen. M. DOLE (J. Amer. Chem. Soc., 1934, 56, 999).-H₂O obtained by the burning of kerosene, C6H6, or honey has higher d than ordinary H_2O . E. S. H.

Interchange of hydrogen atoms between water and acetone. K. SCHWARZ and H. STEINER (Z. physikal. Chem., 1934, B, 24, 153-156; cf. A., 1933, 1242).-In a mixture of heavy H₂O and COMe₂ there is no detectable exchange of H atoms even on prolonged boiling, but in presence of NaOH exchange occurs, probably through repeated keto-enol and enolketo change, and apparently all six H atoms of the COMe₂ are exchangeable. R. C.

Formation of hydrogen peroxide by the simultaneous action of oxygen and acids on metals. E. MULLER and H. BARCHMANN (Z. Elektrochem., 1934, 40, 188-193).-H₂O₂ is formed in small quantities when liquid amalgams of Zn react with dil. H_2SO_4 , H_3PO_4 , or AcOH in presence of O_2 . Its formation is probably due to direct oxidation of H, since the yield is greater with Cd amalgam, which causes a slow conversion $2H \longrightarrow H_2$. The yield of H_2O_2 is increased further by using EtOH- H_2SO_4 and agitating so as to remove the insol. CdSO₄ which is formed; a low temp. is also favourable. An apparatus, in which these features are combined, is described. E.S.H.

Reduction of sodium sulphate to sodium sulphide. P. P. BUDNIKOV (Compt. rend. acad. Sci. U.R.S.S., 1934, 1, 332-336).-Temp. at which the reduction of Na_2SO_4 commences are recorded for various charcoals. Since SO_2 can be detected, Na_2SO_4 must react with Na_2S . Na_2SO_4 cannot be reduced by CO below 850° without a catalyst. The reduction with H, is endothermic, and is effected without a catalyst at comparatively low temp.

W. R. A. Preparation of alkali fluophosphates. J. M. G. MARQUINA (Anal. Fis. Quim., 1933, 31, 516-523).-In the prep. of fluophosphates by heating P2O5 and NH, F, the highest yield is obtained by working with a mol. ratio of 1:3. On treatment of the cooled melt with EtOH (96%), only F_2PO_2' and part of the FPO_3'' dissolve. Details are given of the prep. of $(NH_4)_2$ FPO₂; the mixture is heated first at 90° and finally at 130-140° in a Ni crucible, and the EtOH extract is neutralised with aq. NH₃, when the fairly pure salt is pptd. The yield is 90 g. from 100 g. of $NH_4F.$ (NH_4) F_2PO_2 (60 g.) is obtained by vac. evaporation at 35-40° of the EtOH mother-liquor. Na_2FPO_3 and K_2FPO_3 may be prepared by decomp. of the NH_4 salt with NaOH (KOH) and removing the NH₃ from the cold solution by a current of cold air; no hydrolysis occurs. The Na and K difluophosphates, however, cannot be prepared by the corresponding method, as much of the material used hydrolyses. H. F. G.

Basic copper carbonates. (MLLE.) S. HEMAR (Compt. rend., 1934, 198, 1507-1508).-The ppts. formed by mixing CuCl₂ and Na₂CO₃ solutions (I) were shown to be 8CuO, 3CO2, xH2O or 2CuO, CO2, yH2O according as the concess of (I) were 0.025-0.05Mor 0.125 - 1.0M, respectively. Malachite formed from the foregoing ppts. had the composition $2CuO, CO_2, 1.5H_2O$, and thermal analysis gave no indication of a monohydrate. Other reported basic carbonates of Cu are discussed. B. W. B.

Action of iodine on silver oxide. M. LEMAR-CHANDS and (MLLE.) D. SAUNIER (Compt. rend., 1934, 198, 1501-1502).-Ag₂O decolorised a solution of I in CCl_4 , forming a green compound, Ag_2OI_2 (a), insol. in H_2O and CCl_4 . (a) was decomposed by heat (at 148–170°, leaving AgI), by aq. KOH (giving AgOH+ KIO₃+KI), and by HNO₃ (giving AgIO₃+AgI), and oxidised As_2O_3 in acid solution. Other reactions are described. B. W. B.

Reduction of silver salts with hydroxylamine. M. L. NICHOLS (J. Amer. Chem. Soc., 1934, 56, 841-845).-The composition of the gaseous products of reaction varies with the concn. of the alkali and the temp. AgBr in presence of NaOH gives N2O and N2; AgNO₃ in presence of excess of NH₃ gives N₂, but in presence of NaOH and Na2SO3 yields N2O and N2. E. S. H.

Calcium thiosulphate. P. PETROVICI (J. Pharm. Chim., 1934, [viii], 19, 392-394).-Ca₂S₂O₃,6H₂O is stable at 18° when the H₂O v.p. is 9-12 mm. It loses $5H_2O$ when kept over $50^{\circ}/_{0}H_2SO_4$ or heated at 30° and at > 80° decomp. to $CaSO_3$, S, and H_2O commences. E. H. S.

Ammoniates of double salts. III. G. SPACU. P. SPACU, and P. VOICHESCU (Z. anorg. Chem., 1934, 217, 339-345; cf. this vol., 375).-The existence of the following compounds has been established : K_4 CdCl₆,nNH₃ (n=2, 6, 10); RbCdCl₃,nNH₃ (n=2, 6, 10); RbCdCl₄,nNH₃ (n=2, 6, 10); Rb₂ZnCl₄,nNH₃ (n=1, 2, 4, 6, 10); Cs₂ZnCl₄,nNH₃ (n=1, 2, 3, 4, 6, 9). In each case the first mol. of NH₃ is attached to the central atom more

strongly than the succeeding mols. F. L. U.

Volatilisation, solubility, and oxidation of metallic mercury. A. STOCK [with F. CUCUEL, F. GERSTNER, H. KOHLE, and H. LUX] (Z. anorg. Chem., 1934, 217, 241-253).-When air or O2 is excluded Hg dissolves in H2O to a very small extent only. In presence of air it dissolves gradually until the concn. corresponds with the solubility of HgO. The solubility is increased in presence of KOH and to a smaller extent with KCl. From a saturated solution of HgO Hg vapour passes into the air, and also from aq. (HgCl+KCl). Blood takes up Hg from the air quantitatively, and most org. liquids dissolve it more readily than H₂O, e.g., C₆H₆, CS₂, etc. Thus Hg vapour passes into the air through a layer of H₂O or org. liquid over its surface. It will also pass through layers of solid substances, e.g., S, SiO₂ gel, and P_4S_3 . Various fabrics such as wool, silk, artificial silk, and linen, also moist beet residues and active C or active C impregnated with I, absorb Hg vapour from the air. The presence of H₂S in the atm. does not greatly affect the volatility of Hg, Cl₂ reduces it considerably, and I vapour inhibits it, a layer of HgI and HgI₂ forming over the surface. If air containing Hg vapour is passed through H_2O and aq. KCl, KOH, and H_2SO_4 , the solutions, except 50% KOH, take up much > pure H_2O . Conc. H_2SO_4 takes up a large quantity. The volatility of droplets of varying size has also been investigated. In H_2 the volatility is > in air, probably due to surface oxidation in the latter. The results explain various phenomena such as the complete removal of Hg vapour from air by the lungs and the almost universal presence of Hg in rain H_2O . M. S. B.

Mechanism of the oxidation of alkaline solutions of mercuric cyanide with hypobromites and permanganates. B. RICCA and P. MEDURI (Gaz-zetta, 1934, 64, 113-117).—The reaction between aq. alkalis and Hg(CN)2 takes place thus : 2Hg(CN)2+ $2 \text{KOH} \implies (\text{HgCN})_2 O + 2 \text{KCN} + H_2 O.$ CN The which remains attached to Hg is not oxidised by KMnO4, but the CN' is oxidised to CNO'. The reaction between Hg(CN)₂ and hypobromites in alkaline solution takes place in the three stages: (1) $Hg(CN)_2 + 4NaBr \Longrightarrow Na_2HgBr_4 + 2NaCN;$ (2)2NaCN+2NaOBr=2NaCNO+2NaBr, (3)and $Na_2HgBr_4+2NaOH \implies HgO+4NaBr+H_2O$ (cf. A., 1929, 531). 0. J. W.

Double thiocyanate of mercury and cobalt. I. S. AUGUSTI (Gazzetta, 1934, 64, 33-39).-The macroanalytical application of the formation of HgCo(CNS)4 has been studied. The limiting sensitivities for Hg Co", and CNS' are 0.10, 0.118, and 0.581 mg., respectively. In systematic analysis the test may be made on a slightly acid (HNO₃) solution containing the Hg, Pb etc. having been previously removed from the sulphide ppt., and on a solution containing Ni and Co. Org. liquids such as urine should be centrifuged and the residue treated with HNO3. For determination the complex is dissolved in hot dil. HCl and the Hg is pptd. and weighed as HgS, whilst the Co may be separated by evaporation of the filtrate to dryness and conversion of the ignited residue into H. F. G. $CoSO_4$.

Reactions of Nessler's solutions. M. L. NICHOLS and C. O. WILLITS (J. Amer. Chem. Soc., 1934, 56, 769—774).—The compound formed when Nessler's solution reacts with NH_3 is $NH_2Hg_2I_3$, which is very insol. and tends to form negatively-charged colloid particles. When the alkalinity of the solution is 3N, the colour produced with NH_3 can be made more durable over a wider concn. range by adding stabilised, alkaline ash-free gelatin as a protective colloid.

E. S. H.

Boron arsenate and mixed crystals of boron arsenate and phosphate. G. R. LEVI and D. GHIRON (Atti R. Accad. Lincei, 1933, [vi], **18**, 394– 395).—When a solution of an equimol. quantity of H_3BO_3 in 80% H_3AsO_4 solution is evaporated and the product is dried at 600° , $BAsO_4$, $d \cdot 3 \cdot 583$, is formed. The tetragonal crystals have a $4 \cdot 46$, c $6 \cdot 797$ Å., compared with a $4 \cdot 33$, c $6 \cdot 633$ for BPO₄; 2 mols. per unit cell; d_{calc} . $3 \cdot 67$. BAsO₄ may also be prepared by heating $(NH_4)_2HAsO_4$ with H_3BO_3 . It forms a continuous series of mixed crystals with BPO₄. H. F. G. Decomposition of carbides by water or dilute acids. J. SCHMIDT (Z. Elektrochem., 1934, 40, 170– 174).—The carbides are divided into three groups: (1) Carbides of the Fe group and of Mn having the formula M_3C . In these the C atoms are separated in the crystal lattice, and the gaseous reaction product with H_2O consists mainly of CH_4 . Probably CH_2 is first produced, accounting for the formation of some C_2H_4 . (2) Carbides of the first and second groups of the periodic system and also Al_2C_3 and Ce_2C_3 , in which the crystal lattice contains a C·C linking. These give rise to C_2H_2 . (3) Mg_2C_3 , which yields allylene when treated with H_2O . The crystal structure has not been determined, but probably contains the linking C·C·C. E. S. H.

Constitution of graphitic acid and its reactions. U. HOFMANN, A. FRENZEL, and E. CSALAN (Annalen, 1934, 510, 1-41).—Graphitic acid (I), prepared (cf. A., 1928, 379) by oxidation (KClO₃, HNO₃, H₂SO₄) of Ceylon graphite, contains small amounts of K and S, is very hygroscopic, and cannot be dehydrated completely over P205 at 20°/vac. The H2O (7.05-10.5%) obtained by combustion of different preps. of "dry" (I) is considered to arise from mol. bound H₂O and not from OH groups [since reduction (aq. $FeCl_2$; aq. H_2S) causes a diminution in the H content]. (I) does not contain C and O in stoicheiometric proportion; the ratio varies from 2.9 to 3.5. Contrary to Thiele (A., 1930, 875), (I) is not reduced to graphite; aq. $FeCl_2$, aq. N_2H_4 , H_2O , and aq. H_2S cause the removal of 68, 82, and 91%, respectively, of the combined O. The (I) of Thiele (loc. cit.) is considered to be impure and may be contaminated with org. solvent. Slow or rapid heating of (I) gives CO_{2} , CO_{2} , and graphite-like material (not completely O-free); O_2 is not produced. Crystallographic data (described fully) indicate that (I) is a graphite oxide; the O atoms lie above and below the hexagonal planes of C atoms. The v.-p. curve of the swelling of (I) at room temp. is given; a measurable v.p. is first observed when 10% of H_2O is present in the (I). The heat effect of the swelling is small. The intensities of the interference lines (002) and (004) alter appreciably during the swelling; the former reaches a max. at $p_{\pi,0}$ 7.9 mm. and then decreases, whilst the latter is a min. at 4.4 mm. and then increases. Röntgen investigation of the slow thermal decomp. of (I) shows that the process is not discontinuous. Prolonged interaction of (I) (obtained by washing with much H_2O in the brown form) and H_2S gives a graphite sulphide containing about 38% S; extraction with CS_2 reduces the S content to 27.5%. H. B.

Volatility of SiO_2 in super-critical steam. C. J. VAN NIEUWENBURG and H. B. BLUMENDAL (Rec. trav. chim., 1934, 53, 476).—A reply to criticism (cf. A., 1930, 1262). H. S. P.

Silicate research. W. WEYL (Chem.-Ztg., 1934, 58, 285—287).—The difficulties peculiar to the physico-chemical investigation of silicates are disdiscussed with particular reference to the m.-p. determination. Glasses are in an unstable state of equilibrium and only a careful study of the anomalous physical properties can discover their real constitution. J. A. S. Titanium sulphides. PICON (Compt. rend., 1933, 197, 1415—1417).—If TiO₂ in a graphite boat, or better mixed with 15% of graphite, is heated in H₂S action begins about 1200°; after 2.5 hr. at 1200— 1650° Ti₃S₄ containing about 1% C is obtained. This (or any sulphide richer in S) at 1300° in vac. passes into Ti₄S₅, which above 1500° in vac. slowly loses S, and in a graphite boat in H₂ at 2000—2800° passes into a cryst. carbide, slowly sol. in moist Br; in N₂ at 2000° it forms mixed carbide and nitride, but at 2800° only TiC. Ti₃S₄ (or any sulphide) at 800° in H₂S forms Ti₃S₅; in vac. at 800° it loses S. Heated at 1400° in H₂S Ti₃S₄ after 1 hr. in vac. at 1100°. All the above sulphides are black and amorphous. C. A. S.

Chemical properties of titanium sulphides. PICON (Compt. rend., 1934, 198, 1415—1417).—The actions of various inorg. reagents on Ti sulphides are described. B. W. B.

Compounds of germanium and hydrogen: their reactions and derivatives. I. Preparation of monogermane. II. Sodium trihydrogermanides. C. A. KRAUS and E. S. CARNEY (J. Amer. Chem. Soc., 1934, 56, 765—768).—The prep. of GeH₄ and of NaGeH₃ is described. NaGeH₃ yields NaGe and H₂ when heated. Investigation of the system NH₃-NaGeH₃ at -33° has shown the existence of four solid phases: NaGeH₃,6NH₃, NaGeH₃,4·5NH₃, NaGeH₃,2NH₃, and NaGeH₃. E. S. H.

Neutral zirconium nitrate. H. PIED and (MLLE.) F. FALINSKI (Compt. rend., 1934, **198**, 1505—1506).— The existence of $Zr(NO_3)_4, 5H_2O$ (denied by Chauvenet and Nicolle, A., 1918, ii, 234) was established by analysis of crystals separated from a solution of ZrO_2 in aq. HNO₃, by Schreinemakers' method.

B. W. B.

Compound of stannic chloride and ether. S. AI (J. Soc. Chem. Ind., Japan, 1934, 37, 107B).— When prepared by various methods the composition is always $SnCl_4, 2Et_2O$. This compound volatilises at room temp. and burns without explosion.

A. G.

Complex formation between cerium or tungsten and tartaric acid in alkaline media. R. RAMAN and B. L. VAISHYA (J. Indian Chem. Soc., 1934, 11, 179—184).—Indications of complex formation between 3 mols. of Na tartrate and 2 mols. of CeCl₂, and between 2 mols. of K tartrate and 1 mol. of K_2WO_4 , have been observed by polarimetric and potentiometric methods. F. L. U.

Oxyacids of quadrivalent cerium and thorium. A. HOFFMANN (Naturwiss., 1934, 22, 206).—The compounds BeCeO₃ and BaThO₃ have been prepared. They have the perowskite structure, $a 4.377\pm0.003$ and 4.480 ± 0.003 Å., respectively. A. J. M.

Simple and complex iodates of quadrivalent lead. P.R. Râx and H. SAHA (Z. anorg. Chem., 1934, 217, 376—380; cf. A., 1932, 1099).—The following compounds are described : $Pb(IO_3)_4$, $Pb(IO_3)_4$, $2H_2O$, $H_2Pb(IO_3)_6$, $2H_2O$, $M_2Pb(IO_3)_6$, $2H_2O$ (M=Li, Na, K, XH_4). F. L. U.

Nitrosyl borofluoride and its decomposition by alkali fluorides. G. BALZ and E. MAILANDER (Z. anorg. Chem., 1934, 217, 161–169).—NOBF₄, d^{25} 2·185, has been prepared by the action of N₂O₃ on HBF_4 and purified by sublimation at 200-250° and 0.01 mm. By heating together dry NOBF_4 and NaFat 300° and about 0.01 mm. NOF is obtained; purification by fractional condensation gives a light blue liquid with a v.p. of 230 mm. at -79° . It is slowly decomposed by glass giving N₂O₃. NOF is very reactive. Red P and B burn in it spontaneously. There is no action with S and I, but it is decomposed by Hg. It is readily attacked by H₂O forming HF and by P2O5 forming POF3. With liquid SO2 colourless cryst. plates are formed and sublime without decomp. They are probably NOF,SO₂ and melt at room temp. to a colourless liquid which slowly decomposes in glass. NOF does not combine with SeO₂. With BF₃ it forms NOBF₄. M. S. B.

Preparation of dibromoamine and its reaction with Grignard reagents. G. H. COLEMAN, C. B. YAGER, and H. SOROOS (J. Amer. Chem. Soc., 1934, 56, 965-966).—NH₃ passed into Br in Et₂O at -50° gives NHBr₂ (I), which is stable (in Et₂O) at -72° but decomposes at 0° (more readily than NH₂Br). (I) and MgRX (R=Bu^a, sec.-Bu, Bu^v, ·CH₂Ph, and ·C₂H₄Ph; X=Cl, Br, I) give (cf. A., 1933, 702) N₂ (1-9%), NH₃ (41-95%), NH₂R (2-34%), and NHR₂ (0·4-6%). H. B.

Fused " onium " salts as acids. I. Reactions in fused ammonium nitrate. L. F. AUDRIETH and M. T. SCHMIDT (Proc. Nat. Acad. Sci., 1934, 20, 221-225).-Consistent with an extension of the Brönsted theory of acidity, dry fused NH₄NO₃ (I) is found to be an acid stable at the m.p. and a good conductor of electricity. CuO, UO₃, MgO, CdO, PbO, CaO, NiO, HgO, BaO, and ZnO dissolve forming the metallic nitrate, NH₃, and H₂O, but BeO, Al₂O₃, Cr₂O₃, Fe₃O₄, Fe₂O₃, ThO₂, SnO₂, Ta₂O₅, Nb₂O₅, V₂O₅, MoO₃, and WO₃ do not react although Th(NO₃)₄, $Be(NO_3)_2$, and $Al(NO_3)_3$ are sol. in (I). Many metals above H in the electrochemical series, and Cu and Bi, react vigorously forming the nitrate, N₂, NH₂, and H₂O, but Al, Mn, Cr, Fe, and Sn do not react probably owing to the insolubility of their oxides. Cu₂O is oxidised to Cu(NO₃)₂, FeCl₂ to Fe₂O₃, SnCl₂ to SnO₂, and $Cr(NO_3)_3$ to dichromate, whilst Au dissolves if a little NH_4Cl is added to (I). As, Bi, and Sb are deposited electrolytically from (I). Dehydration of nitrates in the presence of (I) and an example of acid catalysis by (I) are discussed. J. G. A. G.

Preparation of phosphorus nitride. H. MOUREU and A. M. DE FICQUELMONT (Compt. rend., 1934, 198, 1417—1419).—Couldridge's method (J.C.S., 1888, 53, 398) for preparing phospham by the action of NH₃ on (PNCl₂)₃ (I) yields a product which cannot be freed from Cl. The reaction also gives $P_3N_2Cl_4(NH_2)_2$ (II) in quantity; its properties are described. Either (I) or (II) heated to about 850° in a current of NH₃ gives P_3N_5 . B. W. B.

New hydroxy-nitrogen compound of phosphorus. P. RENAUD (Compt. rend., 1934, 198, 1159—1161; cf. A., 1933, 1257).—When PN is heated with H_2O for 15 days at 100° in N_2 or a sealed tube it hydrolyses with a 90% yield of PNO_2H_2 , tetragonal, a 7.60, c 7.57 Å., $6PNO_2H_2$ in the unit cell. It is sol. unchanged in H_2O to a slightly conducting solution, and has m.p. 195°; it decomposes at 210° or on heating with aq. KOH in vac. at 50° with evolution of NH_3 . To bring all the P into solution it must be heated for 200 hr. with H_2SO_4 . It dissolves in aq. NH_3 with apparent production of new cryst. substances. C. A. S.

Behaviour of salts of arsenic, antimony, and tin in presence of potassium cyanate. J. DALLÉros (Z. anorg. Chem., 1934, 217, 381–384).—KCNO and SnCl₂ interact in aq. solution thus: SnCl₂+ $2KCNO+6H_2O=Sn(OH)_2+2NH_4HCO_3+2KCl$. If KCNO is in large excess Sn is formed. Similarly Sb(OH)₃ is pptd. from SbCl₃ solutions. AsCl₃ decomposes KCNO without forming a ppt. The ppts. of Sn(OH)₂ and Sb(OH)₃ are easy to filter and wash, and the method is suitable for quant. analysis. F. L. U.

Thioarsenites. IV. Silver compounds. V. Zinc, lead, manganese, iron, nickel, and cobalt compounds. H. WUNSOHENDORFF and (MME.) P. VALLER (Bull. Soc. chim., 1933, [iv], 53, 1525— 1529, 1529—1532; cf. A., 1930, 48).—IV. The compounds AgAsS₂, Ag₃AsS₃, and KAg₂AsS₃ are described.

V. The compounds $M_3(AsS_3)_2$ and $KMAsS_3$ (M=Zn, Pb, Mn) are described. The corresponding salts of Fe, Co, and Ni are apparently formed, but are unstable and cannot be purified. F. L. U.

Formation of sulphuric acid and hydrogen sulphide in the decomposition of thiosulphate. F. FOERSTER and H. UMBACH (Z. anorg. Chem., 1934, 217, 175—188).—When dil. aq. Na₂S₂O₃ is slowly dropped into boiling HCl the reaction $H_2S_2O_3 + H_2O \longrightarrow H_2SO_4 + H_2S$ takes place, but the max. yield is about 91%. The decomp. is favoured by increase of acidity and, to a smaller extent, by reduction in the rate of addition of Na₂S₂O₃ or by addition of a small quantity of Ag. Addition of Cu, SiO₂, or As has no effect. It is suggested that the primary reaction is the formation of SO : $H_2S_2O_3 \Longrightarrow$ $2SO+H_2O$; $2SO+2H_2O \longrightarrow H_2SO_4+H_2S$.

M. S. B.

Formation of polythionates from thiosulphate and nitrous acid. A. KURTENACKER and H. SPIEL-HACZEK (Z. anorg. Chem., 1934, 217, 321–338).— Na₂S₂O₃ and HNO₂ interact in aq. solution at reactions between $p_{\rm H}$ 5.6 and 3N-HCl, yielding HSO₃', SO₄'', S, S₃O₆'', S₄O₆'', and S₅O₆''. S₆O₆'' appears only at the highest acidity, whilst S is not formed at $p_{\rm H}$ 5.6 or at acidities > 1.5N-HCl. The mean val. of n in the total S_nO₆'' rises with acidity. When S₂O₃'': NO₂' =2:1 the gas formed is nearly pure N₂O, corresponding with 4S₂O₃''+2NO₂'+6H'=4S₂O₃'+N₂O+3H₂O. F. L. U.

Action of chlorates on sulphur, selenium, and tellurium. J. AMIEL (Compt. rend., 1934, 198, 1033—1035).—A moist mixture of S and the chlorates of (with increasing ease in this order) Ba, Sr, Ca, Pb, Cu^{II} , Cr^{III} , Mg, Ni, Co, Zn, and Cd evolves ClO_2 below, and Cl_2 and O_2 above, 50—60°; with the S S₂Cl₂ is formed which is decomposed by H₂O, and finally sulphate is formed. If org. matter is present inflammation may occur. Se acts similarly but more vigorously, a slightly moist mixture thereof with any chlorate, except of K, becoming incandescent. Te is attacked only by conc. aq. $HClO_3$ or aq. $X(ClO_3)_2$ if X=Mg, Ni, Co, Zn, or Cd. Chlorate ammoniates, *e.g.*, $Zn(ClO_3)_2,4NH_3$ or $Cd(ClO_3)_2,6NH_3$, do not react with S or Se. A dry mixture of S and $Sr(ClO_3)_2$ may be preserved indefinitely over P_2O_5 ; addition of an alkali acetate prevents the action of any chlorate on S or Se. C. A. S.

Oxidation by oxygen of the tellurides, selenides, and sulphides of sodium in liquid ammonia. R. L. MCCLEARY and W. C. FERNELIUS (J. Amer. Chem. Soc., 1934, 56, 803-804).— O_2 converts Na₂X (where X=Te, Se, or S) into a mixture of NaX₂O₃ and Na₂XO₄. With Na₂X_n, free Te or Se is formed with Na₂XO₃ and Na₂XO₄, excepting Na₂S₂, when Na₂S₂O₃ is formed. Na₂S₃, Na₂S₄, and Na₂S₅ give Na₂S₂O₃ and S. Solutions of S or S₄N₄ yield small amounts of Na₂S₂O₃ on oxidation. E. S. H.

Reaction between potassium chromate and sodium sulphite in aqueous solution. A. SCONZO (Gazzetta, 1934, 64, 66—68).—When a solution containing K_2CrO_4 and Na_2SO_3 is kept out of contact with the air, a green flocculent ppt. begins to form after a time; when dried over CaCl₂ the ppt. has the composition $Cr_2O_{3,5}H_2O$. The reaction is probably $2CrO_4'' + 3SO_3'' + 5H_2O = 4OH' + 3SO_4'' + 2Cr(OH)_3$, since the solution becomes strongly alkaline.

H. F. G. Production of pure chromium.—See B., 1934, 365.

Influence of age and polonium content on centrifuging of polonium solutions. (MLLE.) C. CHAMIE and M. HAISSINSKY (Compt. rend., 1934, 198, 1229—1231; cf. A., 1931, 591, 697, 1230; 1933, 476).—From a $10^{-5}N$ -HNO₃ solution of Po separation on centrifuging increases markedly with time (e.g., 35, 48, and 71% after 0, 7, and 45 days, respectively). Similar but less marked increases occur on keeping without centrifuging. With const. time of keeping and comparatively high concn. (> $10^{-3}N$) of acid the % separation decreases rapidly with increased content of Po, tending towards equality with that occurring on keeping. With lower concn. the % first declines and then increases with increased content of Po.

C. A. S.

Manganese chromate. H. WUNSCHENDORFF and (MME.) P. VALIER (Bull. Soc. chim., 1933, [iv], 53, 1504—1507).—By the interaction of aq. K_2CrO_4 and MnCl₂ the compounds MnCr₂O₇ (red prisms) and Cr₂(MnO₃)₃ (black ppt.) have been prepared. The former is sparingly sol. in cold H₂O. Its aq. solutions undergo hydrolysis and oxidation on exposure to air. F. L. U.

Petrographic methods in slag examination. R. GRAHAM and R. HAY (J. Roy. Tech. Coll., 1934, 3, 241—243).—Some optical properties of MnO–SiO₂ slags (this vol., 490) are given. H. S. P.

Lower valency states of rhenium. W. MANCHOT and J. DUSING (Annalen, 1934, 509, 228-240; cf. A., 1932, 133; 1933, 581).—The olive-green solution (I)

containing Re^{III}, obtained by cathodic reduction (loc. cit.) of $K_2 ReCl_6$ (II) in $2N-H_2SO_4$, darkens when heated and evolves a little H2; subsequent treatment with an excess of Ru^{II} causes immediate evolution of l equiv. of H₂. (I) heated with conc. HCl and KCl affords 1 equiv. of H₂: ReCl₃+HCl+2KCl \longrightarrow K.ReCl.+H. These results disprove the view of Noddack and Noddack (this vol., 44) that (I) contains Re^{II}. (I) treated with $Fe_2(SO_4)_3$ (cf. Geilmann and Hurd, A., 1933, 479) consumes 4 equiv. of KMnO₄. (I) also consumes 4 equiv. of Br (method : A., 1924, ii, 274), whilst (II) absorbs 3 equiv. H₂ (about 0.7 equiv.) is evolved when (I) is heated with conc. aq. K₂CO₃ or KOH; the red ReCl₃ (III) of Geilmann and Wrigge (A., 1933, 1259) similarly gives about 0.3 Some H₂ is also evolved from (II) and conc. equiv. KOH. Reduction (Zn, H₂SO₄) of (III) affords a bluish-violet, strongly reducing solution, which when heated evolves 1 equiv. of H_2 ; contrary to Noddack and Noddack (*loc. cit.*), this does not contain Re^{I} , since treatment with HCl+KCl gives 1 equiv. of H₂ and regenerates (III). (III) is sol. in Et₂O and amyl alcohol, it does not act as a reducing agent in acid medium, and it gives a little (II) (without the production of H₂) when heated with conc. HCl and KCl at 190° (no reaction at 150°). It is suggested that (111) may be $\operatorname{Re}_2\operatorname{Cl}_6O$. H. B.

Thermal decomposition of manganous salts. P. DUBOIS (Compt. rend., 1934, **198**, 1502—1504).— Guichard's method (A., 1925, ii, 559) adapted to follow changes in wt. during heating in air up to 1000° was applied to $MnSO_4,5H_2O$ (I), $Mn(NO_3)_2,xH_2O$, $MnCl_2,2H_2O$ (II), $MnCO_3,yH_2O$, and $MnC_2O_4,2H_2O$ (III). (I), (II), and (III) gave the anhyd. salt, (I) and (II) passing through intermediate monohydrates. (I) gave Mn_3O_4 directly, but all others passed successively through the stages MnO_3 , Mn_2O_3 , to Mn_3O_4 , where z varied from 1.6 to 1.95 with different salts.

B. W. B.

Iodine pentoxide and its hydrates. II. E. MoLES and A. PARTS (Anal. Fis. Quim., 1933, 31, 618-622).—Oxidation of I with fuming HNO₃ and recrystallisation of the product (after evaporation to dryness) from 50—60% HNO₃ yields cryst. $3I_2O_5, H_2O$ (I), but no HIO₃. (I) on being heated loses H_2O much more slowly than does HIO₃, and cannot be completely dehydrated without decomp. From a supersaturated solution of (I) in 30% HNO₃, HIO₃ separates if a few crystals of HIO₃ are added. When heated, HIO₃ yields first (I) and finally I_2O_5 , without loss of I, but the first stage is not completed before the second begins. (I) has d_4^{30} 5.074, which confirms the formula given in yielding 13.0 as the mol. vol. of the H₂O in the mol. H. F. G.

Stereoisomerism of ferrous tetrapyridine dithiocyanate. G. SPACU (Z. Elektrochem., 1934, 40, 125-126).—Partly polemical against Hieber and Levy (A., 1933, 241). Further work has shown the black (β) form of [Fe(C₅H₅N)₄(CNS)₂] (I) to contain only Fe^{II} and to be a geometrical isomeride of the yellow α form (II). In C₅H₅N solution (I) is transformed into (II), whilst a ppt. of (I) is deposited from solutions of (II) in CHCl₃. At 90° (I) loses 27.30%

of C₅H₅N, and (II) only 17.20%.

 $Fe(C_5H_5N)_3(CNS)_2, 3H_2O$ does not appear to exist. H. F. G.

Metal carbonyl hydrides. Formation of cobalt carbonyl hydride. W. HIEBER (Z. Elektrochem., 1934, 40, 158—159).—The relatively complicated process of the formation of $Co(CO)_4H$, as compared with $Fe(CO)_4H_2$, is due to the dimeric structure and lower stability of $Co(CO)_4$. In these compounds FeH_2 and CoH behave as pseudo-Ni atoms. Physical properties change progressively in the series $Fe(CO)_5$, $Fe(CO)_4H_2$, $Co(CO)_4H$, $Ni(CO)_4$. H. F. G.

Stereochemistry of complex inorganic compounds. I. Walden inversion as exhibited by diethylenediaminocobaltic compounds. J. C. BAILAR, jun., and R. W. AUTEN (J. Amer. Chem. Soc., 1934, 56, 774—776).—*l*-Dichlorodiethylenediaminocobaltic chloride (I) reacts with K_2CO_3 to form the *d*-carbonato-compound, but with Ag_2CO_3 to give the *l*-carbonato-compound. When $K_2C_2O_4$ or $Ag_2C_2O_4$ reacts with (I) the *d*-oxalato-salt is formed.

E. S. H.

Compounds of hexamethylenetetramine with complex cobalt salts and the nature of residual affinity. P. RAY and M. BAKSHI (J. Indian Chem. Soc., 1934, 11, 125—131).—The following compounds have been prepared, where $B=(CH_2)_6N_4$ and X= $[Co(CN)_5(S_2O_3)]'''$. $Ba_2X_1\cdot 5B_4\cdot 5H_2O$; $Sr_2X_2B_7H_2O$; $Ca_2X_2B_1H_2O$; $Mg_2X_2B_12H_2O$; $Sr_2X_2B_7H_2O$; $Ca_2X_2B_1H_2O$; $Mg_2X_2B_1H_2O$;

J. S. A.

Micro-analysis. J. G. PEARSON (Chem. Eng. Min. Rev., 1934, 26, 279–283).—A brief review of published methods which have proved trustworthy.

Sensitivity of chemical analysis by X-rays. A. FAESSLER (Z. Physik, 1934, 88, 342—345).— Cathode-ray excitation has a sensitivity of $1:10^5$ for alloys and $1:2\times10^4$ for powder mixtures. X-Ray excitation is more efficient for short than for long wavelengths. A. B. D. C.

Radioactive methods in the service of chemical and technical problems. H. KADING and N. RIEHL (Angew. Chem., 1934, 47, 263-270).—A review of published work. E. S. H.

Critical test for the purity of gases. M. SHEPHERD (Bur. Stand. J. Res., 1934, 12, 185-191).-The method involves one approx. isothermal distillation, small initial distillate, middle and final residue fractions being collected. The pressures of these fractions are compared by a differential manometer, and indicate the presence of impurities of higher and lower b.p. than the pure substance. Accurate temp. control is not necessary, as in the method based on the constancy of pressure during isothermal processes, and the method may be extended to the testing of mixtures containing > two components and to approx. calculation of the amounts of impurities present. It is unsuitable for studying azeotropic mixtures. J. W. S.

Calorimetric analysis. II. Test of purity of organic substances.—See B., 1934, 354.

Sedimentation method for the determination of the particle size of finely-divided materials (such as hydrated lime). D. L. BISHOF (Bur. Stand J. Res., 1934, 12, 173—183).—An apparatus for the automatic and continuous weighing of depositing sediments is described. This method is compared with the microscopical measurement method of determining the particle sizes of glass spherules. The differences in n for the mounting liquids yield up to 20% differences in the apparent diameters as measured by the latter method, but the shape of the distribution curve is similar by the two methods. The sedimentation method has been applied to the determination of the particle sizes in nine samples of hydrated CaO.

J. W. S.

Exact analysis of electrolytic hydrogen. V. V. SHISHKIN and E. P. KARNAUKH (Khimstroi, 1933, 5, 2475—2477).—An accuracy of 0.01% is attained in the combustion apparatus described. CH. ABS.

Indicators. XX. Irreversible fading of phenolphthalein. A. THIEL and G. COCH (Z. anorg. Chem., 1934, 217, 254—256).—Besides the known reversible fading of phenolphthalein, an irreversible fading has been observed and investigated. It takes place on long keeping and is important when the indicator is used as a colour standard. The effect is attributed to the formation of a *tert.*-carbinolcarbonate ion and its subsequent reaction with OH', since the phenomenon is not observed with phenoltetrachlorophthalein which does not form the *tert.* anion. M. S. B.

Effect of long-chain salts on indicators; the valency-type of indicators and the protein error. G. S. HARTLEY (Trans. Faraday Soc., 1934, 30, 444–450).—Experiments show that the effect of longchain salts of strong acids and bases on the colour of indicators depends on the charges on the micelle and on the indicator ions. R. S. B.

Indicators. XXI. Easily prepared buffer solutions of practically constant electrolyte content. A. THIEL, G. SCHULZ, and G. COCH (Z. Elektrochem., 1934, 40, 150—154).—Four solutions are used, viz.: (1) 0.05M·H₂C₂O₄ and 0.2M·H₃BO₃; (2) 0.2M·H₃BO₃, 0.05M·succinic acid, and 0.05M· Na₂SO₄; (3) 0.05M·Na₄B₂O₇; (4) 0.05M·Na₂CO₃. From appropriate pairs of these, buffer solutions of approx. const. ionic concn. and of $p_{\rm H}$ ranging from 1.5 to 11.0 may be prepared. The greatest variation of the $p_{\rm H}$ of solutions varying between 2 and 0.1 times the standard concn. is 0.06. The influence of additions of NaCl and Na₂SO₄ has been examined. H. F. G.

Series of simple basic indicators. III. Zero point of the acidity function scale. L. P. HAM-METT and M. A. PAUL (J. Amer. Chem. Soc., 1934, 56, 827—829; A., 1932, 921).—The zero point H_0 has been established by determining the ionisation in dil. HCl of some azobenzene indicators. Acidity functions for HCl and HNO₃ up to 7 and 9.5*M* have been determined. E. S. H.

Indicators. XXII. Salt errors of indicators. A. THIEL and G. COCH (Z. anorg. Chem., 1934, 217, 353-375; cf. A., 1933, 29).—Extinction curves of the acid and alkaline forms of Mc-orange, Me-red, phenolphthaloin, and cresol-red have been determined in presence of various salts. Data are recorded to show the effect of the salts (1) on the wave-length corresponding with the max. val. of the extinction coeff. (a), and (2) on the max. val. of a. These effects are sp., but show certain regularities. They give rise to what are termed "complex" salt errors. "Simple" salt errors depend on the displacement (Δ) of the $p_{\rm H}$ at which [A']=[HA] (HA=indicator acid). Vals. of Δ for NaCl and Na₂SO₄ are given for all the indicators. F. L. U.

[Error involved in] the application of "observed titre." J. MIKA (Z. anal. Chem., 1934, 96, 401—412).—The influence of indicator corrections (I) on the accuracy of volumetric determinations is discussed. The observed titre differs increasingly from the true equiv. vol., (a) the larger (I) is, (b) the more the vols. employed in standardisation and in determination differ, (c) the more dil. the standard solution is, (d) the smaller is the abs. quantity determined. J. S. A.

Interferometer in the isotopic analysis of water. R. H. CRIST, G. M. MURPHY, and H. C. UREY (J. Chem. Physics, 1934, 2, 112—115).—The apparent difference of n of H₂O and that containing H²₂O, as obtained by a Zeiss H₂O interferometer, is calibrated against the corresponding differences in d. These quantities are not proportional. The method is accurate to 0.01%. N. M. B.

Determination of hypochlorous acid. LEMAR-CHANDS and (MLLE.) D. SAUNTER (Bull. Soc. chim., 1933, [iv], 53, 1414—1418).—Conditions for the accurate determination of HOCl by As_2O_3 are defined. A simplified and exact method of determining HOCl in presence of aq. Cl₂ is based on the observation that in neutral solution KI is oxidised to KIO₃ by HOCl. F. L. U.

Micro-determination of iodine. M. PATNAIK (Indian J. Mcd. Res., 1933, 21, 237–248).—The material is made into a paste with alkali, 7% KMn0₄ is added with stirring and heating, excess of KMn0₄ is reduced by gradual addition of EtOH, MnO₂ is removed by filtration, the filtrate is evaporated to dryness, and after addition of K_2CO_3 the residue is ignited. I is then determined by Newcomb and Sankaran's method. Best results are obtained when 0.001—0.003 mg. of I is present.

NUTR. ABS. (m)

Determination of fluorides in waters. E. ELVOVE (U.S. Pub. Health Rep., 1933, 48, 1219– 1222).—A modification of the Zr-alizarin method of determining F' in H_2O is described. The highest vals. are found in districts where mottled enamel in teeth is most prevalent. NUTR. ABS. (m)

Acidimetric determination of formaldehyde and sulphites. MALAPRADE (Compt. rend., 1934, 198, 1037—1039).—The solution of CH₂O is neutralised, excess of neutral aq. Na_2SO_3 added, and the resultant NaOH titrated: $CH_2O + Na_2SO_3 =$ $ONa \cdot CH_2 \cdot SO_3H + NaOH$. Conversely to determine SO_3'' excess of neutral aq. CH₂O is added to the sample after it has been neutralised in absence of air, and the resultant NaOH titrated (phenolphthalein). All other neutralisations should be with thymolphthalein. C. A. S.

Stability of aqueous solutions of sodium thiosulphate. I. BELLUCCI and I. DAMIANI (Gazzetta, 1934, 64, 69—76).—The titre of 0·1 and 0·01N aq. Na₂S₂O₃ is unchanged by bubbling through them pure CO₂ or O₂ for 2—3 hr. The slow decrease in the titre of Na₂S₂O₃ solutions on keeping (especially if < 0.01N) is ascribed to a slow decomp. by the H₂O: Na₂S₂O₃ \longrightarrow S+Na₂SO₃, followed by a rapid oxidation of the Na₂SO₃ by atm. O₂. O. J. W.

Standardisation of thiosulphate solution with potassium dichromate as standard. Z. NAKAI (Bull. Fishery Exp. Sta. Gov. Gen. Chosen, 1933, D, No. 3, 1-24).—The wt. of KI and HCl should be respectively $< 11 \times$ and $< 51 \times$ wt. of K₂Cr₂O₇. The KI content should be $\leq 0.6\%$, HCl > 3%, and liberated I about 0.08%. The solution should be titrated at $< 30^{\circ}$ and in diffused sunlight. CH. ABS.

Reactions of selenium and selenium oxide. E. MONTIGNIE (Bull. Soc. chim., 1933, [iv], 53, 1392– 1393).—Se reduces hot aq. HgCl₂ slowly to Hg (faster in presence of HCl), FeCl₃ (slowly hot), KBrO₃, HIO₃ (red Se rapidly, other forms slowly), $K_2Cr_2O_7-H_2SO_4$ (slowly), NH₄ molybdate, Na tungstate, and $K_3Fe(CN)_6$, but not Hg₂Cl₂, KClO₃, or KMnO₄. SeO₂ reduces Hg₂Cl₂ in presence of HCl, forms salts, OR·SeO₂NH₄, in which R is bornyl, m.p. 80–82°, menthyl, m.p. about 50°, and terpinyl, m.p. 98–99°, and is reduced by warm, aq. gallic acid. R. S. C.

Nessler reagent. H. J. FUCHS (Z. physiol. Chem., 1934, 223, 144—146).—The use of LiI and LiOH in place of KI and KOH in the Nessler reagent prevents the formation of a ppt. in the reagent and during determinations. J. H. B.

Argentometric assay of ammonium chloride. B.P. 1932. E. J. SCHORN and J. Y. BAIRD (Pharm. J., 1934, 132, 361).—Direct titration, using K_2CrO_4 as indicator, is not accurate since aq. NH₄Cl has $p_{\rm II}$ 5, but dichlorofluorescein may be used as adsorption indicator. J. S. A.

Bromine method for determining ammonianitrogen.—See B., 1934, 449.

Phosphoric acid and phosphates. XI. Specific solvents and analytical separation of phosphates. A. SANFOURCHE. XII. Determination of water in superphosphate. A. SANFOURCHE and J. DUBIEF. XIII. A complex ferriphosphate. A. SANFOURCHE and B. FOCET. XIV. Reactions in the production of superphosphate. A. SAN-FOURCHE and A. KRAPIVINE. XV. Evolution and retrogradation of superphosphate. XVI. Constitution of superphosphate. General conclu-SIONS. A. SANFOURCHE (Bull. Soc. chim., 1933, [iv], 53, 1507 - 1512, 1512 - 1517, 1517 - 1522, 1573 - 1580,1580-1594, 1594-1596; cf. this vol., 266).-XI. Alkaline NH4 citrate (I) cannot be considered a sp. reagent for different Ca phosphates. The solubility of $Ca_3(PO_4)_2$ may vary, according to its physical condition, from 0 to 100%. CaHPO₄ is insol. when anhyd. In the case of superphosphate indications afforded by the use of (I) are trustworthy, whilst in other cases they are not.

XII. Total H_2O is determined by mixing with an equal wt. of K_2HPO_4 and heating for 12 hr. at 120—125°. Under these conditions H_2O of constitution and volatile compounds other than H_2O are not lost. Free H_2O of the liquid phase is extracted by dry HCO_2Et . The H_2O thus removed is decomposed by CaH₂ and the evolved H_2 is measured.

XIII. When FePO₄ is dissolved in the liquid phase of superphosphate $[CaH_4(PO_4)_2+H_3PO_4]$, a gel is formed from which after 3 days a cryst. *substance* containing CaHPO₄ and Fe₂H₃(PO₄)₃ separates. The substance is white and does not give Fe(OH)₃ with aq. NH₃. It is regarded as a complex ferriphosphate of Ca, its composition approximating to $[FeH_2(PO_4)_2]_2Ca$. The influence of various factors on the course of its formation has been studied.

XIV. Formation of superphosphate from natural phosphates occurs in two stages, viz., (1) a rapid interaction of H_2SO_4 with part of the mineral to give H_3PO_4 , and (2) a slower reaction between the latter and the remaining unchanged $Ca_3(PO_4)_2$. If the state of division of the mineral is extremely fine, or if pptd. $Ca_3(PO_4)_2$ is used, both stages are completed so rapidly as to be analytically indistinguishable. The degree of completeness with which F is removed from apatite depends chiefly on the fineness of grinding.

XV. The changes occurring in freshly prepared superphosphate on keeping are mainly (1) a gradual completion of the second stage of reaction mentioned above, (2) hydrolysis of $CaH_4(PO_4)_2$ in the liquid phase, and (3) formation and separation of the complex ferriphosphate described in XIII. The first change increases, the two latter diminish, the proportion of H_2O -sol. phosphate. The principal physical change is a hardening due to hydration of $CaSO_4, 0.5H_2O$ at the expense of H_2O in the liquid phase.

XVI. Conclusions reached in the foregoing papers are summarised. F. L. U.

Photometric micro-analysis of drinking and service water. VIII, IX.—See B., 1934, 430.

Equilibrium between carbonate hardness and free carbon dioxide in natural waters. A. EMUNDS (Chem.-Ztg., 1934, 58, 328—329).—Excess of CO₂ can be determined by treating H₂O with CaCO₃ but the use of the equation [free CO₂]= $k[\text{Ca}^{\circ}]$ [combined CO₂]² to calculate the [combined CO₂] is limited because the equilibrium is disturbed by the presence of other H carbonates or of Ca or Mg salts. A. G.

Determination of carbon dioxide in air.—See B., 1934, 449.

Determination of the concentration of vapourair mixtures by an optical method. H. SCHILD-WACHTER (Petroleum, 1934, 30, No. 11, 1-5).—The gas interferometer can be used to determine the composition of a binary mixture, e.g., vapour and gas, either by calibrating the instrument with a scries of mixtures of known composition and plotting a calibration curve, or by determining n for each component and calculating the composition from the measured val. of n for the mixture. Both methods have been applied to mixtures of air with the vapours of MeOH, EtOH, Et₂O, C₅H₁₂, C₆H₁₄, C₇H₁₆, C₆H₆, PhMe, C₆H₄Me₂, and of a series of technical benzines (n=1.0024-1.0026) and benzols (n=1.00225-1.00237). A. B. M.

Colorimetric determination of potassium. J. TISCHER (Z. Pflanz. Düng., 1934, A, 33, 335—336).— The suggested inconstancy of the Na K cobaltinitrite ppt. (Alten *et al.*, this vol., 47) is discussed.

A. G. P.

Spectroscopic detection and determination of lithium, rubidium, and cæsium. J. M. TOL-MATSCHEV (Compt. rend. Acad. Sci. U.R.S.S., 1934, 1, 464—470).—Li, Rb, and Cs are best determined with reference to intense components of the first doublet of the principal series, especially when using neocyanine-sensitised plates. For detection and approx. determination, specimens of mineral containing these metals are introduced into the electric arc, comparison being made with the spectra obtained with mixtures of glass and $Al(OH)_3$ of known composition. For accurate determination the alkali metals are extracted as chlorides and compared with standard solutions. J. W. S.

Rapid determination of small amounts of magnesium in presence of phosphates. F. THOMP-SON (Ind. Chem., 1934, 10, 142).—The solution containing 0.02—0.04 mg. of Mg and about 2 ml. per litre of HCl is mixed with 2 ml. of starch-glycerite solution and 4 drops of 1% turmeric solution in EtOH in a 50-c.c. Nessler tube, and, after addition of 5 ml. of 5N-NaOH, the colour of the lake produced is compared with standards prepared in precisely the same way from aq. MgSO₄ and Ca₃P₂O₈ if the latter is present in the test. A. R. P.

Colorimetric determination of lead. S. FEIN-BERG (Z. anal. Chem., 1934, 96, 415–418).—The Pb (0·1—1·7 mg), as anodic deposit of PbO₂, is dissolved in HCl, diluted to 35—40 c.c., and pptd. from AcOH solution as PbMoO₄. The ppt. is treated with hot 10% H₂SO₄, 10 c.c. of 5% aq. KCNS and 5 c.c. of 10% SnCl₂ in HCl are added, and the orange colour is compared with that produced in a standard MoO₃ solution. Co-deposition of MnO₂ with the PbO₂ does not interfere. J. S. A.

Hydrolytic volumetric precipitation. L. VON ZOMBORY and L. POLLÁK (Z. anorg. Chem., 1934, 217, 237-240).—Pb" or C_2O_4'' may be determined volumetrically by pptn. of PbC₂O₄ in solution using a sol. Pb salt and the oxalate of a strong base. The presence of a slight excess of the latter causes an alkaline reaction with chlorophenol-red, owing to hydrolysis, and gives a sharp end-point. CdSO₄ with Na₂HPO₄ may be similarly employed for the determination of Cd" or PO₄'''. M. S. B.

Separation of lead from mercury by carbonic acid in pyridine solution. A. JÍLEK and J. KOŤA (Coll. Czech. Chem. Comm., 1934, 6, 101–106; cf. this vol., 48).—Pb is pptd. quantitatively by CO_2 from a solution (> 0.2 g. Pb in < 100 c.c.) first made neutral to phenolphthalein with 10% aq. C_5H_5N and then treated with 15 c.c. more of 10% aq. C_5H_5N and diluted to 100 c.c. The ppt. is washed with 100 c.c. of solution saturated with CO_2 containing 4 c.c. of 10% aq. C_5H_5N and 4 c.c. of 96% EtOH, and dried at 120°. It may be weighed as PbCO₃ or (preferably) ignited to PbO. Hg, the amount of which should not exceed that of the Pb, may be determined in the filtrate by Volhard's method. D. R. D.

Separation and determination of traces of lead in presence of traces of bismuth. II. Organic compounds. J. H. HAMENCE (Analyst, 1934, 59, 274-276).—FeSO₄ is added to the material, and the Pb, Bi, and Fe sulphides are co-pptd. Fe is removed by the CNS' method (A., 1932, 1223) and Pb determined colorimetrically (A., 1933, 923). The method of prc-treating viscera and org. compounds by wet oxidation is described. E. C. S.

Separation of thallium as bromide from its hydrobromic acid solution by means of ether. I. WADA and R. ISHII (Bull. Inst. Phys. Chem. Res. Japan, 1934, 13, 20).—Tl and Au bromides can be completely separated from those of other metals by extraction of HCl or HBr solutions with Et₂0. The separation of Tl from Au has been effected. R. S.

Determination of copper, cadmium, and nickel as new complex compounds. A. TAURINŠ (Z. anal. Chem., 1934, 97, 27—36).—10% aq. K_2HgI_4 , containing no excess KI, ppts. Cu quantitatively from NH₃ solution in presence of NH₄NO₃ as $[Cu(NH_3)_4][HgI_3]_2$, containing 4.91% Cu. The ppt. is washed with its saturated EtOH solution, Et₂O, and dried in vac. Cd, from 2N-NH₃ solution, is pptd. by 10% K₂HgI₄ containing 4% KI as $[Cd(NH_3)_4][HgI_3]_2$ (8·29% Cd). Ni is pptd. similarly as $[Ni(NH_3)_6][HgI_3]_2$ (4·43% Ni), washed and dried as above. Ni may be separated from Co by oxidation with H₂O₂ in NH₃ solution to $[Co(NH_3)_5Cl]Cl_2$, and pptn. of the Ni as described. J. S. A.

Use of complex ions as indicators in analysis. Indicators for metals, etc. A. R. UBBELOHDE (Analyst, 1934, 59, 339—340).—1 ml. of $10^{-4}M$ aq. Ag', Hg', Hg'', Cd'', or Au''' gives a pink turbidity when added to 3 ml. of a reagent (R) made by adding solid Ni dimethylglyoxime to a mixture of equal vols. of 5% aq. KCN and EtOH, boiling, filtering, and diluting tenfold. Ni also gives a positive reaction but is distinguished by giving a pink colour with [·CMe:N·OH]₂. 3 ml. of $5 \times 10^{-7}M$ aq. CH₂O give a distinct silkiness with 1 ml. of R. The method is also adapted to the determination of Ag, Hg, and Cu. The possible extension of the principle to other complex ions is discussed. E. C. S.

Separation of metals by graded potential. A. J. LINDSEY and H. J. S. SAND (Analyst, 1934, 59, 328—335).—The vals. obtained by Lassieur (A., 1926, 1013; "Electrolyse Rapide," 1927) are not of general application owing to polarisation of the auxiliary electrode (I) and its back-resistance. Modifications of (I), and a potentiometer arrangement by means of which the correction to be applied to direct readings for any given (I) may be determined, are described. E. C. S. E. C. S.

Electrolytic analysis of certain alloys of antimony, copper, and tin. A. J. LINDSEY and H. J. S. SAND (Analyst, 1934, 55, 335-338; cf. preceding abstract).—Modifications of Lassieur's method are described. The method gives accurate results for the determination of Cu and Sb, but errors of 2-3 mg. are obtained with 0.3 g. of Sn.

Separation of copper from other metals by means of ammonium oxalate and its gravimetric determination. A. HEMMELER (Annali Chim. Appl., 1934, 24, 140—154).—Cu(C₂O₄)₂, pptd. from the solution of a Cu salt by excess of $H_2C_2O_4$, contains varying proportions of H_2O but always $< 0.5H_2O$. Pptn. of Cu as $Cu(C_2O_4)_2$ with NH₃ and $H_2C_2O_4$ and weighing as Cu is a good method of determining Cu and of separating it from many other metals, especially if not too little Cu is present. With solutions containing Cu as complex compound, even in small amount, pptn. as CuS, followed by reduction to Cu_2S , permits the exact determination of the Cu. Good results are also obtained by fixing the NH₄ salts present with CH₂O and pptg. the Cu from the complex by slight excess of NaOH or KOH. T. H. P.

Separation reaction for mercury ion. M. STSCHIGOL (Z. anal. Chem., 1934, 96, 328-330).— Glycerol (I) is oxidised in alkaline solution to glyceraldehyde by Hg" and Hg', but by no other metals, Hg being pptd. The substance under test is treated with 10% aq. KI + 30% aq. NaOH and filtered. 1 c.c. of (I) + 2-3 c.c. of 30% NaOH are added, when Hg is pptd. on warming. J. S. A.

Volumetric determination of mercury. M. STSCHIGOL (Z. anal. Chem., 1934, 96, 330–333; cf. preceding abstract).—Hg is pptd. by boiling with NaOH and glycerol and collected by filtration. The ppt. is dissolved in HNO₃, and Hg determined by titration with 0.1N-NH₄CNS. J. S. A.

Colour reactions of the rare earths with pyrogallol: cerium reactions and also reactions of thorium, lanthanum, and elements of the third analytical group with pyrogallol. F. M. SCHEM-JAKIN (Z. anorg. Chem., 1934, 217, 272—276).—Ce^{III} and Ce^{IV} in aq. NH₃ both give with pyrogallol a lilac to dark blue colour, but not in neutral or acid solution. La gives a light brown ppt. which darkens on heating and Th gives a delicate rose colour. Fe, Cr, Al, Mn, Ni, Co, Zn, UO₂, and Ti give brown or reddish-brown colours. M. S. B.

Determination of metals with anthranilic acid. III. Simple method for determination of manganese. H. FUNK and M. DEMMEL (Z. anal. Chem., 1934, 96, 385—388; cf. A., 1933, 244, 924).—Mn is quantitatively pptd. from fairly conc. neutral solution (≥ 80 c.c. for 0.1 g. Mn) by 3% aq. anthranilic acid (I). The ppt. is washed with 0.5% (I), then with EtOH, and dried at 105°. Separation from Ba, Sr, and Mg, but not Ca, is quant. The ppt. may be titrated with 0.1N-KBrO₂. J. S. A.

Rapid titrimetric determination of manganese in steel etc.—See B., 1934, 456.

Detection of rhenium in Noyes and Bray's system of qualitative analysis. C. H. KAO and

T. L. CHANG (J. Chinese Chem. Soc., 1934, 2, 6-12).-A detailed investigation has been made of the behaviour of Re (present initially as KReO₄) in this system of analysis. Most of the Re is found in the Te group, passing into the filtrate from the pptn. of Ir and Rh. To detect Re in this filtrate, 5 c.c. of 12N-HCl are added and the solution is evaporated to dryness. The residue is dissolved in 30 c.c. of H₂O, 12 c.c. of 12N-HCl are added, and the solution is heated to boiling. 5 c.c. of 15% aq. N_2H_4 ,2HCl and 5 c.c. of saturated aq. NaHSO₃ are added and boiling is continued for 5 min. The solution is filtered, acidified with 5 c.c. of 12N-HCl, and a rapid stream of H_2S is passed for 20 min. No ppt. indicates absence of Rc. The ppt., if any, is washed several times with 5 c.c. of 0.1N-Na₂S. A black residue indicates Re. To confirm Re, this residue is warmed with 5 c.c. of 5% H₂O₂ on a boiling H₂O-bath for 5 min., filtered, and conc. to 1 drop. A small crystal of KMnO₄ is added, followed, when dissolved, by 1 drop of conc. aq. RbCl. The formation of bipyramidal rhombic crystals of RbReO4 confirms Re. D. R. D.

Benzoate method for the separation of iron, aluminium, and chromium from the other ions of the third group and the alkaline-earth ions. I. M. KOLTHOFF, V. A. STENGER, and B. MOSKOVITZ (J. Amer. Chem. Soc., 1934, 56, 812–815).—Fe, Al, and Cr are pptd. quantitatively by adding NH₄OBz to a solution in dil. AcOH, effecting a separation from other groups of cations. Two pptns. are made for precise analysis. The ppts. are washed with H₂O containing NH₄OBz to avoid peptisation.

E. S. H. Electrographic determination of metals in alloys. Steel analysis.—See B., 1934, 455.

Spectral analysis with sensitive lines within the range of glass instruments. Spark spectrum of a high per cent. Ni-Fe-Cr-V special alloy. W. KRAEMER (Z. anal. Chem., 1934, 97, 14-18; cf. A., 1933, 1110).—Results are given for a stainless Ni-Fe-Cr-V alloy using the apparatus described previously. J. S. A.

Potentiometric determination of nickel in steel with potassium cyanide.—See B., 1934, 406.

Behaviour of Cr in presence of acetate ions. J. DALISTOS (Z. anorg. Chem., 1934, 217, 189–192).– By the addition of NaOAc or Ca(OAc)₂ under suitable conditions to Cr¹¹¹ salts a ppt. of a basic Cr salt is obtained. By warming or by long keeping this forms a clear bluish-green or bluish-violet solution of a complex salt which, by long boiling with excess of aq. NH₃, ppts. Cr(OH)₃. Two methods are given by which disturbances in qual. analysis due to the presence of Cr¹¹¹ and OAc' may be avoided. One is based on the removal of AcOH by boiling with conc. HCl and the oxidation of Cr¹¹¹ to Cr^{VI} by H₂O₂ and the other on removal of OAc' by addition of excess of FeCl₃ and subsequent boiling when basic Fe¹¹¹ acetate is pptd. and carries down with it Al and Cr. M. S. B.

Colorimetric determination of uranium in ores poor in uranium.—See B., 1934, 407. Volumetric determination of tin, using various reducing agents and various concentrations of acid. F. W. LOUW and W. E. SCHLZ (J.S. African Chem. Inst., 1934, 17, 3—7).—The Sn content of concentrates is determined by fusing with Na₂O₂, dissolving in hot H₂O, neutralising with HCl, and diluting to 400 c.c. The Sn is then reduced with Al turnings, redissolved by boiling, cooled, and titrated with standard I. Reduction may also be effected with Zn dust, Ni foil, or Sb, but Al dust, Pb foil, and Mg give inferior results. Low results are obtained if the solution contains > 60% of conc. HCl, and the best proportion is 40%. A. G.

Volumetric determination of tin; use of potassium iodate. J. B. RAMSEY and J. G. BLANN (J. Amer. Chem. Soc., 1934, 56, 815-818).—Airfree solutions of Sn^{**} can be determined by direct titration with KIO₃ at acid conens. as high as 1.5-2.0N. With KI₃ an error of about 0.5% is obtained even when the conen. of HCl is only 0.3N. By adding air-free SnCl₂ to an excess of KIO₃ or KI₃ accurate results are obtained at any conen. of HCl up to 6.1Nwithout excluding air. The re-dissolution of reduced Sn is hastened by adding small amounts of CoCl₂ or NiCl₂. E. S. H.

Determination of bismuth. P. FARINI (Boll. Chim. farm., 1934, 73, 284–287).—The accuracy of various methods has been compared. Bi is best determined gravimetrically as $BiPO_4$; it may also be pptd. as basic nitrate and weighed as Bi_2O_3 , but not as Bi_2S_3 . Of the volumetric methods, pptn. as $Bi_2(SeO_3)_3$, which is determined iodometrically, gives the best results, the end-point being sharper than when the Bi is pptd. as the double iodide with *iso*quinoline. D. R. D.

Detection of bismuth with sulphur-containing organic reagents. II. Detection with 2-thiol-5-thio-4-phenyl-3:4-diazolone. J. DUBSKÝ and J. TRTILEK (Z. anal. Chem., 1934, 96, 412—415; cf. this vol., 502).— $C_8H_6N_2S_3$ (prep. described), used as an aq. solution of its K salt (Tz,K), gives with Bi in neutral or acid solution orange to red ppts. of Bi(Tz)₃ or Bi(Tz)₂Cl. Other heavy metals also give yellow ppts.; limit, 0.0012 mg. Bi.

J. S. A. Analytical chemistry of tantalum and niobium. V. SCHWARZ (Angew. Chem., 1934, 47, 228–230).— A review of published work. E. S. H.

Potentiometric determinations in alkaline solution. Determination of gold by means of vanadyl sulphate. C. DEL FRESNO and E. MAIRLOT (Anal. Fis. Quím., 1933, 31, 531-536).—When a strongly alkaline solution of a Au^{III} salt is titrated with VOSO₄ solution at $< 50^{\circ}$, a large and sharp potential change occurs at the end of the reaction $AuO_2'+3VO''+8OH'=Au+3VO_3'+4H_2O$. The solution should contain < 8% of NaOH. At room temp. the quantity of VOSO₄ used is about 2% high, but at 50-70° accurate results are obtained.

H. F. G. Separation of ruthenium from platinum, palladium, rhodium, and iridium. R. GILCHRIST (Bur. Stand. J. Res., 1934, 12, 283-290).—The solution in dil. H_2SO_4 containing NaBrO₃ is distilled and the RuO₄ evolved is absorbed quantitatively in dil. HCl saturated with SO₂. The boiling solution is adjusted to p_H 6 by adding NaHCO₃, after decomposing SO₃" by treating with HCl, and the pptd. hydrated oxide is ignited in air and then reduced to Ru in H₂, and weighed. E. S. H.

Separation of platinum, palladium, rhodium, and iridium from one another and their gravimetric determination. R. GILCHRIST (Bur. Stand. J. Res., 1934, **12**, 291–303).—The solution is evaporated to dryness with HCl and NaCl and the residue dissolved in H₂O. 10% NaBrO₃ is added to the boiling solution at $p_{\rm H}$ 6, pptg. hydrated dioxides of Pd, Rh, and Ir. Two pptns. serve to isolate Pt quantitatively. Pt is pptd. as sulphide, ignited, and weighed as Pt. Pd is quantitatively pptd. from solutions in dil. HCl or dil. H₂SO₄ by dimethylglyoxime and the ppt. weighed. Rh is separated from Ir by the TiCl₂ method previously described (A., 1932, 1224). E. S. H.

Potentiometric determination of palladium by means of stannous and titanous salts, iodide, and cyanide. E. MULLER and W. STEIN (Z. Elektrochem., 1934, 40, 133-140).-Even at low [HCl], the potentiometric determination of Pd with Sn" is not satisfactory; in H_2SO_4 solution the acid concn. has but little influence, but the end-point is not sharp. With Ti" in HCl solution the determination is accurate to within only about 2%, whilst in H_2SO_4 solution the curve is very flat. The potentiometric method based on the very low solubility of PdI_2 gives very accurate results, is not influenced by small quantities of HCl, and need not be carried out in absence of air. The indirect method in which an excess of KI is added to the Pd" solution, and the excess of I' is titrated potentiometrically with AgNO₃, is also highly satisfactory, provided the PdI₂ is removed by filtration [after addition of $Al_2(SO_4)_3$ to the solution]. Ag and Pd" cannot be determined consecutively in the same solution by the I' method, although the total Ag' and Pd" may be so determined; neither can Ag' be determined potentiometrically by Cl' in presence of Pd". The reaction between Pd" and $Hg(CN)_2$ yields a very flat potential curve, but with KCN the formation of $Pd(CN)_4$ is indicated by a sharp break, provided NaOAc is present; the results are accurate only if the Pd" solution is added to the KCN. H. F. G.

Application of the polarographic method to the analysis of synthetic phosphorescents. Determination of palladium. S. HAKOMORI and T. TASHIRO (J. Electrochem. Assoc. Japan, 1934, 2, 15—18).—The method is discussed and a polarogram of $[Pd(NH_3)_4]Cl_2$ is given. CH. ABS.

Low-temperature thermostats. K. PETERS (Chem. Fabr., 1934, 7, 47–49).—Liquid air drips into a closed jacket and on evaporation the air escapes through a valve operated by a thermoregulator; the valve opens when the temp. rises and thus permits a further quantity of liquid air to enter the jacket. Temp. between 0° and -185° may be maintained const. to within $\pm 0.1-0.5^{\circ}$. The same principle may be applied for temp. up to 400° $(\pm 1^{\circ})$, using hot air, and for temp. down to -200° or lower $(\pm 1^{\circ})$ using liquid air evaporating under reduced pressure. H. F. G.

Magneto-caloric production of extremely low temperatures. W. MEISSNER (Physikal. Z., 1934, 35, 303—310).—A review of the theory and practice of the method of adiabatic demagnetisation of rareearth salts. A. J. M.

Absolute measurement of thermal conductivity of gases. P. VERNOTTE (Compt. rend., 1933, 197, 1395—1397).—The apparatus consists of a duralumin cylinder, A, of heat capacity C, raised to V° , enclosed in a second cylinder, B, 15 mm. thick, at temp. W° (approx.=V—15°), separated from A by a layer of gas ε (approx.=0.5) mm. across. The coeff. of conductivity, k, of the intervening gas is then given by the equation $C\Delta V = kS(V - W)\Delta t/\varepsilon$, where S is the area of thermal exchange and t the no. of sec. in which A cools by ΔV° . C. A. S.

Gas thermostat. A. J. BALLEY (Science, 1934, 79, 277).—An apparatus for controlling the temp. of ovens and liquid baths to 0.1° is described.

L. S. T.

Exergic and endergic reactions. W. BLUM (Science, 1934, 79, 273—274; cf. this vol., 385).— These terms have previously been applied in connexion with nuclear transformations (*ibid.*, 1932, 76, 615). L. S. T.

Improvements in adiabatic calorimeter for measuring very small heat effects. W. SWIENTO-SŁAWSKI (Bull. Acad. Polonaise, 1934, A, 64—68; cf. A., 1931, 593).—Modifications to eliminate spurious e.m.f. in the measuring thermocouples are described. H. J. E.

Errors of fluid-pressure thermometers and their methods of correction. W. G. BIRD (J. Sci. Instr., 1934, 10, 134–142).—A mathematical analysis is given. C_7H_{16} is suitable for aeronautical instruments. C. W. G.

Technique of sputtering sensitive thermocouples. L. HARRIS and E. A. JOHNSON (Rev. Sci. Instr., 1934, [ii], 5, 153—157).—Cathodic sputtering of Bi, Sb, and Te on thin cellulose gave couples sensitive, when used with a.c. amplification, to adiabatic heat produced in a sound field, and to small intensities of radiation. N. M. B.

Reproducibility of the ice point. J. L. THOMAS (Bur. Stand. J. Res., 1934, **12**, 323—327).—Comparison of 34 ice-baths shows that with reasonable precautions the ice point is reproducible to 0.0001— 0.0003°. E. S. H.

Laboratory gas-burner. J. HUDIG (Chem. Weekblad, 1934, 31, 321—323).—A small combined gas-ring (I) and support is described to replace the Bunsen burner (II) and tripod. (I) works on the nonluminous, bats-wing flame principle (Bray burner) and is more economical than (II). S. C.

Filters for producing the colour of the equalenergy stimulus. R. DAVIS and K. S. GIBSON (Bur. Stand. J. Res., 1934, 12, 263—267; cf. A., 1931, 592). —Two filters have been prepared which, when combined with an illuminant at 2848° abs., give the colours of so-called equal energy stimulus on the bases of the O.S.A. and I.C.I. standard observers, respectively. These contain $3\cdot134$ and $2\cdot954$ g., respectively, each of $CuSO_4,5H_2O$ and mannitol in solution A, and $31\cdot180$ and $28\cdot440$ g. of $CoSO_4,(NH_4)_2SO_4,6H_2O$ and $17\cdot154$ and $17\cdot840$ g. of $CuSO_4,5H_2O$, respectively, in solution B. Spectrophotometric and colorimetric data are given. J. W. S.

Portable ultra-violet intensity meter, consisting of a balanced amplifier, photo-electric cell, and micro-ammeter. W. W. COBLENTZ and R. STAIR (Bur. Stand. J. Res., 1934, 12, 231—237).—The construction and performance of the instrument and the method of testing the constancy of the amplifier are described. After preliminary running for 5—10 min. there is no fluctuation in the zero reading of the meter, and the response is linear within the accuracy of the micro-ammeter used. Owing to the selective wavelength response of the photo-cell, the instrument is calibrated in abs. vals. by means of the standard balanced thermopile and filter radiometer (*ibid.*, 1932, 8, 759; A., 1931, 1386). J. W. S.

Semi-automatic light-distribution photometer. G. H. WILSON and W. WEIR (J. Sci. Instr., 1934, 11, 114—115).—A spot of light controlled by a photoelectric cell moves over a rotating disc of polar curved paper. C. W. G.

Simple method for obtaining photographic records of time-settle curves with elutriation. G. GOLLNOW (J. Amer. Ceram. Soc., 1934, 17, 116).---The suspension is allowed to settle in a vertical tube and the corresponding change in level of the clear liquid in a side tube is recorded on a rotating drum. J. A. S.

Identification of crystalline substances by means of X-rays. B. E. WARREN (J. Amer. Ceram. Soc., 1934, 17, 73-77).—The theory and practical application of X-ray "powder" analysis are described. J. A. S.

Monochromator of high light intensity. H. R. SCHULZ (Z. Physik, 1934, 88, 270-272).

A. B. D. C.

Photo-electric colorimeter. II. B. LANGE (Chem. Fabr., 1934, 7, 45—47).—Methods of increasing the sensitivity of the apparatus previously described (A., 1933, 44) are given. With the modified instrument $10^{-6}N$ -KMnO₄ yields a deflexion of 12 scale divisions; the accuracy is very high, and if desired 0.2 c.c. of liquid can be dealt with. A photoelectric device for measuring the reflexion from a surface, and operating on the same principle as the colorimeter, is described. The MgO deposited from burning Mg is recommended as a standard and easilyrenewable white surface. H. F. G.

Aluminium-surfaced mirrors. H. S. JONES (Nature, 1934, **133**, 552—553).—The deposition and use of Al on glass for astronomical mirrors are described. L. S. T.

Principle of a spectrograph for ultra-radiation. H. ZANSTRA (Naturwiss., 1934, 22, 171—172).—The theory of an arrangement of counters so that coincidence is produced only by primary radiation is given. A. J. M.

ТТ

Composite photo-cathodes. R. FLEISCHER and P. GÖRLICH (Physikal. Z., 1934, 35, 289—292; cf. A., 1933, 887, 999; this vol., 130).—The photo-cell with Cs–Cs₂O cathode can be improved by introducing a foreign metal into the cathode (*e.g.*, Ag). This is done by allowing atoms of the foreign metal to diffuse into the cathode from a very thin layer of the metal deposited on it. An increase in the sensitivity of the cell occurs as the diffusion process takes place.

A. J. M.

Apparatus for the transformation of light of long wave-length into light of short wave-length. G. HOLST, J. H. DE BOER, M. C. TEVES, and C. F. VEENEMANS (Physica, 1934, 1, 297—305).—A picture is projected in infra-red light on to a transparent photocathode (Cs on a very thin film of Ag) sensitive to infra-red rays. The photo-electrons emitted are brought by an electric field on to an anode, coated with a fluorescent salt (e.g., CaWO₄), and the photograph is printed on paper sensitive to visible and ultraviolet rays. H. J. E.

Determination of the space lattice of a triclinic mineral by means of the Weissenberg X-ray goniometer. G. TUNELL (Amer. Min., 1933, 18, 181-186). CH. ABS.

Industrial and research spectrophotometer. J. H. DOWELL (J. Sci. Instr., 1934, 10, 153—156).— The instrument incorporates a system previously described (cf. A., 1932, 245). C. W. G.

Temperature variation of the selenium barrier layer photo-cell. A. MITTMANN (Z. Physik, 1934, 88, 366—371).—Measurements between —174° and 85° show negative coeffs. A. B. D. C.

Synchronisation mechanism for registering photometer. O. BLÜH (Z. Physik, 1934, 88, 403– 408). A. B. D. C.

Simple ultra-violet monochromators for large area illumination. G. R. HARRISON (Rev. Sci. Instr., 1934, [ii], 5, 149—152).—A spherical concave mirror inclined at 30° to the horizontal in distilled H_2O gives monochromatic distorted images of a highpower horizontal Hg arc. The images can be isolated in turn by means of an exit slit, and give pure monochromatic radiation. In an improved instrument a plane mirror with one or two large fused quartz lenses is used. N. M. B.

Statistical investigation of the uniformity of grades of 1000 Lovibond red glasses. G. K. WALKER (Bur. Stand. J. Res., 1934, 12, 269–282).— Apparatus and procedure for the calibration of Lovibond red glasses are described, and a method of expressing the val. in terms of the Priest-Gibson unit and scale has been adopted. The new val. is the effective additive val. when the glass is used in combination with a 35-yellow glass. Variations of 1 unit frequently exist among glasses of similar Lovibond no. The results are discussed with special reference to the oil industry. E. S. H.

Two variations of the powder method of X-ray analysis of crystals. J. P. BLEWETT (J. Sci. Instr., 1934, 11, 148-150).-(1) A converging beam focussed on the circumference of a circular camera is scattered by powder placed at a point diametrically opposite, giving greater intensity and making diffraction angles attainable at almost 0° . (2) A conen. of intensity in the diffracted beam is obtained by making the angle between it and the wide parallel incident beam nearly equal to that between the latter and the plane powder specimen. C. W. G.

Colour correction filter for photo-electric photometry. J. S. PRESTON and L. H. MCDERMOTT (J. Sci. Instr., 1934, 11, 150—157).—Considerable accuracy can be obtained by using an aq. solution of CuCl₂, CoSO₄, (NH₄)₂SO₄,6H₂O, and K₂Cr₂O₇. C. W. G.

Measurement of blackening in the spectrum of sources of light of short duration on photographic plates. S. H. R. VISSER (Physica, 1934, 1, 497—502).—A spectrogram of the light source is made without using a sector or wedge in front of the slit, and the resulting negative is printed on photographic paper through an absorbing wedge the gradient of which is parallel to the spectral lines. The length of the lines on the print measures the blackening of the photographic plate. H. J. E.

Metal contact photo-cell. J. H. DE BOER and W. C. VAN GEEL (Physica, 1934, 1, 449–451).—The cell has a layer of Cs separated from one of Zr by a thin film of ZrO_2 . On illumination electrons pass from the Cs to the Zr. Max. sensitivity is at 5800 Å. Alternative systems are Cs-artificial resin–Ni or Ni–BaO–Ba. H. J. E.

Measurement of high voltage of alternating current by Kerr cell. Y. YAMAGUCHI and K. MIYAMOTO (Bull. Chem. Soc. Japan, 1934, 9, 125– 131).—Light of λ 5200 Å. was passed through PhNO₂ between crossed Nicols in alternating fields of 7000– 25,000 volts per cm. The intensity of the light from the analyser was measured and the potential of the electric field calc. using the known Kerr const. The calc. vals. of the potentials are generally slightly < those obtained from the turn ratios of the transformer. H. S. P.

Measurement of small a.c. voltages by means of cuprous oxide detectors. K. B. KARANDEEV (J. Tech. Phys., U.S.S.R., 1932, 2, 412–424).—Cu₂O acts as a rectifier at 10⁻⁴ volt. CH. ABS.

Thyratron as an α -particle counter. H. TEICH-MANN (Physikal. Z., 1934, 35, 299–301).—The use of an arrangement of thyratrons as an electrical relay in conjunction with a counter for counting α -particles in large nos. is described. A. J. M.

Absolute method of determining dielectric constants of solutions of electrolytes at high frequencies. H. HELLMANN (Ann. Physik, 1934, [v], 19, 623-636).—The method depends on the measurement of the intensity of stationary waves in a Lecher system, when this is connected at one end with a trough containing the liquid under investigation.

A. J. M.

Valve-voltmeter for measurements of hydrogen-ion concentration. A. S. MCFARLANE (J. Sci. Instr., 1934, 10, 142–147).—The instrument is truly direct reading, and is self-standardising and accurate to 0.01 $p_{\rm H}$. C. W. G. Counter tube invariants. L. JANOSSY (Z. Physik, 1934, 88, 372-388).—Theoretical. A. B. D. C.

Capillary electrometer of considerably reduced capacity. R. HAVEMANN (Z. Elektrochem., 1934, 40, 117-119).-A fine capillary tube sealed into a small H₂SO₄ reservoir is enlarged at its upper end to receive a globule of Hg, which, making contact through a Pt wire, serves as one electrode. Hg at the bottom of the reservoir forms the second electrode. The enlarged portion of the capillary is continued as a somewhat wider inverted U tube in which a Hg piston, operated by a screw device, is employed to adjust the air pressure in the tube and hence the position of the Hg in the enlargement and capillary. A vac. jacket maintains a const. temp. of the air. The quantity of Hg used is extremely small, and the capacity very low. With a glass electrode, no polarisation was apparent after 6 hr. at $p_{\rm H}$ between 2 and 9. H. F. G.

Fluorine preparation cell. L. M. DENNIS and E. G. ROCHOW (J. Amer. Chem. Soc., 1934, 56, \$79).—A modified apparatus (cf. A., 1931, 1248) is described. E. S. H.

Experiments with pure metal resistance standards. J. L. THOMAS (Bur. Stand. J. Res., 1934, 12, 313—319).—Determinations of electrical resistance at the ice point indicate that standard wires of Pt, Au, or Cu show little change in a period of 20 months, whilst the performance of Ag and Sn is less satisfactory. E. S. H.

Determination of the e.m.f. of the international Weston standard cell by the silver coulometer method. A. K. KOLOSOV (Vsesoy. Nauch.-Issledov. Inst. Metrol. Stand., 1933, No. 127, 3–17, 82–94).— The mean val. E_{20} =1.018254±8 microv. was obtained. CH. ABS.

Sensitive method for the determination of instantaneous falls of potential in X-ray equipment. H. TELLEZ-PLASENCIA (Anal. Fis. Quím., 1933, 31, 513—515).—A potentiometer is connected across the main supply, before the interruptor and coil primary, and a Ne lamp of known discharge voltage and with very small electrodes is connected across the potentiometer. By suitable adjustment of the electrical vals. in the circuit great sensitivity may be obtained. H. F. G.

Inexpensive, efficient relay. P. T. BLACK (Science, 1934, 79, 322).—The relay described breaks 110 volts at 12 amp. (d.c.) without arcing.

L. S. T.

Preparation of thin metallic layers by cathode sputtering. O. G. KEIKO (J. Tech. Phys., U.S.S.R., 1933, 3, 653-656).—Apparatus is described.

CH. ABS.

Fractionating column with fritted glass plates. S. T. SCHICKTANZ (Bur. Stand. J. Res., 1934, 12, 259-261).—A fractionating column with sintered glass plates, which has a plate efficiency of about 98% as against about 87% for the bubble-cap type column, is described. J. W. S.

Investigation of gas discharge by the use of a directed test. D. VON OETTINGEN (Ann. Physik,

1934, [v], 19, 513—532).—An apparatus for finding the val. of the space charge and electron temp. is described. A. J. M.

Determination of capillary constant by means of two spherical segments. J. VERSLUYS (Proc. K. Akad. Wetensch. Amsterdam, 1934, 37, 45–46).— Theoretical. The capillary const. is derived from measurements of the force required to pull apart two segments of a sphere, held together by a pendular body of liquid. E. S. H.

Funnel with high filtration velocity. H. SCHAFER (Z. anal. Chem., 1934, 96, 305-307). J. S. A.

Apparatus for the laboratory purification of gases. T. P. HOAR (Chem. and Ind., 1934, 244—245).—Two 10-litre aspirator vessels A, B, containing in all 12 litres of purifying liquid, are connected to allow liquid to pass from A to B. Purified gas is withdrawn from A by entry of impure gas for purification into B, and vice versa. H. J. E.

Ultracentrifuge. J. W. BEAMS, E. G. PICKELS, and A. J. WEED (J. Chem. Physics, 1934, 2, 143).— The rotor of a centrifuge previously described (cf. this vol., 52) is redesigned to eliminate convection effects. N. M. B.

Extractor for fluid systems. W. F. BRUCE (Science, 1934, 79, 253—254).—An apparatus for the extraction of various quantities of aq. solutions by solvents heavier or lighter than H_2O is described. L. S. T.

Apparatus for continuous extraction in vacuum at room temperature. M. A. MACHEBEUF and N. FETHKE (Bull. Soc. Chim. biol., 1934, 16, 229—234).— A modification of the Soxhlet apparatus is described. A. L.

Beyond uranium with the magneto-optic method of analysis. J. PAPISH and A. C. SHUMAN (Science, 1934, 79, 297—298).—The method failed in the authors' hands. L. S. T.

Ether-like compounds. XII. Determination of the rate of acetal hydrolysis. M. H. PALOMAA and A. SALONEN (Ber., 1934, 67, [B], 424-429; cf. this vol., 57).—A dilatometer which permits the rate of reaction to be measured by the change in vol. of the solution is described. "Measurements are recorded for CHMe(OEt)₂, OMe·CH₂·CH(OEt)₂, CH₂(OEt)₂, CH₂(OMe)₂, CH₂(OMe)·OEt, and CH₂(OMe)·OPr^a. H. W.

Examination of water from various natural sources for variations in isotopic composition. E. W. WASHBURN and E. R. SMITH (Bur. Stand. J. Res., 1934, 12, 305—311).—A differential pyknometer for determining d to 1 part in 10⁶ is described. The following increases in d over that of ordinary H₂O (in p.p.m.) have been observed : H₂O from the Dead Sea and Great Salt Lake 2, H₂O of crystallisation from native Na₂B₄O₇, 4H₂O 7, sap H₂O from a young willow tree 2.8, H₂O produced by burning the dry wood 5.4. E. S. H.

Significance of interfacial tension in pyknometric determination of densities of solids. E. COHEN and N. W. H. ADDINK (Z. physikal. Chem., 1934, 168, 202-214; cf. A., 1933, 481).--If the

pyknometric liquid wets the solid only incompletely, the apparent d of a solid having a mol. lattice is influenced by the solid-liquid interfacial tension and by small amounts of impurities in the liquid which have some affinity for the solid, since both these influence the wetting. With ionic lattices the apparent d is independent of the pyknometric liquid. R. C.

Correction of displacement errors in the calibration of sensitive manometers. J. WHITMORE (J. Sci. Instr., 1934, 10, 157).—A valve permits the making of connexions without disturbing the zero level. C. W. G.

Oil manometer for moderately low pressures. K. HICKMAN (Rev. Sci. Instr., 1934, [ii], 5, 161-164) .- A very sensitive, accurate, self-priming manometer suitable for the range 5-0.01 mm. is described. N. M. B.

Automatic Wilson cloud chamber. A. J. DEMPSTER (Rev. Sci. Instr., 1934, [ii], 5, 158-160; cf. ibid., 1933, [ii], 4, 373).—A simplified instrument, in which the piston is actuated by a spring and is momentarily held open by small electromagnets, is described. N. M. B.

Simple siphon filter. G. SPIELMEYER (Chem.-Ztg., 1934, 58, 338).—A hard filter-paper is secured against an inverted funnel by gauze stitched at the funnel base and is immersed in the suspension to be filtered. It is connected by a siphon tube to an external capillary and the rate of flow is further regulated by a screw clip. C. I.

Errors in gas analysis arising from loss of gas by dissolution in rubber connexions and stopcock lubricant. J. R. BRANHAM (Bur. Stand. J. Res., 1934, 12, 353—362).—Serious errors may result when high concns. of CO₂, C₂H₆, C₂H₄, C₂H₂, C₃H₈, C₃H₆, or butane are present. A method of obtaining an approx. correction is proposed. E. S. H.

Portable detector for radium. L. F. CURTISS (Bur. Stand. J. Res., 1934, 12, 379-382).

E. S. H.

Perkin tube. J. T. DUNN (Analyst, 1934, 59, 342-343).-The Perkin tube (J.C.S., 1884, 45, 443) is described. E. C. S.

Valve for constant-pressure delivery. J. H. LEES (J. Sci. Instr., 1934, 11, 168-170).-Change of pressure causes movement of Hg into a float chamber, and actuates a rubber diaphragm which presses against the end of the gas delivery jet. C. W. G.

Apparatus for distilling metals. R. V. JONES (J. Sci. Instr., 1934, 11, 167-168).-The metal is heated in vac. in a crucible or W helix, and the vapour is conc. in the desired direction by an electrostatic field. C. W. G.

Lecture experiment for the direct evaluation of Debye-Scherrer photographs. E. HERSCHKO-WITSCH (Physica, 1934, 1, 452-454).—A directreading scale for cubic crystals is described. H. J. E.

Streaming method for the study of chemical intermediate products. H. SCHMID (Oesterr. Chem.-Ztg., 1934, 37, 73-75).-A lecture summarising published work. E. S. H.

Rule for the interpretation of m.p. diagrams. R. F. NEWTON (Science, 1934, 79, 321-322).

Micro-manipulator for pure culture and microchemical work. G. W. FITZ (Science, 1934, 79, 233 - 234). L. S. T.

 γ -Ray ionisation chamber for use with a directcurrent amplifiers. L. F. CURTISS (Bur. Stand. J. Res., 1934, 12, 167–172).—A γ -ray ionisation chamber is described in which the source is within the central electrode and in which only an annular zone of ionisation about the source of γ -rays contributes to the measured ionisation current. With average Ra preps. the current is about 10-11 amp. and is amplified and read on a micro-ammeter. The results are accurately comparable with those obtained with a Au-leaf electroscope, and its advantages over the latter are discussed. It is particularly suited to routine standardisation of Ra and Rn preps.

J. W. S. Copper age in ancient China. III. T. DONO (Bull. Chem. Soc. Japan, 1934, 9, 120-124).-An ancient Chinese spear-head and two halberds consist chiefly of Cu with 6-13% Pb and traces of Sn, whilst one halberd contains 13.7% Sn and only 0.3% Pb and may be called bronze. H. S. P.

Geochemistry.

Presence of phosphorus in the sun. C. E. MOORE, H. D. BABCOCK, and C. C. KIESS (Science, 1934, 79, 390).—The position and intensity of five faint lines in infra-red spectrograms practically establish the presence of P in the sun. L. S. T.

Distribution of ozone in the atmosphere. D. BARBIER (Compt. rend., 1934, 198, 1060-1062).-Theoretical. A new method of calculation is given, and Gauzit's results are criticised (cf. A., 1932, 358; this vol., 386). C. A. S.

Concentration of atmospheric ozone at different (low) altitudes. D. CHALONGE, F. W. P. Görz, and E. VASSY (Compt. rend., 1934, 198, 1442,

and Naturwiss., 1934, 22, 297) .--- Simultaneous measurements of $[O_3]$ by absorption spectra at Jungfraujoch (3450 m.) and Lauterbrunnen (800 m.) during Aug., 1933, showed increase in $[O_3]$ with B. W. B. altitude.

Proportion of heavy water in natural water. H. A. C. MCKAY (Nature, 1934, 133, 611).-Natural H₂O probably contains a sensibly const. concn. of L. S. T. H_2^2O .

Proportion of heavy water in natural water. (SIR) R. ROBERTSON (Nature, 1934, 133, 611; cf. preceding abstract).-Density determinations indicate

L. S. T.

that there is no marked proportion of $H_{\pm}^{2}O$ in the $H_{2}O$ of the Dead Sea. L. S. T.

Variations in the alkalinity of shore pools. A. D. DE VIRVILLE (Compt. rend., 1934, 198, 1178— 1179).—The daily variation of $c_{\rm H}$ in coastal pools is dependent on the chlorophyllic assimilation by green algae under varying light conditions. P. G. M.

Radioactivity of mineral springs of Greece. M. PERTESSIS (Compt. rend., 1934, **198**, 1053—1055). —The salts, temp., and radioactivity of 32, and the composition and radioactivity of the gases evolved at four, springs in Greece have been determined. The most radioactive waters are those of Kamena-Vourla (Phthiotis), 10.41 g. per kg., of salts, 32.4° , and $75.1 \text{ m}\mu C$. The most radioactive gas is from the same : $414 \text{ m}\mu C$ per litre, the gas containing CO₂ 15.1, O₂ 0.5, and N₂ 84.4°_{\circ} , with no He; the only abundant evolution is at Hypati (Phthiotis), 500 cu. m. per hr., of CO₂ 94.8, O₂ 0.4, N₂ 4.62, and H₂S 0.18°_{\circ} , radioactivity only $0.29 \text{ m}\mu C$. C. A. S.

Iodine content of Bohemian drinking waters. 0. TOMÍČEK and R. UZEL (Časopis českoslov. Lék., 1933, 13, 193—196; Chem. Zentr., 1933, ii, 3023).— Results of colorimetric I determinations are recorded and correlated with the occurrence of goitre. The average of 15 samples was 1.3×10^{-6} g. of I per litre. H. J. E.

Titration of sea-water with hydrochloric acid, and the importance of controlling the CO₂ tension of acidified sea-water. G. TOMITA (J. Shanghai Sci. Inst., 1933, 1, 19–28).—The $p_{\rm H}$ of sea-H₂O (of excess alkaline reserve 0.0023N) after addition of HCl was measured at once and after aëration, the difference depending on the change in CO₂ content. The importance in biological experiments is discussed.

R. S. B.

Presence of nitrifying bacteria in deep seas. C. L. CAREY and S. A. WAKSMAN (Science, 1934, 79, 349-350).—Samples of sca-bottom material from deep seas north of Bermuda practically all contained nitrite-forming bacteria. Nitrification in the sea is due to bacteria which are native inhabitants of the sea bottom and are not merely contaminants from land. L. S. T.

Geochemistry of oil-field water. K. KREJCI-GRAF (Petroleum, 1934, 30, No. 18, 1-18).-Waters are classified graphically in a square diagram in which the vertical sides represent % of mono- and di-basic ions and the horizontal sides % of O-containing and O-free acid ions. A diagonal divides the divides the composition of the generality of surface waters from oil-waters. In the latter the Cl is more than equiv. to the alkali. H₂O analyses from the oil-fields of Rumania, Poland, Venezuela, and Calitornia are summarised in this way. In most cases each geological formation corresponds with a characteristic H₂O analysis. In Rumania SO₄" is usually low and S" is probably produced by reduction from SO4". Apart from NaCl derived from dissolution of NaCl-bearing formations and similar cases there is little connexion between H2O analysis and composition of the strata in the Rumanian oilfield; where I, Br, and K contents are high they are of organic origin, and this occurs principally in the newer formations. It is concluded that after allowing for secondary changes the deeper waters of all oil-fields are essentially marine in character. Ra is present as an associate of $CaSO_4$ and Ba, but is absent in presence of $CaCO_3$. The H₂O of recent formations (rich in I etc.) is classified as a "by-product" of petroleum formation, that of older formations as infiltration H₂O. In both cases the origin of the salts is ultimately marine. C. I.

Leucite-basalt from Ryudô, Kankyô-Hokudô, Korea. T. TOMITA (J. Shanghai Sci. Inst., 1933, 1, 25-39).—Analyses are given and the origin of analcite is discussed. C. W. G.

Alteration of talc and antigorite to leuchtenbergite in the metamorphosed dolomite of the Matenrei system, North Korea. S. SATÔ (J. Shanghai Sci. Inst., 1933, 1, 17–24).—Analyses and a scheme for the formation of leuchtenbergite are given. C. W. G.

Dyke-rocks in South Manchuria. T. Ogura (Mem. Ryojun Coll. Eng., 1933, 6, 155—174).— Analyses are given and origins are discussed.

C. W. G. Salt rock from Morszyn. C. KUŹNIAR (Bull. Acad. Polonaise, 1933, A, 447–451).—The salt rock stratum consists of rock-salt (36.57%), anhydrite (5.58%), ankerite (42.75%), quartz and quartzine (12.01%), clay (1.6%), and Fe₂O₃,H₂O (1.42%). The ankerite component contains CaCO₃ (59.29%), MgCO₃ (29.69%), FeCO₃ (12.02%), and traces of MnCO₃. J. W. S.

Gordonia uraninite and the upper precambrian rocks of Southern Africa. A. HOLMES (Amer. J. Sci., 1934, [v], 27, 343—353).—Analyses, including micro-analyses (cf. following abstract), are given. The Pb ratios are discussed and the age of the minerals is calc. to be 9.25×10^6 years. C. W. G.

Quantitative methods of micro-analysis with special reference to the Gordonia uraninite. F. HECHT (Amer. J. Sci., 1934, [v], 27, 321-342).--Experimental details are fully described and a scheme for the analysis of pitchblende is shown. Analyses of the uraninite are given. C. W. G.

Paulopost stilbite in the Camas Land sill, Chelan County, Washington. W. M. CHAPPELL (Amer. Min., 1933, 18, 440-444). CH. Abs.

Piedmontite from Shadow Lake, Madera County, California. A. M. SHORT (Amer. Min., 1933, 18, 493-500).—Piedmontite contains SiO₂ 35·26, Al₂O₃ 23·50, Fe₂O₃ 4·65, MgO 0·21, CaO 22·73, H₂O 1·37, TiO₂ 0·12, Mn₂O₃ 12·13, total 99·97%. The formula H(Ca,Mn,Mg)₂(Al,Mn,Fe)₃Si₃O₁₃ is proposed. CH. ABS.

Tilleyite. E. S. LARSEN and K. C. DUNHAM (Amer. Min., 1933, 18, 469–473).—Tilleyite, from the contact zone at Crestmore, California, d 2.838, $n_a 1.617$, $n_B 1.635$, $n_c 1.652$, contains SiO₂ 24.09, Al₂O₃ 0.61, Fe₂O₃ 0.12, MgO 0.43, CaO 57.75, H₂O 1.09, CO₂ 15.82, total 99.91%. The formula 3CaO,SiO₂,CO₂ is suggested. CH. ABS.

Colusite. R. E. LANDON and A. H. MOGILNOV (Amer. Min., 1933, 18, 528-833).-Colusite, a mineral of the sphalerite group, occurs in Cu veins at Butte, Montana. It is a sulphide in which Cu, Fe, Sn, Mo, and Zn are isomorphous, and As, Te, and Sb are isomorphous with S; d 4·2, H 3—4; Sn 6·64, Cu 35·82, Sb 0·58, As 2·50, Zn 0·90, Te 2·97, Mo 8·80, Fe 18·37, S 24·20, Cr and W trace; total 100·78%. CH. ABS.

Ammonioborite. W. T. SCHALLER (Amer. Min., 1933, 18, 480–492).—Ammonioborite from Larderello, Italy, n_a 1.470, n_β 1.487, n_γ 1.540, and larderellite are dimorphous forms of $(NH_4)_2O_5B_2O_3,5H_2O$. CH. ABS.

Large monazite crystal from N. Carolina. W. T. SCHALLER (Amer. Min., 1933, 18, 435–439).— The crystal (58.75 lb.; ThO₂ 5–7%) is described. CH. Abs.

Artificial jarosites. Separation of potassium from cæsium. J. G. FAIRCHILD (Amer. Min., 1933, 18, 543—547).—Artificial jarosites of K, Rb, Ag, and Pb were prepared by heating the respective sulphate solutions with aq. $Fe_2(SO_4)_3$ in scaled tubes at 110— 180°. At 100° Rb and Co are taken up in small amount by the K jarosite mol. CH. Abs.

Stability relations of a Colorado pisanite (cuprian melanterite). E. B. ECKEL (Amer. Min., 1933, 18, 449-454).—The mineral,

2(FcSO₄,7H₂O),(Cu,Zn)SO₄,7H₂O, has n_a 1.473, n_β 1.478, n_γ 1.483. The 7H₂O compound is stable at R.H. 80—44%; 2H₂O is lost at 30%, and the 5H₂O compound is stable to 5% R.H. Near zero humidity 4H₂O is lost, affording the monohydrate.

CH. ABS.

Sulphohalite and other minerals from the Otjiwalundo Salt Pan, S.W. Africa. W. F. FOSHAG (Amer. Min., 1933, 18, 431-434).—Sulphohalite, $2Na_2SO_4$, NaCl, NaF, n 1.455, pirssonite, trona, and thenardite are described. CH. Abs.

Thermal metamorphism around the Ballachulish granodiorite. A. J. HALL (Nature, 1934, 133, 651).—The contact margin of the granodiorite (I) has undergone contamination by assimilation of the country rocks. A mineralogical examination indicates that (I) has become richer in Al_2O_3 and K_2O , whilst the hornfelses have received CaO and MgO. L. S. T.

Pollucite, a new gem stone. L. J. SPENCER (Gemmologist, 1934, 3, 263-264).—Many silicate minerals would be suitable for use as gem stones if found as large well-developed crystals, clear and of a good colour. Pollucite $[H_2Cs_4Al_4(SiO_3)_9]$, the only mineral containing Cs as an essential constituent (Cs₂O 30·O-36·8%), has been mined at Newry, Maine, U.S.A., as a source of Cs and has yielded colourless gems with a brilliant lustre. L. J. S.

Chemical analyses of some rocks from Aruba. Magmatic province of the Lesser Antilles. W. VAN TONGEREN (Proc. K. Akad. Wetensch. Amsterdam, 1934, 37, 162—168).—Analyses of typical rocks from Aruba are compared with those of specimens from other islands of the Lesser Antilles. J. W. S.

Glaserite rocks from Stebnik. C. KUŹNIAR (Bull. Acad. Polonaise, 1934, **A**, 90—94).—The occurrence and composition are described. H. J. E. Incandescence of certain serpentines. (MLLE.) S. CAILLÈRE (Compt. rend., 1934, 198, 1354—1356).— Incandescence during thermal analysis is shown by a few minerals including the α -antigorites (I) distinguished by evolution of heat (II) at 750—850° (cf. A., 1933, 352). (II) was identified with the (casily visible) incandescence at 810° of both hydrous and completely dehydrated (I). A no. of specimens of (I) all showed incandescence, which is proposed as a test. B. W. B.

Petrographic and mineralogical nature of the iron ore of Staro-Oskolsk district in Kursk Magnetic Anomaly (KMA) region. I. I. TANATAR (Domez, 1933, No. 9, 20–29).—The deposit is of hydrothermal nature, but (1) it was the Turingian schist and not the ferrous quartzite which first underwent metasomatic replacement, (2) pyritisation preceded sideritisation, (3) conversion of martite into limonite proceeded from the nucleus as well as from the periphery of the grain. CH. ABS.

Kursk Magnetic Anomaly (KMA). A. N. POKHVISNEV (Domez, 1933, No. 9, 2-4).—The Fe deposits are described; as a potential source they are almost equal to known world deposits. Most of the ore requires preliminary magnetic separation.

CH. ABS. Space lattice and optical orientation of chalcanthite, $CuSO_4, 5H_2O$. T. F. W. BARTH and G. TUNELL (Amer. Min., 1933, **18**, 187—194).—Procedure and calculations using the Weissenberg X-ray goniometer are given; $a \ 6\cdot110$, $b \ 10\cdot673$, $c \ 5\cdot95 \ Å$.; $a \ 82^{\circ} \ 16'$, $\beta \ 107^{\circ} \ 26'$, $\gamma \ 102^{\circ} \ 40'$. CH. ABS.

Bavenite. C. J. KSANDA and H. E. MERWIN (Amer. Min., 1933, 18, 341–344).—Bavenite has a:b:c=0.839:1:0.429; a 9.67, b 11.53, c 4.95Å, with 1 mol. of $9SiO_2,Al_2O_3,BeO,4CaO,H_2O$ per unit cell; d_{calc} . 2.74₅. CH. ABS.

Laumontite and thomsonite from Table Mountain, Colorado. E. P. HENDERSON and J. J. GLASS (Amer. Min., 1933, 18, 402–406).—Data are recorded. CH. ABS.

Corvusite and rilandite, new minerals from the Utah-Colorado carnotite region. E. P. HENDERSON and F. L. HESS (Amer. Min., 1933, 18, 195-205).—Corvusite, d 2.82, H 2.5—3, is probably $V_2O_4, 6V_2O_5, xH_2O$. Rilandite, H 2—3, contains 47.59% Cr_2O_3 . CH. ABS.

Mercury in native silver. W. H. NEWHOUSE (Amer. Min., 1933, 18, 295—299).—Hg was frequently found in native Ag, which is probably of hypogene origin. CH. ABS.

Physico-chemical properties of Japanese acid clay. VIII. Polarising microscopic studies. IX. Refractive index. K. YAMAMOTO (J. Soc. Chem. Ind. Japan, 1934, 37, 90-96B, 96-98B).-VIII. A detailed description is given with photo micrographs of natural Japanese acid clay, clay after heating or treatment with acid or alkali, fuller's earth, Florida earth, etc. The main constituent, Al₂O₃,4SiO₂,H₂O, is optically uniaxial.

IX. The *n* (about 1.5) and birefringence (0.0035 - 0.1) of a no. of clays are given. A. G.

High concentration of radium and mesothorium I in nature and regularity of their migration. I. D. KURBATOV (J. Physical Chem., 1934, 38, 521-532) .- A determination of the concn. of Ra, Th, and their radioactive isotopes in mineral springs indicates that there is no radioactive equilibrium. Conces. as high as 1.8×10^{-8} g. Ra and 2×10^{-2} g. meso-Th I (Th units) have been found in aq. NaCl associated with petroleum beds. This high concn. is not affected by the presence of SO_4'' . The amount of Ra-Th in natural active H_2O is found to be < the amount in radioactive equilibrium with the meso-Th I present. The transference of Ra and meso-Th I by H₂O from eruptive rocks to sediment results in a thousand-fold concn. of these active substances, Mn(OH)2 and Fe(OH)2 being mainly responsible for the pptn. A method is described for the simultaneous determination of Ra, meso-Th I, Th-X, and Ra-Th. M. S. B.

Tests for mesothorium in radium from Labine Point, Great Bear Lake. G. C. LAURENCE and F. B. FRIEND (Canad. J. Res., 1934, 10, 332—334).— The meso-Th impurity was ascertained by a differential absorption method to be < 0.0008% by wt. or < 0.2% radiation equiv. Chemical analysis indicated 0.021\% radiation equiv. R. S.

Concentration of rare elements in coal. V. M. GOLDSCHMIDT and C. PETERS (Nachr. Ges. Wiss. Göttingen, Math.-physik. Kl., 1933, 371—386; Chem. Zentr., 1933, ii, 2966—2967; cf. this vol., 53).— Be, B, Sc, Cr, Co, Ni, Ga, Ge, Mo, Y, Sn, Ce, Nd, Sm, Gd, Dy, Er, Yb, Ag, Au, Pd, Rh, and Pt have been detected spectrographically in the ash from coal, especially in coals of low ash. The origin is discussed. H. J. E.

Organic minerals. III. Chlorophyll and hæmin derivatives in bituminous rocks, petroleums, mineral waxes, and asphalts. Origin of petroleum. A. TREIBS (Annalen, 1934, 510, 42— 62).—The mixture of porphyrins previously isolated (this vol., 387) from an oil-shale is shown to contain a little mesoporphyrin (I) and (probably) mesoætioporphyrin. The presence of porphyrin complex salts in numerous bituminous rocks, asphalts, and mineral waxes is shown by spectroscopic examination of $Et_2O-C_5H_5N$ extracts. Removal of the metal with HBr-AcOH (cf. *loc. cit.*) gives the porphyrin mixture, in which deoxophylloerythrin (II) and (mainly) deoxophylloerythroætioporphyrin (III) are usually present.

Similar examination of 29 specimens of petroleum shows the presence of porphyrins in 24 of them; (I), (II), and (III) are isolated from a Trinidad petroleum. When phæophytin is heated (slowly) in petroleum to 250—320°, phylloerythrin is formed; further heating at 360° gives (III). The probability of the genesis of petroleum from chlorophyll-containing material is discussed. H. B.

Soil classifications. S. J. SUSHKO (Pedology, 1933, 28, 499-511).—The classifications of Remezov (A., 1932, 1230) and Polynov are reviewed. A. M.

Saline peat profiles of Puerto Rico. A. P. DACHNOWSKI-STOKES and R. C. ROBERTS (J. Washington Acad. Sci., 1934, 24, 175—182).—Characteristics of three peat profiles are recorded and discussed in relation to palæontological classification, and to the formation of accumulations of coal and oil.

A. G. P.

Profile characteristics of New England forest soils. H. A. LUNT (Connecticut Agric. Exp. Sta. Bull., 1932, No. 342, 743—836).—Podsol, raw humus, humus, mild humus, and mull types of profile are distinguished. The physical properties of and biological activities in these types are described. The distribution of bases, org. matter, $PO_4^{\prime\prime\prime}$, and acidity in the various horizons of the profiles is examined.

A. G. P.

Thermal analysis of Tunisian soils. V. AGA-FONOV and G. JOURAVSKY (Compt. rend., 1934, 198, 1356—1358).—Orcel and Caillère's method (cf. A., 1933, 1268) of differential thermal analysis was applied to the identification of kaolinite. Soil and mother-rock samples were decalcified with 10% aq. HCl and decanted from sand. Twenty-four samples from rocks of different ages and successive derived soil-beds, and also a granitic comparison, all showed the presence of kaolinite, inflexions occurring at 500—600° and (less) at 950°. Some samples showed an evolution of heat at 380—400° attributed to gœthite.

B. W. B. "White soils" of Lorraine, their origin, nature, and use. H. ERHART (Compt. rend., 1934, 198, 1522—1525).—The formation of these soils is discussed. In general they are deficient in Ca and PO, ", and pan formation beneath the surface restricts H_2O movement. After breaking up of the pan the soils are suited to sylvicultural work, notably for beech. A. G. P.

Organic Chemistry.

Preparation and physico-chemical properties of hexane and its isomerides. MAMAN (Compt. rend., 1934, 198, 1323–1325).—Hexane, β - and γ -methylpentane, $\beta\beta$ - and $\beta\gamma$ -dimethylbutane are prepared by standard methods and their physical consts. are recorded. J. L. D.

Synthesis of diacetylenes. T. Y. LAI (Bull. Soc. chim., 1933, [iv], 53, 1537–1543).—No reaction takes place between compounds CR:CNa and CR:C·MgBr, even at 140°, but C_5H_{11} ·C:C·CH₂Br and

MgEtBr give nearly quantitatively C_5H_{11} -C:CPr^a. By reaction of the salts CR:CNa (prepared by NH₂Na) and substances CR:C·CH₂Br are obtained Δ^{ζ_1} -n-pentadeca- (I) (15% yield), b.p. 134—135°/4 mm., $\Delta^{\eta\kappa}$ -heptadeca- (18%), b.p. 150—155°/6 mm., Δ^{ζ_1} -hexadeca-(20%), b.p. 169—170°/15 mm., and $\Delta^{\kappa\nu}$ -tricosa-diinene, m.p. -12° to -10°. (I) with O₃ in CCl₄ gives CH₂(CO₂H)₂ and n-hexoic acid, and, owing to the acidity of the central H atoms, gives with MgEtI 0·57 mol. of C₂H₆ at 35° and 1·32 mol. at 88°.

R. S. C.

Synthesis of symmetrical aliphatic γ -diacetylenes. T. Y. LAI (Bull. Soc. chim., 1933, [iv], 53, 1543—1548).—From CR:C·CH₂Br (2 mols.) and Mg (1 atom) in Et₂O are obtained $\Delta^{\zeta\epsilon}$ -hexadeca- (I) (50% yield), b.p. 157—158°/10 mm., $\Delta^{\eta\lambda}$ -octadeca- (70%), b.p. 167—168°/7 mm., and $\Delta^{\epsilon\epsilon}$ -tetracosa-di-inene (75%), m.p. 38·5—39° [also obtained (57%) from C₉H₁₉·C:C·CH₂Br and Na]. (I) with O₃ in CCl₄ gives succinic acid and with NH₂Na in ligroin at 160—170° gives 0.6 mol. of NH₃ owing to isomerisation to the $\Delta^{\zeta\epsilon}$ -compound. R. S. C.

Bibliography of chloropicrin, 1848—1932. R. C. ROARK (U.S. Dept. Agric., Misc. Publ. No. 176, 88 pp.).—Brief abstracts of 533 publications are given.

Enolisation as directed by acid and basic catalysts. II. Enolic mechanism of the halo-form reaction.—See this vol., 607.

Preparation of methyl or ethyl iodide from iodoform. R. H. KINBALL (J. Chem. Educ., 1933, 10, 747).—By boiling CHI_3 with 95%-EtOH-KOH, removing the EtOH, acidifying, filtering, rendering the filtrate alkaline with NaOH, and heating it with Me_2SO_4 , a 78% yield of MeI can be obtained; Et_2SO_4 affords an 80% yield of EtI. CH. ABS.

Process for the addition of ethylene to hydrogen chloride and similar reactions. A. J. TULLENERS, M. C. TUYN, and H. I. WATERMAN (Rec. trav. chim., 1934, 53, 544—554).—HCl and C_2H_4 with anhyd. AlCl₃ in EtCl at $-78^{\circ}/760$ mm. give quantitatively EtCl. No products of high b.p. are formed. No advantage is gained by using higher pressure. EtBr can be obtained similarly in good yield by using HBr. Laboratory and semi-technical apparatus is described. R. S. C.

Addition of hydrogen bromide to Aª-pentene and -heptene. M. L. SHERRILL, K. E. MAYER, and G. F. WALTER (J. Amer. Chem. Soc., 1934, 56, 926-930).—Addition of HBr to Δα-pentene (I), b.p. 30·1- $30.2\pm0.05^{\circ}$ (from MgEtBr and allyl bromide or α -bromo- β -ethoxypropane and Zn), in cold AcOH or hexane gives n-amyl bromide in 60-75% yield. Δ^{a} -Heptene (II), b.p. $93 \cdot 5 \pm 0 \cdot 05^{\circ}$ (from MgBuBr and allyl bromide or a-bromo-\beta-ethoxyheptane and Zn), similarly affords n-heptyl bromide in 65-90% yield. With aq. HBr, (I) and (II) give β -bromo-pentane and -heptane, respectively, in 63-70% yield. The different mode of addition is believed to be due primarily to the solvent and not to the effect of peroxide. Numerous physical data are given for (I) and (II). H. B.

Action of light on di-iodo-hydrocarbons; diiodoethylenes.—See this vol., 611.

Bromoacetylenes. T. Y. LAI (Bull. Soc. chim., 1933, [iv], 53, 1533-1537).-CEt:C·CH₂·OH and PBr₃ in Et₂O-C₅H₅N give a 65% yield of α -bromo- $\Delta\beta$ pentinene, b.p. 147-148°/754 mm. Similarly were prepared α -bromo- $\Delta\beta$ -octinene (55%), -noninene (55%), b.p. 112-114°/9 mm., and -dodecinene (60%), b.p. 131-132°/7 mm., and α -bromo- γ -phenyl- $\Delta\beta$ -propinene (70%). These substances give additive compounds with HgCl₂, are hydrogenated (Pd-starch) in one stage to saturated hydrocarbons, and contain very reactive Br. R. S. C.

Determination of methyl alcohol. W. ENDER (Angew. Chem., 1934, 47, 227–228).—Apparatus and procedure are described for determining MeOH in presence of other org. compounds by adding NaNO₂, acidifying, collecting the evolved MeNO₂ in KI acidified with HCl, and titrating the liberated I with Na₂S₂O₃. E. S. H.

Fungi. III. Parmelia physodes, L.—See this vol., 570.

Compound of stannic chloride and ether.—See this vol., 615.

Constitution of glycerophosphates. III. F. L. PYMAN and H. A. STEVENSON (J.C.S., 1934, 448—450). —Kay and Lee's method (A., 1931, 766) for determination of α - in presence of β -glycerophosphates is trustworthy if enzyme poisons are absent, but is tedious; that of Carrara (A., 1932, 831) is unsatisfactory, whereas that of Fleury and Paris (A., 1933, 696) is recommended. By the last-named method (modified for Ca and Ba salts) it is shown that the samples of Ca α -glycerophosphate (I) obtained by King and Pyman (II) (J.C.S., 1914, **105**, 1238) and by Fischer *et al.* (A., 1920, i, 807) are pure, but Bailly's specimen (A., 1915, i, 492) contains 10% of an impurity. The initially more sol. form of (I) (Charpentier *et al.*, A., 1932, 251) is a hydrate (+1H₂O), the solubility of (I) running parallel to its state of hydration. (II) gives the Na salt, +6H₂O and anhyd., obtained by Charpentier (*loc. cit.*).

J. W. B.

d-Ribitol-5-phosphoric acid. P. A. LEVENE, S. A. HARRIS, and E. T. STILLER (J. Biol. Chem., 1934, **105**, 153—156).—Ba *d*-ribose-5-phosphate (this vol., 390) with H₂-PtO₂ in H₂O gives Ba *d*-ribitol-5phosphate, $[\alpha]_{11}^{\pi}$ —8.9° as Na salt in H₂O, $[\alpha]_{12}^{\pi}$ —6.4° in H₂O (as Na salt in presence of Na₂B₄O₇). Na *d*-ribosephosphate has $[\alpha]_{\rm D}$ +14.8° and +29.6°. Comparison of the sp. rotations of natural and synthetic ribose-5-phosphoric acids during glucoside formation in MeOH-HCl confirms their identity, and also the 5-position of the PO₄H₂, since the rotations rise to a const. max., indicating the formation of a methylfuranoside only. A. A. L.

Preparation of organic sulphur compounds from olefines. A. MAIHLE (Chim et Ind., 1934, 31, 255-261).—Interaction of C_2H_4 , C_3H_6 , Δ^{α} -butene, and iso- C_5H_{10} in the gaseous phase with H_2S in presence of SiO₂ gel at 650-725° gives small amounts of the corresponding thiols and dialkyl sulphides, CS_2 , thiophen, and gaseous and liquid hydrocarbons ($C_{10}H_8$ isolated). Passage of BuSH over SiO₂ gel at 700° results in partial decomp. into H_2S , olefines, and thiophen. H. A. P.

Constitution of graphitic acid and its reactions. —See this vol., 614.

Detection of acetic acid. J. DEUVRE (Bull. Soc. chim., 1933, [iv], 53, 1532—1533).—AcOH is detected by reduction with Mg and HCl and detection of the MeCHO formed by the Rimini–Simon reaction (A). Acraldehyde and crotonaldehyde give a similar blue colour in (A), but EtCHO and tiglaldehyde do so only if an excess of Na nitroprusside is used. R. S. C.

Simplified preparation of butyric acid. L. A. ADAIR and E. J. SIMMONS (Field and Lab., 1933, 2, 31-32).—BuOAc is hydrolysed, and the alcohol (yield 56%) oxidised with $K_2Cr_2O_7$ and H_2SO_4 to PrCO₂H; the Ca salt is treated with conc. H_2SO_4 and the acid distilled. CH. ABS.

β-Methyl-α-ethylvaleric acid. M. M. KATZNELson and M. S. KONDAKOVA (Compt. rend. Acad. Sci. U.R.S.S., 1934, 2, 21–25).—CEtNa $(CO_2Et)_2$ condenses with CHMeEtBr to give the *Et* ester, b.p. 240–270°, of *ethyl*-see.-butylmalonic acid, m.p. 108— 109° (Ag salt), which is converted by heating at 150— 160° into β-methyl-α-ethylvaleric acid, b.p. 217–220° (Ag salt; Me ester, b.p. 168—170°/760 mm.; chloride, b.p. 66—72°/20 mm.; amide, m.p. 114—115°; anilide, m.p. 108—109°). J. W. B.

Conjugated systems. X. Electrolytic reduction of β -vinylacrylic acid. I. E. MUSKAT and B. H. KNAPP (J. Amer. Chem. Soc., 1934, 56, 943—945).— Electrolytic reduction (1 mol. H₂) of β -vinylacrylic acid (I) in 95% EtOH and a little aq. NaCl gives 25—30% of Δ^{β} -pentenoic acid, b.p. 86—87°/10 mm. [ozonolysis products, MeCHO and CH₂(CO₂H)₂], thus differing from catalytic reduction (A., 1931, 719) but resembling Na-Hg reduction. (I) could not be reduced electrolytically in 0.5*M*-H[•] or alkaline solution; reduction occurs most rapidly in neutral or slightly acid solutions. H. B.

Validity of Freudenberg's displacement rule. P. G. STEVENS (J. Amer. Chem. Soc., 1934, 56, 997– 998).—The p-nitrophenyl ester of l- β -methylhexoic acid (Levene and Marker, A., 1931, 711) has b.p. 124– 125°/0·15 mm., $[M]_{\rm D}$ (max.) +5·4°. One of Levene and Meyer's exceptions (this vol., 241) to Freudenberg's displacement rule is, therefore, incorrect.

H. B.

Addition of hydrogen bromide to double linkings. Undecenoic acid. R. ASHTON and J. C. SMITH (J.C.S., 1934, 435-440).-The relative amounts of ι - (I) and κ - (II) -bromoundecoic acid formed by addition of HBr to undecenoic acid (III) in various solvents and in presence or absence of O_2 or peroxides have been determined by thermal analysis. The main conclusions are : in absence of air (presence of H_2 or NHPh₂) addition of HBr to pure (III), m.p. 24.58°, in any solvent gives the normal product (I) in accordance with the Markownikov rule. In presence of O2 or BzO₂H etc. the main function of the solvent is either to favour or hinder the peroxide effect, which reverses the normal addition to give (II). Thus in C₆H₁₂, ligroin, Et₂O, or AcOH, or without solvent, (1) is the main product, but in C_6H_6 or PhMe, it is (II), but the proportion of (I) increases with increase in the concn. of C₆H₆ solutions. H₂O has no influence on the normal reaction, but makes the peroxide effect possible with air where the dry solution (e.g., in ligroin) requires addition of an O_2 carrier. (III) becomes less sensitive to O_2 as the impurities are removed, since the main impurity is an O_2 carrier, possibly the compound $C_{14}H_{26}O$ (Perkin, J.C.S., 1883, 43, 45) desired for the trial debude. Impure (III) 43, 45) derived from n-heptaldehyde. Impure (111),

m.p. 19—21° or 23.7°, in ligroin or C_6H_{12} gives (II) in presence and (I) in absence of air. Pure (I), m.p. 35.1°, is best obtained (prep. described) from dry HBr and pure (III), and pure (II), m.p. 49.25°, from undried HBr and partly purified (III), both in ligroin. J. W. B.

Oxidation of palmitic acid with hydrogen peroxide in presence of cupric salt. I. S. MACLEAN and M. S. B. PEARCE (Biochem. J., 1934, 28, 486— 494).—Palmitic acid was heated with H_2O_2 and $CuSO_4$ in neutral solution for varying periods. Volatile acids including EtCO₂H, AcOH, and HCO₂H, also EtCHO and MeCHO, were obtained. Succinic acid was obtained at all stages except the first. Unsaturated (OH)₂-acids and lactones (C₄—C₇) predominate in the product. H. D.

Preparation of elæostearic acids from Chinese wood oil. A. W. THOMAS and J. C. THOMSON (J. Amer. Chem. Soc., 1934, 56, 898).—Details are given for the prep. of α -, m.p. 48°, and β -, m.p. 70·1—71°, -elæostearic acids from tung oil (I) and "wood oil butter" [from (I) and a trace of S], respectively. H. B.

Spectroscopic study of elæostearic acids from Chinese wood oil. A. DINGWALL and J. C. THOM-SON (J. Amer. Chem. Soc., 1934, 56, 899—901; cf. Manecke and Volbert, B., 1927, 821).—The absorption spectra of α - (I) and β - (II) -elæostearic acids are of similar type, but differ sufficiently for identification; the composition of a mixture of (I) and (II) can be determined spectroscopically. Light from a W spark does not affect (I) in a 1 in 160,000 solution in 90% EtOH, but irradiation apparentlyl cads to the production of a series of compounds. Irradiation of a 15% solution of (I) in 90% EtOH during 2 hr. gives (II). When (I) (in EtOH) is kept in presence of a little air at about -3° , MeCHO is produced.

H. B.

Absorption of oxygen by linseed oil in presence of catalysts of different oxidation-reduction potentials.—See this vol., 607.

Preparation of keto-acids, unsaturated acids and disubstituted lactones.—See this vol., 650.

Reduction with lead-sodium alloy. V. The Tafel rearrangement. H. STENZL and F. FICHTER (Helv. Chim. Acta, 1934, 17, 669-681).-Reduction of CH₂Ph·CHAc·CO₂Et with Pb-Na in EtOH-H₂SO₄ at 55° affords products similar to those obtained by electrolytic reduction (Tafel, A., 1907, i, 765), viz., CH₂Ph·CHEt·CO₂H, OH·CHMe·CH(CH₂Ph)·CO₂H, and a hydrocarbon $C_{11}H_{16}$ which is not CH₂Ph·CHMeEt (loc. cit.), but is n-amylbenzene, b.p. $204-204\cdot 5^{\circ}/750$ mm., readily oxidised by CrO_{3} -AcOH to BzOH, identical with a specimen obtained by Clemmensen reduction of COPhBua, and, contrary to Tafel, affording cryst. αβ-dibromoamylbenzene, m.p. 64-65° (mixed m.p.), with Br at 160°. The various possible migrations of substituent groups in such reactions are discussed, and it is shown that the action of Na on CH₂PhBr and isoamyl bromide in PhMe (Schramm, A., 1883, 977) affords not n- but iso-hexylbenzene, b.p. 216.4°/735 mm. Reduction of CH_Ph·CEt_OH with HI-red P affords y-benzyl-npentane, b.p. $216 \cdot 5$ — $217^{\circ}/735$ mm. Reduction of CMe₂Bz·CO₂Et with Pb-Na in EtOH-H₂SO₄ gives no hvdrocarbon, but a mixture probably containing OH-CHPh•CMe₂·CO₂H and CH₂Ph•CMe₂·CO₂H.

J. W. B. Analytical behaviour of oxalic acid. J. GROSS-FELD, E. LINDEMANN, and M. SCHNETKA (Z. anal. Chem., 1934, 97, 1—14).—CaC₂O₄ is readily dissolved by HCl > 0.2N. Heating with 12.5% HCl causes some decomp. of $H_2C_2O_4$; evaporation of the solution causes loss of $H_2C_2O_4$ by sublimation. Pptn. as CaC₂O₄ is quant. in presence of a NH₄OAc buffer ($p_{\rm H}$ 3.3—4.0). Tartaric, citric, and malic acids interfere, being pptd. as Ca salts. Triple pptn. may be necessary for a quant. separation. J. S. A.

Action of alkali iodides on [bromo]malonic esters. M. WEIZMANN and J. EDLITZ (Bull. Soc. chim., 1933, [iv], 53, 1495—1497).—CHBr(CO_2R)₂ and $CBr_2(CO_2R)_2$ (R=Me or Et), liberate much I from NaI in COMe₂ or EtOH or from KI in EtOH, probably by formation of ethane- and ethylene-tetracarboxylates. A 40% yield of $CI_2(CO_2Me)_2$ was obtained. R. S. C.

Monosubstituted fatty amines and halogenosuccinic acids. O. LUTZ (Ber., 1934, 67, [B], 648-653).-The interaction of primary amines and lhalogenosuccinic acids gives primarily malolactone, which passes into N-substituted d- β -malamic acids (I) with small amounts of N-substituted aspartic acids (II). (I) is separated from (II) by fractional pptn. with AgNO₃. All compounds (I) when tested with Na molybdate are found to belong to the *d*-series, and all are transformed by hot aq. alkali into d-malic acid and the corresponding amine. (II) when treated with varied amounts of acid and alkali give characteristic rotation curves, and as a-NH2-acids, are stable towards hot dil. alkali. The following described : d-mal-B-ethylamide, compounds are CO₂H·CH(OH)·CH₂·CO·NHEt, m.p. 68-70°, [a]D +14·37°; -β-propylamide, m.p. 85–86°, $[\alpha]_{D}$ +12·0° (Ag salt); - β -isobutylamide, m.p. 94°, $[\alpha]_{D}^{20}$ +10.2°; -isohexylamide, m.p. 64-65°, $[\alpha]_{D}^{20}$ +11.5° in H₂O (Ag salt); d-ethylamino-, d-propylamino-, d-isobutylamino-(Ag salt), and d-isohexylamino-succinic acid.

H. W.

Derivatives of alkyl γ -oxalocrotonates. A. B. BOESE, jun., and R. T. MAJOR (J. Amer. Chem. Soc., 1934, 56, 949—952).—CH₂:CH·CH₂·CO₂Et (I), Et₂C₂O₄, and Na in Et₂O give Et₂ γ -oxalocrotonate (II), m.p. 78—80° (the Me₂ ester, m.p. 124—126°, is similarly prepared), the Na derivative (III) of which is hydrolysed (cold 30% NaOH) to γ -oxalocrotonic acid, m.p. 212° (decomp.) (lit. 190°), oxidised (H₂O₂) to glutaconic acid. In the above prep. of (II), (I) probably first rearranges to CHMe:CH·CO₂Et. (III) and CICO₂Et in Et₂O give Et α -carbethoxyoxymuconate, b.p. 158—160°/3 mm.; Me α -carbomethoxyoxymuconate, b.p. 160—163°/6 mm., is similarly prepared. These are reduced (H₂, PtO₂, MeOH) to Et (IV) and Me adipate, respectively. Et₂ sodio-oxaloacetate and CICO₂Et afford Et α -carbethoxyoxyethylene- $\alpha\beta$ -dicarboxylate, b.p. 143—146°/4 mm., similarly reduced to (-CH₂·CO₂Et)₂, whilst Et α -acetoxymuconate (Borsche and Manteuffel, A., 1932, 721) is similarly reduced to (IV). Et α -acetoxyadipate could not be reduced, indicating that the changes $\cdot CH:CO \cdot COR \longrightarrow$ $[\cdot CH_2 \cdot CH \cdot O \cdot COR] \longrightarrow \cdot CH:CH \cdot + RCO_2H \longrightarrow$

Synthesis of homopilopic acids. N. A. PREO-BRASHENSKI, A. M. POLJAKOVA and W. A. PREO-BRASHENSKI (Ber., 1934, 67, [B], 710-714).-*r-iso*-Pilopyl chloride, b.p. $90 \cdot 2^{\circ}/0.05$ mm., in boiling xylene containing Pd is transformed by H₂ into r-iso*pilop*aldehyde, b.p. $90^{\circ}/0.05$ mm. (semicarbazone), reduced (Al-Hg in moist Et₂O) to r-iso*pilopyl alcohol* (I), b.p. 116-117°/0.07 mm. (I) and PBr₃ in CHCl₃ afford r-iso*pilopyl bromide*, b.p. $91^{\circ}/0.06$ mm., whence the corresponding *iodide*, b.p. $94^{\circ}/13$ mm., which yields the nitrile (II), b.p. 112-118°/0.3 mm. (II) is converted by EtOH-H₂SO₄ into Et r-homoiso*pilopate*, b.p. $98^{\circ}/0.05$ mm., hydrolysed by 15°_{0} HCl to r-homoisopilopic acid, $O^{O-CHEt}_{O-CH_2}$ -CH·CH₂·CO₂H, m.p. 74·2°.

H. W.

Polyterpenes and polyterpenoids. LXXXIX. Synthesis of heptane-Beζ-tricarboxylic acid, a degradation product of santonin. L. RUZIOKA, A. STEINER, and (in part) W. ZANKL and O. MATTER Acta, 1934, 17, 614-621).-(Helv. Chim. CHMeBr·CO₂Et condenses with the Na derivative of Et 5-methylcyclopentanone-2-carboxylate to give Et 5-methylcyclopentanone-2-carboxylate-2-a-propionate, b.p. 114°/0.2 mm., hydrolysed by NaOEt-EtOH to the Et₃ ester, b.p. 148-149°/0.5 mm., of n-heptane. βεζ-tricarboxylic acid (3 forms), m.p. 136–137°, m.p. 100–110°, and m.p. 127–128° [anhydride, m.p. 145– 146°, and its chloride, b.p. 150°/0.1 mm.; di-p-bromoanilide, m.p. $180-183^{\circ}$; di-p-anisidide (probably mixture of stercoisomerides), m.p. $182-185^{\circ}$; α -naphthylimide, m.p. $147-147\cdot5^{\circ}$], which is obtained by KOH-EtOH hydrolysis and is identical in all properties with the acid obtained by KMnO₄ oxidation of santonin (Angeli et al., A., 1908, i, 543), thus confirming the position of the inter-ring Me in Clemo's formula. J. W. B.

Dilactylic acids and their anhydrides. P. VIELES (Compt. rend., 1934, 198, 1044—1046).—dl-Dilactylic acid (I) with Ac₂O or when distilled at 20 mm. gives the anhydride (II), b.p. 108°/20 mm., m.p. 36°. The *l*-acid, $[\alpha]_{3461}^{17}$ —126.8°, with Ac₂O gives the d-anhydride, $[\alpha]_{3461}^{17}$ —18.7°. (I) and SOCl₂ give (II) and the dichloride, b.p. 85°/20 mm. The meso-acid (III) does not react with Ac₂O or SOCl₂ and is largely unchanged by distillation at 20 mm. When distilled at 760 mm., (I) or (III) affords H₂O, MeCHO, and CO₂. R. S. C.

Polarimetric study of tartaric acid. Optical method of determination. G. BUOGO (Giorn. Chim. Ind. Appl., 1934, 16, 120—122).—The solution to be tested is neutralised with KOH (phenolphthalein). An excess of saturated NH₄ molybdate solution is added, e.g., 3 vols. to 1 vol. of a 40% solution of tartaric acid (I) (less with more dil. solutions). α is then observed and the concn. of (I) calc., taking [α] = 550°. Oxalates depress [α], but H₃BO₃, glycerol, HNO₃, H₂SO₄, and Ca^{**} do not interfere. NaOH should not be used in place of KOH, since it gives rise to a smaller rotation. The solutions may be decolorised by means of C, which does not adsorb (I). D. R. D.

Preparation of lactones from phenylhydrazides of acids of sugar group. R. M. HANN and C. S. HUDSON (J. Amer. Chem. Soc., 1934, 56, 957—958).— α -Galaheptono- and mannono-lactones are obtained in good yield when the respective phenylhydrazides are heated with aq. CuSO₄ and a little octyl alcohol (to prevent frothing); Cu is removed as CuS and SO₄ as BaSO₄. β -Galaheptonic acid syrups are similarly obtained from β -galaheptonophenylhydrazide.

H. B.

Lead and strontium *d*-xylonates and *d*-threose triacetate. R. C. HOCKETT (J. Amer. Chem. Soc., 1934, 56, 994—995).—Pb ($+5H_2O$), m.p. 58—59°, $[\alpha]_0^m - 6\cdot8^\circ$ in H_2O (cf. Hasenfratz, A., 1933, 376), and Sr ($+5H_2O$) (I), m.p. 65—75°, $[\alpha]_0^m + 13\cdot2^\circ$ in H_2O , *d*-xylonates are described. *d*-Threose triacetate, m.p. 113—114°, $[\alpha]_0^m + 35\cdot5^\circ$ in CHCl₃, has been prepared by degradation of (I). H. B.

Iron compound of gluconic acid. A. PROS-KOURIAKOFF and R. J. TITHERINGTON (J. Amer. Chem. Soc., 1934, 56, 996—997).—A compound, $C_6H_{13}O_9Fe$, probably a basic ferrigluconic acid, is obtained from Ca gluconate (3 mols.) and $Fe_2(SO_4)_3$ (1 mol.) in H_2O . H. B.

Structure of glucuronic acid monobenzoate. A. J. QUICK (Biochem. J., 1934, 28, 403—405).—The compound resulting from the conjugation of glucuronic acid (I) with BZOH exhibits mutarotation, reacts directly with NaCN without previous hydrolysis, and is therefore not benzoylglucuronic acid (cf. A., 1933, 1035) but a monobenzoate of (I). A. E. O.

II. Transformation d-Galacturonic acid. into 1-8-ketogalactonic acid. F. EHRLICH and R. GUTTMANN (Ber., 1934, 67, [B], 573-589; cf. A., 1932, 367).—Treatment of α -d-galacturonic acid with a small excess of Ca(OH)₂-H₂O at 15-20° results in the separation of basic Ca $1-\delta$ -ketogalactonate (I), $C_6H_9O_7\cdot Ca\cdot OH, 2H_2O, [\alpha]_{10}^{30} - 6\cdot6^{\circ} \text{ in } 5\% \text{ HCl (yellow anhyd. salt, } [\alpha]_{10}^{30} - 7\cdot3^{\circ} \text{ in } 5\% \text{ HCl}).$ Treatment of (I) with $H_2C_2O_4$ gives 1-d-ketogalactonic acid (II), mp 100° (decamp) of the softward of 107° [ca]³⁰ m.p. 108° (decomp.) after softening at 107°, $[\alpha]_{10}^{30}$ -22.0° to -12.3° in H₂O. (II) is approx. as strong as α -d-galacturonic acid (III). When gently heated it evolves furfuraldehyde and CO_2 . It gives a red basic Pb salt; that obtained from (III) (loc. cit.) is probably derived from (II). The normal Na, Ca, $[\alpha]_{\rm D}$ -15.25° in H₂O, and Cd salts could not be obtained eryst. The brucine salt has m.p. 149° (decomp.) after softening at 148°, $[\alpha]_{12}^{22} - 25 \cdot 3^{\circ}$ in H₂O. (II) reduces cold Fehling's solution, Cu(OAc)₂, and NH₃-Ag₂O, but not 2:6-dichlorophenol-indophenol or I in acid solution. With OI' according to Willstätter and Schudel, (II) requires about 1 I, but protracted action causes much further oxidation. In contrast to (III), (II) is not attacked by Br at 15-20°, and does not afford mucic acid when heated with HNO3. Protracted warming with Br causes disappearance of the typical keturonic acid reactions, but the sole isolable product of the change is a dextrorotatory acid which forms a sparingly sol., lævorotatory Ca salt (? d-arabotrihydroxyglutaric acid). Treatment of (II) with COMe₂ and conc. H₂SO₄ affords diisopropylidene-l-8-ketogalactonic acid, m.p. 118—119° after softening at 114°, $[\alpha]_{\rm D}^{22}$ +34.8° in COMe₂ (Ba salt, $[\alpha]_{\rm D}^{20}$ -15.25° in H₂O). d-Diisopropylidenegalacturonic acid has m.p. 156—157°, $[\alpha]_{\rm D}^{22}$ -73.1° in H₂O, $[\alpha]_{\rm D}^{20}$ -69.4° in COMe₂, $[\alpha]_{\rm D}^{20}$ -88.5° in CHCl₃. H. W.

Methylglucosides of the naturally occurring hexuronic acids. III. Polygalacturonic acid methylglucoside derived from pectin. S. MORELL, L. BAUR, and K. P. LINK (J. Biol. Chem., 1934, 105, 1-13).—Citrus polygalacturonide (A., 1933, 595) heated with MeOH-HCl for 90 hr. gives approx. 50% of Me α -methyl-d-galacturonate, and a mixture of its polygalacturonic acids, the main fraction (I) of which contained 8—10 galacturonic acid residues, as indicated by analyses of (I), of the free acid, of the Na and Ba salts, and by the sp. viscosity and the mol. wt. The kinetics of hydrolysis of (I) with HCl indicate a pyranoid structure for the galacturonic acid residues. The structural unit of citrus pectin must contain at least 8—10 galacturonic acid residues. A. A. L.

Synthesis of vitamin-C. F. MICHEEL and K. KRAFT (Naturwiss., 1934, 22, 205-206).—The series of reactions : sorbitol \longrightarrow (B. xylinum) l-sorbose \longrightarrow l-sorbosazone \longrightarrow l-sorbosone, and mild oxidation, yields d-keto-l-gulonic acid (Na salt), which is converted by alkali into a mixture of the cis- (I) and trans-isomerides of

 $OH \cdot CH_2 \cdot [CH \cdot OH]_2 \cdot C(ONa) \cdot C(ONa) \cdot CO_2Na$. The reaction is partly reversed by acid, but (I) yields some ascorbic acid, which can be isolated via the Pb salt. R. K. C.

Primary product of the synthesis of ascorbic acid and its analogues. W. N. HAWORTH and E. L. HIRST (Helv. Chim. Acta, 1934, 17, 520-522; cf. following abstract) .- The use of CaCl₂ in the KCN synthesis of ascorbic acid (I) and its analogues is not essential, but shortens the reaction period and slightly increases the yield. The small amount of NH3 evolved is due to hydrolysis of the nitrile. The following observations support the cyclic imine structure previously assigned (this vol., 279) to the labile intermediate $C_2H_{11}O_0N$ (II), $[\alpha]_D - 145^\circ$ in H_2O , -17° in 8% HCl, in the synthesis of glucoascorbic acid (III). In H_2O (II) displays simple rotatory acid (III). In H_2O (II) displays simple rotatory dispersion, but in acids (suppression of enolic ionisation) it is anomalous, the consts. in the 2-term Drude equation being closely similar to those of (I). (II) reacts with I to give a base, the NH group in the oxidation product being labile and eliminated during osazone formation to give the osazone, m.p. 225°, obtained from oxidised (III). With CH₂N₂ (III) gives its 3-Me ether, m.p. 142° [α]²⁰_D -5° in H₂O, but (I) similarly gives its 3-Me ether, m.p. 121°, $[\alpha]_{ij}^{ij}$ +28° in H₂O, accompanied by an isomeric substance, m.p. 162°, $[\alpha]_{\rm p}$ about +200° in H₂O (absorption band at 275–280 mµ). The position of the OH responsible for the acidic properties of (I) cannot yet be decided, but it is probably 3. J. W. B.

Synthesis of ascorbic acid and its analogues by the osone-hydrocyanic acid method. T. REICH-STEIN, A. GRÜSSNER, and R. OPPENAUER (Helv.

Chim. Acta, 1934, 17, 510-520).-The efficacy of dil. aq. KCN in place of HCN in the synthesis of ascorbic acid (I) is confirmed, but with CaCl₂ (Baird et al., this vol., 279) little or no liberation of NH_3 occurs and the intermediate product ψ -(I) is pptd. (cf. preceding abstract). From the appropriate osone (from the osazone and PhCHO) by this method are prepared d-, m.p. 174° (corr., decomp.), $[\alpha]_{D}^{16^{\circ}} - 17^{\circ}$, *l*-, m.p. 170° (corr., decomp.), $[\alpha]_{l}^{133} + 17^{\circ}$, and *dl*-, m.p. (?), arabo-, d-gluco- $+H_2O$, m.p. (indef.) 101-105° (decomp.), resolidifying and remelting 192° (corr., decomp.), $[\alpha]_{b}^{4*} - 37.8^{\circ}$ (as anhyd. substance), dgalacto-, m.p. 100°, resolidifying and remelting 134gatactor, in.p. 100, resoluting and relation in 137 135° (decomp.), $[\alpha]_{15}^{1*5} = -5.8°$, and 1-gulo-, m.p. 183 184° (decomp.), $[\alpha]_{15}^{1*5} = -19.0°$, -ascorbic acid. With CH₂N₂ in MeOH at -10° *l*-(1) gives its 3-Me ether, m.p. 120–122°, $[\alpha]_{19}^{19} + 42°$ in MeOH [isopropylidene derivative, m.p. 88–90°, $[\alpha]_{19}^{19} + 20°$ in MeOH, by methylation of the correspondence of *l*(1) methylation of the *iso* propylidene derivative of l-(I)], giving, with FeCl₃, a violet colour and a trace of an inactive substance $C_7H_{10}O_6$, m.p. 150—152° (corr.). All $[\alpha]_D$ vals. are in 0-01N-HCl. J. W. B.

d-Glucosaccharosonic acid. II. Constitution of glucosaccharosonic acid and its compound with o-phenylenediamine. H. ERLBACH and H. OHLE (Ber., 1934, 67, [B], 555—563; cf. this vol., 392).—Glucosaccharosonic acid (I) is smoothly and almost quantitatively dehydrogenated by p-O:C₆H₄:O in H₂O or EtOH yielding $\alpha\beta$ -diketogluconolactone (II), which is readily hydrolysed, and loses CO₂ almost



quantitatively when boiled without apparently affording arabinosone. The cold solution of (II) in H₂O yields with o-C_eH₄(NH₂)₂ a sparingly sol., unstable substance (? III), m.p. 175° (decomp.), $[\alpha]_{D}^{\infty}$ -100.2° in C₅H₅N, which does not lose H₂O at 100° and is sol. in alkali. It affords a red phenylhydrazone, m.p. 203° (decomp.), $[\alpha]_{15}^{15}$ -84.6° in \overline{C}_5H_5N , and with o-C₆H₄(NH₂)₂ yields the substance (IV), m.p. 212° (decomp.), $[\alpha]_{19}^{19} - 14.54^{\circ}$ to -11.18° in C_5H_5N . (IV) is obtained almost quantitatively from (II) and 2 mols. of $o - C_6 H_4 (NH_2)_2$ or from (I) and $o - C_6 H_4 (NH_2)_2$. The position of the substituent groups is established by the observations that mesoxalic esters yield an analogous substance and that cold, dil. mineral acids transform (IV) into 3-d-erythro-aby-trihydroxypropylquinoxaline-2-carboxylactone (V), m.p. 187° , $[\alpha]_{11}^{2}$ + 151° in C_5H_5N . The lactonic structure of (V) follows from its conversion into a salt (VI), $C_{12}H_{11}O_5N_2Na$, m.p. 216°, $[\alpha]_D^{-12} \cdot 62^{\circ}$ in H_2O , an *amide*, m.p. 167° (decomp.), $[\alpha]_D^{-12} - 86 \cdot 8^{\circ}$ in C_5H_5N , and a *hydrazide*, $C_{12}H_{14}O_4N_4$, m.p. 171°, $[\alpha]_D^{-12} - 77 \cdot 96^{\circ}$ in C_5H_5N .

(V) affords a well-crystallised diacetate (VII), m.p. 185—186°, $[\alpha]_{l_2}^{l_3}$ +133.5° in CHCl₃, and an isopropyl. idene derivative (VIII), m.p. 225° (decomp.), $[\alpha]_{B}^{\circ}$ +109.8° in C₅H₅N. (VII) is also obtained by direct acetylation of (IV). The acid liberated by the action of mineral acid on (VI) passes into a mixture of the γ- and δ-lactone, m.p. 186° after softening at 174° $[\alpha]_{\rm F}^{\rm c}$ +64.5° in C₅H₅N, -72.9° in H₂O, obtained pure by acid hydrolysis of the Na salt of (VIII). (V) does not condense with $o-C_6H_4(NH_2)_2$. It reduces Fehling's solution, possibly owing to loss of H_20 . When boiled with EtOH and p-C₆H₄Me·SO₃H it suffers partial loss of H₂O and the lactone produced decomposes with production of EtOAc. Dehydrogen. ation of the Na salt of (I) with p-O.C.H4:O followed by addition of HCl and $p - C_6 \hat{H}_4(NH_2)_2$ gives very small amounts of (IV), which is not obtained at all by action on the neutral solution of the dehydrogenated product. It results in about 70% yield from the Na glycerylquinoxalinecarboxylate. The previous conception (loc. cit.) of the course of oxidation in neutral solution is therefore withdrawn. The poor yields of H₂C₂O₄ obtained by oxidation with OI' are not due to differing oxidations of (I), but to secondary changes in (II). It follows therefore that the condensation products obtained from (I) are actually derived from (II), and that (I) possesses the same structure as ascorbic acid. *l*-Ascorbic and *d*-glucosaccharosonic acid differ essentially in the configuration of C_5 . H. W.

Disulpho- and hydroxysulpho-glutaric acids. J. M. VAN DER ZANDEN (Rec. trav. chim., 1934, 53, 477-488).—Glutaric acid and SO₃ (3 mols.) in H₂SO₄ at 90° give a mixture of dl- (I) [*Pb* and *Ba* (hydrated) salts] and meso- $\alpha\alpha'$ -disulphoglutaric acid (tristrychnine, +6H₂O, and *Ba*₂ salts). (I) is resolved by the dior, better, tri-strychnine salt, the *Na* salt of d-(I) having [*M*]_p +20.9° in H₂O. Meso- and dl- $\alpha\alpha'$ -dibromoglutaric acid (modified prep.) and (NH₄)₂SO₃ give the same α -hydroxy- α' -sulphoglutaric acid (Pb_{1.5}, +5H₂O, Ag₃, +H₂O, and Tl₃, +H₂O, salts). $\alpha\beta$ -Dibromoglutaric acid and KHSO₃ give glutaconic acid. R. S. C.

Polymerisation. I. Kinetic investigations of aqueous solutions of formaldehyde.—See this vol., 493.

Acidity of formaldehyde and end-point in formol titration. M. LEVY (J. Biol. Chem., 1934, 105, 157—165).—The titration curves of CH₂O against NaOH are determined electrometrically for different concns. of [CH₂O], and the relation $p_{K'f}=12.87-$ 0.19[CH₂O] obtained. Functions corresponding with those in Roller's equation (A., 1932, 1101) for the % error in a titration of a weak acid by NaOH are deduced for the formol titration, and from the modified equation optimal conditions : CH₂O=6-9%, highest possible [NH₂-acid], and the stoicheiometric end-point are obtained. Phenolphthalem is a suitable indicator. H. D.

Principle of formaldehyde, alcohol, and acetone titrations. Proof and implication of the Zwitterion conception. G. M. RICHARDSON (Proc. Roy. Soc., 1934, B, 115, 121-141).—In the light of the zwitterion hypothesis the Sörensen and Foreman (Willstätter) titration determines NH_2 and the Linderstrøm-Lang titration (A., 1928, 536) CO_2H . Comparison of Van Slyke NH_2 -N and Willstätter titrations for the liberations of NH_2 and acid groups during protein hydrolysis is valid. The hypothesis may be used to allocate titration consts. to titratable groups of ampholytes (cf. A., 1933, 1015). H. G. R.

Acidimetric determination of formaldehyde and sulphites.—See this vol., 618.

Combination of formaldehyde with amino-acids and proteins. H. ANDERSON (J. Soc. Leather Trades Chem., 1934, 18, 197–200).— p_{Ka} for glycine (I) is affected by acetylation and benzoylation, but not by condensation with CH₂O, so that there is no combination of CH₂O with (I) at $p_{\rm H} < 4.7$, the isoelectric point of (I). Very little CH₂O combines with gelatin at $p_{\rm H}$ vals. < the isoelectric point of gelatin. D. W.

[Highly polymerised compounds.] K. HESS (Ber., 1934, 67, [B], 610-612).—A reply to Staudinger (this vol., 514). H. W.

cis-trans and synionic isomerism in crotyl derivatives. (MLLE.) B. GREDY and L. PIAUX (Compt. rend., 1934, 198, 1235—1237).—Raman spectra show that crotonaldehyde contains 99% of the trans and 1% of the cis form, Charon's CHMe:CH·CH₂·OH and the acetate obtained by Ac_2O contain much trans and a little cis form, the acetate obtained from buten- γ -ol (I) is free from crotyl acetate (II), HBr and (I) give at least 80% of trans-CHMe:CH·CH₂Br (III) and 10% each of cis-(III) and the bromide of (I), and that the above mixture of bromides with NaOAc in AcOH yields equal amounts of (II) and the acetate of (I). R. S. C.

isoPropylidenedioxypropaldehyde. II. Preparation of *d*-isopropylidenedioxypropaldehyde. H. O. L. FISCHER and E. BAER (Helv. Chim. Acta, 1934, 17, 622-632).-Oxidation of αβεζ-diisopropylidene-d-mannitol (Fischer et al., A., 1916, i, 363; cf. Vargha, A., 1933, 1140) with Pb(OAc)₄ affords d-isopropylidenedioxypropaldehyde (I), b.p. 27°/2 mm., $[\alpha]_{\overline{b}} + 64.9^{\circ}$ (readily polymerises), hydrolysis of which $(0.05N-H_2SO_4 \text{ at room temp. or } 12\% \text{ AcOH})$ gives only syrupy d-glyceraldehyde, $[\alpha]_{11}^{20} + 9.6^{\circ}$ (dimedon compound, m.p. 199-201°; 2:4-dinitrophenylhydrazone, m.p. 155-156°). Direct treatment of (I), without isolation, with CH(OEt)₃ gives its Et_2 acetal, b.p. $90-92^{\circ}/10 \text{ mm.}, [\alpha]_D^{1\circ}+28\cdot78^{\circ}$, and with aq. Ba(OH)₂ is obtained the inactive diisopropylidenehexose (A., 1930, 1164), an *iso*propylidenchexose, m.p. 155-157°, being obtained from the mother-liquor. From From accumulated residues of COMe2-dl-glyceraldehyde condensations is isolated a dimeride, m.p. 74-75°, of dl-isopropylidenedioxypropaldehyde, polymorphous with the form, m.p. 104°, previously obtained.

J. W. B.

Determination of aldehydes and ketones with hydroxylamine salt. H. SCHULTES (Angew. Chem., 1934, 47, 258—259).—Accurate results are obtained in the usual titrimetric method by using bromophenolblue instead of Me-orange as indicator. S. C.

Spectrophotometric determination of diacetyl. H. MOHLER and F. ALMASY (Z. anal. Chem. 1934, 96, 399–400).—Alcoholic distillates containing Ac_2 give an absorption spectrum with max. absorption at 4200 and 2870 Å., and a min. at 3420 Å. J. S. A.

Synthesis of βo-diketo-ζλ-dimethyl-n-hexadecane. P. KARRER and J. LEE (Helv. Chim. Acta, 1934, 17, 543-549).--Reduction of

CHMe(CH₂·CO₂Et)₂ with Na-EtOH gives γ -methyln-pentane- α E-diol, converted by Na-EtI into its Et_1 ether, b.p. 109—111°/20 mm., the bromide, b.p. 92·5— 93°/20 mm. (by PBr₃), of which with "mol." Na in PhMe at \Rightarrow 50° affords α K-diethoxy- γ 0-dimethyl-ndecane, b.p. 105—106°/0·3 mm., hydrolysed by HBr-AcOH at 100° to the α K-dibromide; condensation of this with CHNa(CO₂Et)₂ and hydrolysis and decarboxylation of the product affords δ_1 -dimethyl-ndodecane- $\alpha\mu$ -dicarboxylic acid, b.p. 225—235°/0·2 mm., converted by the Blaise-Maire reaction into β_0 -diketo- ζ_2 -dimethyl-n-hexadecane, identical with a specimen obtained from perhydrocrocetin (A., 1932, 1234). J. W. B.

Crystalline compound of α -*l*-arabinose with calcium chloride and water. W. C. AUSTIN and J. P. WALSH (J. Amer. Chem. Soc., 1934, 56, 934— 935).—*l*-Arabinose and CaCl₂,2H₂O in a little hot H₂O and current of air give the compound α -C₅H₁₀O₅,CaCl₂,4H₂O, softens at 106—108°, liquefies slowly at 112—115°, decomp. 214—215°, $[\alpha]_{D}^{\alpha}$ (in H₂O) +36·41° (3 min.) —> +47·65° (const.), whence α -*l*-arabinose has $[\alpha]_{D}^{\alpha}$ +75·18° (initial) (cf. Simon, A., 1901, i, 256; Hudson and Yanovsky, A., 1917, i, 445). H. B.

Crystalline compounds of *d*-xylose and *l*arabinose with calcium chloride. J. K. DALE (J. Amer. Chem. Soc., 1934, 56, 932—934).—*d*-Xylose and CaCl₂,2H₂O in a little hot H₂O give the compound, α -C₅H₁₀O₅,CaCl₂,3H₂O, m.p. 126°, [α] (in H₂O) + 46·8° \rightarrow +9·33°. *l*-Arabinose similarly affords the compounds, β -C₅H₁₀O₅,CaCl₂,H₂O, decomp. 212°, [α] (in H₂O) +99·59° \rightarrow 56·6°, and (β -C₅H₁₀O₅)₂,CaCl₂,2H₂O, darkens from 160°, [α] (in H₂O) +124·6° \rightarrow +69·94°. The mutarotation curves of these compounds are similar to those of the component sugars[initial [α] (calc.) +98·5° and +186°, respectively (cf. Hudson and Yanovsky, A., 1917, i, 445)]. H. B.

Triphenylmethyl derivatives of β -methyl-dxyloside. E. L. JACKSON, R. C. HOCKETT, and C. S. HUDSON (J. Amer. Chem. Soc., 1934, 56, 947—949; cf. A., 1932, 146).— β -Methyl-d-xyloside and CPh₃Cl in C₅H₅N at 20° for 14 days give two ditriphenylmethyl- β -methyl-d-xylosides, m.p. 162-5—163° (corr.), $[\alpha]_{10}^{25}$ —22.5° in C₅H₅N, and m.p. 238—240° (corr.), $[\alpha]_{10}^{26}$ —55.5° in C₅H₅N, and a syrup (A). Acetylation (Ac₂O, C₅H₅N at 0°) of A affords two triphenylmethyl- β -methyl-d-xyloside diacetates, m.p. 125—127° (corr.), $[\alpha]_{10}^{26}$ —15.7° in CHCl₃, and m.p. 169—170° (corr.), $[\alpha]_{10}^{26}$ —15.7° in CHCl₃. These results show that CPh₃Cl reacts with sec.-OH groups. H. B.

Action of triphenylmethyl chloride on α -methyl*i*-fucoside. R. C. HOCKETT and C. S. HUDSON (J. Amer. Chem. Soc., 1934, 56, 945—946).— α -Methyl-*i*fucoside (which contains only sec.-OH groups) and CPh₃Cl in C₅H₅N at room temp. for 5 days and then at 100° for 1 hr. give a triphenylmethyl-a-methyl-lfucoside (+EtOH), m.p. 123—126° (corr.); the EtOHfree form has m.p. 126—128° (corr.), $[\alpha]_{1}^{m}$ —59.5° in CHCl₃. The view that CPh₃Cl is completely sp. in action towards primary OH is thus disproved.

H. B.

Free aldehyde form of fucose tetra-acetate. M. L. WOLFROM and J. A. ORSINO (J. Amer. Chem. Soc., 1934, 56, 985—987).—Fucose Et mercaptal is acetylated (Ac₂O, C₅H₅N) to the *tetra-acetate*, m.p. 99—100°, $[\alpha]_{15}^{25}$ +5° in CHCl₃, converted by HgCl₂ in COMc₂+CdCO₃ into aldehydo-1-fucose tetra-acetate, m.p. 166—167°, $[\alpha]_{25}^{25}$ +40° in C₂H₂Cl₄ (in MeOH the initial rotation of +22° changes to +9° in 4 days) [semicarbazone, m.p. 215° (decomp.); alcoholate, softens at 120—121°, solidifies on further heating, and then melts at 170°, $[\alpha]_D$ (in EtOH) $-3\cdot4^\circ \longrightarrow +3\cdot4^\circ$, which when crystallised from H₂O gives the hydrate, m.p. 160—161°]. α -1-Fucose tetra-acetate has m.p. 92°, $[\alpha]_{16}^{16} - 120^\circ$ in CHCl₃. H. B.

Methylated sugars. I. Preparation of tetramethylglycose. E. S. WEST and R. F. HOLDEN (J. Amer. Chem. Soc., 1934, 56, 930—932).—Glucose (in conc. aq. solution) is methylated rapidly by treatment with Me₂SO₄-CCl₄ followed by 60% NaOH and Me₂SO₄; the resulting tetramethylmethylglucoside (I), b.p. 88—90°/0·15 mm., contains 83—85% of the β -form. Hydrolysis (HCl under various conditions) of (I) gives tetramethylglucose (II), $[\alpha]_D^m + 81\cdot3^\circ$ in H₂O (lit. 83·3°). α -Methylglucoside is similarly methylated to its Me₄ derivative, b.p. 89—92°/0·4 mm., also hydrolysed to (II). The effects of solvent and temp. on the rotation of (II) are investigated.

H. B.

Syntheses in the series of *p*-toluenesulphonyl (tosyl) sugars. O. LITTMANN and K. HESS (Ber., 1934, 67, [B], 519-526; cf. A., 1933, 1279).-Acetobromoglucose (improved prep.) is converted into 4:6benzylidene- β -methylglucoside, m.p. 199–200°, $[\alpha]_{10}^{20}$ -63.12° in CHCl₃, and thence according to Ohle *et al.* (A., 1929, 50) into 4 : 6-benzylidene-β-methylglucoside 2:3-di-p-toluenesulphonate (I), labile from, m.p. 157—159°, $[\alpha]_{10}^{18}$ —62.08° in CHCl₃ (loc. cit.), stable variety, m.p. 182—183°, $[\alpha]_{10}^{18}$ —62.82° in CHCl₃. (I) is transformed by McOH-HCl into β -methylglucoside β -2.2 dip tolucomethylogenets 2:3-di-p-toluenesulphonate, $[\alpha]_D^{18} - 1.51^{\circ}$ in CHCl₃, -12.99° in COMe₂, -27.40° in C₆H₆, converted by p-C₆H₄Me·SO₂Cl and C₅H₅N at 30° into β-methylglucoside 2:3:4:6-tetra-p-toluenesulphonate, m.p. 181–182°, $[\alpha]_{17}^{16}$ -6.57° in CHCl₃, $[\alpha]_{17}^{16}$ -10.40° in COMe, (cf. Oldham et al., A., 1932, 500). Treatment of β-methylglucoside 4-acetate 2:3:6-trip-toluenesulphonate with 0.1N-NaOMe-MeOH at 100° is without effect, whereas use of a more conc. solution leads to a β -methylglucoside di-p-toluenesul-phonate, $[\alpha]_{15}^{18} = 57.76^{\circ}$ in CHCl₃, -54.82° in COMe₃, -71.35° in C₆H₆, which does not react with PhCHO, and hence does not contain a free 6-OH. Hydrolysis of 4 : 6-benzylidene- α -methylglucoside 2 : 3-di-*p*-tolu-enesulphonate, $[\alpha]_{10}^{\infty}$ +13·3° in CHCl₂, with 18% HCl or, more readily, 1% HCl-McOH, leads to non-cryst. α -methylglucoside 2 : 3-di-*p*-toluenesulphonate (II), $[\alpha]_{10}^{\infty}$ +58·21° in CHCl₃ $[\alpha]_{10}^{\infty}$ +40·73° in COMe₂. Successive treatment of (II) with CPh-Cl in C H N and As O at treatment of (II) with CPh_3Cl in C_5H_5N and Ac_2O at

55° affords 6-triphenylmethyl- α -methylglucoside 4-acetate 2:3-di-p-toluenesulphonate, m.p. 174—175°, [α]]^s +56·03° in COMe₂, +55·00° in CHCl₃, transformed by HBr-AcOH into α -methylglucoside 4-acetate, 2:3-di-p. toluenesulphonate (III), m.p. 162—163°, [α]]^s +35·28° in CHCl₃. (III), p-C₆H₄Me·SO₂Cl, and C₅H₅N do not react at 48°, and at 100° yield 6-chloro- α -methylglucoside 4-acetate 2:3-di-p-toluenesulphonate, m.p. 96°, [α]]^s +53·42° in COMe₂. H. W.

Preparation of *d*-mannose. C. S. HUDSON and E. L. JACKSON (J. Amer. Chem. Soc., 1934, 56, 958– 959).— α -Methyl-*d*-mannoside (prep.: A., 1928, 399) is hydrolysed (2% HCl) to *d*-mannose (70% yield). H. B.

ketoFructose penta-acetate. M. L. WOLFROM and A. THOMPSON (J. Amer. Chem. Soc., 1934, 56, 880-882).—Acctylation (Ac₂O, ZnCl₂) of β -fructose tetra-acetate gives (cf. Hudson and Brauns, A., 1916, i, 118) α - (I) and β - (II) -fructose penta-acetates. (I), EtSH, and ZnCl₂ at $< 0^{\circ}$ afford d-fructose ethylthioacetal penta-acetate, m.p. 83°. [a]²⁷ +20° in CHCl₃, deacetylated (MeOH-NH₃) to d-fructose ethylthioacetal, m.p. 65-67°, $[\alpha]_{ii}$ +35.8° in MeOH, and converted by HgCl₂ in COMe₂+CdCO₃, into ketofructose penta-acetate, m.p. 69-70°, $[\alpha]_{11}^{11}$ +35·1° in CHCl₃, which is identical with (I). This result confirms the work of Pacsu and Rich (A., 1933, 937). (II), EtSH, and $ZnCl_2$ similarly give β -ethylthiofructoside tetra-acetate, m.p. 96-98°, $[\alpha]_{10}^{22}$ -151.9° in CHCl₃, de-acetylated (MeOH-NH₃) to β -ethylthiofructoside, m.p. 140°, $[\alpha]_{10}^{22}$ 232.9° in McOH. The corresponding ethylthioacetal penta-acetates are similarly obtained from aldehydo-glucose and -galactose penta-acetates. This method can thus be used to distinguish between cyclic and open-chain sugar penta-acetates. H. B.

Oxidation of sucrose to oxalic acid.—See this vol., 495.

Heart glucosides. V. Acetyldigitoxin, acetylgitoxin, and acetyldigoxin. A. STOLL and W. KREIS. VI. Nature of the oxygen atom in scillaridin A. A. STOLL, A. HOFMANN, and A. HELFENSTEIN (Helv. Chim. Acta, 1934, 17, 592-613, 641-669; cf. this vol., 59).-V. By the action of an enzyme prep. (I) from D. lanata (fresh leaves) digilanid C affords acetyldigoxin, C43H66O15, separated (full details) into the stereoisomeric α -form, softens 222°, m.p. 230° (corr.), $[\alpha]_D^{z0} + 18.0°$ in C_5H_5N , and β -form (more sol. in McOH and EtOH), m.p. about 170° (? loss of solvent of crystallisation), resolidifying and remelting at 258° (corr., decomp.), $[\alpha]_{\rm in}^{20}$ +29.2° in C₅H₅N, both of which afford digoxin by hydrolysis with aq. MeOH-KOH, and have the same toxicity (cats). Similarly (I) (from dried leaves) hydrolyses digilanid A to give acetyldigitoxin, C43H66O14, only the β -form, darkens about 200° (corr.), m.p. (indef.) 210-225° (corr., decomp.), $[\alpha]_{10}^{30}$ +16.7° in C₅H₅N, which affords digitoxigenin (46.6%) yield) by acid $(N-H_2SO_4)$, and digitoxin by alkaline (aq. McOH-KOH), hydrolysis, being obtained cryst. Digilanid B similarly affords acetylgitoxin, also obtained only in the β -form, darkens >200°, m.p. 220–225° (corr., decomp.), $[\alpha]_{10}^{20}$ +15.7° in C_5H_5N , and affording gitoxin by alkaline hydrolysis. The contentions of Mannich (this vol., 282) are disputed.

VI. Anhydroscillaridin A (I) with cold KOH-MeOH is converted (opening of lactone ring to give a phenolic OH) into Me anhydroscillaridate (II, R'=H), m.p. 142-144°, $[\alpha]_{10}^{20}$ -279° (Et ester, m.p. 125°, $[\alpha]_{10}^{20}$ -232°, similarly obtained with KOH-EtOH), reconverted into (I) by 0·1N-NaOH in 25% EtOH, and converted by MeOH-HClinto its Me ether (II, R'= Me), m.p. 175°, $[\alpha]_{10}^{20}$ -246°, or by p-NO₂·C₆H₄·COCh-C₅H₅N into its p-nitrobenzoyl derivative (II, R'= CO·C₆H₄·NO₂), m.p. 190-192°. (I) contains a substituted coumarin skeleton. Scillaridin A (III) with KOH-MeOH affords Me scillaridate (IV) (A, R'=Me;

(I.)
$$\mathbb{R} \begin{cases} C:O \\ C & (II.) \ \mathbb{R} \begin{cases} CO_2Me \\ C \cdot OR' \end{cases}$$
 ($\mathbb{R} = C_{23}H_{30}$)
 $\mathbb{R} \begin{cases} C:O \\ C \geq O \\ C \cdot OH \\ (III.) \end{cases}$ ($\mathbb{R} = C_{22}H_{31}$)
 $\mathbb{R} \begin{cases} CO_2R' \\ C \cdot OR' \\ C \cdot OH \\ (\mathbb{R} - C_{22}H_{31}) \end{cases}$ ($\mathbb{R} = C_{22}H_{31}$)

R''=H) which passes spontaneously $(-H_2O)$ into the Me ester (V) (B, R'=Me), m.p. 175°, $[\alpha]_{10}^{\infty} -301°$ (Et ester, m.p. 125°, $[\alpha]_{10}^{\infty} -270°$), of isoscillaridic acid (VI) (B, R'=H), m.p. 264°, $[\alpha]_{10}^{\infty} -292°$, which is obtained by hydrolysis of (V) with aq. EtOH-NaOH, and is reconverted into (V) with CH₂N₂. Immediate treatment of (IV) with CH₂N₂ effects the isolation of its Me ether (VII) (A, R'=R''=Me), m.p. 177-178°, $[\alpha]_{10}^{\infty} -78.9°$, hydrolysed to methylscillaridic acid (A, R'=H, R''=Me), m.p. 203-207°, $[\alpha]_{10}^{\infty} -79.4°$, reconverted by CH₂N₂ into (VII): HCl-MeOH converts (VII) into (V). (III) contains a tert.-OH in addition to the lactone ring. The structural relationships of the Strophanthus and Digitalis aglucones are discussed. All m.p. are corr., and all $[\alpha]_{D}$ vals. in dioxan. J. W. B.

Unsaponifiable fraction of spinach fat. Glucoside of γ -spinasterol. F. W. HEYL and D. LARSEN (J. Amer. Chem. Soc., 1934, 56, 942—943).—The resin obtained by addition of H₂O to the EtOH-extract of dry spinach is freed from fat (light petroleum) and most of the pigment (Et₂O) and then extracted with EtOH. This extract contains a phytosterolin, m.p. 275—280° (decomp.), $[\alpha]_{2\alpha}^{2\alpha}$ —33° in C₅H₅N [tetraacetate, m.p. 178·5—179°, $[\alpha]_{2\alpha}^{2\alpha}$ —13·4° (this and following vals. are in CHCl₃); tetrabenzoate, m.p. 178—178·5°, $[\alpha]_{\alpha}^{\alpha}$ +21·6°], hydrolysed by Power and Salway's method (J.C.S., 1913, 103, 399) to γ -spinasterol (I), m.p. 159—160°, $[\alpha]_{5461} \pm 0°$ [acetate (II), m.p. 139·5—140°, $[\alpha]_{5461}$ —14·1°; benzoate, m.p. 118·5— 119°, $[\alpha]_{5461}$ —10·3°; p-nitrobenzoate, m.p. 200°, $[\alpha]_{5461}$ -15·9°]. Reduction (H₂, PtO₂, AcOH) of (II) gives dihydro. γ -spinasterol, m.p. 105·5—106°, $[\alpha]_{5461} + 24°$ (as acetate, m.p. 115·5—116°, $[\alpha]_{5461} + 12·4°$), which appears to be identical with dihydro- α -spinasterol (Å., 1932, 381). (I) appears to be an isomeride of α - (loc. cit.) and β -spinasterol (A., 1933, 989); they are all (probably) C₂₈H₄₆O (cf. loc. cit.). H. B.

Plant colloids. XXXV. Solution state of isohexosans. M. SAMEC and C. KNOP (Kolloid-Beih., 1934, 39, 259—264; cf. A., 1933, 1117).—isoHexosan prepared by Pictet's method (A., 1929, 914) contains polydisperse isotri- (I) and isodi-hexosan (II), which are stabilised by EtOH or glycerol. Diffusion experiments indicate a mean mol. wt. about 2300 for (I) and about 1700 for (II), but the val. varies greatly with the concn. E. S. H.

Carbon tetrahedron as sole ruler in all organic chemistry. R. REINICKE (Chem.-Ztg., 1934, 58, 369-371).—Mainly a re-statement of the author's views (A., 1931, 1001) and an extension of them to cellulose. H. W.

Mechanism of macropolymerisation reactions. —See this vol., 607.

Structure of cellulose and its derivatives.—See this vol., 587.

Mode of reaction of cellulose. III. Formation of intermediate compounds in the nitration of cellulose and their relation to the stability of the products of nitration. C. TROGUS and K. HESS. IV. Mechanism of denitration of cellulose nitrate. T. TOMONARI (Z. Elektrochem., 1934, 40, 193-207, 207-211; cf. A., 1933, 1280).-III. Investigation by extraction methods and by X-rays shows that nitration of cellulose to the trinitrate takes place through two intermediate stages, involving the formation of (1) an additive compound of cellulose and HNO₃, and (2) cellulose dinitrate. A nitrosulphonic ester is also formed from the dinitrate in a side reaction. The relative proportions of the reaction products depend on the concn. of H₂O in the nitration mixture.

IV. Determinations of N content, extraction by means of solvents, and X-ray investigations show that no intermediate products are formed in the denitration of cellulose trinitrate by alcoholic NH_4HS . Denitration with H_2O -rich $HNO_3-H_2SO_4-H_2O$ mixtures is a complex process involving the formation of several intermediate products. E. S. H.

Preparation of dibromoamine and its reaction with Grignard reagents.—See this vol., 615.

Separation of dimethylamine and ammonia.— See this vol., 500.

Preparation of anhydrous ethylenediamine. J. C. BAILAR, jun. (J. Amer. Chem. Soc., 1934, 56, 955).— $(\cdot CH_2 \cdot NH_2)_2$ hydrate and ZnC_2O_4 give a salt, $[ZnC_2H_4(NH_2)_2]C_2O_4$, which when heated to 200° in a vac. affords anhyd. $C_2H_4(NH_2)_2$, b.p. 116—117°, in almost quant. yield. H. B.

Hofmann's ethylene bases. Synthesis of $\beta\beta'$ diaminodiethylamine and of $\beta\beta'$ -diaminodiethylmethylamine. F. G. MANN (J.C.S., 1934, 461– 466).—NH(C₂H₄·OH)₂ (I) with SOCl₂ in CHCl₃ gives the hydrochloride (II), m.p. 216—217°, of $\beta\beta'$ -dichlorodiethylamine (III) (benzoate, m.p. 135—136°, by decomp. of the Bz derivative during purification). With HCl-AcOH (saturated at 0°) at 100° (I) affords only the hydrochloride, m.p. 147—149°, of its O-Ac₂ derivative, and with boiling Ac₂O gives aceto- $\beta\beta'$ -diacetoxydiethylamide, b.p. 212—213°/23·5 mm., converted by saturated HBr-AcOH at 170° into NH(C₂H₄Br)₂,HBr. Crude (III) [liberated from (II) by 20% KOH at 0°] heated with o-C₆H₄(CO)₂NK at 145—150°, gives $\beta\beta'$ -diphthalimidodiethylamine (IV), m.p. 178—180°, hydrolysed by boiling dil. HCl to the trihydrochloride of $\beta\beta'$ -diaminodiethylamine (tripicrate +2H₂O), identical with Hofmann's "diethylenetriamine" (cf. Fargher, J.C.S., 1920, **117**, 1351). Methylation of (IV) with MeI-AgO in COMe₂ gives $\beta\beta'$ -diphthalimidodiethylmethylamine, m.p. 124—126°, hydrolysed to the trihydrochloride, m.p. 239° (decomp.), of $\beta\beta'$ -diaminodiethylmethylamine [platinichloride +6H₂O and anhyd.; trioxalate, m.p. 205° (decomp.), tripicrate, m.p. 203—205° (decomp.)], converted by PhSO₂Cl into the monohydrochloride, m.p. 163—164°, of di(benzenesulphonamidoethyl)methylamine.

J. W. B.

New aliphatic tetramine: tetra-aminotetramethylmethane $C(CH_2 \cdot NH_2)_4$. F. J. GOVAERT (Proc. K. Akad. Wetensch. Amsterdam, 1934, 37, 156— 162).—*Tetra-aminotetramethylmethane* (I) [tetrahydrobromide; tetranitrate, m.p. 220—222° (decomp.); picrate, m.p. 211—212°; diplatinichloride] is prepared in 35% yield from $C(CH_2Br)_4$ and NH_3 in EtOH at 180—190°. Only a trace of (I) is obtained from Na and $C(CH_2Br)_4$ in liquid NH_3 . Analysis of the hydrochloride of (I) suggests that it contains the spirocompound $HCl_1NH:C_2H_4:C:C_2H_4:NH,HCl$.

R. K. C. Compounds of hexamethylenetetramine with complex cobalt salts.—See this vol., 617.

Electrometric titration of amino-acids in aqueous-alcoholic solution. A. NEUBERGER (Proc. Roy. Soc., 1934, **B**, 115, 180—199).—A method for the electrometric titration of H_2O -EtOH solutions of NH_2 acids against a standard calomel electrode is described. The results strongly support the zwitterion hypothesis. H. G. R.

Hydrolytic dissociation of some readily accessible hydrochlorides of amino-acids. R. ZEYNEK and S. KITTEL (Med. Klinik, 1933, 29, 1313—1314; Chem. Zentr., 1933, ii, 2972).—Hydrochlorides of leucine, glutamic acid, glycine, and betaine are strongly hydrolysed, and give an acid reaction in solution. H. J. E.

Identification of amino-acids by means of 3:5-dinitrobenzoyl chloride. B. C. SAUN-DERS (Biochem. J., 1934, 28, 580–586).—3:5- $C_6H_3(NO_2)_2$ ·COCl condenses in alkaline solution with many NH₂-acids (I) and may be used as a means of separation and identification. Acidic (I) are less reactive and no condensation could be effected with tyrosine. A further separation can be effected by the insolubility of some of these derivatives in dil. acid. H. G. R.

Proteins in liquid ammonia. II. Reaction of sodium in liquid ammonia with amino-acids and related substances. C. O. MILLER and R. G. ROBERTS (J. Amer. Chem. Soc., 1934, 56, 935–937; cf. A., 1931, 1437).—Vals. of the ratio mols. H_2 evolved: mols. substances used, on treatment with a slight excess of Na in liquid NH₃ are: glycine (1) 0-5; alanine (II) 0-48; tyrosine (III) 0-66; OH-CH₂ CO₂H 0-95; *l*-cystine 0-54; *l*-leucine 0-64; 2:5-diketopiperazine (IV) 0-32; glycylglycine (V) 0-51; glycyl-*dl*-alanine 0-51; NHAcMe 0-53; NHAcPh 0-05; a mixture of (IV) (1 mol.) and (V) (1 mol.) 0-02; a mixture of (IV) (1 mol.) and (V) (2 mols.) 0.05; a mixture of (I) (1 mol.) and (III) (1 mol.) 0.39; a mixture of (I) (53.3%), (II) (31.1%), and (III) (15.6%) 0.36. In some cases [e.g., (III), (IV)] reduction also occurs. H. B.

Lysine reineckate. W. GRASSMANN and O. LANG (Biochem. Z., 1934, 269, 223–224).—This salt $C_6H_{14}O_2N_2,2Cr(NH_3)_2(CNS)_4H,4H_2O$, m.p. 230–235° decomp., obtained from the hydrochloride by pptn. with NH₄ reineckate, is sol. in EtOH. 100 c.c. of H₂O at 24° dissolve 0.74 g. W. McC.

Synthesis of α -amino- β -hydroxy-*n*-butyric acid, α-amino-β-hydroxyisovaleric acid (β-hydroxyvaline), and α -amino- β -hydroxy-*n*-valeric acid $(\beta$ -hydroxynorvaline). Question of the occurrence of these aminohydroxy-acids as components of proteins. E. ABDERHALDEN and K. HEYNS (Ber., 1934, 67, [B], 530-547).-β-Methyl-Δα-butenoic acid (I) is converted by HOCl in H_2O into achloro- β -hydroxyisovaleric acid (II), m.p. 70° [Me ester (III), b.p. 89–90°/12 mm.]. Treatment of (II) or (III) with NH₃ in H₂O, EtOH, or CHCl₃ does not give homogeneous products. (III) in MeOH does not react with NaN₃. (II) and 10% KOH-EtOH afford $\alpha\beta$ -oxido- β -methylbutyric acid (IV), which does not give homogeneous products with NH3 in EtOH or $H_2O.$ (II) and liquid NH_3 afford the NH_4 salt of (IV), m.p. 123-125° (decomp.) after softening at 115°. αβ-Dibromoisovaleric acid, m.p. 107-108°, is converted by 30% NH₃ at 37° into α -bromo- β -methyl- Δ^{α} -propene, b.p. 92°/760 mm. Addition of N₂O₄ to (I) in light petroleum at 15–20° and reduction of the product by Sn and HCI leads to a mixture of a-amino-B-hydroxy-(V) and β-amino-α-hydroxy-isovaleric acids, m.p. 255° (decomp.) after darkening at 240°. Crotonic acid behaves analogously. Attempts to separate the mixtures of isomerides through the Zn or Cu salts or esters were unsuccessful. Reduction (red P-HI) yields a mixture of the corresponding α - and β -NH₂-acids. Et α -chloron-propyl ether, b.p. 111-113°/750 mm. (from EtCH0 and HCl in EtOH), condenses with Et sodiophthalimidomalonate in C_6H_6 to Et phthalimido- α -ethoxy-npropylmalonate, hydrolysed to a-amino-\beta-ethoxy-nvaleric acid, m.p. 258°, which, with boiling HBr (d 1.49), affords α -amino- β -hydroxy-n-valeric acid (VI), m.p. 230-231° (decomp.) after darkening at 215°. Et crotonate is transformed by Hg(OAc)₂ in MeOH followed by KBr in H_2O into Et α -acetatomercuri- β methoxy-n-butyrate, OMe·CHMe·CH(Hg·OAc)·CO₂Et, m.p. 78-79°, which, with Br in CHCl₃, affords Et α-bromo-β-methoxy-n-butyrate, b.p. 94-95°/12 mm. α-Bromo-β-methoxy-n-butyric acid, m.p. 59-60°, is converted by 25% NH, into a-amino-B-hydroxy-nbutyric acid (VII), m.p. 239° (decomp.) after becoming brown at 225°. (V), m.p. 218° (decomp.) (Cu salt), 18 obtained similarly but in poorer yield from CMe2:CH·CO2Et. The constitution of the aminohydroxy-acids is established by their transformation [HI ($d \ 2.00$) and red P at 140—150°] into the corresponding, known NH2-acids and their derivatives. (VII) gives a phenylcarbimide derivative, m.p. 177-178°, and 3-phenyl-5-a-hydroxyethylhydantoin, m.p. The phenylcarbamide, C₁₂H₁₆O₄N₂, m.p. 164—165°. 182°, and 3-phenyl-5-a-hydroxyisopropylhydantoin. m.p. 125° after softening at 117°, and the phenyl-

carbamide, C12H16O4N2, m.p. 156°, and 3-phenyl-5-ahydroxy-n-propylhydantoin, m.p. 154-155°, are derived from (V) and (VI), respectively. The phenylhydantoin of 1-hydroxyproline has m.p. 123-124°. Treatment of (VII) with BzCl and NaOH leads to a-benzamido-B-hydroxy-n-butyric acid, m.p. 176°, transformed by further treatment into α -benzamido- β benzoyloxy-n-butyric acid, m.p. 174°, also obtained directly from (VII) by use of the reagents in large excess. α-Benzamido-β-hydroxyisovaleric acid, m.p. 153°, could not be transformed into the Bz₂ derivative. α-Benzamido-β-hydroxy-n-valeric acid has m.p. 170-171°. ON-Dibenzoyl-1-hydroxyproline, m.p. 92°, is converted by NaOH-H₂O into a Bz_1 derivative, m.p. about 100°. Benzoyl-l-proline has m.p. 156° after softening at 145°. The products obtained by Schryver et al. and by Rimington by hydrolysis of proteins are not identical with the synthetic aminohydroxy-acids.

H. W. Syntheses of N-acetyldipeptides and their azlactones and amides. R. E. STEIGER (Helv. Chim. Acta, 1934, 17, 563-573).-By either (a) the action of Ac,O-AcOH on the dipeptide or (b) interaction of the NH₂-acid on the azlactone of the NHAc-acids in AcOH (details given) are obtained the N-Ac derivatives of dl-\beta-phenylalanyl-a-aminoisobutyric acid, m.p. 204° (corr.) (199°) [anilide, m.p. 200.5-201.5° (corr.) (197°)], dl-α-phenylalanyl-dl-alanine, m.p. 209° (corr., decomp.) (205°) [anilide, m.p. 202–203° (corr.)], and -glycine, m.p. 192° (corr.) (188°) [anilide, m.p. 214–215° (corr., decomp.) (210°)], all by (b). The azlactone, m.p. 141.0–141.5° (corr.), of dl-aphenylalanyl-a-acetamidoisobutyric acid with NH3 gives the amide, m.p. 206.5-207.5° (corr.) (202°). NH2. CMe2. CO2H with dl-CHMeBr. COBr affords dl-abromopropionyl-a-aminoisobutyric acid, sinters 197°, m.p. 199° (corr., decomp.) (195°), whence dl-alanyl-aaminoisobutyric acid and its N-Ac derivative, sinters 182°, m.p. 183.5° (corr.) (178°) [azlactone, m.p. 90° (corr.)], are obtained. By (a) are obtained the N-Ac derivatives of dl-alanyl-glycine, sinters 189°, m.p. 1905° (corr., decomp.) (184°), and -dl-alanine, sinters 195°, m.p. 196° (corr.) (191°), glycyl-dl-alanine, sinters 180°, m.p. 182° (corr., decomp.) (177°), -dl-valine, sinters 185.5°, m.p. 187.5° (corr., decomp.) (182°), and -dl-leucine, sinters 178°, m.p. 180° [corr., decomp.) (187°), bit of the sinters 188° (corr.) decomp. (175°); lit. m.p. 177° (corr.)] [anilide (from azlactone), m.p. 172—173° (corr.) (167°)]; dl-valyl-, sinters 223°, m.p. 224—225° (corr., decomp.) (220°), and dl-leucyl-, sinters 182°, m.p. 183.5° (corr., decomp.) (178°), -glycine. All are of type

(A) Autolysis of N-acyldipeptides. (B) Action of alkali on N-acyldipeptides. R. E. STEIGER (Helv. Chim. Acta, 1934, 17, 573—582, 583—592).—A. The % hydrolysis of N-Ac derivatives of the following dipeptides X·CO·NH·CR"R"··CO·NH·CRR··CO₂H in 0.05M solution by H₂O at 100° for 4 hr. (by Van Slyke determination of NH₂-N) is given in parentheses: (X=Me) dl-alanyl- (8.8), dl-leucyl- (6.9), and dlvalyl- (6.1), -glycine; glycyl-dl-alanine (8.1), -leucine (6.2), and -valine (4.5); dl-alanyl- (I) (45), dl-β-U U

phenylalanyl- (II) (35), glycyl- (13.2), and α -aminoisobutyryl- (87) -a-aminoisobutyric acid; dl-alanyldl-alanine (13.7); and, in 0.025M solution, N-acetyl- α -phenylalanyl-glycine (III) (16.7), -dl-alanine (IV) (27), and $-\alpha$ -aminoisobutyric acid (V) (84) (amide suffers no hydrolysis under these conditions). Thus introduction of alkyl or aryl groups into the Me group (R or R'') reduces the velocity of hydrolysis (v), but replacement of CH2. H in N-acetylglycylglycine by alkyl increases v. The nature of X also affects v, since dlalanyl- α -benzamidoisobutyric acid (X=Ph) is more stable than the corresponding Ac derivative (I). The N-benzenesulphonyl derivatives of dl-alanyl-, m.p. 203-204° (199°), and α-aminoisobutyryl-, m.p. 191-192° (186.5°), -a-aminoisobutyric acid are unattacked under the same conditions, and the function of the CO in permitting hydrolysis is discussed.

B. The vals of the unimol. $k \times 10^3$ (days⁻¹) for the hydrolysis of the above N-acetyldipeptides with 15 equivs. of N-NaOH at 25° are : (III) 16.7, (IV) 2.5, (V) 0.0, (I) 17.7, and (II) 6.0. The order of decreasing v for alkaline hydrolysis is that of increasing v for acid hydrolysis. Dil. alkali never causes rupture of the linking between an NH2-acid residue containing tert.-C and the other portion of the mol., and in (I) (R=R'=R''=Me) and (II) (R=R'=Me; R''=Ph)it is the Ac which separates. With excess N-NaOH $NHAc \cdot CPhMe \cdot CO \cdot NH_2$ affords dl-4-phenyl-2:4-di-methyliminazol-5-one (not purified), which is not formed in acid solution. a-Benzenesulphonamidoiso-butyric acid, sinters 143°, m.p. 145—146° (140.5°), is converted into its amide, sinters 201°, m.p. 202.0-202.5°, and methylamide, m.p. 142.5-143.5°, both of which are hydrolysed only very slowly with NaOH. All m.p. are corr., the figures in parentheses being initial bath temp. Mechanisms are discussed. J. W. B.

Oxidation of cystine in non-aqueous media. III. Products of exhaustive oxygenation of cystine perchlorate in acetonitrile. IV. Course of non-hydrolytic oxygenation. G. TOENNIES and T. F. LAVINE (J. Biol. Chem., 1934, 105, 107—113, 115—121).—Cystine perchlorate at -10° in anhyd. MeCN with BzO₂H in presence or absence of CHCl₃ absorbs a max. of 4 O, an impure cystine tetroxide being isolated as perchlorate (I). This is hydrolysed to a mixture of cysteic acid and (?) the corresponding sulphinic acid. Oxidation to cysteic acid may be completed at any stage of the anhyd. reaction with I in presence of H₂O. Evidence is adduced that a disulphoxide is formed as an intermediate in the formation of (I). A. A. L.

Dithiocyano-derivatives of elaidic acid. Synthesis of p-phenylbenzoylmethyl 0.-dithiocyanostearate and some p-halogenobenzoylmethyl 0.dithiocyanostearates. W. KIMURA (J. Soc. Chem. Ind. Japan, 1934, 37, 58—60B).—The following are described (cf. A., 1933, 940): p-phenyl-, m.p. 92°; p-iodo-, m.p. 88°, p-bromo-, m.p. 79°, and p-chlorobenzoylmethyl 0.-dithiocyanostearate, m.p. 69°. The SCN groups are in the trans-positions, whereas in similar derivatives of oleic acid they are in cispositions. J. L. D.

Decomposition and reactions of carbamide. IV. Mechanism of the formation of ammelide etc. J. M. DAS-GUPTA (J. Indian Chem. Soc., 1934, 11, 207—211).—The action of heat on carbamide (I) at different temp. and for different periods has been examined and the amounts of biuret (II), cyanuric acid, ammelide (III), and unchanged (I) have been determined. (III) is not produced below 190—195°, even in presence of HCl. The decomp. point of (II) (195°) is lowered in presence of NH_2Ph . A scheme is suggested to account for the results obtained.

F. R. S.

Tautomerism of cyanocarbamide with guanylcarbimide. J. S. BLAIR and G. E. P. SMITH, jun. (J. Amer. Chem. Soc., 1934, 56, 907-910).-Cyanocarbamide (amidodicyanic acid) (I) [K, K_2 , and K_3 salts, obtained from (I) and varying amounts of KNH₂ in liquid NH₃], prepared by Hallwach's method (Annalen, 1870, 153, 293), is hydrolysed (6N-H₂SO₄ at 60-65°) to biuret (II) and guanidine (III) (cf. Baumann, A., 1875, 1187). The formation of (II), and (III) cannot be explained by the structures NH2·CO·NH·CN and NH2·C(:NH)·NCO (guanylcarbinide) for (I). (I) may react in either of these forms or as CO<NH>C:NH. (I) should be regarded as a mixed aquo-ammonopyrocarbonic acid (A., 1926, 277). Mol. wt. determinations on diphenyldicarbimide, m.p. 175-176° (decomp.), prepared by a modification of Snape's method (J.C.S., 1886, 49, 254), indicate that it is NPh $<_{CO}^{CO}$ >NPh. H. B.

Ethylenic nitriles. Δ^{a} -Decenonitrile. M. FON-TEYN (Bull. Soc. chim. Belg., 1934, 43, 189—192).— Δ^{a} -Decenonitrile is separated (Gavrilov's method, A., 1933, 1281) by fractional distillation, conversion into the amides, fractional crystallisation of these to give the trans-, m.p. 122·5—123·20°, and cis-, m.p. 64·6— 65·2°, -amide, and regeneration by distillation with P₂O₅ into the trans-, b.p. 113·8—114·2°/10 mm., and cis-, b.p. 105·6—105·8°/10 mm., -nitrile. J. W. B.

Steric hindrance and steric protection. H. J. BACKER (Chem. Weekblad, 1934, 31, 275–279).—A review. The following new data are recorded : $\alpha\gamma$ -dibromopropane and Na₃AsO₃ give propane- $\alpha\gamma$ -diarsinic acid, but $\alpha\gamma$ -dibromo- $\beta\beta$ -dimethylpropane fails to react. Methylene dialkylsulphones, CH₂(SO₂R)₂, are readily brominated except when R=Bu⁷. Bu⁷SO₃H is unique in being non-hygroscopic. S. C.

Functional exchange between magnesium compounds and halogen derivatives. E. URION (Compt. rend., 1934, 198, 1244—1246).—Interchange of radicals between MgRBr and R'Br is shown by the following reactions. MgEtBr and cyclohexyl bromide, when kept for 1 day at room temp., give 12% of cyclohexane (I), but 40% of (I) if the liberated EtBr is removed by distillation. p-C₆H₄Br·MgBr and MgEtBr give 15% of C₆H₆ and much PhBr.

R. S. C.

Resolution of co-ordinated inorganic compounds into optical isomerides. I. Resolution of triethylenediamino-cadmium chloride, bromide, iodide, and sulphate. P. NEOGI and G. K. MUKHERJEE (J. Indian Chem. Soc., 1934, 11, 225-230).—d-Triethylenediaminocadmium tartrate, camphorsulphonate, and bromocamphorsulphonate could not be resolved. Crystallisation of *d*-triethylenediaminocadmium camphornitronate from H₂O has given fractions having $[\alpha]_{10}^{30} + 133 \cdot 2^{\circ}$, $+97 \cdot 4^{\circ}$, and $+94 \cdot 7^{\circ}$, respectively. The first fraction gave *d*-triethylenediaminocadmium chloride, $[\alpha]_{10}^{30} + 113 \cdot 7^{\circ}$ in H₂O, bromide $[\alpha]_{10}^{30} + 105 \cdot 0^{\circ}$ in H₂O, iodide $[\alpha]_{10}^{30} + 90^{\circ}$ in H₂O, and sulphate $[\alpha]_{10}^{30} + 83 \cdot 1^{\circ}$, the solutions being easily racemised. F. R. S.

Copper di- and tri-ethylenediamine salts of sulphonic acids. J. V. DUBSKÝ and J. TRTÍLEK (J. pr. Chem., 1934, [ii], **140**, 47—55).—By the action of $[\cdot CH_2 \cdot NH_2]_2$ (en) on the appropriate $(ArSO_3)_2Cu$ the following complex salts are obtained : $(PhSO_3)_2Cu$ + $6H_2O$ gives $[PhSO_3]_2Cu, 2 \text{ en} + 5H_2O$, dissolves in H_2O of crystallisation at 100—110°, decomp. 255°, $+2H_2O$, decomp. 260°, and $+H_2O$, m.p. 260° (decomp.); $(C_6H_4Me\cdotSO_3)_2Cu+6H_2O$ gives

 $[C_6H_4Me\cdot SO_3]_2Cu, 3 en, 6H_2O, m.p. 95^{\circ}$ (in H₂O of crystallisation), resolidifying, and m.p. 285° (decomp.), and $[C_6H_4Me\cdot SO_3]_2Cu, 2 en, 2H_2O$, darkens 270°, m.p. 290—294° (decomp.); $[C_6H_3Me(NO_2)\cdot SO_3]_2Cu+4H_2O$ gives $[C_6H_3Me(NO_2)\cdot SO_3]_2Cu, 3 en, +9H_2O$, decomp. 255°, and +6H₂O, decomp. 258°, and

 $\begin{array}{ll} [C_{6}H_{4}Me(NO_{2})\cdot SO_{3}]_{2}Cu,2\ en,4H_{2}O\ ; \ 2-(C_{10}H_{7}\cdot SO_{3})_{2}Cu\\ +6H_{2}O\ gives\ (C_{10}H_{7}\cdot SO_{3})_{2}Cu,3\ en,4H_{2}O\ , \ decomp.\\ 260-265^{\circ},\ and\ (C_{10}H_{7}\cdot SO_{3})_{2}Cu,2\ en,2H_{2}O\ ,\ m.p.\ 278^{\circ}\\ (decomp.). & J.\ W.\ B. \end{array}$

Walden inversion as exhibited by diethylenediaminocobaltic compounds.—See this vol., 617.

Organo-metallic compounds. III. Syntheses of organic compounds of lead from lead salts and carboxylic acids. K. A. KOZESCHKOV and A. P. ALEXANDROV (Ber., 1934, 67, [B], 527-530).--K Et malonate, prepared by semi-hydrolysis of $CH_2(CO_2Et)_2$ by KOH in abs. EtOH at 0°, is transformed by PbPh₃Cl in boiling EtOH-COMe₂ into *Et triphenylplumbic malonate*, CO₂Et·CH₂·CO₂PbPh₃, m.p. 159-160° (corr., decomp.), which passes at 160-165°/15 mm. into *Et triphenylplumbiacetate*, PbPh₃·CH₂·CO₂Et, m.p. 59-60° (corr.). At 128-132°/25 mm., *Et triphenylplumbic benzylmalonate*, m.p. 131-132° (corr., decomp.), affords *Et α-triphenyl plumbi*-β-*phenylpropionate*, m.p. 82-84°. H. W.

Complex metallic derivatives of polyamines. M. LESBRE and E. GARDNER (68th Congr. Soc. Savantes, 1933, 104—106).—Interaction of K_2PtCl_4 with excess of guanidine carbonate (I) in H₂O at room temp. or 40—50° gives the black, amorphous salt [Pt(CH₅N₃)Cl](OH)_n, transformed by conc. HCl or HBr into [Pt(CH₅N₃)Cl₂]₂ and [Pt(CH₅N₃)Br₂]₂, respectively. Cyanurtriamide, prep. from (I) and PhOH at 170°, similarly gives the substance [Pt[C₃N₃(NH₂)₃]Cl(OH)_n, whereas NH₂·CH(CH₅·NH₂)₂,3HCl affords the compounds [Pt[C₃H₅(NH₂)₃]Cl]Cl₂,H₂O and [PdC₃H₅(NH₂)₃Cl]Cl₂,H₂O. H. W.

Constitution of complex metallic salts. II. Platinum derivatives of $\beta\beta'$ -diaminodiethylamine. F. G. MANN (J.C.S., 1934, 466—474).—With aq. H₂PtCl₆ $\beta\beta'$ -diaminodiethylamine trihydrochloride (I) (this vol., 637) gives tetrachloro-($\beta\beta'$ -diaminodiethylamine monohydrochloride)platinum monohydrate [Cl₄Pt(NH₂·C₂H₄)₂NH,HCl] (II), shrinks at 215°, m.p.

221°, decomp. 228-230° [together with a small amount of a substance, darkens at 265°, if impure (I) is used], the platinichloride+2H₂O of which is obtained if (I) is boiled with aq. Na₂PtCl₆. With cold conc. aq. NaBr (II) gives the corresponding dichlorodibromo-monohydrochloride, and with aq. NH3 or $[CH_2 \cdot NH_2]_2$ an unidentified compound, and not the expected $[Cl_3Pt(H_2N \cdot C_2H_4)_2NH]Cl$ (III), is obtained. The N atom in the central sec. amine group in (II) is asymmetric, but resolution through its mono-dcamphor-β-sulphonate, $[\alpha]_{5461}$ +9·1° in H₂O, failed, trichlorodiaminodiethylamineplatinum d-camphor-β-sulphonate, $[\alpha]_{5461}$ +9·7° in H₂O (giving trichlorodi-aminodiethylamineplatinic chloride monohydrate with cold saturated aq. CaCl₂), being obtained as a byproduct. With Ag d- α -bromocamphor- π -sulphonate in hot H₂O (II) gives trichlorodiaminodiethylamineplatinum d-bromocamphorsulphonate [as (III)], but at room temp. tetrachloro(diaminodiethylamine d-bromocamphorsulphonate) platinum dihydrate, softens 120°, m.p. $205-208^{\circ}$ (decomp.), $[\alpha]_{5461} + 43 \cdot 2^{\circ}$ in H₂O, which also could not be resolved, is obtained. In an attempt to prepare similar derivatives of 4-coordination.metals (I) was treated with hot aq. K2PtCl4, but from the products only monobromo(diaminodiethylamine)platinous monobromide

[BrPt(NH₂·C₂H₄)₂NH]Br, darkens at 200°, and the corresponding monoiodo-monoiodide, darkens at 270°, m.p. $280-281^{\circ}$ (decomp.), were isolated, but with initial addition of N-HCl, dichloro(diaminodiethylmonohydrochloride)platinum amine platinochloride monohydrate was obtained. With Na rhodiochloride dihydrate in dil. HCl (I) gives dichlorobis(diaminodiethylamine monohydrochloride)rhodium rhodiochloride, the filtrate with KCNS affording oxythiocyanic acid, m.p. 200-202° (decomp.). Similar addition of KCNS to the solution obtained from (I), aq. NaOH, and CuSO₄ gives thiocyanato(diaminodiethylamine)cupric monothiocyanate, m.p. 165-167° (decomp.), similar addition of saturated aq. KI affording tris(diaminodiethylamine) dicupric tetraiodide $+2H_2O$ and anhyd., CO_2 into the filtrate giving monoiodo(diaminodiethylamine)cupric monoiodide. When aquopentamminocobaltic chloride, N-NaOH, and (I) are heated together bis(diaminodiethylamine) cobaltic tri-iodide, unchanged at 280°, is obtained. J. W. B.

Polymerisation of cyclic hydrocarbons. VII. Energy contents of the polymeric cyclopenta-dienes; strain theory. K. ALDER and G. STEIN (Ber., 1934, 67, [B], 613-626).—Determination of the heater of land the double linkings in the heats of hydrogenation of the double linkings in the tricycloheptene (I) and the 5-membered ring (II) of a series of cyclopentadienes shows those of (I) to be considerably richer in energy than those of (II) or of acyclic, semicyclic, or cyclic olefines. Extension of the measurements to cyclohexadiene renders doubtful whether this effect is due to strain or to the particular structure of the bridged ring. α (endo)-Isomerides are richer in energy than the $\beta(exo)$ -compounds, the magnitude of the differences corresponding with those observed with stereoisomeric, alicyclic cis-trans compounds when the solid compounds are compared. It appears probable that the differences would be diminished or would disappear if the heats of sublimation were considered. Examination of a series of cyclopentadienes and their H-derivatives proves that strain in the ring has a definite energy equiv., the result is confirmed by comparison of camphor with 2-ketodecahydronaphthalene and of norcamphor with 2:5-endoethylenecyclohexanone. H. W.

Fulvene containing a β -ionone-carbon ring. H. WILLSTAEDT (Svensk. Kem. Tidskr., 1934, 46, 61-63).— β -Ionone condenses with cyclopentadienc in EtOH-KOH to give 2-(γ -cyclopentadienylidene- Δ^{α} n-butenyl)-1:1:3-trimethyl- Δ^{2} -cyclohexene, b.p. 125°/ 12 mm., which gives a bluish-green colour with SbCl₃. J. W. B.

Separation of carotenes by adsorption on magnesium oxide. H. H. STRAIN (Science, 1934, 79, 325—326).—MgO prepared by low-temp. decomp. of Mg(OH)₂ is preferable to CaO or Ca(OH)₂ for separating carotenes by a Tswett column. Admixture with a heat-treated siliceous earth improves filtration. Using this adsorbent, carrot-root carotene has been separated into its major constituents with a recovery of 30—40% of the β - and 40—70% of the α -carotene originally present, both of which were identical with those separated by other methods. L. S. T.

Isolation of free phenyl radicals in the reaction of sodium vapour with bromobenzene. E. HORN and M. POLANYI (Z. physikal. Chem., 1934, B, 25, 151-152).—The existence of free gaseous Ph has been demonstrated. R. C.

Compounds of aluminium bromide with toluene, nitrobenzene, and metal bromides.—See this vol., 498.

Preparation of pure mesitylene [from crude cumene]. D. TISCHTSCHENKO (Bull. Soc. chim., 1933, [iv], 53, 1428—1430).—Crude cumene (I), b.p. 163—169°, is sulphonated $(95\% H_2SO_4)$ at 80-100°; ψ -cumenesulphonic acid is removed by dilution and crystallisation (details given), and the mother-liquor containing cumenesulphonic acid is hydrolysed by HCl at 100° to pure mesitylene (II). The unsulphonated portion of (I) contains much (II). R. S. C.

Mol. wt. determinations in synthetic highly polymerised substances.—See this vol., 504.

Highly arylated aromatic compounds. II. W. DILTHEY and G. HURTIG (Ber., 1934, 67, [B], 495– 496; cf. this vol., 62).—Determination of the mol. wt. of the "hexaphenylbenzene" of Durand *et al.* (A., 1931, 207) in freezing phenanthrene and boiling PhNO₂ indicates that it is a $C_6H_2Ph_4$. C_6HPh_5 and $1:2:3:4\cdot C_6H_2Ph_4$ give normal vals. in boiling PhNO₂. H. W.

Action of nitrosyl chloride on aromatic hydrocarbons. R. PERROT (Compt. rend., 1934, 198, 1424—1426).—In sealed tubes at 150° the following general reaction occurs: $RH+2NOCI \longrightarrow$ 2NO+RCl+HCl. Thus CH_2PhCl , $CH_2Ph\cdot CH_2Cl$, $CHPh_2Cl$, CPh_3Cl , chlorodiphenyl, $1-C_{10}H_7Cl$, and 9:10-dichloroanthracene are obtained; and, from CH_2PhCl , $CHPhCl_2$ and $CPhCl_3$. In sunlight at room temp. much N_2 is formed, with oximinocompounds or nitrosochlorides. E. W. W. Richter's supposed triarylorthosulphurous acids. D. LIBERMANN (Compt. rend., 1934, 198, 1421—1423).—These compounds (A., 1919, i, 73) are shown to be actually trihydroxytriarylsulphonium sulphates; thus the "sulphate of triphenylorthosulphurous acid" (loc. cit.) is tri-p-hydroxyphenylsulphonium sulphate, since benzoylation yields tri-p-benzoyloxyphenylsulphonium hydroxide (A., 1933, 389). Similarly the product from o-tolyl sulphite yields a Bz₄ derivative (cf. this vol., 69). The chlorides and hydroxides described by Richter are also those of the sulphonium radicals (cf. *ibid.*, 183); when treated with H_2SO_4 the hydroxides furnish Richter's sulphates.

E. W. W.

Hydrolysis of substituted sulphonanilides. II. M. PEZOLD, R. S. SCHREIBER, and R. L. SHRINER (J. Amer. Chem. Soc., 1934, 56, 696–697).—The reaction temp. and yields (%) of NH₂Ph or NHPhMe obtained from the following anilides and 80% NaOH are given in parentheses : PhSO₂·NHPh (250°; 0); 2:4:6-tri-methylbenzenesulphon-anilide, m.p. $108-109^{\circ}$ (170-225°; 0), and -methylanilide, m.p. 95-96° (185-225°; 0); 2:4-dibromobenzenesulphon-anilide, m.p. 145.4-146.5° (210—215°; 0.8), and *methylanilide*, b.p. 210— 214°/4 mm. (210—215°; 0.56); 2:4:6-tribromobenz-enesulphon-anilide, m.p. 118° (210—215°; 5.3), and -methylanilide, m.p. 148-148.5° (210-215°; 3.4); 2:4-dinitrobenzenesulphon-anilide (155°; 79) and -methylanilide $(155^{\circ}; 71)$. NO₂-groups are thus more effective than Br or Mc in promoting cleavage (cf. this vol., 288); steric hindrance effects and the size and wt. of the group arc not factors. 2:4-C₆H₃Br₂·SO₂Cl, m.p. 82° (lit. 79-79.5°), and 2:4:6-C₆H₂Br₃·SO₂Cl are prepared from $m - C_6H_4Br_2$ and $s - C_6H_3Br_3$, respectively, with $CISO_3H$ and SO_2Cl_2 at 100°. $s - C_6H_3(NO_2)_3$ could not be sulphonated. $2:4:6-(NO_2)_3C_6H_2SO_3Na$ and PCL (varying conditions) give 2:4:6and PCl_5 (varying conditions) give $2:4:6-(NO_2)_3C_8H_2Cl$, which with Na_2S_2 (varying conditions) affords 2:4:6:2':4':6'-hexanitrodiphenyl sulphide, decomp. 227-228°.

Tribenzylmethane. G. A. HILL, M. H. LITTLE, S. WRAY, jun., and R. J. TRIMBEY (J. Amer. Chem. Soc., 1934, 56, 911—912).—Reduction (red P, HI at 200°) of tribenzylcarbinol gives tribenzylmethane (I), m.p. 81-8—82° $[(NO_2)_3$ -derivative, softens at 74°, decomp. when heated further], also obtained by similar reduction of Ph dibenzylmethyl ketone and from Ph tribenzylmethyl ketone (prep. to be reported later) and NaNH₂ in xylene at 145—150°. The hexabenzylethanes of Schmerda (A., 1909, i, 563) and Trotman (A., 1925, i, 382) are (I). H. B.

Catalysts for destructive hydrogenation. I. Hydrogenation of naphthalene in presence of molybdenum sulphide.—See this vol., 609.

Synthesis of condensed polynuclear hydrocarbons by cyclodehydration of aromatic alcohols. II. Synthesis of ionenes. M. T. BOGERT, D. DAVIDSON, and P. M. APFELBAUM (J. Amer. Chem. Soc., 1934, 56, 959—963; cf. A., 1933, 153, 599).— Reduction (Na, amyl alcohol) of Et m-methylcinnamate gives γ -m-tolylpropyl alcohol, b.p. 108°/4 mm., 147°/20 mm. (bromide, b.p. 104°/4 mm., 140—145°/20 mm.; phenylcarbamate, m.p. 52—53°). Mg γ -m-tolyl-

propyl bromide and COMe, afford e-m-tolyl-B-methyl. pentan-β-ol, b.p. 128-132°/5 mm. (phenylcarbamate, m.p. 97-98°), converted by cold conc. H₂SO₄ into 1:1:6-trimethyl - 1:2:3:4-tetrahydronaphthalene (ionene), b.p. 88—91°/4 mm. (cf. this vol., 76) [$(NO_2)_2$, m.p. 102°, and SO_2 ·NH₂, m.p. 158—159°, derivatives (cf. dec. cit)] Marchinethylogical constraints (cf. loc. cit.)]. Mg y-phenylpropyl bromide and $COMe_2$ give ε -phenyl- β -methylpentan- β -ol (I), b.p. 120°/7 mm., 130°/10 mm. (phenylcarbamate, m.p. 101.5– 102.5°), dehydrated by I to impure ε -phenyl- β -methyl- Δ^{β} -pentene (II), b.p. 108—112°/25 mm. (ozonolysis product, CH2Ph·CH2·CHO). CH2Ph·CH2·MgBr and Pr^βCHO afford ε-phenyl-β-methylpentan-γ-ol (III), b.p. 138-142°/13 mm. (I) and (III) are converted by cold conc. H₂SO₄ into 1:1-dimethyl-1:2:3:4-tetra. hydronaphthalene (IV), b.p. 98°/10 mm., 220-222°/761 mm. [(NO2)2-, m.p. 64.5°, and SO2.NH2, m.p. 111° and 148-149°, derivatives]; reaction probably proceeds through (II) [which is converted by 90% H₂SO₄ into (IV)]. (IV) could not be dehydrogenated (S or Se); it is oxidised (alkaline KMnO₄) to o-CO2H·CBH4·CMe2·CO2H. H. B.

Synthesis of 1:1:2:6-tetramethyltetrahydronaphthalene and the constitution of irene. M.T. BOGERT and P. M. AFFELBAUM (Science, 1934, 79, 280).—m-C₆H₄MeBr is condensed with $(CH_2)_2O$ and Mg to β -m-tolyl ethyl alcohol, which yields the corresponding bromide (I) with HBr. A Grignard reaction between (I) and COMePr^{β} gives a *tert*.-alcohol which, when heated with H₂SO₄, yields 1:1:2:6-tetramethyltetrahydronaphthalene (II). On heating with Se, (II) gives a C₁₀H₅Me₃ with the 1:2:6-C₁₀H₅Me₃ (Ruzicka *et al.*, A., 1933, 1296). L.S.T.

Hydrogenation of anthracene. Attempted hydrogenation of tetra-alkyldihydroanthracenes. (MLLE.) E. MARTIN and G. HUGEL (Bull. Soc. chim., 1933, [iv], 53, 1500—1502).—9:9:10:10-Tetraisobutyldihydroanthracene is hydrogenated with difficulty (Ni, 160—188°; not Pt or at a lower temp.) to 9:9:10:10-tetraisobutyldecahydroanthracene, m.p. 86—87°, and does not react with Br. R. S. C.

Preparation of 9:10-dialkylanthracenes. G. HUGEL and M. LERER (Bull. Soc. chim., 1933, [iv], 53, 1497—1498).—Dialkyldihydroanthracenes (I) with p-O:C₈H₄:O in boiling xylene give quinhydrone and 60—80% yields of 9:10-dialkylanthracenes (II), not obtainable by Pt. The Na₂ derivatives of (II) with H₂O give (I). 9:10-Di-ethyl-, m.p. 145.5°, -n-butyl-, m.p. 105—106°, -isobutyl-, m.p. 132—133°, and -isoamyl-anthracene, m.p. 134.5—135°, are prepared. R. S. C.

Synthesis of 9:9:10:10-tetra-alkyldihydroanthracenes. G. HUGEL and M. LERER (Bull. Soc. chim., 1933, [iv], 53, 1498—1504).—The Na₂ derivatives of the appropriate 9:10-dialkylanthracenes with alkyl halides in Et₂O give 9:9:10:10-tetraisoamyl-, m.p. 168—170°, and -isobutyl-dihydroanthracene, m.p. 175°, and 9:10-diisopropyl-9:10-din-butyldihydroanthracene, m.p. 131—133°. R. S. C.

Alkylation of phenanthrene. G. HUGEL and M. LERER (Bull. Soc. chim., 1933, [iv], 53, 1502–1504).— The Na derivative of phenanthrene (I) with Bu^gClgives some isobutyl., b.p. 120–140°/0.02 mm., and diisobutyl-dihydrophenanthrene, b.p. 160-170°/0.02 mm., and much (I). R. S. C.

Synthesis of alkylphenanthrenes. VI. Attempts to synthesise the hydrocarbon "C16H14" derived from strophanthidin. R. D. HAWORTH, C. R. MAVIN, G. SHELDRICK, and (in part) J. MUSGRAVE (J.C.S., 1934, 454-461).-None of the following alkylphenanthrenes is identical with the hydrocarbon C₁₆H₁₄ obtained by Se dehydrogenation of strophan-thidin (Jacobs et al., A., 1932, 948). 1-Keto-2-methyl-1:2:3:4-tetrahydro- and MgMeI gives 1:2-dimethyl-3:4-dihydro-phenanthrene, m.p. 99-100° (picrate, m.p. 121-122°), dehydrogenated to 1:2-dimethylphenanthrene, m.p. 142-143° (styphnate, m.p. 153°; quinone, m.p. 213-214°; quinoxaline, m.p. 143-144°). Me 3-2-naphthoylisobutyrate, m.p. 74-75°, with MgMeI gives γ -2-naphthyl- α -methyl- Δ^{β} -pentenoic acid, m.p. 168-169°, reduced and cyclised to 4-keto-1: 3-dimethyl-1:2:3:4-tetrahydro-, b.p. 167-169°/0.3 mm., whence 1:3-dimethyl-phenanthrene, m.p. 75-76° (styphnate, m.p. 165-166°; quinoxaline, m.p. 154-155°), is obtained. The K derivative of Et 5-methylcyclohexanone-2-carboxylate with o-C6H4Me·CH2·CH2Br gives Et 2-(B-0-tolylethyl)-5 - methylcyclohexanone - 2 - carboxylate (I), b.p. 170—175°/04 mm., converted into 1:6-di-methylphenanthrene, m.p. 87—88° (picrate, m.p. 134°; quinone, m.p. 200°; quinoxaline, m.p. 189°), also obtained from Et 2-(B-p-tolylethyl)-6-methylcyclohexanone-2-carboxylate (m), b.p. 170-175°/0.4 mm. 5-Methyl- α -naphthyl CH₂Br ketone and CHNa(CO₂Et)₂ give β -(5-methyl-1-naphthoyl) propionic acid, m.p. 169-170° [Me ester (II), b.p. 195-197°/0.3 mm.], reduced to y-(5-methyl-1-naphthyl)butyric acid, m.p. 128-129°, converted successively into 1-keto-8-methyl-1:2:3:4tetrahydro-, m.p. 164-165°, 1:8-dimethyl-3:4-dihydro-, and 1:8-dimethyl-phenanthrene (III), m.p. 191—192° (picrate, m.p. 151—152°; quinone, m.p. 190°; quinoxaline, m.p. 178°). Reduction (P-HI) of the pentenoic acid from (II) and MgMeI, and cyclisation affords 1-keto-4:8-dimethyl-1:2:3:4-tetrahydrophenanthrene (IV), m.p. 104-106°, and Et $2\-(\beta-o-tolylethyl)-6-methylcyclohexanone-2-carboxylate$ (V), b.p. 170—172°/0.4 mm., is obtained in a similar manner to (I). The ultimate dehydrogenation products (m) from either (IV) or (V) are a mixture of (III) and 1:5-dimethylphenanthrene, m.p. 57-58° (picrate, m.p. 134-135°). Similar methods afford γ -(6:7-dimethyl-2-naphthyl)butyric acid, m.p. 137-139°; 4keto-6:7-dimethyl-1:2:3:4-tetrahydro-, m.p. 112-113°, and 2: 3-dimethyl-phenanthrene, m.p. 65-66° (picrate, m.p. 138—140°; styphnate, m.p. 165—167°; quinone, m.p. 234—235°; quinoxaline, m.p. 205°); 2-naphthyl \$-bromoethyl ketone, m.p. 81°, 4-keto-2methyl-1:2:3:4-tetrahydro-, m.p. 79-80°, and 2:4-dimethyl-phenanthrene, m.p. 111° (picrate, m.p. 139-140°; quinone, m.p. 169°; quinoxaline, m.p. 155-156°); 2:5-dimethylphenanthrene, b.p. 204-205°/15 mm., m.p. 46-47° (picrate, m.p. 127-129°; styphnate, m.p. 132-133°; quinone, m.p. 140-141°; quin-oxaline, m.p. 166°). Reduction of β -(6-methyl-2naphthoyl) isobutyric acid and cyclisation gives 4-keto-3:7-dimethyl-1:2:3:4-tetrahydro-, b.p. 218-220° (semicarbazone, m.p. 220-221°), whence 2:6-dimethylphenanthrene, m.p. 33-34° (picrate, m.p. 135-136°;

styphnate, m.p. 148-150°; quinone, m.p. 202°; quinoxaline, m.p. 178-180°), is obtained. Similarly 4-keto-2:7-dimethyl-1:2:3:4-tetrahydro-, m.p. 133-134°, 2:7-dimethyl-, m.p. 101-102° (picrate, m.p. 152-153°; quinone, m.p. 224-225°; quinoxaline, m.p. 235°), 1-keto-2:9-dimethyl-1:2:3:4-tetrahydro-, m.p. 84-85° [from β-(4-methyl-1-naphthoyl) isobutyric acid, m.p. 141-142°], 2:9-, m.p. 56-57° (picrate, m.p. 138°), 3:4-, m.p. 62-63° (picrate, m.p. 129-130°; styphnate, m.p. 142-143°; quinone, m.p. 207-208°; quinoxaline, m.p. 203-204°), and 3:6-dimethylphenanthrene, m.p. 141° (picrate, m.p. 172-173°; quinone, m.p. 212-213°; quinoxaline, m.p. 252°) 2-B-p-tolylethyl-5-methylcyclohexanone-2-carbfrom oxylate, b.p. 170-173°/0.4 mm.], are obtained. The appropriate MgRI and 1-keto-1:2:3:4-tetrahydrophenanthrene, and subsequent dehydration and dehydrogenation, afford 1-ethyl-, m.p. 62.5° [picrate, m.p. 108—109°; styphnate, m.p. 144°; quinone, m.p. 155°; quinoxaline, m.p. 151° (all different from lit.)], 1-iso-, m.p. 85—86° (picrate, m.p. 125—126°; quinone, m.p. 147° (148°; quinoraline, m.p. 142°) (142°) 1-180-, m.p. 85-80 (picrate, m.p. 125-120); quinone, m.p. 147-148°; quinoxaline, m.p. 142-143°), and 1-n-propylphenanthrene, m.p. 34-35° (picrate, m.p. 100-101°; quinone, m.p. 139-140°; quinoxaline, m.p. 144-145°). Similarly are obtained 4-keto-7isopropyl-1:2:3:4-tetrahydro-, m.p. 55-56°, 2-isopropyl., m.p. 44—45° (picrate, m.p. 108°; quinone, m.p. 134°; quinoxaline, m.p. 172°), 2-methyl-1-ethyl-3:4-dihydro, m.p. 77—78°, 2-methyl-1-ethyl-, m.p. 80° (picrate, m.p. 134—135°; quinone, m.p. 157—159°; quinoxaline, m.p. 146—147°), 1-keto-2-ethyl-1:2:3:4tetrahydro-, m.p. 60-61° [from β-1-naphthyl-a-ethylpropionic acid, m.p. 112—113°], and 1-methyl-2-ethyl-phenanthrene, m.p. 100° (picrate, m.p. 134—135°; quinone, m.p. 163°; quinoxaline, m.p. 108°). In dehydrogenations marked (m), migration of a Me group from the 4- to the 1-position occurs, a possible mechanism being suggested. J. W. B.

Coloured hydrocarbons of coal-tar. A. WINTER-STEIN and K. SCHÖN (Naturwiss., 1934, 22, 237-238).-1:2-Benzpyrene occurs in appreciable quantities in the fractions of higher b.p. and can be separated by fractional distillation and crystallisation. Chromatographic absorption is particularly applicable to the separation of coloured hydrocarbons occurring in small amounts in coal-tar fractions. Absorption of a C₆H_a solution of technical anthracene (I) in a column of active Al₂O₃ gives a well-defined yellow zone from which by extraction with Et₂O and repetition of the process naphthacene (II), m.p. 337°, is isolated. The blue fluorescence of (I) is prevented by 0.00003% of (II). From a tar fraction, b.p. 425-464°, d 1.23, (II), (?) 1:2-benznaphthacene, absorption max. λ 457 and 430 mµ, and (?) 1:2-2':3'-naphthanthracene, absorption max. λ 423 and 423 mµ in C₆H₆, are similarly isolated. H. A. P.

Di-radical formula of rubrene and constitution of its dissociable peroxide. A. Schönberg (Ber., 1934, 67, [B], 633–638).—Rubrene (I) is considered

I.)
$$\left[o - C_{g} H_{4} \ll CPh > C \right]_{2} \left[C_{g} H_{4} \ll CPh > C \right]_{2} (II.)$$

to pass under the influence of light into the activated di-radical form (II) which adds O to give the peroxide (III). Structure (II) readily accounts for addition of Na and the repeated presence of Cin (I) is causative of colour. A mechanism is suggested whereby (III) is transformed by MgI₂ into C_6H_4 CPh C_6H_4 CPh C-CPh C_6H_4

(IV) and by HCl in C_6H_6 into (V). The production of "metrubrene" from (III), Zn, and AcOH is



explained by rupture of the -0.0 bridge, addition of H, and loss of H₂O to

 $C_{6}H_{4}$ \xrightarrow{CPh}_{CPh} $C_{6}H_{4}$. The action of Grig-

nard's reagents on (III) leads partly to (IV) owing to presence of MgI_2 , and occurs partly in accordance with Gilman's scheme for the reaction with peroxides. H. W.

Reactions of unsaturated compounds. II. Addition of arylamines to styrene. W. J. HICKINBOTTOM (J.C.S., 1934, 319-323).-Interaction of NH₂Ph in presence of its hydrochloride or hydrobromide with styrene at 220—260° gives α -anilino- α -phenylethane (p-toluenesulphonyl derivative, m.p. 95—96°) and o- (I), m.p. 58—59° (hydrochloride; Ac, m.p. 112—113°, and Bz, m.p. 95—96°, derivatives), and p-amino-as-diphenylethane, (II), b.p. 176-178°/20 mm. [hydrochloride; picrate, m.p. 197-199° (decomp.); Ac, m.p. 112-113°, Bz, m.p. 127-128° (lit. 123°), and m-nitrobenzenesulphonyl, m.p. 122-123°, derivatives]. The constitution of (II) was confirmed by replacement of NH₂ by Br (Sandmeyer) and oxidation of the product to p-C₆H₄Br·COPh; this was unsuccessful with (I), which was deaminated (diazo-reaction) and the product oxidised to COPh₂. Similarly $p - C_8 H_4$ Me·NH₂ gives α -phenylethyl-p-toluid-ine, m.p. 69—70°, b.p. 183—184°/23 mm. (p-toluene-sulphonyl, m.p. 86—87°, and N-NO-derivatives) (synthesised for comparison from p-CHPh:N·C₆H₄Me and MgMeI), and a-phenyl-a-4-amino-m-tolylethane, b.p. 173-174°/18 mm. (hydrochloride; hydrobromide; sulphate; picrate, m.p. 162-163°; Ac, m.p. 141-142°, and p-toluenesulphonyl, m.p. 122-123°, derivatives), and as-m-xylidine gives a-phenyl-a-4-amino-5-m-xylylethane (Ac derivative, m.p. 148-149°).

H. A. P.

Monophenyl nitrogen esters of biuret. J. S. BLAIR (J. Amer. Chem. Soc., 1934, 56, 904—907).— The variation in the reported m.p. (156—165°) of as-phenylbiuret (I) is due to its decomp. (with slow gas evolution and no charring) when heated. The phenylbiuret of Gatewood (A., 1923, i, 254) is a compound (II) of 3 mols. of (I) and 2 mols. of phenylisocyanuric acid. (II) forms a continuous series of solid solutions with each component. H. B.

Action of nitrous acid on dimethylaniline. I, II. J. C. EARL and A. W. MACKNEY (J. Proc. Roy. Soc. N.S.W., 1933, 67, 231–239, 419).—I. Equimol. amounts of NPhMe₂,HCl and NaNO₂ give tetramethylbenzidine and little p-NO·C₆H₄·NMe₂ (I), whilst if small quantities of HCl are added the same products are obtained, (I) in larger yield. When excess of HNO₂ is used, the products are 3:3'-dinitrotetramethylbenzidine, p-NO₂·C₆H₄·NMe₂, and a substance (II), m.p. 157–158°.

II. (II) is the nitrate of (I), since with Na_2CO_3 it gives (I) and is also formed directly from (I) and HNO₃. F. R. S.

Chlorination of aceto-o-xylidides. L. E. HIN-KEL, E. E. AYLING, and T. M. WALTERS (J.C.S., 1934, 283-287; cf. ibid., 1923, 123, 2968).-Chlorination of aceto-o-3- and -4-xylidides with Cl₂ in aq. or abs. EtOH, or dichloramine-T in CHCl₃, or by rearrangement of the N-chloroamines proceeds in the anticipated manner, the ease of direct chlorination and of rearrangement of the chloroamines being directly comparable. The following are described : 4-chloro. (I), m.p. 169°, N-chloro-, m.p. 94.5°, N : 6-dichloro-, m.p. 81°, 4 : 6-dichloro-, m.p. 188°, 4 : 6 : N-trichloro-, and 6-chloro-4-nitro-aceto-0-3-xylidide (6-Cl- and HNO3, d 1.5, in AcOH at 100°), m.p. 196.5°; 3-chloro- (II). m.p. 114°, N-chloro, m.p. 55°, 5-chloro- (III), m.p. 157°, and N: 5-dichloro-aceto-o-4-xylidide, m.p. 74°; 4:6-dichloro- (IV), m.p. 44°, and 4:5:6-trichloro-0-3xylidine (V), m.p. 207°; and 3-chloro-o-4-xylidine, m.p. 26°. (I) was synthesised by reduction (Fe and AcOH) of 4-chloro-3-nitro-o-xylene, m.p. 75° (Sandmeyer, from $4:1:2:3-NH_2 \cdot C_6H_2Me_2 \cdot NO_2$ and acetylation of the product. Elimination of NH2 from (IV) (diazo-reaction) gives $1:2:3:5-C_6H_2Me_2Cl_2$. (V) is synthesised by reduction of the corresponding NO₂-compound, m.p. 169° (lit. 149°), (III) by reduc-tion of 5-chloro-4-nitro-o-xylene, m.p. 63° (from $5:1:2:4-NH_2 \cdot C_8H_2Me_2 \cdot NO_2$) and acetylation of the product, and (II) similarly from 3-chloro-4-nitro-oxylene, m.p. 46°. H. A. P.

Degradation of quaternary ammonium salts. VIII. Necessary structural conditions for migration in radicals. J. L. DUNN and T. S. STEVENS (J.C.S., 1934, 279-282).-The rearrangement $\text{COPh}\cdot\text{CH}_2\cdot\text{NRMe}_2X \longrightarrow \text{COPh}\cdot\text{CHR}\cdot\text{NMe}_2(+\text{HX})$ under the influence of alkali takes place when R is allyl or phenylpropargyl, but not when R is Me, Et, hexahydrobenzyl, Ph, ·CH₂·CH₂Ph, or ·[CH₂]₂·CH₂Ph. The following are prepared by interaction of COPh.CH, Br and the appropriate tert.-amine, followed by metathesis where necessary : phenacylallyldimethylammonium picrate (I), m.p. 78–79°; -phenylpropargyldimethylammonium bromide (II), m.p. 162°; -phenyldiethylammonium bromide (III), m.p. 150–152°, and *hexahydrobenzyldimethylammonium* bromide (IV), m.p. 185–187° (picrate, m.p. 123– 124°). (I) is converted by $2 \cdot 5N$ -NaOH at the b.p. into ω -dimethylamino- ω -allylacetophenone (picrate, m.p. 97-99°), identified by reduction of its methosulphate $(Zn and H_2SO_4)$ to allylacetophenone. Similarly, (11) with hot 8% Na2CO3 gives w-dimethylamino-w-phenyl-

propargylacetophenone [hydrochloride, m.p. 167—168°; hydrobromide (+0.5H2O), m.p. 182-183° (decomp., darkens 130°)], the methosulphate of which on reduction gives CH₂(CH₂Bz)₂. On the other hand, (III) with 25-30% NaOH gives BzOH, COPhMe, and NMe₃, and (IV) is either unchanged (10%) or completely decomposed (50%) by alkali. Similarly phenacyl-\beta-phenylethyldimethylammonium bromide with NaNH₂ gives CH₂Ph·CH₂·NMe₂, and phenacyly-phenylpropyldimethylammonium bromide with boiling 25% NaOH gives CH2Ph·[CH2]2·NMe2 and a base (picrate, m.p. 103-104°) and with NaNH₂ at 130-140° gives phenacyldimethylamine (methopicrate, m.p. 140° gives phenacyldimethylamine (methopherate, m.p. 137–139°) and CHPh.CHMe. o-Hydroxyphenyl-benzyldimethylammonium chloride, m.p. 115–116° [from NMc₂·C₆H₄·OH(o) and CH₂Ph·Cl], reacts violently with NaNH₂ at 110° to give o-benzyloxy-phenyldimethylamine, the methiodide (+1H₂O), m.p. 157–158° (methopicrate, m.p. 155°), of which is synthesised by methylation (MeI and NaOH) of o-aminophenyl benzyl ether. Interaction of CH₂PhCl and 6-dimethylaminopropionhenone gives only β-dimethylaminopropiophenone gives and only (CH₂Ph)₂NMe₂Cl. Trimethylhydroxylamine and COPh·CH₂Br give COPh·CH₂·NMe₂,HBr, m.p. 185-186°. Methylation of NH₂·CH₂·CPh₃ gives βββ-triphenylethyldimethylamine, m.p. $110-112^{\circ}$ (hydro-chloride, m.p. $207-209^{\circ}$). Distillation of $\alpha\beta\gamma$ - $C_3H_5Br_3$ over KOH gave β -bromoallyl bromide only (cf. Annalen, 1870, 154, 371); this with NHMe2 gives β -bromoallyldimethylamine, b.p. 132–134° (picrate, m.p. 94-95°), which is either unchanged or completely decomposed by alkali. Interaction of a-dimethylaminoisobutyronitrile with MgPhBr gives phenylisopropyldimethylamine (picrate, m.p. 205°), gives and of dimethylaminophenylacetonitrile with MgEtBr gives a-dimethylamino-a-phenylpropane, b.p. 100-105°/22 mm. (picrate, m.p. 161-164°). β-Dimethylamino-a-phenylpropane picrate, m.p. 135-139°, and ω-piperidinoacetophenone hydrobromide, m.p. 227-H. A. P. 228° (lit. 220°), are described.

Reactions of thiocarhonyl chloride. III. Structure of so-called "thiocarbonylbenzidine." G. M. DYSON and D. W. BROWNE (J.C.S., 1934, 318— 319).—"Thioearbonylbenzidine" (I) is shown by ultimate analysis and synthesis to be 4:4'bis-(4''-aminodiphenylyl-4'''-thiocarbamido)diphenyl,['C₆H₄·NH·CS·NH·C₆H₄·C₆H₄·NH₂]₂, and not 4aminodiphenylyl-4'-thiocarbimide (cf. A., 1926, 1131). It is decomposed by Ac₂O (at the b.p.?) into 4-acetyldiphenylyl-4'-thiocarbimide, m.p. 224°, and diphenyl-4: 4'-dithiocarbimide (II), m.p. 203°. (II) is also obtained from CSCl₂ and benzidine (III) in excess of 2N-HCl, and with more (III) in warm C₆H₆ gives (I). CSCl₂ and (III) in AcOH give 4:4'''-diamino-4': 4''-diphenylthiocarbamide as by-product. CSCl₂ and 4:4'-CH₂(C₆H₄·NH₂)₂ give 4:4'-dithiocarbimidodiphenylmethane, m.p. 196°. H. A. P.

Benzidine derivatives. S. SAKO (Bull. Chem. Soc. Japan, 1934, 9, 150—154).—2-Nitro- (I), m.p. 143° and dimorphous form, m.p. 117°, is reduced to 2-amino-, m.p. 134°, and dimorphous form, m.p. 50°, -benzidine, the $4:4'-Ac_2$ derivative, m.p. 261—262°, of which [by HCl-SnCl₂-AcOH reduction of the Ac₂ derivative of (I)] is converted into the diazonium iodide, decomposed by cold glacial AcOH to 2-iodo-4:4'-diacetamidodiphenyl, m.p. 310-311°, hydrolysed by EtOH-HCl to the dihydrochloride of 2-iodobenzidine (sulphate). J. W. B.

Triarylaminoethylenes. III. Interaction of sulphur and trianilinoethylene (addendum). R. SHIBATA, M. OKUYAMA, N. KOJIMA, and T. NISHI. IV. Interaction of sulphur and tritolylaminoethylenes. V. Coloured by-products in the synthesis of triarylaminoethylenes. R. SHIBATA and T. NISHI (Tech. Rep. Tôhoku, 1934, **11**, 160— 167, 168—183, 184—198).—III. In addition to the products already given (A., 1933, 1286), monothiooxanilide and oxanilide [oxidation products of (NHPh·CS·)₂] are isolated from the products of fusion of trianilinoethylene (I) with S, and a *substance* C_9H_7N , m.p. 207°, from those of the interaction of NH₂Ph and CHCI:CHCl, which condensation is investigated under a variety of conditions and with different catalysts.

IV, V. Isolated by-products of the interaction of NH2Ph and CHCI:CCl2 are a red substance, C13H10N2, m.p. 212° [corresponding with the substance $C_{15}H_{13}N_2$ (II), m.p. 207°, in the p-tolyl series (loc. cit.)], and a yellow substance, C22H17N3 (III), m.p. 115-117° [corresponding with the substances C23H23N3, m.p. 115-116° (IV) and m.p. 141° (V), respectively, in the o-and p-tolyl series]. When heated in decalin at 160-170°, tri-p-tolylaminoethylene (VI) gives (V) and a trace of (II); without solvent it affords $p-C_6H$. Me·NH₂ (VII) and (II) at 160-170°, and (V) at 145°. Without solvent at 140-150° (V) gives a trace of (II), unchanged (V), and a trace of a colourless compound. With S at 140—150° (V) gives (VII), dithio-ox-p-toluidide, and tri-p-tolylaminothiolethylene. Reduc-tion of (V) with either Na-Hg in 95% EtOH (CO₂) or Pd-H₂ gives an almost quant. yield of (VI), (IV) being similarly reduced to tri-o-tolylaminoethylene (VIII). Conversely oxidation of (VI) with PbO₂, KMnO₄, or air in NaOH-H₂O-PhMe gives (V); (VIII) gives (IV), and (I) gives (III). (III), (IV), and (V) are probably, therefore, α -anilino- $\alpha\beta$ -di-(phenylimino)-, α-o-tolylamino-αβ-di-(o-tolylimino)-, and α -p-tolylamino- $\alpha\beta$ -di-(p-tolylimino)-ethane, all of type NR:C(NHR)·CH:NR. With anhyd. ZnCl₂ at 140-180° (VI) gives a substance, $C_{16}H_{18}ON_2$, m.p. 133– 134°. With 2N-HCl (V) gives a substance, m.p. 100– 101° (? hydrochloride +3H₂O). Interaction of Interaction of β-C₁₀H₇·NH₂ and C₂HCl₃ in boiling 20% NaOH affords tri-β-naphthylaminoethylene, m.p. 200°. J. W. B.

Acyldiarylhydrazine series. III. Oxidation of acetylhydrazobenzene. F. O. RITTER (J. Amer. Chem. Soc., 1934, 56, 975—976; cf. A., 1931, 476).— NAcPh·NHPh is oxidised ($Na_2Cr_2O_7$, AcOH) to p-benzoquinone - p-benzeneazodiphenylhydrazone (I). O:C₆H₄:N·NPh·C₆H₄·N:NPh, dark red with bronze reflex, m.p. 163° (corr.), which is reduced by SnCl₂ (=8H), and is converted by EtOH-KOH into p-anilinoazobenzene. (I), Zn dust, AcOH, and Ac₂O give p-NHAc·C₆H₄·NHPh, p-NHAc·C₆H₄·OH, and NHAcPh. It is suggested that a compound analogous to (I) may be an intermediate in the semidine rearrangement of hydrazo-compounds. NPh₂·NH₂ and EtOH-KOH give NHPh₂ and NH₃. H. B.

Phosphoric acid as condensing agent. Alkylation of phenols and their ethers. A. TSCHITSCHI-BABIN (Compt. rend., 1934, 198, 1239-1242).-The BABIN (Compt. rend., 1934, 198, 1239–1242).—The following are prepared by condensation with hot H_3PO_4 (d 1.85—1.87; 400 g. per mol.): 2- or 4-tert.-butyl-m-cresol, m.p. 23°, b.p. 121–122°/15 mm. [75– 80%; from m-cresol and Bu^gOH or Bu^{γ}OH], 3-tert.-butyl-o- (I), m.p. 27°, b.p. 122·5°/14 mm. (78%; from o-cresol and Bu^{γ}OH), and -p-cresol, m.p. 44°, b.p. 118–119°/14 mm. (73%; by Bu^{γ}OH), 2- or 4-tert.-amyl-, b.p. 119–122°/10 mm., and -menthyl-m-cresol, b.p. 152–155°/2 mm. (by tert.-amyl alcohol or menthol). 3-benzul-o-cresol, m.p. 52°, b.p. 180– or menthol), 3-benzyl-o-cresol, m.p. 52°, b.p. 180-186°/12 mm. (from CH₂Ph·OH), isopropyl-, b.p. 127-130°/17 mm., and tert.-butyl-1:2:4-xylenol, b.p. 126-128°/17 mm., tert.-butyl- (56.9%), b.p. 134-136°/1.5 mm., and ditert.-butyl-resorcinol (27.7%), m.p. 123°, the Me ether of (I) (65%; from BurOH and C₆H₄Me·OMe), and hexyl-m-cresol, b.p. 152-154°/ 11 mm. (from m-cresol and hexene). Condensation occurs only in the o-position to OH. Saturated primary alcohols react only if they can isomerise to the sec. or tert. isomerides. Allyl alcohol gives poly-merised products, which yield isopropylphenols and hydrocoumarans when dry-distilled. R. S. C.

Homologues of phenol. G. T. MORGAN and A. E. J. PETTET (J.C.S., 1934, 418-422):-2:3:6- $C_{6}H_{2}Me_{3}\cdot NH_{2}$ gives (diazotisation) 2:3:6-trimethylphenol, m.p. 62° (p-xenylcarbamate, m.p. 189°). 3-Nitro-4-methylacetophenone, m.p. 62° (from p-C₆H₄MeAc), Fe, and 1% HCl give the 3-NH₂-com-pound, m.p. 81°, converted (diazo-reaction) into 3hydroxy-4-methylacetophenone, m.p. 119-120°, which is reduced (Clemmensen) to 2-methyl-5-ethylphenol, b.p. 224° (p-xenylcarbamate, m.p. 160°). 2-Methyl-4-cthylacetanilide (I) and fuming HNO₃ in AcOH at $< 40^{\circ}$ give the 6-NO₂-derivative, m.p. 142°, deacetylated by hot 25% HCl to 6-nitro-2-methyl-4-ethylaniline, m.p. 64°, whence were prepared successively 1-nitro-3methyl-5-ethylbenzene (by diazotisation and EtOH), b.p. 262—264°, 3-methyl-5-ethylaniline (by Fe and 1%) HCl), b.p. 233°, and 3-methyl-5-ethylphenol, m.p. 51°, b.p. 233° [phenylcarbamate, m.p. 151°, does not depress the m.p. of m-5-xylenyl phenylcarbamate; p-xenylcarbamate, m.p. 125°, and p-xenoate, m.p. 70° depress the m.p. of the corresponding derivatives of m-5-xylenol; Me ether, oxidised by hot, alkaline $KMnO_4$ to 5-methoxy isophthalic acid (Me₂ ester, m.p. 109°)]. (I) with H_2SO_4 -HNO₃ gives the 5-NO₂derivative, m.p. 143°, yielding successively 5-nitro-2methyl-4-ethylaniline, m.p. 74°, 1-nitro-4-methyl-2-ethylbenzene, b.p. 253-263°, 4-methyl-2-ethylaniline, b.p. 230° (Ac derivative, m.p. 132°), and 4-methyl-2ethylphenol (phenylcarbamate, m.p. 99°). m-C₆H₄Me·NH₂, ZnCl₂, and EtOH at 280° give a mixture containing 3-methyl-4-ethylaniline, b.p. 236° [sulphate; Ac derivative (II), m.p. 90°], converted into 3-methyl-4-ethylphenol, m.p. 26°, b.p. 235° (p-xenylcarbamate, m.p. 152°), also obtained from 4-aceto-mcresol. (II) and fuming HNO₃ in AcOH at $<40^{\circ}$ give the 2-, m.p. 103°, and ?-NO₂-derivative, m.p. 109°; the former affords successively 2-nitro-5-methyl-4-ethylaniline, m.p. 90°, 1-nitro-4-methyl-3-ethylbenzene, m.p. 23°, b.p. 271°, 4-methyl-3-ethylaniline, b.p.

234—235° (Ac derivative, m.p. 88°) (also obtained from 3-chloroaceto-4-methylacetanilide), and 4-methyl. 3-ethylphenol, b.p. 234—235° (p-xenylcarbamate, m.p. 162°). R. S. C.

o- and m-4-Xylenolsulphones. J. ZEHENTER [with O. RIFL] (J. pr. Chem., 1934, [ii], 139, 309– 317).—o-4-Xylenol and conc. H_2SO_4 (10:4) at 170– 175° give the 3:3'- or 5:5'-sulphone, m.p. 244–245° (30–40% yield) [Na₂ salt, cryst.; Br_2 -, m.p. 227– 228°, $(NO_2)_2$ -, cryst., decomp., Ac_2 , m.p. 218°, and Bz_2 derivatives, m.p. 238°; Me, m.p. 184°, and Me_2 ether, m.p. 189°]. This with conc. H_2SO_4 at room temp. gives a sulphonic acid, $+1\cdot5H_2O$, m.p. 80–90° (K and Ba salts, cryst.), and disulphonic acid, $+2\cdot5H_2O$, m.p. 124–125° { K_2 , $+2\cdot5H_2O$, Ba, $+2H_2O$, and basic Ba salt, [$C_{18}H_{15}O_4S(SO_3)_2$] Ba_3 , $+7H_2O$], whereas at 100° xylenolsulphonic acid is formed. m.4-Xylenol affords at 170–180° the 5:5'-sulphone, m.p. 221° (Na salt, $+5H_2O$; Ac, m.p. 199°, and Bzderivative, m.p. 244–245°; Me_2 ether, m.p. 181°), hydrolysed by H_2SO_4 to xylenolsulphonic acid.

R. S. C.

2:3-Derivatives of 2-methylnaphthalene. V. VESELY and F. STURSA (Coll. Czech. Chem. Comm., 1934, 6, 137-144).-The mixture of 5- and 6-bromotetralin obtained by bromination of tetralin (von Braun, A., 1924, i, 48) is converted by Mg and Me₂SO₄ in $Et_2O(N_2)$ into a mixture of the corresponding 5and 6-Me derivatives, from the sulphonation product of which separates the sparingly sol. Ba salt of 6methyl - 1:2:3:4-tetrahydronaphthalene - 7 - sulphonic acid, m.p. 102° [Na salt (I); amide, m.p. 158-159°]. Removal of the SO₃H by 55% H₃PO₄ at 165° gives 6-methyl-1:2:3:4-tetrahydronaphthalene, dehydrogenated by S at 220° to 2-C₁₀H₇Me. With KOH at 240-290° (I) affords 7-hydroxy-6-methyl-1:2:3:4tetrahydronaphthalene, m.p. 88-89° (Me ether, m.p. 63-64°; p-nitrobenzeneazo-compound, m.p. 244-245°), dehydrogenated to 3-methyl-β-naphthol, b.p. $176^{\circ}/20$ mm., m.p. $155-156^{\circ}$. This with cone. aq. $NH_3-(NH_4)_2SO_3$ at $160-170^{\circ}$ gives 3-methyl β -naphthylamine, m.p. $135-135\cdot5^{\circ}$ (Ac, m.p. $181-125\cdot5^{\circ}$) 182°, and Bz, m.p. 189-191°, derivatives; p-nitrobenzeneazo-compound, m.p. 238-240°), converted by diazotisation and NaNO2-Cu-bronze into 3-nitro-2methylnaphthalene, m.p. 117-118°. J. W. B.

Retene. III. Nitroretenols, nitrofluorenones, and related compounds. M. T. BOGERT and T. HASSELSTRÖM (J. Amer. Chem. Soc., 1934, 56, 983– 985).—6-Acetoxyretene and HNO₃ ($d \ 1.52$) in AcOH at 15—20° give a NO_2 -derivative, m.p. 194.5—195.5° (all m.p. are corr.), reduced (SnCl₂, EtOH-HCl) to the unstable NH_2 -compound, m.p. 215—217° (Ac derivative, m.p. 203.5—204.5°). Retene ketone (1methyl-7-*iso*propylfluorenone) [oxime (I), m.p. 174.5°, formed only in an anhyd. medium (MeOH+BaCO₃)] similarly affords NO_2 -, m.p. 165.5°, and NH_2 -derivatives, m.p. 146° [Ac derivative, m.p. 197.5—198.5° (oxime, m.p. 254—255.5°)]. (I) and PCl₅ in Et₂O give a methylisopropylphenanthridone, m.p. 219.5— 220.5°. 6-Acetoxyretenequinone is not converted by 50% KOH into a fluorenone; the resultant 6-hydroxyretenequinone gives a vat (Na₂S₂O₄) which dyes cotton peach-red (fugitive to light). H. B.
Manufacture of s-diarylaminophenols.—See B., 1934, 355.

Rearrangement of hydroxy-sulphones. IV. B. A. KENT and S. SMILES (J.C.S., 1934, 422-428; cf. A., 1932, 735).—The rates of change of a series of ohydroxy-sulphones to ether-sulphinic acids, measured by a colorimetric method, are in agreement with the electronic considerations previously suggested. The change occurs more rapidly with a suitably placed aliphatic OH, and even with aliphatic hydroxy-4-Chloro-2-nitrophenyl 4-hydroxy-msulphoxides. tolyl sulphide (I), m.p. 134° (from 4-chloro-2-nitro-phenylchlorothiol and p-cresol at 100°) (Ac deriv-ative, m.p. 86°), and \hat{H}_2O_2 -AcOH at 90° give the corresponding sulphone, m.p. 157°. p-Benzoquinone and o-NO₂·C₆H₄·SO₂H in H₂O give 2-nitro-2': 5'-dihydroxydiphenylsulphone, m.p. 214°. o-NO₂·C₆H₄·SCl and resorcinol in CHCl₃ give o-nitrophenyl 2:4-dihydroxyphenyl sulphide, m.p. 157° (lit. 150-151°), the Ac derivative, m.p. 94° (lit. 102-103°), of which with H2O2-AcOH at 90° gives 2-nitro-2': 4'-diacetoxydiphenylsulphone, m.p. 125°, hydrolysed by H2SO4-EtOH to the 2': 4'-(OH)2-derivative, m.p. 132°. 4-Hydroxy-m-tolylthiol (prepared from the carbonate by alkali), $3: 4-C_6H_3Cl(NO_2)_2$, and NaOEt in hot EtOH give 2: 4-dinitrophenyl 4-hydroxy-m-tolyl sulphide, m.p. 123° (Na salt), oxidised to 2:4-dinitrophenyl-4'-hydroxy-m-tolylsulphone, m.p. 139-140°. 3-Nitrophenyl disulphide (from m-NO2 C6H4 SO2Cl and HI in 78% yield) gives the chlorothiol, which with p-cresol in hot CHCl3 yields 3-nitrophenyl 4-hydroxy-mblyl sulphide, m.p. 112° (Ac derivative, m.p. 96°), oxidised to 3-nitrophenyl-4'-hydroxy-m-tolylsulphone, m.p. 133°, which is stable to aq. NaOH. m-4-Xylenol and o-NO2 C6H4 SO2Cl give 2-nitro-2'-hydroxy-3': 5'dimethyldiphenyl sulphide, m.p. 123° (Ac derivative, m.p. 158°), and thence 2-nitro-2'-hydroxy-3': 5'-dimethyldiphenylsulphone, m.p. 178°. Similarly were prepared 2-nitro-2'-hydroxy-5'-methoxy-, m.p. 135°, and 5'-chloro-2-nitro-2'-hydroxy-diphenyl sulphide, m.p. 159°, 2-nitro-2'-hydroxy-2'-methoxy- (II), m.p. 152°, and 5'-chloro-2-nitro-2'-hydroxy-diphenylsulphone, m.p. 175°, and 2-nitrobenzyl-4'-hydroxy-m-tolylsulphone (by way of an impure sulphide), m.p. 139° (not affected by 2N-NaOH at 180°). 2-Nitrophenyl B-hydroxyethyl sulphide gives an impure acetate, which with H_2O_2 -AcOH at 90° gives the corresponding acetyl-sulphoxide (III), m.p. 113°, hydrolysed by 2N-H₂SO₄ to the hydroxy-sulphoxide (IV), m.p. 157°. (III) is further oxidised to the oily Ac derivative of 2-nitrophenyl-Bhydroxyethylsulphone (V), m.p. 88°. Rearrangement of the appropriate hydroxysulphones and reduction of the resulting sulphinic acids by HI-SO,-AcOH and of the disulphides by glucose and alkali led to (a) 4chloro-2-nitrophenyl, m.p. 137° [converted by oxidation and hydrolysis into 4-chloro-2-nitrophenyl p-tolyl ether, m.p. 103°, also obtained from p-C6H4Me OK and $2:5 \cdot C_6 H_3 Cl(NO_2)_2]$, and 2:4-dinitrophenyl 3-sulphinop-tolyl ether, m.p. 117-118°, 2-nitro-4'-hydroxy-, m.p. 64, 2-nitro-5'-hydroxy-, m.p. 107° (decomp.), 2-nitro-4'-methoxy-, m.p. 122-123°, and 4'-chloro-2-nitro-, m.p. 117-118°, -2'-sulphinodiphenyl ether; (b) the following disulphides : di-(4-p-chloro-o-nitrophenoxym.tolyl), m.p. 133°, di-(5-hydroxy-2-p-nitrophenoxy-

phenyl), m.p. 207°, di-(2-o-nitrophenoxy-5-methoxyphenyl), m.p. 114°, and di-(5-chloro-2-o-nitrophenoxyphenyl), m.p. 159°; (c) the following sulphides : (I), 2-nitro-2': 5'-dihydroxydiphenyl, m.p. 161°, and (II); (d) by more prolonged rearrangement, 3-chloro-8methoxyphenothioxin 10-dioxide, m.p. 173°. (V) and 0.5% aq. NaOH rapidly give β -o-nitrophenoxyethanesulphinic acid (VI), m.p. 121° (and, under more vigorous conditions, also o-NO₂·C₆H₄·OH), reduced to di-(β -o-nitrophenoxyethyl) disulphide (VII), m.p. 76°. (IV) with 1.5% NaOH gives a mixture of (VI) and (VII). o-NO₂·C₆H₄·SCl and ψ -cumenol at 100° give ψ -cumenyl 2-nitrobenzenesulphenate, m.p. 162°, stable to hot AcOH, but slowly hydrolysed by hot 2N-NaOH to (o-NO₂·C₆H₄·S·)₂. 2-Chloro-m-5-xylyl 2-nitrobenzenesulphenate, m.p. 190°, similarly prepared, behaves similarly. R. S. C.

isoChavibetol. I. isoChavibetol ethyl ether and its decomposition by methyl-alcoholic potassium hydroxide into isohomogenol. II. "Diisochavibetol" and the stereoisomeride of isochavibetol ethyl ether. M. IMOTO (J. Soc. Chem. Ind. Japan, 1934, 37, 78–79E, 79–81E).—I. iso-Chavibetol Et ether (I) (prep.dcscribed) with EtNaSO₄, KOH, and a little H₂O at 157–163° under pressure during 3 hr. affords isohomogenol (II) and no isochavibetol (III).

II. (III) with EtNaSO₄ and 10% NaOH at 160° affords diisochavibetol, m.p. 179–181°, which gives (I) with Me₂SO₄. With conc. KOH, (III) affords a stereoisomeride (?) of (I), m.p. 40–41°, converted into (I) by crystallisation from 70% EtOH, is oxidised (KMnO₄) to isovanillic acid Et ether, and affords (II) with KOH-MeOH. J. L. D.

β-Hydroxyphenylethylamines and their transformations. I. Synthesis of mezcaline. G. HAHN and H. WASSMUTH (Ber., 1934, 67, [B], 696-708).—3:4:5-(OMe)₃C₆H₂·CO₂H, prepared in 92% yield from gallic acid, Mc₂SO₄, and NaOH, is converted by conc. H₂SO₄ at 40° into 4-hydroxy-3:5dimethoxybenzoic acid (I) (yield 83%), slowly de-carboxylated at 250-295° to pyrogallol 1:3-Me₂ ether (II) [yield 70.7%]. Pyrogallol 1 : 3-Me, 2-allyl ether, b.p. 138—140°/12 mm., obtained in 91% yield from (II), C_3H_5Br , and K_2CO_3 in boiling COMe₂, is isomerised at 240°/75 mm. to 2 : 6-dimethoxy-4-allylphenol (III) in 91% yield. (I), MeOH, and HCl afford Me 4-hydroxy-3:5-dimethoxybenzoate, m.p. 107° (yield 85%), whence Me 3: 5-dimethoxy-4-allyloxybenzoate, m.p. 75° (yield 93%), converted by boiling 2N-NaOH into (III) in 95% yield. The Na salt of (III), CaCO₃, and Me₂SO₄ in PhMe at 140° give 3:4:5-trimethoxyallylbenzene (elemicin) (IV), b.p. 152-156°/17 mm., in >79% yield. Treatment of (IV) with 1% O_3 and of the ozonide with H_2 -Pd-CaCO₃ gives 3:4:5-trimethoxyphenylacetaldehyde (V) in 75% yield (as NaHSO₃ compound), (V) gives an oxime (VI), m.p. 67°, and semicarbazone, m.p. 191°. (VI) and boiling Ac₂O afford 3:4:5-trimethoxyphenylacetonitrile, m.p. 81°, smoothly reduced to β-3:4:5trimethoxyphenylethylamine (yield 90-95%) when gradually added in AcOH to PtO₂ suspended in AcOH containing conc. H₂SO₄. H. W.

Diethoxydulcin, diethoxyphenacetin, and other derivatives of pyrogallol. K. FEIST, F. KLATT, and W. AWE (Arch. Pharm., 1934, 272, 221–235). The hydrazide, decomp. 180°, of 2:3:4-trihydroxy-benzoic acid with o-OH·C₆H₄·CHO (I) and d-glucose (II) gives, respectively, the 2:3:4-trihydroxybenzoyl-hydrazone of (I), decomp. 255°, and of (II), m.p. 161°; the 3:4:5-trihydroxybenzoylhydrazone, m.p. 246°, of (I) is similarly obtained from the hydrazide of gallic acid. The hydrazide (III), m.p. 116° (hydrochloride, m.p. 195°; isopropylidene, m.p. 142°, and o-hydroxybenzylidene, m.p. 121°, derivatives), of 3:4:5-triethoxybenzoic acid (IV) (Me ester, m.p. 53°) with HNO, gives the azide, m.p. 98°, converted by boiling EtOH into the urethane, m.p. 130°, and by boiling H_oO into s-di-(3:4:5-triethoxyphenyl)carbamide, m.p. 225°. With dil. EtOH-NaOH (III) gives C₆H₃(OEt)₃ and 3:4:5-triethoxybenzylidene-3':4':5'-triethoxybenzoylhydrazine, m.p. 197°, hydrolysed to 3:4:5triethoxybenzaldehyde characterised as its m-nitrobenzoylhydrazone, m.p. 167°. The acid chloride, m.p. 68°, of (IV) with N_2H_4 , H_2O gives only a trace of (III), the main product being s-di-(3:4:5-triethoxybenzoyl)hydrazine, m.p. 193° [also by HgO oxidation of (III)], converted by heating at 250-300° into 2:5-di-(3:4:5-triethoxyphenyl) furodiazole,

 $\begin{array}{l} O & \underbrace{C[C_6H_2(OEt)_3]^*N}_{C[C_6H_2(OEt)_3]^*N}, \text{ m.p. 150°. With Pb(SCN)_2 at}\\ 200° (IV) is converted into its$ *nitrile*, m.p. 102°. The*amide*, m.p. 145°, of (IV) with NaOCl-NaOH gives5-amino-1:2:3-triethoxybenzene (Ac derivative, diethoxyphenacetin, m.p. 98°), the hydrochloride ofwhich with KCNO gives 3:4:5-triethoxyphenylcarbamide (diethoxydulcin), m.p. 140°, having a bittertaste. Me 6-amino-2:3:4-trimethoxybenzoate(Will, A., 1888, 1089) by the Sandmeyer reaction givesthe 6-chloro-compound, m.p. 67°, and [using Cu₂(CN)₂]the nitrile, hydrolysed to 3:4:5-triethoxy-o-phthalicacid. J. W. B.

Condensation of cholesterol with aromatic amines. H. LIEB, K. WINKELMANN, and F. KÖPPL (Annalen, 1934, **509**, 214—228).—Cholesteryl chloride (or bromide) and boiling NH₂Ph give *cholesteryl-aniline* (I), C₂₇H₄₅·NHPh, m.p. 189° (*Ac*, m.p. 187°, and *NO*-, m.p. 147°, derivatives). The following are similarly obtained from the appropriate NH₂Ar at 180-200°: cholesteryl-o-, m.p. 147°, -m-, m.p. 147°, and -p-, m.p. 171°, -toluidine; -m-4-xylidine, m.p. 153° ; - α -, m.p. 203°, and - β -, m.p. 201°, -naphthylamine; -methylaniline, m.p. 141.5°; -p-aminodi-methylaniline, m.p. 154°; -o-, m.p. 116° (Ac derivative, m.p. 85°), and -p-, m.p. 157° (Ac derivative, m.p. 143°), -anisidine, and -o-, m.p. 91° (Ac derivative, m.p. 88°), and -p-, m.p. 140° (Ac deriv-ative, m.p. 129°), -phenetidine. (I) and Br in cold AcOH afford dibromocholestanyl-2: 4-dibromoaniline, $C_{27}H_{45}Br_2 \cdot NH \cdot C_6H_3Br_2$, decomp. 147°; dibromocholestanyl - 2:4:6-tribromomethylaniline, decomp. about 150°, -4:6-dibromo-2-methylaniline, decomp. 154°, -2:6-dibromo-4-methylaniline, decomp. 160°, and -6-bromo-2:4-dimethylaniline, decomp. 145-147°, are similarly prepared. (I) and HNO_3 (d 1.4) in warm AcOH give a $(NO_2)_2$ -derivative, probably $p \cdot \mathrm{NO}_2 \cdot \mathrm{C}_6 \mathrm{H}_4 \cdot \mathrm{N(NO}_2) \cdot \mathrm{C}_{27} \mathrm{H}_{45}$, m.p. 230°, reduced

 $(\text{NHPh}\cdot\text{NH}_2 \text{ in xylene at } 160-170^\circ)$ to a *nitroamino*derivative, probably $p \cdot \text{NO}_2 \cdot \text{C}_6 \text{H}_4 \cdot \text{N}(\text{NH}_2) \cdot \text{C}_{27} \text{H}_{45}$, m.p. 209°, since it does not diazotise (an attempt to introduce As by the Bart reaction gave a *compound*, m.p. 235-237°). $p \cdot \text{NHAc} \cdot \text{C}_6 \text{H}_4 \cdot \text{NH}_2$, NHAcPh, $\text{C}_6 \text{H}_4(\text{NH}_2)_2$, $\text{NO}_2 \cdot \text{C}_6 \text{H}_4 \cdot \text{NH}_2$, $p \cdot \text{NH}_2 \cdot \text{C}_6 \text{H}_4 \cdot \text{CO}_2 \text{Et}$, and 1-aminoanthraquinone do not undergo the above condensation. H. B.

Comparison of the reactions of cholesterol with sulphuric, selenic, and telluric acids. E. MONTIGNIE (Bull. Soc. chim., 1933, [iv], 53, 1394).— If H_2SeO_4 (I) [not H_2TeO_4 (II)] is used instead of H_2SO_4 (III) in Libermann's test, cholesterol (IV) gives the same colours (max. after 30 min.), but the reaction is very slow with metacholesterol and stigmasterol. Substituting (I) [not (II)] for (III) in Salkowsky's reaction gives pink colours. With cold (I) [not (II)] (IV) gives a grey colour changing to greenish-black. (IV) reduces 45% (I) at 100° only very slowly and boiling 50% (II) not at all. (IV) (1 mol.) with cryst. (II) (1 mol.) at 170—180° gives Te and 10% of β -cholesterylene or cholesteryl oxide. R. S. C.

Isomerism of cholesterol. E. MONTIGNIE (Bull. Soc. chim., 1933, [iv], 53, 1408—1409).—Cholesterol with AgOBz and I in dry Et₂O or PhMe at 100° gives some metacholesterol. R. S. C.

Action of oxides on cholesterol. E. MONTIGNIE (Bull. Soc. chim., 1933, [iv], 53, 1411-1412).-Cholesterol does not react with BaO, ThO₂, MoO₃, Al₂O₃, or ZrO₂, gives uncrystallisable products with I_2O_5 , Sb₂O₃, and SeO₂, yields cholestenone with CuO at 300° or V₂O₅ at 200° (7% yield), and forms metacholesterol with CuO at 200-220°, Ni₂O₃, MnO₂, ZnO, Bi₂O₃, U₃O₈, HgO, ClO₂, or Ag₂O. R. S. C.

Action of iodine on cholesterol. E. MONTIGNIE (Bull. Soc. chim., 1933, [iv], 53, 1412—1414).— Cholesterol (I) and I in hot C_6H_6 or CHCl₃, not in Et₂0, C_5H_5N , or CS₂, give a product behaving as a mixture of isomerides of (I), probably containing metacholesterol. R. S. C.

Dehydration of alcohols. (MLLE.) D. SONTAG (Ann. Chim., 1934, [xi], 1, 359-438).-CH₂Ph·CH₂·OH (I) with P2O5 at 0° gives styrene (II), with hot acid and neutral dehydrating agents the ether (III) with or without (II), and with alkalis only (II) (quantitatively with KOH). CHPhMe OH (IV) is unaffected by KOH, but gives (II) with acid reagents. Anhyd. H₂C₂O₄ (V) and boiling (I) give a 33% yield of (CH₂Ph·CH₂·)₂C₂O₄, m.p. 51-51.5°, obtained in 43% yield by adding (I) slowly to molten (V); by the latter method small amounts of (I) can be identified. CH, Ph·CHPh·OH, and CH₂Ph·CHMe·OH, (I), CH2Ph.CMe2.OH (VI) are dehydrated by molten KOH in > 90, 43, 18–22, and 0% yield, respectively. (VI) gives PhCHO and COMe2. CHPh.CH.OAc gives PhMe, whilst CH:CPh is unaffected. (I) and NH₂Na in hot xylene give slowly only the Me ether. β -Phenyl-n-propyl Me ether has b.p. 84.5-85.5°/17 mm. Phenylethylene glycol and KOH at 235° give (IV) and BzOH; (·CHPh·OH)₂ gives CH₂Ph·OH and (·CH₂Ph)₂. α-C₁₀H₇·CH₂·CH₂·OH and molten KOH at 30-40 mm. give 1-C₁₀H₇·CH:CH₂, b.p. 115-116°/3-4 mm. isomeride (III), m.p. 116.5°, hydrolysed to β -stycerol, an oil. (II) and (III) form an eutectic, m.p. 109.5° [78% (III)]. (II) has the OH groups in *cis*-positions. (I) and *CHPh(OBz)·CH:CH₂ afford 90% of (II), which indicates that the new asymmetric C atom is sterically identical with *C. J. L. D.

Addition of methyl hypochlorite to phenylacetylene. E. L. JACKSON (J. Amer. Chem. Soc., 1934, 56, 977—978).—Cl₂ passed into CH:CPh in abs. MeOH gives 71% of αα-dichloro-ββ-dimethoxy-β-phenylethane, m.p. 66—66.5° [hydrolysed (aq. McOH-HCl) to CHCl₂·COPh], formed by addition of 2 mols. of MeOCl. H. B.

Arylglycols. E. BALLA (Compt. rend., 1934, 198, 947—948).—By the method previously described (A., 1933, 711) are prepared phenyl-, α-naphthyl-, m.p. 114·5—115° (dibenzoate, m.p. 107°), α-phenyl-β-pisopropylphenyl-, m.p. 117·5—118·5° (dibenzoate, m.p. 217·5—218°), and α-phenyl-β-1-naphthyl-ethylene glycol, m.p. 95° [dibenzoate, m.p. 196·5—197° (uncorr.) and 201° (corr.)]. α-Phenyl-β-p-isopropylphenyl- (from MgPhBr and cuminaldehyde), m.p. 42—42·5°, and α-1-naphthyl-β-phenyl-ethyl alcohol (from C₁₀H₇·MgBr and CH₂Ph·CHO), m.p. 78·5—79·2°, and ω-1-naphthylstyrene, m.p. 72·5—73·5°, are described. R. S. C.

Synthesis of glycols, $C_6H_4(CHR \cdot OH)_2$, and their derivatives. Synthesis of divinyl-, dipropenyl-, and diacetylenyl-benzenes. R. DELU-CHAT (Ann. Chim., 1934, [xi], 1, 181-255).-Largely a more detailed account of work previously reviewed (A., 1930, 471, 588; 1931, 946). The following appears to be new. MgPhBr and o- and $m-C_6H_4(CHO)_2$ give o- (I), m.p. 90° (purified through the diacetate, m.p. 106.5°), and m-di-a-hydroxybenzyl-, m.p. 157°, -benzene, respectively. o-Di-a-hydroxyethylbenzene is dehydrated (dil. H₂SO₄) to dimethylphthalan, b.p. 75°/10 mm., which decomposes when kept; o-di-a-hydroxypropyl-benzene, m.p. 79° (lit. 70°), similarly gives diethylphthalan, b.p. 100°/11 mm., whilst (I) affords diphenylphthalan, m.p. 93° (Maquenne block) [also obtained from (I) and PBr_3 in $CHCl_3$ at 0°]. $C_6H_4(CHEt \cdot OH)$, and PBr_3 (slight excess) in $CHCl_3$ at 0° give 0-, m.p. 46°, m-, decomp. on attempted distillation, and p-, m.p. 70°, -di-a-bromopropylbenzenes, which when distilled with quinoline afford o- (II), b.p. 108.5-109° 9 mm., m.p. -26° (tetrabromide, m.p. 85°), and m- (III), b.p. 117-120°/14 mm. (tetrabromide, m.p. 98-99°), -dipropenylbenzenes and p-dipropenylbenzene (IV), m.p. 63° [tetrabromide, m.p. 187° (lit. 168-169°)], respectively. These hydrocarbons absorb O2 from the air at room temp. (II) is thus oxidised to (probably) o. propenylbenzaldehyde, b.p. 90-92°/2.5 mm. (semicarbazone, m.p. 205°), and resinous material; (III) and (IV) give aldehydes, b.p. 95°/3 mm. (semicarbazone, m.p. 226°), and b.p. 97°/3 mm. (semicarbazone, decomp. 280°), respectively. Distillation of o-di-abromoethylbenzene at 5 mm. gives o-divinylbenzene and o-a-bromoethylvinylbenzene, b.p. 87.5°/3 mm., 115°/10 mm. The dibromide of m-a-bromoethylvinylbenzene has m.p. 39°. H. B.

Dissociable organic oxides. Two reducible, but not dissociable, stages of oxidation of bis-1: 1'-p-tolyl-3: 3'-diphenylrubene : bisepoxytetrahydro- and dihydroxydihydro-derivatives.

[picrate, m.p. 101-102° (decomp.) (block); styphnate, m.p. 96—97° (decomp.) (block); polymeride, m.p. about 85°]. 2-C₁₀H₇Br (modified prep. from β -C₁₀H₇OH and PBr₃ at 170°), m.p. 59°, b.p. 146—147°, gives with difficulty a Grignard reagent, which with (CH₂)₂O affords β-naphthylethyl alcohol, b.p. 178–188°/ 15 mm., m.p. 67.5-68°, dehydrated by KOH to 2-vinylnaphthalene, b.p. 135-137°/17-18 mm., m.p. 66° (dibromide, m.p. 84.5-85°). 2.C10H7.CH2Br (modified prep.), m.p. 56°, b.p. 168-172°/17 mm., readily gives a Grignard reagent, which with CH,O forms probably 1-methyl-2-hydroxymethylnaphthalene, b.p. 170—195°/17 mm., dehydrated by KOH to a mixture. Reduction of Et β -naphthylacetate by Na and BuOH gives partly reduced β -(β -naphthyl)ethyl alcohol, b.p. 175–177°/13–14 mm., dehydrated by KOH to a substance, b.p. 130°/17-18 mm. Reduction of β-C₁₀H₇·COMe by Na-Hg and dry EtOH gives an alcohol which is partly dehydrated by distillation with NaHSO4 in vac. CH, Ph·CH, Br with Br and Fe gives much p- and a little o-C₆H₄Br·CH₂·CH₂Br, b.p. 137—143°/15 mm., converted by KOAc in AcOH into mixed β-bromophenylethyl acetates, b.p. 148-149°/15 mm., which with KOH-EtOH give a mixture of the corresponding alcohols, b.p. $144.5 - 145^{\circ}/15 \text{ mm.}$ (oxidised to p- and o-C₆H₄Br·CO₂H). Mixtures of the same alcohols and bromides are slowly obtained from cold (I), Br, and Fe. The alcohols, alone or mixed with the bromides, with molten KOH give a mixture of much p- (dibromide, m.p. 59.5°) and some o-bromostyrene, b.p. 88-90°/15 mm. (I) with Cl₂ and I gives a mixture of p- and $o-\beta$ -chlorophenylethyl alcohols, b.p. 131— 132°/11 mm., dehydrated by KOH to chlorostyrene, b.p. 71.5-72.5°/15 mm. (dibromide, m.p. 53-54°). y-Phenylpropyl alcohol or bromide with Br and Fe gives y-bromophenylpropyl bromide, b.p. 161-163°/17 mm., acetate, b.p. 168-170°/17 mm., and alcohol, b.p. 157-158°/14 mm.; the last mentioned substance with KOH gives a saturated, liquid mixture containing Br. CH₂Ph·CH₂·SH (obtained from CH₂Ph·CH₂Br and KHS), b.p. 96—98°/15 mm., with KOH at 200—230° gives 53% of (II). CHPhMeBr similarly gives CHPhMe·SH, b.p. 83—84°/14 mm., which with KOH gives a little (II) and much BzOH. CH₂Ph·CH₂·CH₂·SH b.p. 121-122°/23 mm., similarly prepared, and KOH give much propenyl- and a little allyl-benzene, and some disulphide, b.p. 235°/21 mm. R. S. C.

Raman effect, molecular refraction, and constitution. Supposed 1-benzylcyclohexene. C. Prevost, P. DONZELOT, and E. BALLA (Compt. rend., 1934, 198, 1041—1043).—Dehydration of phenylethylcarbinol by KHSO₄ gives only propenylbenzene, but phenylisopropylcarbinol gives 95% of $\beta\beta$ -dimethylstyrene, m.p. -51° , and 5% of β -methylallylbenzene. cycloHexylphenylcarbinol gives benzylidenecyclohexane, b.p. 116°/9 mm., m.p. -36° , oxidised to BzOH (cf. A., 1915, i, 789), the exaltations of $[R_L]$ and Raman spectra of this and similar compounds supporting this structure. R. S. C.

Stycerols. C. PRÉVOST and LOSSON (Compt. rend., 1934, 198, 659—661; cf. A., 1933, 711).—Cinnamyl benzoate and $AgI(OBz)_2$ (I) affords α -styceryl tribenzoate (II), m.p. 152°, and a product, m.p. about 108°, now shown to be a mixture of (II) and its β - L. ENDERLIN (Compt. rend., 1934, 198, 945—947).— The dissociable oxide, $C_{44}H_{32}O_2$, of bis-3: 3'-diphenyl-1: 1'-p-tolylrubene (I) with MgI₂ in Et₂O at 0° gives a mixture of much bis-3: 3'-diphenyl-1: 1'-di-p-tolyl-3: 3'-bisepoxy-1: 3: 1': 3'-tetrahydrorubene (II), m.p. 210° (block), and some 1: 3'-dihydrorubene (III), m.p.



(+solvent, from Et_2O , C_6H_6 , or CS_2) about 200° (decomp.) (block) and (anhyd., from ligroin) 280° (block). (II) is stable to hot AcOH, is not dissociable by heat, but with Fe and hot AcOH affords (I). (III) loses 2H,0 in boiling AcOH to give the

fluorescent naphthenic hydrocarbon, $C_{44}H_{30}$, loses H_2O at 275°/vac. to give the monoxide, $C_{44}H_{32}O$, is not dissociable, and with Fe and hot AcOH gives (I). Only one form of (III) is known. Analogy with tetraphenylrubene is thus complete. R. S. C.

Synthesis of adrenaline. B. CIOCCA (Boll. Chim. Farm., 1934, 73, 241–245).—The reduction of adrenalone can be carried out very simply in 95% EtOH suspension by 1.25% Na amalgam in a slow stream of H₂. R. N. C.

Electrolysis of benzoic and of 2:6-dimethyl-4tert.-butyl benzoic acid and their salts in absolute methyl alcohol. F. FICHTER and R. E. MEYER (Helv. Chim. Acta, 1934, 17, 535-543).-Electro-lysis of a mixture of 2:6-dimethyl-4-tert.-butylbenzoic acid (I) [anhydride, m.p. 140-141° (cryst. data by SPAENHAUER); chloride, m.p. 62°; Me ester, b.p. 135°/9 mm., m.p. 39°] and its Na salt in MeOH gives CO_2 (<20% of that required for a Kolbe synthesis), CO and O₂, and, after hydrolysis, 5-tert.-butylm-xylene (40%; 12%), a reduction product, $C_{26}H_{40}O_6$, b.p. $125-140^\circ/15$ mm. (only formed in the absence of a diaphragm), 6-methyl-4-tert.-butylphthalic acid (11%; 21.2%) (imide, m.p. 180.5-181°), and amorphous products (17%; 46.6%), the vals. in parentheses representing the proportions obtained using 0.5 and 0.3 amp. per sq. cm., respectively. BzOH similarly affords a little C_6H_6 and a large amount of amorphous substances. Mechanism is briefly discussed.

J. W. B.

2:4:6-Trinitrobenzoic acid. S. SECAREANU (Bull. Soc. chim., 1933, [iv], **53**, 1395—1399).— $C_6H_2(NO_2)_3$ ·CO₂H (I) with hot conc., aq. NH₃ gives CO₂, $C_6H_3(NO_2)_3$, and an NH₄ salt of (I). This reaction, and the similar reactivity of 2:4:6-trinitrobenzaldehyde (A., 1932, 851), are explained on the theory of alternate polarities. R. S. C.

General reaction for preparation of keto-acids, unsaturated acids, and disubstituted lactones. G. KOMPPA and W. ROHRMANN (Annalen, 1934, 509, 259—268).—Hexahydroisophthalic anhydride (1 mol.) and MgMeI (I) (2 mols.) in Et₂O-C₆H₆ give az-dimethylhexahydroisophthalide, b.p. 143—146°/18 mm., 3-isopropylidenecyclohexane-1-carboxylic acid, b.p.

157-161°/15 mm. (Ag salt; Et ester, b.p. 109-111° 8 mm.), and 3-acetylcyclohexane-1-carboxylic acid (II) b.p. 179—180°/7 mm., 196—198°/15 mm. [Ag salt; semicarbazone, m.p. 190° (decomp.); oxime, m.p. 133°; Et ester, b.p. 134—136°/7 mm. (semicarbazone, m.p. 170°)]. (II), obtained in >50% yield when 1 mol. of (I) is used, is oxidised (alkaline NaOBr) to hexahydroisophthalic acid. Glutaric anhydride (1 mol.) and (I) (1 mol.) afford γ -acetylbutyric acid; with 2 mols. of (I), 8-methyl-8-hexolactone, b.p. 113-115°/13 mm., 220-222°/760 mm., and S-methyl-Ay-hexenoic acid are formed. Dimethylglutaric anhydride and MgEtBr (>1 mol.) give δ -keto- $\beta\beta$ -dimethylheptoic acid, b.p. 142°/8 mm. [Ag salt; semicarbazone, m.p. 140° (decomp.)], and ββ-dimethyl-δ-ethyl-δ-heptolacione, b.p. 117.5—119°/17 mm. When Ba δ -hydroxy- $\beta\beta$ -dimethyl-8-ethylheptoate $(+2H_2O)$ (corresponding Ag salt) is dried at 115° in a vac., Ba $\beta\beta$ -dimethyl- δ -ethyl- Δ^{γ} -heptenoate is formed. MgPhBr (>1 mol.) and (·CH₂·CO)₂O give β-benzoylpropionic acid and (·CH2·CPh2·OH)2; unsaturated acid and lactone are not produced. H. B.

Complex metal salicylates. G. SPACU and M. KURAŠ (J. pr. chem., 1934, [ii], 139, 322–328).— The following salts are prepared (Sal= $\cdot O \cdot C_6 H_4 \cdot CO_2 \cdot)$: [Cu en₂][CuSal₂];

Organic vanadyl compounds. P. BRAUMAN (Compt. rend., 1934, **198**, 1237—1239).—o-OEt·VO·C₆H₄·CO₂Me (I) and an excess of freshly distilled Me salicylate (II), when boiled at 200—210° for 10 min. in N₂, give Me_2 vanadylsalicylate, VO(O·C₆H₄·CO₂Me)₂ (III). (III) is slowly hydrolysed by H₂O, decomposed by COMe₂, and with EtOH gives (I). (I), when boiled with PhOH at 190° in N₂ for 5 min., gives Me phenoxyvanadylsalicylate, OPh·VO·C₆H₄·CO₂Me, with NH₄ salicylate in EtOH at 98° gives (NH₄)₂ vanadylsalicylate, +2H₂O,EtOH (which in air slowly gives the trihydrate), with warm (II) or Bu^βOH and o-OH·C₆H₄·CO₂H gives vanadyl salicylate, (o-OH·C₆H₄·CO₂NH₄)₂], and with BzOH affords similarly vanadyl benzoate. R. S. C.

Synthetic studies on the relationship between chemical constitution and bactericidal activity. XII. 3-Nitro- and 3-amino-4-hydroxy- and -alkyloxy-benzoic esters. T. SABALITSOHKA and K. H. TIEDGE (Arch. Pharm., 1934, 272, 383—394). By direct esterification of the NO₂-acid, or nitration of the *p*-alkoxy-ester are obtained Pr^a, Bu^a, b.p. 174— 176°/8 mm., isoamyl, b.p. 177—179°/2 mm., m.p. 59°, and CH.Ph, m.p. 82°, 3-nitro-4-hydroxybenzoate; Me, Et, Pr^a, b.p. 213—215°/16 mm., m.p. 63°, allyl, b.p. 207°/11 mm., m.p. 50°, and n-hexyl, b.p. 224— 226°/11 mm., 3-nitro-p-anisate : Me 3-nitro-4-propoxybenzoate, b.p. 144—146°/11 mm., and Me 3-nitro-4-benzyloxybenzoate, m.p. 107—108°. By reduction of the NO₂-ester or coupling with diazotised p-NH₂·C₆H₄·SO₃H and fission of the azo-compound are obtained Pr^a , m.p. 105°, Bu^a , b.p. 230°/16 mm., m.p. 83°, isoamyl, b.p. 224—226°/3 mm., m.p. 94°, and CH_2Ph , m.p. 94°, 3-amino-4-hydroxybenzoate; Me 3-amino-p-anisate, b.p. 183°/15 mm., m.p. 84°; Me 3-amino-p-ethoxy-, b.p. 202—204°/21 mm., m.p. 104°, and Me 3-benzylideneamino-p-hydroxy-, m.p. 92°, -benzoate. In all cases the anti-bacterial action (against sugar fermentation by yeast) of the NO₂derivatives is >, and that of the NH₂-compounds <, that of the parent p-hydroxybenzoic acid or ester.

J. W. B.

Anhydrous acetylbenzilic acid. V. K. LA MER and J. GREENSPAN (J. Amer. Chem. Soc., 1934, 56, 956).—The acetylbenzilic acid of Herzig and Schleiffer (A., 1921, i, 244; cf. Klinger and Standke, A., 1889, 885) contains approx. 1 mol. of H_2O ; the anhyd. acid has m.p. $104.5-104.8^{\circ}$ (corr.). H. B.

Interaction of o-benzoylbenzoyl chloride with phenols. I. Aryl esters and α -aryloxy- α phenylphthalides. II. Diarylphthalides. F. F. BLICKE and R. D. SWISHER (J. Amer. Chem. Soc., 1934, 56, 902-904, 923-925).-I. o-C₆H₄Bz·COCl (I) (from the acid or by chlorination of phenylphthalide) reacts with (a) KOAr usually in C_6H_6 , (b) ArOH in C_5H_5N , and (occasionally) (cf. below) (c) ArOH in C₆H₆, to give varying amounts of hydroxydiarylphthalide and (probably) $o-C_6H_4Bz \cdot CO_2Ar$ and α -aryl $oxy-\alpha$ -arylphthalide. Thus, (I) and PhOH afford [methods (a) and (b)] two isomeric compounds, $C_{20}H_{14}O_3$, m.p. 80–82° and 162–163°, which are hydrolysed (EtOH-NaOH) to o-C6H4Bz·CO2H and PhOH, and are converted by conc. H₂SO₄ or AlCl₃ (in $C_2H_2Cl_4$) into 4'-hydroxy- $\alpha\alpha$ -diphenylphthalide. p- $C_{6}H_{4}Br OH$ yields (b) a compound, $C_{20}H_{13}O_{3}Br$, m.p. 92–94°, and (c) an isomeride, m.p. $170-172^{\circ}$. PhSH furnishes (a) a compound, $C_{20}H_{14}O_2S$, m.p. $112-12^{\circ}$. 113°, and (c) an isomeride, m.p. 117-118°. 0-Hydroxydiphenyl gives (a) a compound, $C_{26}H_{18}O_3$, m.p. 103-105°, and (c) an isomeride, m.p. 195-197° [both obtained in (b)]. p-Hydroxydiphenyl affords (a) (b) two compounds, $C_{26}H_{18}O_3$, m.p. 163–165° and 117-119° [also formed in (c)]. β-C₁₀H₇ OH yields (a) a compound, C₂₄H₁₆O₃, m.p. 103-105°, also obtained (b) with an isomeride, m.p. 198-199°, whilst $a \cdot C_{10}H_7 \cdot OH$ furnishes (a) (b) a compound, $C_{24}H_{16}O_3$, m.p. 102-104°. All these compounds are hydrolysed to o-C₆H₄Bz·CO₂H and ArOH.

II. aa-Diarylphthalides are obtained from (I) (and its 4'-OH and 4'-OMe derivatives) and ArOH or ArOMe in C_6H_6 at room temp.; the following are thus prepared : 4'-hydroxydiphenyl-, m.p. 168—170°, 4'methoxydiphenyl- (II), m.p. 110—115° (lit. 86°), a-phenyl-a-o-methoxydiphenylyl-, m.p. 152—154° (from o- C_6H_4 Ph·OMe), a-phenyl-a-p-methoxydiphenylyl-, m.p. 179—180° (from p- C_6H_4 Ph·OH), a-phenyl-a-1-hydroxynaphthyl-, m.p. 231—233° (from a- $C_{10}H_7$ ·OH) (Me ether, m.p. 206—207°, also prepared from a- $C_{10}H_7$ ·OMe), a-phenyl-a-2-hydroxynaphthyl-, m.p. 234—236° (from β - $C_{10}H_7$ ·OH) (Me ether, m.p. 210— 212°, also obtained from β - $C_{10}H_7$ ·OMe), 4': 4''-di-

hydroxydiphenyl-, m.p. 253-256°, 4'-hydroxy-4''methoxydiphenyl-, m.p. 139-142°, and 4': 4"-dimethoxydiphenyl-, m.p. 97-99° (lit. 101-102°), -phthalides. The following are obtained only in presence of AlCl₃ (1 equiv.) and C₂H₂Cl₄: 4'[?5']bromo-2'-hydroxydiphenyl- (III), m.p. 210-211° (from p-C₆H₄Br·OH), 3': 5'-dibromo-4'-hydroxydiphenyl-, m.p. 199-200° (lit. 196-199°), a-phenyl-a-o-hydroxydiphenylyl-, m.p. 178-180° (from o-C_eH₁Ph·OH), and a-phenyl-a-p-hydroxydiphenylyl-, m.p. 220-222° (from p-C₆H₄Ph·OH), -phthalides. (II) is reduced (Zn dust, aq. EtOH-NaOH) to 4'-methoxytriphenylmethane-2carboxylic acid, m.p. 146-147°, demethylated (40%) HBr, AcOH) to the 4'-OH-acid. (III) is similarly reduced to 2'-hydroxytriphenylmethane-2-carboxylic acid, m.p. 194—196° (Me ether, m.p. 191—193°). o-Cyanodiphenylmethane [from o-benzylbenzoic acid and Pb(CNS)2 at 200°] and p-OMe C6H4 MgI give 2-pmethoxybenzoyldiphenylmethane, m.p. 68-70°, oxidised (dil. HNO₃) to 2-p-methoxybenzoylbenzophenone, m.p. 133-135° (diphenylhydrazone, m.p. 157-160°), which with N2H4 in AcOH affords 3-phenyl-6-anisyl-4:5-benzpyridazine, m.p. 157-159°. The colours of most of the above compounds with conc. H₂SO₄ are given. H. B.

Halogeno- and nitro-derivatives of α -naphthoyl-o-benzoic acid.—See B., 1934, 394.

Ring fission of cyclohexane derivatives. G. WITTIG and G. WALTNITZKI (Ber., 1934, 67, [B], 667— 675).—The action of LiPh on Et_2 cis- and transhexahydrophthalate, respectively, affords cis- (I), m.p. 204—206°, and trans- (II), m.p. 185—186·5°, -1:2di(hydroxydiphenylmethyl)cyclohexane. Attempts to convert (I) and (II) by CHCl₃-MeOH into the Me₂ ethers resulted in the production of the cis-, m.p. 199°, and trans-, m.p. 221—221·5°, -anhydrides,

 $CH_2 \cdot CH_2 \cdot CH \cdot CPh_2 > 0$. Even in the case of (II) intramol. loss of H₂O occurs very readily, and in boiling AcOH is more rapid than with (I). The possibility that a change of configuration occurs during the formation of (I) or (II) is excluded, since Me₂ trans-hexahydrophthalate, $[\alpha]_D + 28.7^{\circ}$ in COMe₂, gives (-)trans-1: 2-di(hydroxydiphenylmethyl)cyclohexane, m.p. 184—186°, $[\alpha]_{\rm D} = -188°$ in C_6H_6 , whence the anhydride, m.p. 259—260°, $[\alpha]_{\rm D} + 279°$ in C_6H_6 . Treatment of (I) or (II) with KCMe2Ph (but not with K, which displaces only 1 H) gives the K_{2} derivatives, which with MeI yield cis- (III), m.p. 170-172°, and trans- (IV), m.p. 173-175°, -1 : 2-di(methoxydiphenylmethyl)cyclohexane [the Me₁ ether of (III) has m.p. 165-167°]. Treatment of (III) and (IV) with Na-K in N₂ followed by MeOH leads to cis-, m.p. 174-175°, and trans- (V), m.p. 210-212°, -1 : 2-dibenzhydrylcyclohexane. Either K, compound under the influence of (.CMe2Br)2 passes into ααθθ-tetraphenyl-Δαη-octadiene (VI), m.p. 91-92°, identical with that obtained by the action of boiling AcOH containing a little HCl on aa00-tetraphenyloctane-a0-diol, m.p. 113-115°, derived from Et suberate and LiPh. (VI) is hydrogenated (PtO2-AcOH) to aa00-tetraphenyloctane (VII), m.p. 120-121.5°, and is converted by Li in dioxan or by K-Na into (VII) H. W. and (V).

Synthetic investigation in the series of anthelmintics. K. W. ROSENMUND and D. SCHAPIRO (Arch. Pharm., 1934, 272, 313-323).—From the appropriate phenol ether, (·CH₂·CO·)₂O, and AlCl₃ in PhNO₂ are obtained y-keto-y-p-methoxy-, m.p. 146°, -y-(4-methoxy-3-methyl)-, -y-(4-methoxy-2-methyl)-, m.p. 138°, -y-(2-methoxy-5-methyl)-, m.p. 115-117° and -y-(4-methoxy-2-methyl-5-isopropyl)-, m.p. 92°, -phenylbutyric acid, reduced by H2-Pd-BaSO4 in EtOH, respectively, to γ-p-methoxy- (I), m.p. 53-55°, y-4-methoxy-3-methyl- (II), m.p. 75°, y-4-methoxy-2methyl- (III), m.p. 55–57°, γ -2-methoxy-5-methyl-(IV), m.p. 52-55°, and γ -4-methoxy-2-methyl-5-iso-propyl- (V), m.p. 75°, -phenyl- γ -butyrolactone. By the method of Mayer et al. (A., 1924, i, 410) or Rosenmund et al. (A., 1928, 1010) are prepared o-hydroxy-, 2-hydroxy-5-methyl-, m.p. 67°, and 4-hydroxy-2-methyl-5-isopropyl-, m.p. 101° , -phenyl β -chloroethyl ketone, converted through the nitrile and hydrolysis, respectively, into γ -keto- γ -o-hydroxy-, m.p. 97°, - γ -2-hydroxy-5-methyl-, m.p. 136—137°, and - γ -4-hydroxy-2-methyl-5-isopropyl-, m.p. 117—120°, -phenylbutyric acid, reduced to the corresponding γ -o-hydroxy- (VI), m.p. 107—108°, γ -2-hydroxy-5-methyl- (VII), m.p. 110—112°, and γ -4-hydroxy-2-methyl-5-isopropyl-(VIII), m.p. 88—91°, -phenyl- γ -butyrolactone. The disinfectant action, on Ascaridæ, of (I), (II), and (VI) is much stronger than that of santonin, that of (VII) and (IV) much weaker, whereas (III), (V), and (VIII) are inactive. J. W. B.

Reactions of y-ketonic acids. II. Hydroxyderivatives. E. P. KOHLER and L. LEERS (J. Amer. Chem. Soc., 1934, 56, 981-982; cf. this vol., 523).-Anisyl styryl ketone and KCN in aq. EtOH-AcOH give β-anisoyl-α-phenylpropionitrile, m.p. 68°; the free acid, m.p. 141° (*Me* ester, m.p. 97°), is brominated to the β -Br-derivative (I), m.p. 158°, hydrolysed (boiling H_2O) to β -hydroxy- β -anisoyl- α -phenylpropionic acid (II), m.p. 159°. (I) and cold aq. NaOH (2 equivs.) or (II) and cold 1% NaOH give phenylacetylanisyl-carbinol (III), m.p. 119° [also obtained from CH₂Ph·MgCl and p-OMe·C₆H₄·CH(OH)·CN], converted by 2% NaOH at 100° (bath) into anisoylbenzylcarbinol (IV), m.p. 62° (oximes, m.p. 118° and 135°). (IV) is also obtained (together with an unidentified acid) from (I) or (II) and hot aq. NaOH. (III) and (IV) with NHPh·NH₂ give the osazone of anisyl benzyl diketone. p-Methoxyphenylacetylphenylcarbinol, m.p. 126°, is prepared from p-OMe·C₆H₄·CH₂·MgCl and OH·CHPh·CN. The above results establish the mechanism of conversion of B-OH-y-CO-acids into hydroxyketones previously proposed (loc. cit.).

H. B.

Synthesis of 5:6-dimethoxy- and methoxyhomophthalic acids. S. N. CHAKRAVARTI and M. SWAMINATHAN (J. Indian Chem. Soc., 1934, 11, 101— 105).—2-Oximino-4:5-dimethoxy- α -hydrindone (I), 40% CH₂O, and conc. HCl give 1:2-diketo-4:5-dimethoxyhydrindene (II), m.p. 150° (decomp.) [quinoxaline, m.p. 192°, from o-C₆H₄(NH₂)₂]. (I) and p-C₆H₄Me·SO₂Cl in 10% NaOH afford 2-carboxy-5:6dimethoxyphenylacetonitrile, m.p. 175°, hydrolysed (10% NaOH) to 5:6-dimethoxyhomophthalic acid, m.p. 196°, also obtained (in poorer yield) by oxidation

(dichromate, H₂SO₄) of (II). 2-Oximino-5-methoxy. a-hydrindone, m.p. 221° (decomp.) (from the ketone, isoamyl nitrite, and conc. HCl in MeOH), is similarly converted into 2-carboxy-5-methoxyphenylacetonitrile, m.p. 177°, and thence into 5-methoxyhomophthalic acid, m.p. 222°. 1:2-Diketo-5-methoxyhyarindene (quinoxaline, m.p. 140°) has m.p. 152°. The 2-oximino-derivative, m.p. 234° (decomp.), of 6-methoxyα-hydrindone (obtained in 20% yield from β-anisylpropionyl chloride and AlCl₃ in PhNO₂) (cf. Perkin and Robinson, J.C.S., 1907, 91, 1081) similarly affords 2-carboxy-4-methoxyphenylacetonitrile, m.p. 140°, and 4-methoxyhomophthalic acid, m.p. 188°. 1:2-Diketo-6-methoxyhydrindene (quinoxaline, m.p. 156°) has m.p. 126°. H. B.

5-Carboxyhomophthalic acid, 6-nitrophthalide, and 6-nitrophthalimidine. W. BORSCHKE, K. DIACONT, and H. HANAU (Ber., 1934, 67, [B], 675-686).-Homophthalic acid in conc. H₂SO₄ is converted by KNO3 in H2SO4 at 0° into 5-nitro- (I), m.p. 215°, reduced (Sn and HCl) to 5-amino- [hydrochloride (II)], whence (Ac₂O and NaOAc) 5-acetamido-, m.p. 208°, -homophthalic acid. (II) is transformed by diazotisation and treatment with KCN-NH3-CuSO4 into 5-cyano-, m.p. 190°, hydrolysed to 5-carboxy-, m.p. 220° (decomp.), -homophthalic acid $[Et_1, \text{ m.p. } 195-196^\circ, \text{ and } Me_3 (III), \text{ m.p. } 95^\circ, \text{ esters}].$ (I), McOH, and H₂SO₄ yield Me_2 5-nitro-, m.p. 99°, the set of the set reduced (colloidal Pd) to Me2 5-amino- (hydrochloride, m.p. 235°), whence Me 5-cyano-, m.p. 80-82°, -homophthalate, hydrolysed by MeOH-H₂SO₄ to (III). Phthalide is converted by KNO₃ in conc. H₂SO₄ mainly into 6- (IV), m.p. 145°, with a small proportion of 3-, m.p. 136°, -nitrophthalide. The position of NO₂ in (IV) follows from its transformation by the successive action of Br in CO₂ at 175° and boiling H₂O into 5-nitro-2-aldehydobenzoic acid, m.p. 162° (phenylhydrazone, m.p. 140°, which passes in boiling MeOH or AcOH into 7-nitro-2-phenylbenzpyridazone NO2·C6H3 CH:N m.p. 171°; 2:4-dinitrophenylhydrazone, m.p. 292°). (IV), PhCHO, and piperidine at 190-200° afford 6-nitro-3-benzylidenephthalide (V), m.p. 236-237° (corresponding 3-salicylidene, m.p. 210°; 3-p-anisylidene, m.p. 201.5°, 3-piperonylidene, m.p. 244°, and 3'-p'-dimethylaminobenzylidene, m.p. 270°, derivatives). Reduction of (V) (colloidal Pd-H₂O) leads to 6-amino-3-benzylidene-, m.p. 206.5° (Ac derivative, m.p. 258-259°), and thence to 6-amino-3-benzyl-, m.p. 145° (Ac derivative, m.p. 165°), -phthalide. Similarly, (IV) yields 6-amino-phthalide (VI), m.p. 177-178° (Bz derivative, m.p. 225°), transformed by hot dil. HCl into a substance, m.p. >300°. 6-Cyanophthalide, m.p. 188°, is obtained from (VI).

Phthalimide is transformed by spongy Sn, H_2O , and HCl and subsequently with NaNO₂ into 2-nitrosophthalimidine (VII), m.p. 157—159°, readily converted (H₂-colloidal Pd-MeOH) into phthalimidine. Nitration of (VII) affords 6-nitro-2-nitrosophthalimidine (VIII), m.p. 167° when rapidly heated, accompanied by small amounts of (?) Me 5-nitro-2-methoxymethylbenzoate, m.p. 102°. Boiling AcOH transforms (VIII) into 6-nitrophthalimidine (IX), m.p. 253° (decomp.), which could not be obtained from (IV) and $N\dot{H}_3$ or $CO(NH_2)_2$. 6-Nitro-2-acetylphthal-imidine has m.p. 157°. 6-Nitro-3-benzylidene-, m.p. 285° (decomp.), -3-anisylidene-, m.p. 254°, and -3-piperonylidene-, m.p. 299°, -phthalimidine are described. 6. Aminophthalimidine, m.p. 247° (decomp.) (Bz derivative, m.p. 285°), is obtained by reduction (colloidal Pd) of (IX). 2-Methyl- is nitrated to 6-nitro-2methyl-phthalimidine, m.p. 150° (3-benzylidene derivative, m.p. 158°), reduced (Pd-C) to 6-amino-2methylphthalimidine, m.p. 209° (Ac derivative, m.p. 246°), whereas 2-phenyl- yields solely 2-p-nitrophenylphthalimidine, m.p. 233° (decomp.).

o-CN·C₆H₄·CH₂Br and p-NO₂·C₆H₄·NH₂ at 140-180° yield 4-nitro-2'-cyanobenzylaniline, m.p. 219°, which could not be transformed into 6-nitro-2-phenylphthalimidine. 4-Nitro-2-cyanobenzyl bromide, m.p. 130°, is hydrolysed to (IV), and with NH₂Ph gives 4'-nitro-2'-cyanobenzylaniline hydrobromide, decomp. 181° after becoming discoloured at 150° and softening at 172°. o-CN·C₆H₄·CH₂Br and p-C₆H₄Me·NH₂ yield 2-p-tolylphthalimidine, m.p. 141°, also obtained from 2-p-tolylphthalimide, spongy Zn, and conc. HCl in MeOH. 2-Nitro-p-tolylphthalimidine has m.p. 204°. H. W.

Bile acids. XLII. M. SCHENCK (Z. physiol. Chem., 1934, 223, 259-266; cf. this vol., 189).-



gives bilianic acid dioxime (NO₂ \longrightarrow NOH), and the nitroketohydroxamic acid (II), C21H34O9N2 (A., 1929,

CO

NH C

¢Η₂

ČH,

H₂C Me CH

CH

(VI.)

HO.C

HO.C

558), yields a nitro-oximinohydroxamic acid (III), C₂₄H₃₅O₉N₃, decomp. 263°. From (III), hot 20% HCl or cold HNO₃ re- $C_{\rm C}$ generates (II); hot conc. H₂SO₄ yields the isomeric nitrolactamhydroxamic acid (IV), decomp. C.NO 268°. With Zn dust and AcOH, (IV) affords an oximinolactamhydroxamic acid (V), C₂₄H₃₇O₈N₃, decomp. from 206°. With HNO₃,

(V) gives the blue NO-compound (VI), $C_{24}H_{34}O_8N_2$, decomp. 231° (cf. A., 1928, 764). J. H. B.

Constitution of the bile acids. H. WIELAND (Ber., 1934, 67, [A], 27-39).-A lecture. H. W.

Follicular hormone.—See this vol., 567.

Mixed halogen derivatives of toluene and benzaldehyde. F. ASINGER (J. pr. Chem., 1934, [ii], 139, 296–308). $-3:5-C_6H_3MeCl_2$ with Br and a little Fe gives 3: 5-dichloro-2-bromotoluene (I), m.p. 33.5°, also obtained in 70% yield from 3:5-dichloro-otoluidine by a diazo-reaction. 3:5-Dichloro-2aminobenzaldehyde gives (diazo-reaction) a 71% yield of 3: 5-dichloro-2-bromobenzaldehyde (II), m.p. 82° (oxime, m.p. 139-140°; phenylhydrazone, m.p. 159°). (I) and Br at 180-200° give 3 : 5-dichloro-2bromobenzylidene bromide, m.p. 38°, b.p. 190°/16 mm., hydrolysed by conc. H_2SO_4 at 70-80 to (II). (II) gives with KMnO₄ 3: 5-dichloro-2-bromobenzoic acid, m.p. 178° (also obtained from dichloroanthranilic acid), and with HNO3 (d 1.48) at 0° affords 3:5-dichloro-2-bromo-6-nitrobenzaldehyde, m.p. 151° [oxime, m.p. 154°; phenylhydrazone, m.p. 175-176° (de-comp.)], which with NaOH and COMe₂ gives 5:7:5':7'-tetrachloro-4:4'-dibromoindigotin, cryst. p-Acetotoluidide with Cl₂ in AcOH-Ac₂O gives the p-Accelotonialate with O_2 in $H_2O_1 + O_2$ in H_2O_4 to 3:5-dichloro-p-toluidine, b.p. $126-128^{\circ}/16$ mm., which gives (diazo-reaction) 3:5-dichloro-4-bromotoluene(III), m.p. $35-36^{\circ}$, b.p. $265^{\circ}/763$ mm., also obtained as a by-product with (I). (III) leads by similar reactions to 3:5-dichloro-4-bromo-benzaldehyde, m.p. 84° (oxime, m.p. 147°; phenylhydrazone, m.p. 150°), and -benzoic acid, m.p. 220° [NO₂-derivative (IV), m.p. 217°], 3:5-dichloro-5-bromo-2-nitrobenzaldehyde, m.p. 144° [oxime, m.p. 160; phenylhydrazone, di-morphic, m.p. about 213° (decomp.)] [oxidised to (IV)], and 5:7:5':7'-tetrachloro-6:6'-dibromoindigotin, cryst. 3: 5-C₆H₃MeBr₂ affords by Br and hydrolysis $3: 5-C_6H_3Br_2$ CHO (85% yield), m.p. 90°, and a little of the corresponding acid, m.p. 215°.

R. S. C.

Oxidation of organic compounds as a means of investigating their constitution. C. SANDONNINI and G. GIACOMELLO (Atti R. Accad. Lincei, 1934, [vi], 19, 43-49).-The valency of C towards O is discussed in relation to the different forms in which aldehydes may exist (cf. Fry and Payne, A., 1931, 819). The action of $1H_2O_2$ on 2PhCHO in Ét₂O at 5° gives the *compound*, (PhCHO)₂, H_2O_2 (I), m.p. 59—60°, stable at room temp. With $1H_2O_2$ and 1PhCHO, an unstable *compound*, decomposing into (I), PhCHO, and H₂O₂, is formed. Both these are regarded as additive compounds, and not as true peroxides of the aldehyde. In presence of H₂O containing either H₂SO₄ or NaOH or kept neutral, the reaction gives BzOH, PhOH, and HCO₂H. The H₂O₂ evidently acts by perhydrolysis. T. H. P.

Manufacture of aldehydes of the benzanthrone series.—See B., 1934, 356.

Reactions of maple and spruce lignins. E. E. HARRIS, E. C. SHERRARD, and R. L. MITCHELL (J. Amer. Chem. Soc., 1934, 56, 889-893).-Lignin (I) isolated in good yield by the cold H2SO4 method (B., 1932, 542), is free from carbohydrate (II) and contains all the OMe not accounted for in the (II) of

the wood. Hagglund and Urban's method (A., 1929, 856) gives a (I) which contains cellulose (III) and has a low OMe content, whilst the cuprammonium method affords a (I) (in low yield) also containing (III). Spruce-lignin (IV) (H_2SO_4 method) contains 17.3% OMe (i.e., 50Me in unit of 890), is methylated (Me₂SO₄, 1% NaOH) to a methyl-lignin (OMe 20.9%; 6OMe in unit of 900), and thence in 5 and 15% NaOH to dimethyl-lignin (OMe 24.1%) and a fully methylated lignin (OMe 32.2%; 100Me in unit), respectively. Acetylation occurs slowly and gives an acetyl-lignin (OMe 14·1%, Ac 19·5%; 5OMe, 5Ac). (IV) and Br in CCl₄ afford bromolignin (OMe 9·5%, Br 24·3%; 30Me, 3Br); Br-H₂O yields a bromolignin (OMe $6\cdot4\%$, Br $20\cdot6\%$). (IV) and Cl₂ in CCl₄ give chloro-lignin (V) (OMe $6\cdot1\%$, Cl $27\cdot5\%$; 20Me, 8Cl in unit of 1030), converted by 5% NaOH into CHCl₃ and a product (OMe 6.6%, Cl 15.8%; 2OMe, 4Cl). The yield of (V) indicates that addition of Cl is the main reaction; loss of OMe may occur thus: $\cdot C:C \cdot OMe \longrightarrow$ \cdot ČCl \cdot ČCl \cdot OMe \longrightarrow \cdot ČCl \cdot CO \cdot . Maple-lignin (VI) contains 20.7% OMc (120Me in unit of 1800) and is methylated easily in 1% NaOH to the fully methyl-ated product (OMe 32%; 200Me in unit of 1920), which with Cl₂ in CCl₄ gives a chloromethyl-lignin (OMe 14.7%, Cl 25%; 80Me and 12Cl in unit). (VI) and Cl_2 in CCl_4 afford a chlorolignin (VII) (OMe 8.7%, Cl 19.8%; 4OMe and 8Cl in unit of 1440), converted by 5% NaOH into CHCl₂, HCl, CO₂, and a product (OMe 10.5%, Cl 11.9%; 40Me and 4Cl in unit of 1200), and by moist air into HCl and a product (OMe 8.8%, Cl 17.5%; 4OMe and 7Cl in unit of 1400). Acetylation of (VI) gives an acetyl-lignin (OMe 17.4%) Ac to show the set of Chlorination and bromination cause loss of OH groups since the resulting products do not methylate or acetylate. The OH groups appear to be present as phenolic, enolic, and (at least one) as .CHMe.OH since (V) and (VII) afford CHCl₃ when treated with alkali; CHCl₃ is not formed when the lignins are methylated and then acted on by Cl₂ and alkali]. Evidence is given to show that lignin is combined (through OH groups) with carbohydrate in the wood. H. B.

Mechanism of the formation of alkylcyclohexanones by the action of organomagnesium derivatives on α -chlorocyclohexanones. Indirect replacement of halogen by alkyl. M. TIFFENEAU and (MLLE.) B. TCHOUBAR (Compt. rend., 1934, 198, 941—943).—Grignard reagents react with chloroketones at room temp. at the CO group. The OMgHal derivatives of the carbinols thus formed rearrange by migration and loss of Mg halide when warmed. Chlorocyclohexanones thus yield as final products the 2-alkylcyclohexanones and acylcyclopentanes. 2-Chlorocyclohexanone and MgMeI at room temp. give 2-chloro-1-methylcyclohexanol, b.p. 75—76°/14 mm., which with MgEtBr (1 mol.) in hot Et₂O gives C₂H₄, 2-methylcyclohexanone (semicarbazone, m.p. 198°), and acetylcyclopentane (semicarbazone, m.p. 145°). MgEtBr affords similarly 2-chloro. 1-ethylcyclohexanol, b.p. 89·5—91°/14 mm., 1-ethyl. cyclohexanone (semicarbazone, m.p. 161—163°), and propionylcyclopentane (semicarbazone, m.p. 134— 135°). 2-Chloro-5-methylcyclohexanone and MgMeI give 2-chloro-1:5-dimethylcyclohexanol, b.p. 87— 89°/14—15 mm., and thence 2:5-dimethylcyclohexanone and 1-acetyl-3-methylcyclopentane [semicarbazones, m.p. 160° and 132° (lit. 155° and 122°), respectively]. R. S. C.

Molecular rearrangements in the dimethylcyclohexane series, with and without ringdiminution, by removal of halogen from chlorohydrins and isomerisation of epoxides. TIFFE. NEAU, E. DITZ, and (MLLE.) B. TSCHOUBAR (Compt. rend., 1934, 198, 1039-1041).-2-Chloro-4-methylcyclohexanone and MgMeI give 2-chloro-1: 4-dimethylcyclohexanol, b.p. 92-94°/16-17 mm., which with MgEtBr gives C_2H_6 and an OMgI derivative, which is converted at 100⁶ into a mixture of 3-acetyl-1methylcyclopentane (semicarbazone, m.p. 132°) and 2:4-dimethylcyclohexanone. 1:4-Dimethylcyclohexene and I-HgO give the iodohydrin and 1:2. epoxy-1: 4-dimethylcyclohexane, b.p. 155°, which with kaolin at 220-230° gives 2 : 5-dimethylcyclohexanone and 1: 3-dimethylcyclopentane-1-aldehyde (semicarb-azone, m.p. 111°). The difference in the mechanism of the two reactions given in the title is thus proved. R. S. C.

Mutual influence of chromophoric groups. H. LEY and H. WINGCHEN (Ber., 1934, 67, [B], 501– 519).—Measurements of the absorption spectra of $CH_2Ph\cdot COMe$, $CO(CH_2Ph)_2$, COPhMe, $CH_2Ph\cdot COPh$, and $COPh_2$, $CHMe:N\cdot OH$, $CMe_2:N\cdot OH$, and their Na salts, mesityl oxide and its β -oxime, and Na fulminate are recorded and discussed. The following acids and their Na salts have been examined: α -erotonic, maleic and fumaric, o- and tere-phthalic, further $CH_2Ph\cdot CO_2H$, $CH_2Ph\cdot CH_2\cdot CO_2H$, and $CH_2Ph\cdot CH_2+CO_2H$ (as Na salt) Observations have

 $CH_2Ph\cdot[CH_2]_2\cdot CO_2H$ (as Na salt). Observations have been made on MeOH, NaOMe, and NH₂OH,HCl. Attention is directed to the marked photolytic action of light of very short wave-length. H. W.

Metal ketyls of the aliphatic-aromatic series. I. N. NAZAROV (Compt. rend. Acad. Sci. U.R.S.S., 1934, 1, 325—331).—Interaction of COPhR (R=Me, Et, Pr^s, Pr^{β}) with Na affords a red colour which disappears after a few days to give a ppt. of a pinacol. ω -Diethyl--trimethyl-, -dimethylethyl-, -methyldiethyl- and -triethyl-acetophenone afford stable cryst. ketyls under similar conditions, which indicates that branched aliphatic chains favour their formation. J. L. D.

Diphenylketazine oxide. K. VON AUWERS and H. WUNDERLING (Ber., 1934, 67, [B], 497-501).—The yellow compound (I) obtained by oxidation of CPh_2 :N·OH by $K_4Fe(CN)_6$ (A., 1933, 505; Hunter et al., this vol., 191) is identified as diphenylketazine oxide, CPh_2 :N(:O)·N: CPh_2 . (I) is converted by $SnCl_2$ and HCl at 70° mainly into $COPh_2$ and by Zn dust and AcOH into (·N: CPh_2)₂ (II). With well-cooled PCl_5 (I) affords $COPh_2$ and (· CPh_2Cl_2). A saturated solution of HCl in boiling AcOH converts (I) into $COPh_2$ and benzhydryl ether, m.p. 109-110°. (I) is transformed by NH_2OH in AcOH- H_2O into CPh_2 :N·OH in small yield, but appears unaffected by NHPh·NH₂, whereas it gives benzophenone-*p*-nitrophenylhydrazone with p-NO₂·C₆H₄·NH·NH₂. With the appropriate reagent (II) affords the oxime, phenylhydrazone, and *p*-nitrophenylhydrazone of COPh₂. (I) and cold conc. H₂SO₄ yield COPh₂ with evolution of gas; under similar conditions, no reaction appears to occur with (II), but COPh₂ is produced. (I) is mainly unchanged by boiling dil. H₂SO₄, but yields a little COPh₂, whereas (II) is scarcely affected. (I) and boiling HCO₂H afford COPh₂ mixed with a little oil, whereas no change is caused by AcOH at 100°. (II) and boiling HCO₂H give COPh₂ quantitatively, whilst little ketone results from the action of AcOH. With NaOH in H₂O-MeOH or H₂O-EtOH (I) yields COPh₂ and a small amount of liquid, b.p. 147—150°/11 nnm.; (II) is scarcely attacked. H. W.

Abnormal reaction of potassium cyanide and an α -chloroketone. G. RICHARD (Compt. rend., 1934, 198, 943—945).—Ph α -chlorobenzyl ketone and KCN give α -cyano- $\alpha\beta$ -diphenylethylene oxide, m.p. 77— 78°, which is stable to hot 5% H₂SO₄ and insol. in alkali. With NH₂OH it gives a compound, C₁₅H₁₂ON₂, m.p. 161—162°, whence it is not regenerated by hydrolysis, and with hot NH₂Ph (1 mol.) it gives α -cyano- β -anilino- $\alpha\beta$ -diphenylethyl alcohol (not isolated), which loses HCN to give anilinobenzoin, m.p. 97—97-5°. R. S. C.

α-Chloroketones. G. RICHARD (Compt. rend., 1934, 198, 1242—1244).—CHPhBzCl (I) and MgPhBr (2 mols.) give $\alpha\alpha\beta\beta$ -tetraphenylethyl alcohol. CHPhAcCl and MgPhBr give CHPh₂·COMe. (I) and PhONa give *phenyl* α-*phenoxybenzyl ketone*, m.p. 85·5°, which distils unchanged in vac., but, when distilled at atm. pressure, gives 1:1:3:3-tetraphenyl*cyclobut*anedione, m.p. 244—245° (probably formed by way of CPh₂:CO). R. S. C.

Cholestenone and coprostanone. H. GRASSHOF (Z. physiol. Chem., 1934, 223, 249—251).—Oxidation of ψ -cholestene (I) with CrO₃ in AcOH gives 7-ketocholestene [probably by conversion of (I) into cholestene] and cholestenone, confirming the $\Delta^{4:5}$ -linking in (I). Hydrogenation (spongy Pd) of cholestenone in Et₂O affords coprostanone; a coprosterol derivative thus becomes readily accessible. J. H. B.

Cholestenedione. O. STANGE (Z. physiol. Chem., 1934, **223**, 245—248).—Cholestenedione (I) affords a *disemicarbazone*, m.p. 296° (decomp.), which is reduced by NaOEt at 200° to ψ -cholestene, indicating that the double linking in (I) is between C₄ and C₅. Hydroxy-



cholestenone yields a *semicarbazone*, m.p. 245°, which on reduction by NaOEt gives 3 : 6-dihydroxycholestx x ane and an alkali-sol. product (II), $C_{28}H_{43}ON_3$, m.p. 285° (Me ester, m.p. 166°), probably a hydroxy-triazine. J. H. B.

Condensation products of hydroxymethyleneacetophenone with bases. K. von Auwers and H. WUNDERLING (Ber., 1934, 67, [B], 644-648).-The conversion of di- β -benzoylvinylamine (I) (Claisen's "NH₃ compound of benzoylacetaldehyde," A., 1888, 690; cf. Benary et al., A., 1924, i, 872) by NHPh•NH₂ into 1:3-diphenylpyrazole occurs through the compound $NH_2 \cdot NPh \cdot CH:CHBz$. $p \cdot NO_2 \cdot C_6H_4 \cdot NH \cdot NH_2$, which reacts solely with the NH_2 group, transforms (I) into 5-phenyl-1-p-nitrophenylpyrazole, m.p. 116-118°. (I) is unexpectedly stable towards $KMnO_4$ in Na_2CO_3 -COMe₂, although readily oxidised in presence of acid. The presence of a terminal basic group in this and allied compounds appears to mask the unsaturated linking. They are unsaturated towards Br in CHCl₃. (I) is very resistant towards MeI at 100° and towards Ac,O-NaOAc. β-Benzoylvinylaniline, however, readily affords an Ac derivative, m.p. 157°. Dimethyl-β-benzoylvinylamine has m.p. 92°. H. W.

Optically active mixed benzoins derived from (+)mandelonitrile. A. McKENZIE and A. L. KELMAN (J.C.S., 1934, 412–418).—(+)Mandelonitrile (I) and p-C₆H₄Me·MgBr give (-)p-toluoylphenylcarbinol (II), m.p. 102–103°, $[\alpha]_{2541}^{25}$ –120° in EtOH, -103·6° in COMe₂, which with MgPhBr gives (+)p-tolylhydrobenzoin (β-form) (III), m.p. 135·5-136°, $[\alpha]_{2541}^{25}$ +252° in COMe₂. The dl-form of (II) with MgPhBr gives the dl-form of (II) with MgPhBr gives the dl-form of (III) (β-form), m.p. 181–182°. Similarly were prepared (-)-, m.p. 73–73·5°, $[\alpha]_{5461}^{25}$ –122·3° in COMe₂, and dl-m-toluoyl-, m.p. 69·5-70°, (-)propionyl-, m.p. 39–40°, $[\alpha]_{5461}^{25}$ –533° in CHCl₃, partly racemised (-)acetyl-, dl-cyclohexyl-, m.p. 62–63°, and $(-)anisoyl-phenylcarbinol [(-)benzanisoin], m.p. 102·5-103·5°, <math>[\alpha]_{5461}^{25}$ +244·3° in COMe₂, and dl-m-tolyl-, m.p. 123–124°, dl-cyclohexyl-, m.p. 133–134°, (+)-, m.p. 146–147°, $[\alpha]_{5461}^{25}$ +259·7° in COMe₂, and dl-anisyl-hydrobenzoin, all β-forms, m.p. 155–156°. o-C₆H₄Me·MgBr and (I) give, however, Ph o-tolyl diketone (2-methylbenzil), m.p. 57–58°, also obtained from o-C₆H₄Me·CN by way of

o-C₆H₄Me·CO·CH₂Ph. α -C₁₀H₇·MgBr and dl-(I) give similarly Ph α -naphthyl diketone, m.p. 102·5—103°, but with (+)(I) 2:5-diphenyl-3:6-di- α -naphthylpyrazine, m.p. 260—260·5°, is obtained. The hydrobenzoins are racemised by a few drops of KOH-EtOH, a mixture of structurally isomeric dl-compounds being obtained from the active mixed hydrobenzoins.

R. S. C.

Synthesis of substituted benzoins and of deoxybenzoins. R. ROGER and A. MCGREGOR (J.C.S., 1934, 442-444).—m-C₆H₄Me·MgBr (1.5 mols.) and benzil (I) in Et₂O give *m*-tolylbenzoin, m.p. 82-83°, which with KOH-EtOH gives BzOH and m-C₆H₄Me·CHPh·OH, m.p. 52°, and with HI and red P *m*-tolyldeoxybenzoin. *p*-C₆H₄Me·MgBr (II) (1.5 mol.), when added to (I) in Et₂O, affords an oil, b.p. 220-230°, reduced (HI-P) to *p*-tolyldeoxybenzoin; however, when (I) in Et₂O is added to (II) in Et₂O, there are formed benzoin and two substances,

C28H24O, m.p. 212-213° and 159-160°, respectively, probably pinacolins, but in a second experiment a substance, C28H26O2, m.p. 162-163°, probably s-diphenyldi-*p*-tolylpinacol, was isolated. Addition of $o - C_6 H_4 Me \cdot MgBr$ (1.25 mol.) to (I) in Et₂O gives a substance, m.p. 116-117°, probably o-toluoyldiphenylcarbinol, but possibly o-tolyldeoxybenzoin, which with KOH-EtOH gives $o-C_6H_4Me\cdot CO_2H$ (III) and benzhydrol (IV) and is reduced (HI-P) to a ketone (V), $\tilde{C}_{21}H_{18}O$, m.p. 47.5–49°, previously (A., 1933, 611) termed o-tolyl CHPh₂ ketone. With KOH-EtOH (V) yields (III) and (IV). The constitution of methylbenzoin is proved by reduction to CHMePhBz and alkalino fission to BzOH, dl-CHPhMe·OH, and (IV). It is uncertain whether the migration with o-tolyl derivatives occurs during the Grignard reactions or during the alkaline scission, but the former (for which a mechanism is proposed) is considered R. S. C. more probable.

Preparation and reactions of disodium stilbene aa'-dioxide. W. E. BACHMANN (J. Amer. Chem. Soc., 1934, 56, 963-965).-Benzil (I) and 2% Na-Hg in Et₂O-C₆H₆ and N₂ at room temp. give a violet compound (1 min.) and then the orange (:CPh·ONa)₂ (II). (II) is hydrolysed (H₂O) to benzoin (III), converted by I into (I), by CO₂ into (:CPh·O·CO₂Na)₂ [which is decomposed by H₂O to CO₂ and (III)], and by ClCO₂Et into $\alpha \alpha'$ -di(carbethoxy-oxy)stilbene, m.p. 69-70° [hydrolysed (dil. alkali) to (III)]. (II) is oxidised by atm. O₂; subsequent hydrolysis (H₂O) gives BzOH and benzilic acid. The hydrolysis (H₂O) gives BzOH and benzilic acid. The diacetate, m.p. 118°, dibenzoate, m.p. 158°, di-p-toluate, m.p. 199.5°, Me, ether, m.p. 66-67° (cf. Staudinger and Binkert, A., 1922, i, 1016), and diallyl ether, m.p. 92-93°, of aa'-dihydroxystilbene are prepared from (II). (II) is converted by CPh₃Cl or S into (I); with PhCHO, (III) and CH₂Ph·OBz result. 4:4'-Diphenylbenzil, anisil, and α -naphthil similarly give analogous Na, derivatives, hydrolysed to 4:4'-diphenylbenzoin, anisoin, and α -naphthoin, respectively. H. B.

Synthesis of vic.-resacetophenone. F. MAUTH-NER (J. pr. Chem., 1934, [ii], 139, 290–292).—2:6-Dimethoxybenzonitrile and MgMeI, best in boiling PhMe, give 2:6-dimethoxyacetophenone, m.p. 73—74°, hydrolysed by AlCl₃ in boiling PhCl to vic.-resacetophenone, m.p. 157—158°. R. S. C.

Chalkone picrates as organic molecular compounds. T. ASAHINA (Bull. Chem. Soc. Japan, 1934, 9, 131-138).—The formation of the following compounds of various chalkones (A) and picric acid (B) (mol. ratio A : B in parentheses) is proved by thermal analysis: Ph 3: 4-methylenedioxy- (I) (1:2), m.p. 128.5°, o- (2:3), m.p. 132°, and p- (1:1), m.p. 157.5°, -hydroxy-, and p-ethoxy- (1:1), m.p. 84.5°, -styryl ketone picrates. With β -C₁₀H₇°OH (58.2 mol.-%) (I) gives only a eutectic (71.5°) and no compound. J. W. B.

Phototropy of the semicarbazones of ethylenic ketones. II. C. V. GHEORGHIU (Bull. Soc. chim., 1933, [iv], 53, 1442—1463; cf. A., 1930, 604).— Further examples are provided of the fact that, in general, semicarbazones of ketones (A), CHATCH:COR but rest 41

CHAr.CH-COR, but not those of ketones (B),

CHAr:CR•COMe, are phototropic. When $R=Pr^{\beta}$ (not Bu^{β}), ketones (A) have diminished or no phototropy. The semicarbazone of

p-OMe·C₆H₄·CH:CEt·COMe, although of type (B), is phototropic, the phenomenon being reversible in this case and in that of the derivative of

 $OMe \cdot C_6H_4 \cdot CH \cdot COPr^{\beta}$ (colour vanishes in the dark). Phototropy is not due to structural isomerism, since it occurs only with the solid substances; it is probably caused by electronic displacements with formation of a

dipolar molecule, CHAr·CH·CH·CR·N·NH·CO·NH, containing triple electron links in the conjugated system. The thiosemicarbazone of

CH2O2:C6H3 CH:CH COPr^{\$} is phototropic. Semicarb. azones of the following ketones are prepared, those which are phototropic being marked (*), those feebly so (†): o-hydroxy-, m.p. 178-179° (†), o-methoxy- (I), m.p. 167-178° (*), p-isopropyl- (II) (α-form), and 3: 4-methylenedioxy-styryl Et ketone (III), α-form, m.p. 198° (*), y-form, m.p. 198-200° (*); o-methoxy- (IV), m.p. 177-178°, p-hydroxy-, m.p. 208°, and 3:4-methylenedioxy-α-methylstyryl Me ketone, (V), m.p. 216-218° (decomp.); p-methoxy-α-ethylstyryl Me ketone (VI), α-form, m.p. 214-215° (reversible *); a-ethylstyryl Me ketone; styryl, o- (VII), m.p. 179-181° (reversible †), and p-methoxy-, m.p. 173-174° (†), p-isopropyl-, and 3: 4-methylenedioxy-styryl Prs ketone, m.p. 188°; styryl (*) and 3: 4-methylenedioxystyryl Pro ketone (VIII), a-form (IX), m.p. 175° [† probably by change into the γ -form, which was not isolated pure, since by recrystallisation it gives (IX)]; p-isopropylstyryl Bu^β ketone (X), m.p. 161° (†); α-furfurylidenc-methyl Et and phenyl ketone, m.p. 175-179°. The above ketones are prepared : (I) (from COMeEt, OMe·C₆H₄·CHO, and NaOH in cold EtOH), m.p. 30-32°, b.p. 177-178°, dimeric form, m.p. 178-179°; (II) [from cuminaldehyde (XI) and COMeEt in aq. EtOH], b.p. $170^{\circ}/17$ mm.; (III), m.p. $101-102^{\circ}$; (IV) (from OMe·C₆H₄·CHO, COMeEt, and HCl gas), b.p. 168-170°/20 mm.; (V) [from piperonal (XII), COMeEt, and HCl at -3°], m.p. 135-136°; (VI), b.p. 173-174°/16 mm.; (VII) (by alkaline condensation), b.p. 186-187°/20 mm.; (VIII) [from (XII), COMePr^a, and NaOH in EtOH], m.p. 63° ; (X) [from (XI), COMeBu^{β}, and NaOH in aq. EtOH], b.p. $184^{\circ}/14$ mm. R. S. C.

Migration of the acyl group in polyhydric phenols. II. F. MAUTHNER (J. pr. Chem., 1934, [ii], 139, 293—295; cf. A., 1933, 395).—Triacetylphloroglucinol and AlCl₃ in cold PhNO₂ give 2:4:6triacetocyclohexatrione [p-nitrophenylhydrazone, m.p. 258—259° (decomp.)]. R. S. C.

Synthesis of 5:6-dimethyl-1:2-benzanthraquinone, a degradation product of deoxycholic acid. J. W. COOK and G. A. D. HASLEWOOD (J.C.S., 1934, 428—433).—Wieland and Dane's formula for methylcholanthrene (I) is proved by degradation of (I) to 5:6-dimethyl-1:2-benzanthraquinone (II), the constitution of which is determined by (a) oxidation and (b) synthesis. This proves also the accepted C skeleton of the sterols and bile acids, including the attachment of the side-chain to position 17, and the position of the CO in 12-ketocholanic acid (III) and of one OH in deoxycholic and cholic acids. (I) in C_6H_6 is carcinogenic to mice. Transformation of a product of animal metabolism into a carcinogenic substance is thus possible by reactions of a biochemical nature. Equilenin contains the same ring system as cestrin.

3:12-Diketocholanic acid (modified purification) is reduced by Zn and HCl to (III), decarboxylated at 320-345° in CO₂ to dehydronorcholene, whence by Se at 325-340° were obtained (I), m.p. 176.5-177.5° (30% yield), best purified by the picrate, m.p. 177-178°, and, in one experiment, a hydrocarbon, C22H26, m.p. $132-134^{\circ}$ (*picrate*, m.p. $163-166^{\circ}$). (I) is rapidly oxidised by Na₂Cr₂O₇ in AcOH at room temp. to a *ketone*, m.p. $228-229^{\circ}$ (decomp.), not isolated pure, and, when boiled, to 6-methyl-1: 2-benzanthraquinonylacetic acid, m.p. variable, $250-260^{\circ}$ (decomp.), which rapidly at 400° in CO₂ or, much better, with Cu-bronze in boiling quinoline loses CO2 to yield (II), m.p. 229-230°. (II) with KMnO₄-H₂SO₄ affords anthraquinone-1:2:5:6-tetracarboxylic acid. Methylsuccinic anhydride, phenanthrene, and AlCl₃ in cold PhNO₂ give acids, whence after esterific-ation (MeOH-HCl) were isolated $Me \beta$ -2 (IV), m.p. 134.5–135.5°, and β -3-phenanthroylisobutyrate (\vec{V}), m.p. 88–89°. 2-Bromoacetylphenanthrene and 2-Bromoacetylphenanthrene and CheNa(CO₂Et)₂ led to the acid, m.p. 225-227°, corresponding with (IV). The crude bromination product of 3-acetylphenanthrene affords similarly the acid (VI), m.p. 179—180.5°, corresponding with (V). The semi-carbazone, m.p. 193—195° (decomp.), of (VI) gives (NaOEt; 195—200°) γ -3-phenanthryl- α -methylbutyric acid, m.p. 119—121°, which with SnCl₄ at 120° yields 5-keto-6-methyl-5: 6:7:8-tetrahydro-1:2-benzanthr acene, m.p. 137—138.5°. This with MgMeI forms a resinous product, which is dehydrogenated (Se; 300—310°) to 5:6-dimethyl-1:2-benzanthracene, m.p. 187-188° (picrate, m.p. 191-193°), also obtained by reduction of (I), into which it is converted by Na₂Cr₂O₇ in AcOH. 12-Ketonorcholanic acid, m.p. 185.5-186.5°, gives a semicarbazone, m.p. 235° (decomp.), which is reduced (NaOEt; 170-175°) to norcholanic acid, identical with that obtained from cholanic acid. R. S. C.

Perylene and derivatives. G. T. MORGAN and G. MITCHELL (J.C.S., 1934, 536) .- Perylene, purified through its picrate, m.p. 223-224.5° (lit. 221°), has m.p. $273-274^{\circ}$ (lit. $264-265^{\circ}$). $1:2-C_{10}H_{6}I\cdot OH$ (I) gives by Meldola's 1:7-perylenequinone synthesis (J.C.S., 1885, 47, 525) a substance, m.p. 94.5°, which is now obtained colourless and insensitive to light. Methoxy- β -naphthol does not react. (I) in boiling C₅H₅N yields a mixture, the alkali-insol. portion of which contains no quinone and with Zn in H₂ gives $C_{10}H_8$, dinaphthalene dioxide, and a trace of a red substance. The Al salt of β-dinaphthol with AlCl₃ at 140-150° gives 70-80% of quinone, but the yield from the free phenol is variable and low. The Al salt of P-naphthol-3-carbanilide gives an impure, green substance forming an orange vat. Unsuccessful attempts to improve the prep. of perylenetetracarboxylic anhydride (II) are recorded. The acid from (II) and its monoimide are separated by NaCl in dil. NaOH, the imide being pptd. R. S. C.

Atractylic acid. H. WUNSCHENDORFF and P. VALLER (Bull. Soc. Chim. biol., 1934, 16, 74-79, 8084).—Cryst. sec. atractylates of Cu, Ni, Co, Zn, Cd, Cr, Fe, Ag, and tert. salts of Ba, Ca, Sr, Ni, Co, Cu, Pb, Ag, Zn, Cd have been prepared. The primary salts readily decompose into sec. salts and free acid. With saturated aq. Ba(OH)₂, K atractylate gives 1 mol. of valeric acid and Ba atractylenate $C_{25}H_{42}O_{17}S_2Ba$.

A. L.

Resen of Manila-elemi resin. K. H. BAUER and H. J. STARCKE (Arch. Pharm., 1934, 272, 167—171).— Distillation of the residual resin (I) after extraction of the amyrin-freed elemi resin with EtOH-NaOH and steam-distillation gives a fraction, b.p. 112—114°/5 mm., which contains elemicin (II) (Semmler, A., 1916, i, 492) since it is oxidised by $KMnO_4$ -COMe₂ to trimethylgallic acid. Distillation of (I) with superheated steam gives (II) and elemol, and a residual resin (III) distillation of which gives fractions (a) b.p. 135—140°/ 7 mm. (2.52% OMe: 9.08% OH), (b) b.p. 151—152°/8 mm. (2.2% OMe), and (c) b.p. 152—200°/8 mm. The residue (OMe-free: 5.7% OH), partly purified by pptn. from solution in 98% HCO₂H by H₂O, gives a substance, m.p. 73° (C, 81.16; H, 10.76; OH, 1.55%; I val. 163.5), probably an autoxidation and polymerisation product of a terpene hydrocarbon.

J. W. B. Paprika colouring matter. VII. Adsorption analysis of pigment. L. ZECHMEISTER and L. VON CHOLNOKY (Annalen, 1934, 509, 269-287).—The crude pigment, obtained by hydrolysis (MeOH-KOH) of the extracted wax, is separated by adsorption on CaCO₃ [essentially Tsvett's method (A., 1907, ii, 144)] into capsanthin (I), a new violet-red polyene (termed capsorubin) (II), zeaxanthin (III), m.p. 206° (all m.p. are corr.), $[\alpha]_{c}^{c} -54^{\circ}$ in CHCl₃, and cryptoxanthin (IV) (Kuhn *et al.*, this vol., 70). Lutein (xanthophyll), m.p. 192°, $[\alpha]_{c}^{co} + 163^{\circ}$ in CHCl₃, (I), and (III) are similarly obtained from a crude prep. (A., 1928, 1252) of (I). In both cases, dil. solutions in CS_2 are used. The original coloured wax (cf. A., 1931, 1066) can similarly be separated (petrol solution) into cryst. capsanthin ester mixtures and esters of (III) and (IV); hydrolysis (MeOH-KOH) and re-adsorption give (I), (III), (IV), and a little β -carotene [best adsorbed on Ca(OH)₂]. The previously described (A., 1931, 1066) synthetic esters of (I) are also purified by adsorption on CaCO₃, small amounts of the esters of (II) and (III) being removed : the didecoate, m.p. 109° [previously described (loc. cit.) as the dihexoate], diacetate, m.p. 146.5°, and dipalmitate, m.p. 92°, are thus obtained pure. Analytical data for these esters and purified (I), m.p. 175-176° (Berl block), indicate that (I) is C40H 58O3 (±2H) and not C35H 50O3. H. B.

Strophanthin. XXIX. Dehydrogenation of strophanthidin. R. C. ELDERFIELD and W. A. JACOBS (Science, 1934, 79, 279–280).—Dehydrogenation of strophanthidin with Se under carefully-controlled temp. conditions gave a hydrocarbon $C_{18}H_{16}$, m.p. 124—125° (corr.), identical with that isolated by Diels *et al.* (A., 1928, 169), which did not yield a red quinone on oxidation (cf. A., 1932, 948). The "dimethylphenanthrene" previously obtained (*loc. cit.*) appears to be due to too rapid heating of the reaction mixture. Since $C_{18}H_{16}$ appears to be a characteristic degradation product of the sterol skeleton, the ring system of the cardiac aglucones appears to be built on the same general plan as that of the sterols and bile acids. L. S. T.

Steric series of xanthophylls. R. KUHN and C. GRUNDMANN (Ber., 1934, 67, [B], 596—598).—Pure zeaxanthin, m.p. 215.5° (corr.), from *Physalis* is optically inactive, the dextrorotation of the initial material disappearing during purification. Only dextrorotatory and optically inactive xanthophylls are known, the inactive crypto-, rubi-, and zea-xanthins being related to β -, γ -, and β -carotene, respectively; although the entry of OH causes development of asymmetric C, optical activity is not observed. Lutein is related to α -carotene, but the relationships of the remaining optically active xanthophylls are obscure. Zeaxanthin dipalmitate, C₇₂H₁₁₆O₄, has m.p. 99.5°, in agreement with that of natural physalien, which is optically inactive. H. W.

Constituents of roots of Arctopus echinatus.— See this vol., 709.

Spectroscopy of terpene alcohols and esters. P. BONICHON (Bull. Inst. Pin, 1933, 249-251; 1934, 1-8, 32-46).—The formates described below were obtained by Ac_2O-HCO_2H (1:1 mol.), acetates by Ac₂O and NaOAc in xylene, propionates and butyrates Ac₂O and NaOAc in xylene, propionates and butyrates by the acid and H_2SO_4 . Hydrogenation (PtO₂) of isopulegol (I), b.p. 96·5—98·5°/18 mm., $[\alpha]_{5461} - 1.72^\circ$, and its acetate, $[\alpha]_{5461} - 1.16^\circ$, and of carvone, b.p. $111^\circ/18$ mm., $[\alpha]_{5461} + 64\cdot76^\circ$, gives isopulegomenthol, b.p. $104 - 105^\circ/18$ mm., $[\alpha]_{5461} - 16\cdot11^\circ$ (phenyl-urethane, m.p. $111 - 112^\circ$), and its acetate, b.p. $108 - 109^\circ/18$ mm., $[\alpha]_{5461} - 24\cdot62^\circ$, and tetrahydrocarvone (II), b.p. $104 - 105^\circ/22$ mm., $[\alpha]_{5461} - 23\cdot75^\circ$ (semi-carbazone, m.p. 152°). Further hydrogenation of (II) affords carvomenthol, b.p. $105 - 107^\circ/18$ mm. (II) affords carvomenthol, b.p. 105-107°/18 mm., $[\alpha]_{5461} - 22.3^{\circ}$ [phenylurethane, m.p. 88-90° (lit. 74-75°)]. Cyclisation of citronellal and its diacetate gives (I) (formate, b.p. $104-106^{\circ}/24$ mm.) and its acetate, b.p. 110-114°/18 mm. Reduction of pulegone with Na and EtOH gives pulegomenthol (phenylurethane, m.p. 112°) and a little pulegomenthone. Similar reduction of carvone (III) gives dihydrocarveol, b.p. 112–113°, $[\alpha]_{5461}$ +32.74° (phenylurethane, m.p. 87°), and 3–4% of unchanged (III). Raman spectra are recorded for the above esters and alcohols and for menthol, its acetate, b.p. 120-122°/22 mm., $[\alpha]_{5461} - 80.91^{\circ}$, and formate, b.p. 111-112°/18 mm., $[\alpha]_{5461} - 78.88^{\circ}$, α -terpineol, m.p. 35°, $[\alpha]$ 0, and its acetate, b.p. 129-132°/24 mm., borneol, its formate, b.p. 110°/20 mm., $[\alpha]_{5461} + 17.25^{\circ}$, acetate, b.p. 97– 98°/9 mm., $[\alpha]_{5461} + 11.17^{\circ}$, propionate, b.p. 124–125°/ 18 mm., $[\alpha]_{5461} + 18.38^{\circ}$, and butyrate, b.p. 140–142°/ 22 mm., $[\alpha]_{5461} + 15.04^{\circ}$, and *iso*borneol and its form-ate, b.p. 110°/20 mm., $[\alpha]$ 0, acetate, b.p. 115–117°/22 mm., propionate, b.p. 124-125°/18 mm., and butyrate, b.p. 141-143°/22 mm. (III) has a line of frequency 1.673 due to the CO and one of 1.646 due to the ethylenic linking. The lines due to the CO are materially shifted by unsaturation only if this is in the $\alpha\beta$ -position. Alcohols and their esters give very similar spectra. The isomeric menthols give distinguishable spectra, by means of which they can be detected in mixtures. R.S.C.

Isomerisation of α -pinene to an aliphatic terpene (alloocimene). I. Preparation and properties. II. Constitution. B. ARBUSOV (Ber., 1934, 67, [B], 563-569, 569-573; cf. A., 1933, 717). -I. The main factor in the isomerisation of α -pinene to an aliphatic terpene (I), b.p. 87-87.5°/16 mm., $[\alpha]_{\rm p} \pm 0^{\circ}$, is the temp., reduced Cu or glass fragments being as efficient as Cr-Cu or Co-Th used previously. Production appears to occur invariably at $>300^\circ$, particularly if the products are removed rapidly from the heated zone. Exposure of (I) at 300° results in the formation of a terpene, b.p. $57-58\cdot5^{\circ}/14$ mm., with, probably, di- and tri-terpenes. (I) and α -naphthaquinone give an *adduct*, $C_{20}H_{22}O_2$, m.p. 122°, dehydrogenated by air in presence of KOH to the dihydroanthraquinone derivative, C₁₀H₂₀O₂, m.p. 120-120.5°, which is oxidised by HNO3 to an acid, m.p. 331° (decomp.). Treatment of (I) with AcOH and 50% H₂SO₄ leads to dipentene (tetrabromide, m.p. 124-125°) and, mainly, an unknown diterpene, b.p. $142-143^{\circ}/4$ mm., d_0^{23} 0.8654.

II. The identity of (I) with alloocimene is established by its comparison with the hydrocarbon of Fischer et al. (A., 1933, 592) and their adducts with maleic anhydride and α -naphthaquinone. γ -Methyl- Δ^{β} -butenyl bromide and tiglaldehyde in Et₂O are completely resinified by Zn, but transformed by Mg into the carbinol C₁₀H₁₈O, b.p. 82-83°/13 mm., dehydrated by KHSO₄ to the hydrocarbon (II) C₁₀H₁₆. b.p. 160.5°/760 mm. (II) and maleic anhydride yield the substance C₁₄H₁₈O₃, m.p. 70-71°, from which the acid C₁₄H₂₀O₄, m.p. 169-170°, is derived. H. W.

Parent substance of the camphor group, dicyclo-(1:2:2]-heptane, and the stereoisomeric norborneols. G. KOMPPA and S. BECKMANN (Naturwiss., 1934, 22, 171).—Norcamphor is catalytically reduced to α -norborneol, m.p. 149—150° (phenylurethane, m.p. 158—159°). β -Norborneol (I), m.p. 123—124° (phenylurethane, m.p. 144—145°), is obtained by the Hofmann degradation of dicyclo-[1:2:2]-heptane-2-carboxylamide to norbornylamine, which is treated with HNO₂. Conversion of (I) into the chloride and reduction with Na and EtOH leads to dicyclo-[1:2:2]-heptane (norbornylane), m.p. 86— 87°, which is extraordinarily volatile. H. W.

Products of the degradation of camphor and camphorquinone in the animal organism. F REINARTZ and W. ZANKE [with O. SCHAEFERS and K. FAUST] (Ber., 1934, 67, [B], 548-553).-Camphorquinone is reduced in the animal organism to a mixture separable by MeOH-HCl into 2-hydroxyeptcamphor, identical with the synthetic product, and 3-hydroxycamphor (semicarbazone, m.p. 181-184, $[\alpha]_{b}^{13} - 23.9^{\circ}$ in abs. EtOH). The authors' results with camphor confirm those of Asahina *et al.* (cf. this vol., 299). Contrary to Takeuchi et al. (A., 1933, 1300), diketocamphane (I) can be hydrogenated slowly and incompletely, and then yields a 5-hydroxycamphor (dinitrobenzoate, m.p. 165-171°) not identical with the biological product (dinitrobenzoate, m.p. 96-97). (I) after being heated in light petroleum does not contain OH, is stable towards Br, and behaves like ordinary (I) when hydrogenated. The very pronounced physiological action of "vita-camphor" could not be confirmed. H. W.

Products of the degradation of epicamphor in the animal organism. F. REINARTZ and W. ZANKE [with O. SCHAEFERS] (Ber., 1934, 67, [B], 589-593; cf. preceding abstract).-epiCamphor, like camphor, is oxidised to hydroxycamphors in the cell and excreted in conjunction with glycuronic acid. The yields are poor and the hydroxycamphor, m.p. 206-208°, $[\alpha]_{D}^{\circ}$ -53.33° in abs. EtOH, appears to have a tert.-OH, since it is mainly resistant towards CrO₃. Subsequent oxidation with KMnO_4 gives small amounts of an acid $\text{C}_{10}\text{H}_{14}\text{O}_3$, m.p. 240—242° (decomp.), apparently derived from a π -hydroxy-camphor. The 3:5-dinitrobenzoate, m.p. 117—119°, of (I) and its additive compound with α -C₁₀H₇·NH₂, m.p. 201.5-205°, are described. H. W.

Synthesis of 5-hydroxycamphor. K. TAKEUCHI (Sci. Papers Inst. Phys. Chem. Res. Tokyo, 1934, 23, 288—296).—β-pericycloCamphanone (A., 1917, i, 655) with CCl₃·CO₂H and H₂SO₄ at 150-160° gave 5-trichloroacetoxycamphor, b.p. 140-145°/4 mm., [a] +9.30° in EtOH, converted by boiling KOH-EtOH into 5-hydroxycamphor, identical with one com-ponent of "campherol" isolated from the urine of dogs fed with camphor (A., 1929, 72). A. E. O.

Bromination of camphorquinone. W.C.EVANS, J. L. SIMONSEN, and (in part) M. B. BHAGVAT (J.C.S., 1934, 444-447).-The compound, C₁₀H₁₁O₃Br₂, obtained by Manasse and Samuel (A., 1898, i, 147; 1903, i, 45) by brominating camphorquinone has been shown to be the lactone of 1:5-dibromo-3-hydroxy-3-bromomethyl-2: 2'-dimethylcyclohexan-4-one-1carboxylic acid, reduced with Zn-AcOH to 2:2:3trimethylcyclohexan-4-one-1-carboxylic acid or with Al-Hg to the lactone of 3-hydroxy-3-bromomethyl-2:2dimethylcyclohexan-4-one-1-carboxylic acid (I), m.p. 144—145°, $[\alpha]_{D}$ +72·25°, in CHCl₂. (I) and NaOMe afford the *lactone* of the 3-OMe-acid, m.p. 81—82°, $[\alpha]_{5461} + 64 \cdot 6^{\circ}$ in CHCl₃ [with semicarbazide acetate, a substance, m.p. 183-184°, is formed], oxidised $(HNO_3 \text{ or } KMnO_4)$ to $\alpha\alpha$ -dimethyltricarballylic acid and reduced (Pd-H₂) to the lactone of 3-hydroxy-3methoxymethyl-2: 2 - dimethylcyclohexan - 4 - ol - 1 - carb oxylic acid, m.p. 48-49°, [a]5461 +14.22° in MeOH (oxidised by HIO4 and NaOBr successively to 3-methylpentane-Byz-tricarboxylic acid). The Br2lactone of Manasse and Samuel is the lactone of -bromo-3-hydroxy-3-bromomethyl-2:2-dimethyl-

$$\begin{array}{c} CO-C(CH_2Br)\cdot O\\ (II.) \qquad (Br)(H)CH \quad CMe_2 \quad |\\ CH_2\cdot CBr - CO \end{array}$$

cyclohexan-4-one-1-carboxylic acid. The Br2- and F. R. S. Br_3 -lactones are probably as (11).

Bisiminocamphor derivatives with exalted optical activity. S. M. PATEL and P. C. GUHA (J. Indian Chem. Soc., 1934, **11**, 87–93).—1:4- $C_{10}H_6(NH_2)_2$,2HCl and *p*-NHAc·C₆H₄·CHO, m.p. 154– 155° (lit. 161°), in aq. EtOH-NaOAc give di-p-acetamidobenzylidene-1: 4-naphthylenediamine, m.p. 317°, hydrolysed (dil. HCl, EtOH) to the di-p-aminobenzylidene derivative, the dihydrochloride of which with camphorquinone (I) in aq. EtOH-NaOAc (general method) affords 1: 4-naphthylenebisimino-p-benzylideneimino*camphor*, m.p. 239°, $[M]_{5780}^{25} + 22,050^{\circ}$ in C_5H_5N , which has a high rotatory power owing to the large no. of conjugated double linkings in the mol. (cf. Forster and Thornley, J.C.S., 1909, 95, 942). Reduction (EtOH-NH₄HS; aq. Na₂S; Zn dust and AcOH; FeSO₄ and aq. NH3) of di-p-nitrobenzylidene-1: 4-naphthylenediamine, m.p. 281°, gives tarry products. 4:4'-Diacetamidodiphenylcarbamide [from p-NH₂·C₆H₄·NHAc and CO(NH₂)₂; method, A., 1931, 209] is hydrolysed (conc. HCl) to the $(NH_2)_2$ -derivative, which with (I) affords carbamidodi-p-phenylenebisiminocamphor, m.p. 280°, [M]_D +8911.4° in CHCl₃, and an isomeride, m.p. 266°. Ox-p-aminoanilide (loc. cit.) and (I) give oxamidodi-p-phenylenebisiminocamphor, m.p. 183°, [M]p +12,095° in C_5H_5N , whilst (I) (2 mols.) and CS(NH·NH₂)₂ (1 mol.) in EtOH+anhyd. Na₂SO₄ afford the thiocarbohydrazone, $\begin{bmatrix} C_8H_{14} < CN \cdot NH \cdot \\ CO \end{bmatrix}$ CS, m.p. 226°, $[M]_{\rm D}$ +1557° in CHCl₃. Introduction of \cdot NH·CO·NH· and \cdot NH·CO·CO·NH· causes an increase in $[M]_{D}$ (compared with 4:4'-diphenylbisimino-camphor), in spite of the interruption of the conjugated system. (I) could not be condensed with 4:4'diamino-benzophenone, -azobenzene, and -diphenylazodicarbonamide, 2:2'-diaminodiphenyl, 1:2- $C_{10}H_6(NH_2)_2$, 1: 4-diaminoanthraquinone, and anthra-H. B. quinonedi-p-aminoanil.

Polyterpenes and polyterpenoids. XC. Synthesis of the monocyclic diterpene alcohol $1-(\beta-cyclogeranyl)$ geraniol. L. RUZICKA and W. FISCHER (Helv. Chim. Acta, 1934, 17, 633-641).-Cyclisation $(H_3PO_4 \text{ at } 0^\circ)$ of geranyl acetate and subsequent hydrolysis affords cyclogeraniol, converted by PCl₅ in ligroin into a-cyclogeranyl chloride $CH_2 < CH_2 - CMe > CH \cdot CH_2Cl$, condensed with

CHNaAc·CO₂Et to Et cyclogeranylacetoacetate, b.p. 120-127°/0.4 mm., hydrolysed by aq. Ba(OH)2 to dihydro-a-ionone (semicarbazone, m.p. 167-168°), identical with the product obtained by catalytic reduction (H₂-Ni in EtOH at 50°) of α -ionone. The semicarbazone of dihydro- β -ionone, similarly obtained, has m.p. $153-154^{\circ}$. With C_2H_2 and NaNH₂ in Et₂O either dihydroionone affords the acetylenic carbinol, b.p. $135-138^{\circ}/10$ mm. (from α), b.p. $134-137^{\circ}/10$ mm. (from β), reduced (H₂-Ni in EtOH at 50°) to $\varepsilon - (2:6:6-trimethyl-\Delta^1-cyclohexenyl) - \gamma - methyl - \Delta^a$ penten-y-ol, b.p. 134-135°/10 mm. (a), b.p. 135-136°/ 10 mm. (B) (α - and β -cyclonerolidol), converted by PCl₅ in ligroin into the corresponding $-\Delta^{\beta}$ -pentenyl chloride (cyclofarnesyl chloride). Condensation of the β-product with CHNaAc·CO₂Et gives the substituted aceto-acetic ester, b.p. 165-167°/0.4 mm., hydrolysed to ζ -(2:6:6-trimethyl- Δ^1 -cyclohexenyl)- δ -methyl- Δ^{γ} -pentenyl Me ketone, b.p. 116-117°/0.05 mm., similarly condensed with C2H2-NaNH2 to the acetylenic carbinol, b.p. 125-126°/0·1 mm., reduced (Ni) to 1-(2:6:6-trimethyl- Δ^1 -cyclohexenyl)- $\gamma\eta$ -dimethyl- $\Delta^{\alpha\zeta}$ -nonadien- γ -ol (1-β-cyclogeranyl-linalool), converted by anionotropic change in Ac₂O, conversion into the phthalate, and hydrolysis into the corresponding $-\Delta^{\beta\beta}$ -n-nonadien- α -ol (1-B-cyclogeranylgeraniol), b.p. 136-138°/0·1 mm. J. W. B.

Preparation of α -alkyltetrahydropyrans. R. PAUL (Compt. rend., 1934, **198**, 1246—1248).—Dihydropyran and anhyd. HBr at 0° give a crude 2-bromotetrahydropyran, which with Grignard reagents (excess) in Et₂O at —17° gives 75—85% yields of α -ethyl-, b.p. 128—129°/770 mm., -propyl-, b.p. 152—153°, and -phenyl-tetrahydropyran, b.p. 113°/11 mm., which with HBr at the temp. stated afford (150°) $\alpha \varepsilon$ -dibromo-heptane, b.p. 113—115°/11 mm. (90% yield), and (b.p.) -octane (80%), b.p. 127—128°/ 11 mm., and (90—100°) α -bromo- ε -phenyl- Δ^{δ} -pentene, b.p. 149—151°/11 mm., respectively. 2:3-Dibromotetrahydropyran at —17° gives similarly poorer yields of 2-bromo-1-ethyl-, b.p. 71—72°/12 mm., and -phenyltetrahydropyran, b.p. 160—162°/15 mm., m.p. 38°. R. S. C.

Synthetical experiments in the chromone group. XI. Synthesis of isoflavone. P. C. JOSHI and K. VENKATARAMAN (J.C.S., 1934, 513—514). —o-Hydroxyphenyl benzyl ketone, Na, and HCO₂Et yield isoflavone, m.p. 148°. 2:4-Dihydroxyphenyl 4nitrobenzyl ketone, m.p. 210° (2:4-dinitrophenylhydrazone, m.p. 238°; dibenzyl ether, m.p. 121°), is obtained from p-nitrophenylacetonitrile (I), resorcinol, and ZnCl₂, and is converted into 7-hydroxy-2-phenyl-3-pnitrophenylchromone, m.p. 301°. (I), resorcinol Me ether, and ZnCl₂ afford 2-methoxy-4-hydroxy-, m.p. 149—150° (2:4-dinitrophenylhydrazone, m.p. 229°), and 2-hydroxy-4-methoxy-phenyl 4-nitrobenzyl ketone, m.p. 136° (2:4-dinitrophenylhydrazone, m.p. 232°). α -Naphthyl p-nitrophenylacetate, m.p. 146° and 152°, is obtained from p-nitrophenylacetic acid, α -C₁₀H₇·OH, and POCl₃. F. R. S.

Coumarin derivatives. III. Characteristic reaction of coumarin-3-carboxylic acid. T. BOEHM and R. THEMLITZ (Arch. Pharm., 1934, 272, 406-427).—NH₂Ph coumarin-3-carboxylate (I) from NH₂Ph, o-OH·C₆H₄·CHO, and CH₂(CO₂H)₂ in EtOH] is converted, by keeping in $COMe_2$ solution, into γ acetyl-3-o-hydroxyphenylbutyranilide (II), m.p. 176° [p-nitrophenylhydrazone, m.p. 193-194°; Me ether, m.p. 104-105° (p-nitrophenylhydrazone, m.p. 178-179°)], converted by distillation in vac. into NH, Ph and the lactone (III), b.p. 218-225°/14 mm., m.p. 65° (p-nitrophenylhydrazone, m.p. 141°; semicarbazone, m.p. 184°; oxime, m.p. 197—198°), of γ-acetyl-β-0hydroxyphenylbutyric acid (IV), m.p. 116-118° (decomp.) (p-nitrophenylhydrazone, m.p. 165°; semicarbazone, m.p. 173°), which is obtained on hydrolysis, or by hydrolysis of (II). With Me₂SO₄-NaOH (IV) gives the corresponding OMe-acid, m.p. 102-104° (Et ester, b.p. 200-205°/14 mm.; p-nitrophenylhydrazone, m.p. 163°; semicarbazone, m.p. 199-200°), oxidised by NaOBr-NaOH to \$-0-methoxyphenylglutaric acid, m.p. 189-190° (decomp.) (monoanilide, m.p. 182°), identical with a specimen synthesised by hydrolysis of Et β -o-methoxy-n-propane-aayy-tetracarboxylate, m.p. 55° [from o-OMe·C₆H₄·CHO, CH₂(CO₂Et)₂, and NaOEt-EtOH]. With cold fuming HCl (II) affords, with loss of H2O, the lactam of 2-anilino-2-methylchroman-4acetic acid (V) (A, R=Ph), m.p. 126°. Similarly (III) with cone. aq. NH3 affords the lactam of 2-amino-2methylchroman-4-acetic acid (VI) (A, R=H), m.p. 252-254°. Heated in AcOH (IV) gives the lactone

of 2-hydroxy-2-methylchroman-4-acetic acid, m.p. 148°



[converted by NH_3 into (VI), and hydrolysed to (IV)]. By similar methods from coumarin-3-carboxylic acid and the appropriate base in COMe₂ are obtained : the *piperidide*, m.p. 143—145° (p-nitro*phenylhydrazone*, m.p. 193°), of

(IV), and the lactam of 2-p-methoxyphenyl-, m.p. 160°, 2-p-ethoxyphenyl-, m.p. 114—115°, 2-p-, m.p. 160°, 2-p-ethoxyphenyl-, m.p. 114—115°, 2-p-, m.p. 170— 171°, and 2-m-, m.p. 132—133°, -tolyl-, and 2-p-chlorophenyl-, m.p. 175°, -amino-2-methylchroman-4-acetic acid [all as (A)]. By a similar reaction in COMeEt (I) affords α -acetyl- β -o-hydroxyphenyl-n-valeranilide, m.p. indefinite 200°, converted by HCl into the lactam of 2anilino-2 : 3- dimethylchroman-4-acetic acid, m.p. 169— 170°. The mechanisms of these reactions are given. J. W. B.

Hydroxy-carbonyl compounds. IX. Benzopyrones related to phloretin. F. E. KING and A. ROBERTSON (J.C.S., 1934, 403-405).-The Me₃ derivative of 5:7:4'-trihydroxy-3-benzyl-2-methylchromone, to which Ciamician and Silber (A., 1894, i, 471; 1895, i, 538) assigned a coumarin structure, with PhCHO-NaOEt gives 5:7:4'-trimethoxy-2-styryl-3. benzylchromone, m.p. 165°, confirming the chromone structure. CH₂Ph·CH₂·CN and phloroglucinol Me₂ ether condense (ZnCl_-HCl) to 2-hydroxy-4: 6-dimethoxy-B-phenylpropiophenone (I), m.p. 105°, and the ZnCl_-imine double compound of 4-hydroxy-2: 6-dimethoxy-\beta-phenylpropiophenone, m.p. 206-208° (decomp.), converted into the ketone hemihydrate, m.p. 73-74°, and 104-105° (anhyd.). (I) and NaOAc-Ac_O yield 5: 7-dimethoxy-3-benzyl-2-methylchromone, m.p. 168°, which with PhCHO condenses to the 2styryl derivative, m.p. 179-181°. 7-Methoxy-2-styryl-3-benzylchromone, m.p. 174°, is obtained from the corresponding Me derivative. Phloroglucinol Me, ether and P_2O_5 with Et α -benzylacetoacetate form 5:7-dimethoxy-3-benzyl-4-methylcoumarin, m.p. 172-173°, and with Et α -p-methoxybenzylacetate, the 5:7:4'-(OMe)3-compound, m.p. 137°, and not the F. R. S. 1:4-pyrones.

Acid condensation of salicylaldehyde with acetylacetone, ethyl acetoacetate, and pyruvic acid. R. J. W. LE FÈVRE (J.C.S., 1934, 450–454).— Salicylaldehyde (I) (2 mols.), CH_2Ac_2 (1 mol.), and $HClO_4$ afford 3-acetyl-2-o-hydroxystyrylbenzopyrylium perchlorate, m.p. 135–140°, which is obtained impure by the method of Chatterji and Ghosh (*ibid.*, 1918, **113**, 446), who assigned to the corresponding chloride the constitution (II). Salicylideneacetylacetone, HCl, and HClO₄ give 3-acetyl-2-methylbenzopyrylium perchlorate (?), m.p. 145–150°, correspond-



ing with (II). (I), $CH_2Ac \cdot CO_2Et$, and $HClO_4$ -HCl condense to a per-Me chlorate $C_{18}H_{17}O_7Cl$ (III), m.p. COMe 300-305°, identical with the product obtained from 3-acetylcoumarin and (I). β -Naphthol-1-

aldehyde and $CH_2Ac \cdot CO_2Et$ similarly condense to a *perchlorate*, $C_{16}H_{15}O_7Cl$, m.p. above 300°. (I) and $CH_2Bz \cdot CO_2Et$ yield 3-benzoylcoumarin; COPhMe and $o \cdot OAc \cdot C_6H_4 \cdot CHO$ condense to 2-phenylbenzopyrylium

perchlorate. (I) and $AcCO_2H$ with $HClO_4-HCl$ give 2-carboxybenzopyrylium perchlorate, m.p. 230—235° (decomp.), decarboxylated to benzopyrylium perchlorate monohydrate, m.p. 230—240°. $AcCO_2H$ condenses with piperonal to a substance, m.p. 161—162°. F. R. S.

Interaction of chloroacetyl chloride with βnaphthol. K. Dziewoński and T. Duźyk (Bull. Acad. Polonaise, 1934, A, 81–89).—Interaction of β -C₁₀H₂·OH, CH₂Cl·COCl, and AlCl₃ in PhNO₂ gives dihydro- β -naphthafuran-1-one (I) (cf. A., 1921, i, 431; 1931, 737) and (if a trace of H₂O is present) its anhydrobis-derivative (II), m.p. 228-229° (picrate, m.p. 170°; Br-derivative, m.p. 267°), which is also formed from (I) by action of conc. KOH or cold conc. H₂SO₄. Action of HNO₃ ($d \ 1.52$) in AcOH converts (I) into its 2- NO_2^- , m.p. 190° (decomp.), 2 : 2-(NO_2)₂-(III), m.p. 160° (decomp.), and $2:2:Bz-(NO_2)_3$ -(IV), m.p. 189°, -derivatives; the two former on reduction with Zn and 10% aq. KOH at 100° give 2:1-0H·C₁₀H₆·CO₂H. (III) and (IV) are converted by dissolution in KOH and acidification of the solutions into their (di-)aci-forms, m.p. 152° (decomp.) and 202° (decomp.), respectively; the K_2 salts of these are described. With acenaphthaquinone in AcOH and Ac.O (I) gives 2: 1'-dihydro-\$-naphthafuranoneacenaphtheneindigo, m.p. 287° (decomp.). (II) also gives a $(NO_2)_2$ -derivative, m.p. 161° (decomp.), and is oxidised by PbO_2 to 5:6:5':6'-dibenzo-oxindirubin, m.p. 335°. H. A. P.

Nitric acid oxidation of 2: 5-diphenylfurans to unsaturated $cis-\alpha\delta$ -diketones. R. E. LUTZ and F. N. WILDER (J. Amer. Chem. Soc., 1934, 56, 978— 979).—2: 5-Diphenylfuran is oxidised by HNO₃ (d 1.42) in AcOH at 25° to $cis-\alpha\beta$ -dibenzoylethylene; 3:4-dichloro- and -dibromo-2: 5-diphenylfurans similarly give (at 100°) $cis-\alpha\beta$ -dichloro- and -dibromo- $\alpha\beta$ -dibenzoylethylene, respectively. Oxidation probably involves addition of OH and NO₂ at C₂ and C₅ and subsequent elimination of HNO₂. H. B.

Toxicarol. V. 7-Hydroxytoxicarol and related compounds. E. P. CLARK (J. Amer. Chem. Soc., 1934, 56, 987-991).—The toxicarol and dihydrotoxicarol hydrates of Butenandt and Hilgetag



(A., 1932, 751; 1933, 1302) are 7-hydroxytoxicarol (I), m.p. 226-227°, and 7 - hydroxydihydrotoxicarol (II), m.p. 222-223°, respec-

tively. The production of (I) from toxicarol (III) and EtOH-KOH (cf. loc. cit.) involves atm. oxidation. (III) and 50% KOH in C_6H_6 -EtOH give (I) and a little dehydrotoxicarol (IV). (I) is best prepared from (III) and 2.5% Na-Hg in C_6H_6 -EtOH; reduction does not occur. (I) is also obtained by oxidation (CrO₃,AcOH) of (III); diacetyltoxicarol similarly gives 7-hydroxyacetyltoxicarol (V), m.p. 184°, hydrolysed (EtOH-KOH) to (I) and by 5% HCl to (IV). Reduction (H₂,PtO₂,EtOAc) of (V) affords 7-hydroxyacetyldihydrotoxicarol, m.p. 196-198° [also obtained by oxidation (KMnO₄, COMe₂) of diacetyldihydrotoxicarol], which is hydrolysed (EtOH-KOH) to (II). (II) is best prepared from dihydrotoxicarol and Na-Hg in C_6H_6 -EtOH; it is converted by EtOH-HCl into dehydrodihydrotoxicarol. (I), Ac₂O, and NaOAc give acetyldehydrotoxicarol, the formation of which involves acetylation of C₂·OH and elimination of H₂O between C₇·OH and C₈·H. (IV) is produced from (I) and EtOH-HCl. H. B.

Oxygen and sulphur isologues of antidiperidibenzocoronenequinone and attempted preparation of the nitrogen isologue, di-imidoheterocoerdianthrone. R. SCHOLL, O. BOTTGER, and L. WANKA [with, in part, H. HAHLE and H. BEHER] (Ber., 1934, 67, [B], 599—610; cf. A., 1932, 617, 731).—Treatment of 4:8-diphenoxyanthraquinone-1:5-dicarboxylic acid with Ac₂O+conc. H₂SO₄ gives (?) 4:8-diphenoxyanthraquinol-1:5-dicarboxydilactone, whereas it is transformed by AlCl₃ or NaCl-AlCl₃ into chlorinated products, which after removal of Cl by Na₂S₂O₄ give heterocoerbioxene-1:5-dicarboxylic acid (I), m.p. about 350° after darkening at about 250°. (I) is transformed by conc. H₂SO₄ at



100° into 4:3''-8:3'-dioxidohetero-7': 7''-coerdianthrone (II, R=O), which chars when heated and is reduced by NH₃-Na₂S₂O₄ to 7': 7''-dihydroxy-4:3''-8:3'-dioxidoheterocoerdianthrene. Similarly, 4:8-diphenylthiolanthraquinone - 1: 5-dicarboxylic acid and AlCl₃ at 135—140° afford a partly chlorinated heterocoerbithiene-1: 5-dicarboxylic acid, trans-



formed by successive treatment with conc. H₂SO₄ at 100° and NaOH-Na₂S₂O₄ into 4:3"-8:3'-disulphidohetero-7:7"-coerdianthrone Cl₂ (III) (cf. II, R=S). (III) is reduced by NH₃-Na₂S₂O₄ to 7':7"-dihydroxy-4:3"-8:3'-disulphidoheterocoerdianthrene. 4:8-Dichloro-1:5-diamino- (IV) is converted by KOH and PhOH

at $160-170^{\circ}$ into 4:8-diamino-1:5-diphenoxyanthraquinone, m.p. 282° after softening. 1:4:5:8-Tetraphenoxyanthraquinone, m.p. $234-235^{\circ}$, is derived from the 4:8-dichloro-1:5-dinitro-compound, KOH, and PhOH at 150° . (IV) is transformed by boiling NH₂Ph, KOAc, and a little Cu powder into 1:5-diamino-4:8-dianilinoanthraquinone, m.p. 330° . 4:8-Dianilino-1:5-dicyanoanthraquinone, m.p. about 360° , similarly prepared from the 4:8-dichloro-1:5-dicyano-compound, is converted by 70°_{0} H₂SO₄ at $150-160^{\circ}$ into the acridine derivative, C₂₆H₁₄N₂, in small yield. 4:8-Di-p-toluidino-1:5-dicyanoanthraquinone, m.p. about 365°_{\circ} , and the acridine compound, $C_{28}H_{18}N_2$, are described. 1:5-Diamino- and SO_2Cl_2 in boiling C_6H_6 give 2:4:6:8tetrachloro-1:5-diamino-anthraquinone, m.p. <360°, whence 2:6-dichloro-1:5-diamino-4:8-dianilino- and -4:8-di-p-toluidino-anthraquinone. 2:4:6:8-Tetrachloro-1:5-dicyano-, 2:6-dichloro-4:8-dianilino-1:5dicyano-, and 2:6-dichloro-4:8-dianilino-1:5dicyano-, and 2:6-dichloro-4:8-di-p-toluidino-1:5dicyano-anthraquinone are described. 4:8-Dianilinoanthraquinone-1:5-dicarboxyl chloride, m.p. 280– 290°, from the acid (V) and PCl₅ in boiling C_6H_6 is converted by the successive action of boiling PhNO₂ and AcOH into the dimeric anilide

 $\begin{array}{c} {}^{\rm CO_2H}_{\rm NHPh} > {\rm C_6H_2} < {}^{\rm CO}_{\rm C0} > {\rm C_6H_2} < {}^{\rm NPh \cdot CO}_{\rm C0} > {\rm C_6H_2} < {}^{\rm CO}_{\rm C0} > {\rm C_6H_2} < {}^{\rm CO}_{\rm C0_2H} , \\ {\rm m.p. 330-335^\circ \ after \ softening. (V) \ and \ AlCl_3 \ at 145^\circ \ afford \ 1:5-dicarboxycoerbiamidinium \ dichloride \ (VI), from which the free base is obtained by treatment \ with \ NH_3. \qquad H. W. \end{array}$

Cyclic sulphones derived from butadienes. H. J. BACKER and J. STRATING (Rec. trav. chim., 1934, 53, 525—543).— $[CH_2:CMe\cdot]_2$ and SO_2-Et_2O at 100° give a 60% yield of 3:4-dimethylthia- Δ^3 -pentene 1:1-dioxide (3:4-dimethyl-2:5-dihydrothiophen 1: 1-dioxide) (I), m.p. 135°, stable to KOĤ-EtOH in ultra-violet light and to K in Et_2O . (I) with Br in CCl₄ gives the dibromide (II), m.p. about 215°, reduced by Zn-AcOH to (I) and hydrolysed by boiling H_2O to trans-3: 4-dihydroxy-3: 4dimethylthiacyclopentane 1 : 1-dioxide (III), m.p. 175°, rhombic, a:b:c=0.942:1:1.387 (Ac₂ derivative, m.p. 138°). (I) with cold, aq. KMnO₄ gives the cis-form of (III), $+0.5H_2O$, m.p. 121.5 -122.5° , monoclinic, a:b:c=2.660:1:1.4650, $\beta=69^\circ$ 34' (anhydride, m.p. 145°; Ac_2 derivative, $+1.5H_2O$, m.p. 92°). (I) with Cl_2 -AcOH gives the $3:4-Cl_2$, m.p. 265° (decomp.), and 3-chloro-4-acetoxy-deriv-atives, m.p. 120-121°, the latter being also obtained by NHAcCl in AcOH at 100°. C₂H₄ and Cl₂-AcOH gives similarly CH₂Cl·CH₂·OAc, b.p. 143-145°. (I) and Br-AcOH give 80% of (II) and some 3bromo-4-acetoxy-derivative (IV), m.p. 133-135.5°. (IV) is obtained in 50% yield by NHAcBr and with BaCO₃-H₂O or KOAc-AcOH-Ac₂O gives 4-acetoxy-3: 4-dimethylthia- Δ^2 -cyclopentene 1: 1-dioxide* (70%) yield), m.p. $102-103^{\circ}$. (II) and hot N-NaOH give 3:4-dimethylthiophen 1:1-dioxide* (72% yield), m.p. 107° (HgCl₂ compound, decomp. about 100°), oxidised by KMnO₄ to AcOH and giving with Br-AcOH (?)2:3-dibromo-3:4-dimethylthia-(?) Δ^4 -cyclopentene 1:1-dioxide*, m.p. 158-159°, which is decomposed by hot H_2O and with KCN in aq. EtOH gives ?hydroxy - ?-cyano-3 : 4 - dimethylthia-(?) Δ^2 -cyclopentene 1:1-dioxide, m.p. 207°. Methylethylpinacone and a little hot 20% H_2SO_4 give a 75% yield of [CHMe:CMe·]₂, which with SO_2 -Ét₂O at 105° gives 2:3:4:5tetramethylthia- Δ^3 -cyclopentene 1: 1-dioxide (V), m.p. 58-59°, stable to aq. SO_2 at 150°, which with aq. HBr gives the 3: 4-hydrobromide, m.p. 155° (decomp.), and with Br-AcOH the 3:4-dibromide, m.p. 137° (decomp.); this is decomposed by hot H₂O, reduced by Zn-AcOH to (V), and with N-NaOH at 100° gives 2:3:4:5-tetramethylthiophen 1:1-dioxide*, m.p. 93-95°, unstable, which with Br-AcOH gives the (?)2:3dibromide*, m.p. 145-146° (decomp.) (?125-126°).

Diethylpinacone and alum at 140° give ad-dimethyl. By-diethylbutadiene (VI), b.p. 158-163°, yielding with maleic anhydride 1:4-dimethyl-2:3-diethyl. Δ^2 -tetrahydrophthalic anhydride, m.p. 90-91°. naphthaquinone 1:4-dimethyl-2:3-diethylwith 2:4:13:14-tetrahydroanthraquinone (VII), m.p. 91-92°, and 1: 4-dimethyl-2: 3-diethylanthraquinone, m.p. 152-153° [also obtained from (VII) by air in KOH-EtOH], and with SO₂-Et₂O at 100° 2:5-dimethyl. 3: 4-diethylthia - Δ^3 -cyclopentene 1: 1-dioxide, m.p. 145° [(?)3 : 4-dibromide, m.p. 106° (decomp.) after softening at about 90°]. Pinacolin and MgEtBr give CMeEtBu^{*}·OH, b.p. 149-152°, m.p. -20°, which, when distilled with a drop of H2SO4, gives impure CHMe:CMeBu^y; this with Br in CS₂ gives a mixture of dibromides, passing by distillation at 25 mm. into nearly pure tert.-butylbutadiene, b.p. 104-106°, whence are obtained 5-tert.-butyl- Δ^5 tetrahydrophthalic anhydride, m.p. $123 \cdot 5-124^{\circ}$ (corresponding acid, m.p. $132-133^{\circ}$), 2-tert.-butylanthra-quinone, m.p. $104-104 \cdot 5^{\circ}$, and its 1:4:13:14-tetrahydro-derivative, m.p. $89 \cdot 5-90^{\circ}$, and 3-tert.butylthia-∆3-cyclopentene 1:1-dioxide, m.p. 82-83°, which does not add Br and with KOH-EtOH in ultra-violet light gives an isomeride, m.p. 96-97°. CPhMeEt OH and alum at 130-140° give a 64% yield of β -phenyl- Δ^{β} -butene (containing some Δ^{α} isomeride), which with Br in CCl_4 gives the $\beta\gamma$ - (and some ab-)dibromide, which with hot KOH-EtOH gives a mixture of bromo-β-phenylbutenes, decomposed at $380^{\circ}/20$ mm. to β -phenylbutadiene, b.p. $58-59^{\circ}/9$ mm. This yields 5-phenyl- Δ^{5} -tetrahydroph-thalic anhydride, m.p. $105-105\cdot5^{\circ}$ (corresponding acid, m.p. 214°), 2-phenylanthraquinone and its 1:4:13:14-tetrahydro-derivative, m.p. $142\cdot5-143\cdot5^{\circ}$ and 3-phenylthia- Δ^3 -cyclopentene 1 : 1-dioxide (VIII), m.p. 132.5-133.5°. (VIII) gives an isomeride, m.p. 166–167°, and, rapidly in AcOH but slowly in CS_2 , the 3: 4-dibromide, m.p. 147° (decomp.), decomposed by hot H₂O. (VIII) with cold KMnO₄ gives 3:4. dihydroxy-3-phenylthiacyclopentane 1: 1-dioxide, m.p. +0.5H,0, 109-110°, anhyd., 134-135°, which with Ac₂O and a drop of H₂SO₄ forms 4-acetoxy-3phenylthia- Δ^2 -cyclopentene 1:1-dioxide, m.p. 158-159°. γ -Hydroxy- $\beta\gamma$ -ditert.-butyl- Δ^{α} -butene with hot $H_2C_2O_4$ gives a very poor yield of $\beta\gamma$ -ditert.-butyl-butadiene, which affords 3:4-ditert.-butylthia- Δ^3 cyclopentene 1: 1-dioxide, m.p. 69-70°. By-Diphenyland β-chloro-y-methyl-butadiene yield similarly 3:4diphenyl-, m.p. 183-184°, and 4-chloro-3-methylthia- Δ^3 -cyclopentene 1 : 1 dioxide, m.p. 120–120.5°, respectively. The formulæ assigned to substances marked * above are, however, not in accord with products of ozonolysis. R. S. C.

Synthesis of pp'-diphenylene disulphide. V.C.

PAREKH and P. C. GUHA (J. Indian Chem. Soc., 1934, 11, 95–100).—p-C₆H₄(SH)₂ (improved prep. described) and EtOH-FeCl₃ give an amorphous product, (C₆H₄S₂)_n, m.p. >300°, which with Cu at 300° gives traces of a compound, C₁₂H₈S₂, m.p. 148°, which is unaffected by Zn+HCl and is considered). H. B.

(I.) to be (I).

Action of acetic anhydride on a-methylaminoisobutyric acid. R. E. STEIGER (Helv. Chim. Acta, 1934, 17, 555-563).-Acetylation of NHMe CMe₂·CO₂H (I) (improved prep.) with Ac₂O in AcOH is complicated by interaction of the products (details tabulated). The N-Ac derivative (II), sinters 181°, m.p. 184° (corr., decomp.; initial bath temp. 179°), of (I) [optimum yield 40% of (I) reacting] by cyclisation and loss of H₂O affords CO-O-CCH₂ which condenses $(-H_2O)$ with (II) to give α -(3-keto-1:2:2:5tetramethyl-2: 3-dihydropyrrole-4-carboxymethylamido)- $\stackrel{\mathrm{NMe} \cdot \mathrm{CMe}}{\mathrm{CMe}_2 \cdot \mathrm{CO}} > C \cdot \mathrm{CO} \cdot \mathrm{NMe}_2 \cdot \mathrm{CMe}_2 \cdot \mathrm{CO}_2 \mathrm{H}$ isobutyric acid, (III), m.p. 206° (corr., decomp.; bath at 200°), (optimum yield 8.7%), hydrolysed by H₂O at 100° to (I), 3-keto-1:2:2:5-tetramethyl-2:3-dihydro-pyrrole, and CO₂. With Ac₂O (II) does not give (III), (I) being the only cryst. material isolated. Mechanisms are given. J. W. B.

Photopyridine reaction. I. F. FEIGL. II. H. FREYTAG (J. pr. Chem., 1934, [ii], **139**, 343, 343— 344).—Polemical (cf. this vol., 303). R. S. C.

Isomerisation products of pyridine salts of unsaturated acids. H. LOHAUS (J. pr. Chem., 1934, [ii], 139, 289).—The C_5H_5N salts of piperonylpropargylidenemalonic (A., 1928, 1005) and cinnamylidenecyanoacetic acids isomerise (cf. A., 1933, 1169). C_5H_5N salts of similar acids will probably isomerise if the time of reaction is sufficiently long. R. S. C.

β-Hydroxyphenylethylpyridinium chloride and 1-β-hydroxyphenylethyl-2-pyridone. J. A. GAUTIER (Compt. rend., 1934, 198, 1430—1432).—Styrene chlorohydrin combines with C_5H_5N at 120° to form β-hydroxy-β-phenylethylpyridinium chloride, m.p. 210— 212° (decomp.). This is decomposed at 150° with formation of COPhMe, and is oxidised by $K_3Fe(CN)_6$ to 1-β-hydroxy-β-phenylethyl-2-pyridone, m.p. 127°. E. W. W.

Synthesis of pyridiniumethanols by a novel aldehyde condensation. I. F. KRÖHNKE [with K. FASOLD] (Ber., 1934, 67, [B], 656-667).-The compound obtained by the action of PhCHO and KOH-EtOH on phenacylpyridinium bromide (I) is identified 1-β-hydroxy-β-phenylethylpyridinium as (" a-phenyl-\$-pyridiniumbromidebromide (II) ethanol"), since oxidation of the perchlorate with hot CrO_3 -H₂SO₄ gives quantitatively 1-phenacyl-pyridinium perchlorate. The presence of OH is established by the isolation of an Ac deriv-ative [perchlorate, m.p. (vac.) 142-145° after softening at 138°]. Catalytic reduction of (I) attords (II) in small amount. (II) is obtained from OH·CHPh·CH₂Br (improved prep.) and C₅H₅N. Hydrogenation of (II) in H₂O leads to 1-β-hydroxyβ-phenylethylpiperidine, m.p. 68.5-69.5° (hydrobromide, m.p. 167—168°; perchlorate, m.p. 133— 134°; picrate, m.p. 137·5° after softening at 135°; Ac derivative, m.p. 207–208°, and its perchlorate). Complete hydrogenation of (II) at 50° (PtO₂-gum arabic-H2O) yields 1-\beta-hydroxy-\beta-cyclohexylethylpiperidine [hydrobromide, m.p. 230-232° after softening at 227°; hydrochloride, m.p. 240-241° (decomp.)

after softening at 238°; Ac derivative, m.p. 218-219°]. 1-β-hydroxy-β-phenylethylquinolinium bromide, m.p. 185° (or, $+1H_2O$, m.p. $112-113\cdot 5^{\circ}$) (corresponding perchlorate, m.p. 202° after softening at 198°), and 2-β-hydroxy-β-phenylethylisoquinolinium bromide, m.p. 170-172° after softening at 160° (or $+H_2O$, m.p. 110-112°) (corresponding perchlorate), are derived from the appropriate base and OH-CHPh-CH_Br. Condensation of (I) with the appropriate aldehyde in H₂O-EtOH containing NaOH yields the following 1-β-hydroxy-β-phenylethylpyridinium salts with substituents in the Ph nucleus: $0 - NO_2$ -, bromide, m.p. 222.5° after softening at 221°; $p - NO_2$ -, bromide, m.p. 270—272° (decomp.); 0 - Cl-, bromide, m.p. 275° (decomp.); m - Cl-, bromide, m.p. 213—214°, and perchlorate, m.p. 167°; p-Me, bromide, m.p. 212.5° after softening at 210°; p-Pr^β, perchlorate, m.p. 115— 117°; p-OMe-, bromide, m.p. 180-181°, and perchlorate; m-OMe-, bromide, m.p. $165-166^{\circ}$; 3:4-(OMe)₂-, bromide, m.p. 180° ; 3:4-O₂CH₂, bromide, dccomp. 147°. 1-β-Hydroxy-δ-phenyl-n-butyl-, m.p. 145° after softening at 142°, -γ-phenyl-n-propyl-, m.p. 206—207° after softening at 205°, -γγγ-trichloro-n-propyl-, decomp. 220—222°, -n-octyl-, m.p. 111—113°, and -furyl (III)-, m.p. 215.5°, -pyridinium bromide and the perchlorate corresponding with (III) are described. C5H5NEtBr and PhCHO yield the stereoisomeric β -hydroxy- β -phenyl- α -methylethylpyridinium bromides, m.p. 199-200° and m.p. 186° after softening above 180° (corresponding perchlorates, m.p. 181-182° after softening and m.p. 180-181° after softening at 156°. respectively). 1-Benzylpyridinium bromide, m.p. 89.5-91°, and PhCHO give 1-β-hydroxy-αβ-diphenylethylpyridinium bromide, m.p. 234-235° after softening at 180°. CH2Ph·CH2Br and C5H5N when heated yield 1-3-phenylethylpyridinium bromide, m.p. 126° (corresponding iodide, thiocyanate, and perchlorate, m.p. 140-142° after softening at 138°), which with PhCHO affords $1-\beta-hydroxy-\alpha-benzyl-\beta-phenylethyl-$ pyridinium perchlorate, m.p. 158—160°. (I) andZn-AcOH yield COMePh. Triethylphenacylammonium bromide, m.p. 150—151° (corresponding per-chlorate, m.p. 116—117°), appears unaffected by PhCHO. Similarly, PhCHO does not appear to react with 1-methylpiperidine hydrobromide, m.p. 182-184° (corresponding picrate, m.p. 145-150° to a turbid liquid), or with ethylenedipyridinium bromide, m.p. 295° (decomp.) (corresponding perchlorate)].

H. W. **Preparation of pyridine-2-carboxylamide from 2-bromopyridine.** W. R. BRODE and C. BREMER (J. Amer. Chem. Soc., 1934, 56, 993—994).—Pyridine-2-carboxylamide (25%), m.p. $106\cdot3$ — $106\cdot8^{\circ}$ (corr.) (lit. 103·5°), and a little of the free acid are obtained from 2-bromopyridine (I), aq. KCN, and Cu(CN)₂ at 175°. 2-Cyanopyridine could not be prepared from (I) by essentially Craig's method (this vol., 303). H. B.

Synthesis of medicinal products. VII. Theory of laxatives. II. H. P. KAUFMANN and K. WUL-ZINGER (Arch. Pharm., 1934, 272, 481–502).—By fusion of $o - C_6H_4(CO)_2O$ with the appropriate hydroxydiphenyl and ZnCl₂ are prepared : oo'-diphenyl-[bis-(2-hydroxy-4-diphenylyl)-], m.p. 272° (Ac₂ derivative), and oo'-di-o-hydroxyphenyl- [bis-(2 : 2'-dihydroxy-4-diphenylyl)-] (Ac₄ derivative), -phenolphthalein [-phthalide]. Similarly from isatin (I) are obtained 3: 3-di-(2-hydroxy-4'-diphenylyl)-, sinters 110-120° (OO- Ac_2 , sinters 100°, Ac_3 , and Bz_3 , sinters 100°, derivatives); 3: 3-bis-(2:2'-dihydroxy-4-diphenylyl)-(Ac5 derivative, sinters 110-120°); 3: 3-di-(4-hydroxy-3-benzylphenyl)isatin (OO-Ac2, sinters 100°, Ac3, sinters 70-80°, and Bz3, sinters 60-70°, derivatives). Similar condensations with N-benzylisatin [from (I), NaOMe, and CH₂PhCl] afford 3:3-di-phydroxyphenyl-, m.p. 227° (Ac₂ and Bz₂, sinters 100– 110°, derivatives), 3: 3-di-(2-hydroxy-4-diphenylyl)-, sinters 100° (Ac_2 , sinters 100—110°, and Bz_2 , derivatives), 3: 3-bis-(2: 2'-dihydroxy-4-diphenylyl)- (Ac_4 , m.p. 110—115°, and Bz_4 derivatives), and 3:3-di-(4hydroxy-3-benzylphenyl)-1-benzylisatin (Ac, derivative). The laxative properties of these derivatives are discussed in relation to structure and solubility. J. W. B.

Constitution of the isatides. R. STOLLE and M. MERKLE (J. pr. Chem., 1934, [ii], 139, 329-337).-The following and other reactions favour the pinacone structure for isatides. 1-Phenyldioxindole (I), m.p. 132° [best obtained from 1-phenylisatin (II) and Zn-EtOH-aq. SO2], with 3-acetyl-1-phenyldioxindole (III) and a few drops of piperidine in dry EtOH give 3-acetyl-1: 1'-diphenylisatide (IV), m.p. about 180° (variable). (II) and hot, aq. $Na_2S_2O_4$ give 1:1'-diphenylisatide (V), m.p. 195° [Ac₂ derivative, m.p. 221°, also obtained from (IV)], also obtained from (II) and (I). (I) and BzCl in C_5H_5N give a substance (VI) (R=Ph), m.p. 184°, hydrolysed by hot 2N-HCl to 3-benzoyl-1-phenyldioxindole (VII), m.p. 137°.



(VII) and (II) give 3-benzoyl-1: l'-diphenylisatide, m.p. 172°, CONBzPh giving with BzCl-C5H5N the 3: 3'-Bz₂ derivative, m.p. 254°, also obtained similarly from (IV). 1 - Methyldioxindole

(VIII), best obtained by Zn dust-EtOH-aq. SO₂, and Ac₂O in CO₂ give the 3-Ac derivative, m.p. 141⁵. (VIII) and 1-methylisatin (IX) give 1:1'-dimethyl-isatide (X), m.p. 174°. 3-Acetyl-1-methyldioxindole and (IX) give 3-acetyl-1:1'-dimethylisatide, m.p.about 160° (decomp.), which with Ac₂O gives the $3:3\text{-}Ac_2$ derivative, m.p. 220°, also obtained from (X). (VIII) and BzCl-C₅H₅N give the substance (VI) (R=Me), m.p. 174°, and 3-benzoyl-1-methyldioxindole, m.p. 115° [also obtained from (VI) (R=Me) by hot dil. HCl]. (I) and (IX) give 1-phenyl-1'methylisatide, m.p. 134° (decomp.) [3:3-Ac2 (XI), m.p. 241°, and 3-Ac (XII) derivative, m.p. about 187° (decomp.) (variable)]. (XII) gives (XI) by further acetylation and is also obtained from (III) and (IX). (XII) and 3'-acetyl-1-phenyl-1'-methylisatide do not give a depression of the m.p.

R. S. C.

Germicidal and antiseptic activities of some derivatives of 8-hydroxyquinoline. E. MONESS and W. G. CHRISTIANSEN (J. Amer. Pharm. Assoc., 1934, 23, 228-232).-Chlorination of 5:8-dihydroxyquinoline (I) (Et_1 ether (II), m.p. 96–98°; Bu^{a_1} ether (III), m.p. 92°) by SO₂Cl₂ in glacial AcOH yields a mixture of Cl₁- and Cl₂-derivatives, the germicidal and bacteriostatic actions (IV) of which are only

moderate. (II) and especially (III) exhibit enhanced (IV). A. E. O.

[Comparison of the dimethylquinoline from aniline, isobutaldehyde, and methylal with 2:3dimethylquinoline and the relationship of 2:3dimethylquinoline to benzil.] G. ROHDE (Ber., 1934, 67, [B], 715; cf. this vol., 533).—A correction of crystallographic data. H. W.

New synthesis of 3-alkylquinolines. G. DAR. ZENS and M. MEYER (Compt. rend., 1934, 198, 1428-1429).-A modification of the Skraup synthesis, employing substituted glycerols of type OEt·CH, CR(OH)·CH2·OEt. When R=H, Me, Et, and Bu^{β} , the products are, respectively, quinoline, and 3-methyl-, 3-ethyl- (picrate, new m.p. 192°). and 3-isobutyl-quinoline, b.p. 114°/2 mm. (picrate, E. W. W. m.p. 160°).

Oxidising action of selenium dioxide. L. MONTI (Atti R. Accad. Lincei, 1933, [vi], 18, 505-507).—In PhMe, SeO_2 readily oxidises 2-methyl-quinoline to quinoline-2-aldehyde. T. H. P.

Antiseptic properties of amino-derivatives of styryl- and anilo-quinoline. C. H. BROWNING, J. B. COHEN, K. E. COOPER, S. ELLINGWORTH, and R. GULBRANSEN (Proc. Roy. Soc., 1934, B, 115, 1-13).—A continuation of previous work (A., 1926, 1153; 1928, 1141). 6-Amino-2-methylquinoline and $CO_2Et \cdot CH_2 \cdot CH_2 \cdot CCl$ in $CHCl_3$ (cf. A., 1932, 623) give 6-β-carbethoxypropionamido-2-methylquinoline, m.p. 155-156°, the methiodide (I), m.p. 190-192° (decomp.), of which with p-NMe₂·C₆H₄·CHO in EtOH and a little C5H5N affords 6-\beta-carbethoxypropionamido-2-p-dimethylaminostyrylquinoline methiodide. (I) and p-NO·C₆H₄·NMe₂ give 6- β -carbethoxypropionamido-2p-dimethylaminoaniloquinoline methiodide. 6-8-Carbethoxyvaleramido-2-methylquinoline, m.p. 93-95° (methiodide, m.p. 158-159°), and 6-8-carbethoxyvaleramido - 2 - p - dimethylamino - styryl - and -aniloquinoline methiodides are similarly prepared. 2-Aldehydo- β -naphthquinoline methochloride with *m*and $p - C_6 H_4 (NH_2)_2$ in $H_2 O$ give the dianils, $C_{36} H_{30} N_4 Cl_2$. p-Nitroso-isopropylaniline, m.p. 86°, -butylaniline (II), m.p. 60°, -phenylethylaniline (III), and -benzylaniline, m.p. 35°, are prepared as previously described (A., 1928, 1141), and condensed (no details) with 2methylquinoline (A., 1924, i, 990). (II) and (III) are condensed (no details) with β -naphthquinaldine and p-toluquinaldine methochlorides, respectively. The antiseptic action of the above (as methochlorides) and related compounds has been investigated; previous observations (loc. cit.) on the effects of H. B. substituents are confirmed.

Action of acid chlorides on azines. E. BENARY (Ber., 1934, 67, [B], 708-710).-Benzaldazine and CH,Cl·COCl give N-chloroacetyl-N-benzylidenehydr azine, m.p. 165-166°, transformed by NH₂Ph in boiling EtOH into benzylidenephenylglycinehydrazide. N'-aβ-Dibromopropionyl-N-benzylidenehydrazine, m.p. 135°, is similarly prepared. cycloHexanoneazine and CH,Cl·COCl in Et₂O afford 9-chloroacetyl-

1:2:3:6:7:8:10:13-octahydrocarbazole, m.p. 90-91°, converted by KOH-EtOH into octahydrocarbazole, m.p. 102°. 9-Acctyl-, 9-a-bromoisobutyryl-, and 9-p-nitrobenzoyl-1:2:3:6:7:8:10:13-octahydrocarbazole have m.p. 73°, 130-131°, and 163-165°, respectively. H. W.

Reaction of ninhydrin [triketohydrindene] and isatin with proline and hydroxyproline. W. GRASSMANN and K. VON ARNIM (Annalen, 1934, 509, 288–303).—Triketohydrindene hydrate (I) (2·2 mols.) and proline (II) (1 mol.) in H₂O at $p_{\rm H}$ 7 (phosphate) give the dye (III) (A or B, R=H), m.p. 176° (decomp.), also obtained from (I) and pyrrolidine



(IV) in AcOH. (I) (1 mol.) and (II) (1 mol.) in EtOH give a compound, $C_{13}H_{11}O_2N$, decomp. >190°, which with (I) at $p_{\rm H}$ 7 affords (III). (I) and hydroxyproline (V) give a dye (A or B, R=OH), m.p. $>275^{\circ}$. Piperidine (VI) (>2 mols.) and (I) (1 mol.) in EtOH afford a compound, C₁₉H₂₄O₂N₂, m.p. 131° (decomp.), converted by Ac₂O in boiling PhMe into a dye, C₂₃H₁₅O₄N, also obtained from (I) (2 mols.) and (VI) or piperidine-2-carboxylic acid (1 mol.) in AcOH. Isatin (2 mols.) and (II) (1 mol.) in AcOH give a dye (C or D, R=H), also obtained similarly from (IV), which is reduced (Zn, AcOH; TiCl_a) to a leuco-compound (uptake of 2H); (V) similarly affords the dye (C or D, R=OH). Absorption spectra curves of the above dyes are given. Structures are suggested for the intermediate H. B. compounds.

Influence of alkyl- and alkylene-mercaptan groups on the therapeutic activity of organic Methylthiolatophan. compounds. I. К. BRAND and E. VÖLCKER. II. 4-Methylthiol-1phenyl-2: 3-dimethylpyrazol-5-one (4-methylthiolantipyrine). K. BRAND and W. BAUSCH (Arch. Pharm., 1934, 272, 257-268, 269-273).--I. o- (I) and p- (II) - Aminophenyl Me sulphide with AcCO₂H and PhCHO in boiling EtOH give, respectively, 8-, m.p. 257° (13% yield : Me, m.p. 113°, and Et, m.p. 123·5°, esters; $Na+6H_2O$, m.p. 102°, $K+6H_2O$, m.p. 125°, and Ba salts), and 6-, m.p. 224° (329) right Max = 1000(33% yield : $Me, m.p. 125^{\circ}$, and $Et, m.p. 94.5^{\circ}$, esters; $Na+6H_2O, m.p. 85^{\circ}, K+6H_2O, m.p. 65^{\circ}$, and Basalts), -methylthiol-2-phenylquinoline-4-carboxylic acid (methylthiolatophan), the 6-compound being accompanied by a 20% yield of the 4-p-methylthiolanil of 4:5-diketo-2-phenyl - 1 - p-methylthiolphenylpyrrolidine, MeS·C₆H₄·N < CHPh·CH₂ CO-C:N·C₆H₄·SMe[,] m.p. 224–226°. With NH2OH, H2SO4 and CCl3 CH(OH)2 in boiling H2O (1) gives oximino-o-methylthiolacetanilide, m.p. 164°, which could not be converted into the corresponding isatin, but which with P_2O_5 in boiling PhMe affords (?) 2-hydroxy-8-methylthiolquinoxaline,

MeS·C₆H₃<N:CH N:C·OH, m.p. 227°; NHPh·CO·CH:N:OH similarly treated gives only a trace of an (unpurified) substance, m.p. 252° (2-hydroxyquinoxaline, m.p. 265°). Neither oximino-p-methoxyacetanilide, m.p. 183° (from p-anisidine), nor the corresponding o-compound gave similar products. With CO(CO₂Et)₂ in AcOH (II) gives an additive compound, m.p. 107°, converted by heating in AcOH into Et 5-methylthioldioxindole-3-carboxylate, m.p. 175°, converted, by heating with aq. KOH in a current of air, into 5-methylthiolisatin, m.p. 185°. The introduction of MeS lessens the physiological activity of atophan.

II. Bis-1-phenyl-2: 3 - dimethyl-5-pyrazolonyl 4-disulphide (Kaufmann et al., A., 1924, i, 209, modified) heated with Na₂S,9H₂O and NaOH in EtOH affords the Na derivative of 4-thiolantipyrine, converted by Me₂SO₄ into 4-methylthiolantipyrine, m.p. 115°, which, although less toxic, has also a much smaller antipyretic action than antipyrine itself. J. W. B.

5-Carboxyhomophthalic acid, 6-nitrophthalide, and 6-nitrophthalimidine.—See this vol., 652.

N-Aminobarbituric acids. M. BUSCH and F. PöHLMAN (Arch. Pharm., 1934, 272, 190—197).— Although $CH_2(CO_2Et)_2$ (I) condenses with $NH_2\cdot NH\cdot CO\cdot NH_2$ in NaOEt-EtOH to give only $[NH_2\cdot CO\cdot NH\cdot]_2$, with $NHPh\cdot NH\cdot CO\cdot NH_2$ (II), 3-anilinobarbituric acid, m.p. 206° [Na salt, m.p. 275° (decomp.)], is obtained, its 5-*Et* derivative, m.p. 94—96°, being similarly obtained from $CHEt(CO_2Et)_2$. $CEt_2(CO_2Et)_2$ (III) and (II) give 1-phenyl-4:4-diethylpyrazolone and phenylurazole. (I) and $CH_2Ph\cdot NPh\cdot NH\cdot CO\cdot NH_2$ (IV) give 3-phenylbenzylaminobarbituric acid, m.p. 194°, its 5:5-*Et*_2 derivative (V), m.p. 131°, being similarly obtained from (III). (I) with as.-dibenzylsemicarbazide, m.p. 157° [from $N(CH_2Ph)_2\cdot NH_2$ and KCNO], and with $NPh_2\cdot NH\cdot CO\cdot NH_2$ gives, respectively, 3-dibenzylamino-, m.p. 161°, and 3-diphenylamino-barbituric

and 0^{-1} , m.p. 101, and $3^{-acphenglamino-barbituric}$ acid, m.p. 185°, and $3^{-methylanilino-5}: 5^{-diethylbarbituric}$ barbituric acid, m.p. 167°, is obtained from (III) and NPhMe·NH·CO·NH₂. Only (V) has marked narcotic, but also irritant, action. J. W. B.

Reduction with lead-sodium alloy. IV. Alkylbarbituric acids. F. FICHTER and H. STENZL (Helv. Chim. Acta, 1934, 17, 665—669).—Reduction of 5-isopropylbarbituric acid with Pb-Na in aq. AcOH or electrolytically (Pb cathode) gives 5-isopropyluracil, m.p. 288—289°. By similar reduction methods the 5-Et compound gives 5-ethyldihydrouracil, m.p. 254° (lit. 274—275°), probably mixed with 5-ethyluracil. J. W. B.

Lævorotatory allantoin.—See this vol., 695.

Organic sulphur compounds. I. Action of hydrogen cyanide, ammonia, and hydrogen sulphide on saturated ketones. K. ABE (Sci. Rep. Tokyo Bunrika Daigaku, 1934, A. 2, 1-7).—COMeEt with KCN-AcOH and subsequent saturation of the solution first with NH₃ and then with H₂S gives an unstable yellow substance, m.p. 58°, which loses H₂S when warmed with H_2O giving 5-thio-2: 4-dimethyl-2: 4-diethyl-2-deoxyhydantoin, m.p. 67° (cf. Gatewood ct al., A., 1928, 745). Similar treatment of COPhMe affords α -amino- α -phenylpropionthioamide, m.p. 138° (corr.) (compound with HgCl₂, darkens about 180°), 5-phenyl-5-methylhydantoin, m.p. 197° (corr.), and α -imino- α -phenylpropionitrile, m.p. 218° (corr.). COPh₂ gives only dibenzhydryl disulphide, m.p. 153° (corr.). J. W. B.

Reactions of purine bases with metallic salts. A. F. SCHUTZ and B. UMSCHWEIF (Biochem. Z., 1934, 268, 326—330).—Adenine, guanine, hypoxanthine, 7-methylhypoxanthine, xanthine, theophylline, and uric acid, but not 7-methyladenine, 7-methylguanine, 7-methylxanthine, 2-chloro-7-methylpurine, 2-chloro-6-hydroxy-7-methylpurine, 1:7-dimethylhypoxanthine, and theobromine, give complex compounds with Cu. This confirms the view that formation of these compounds requires the presence of a free NH-group. P. W. C.

XLIV. Catalytic hydrogen-Chlorophyll. ation in chlorophyll series. III. H. FISCHER, E. LAKATOS, and J. SCHNELL (Annalen, 1934, 509, 201-214; cf. A., 1930, 932; 1933, 1308).-Reduction (H₂, Pd) of 10-ethoxyethylphæophorbide a (I) results in the absorption of 3.8 mols. of H₂; oxidation (atm. O_2) of the resulting leuco-compound gives phæoporphyrin a_6 Et ester Et ether, m.p. 302° , thus confirming the constitution previously assigned (A., 1933, 1308) to (I). Dihydro-10-ethoxy-ethylph α ophorbide a, m.p. 175°, is obtained in 52% yield by partial reduction [H₂ (1 mol.), Pd] of (I). Reduction (PtO₂, AcOH) of dimethylphæopurpurin 7 (II) with 1 mol. of H₂ affords a green compound (not isolated), which is oxidised (atm. O_0) to (II); 3 mols. of H₂ are absorbed on complete reduction and oxidation affords allophæoporphyrin a, Mea ester, rhodoporphyrin Me₂ ester, and 17% of dihydrodimethylphæopurpurin 7, C₃₇H₄₂₍₄₁₎O₇N₄, m.p. 195°. Reduction [H₂ (1 mol.), Pd, HCO₂H] of phæophorbide b gives 49% of dihydrophæophorbide b (III), $C_{35}H_{36}O_6N_4$, which when heated with C_5H_5N affords pyrodihydrophæophorbide b, $C_{33}H_{34(36)}O_4N_4$, m.p. 251° (Me ester, m.p. 244°). (III) is hydrolysed (MeOH-(Me ester, m.p. 244). (111) is hydrorysed (meon KOH in C_5H_5N) to dihydrorhodin g, $C_{34}H_{36(38)}O_7N_4$, m.p. 215° (Me₃ ester, m.p. 212°). Phæophorbide b heated with C_5H_5N gives pyrophæophorbide b, $C_{33}H_{32(34)}O_4N_4,0.5H_2O$, m.p. 232° [Me ester, m.p. 246° (decomp.) (oxime, m.p. > 340°; cyanohydrin, decomp. 280° without melting)], reduced (Wolff-Withow) to decomphyllogrythmin The Fe m.p. Kishner) to deoxophylloerythrin. The Fe, m.p. 197° (not sharp), and Cu, m.p. 200°, salts of dihydromethylphæophorbide a (A., 1933, 1308) are described. H. B.

Organic minerals. III. Chlorophyll and hæmin derivatives in bituminous rocks, petroleums, etc.—See this vol., 629.

Relation between fluorescence and chemical constitution of benzoxazole derivatives. F. HEN-RICH and F. BRAUN (J. pr. Chem., 1934, [ii], 139, 338—342).—Anhyd. aminoresorcinol hydrochloride (I) and $o-C_6H_4$ Me·COCl at 140° give the *tri-o-toluoyl* derivative, m.p. 125.5°, which at 320—360° gives 6-o-toluoyl-2-o-tolylbenzoxazole, m.p. 102°. Similarly were obtained the triphenylacetyl, m.p. 128–129°, and tri-p-toluoyl, m.p. 178°, derivatives of (I) and 6. phenylacetyl-2-benzyl- (II), m.p. 154°, and 6-p. toluoyl-2-p-tolyl-benzoxazole, m.p. 284° after sintering from 240°. The 2-C₆H₄Me derivatives fluoresce (blue) as strongly as the 2-Ph compounds. The following order of intensity of fluorescence is recorded : $4:7-Me_2 > Me$ derivatives (green; 5- > 6- > 7-Me) of 6-hydroxy-2-phenylbenzoxazole. (II) does not fluoresce. R. S. C.

Claisen's "sesquioximes" from hydroxymethylene-ketones. K. VON AUWERS and H. WUNDERLING (Ber., 1934, 67, [B], 638-644).—The formation of Claisen's "sesquioximes" is considered to occur by primary reaction of the β -keto-aldehyde as •CH•OH compound with its OH followed by replacement of the two CO oxygen atoms by :N•OH and final ring closure of the doubly unsaturated dioximes to diisooxazolines (I)

 $\underbrace{\operatorname{CR-CH}_2}_{N} \xrightarrow{\operatorname{CH-N}(OH)} \cdot \operatorname{CH}_2 \xrightarrow{\operatorname{CH}_2} \cdot \operatorname{CR}_N.$ The " sesquioxime" of hydroxymethyleneacetophenone is shown to be di-3-phenylisooxazolinylhydroxylamine, m.p. 200-202°. The presence of OH is established by the formation of an Ac (II), m.p. 133-134°, and a Bz, m.p. 169°, derivative. The spectrochemical behaviour of (II) accords with the presence of CPh.N. (I, R=Ph) is transformed by hot conc. HCl into 3phenylisooxazole (formed by loss of H₂O from 5hydroxy-3-phenylisooxazoline), accompanied by some 5-phenylisooxazole due to fission and re-closure of the isooxazoline ring under the influence of the acid. Boiling KOH-MeOH converts (I) into 5-amino-3phenylisooxazole, m.p. 111°, and BzOH. With the cold reagent the products are NH₂Bz, a little PhCN and phenylisooxazole, and 5-hydroxylamino-3-phenylisooxazoline, m.p. 108-109°. H. W.

4-p-Halogenophenyl-2-methyl- and -2-ethylthiazoles and their derivatives. J. P. WETHERILL and R. M. HANN (J. Amer. Chem. Soc., 1934, 56, 970—971).—The following are prepared from the appropriate p-Hal·C₆H₄·CO·CH₂Br and SH·CMe:NH and SH·CEt:NH in 95% EtOH: 4-p-chlorophenyl-2methyl-, m.p. 122—123° (all m.p. are corr.) (picrate, m.p. 163°; mercurichloride, m.p. 202—203°; hydrobromide, m.p. 186—187°), and -2-ethyl-, m.p. 72° (picrate, m.p. 143—144°; mercurichloride, m.p. 164°); 4-p-bromophenyl-2-methyl-, m.p. 134° (picrate, m.p. 160°; mercurichloride, m.p. 221°), and -2-ethyl-, m.p. 86° (picrate, m.p. 143°; mercurichloride, m.p. 177°), and 4-p-iodophenyl-2-methyl-, m.p. 138° (picrate, m.p. 152°; mercurichloride, m.p. 235°), and -2-ethyl-, m.p. 99° (picrate, m.p. 148°; mercurichloride, m.p. 188°), -thiazoles. H. B.

Fractionation of two trisubstituted thiodiazolines (dihydrothiodiazoles). (MLLE.) A. LACOURT (Bull. Soc. chim. Belg., 1934, 43, 193–199).—Reexamination (mainly by fractional crystallisation) of the products obtained by condensation of β -(α thionaphthoyl)- α -phenylhydrazine with β -C₁₀H₇·CHO (this vol., 537) shows that the dihydrothiodiazole constitutes 56% of the product, two substances, m.p. 101—115° and m.p. 92°, which could not be purified also being obtained. No other compound could be isolated from crude 3-phenyl-5-α-naphthyl-2-methyl-2:3-dihydro-1:3:4-thiodiazole (A., 1933, 839). J. W. B.

Reactions of aldehydes and ketones : synthesis of thiodiazolines from ketones. (MILE.) A. LACOURT (Bull. Soc. chim. Belg., 1934, 43, 206-210). -Condensation of the appropriate NHAr·NH·CSAr' and ketone (A., 1933, 839) affords 3-phenyl-5- α naphthyl-2 : 2-dimethyl-, m.p. 68°, 2 : 3-diphenyl-5benzyl-2-methyl-, m.p. 120°, and -5- α -naphthyl-2methyl-, m.p. 110°, 2-spirocyclopentane-3 : 5-diphenyl-, m.p. 94°, -5-phenyl-3-p-bromophenyl-, m.p. 79°, and -3-phenyl-5- α -naphthyl-, m.p. 98°, -2 : 3-dihydro-1:3 : 4-thiodiazole. All give colours with conc. H₂SO₄ and ppts. with aq. EtOH-AgNO₃. J. W. B.

Preparation of N-o-aminobenzenesulphonylbenzamide. Condensation to heterocyclic compounds. E. WERTHEIM (J. Amer. Chem. Soc., 1934, 56, 971-973).-N-o-Nitrobenzenesulphonylbenzamide, m.p. $197 \cdot 5 - 198^{\circ}$ (from $o \cdot NO_2 \cdot C_6 H_4 \cdot SO_2 \cdot NH_2$ and BzCl at $170 - 180^{\circ}$), is reduced (FeSO₄, aq. NH₃) to N-o-aminobenzenesulphonylbenzamide (I), m.p. 198-198.5°, which is converted by HCl in EtOH into 3-phenyl-1:2:4-isobenzthiodiazine 1:1-dioxide, o-C₆H₄ < N==CPh SO₂·NH, m.p. 302-303°. Diazotisation of (I) gives a compound, explodes violently when heated, which when heated in kerosene or H₂O, or kept over H₂SO₄(H₂O), affords 3-phenyl-1:4:2-benzthioxazine 1:1-dioxide (II), $o-C_6H_4 < SO_2 \cdot N$, m.p. 176—177°. (II) is hydrolysed by cold aq. NaOH to o-benzoyloxybenzenesulphonamide, m.p. 178-180°, and by H. B. HCl to BzOH.

Ergine. S. SMITH and G. M. TIMMIS (Nature, 1934, 133, 579; cf. A., 1932, 759).—Ergine (I) is the amide of $C_{15}H_{15}N_2$ ·CO₂H (II), now prepared from (I), and its corr. formula is $C_{16}H_{17}ON_3$. Lysergic acid (this vol., 538) appears to be identical with (II).

Alkaloids of Narcissus poeticus, L. F. Kolle and K. E. GLOPPE (Pharm. Zentr., 1934, 75, 237— 239).—Narcipoetine, $C_{18}H_{22}O_4N$, m.p. 172°, $[\alpha]_D$ +84·4° [aurichloride, m.p. 131—132° (decomp.); picrate, m.p. 261° (decomp.); hydrochloride +H₂O, m.p. 271° (decomp.), $[\alpha]_D$ +111·2°], contains two OMe or possibly a NMe and may be identical with homolycorine (Morishima, A., 1899, i, 92). S. C.

Synthesis of eserine[-like substances]. II. T. HOSHINO and T. KOBAYASHI (Proc. Imp. Acad. Tokyo, 1934, 10, 99—102; cf. A., 1932, 952; 1933, 164).— Treatment of *dl*-dinoreservethole methiodide followed by extraction with Et₂O or of the benzoate with MeI



and NaOBz affords a base. $C_{16}H_{24}ON_2$ (I), m.p. 80–81° (*picrate*, m.p. 140–141°). (I) with EtOH-MeI and picric acid gives eserethole dimetho *picrate*, m.p. 150–151°. dl-Noreserethole with Et₂O-MeI

(cf. this vol., 89) gives dl-noreserethole hydriodide, m.p. $156-157^{\circ}$, the mother-liquor on addition of alkali, extraction with Et_2O , and treatment with EtOH-picric acid affording the *picrate*, m.p. 192-193°, of

dl-eseretholemethine (II) and dl-eserethole methopicrate, m.p. 184–185°. (II) with MeI and picric acid yields 5-ethoxy-3-methyl-3-dimethylaminoethylindolenine dimethopicrate, m.p. 204–205° (cf. A., 1925, i, 292; 1932, 287). The following have been resolved (m.p. of H d-tartrates given): $l \cdot (164-165°)$ and d-dinoreserethole (166–167°), $l \cdot (179-180°)$ and d-dinoreserethole (180–181°), $l \cdot (181-182°)$ and d-noreserethole (190–191°). F. O. H.

Yohimbe alkaloids. VIII. Dehydrogenation of yohimbine with lead tetra-acetate and the constitutional formula of yohimbine. G. HAHN, E. KAPPES, and H. LUDEWIG (Ber., 1934, 67, [B], 686-696).—Interaction of yohimbine (I) (1 mol.) with Pb(OAc)₄ (II) (1 mol.) in AcOH at room temp. leaves large amounts of unchanged base and gives



dehydrohydroxyacetylyohimboaic acid (III), $C_{22}H_{24}O_5N_2$, m.p. $350-355^\circ$, $[\alpha]_{10}^{\circ\circ}+391\cdot7^\circ(\pm 12^\circ)$ in $0\cdot32^{\circ}_{0}$ AcOH, transformed by MeOH-HCl into Medehydrohydroxy-yohimboate, m.p. 310- 315° , $[\alpha]_{10}^{\circ\circ}+348\cdot6^\circ(\pm 12^\circ)$ in $0\cdot13^{\circ}_{0}$ AcOH [corresponding Et ester, m.p. $318-320^\circ$ (decomp.), $[\alpha]_{10}^{\circ\circ}+368\cdot3^\circ(\pm 12^\circ)$ in $0\cdot22^{\circ}_{0}$ AcOH]. (III) cannot be isolated when (I) and (II) are used in

the mol. ratio 1:2, the main product (obtained in a maximal yield of 50-60% with a 1:3 ratio) being tetradehydroyohimbine, $C_{21}N_{22}O_3N_2$, m.p. 248— 250° (decomp.) after softening at 240°, $[\alpha]_{10}^{20} + 229 \cdot 4^{\circ}$ $(\pm 10^{\circ})$ in 0.266% AcOH, hydrolysed to tetradehydroyohimboaic acid (IV), $C_{20}H_{20}O_3N_2,2H_2O$, m.p. 230— 235° , $[\alpha]_{10}^{20} + 247 \cdot 40^{\circ} (\pm 10^{\circ})$ in 0.157% AcOH [K salt; hydrochloride $C_{20}H_{20}O_3N_2$,HCl,2H₂O; nitrate; Et ester, m.p. 294—297° (decomp.), $[\alpha]_{10}^{20} + 239 \cdot 1^{\circ} (\pm 12^{\circ})$ in 0.45%AcOH, and its perchlorate]. Treatment of (IV) with KOH in boiling amyl alcohol gives harman and m- C_0H_4 Me·CO₂H in good yield, thus establishing the structure of (I). Treatment of (I) with 6, 7, 8, or 9 mols. of (II) gives ill-defined results. H. W.

"Open" ecgonine and tropine. C. MANNICH (Arch. Pharm., 1934, 272, 323—359).—A series of "open" analogues of tropine derivatives in which the 2 CH₂ groups of the 5-membered ring are replaced by Me are prepared, the true analogues of the ring derivatives having the *cis*-configuration, which is meso, whereas the *trans*-derivatives are resolvable. By condensation of CO(CH₂·CO₂R)₂, R'·CHO, and NH₂R",HX, usually in slightly acid solution, are obtained the following derivatives of type _CHR'·CH·CO₂R

 $NR'' < CHR' CHR' CH CO_R : Et, m.p. 62-63^{\circ} [hydro-$

chloride, m.p. 146° (decomp.); 1:5-Bz₂ derivative, m.p. 135—136°; nitrosoamine; additive compound with NHPh·NH₂, m.p. 81°], and Me, m.p. 81° (N-Bz derivative, m.p. 174°) {accompanied by a substance, m.p. 139°, probably CHMe[·CH(CO₂Me)·CO·CH₂·CO₂Me]₂}, 4-keto-2:6-dimethyl-; Et (I) [as its nitrate, m.p. 123— 124° (decomp.); picrate, m.p. 132—133°; platinichloride, decomp. 177°], and Me (II), m.p. 76° (nitrate, decomp. 144—145°; perchlorate, m.p. 145°), 4-keto-

1:2:6-trimethyl-; Me 4-keto-1-benzyl-, m.p. 97-98° (nitrate, decomp. 130-133°), -1-β-phenylethyl- (as hydrochloride, decomp. 122—124°), and -1- β -carbo-phenoxyethyl-, m.p. 92° (using β -aminoethyl benzoate hydrochloride, m.p. 144—145°), -2 : 6-dimethyl-piperidine-3: 5-dicarboxylate. Reduction of (I) with Na-Hg gives Et 4-hydroxy-1:2:6-trimethylpiperidine-3:5-dicarboxylate as its hydrochloride, m.p. 133-134°, the corresponding Me ester, b.p. 170-175°/ 1 mm., m.p. 69° (perchlorate, m.p. 232°; hydrochloride of the Bz, m.p. 176-177°, p-nitrobenzoyl, m.p. 161°, and p-aminobenzoyl, m.p. 175°, derivatives), being similarly obtained from (II), and hydrolysed to the acid, m.p. $240-242^{\circ}$ (decomp.). Use of $CO_2Me \cdot CH:C(OK) \cdot CH_2 \cdot CO_2K$ in the original synthesis gives the corresponding 3-monocarboxylic acid derivatives and thus are obtained: Me 4-keto-2:6-dimethyl- (as hydrochloride, decomp. 172-173°; Bz derivative, m.p. 126°); 4-keto-2:6-dimethyl-1-allyl-[as hydrochloride $+H_2O$, m.p. 117—118° (decomp.)]; 4-keto-1-carbethoxymethyl- (as hydrochloride $+H_2O$, m.p. 96—97°), -1-benzyl- (as hydrochloride, decomp. 157-158°), and -1-β-phenylethyl- (III) [as hydro-chloride, m.p. 126-127° (decomp.)], -2: 6-dimethyl-; 4-keto-1-methyl-2: 6-diethyl- [as hydrochloride, m.p. $144-145^{\circ}$ (decomp.)], and -2: 6-di-n-propyl- [as nitrate, m.p. $127-128^{\circ}$ (decomp.)]; and 4-keto-1: 2: 6-trimethyl- (IV), b.p. $127-128^{\circ}/16$ mm. [hydrochloride +H₂O, m.p. $105-106^{\circ}$; oxime, m.p. $153-155^{\circ}$ (decomp.); methiodide, decomp. $116-119^{\circ}$] [resolved by d tartaria solid into the hydrochloride +H O m p by d-tartaric acid into the hydrochloride $+H_{o}O$, m.p. 106° , $[\alpha]_{D}^{20} - 17.0^{\circ}$ (d-tartrate, m.p. 113-115°), of the l-, and the hydrochloride $+H_2O$, m.p. 106°, $[\alpha]_{10}^{20}$ +17.0° (d-tartrate, m.p. 145-146°), of the d-base], -piperidine-3-carboxylate. Reduction of (III) with Ptblack-H₂ in H₂O gives the hydrochloride, m.p. 195-196°, of Me 4-hydroxy-1-β-phenylethyl-2: 6-dimethylpiperidine-3-carboxylate (p-nitrobenzoate, m.p. 133°). Reduction of (IV) with PtO_2-H_2 gives a mixture of the cryst. a-form (V) (ecgonine analogue), m.p. 96°, and a liquid β -form (ψ) (VI), b.p. 135–137°/11 mm. (*picrate*, m.p. 154–155°) (partly resolved by bromo-camphorsulphonic acid to give the *hydrochloride*, decomp. 221–222°, [α]²⁰ –66.6°, of the *l*-form), of the Me ester of, respectively, a-, m.p. 198-200° (decomp.), and β - + \hat{H}_2O (ψ), m.p. 246-248° (decomp.), -dl-4-hydroxy-1:2:6-trimethylpiperidine-3carboxylic acid, which result from hydrolysis. The α -form is converted into the β - (ψ) form by heating with 33% aq. KOH. With BzCl (V) gives its Bz derivative (cocaine analogue), m.p. 74-75°, resolved by d-tartaric acid to the oily 1-base (d-tartrate $+2H_2O$, m.p. 103-104°, $[\alpha]_D^{39}$ -19.94° in MeOH) and the d-base (d-tartrate, $+3H_2O$, m.p. $82-84^\circ$, $[\alpha]_{10}^{\circ}$ +43.42° in MeOH), whereas (VI) similarly affords its Bz derivative as the hydrochloride, decomp. 204°, the hydrochloride, m.p. 189–190°, $[\alpha]_{D}^{20}$ +50.8°, of the *d*-base being obtained by benzoylation of the bromocamphorsulphonate, m.p. 155°, of (VI). By HCl hydrolysis of the appropriate 3-carbaxylic esters are obtained : 4-keto-2:6-dimethyl-1allyl- (oxime, m.p. 100°), and 4-keto-2: 6-dimethyl-, b.p. 81-82°/12 mm. [hydrochloride, m.p. 204-205° (decomp.)], -piperidine. cis-meso-4-Keto-1:2:6-trimethylpiperidine (VII), b.p. 86°/14 mm. [hydrobrom-

ide, m.p. 174-175° (decomp.); hydriodide, m.p. 169-170°; perchlorate, m.p. 166-168°; picrate, m.p. 163-164° (decomp.); methiodide, m.p. 180° (decomp.); and oxime, m.p. 92°], is obtained by hydrolysis of (II) or (IV), or by condensation of CO(CH2·CO2H)2, NH2Me, HCl, and MeCHO, in which case some of the trans-dl-form (VIII), b.p. 86°/14 mm. [oxime, m.p. 93-94°, not free from (VII)], is also obtained. Reduction of (VII) (Na-Hg or electrolytic) gives only cis-meso-4-hydroxy-1:2:6-trimethylpiperidine (IX), b.p. 105-107°/11 mm. (stable to $NaOC_5H_{11}$ and therefore the ψ -form) [hydrochloride, m.p. 267-268°; hydrobromide, m.p. 265-266°; hydrochloride of Bz derivative, m.p. 238°; tropate, m.p. 98° (nitrate, m.p. 163-164°)], but with Zn-HI some cis-1:2:6-trimethylpiperidine, b.p. 50-55°/ 12 mm. (platinichloride, m.p. 174-175°), is also obtained. Reduction of (VIII) gives (IX) and transdl-4-hydroxy-1:2:6-trimethylpiperidine, m.p. 70° (hydrochloride, m.p. 185°; hydrochloride of Bz derivative, m.p. 165-168°), imperfectly resolved ([a]) +15°) by bromocamphorsulphonic acid. The physiclogical properties of the tropine analogues are J. W. B. recorded.

Lupin alkaloids. IX. Sparteine. IV. K. WINTERFELD and C. RAUCH (Arch. Pharm., 1934, 272, 273-290).-Dehydrosparteine (I), b.p. 110-112°/1 mm., $[\alpha]_D$ –124° in EtOH [aurichloride +2H₂O and anhyd., m.p. 158° (decomp.); picrale, m.p. 147°; platinichloride +1.33H₂O and anhyd., m.p. 247-248°], as previously prepared is contaminated with didehydrosparteine (II) from which it is separated by Et₂O extraction from H₂O solution and distillation in a high vac., all in H₂. Catalytic reduction of (I) (+2H) regenerates the original sparteine (III). (II) is also a mixture, separated by fractional crystallisation of the H sulphate into cryst. α -didehydrosparteine (IV), m.p. 106—107° (purified by sublimation), $[\alpha]_{\rm D}$ —647° in C₆H₆ [H sulphate, m.p. 253°; sulphate; perchlorate, m.p. 257° (decomp.); picrate, m.p. 164°; reineckate, m.p. 174-175°; aurichloride, m.p. 156° (decomp.); platinichloride, m.p. 242-243°], and, from the motherliquor, oily β -didehydrosparteine (V), $[\alpha]_{p} = -37.4$ in C₆H₆ (reineckate, m.p. 194°). Reduction of (IV) (Pd-CaCO3-H2) in MeOH gives cryst. a-isosparteine, b.p. 99—100°/1 mm., m.p. 118°, $[\alpha]_{\rm D}$ –56.2° in MeOH [H sulphate, m.p. 244—245°; sulphate, m.p. 92°; picrate, m.p. 214° (decomp.); mercurichloride, m.p. 247-248° (decomp.); aurichloride, m.p. 191-192°; platinichloride +3H₂O, m.p. 243 5°], reconverted into (IV) by Hg(OAc)₂ in AcOH. Similar reduction of (V) gives β -isosparteine, b.p. $104-105^{\circ}/1$ mm., $[a]_{0}$ +19·2° in C₆H₆ (mercurichloride, m.p. 208-209°; picrate, m.p. 203°), which is probably identical with the d-sparteine of Clemo et al. (A., 1931, 498). The bearing of these results on Ing's formula for (III) J. W. B. (A., 1933, 727) is discussed.

Quinine iodobismuthate. PICON (Compt. rend., 1934, 198, 926—928; cf. A., 1923, i, S30).—By determining the heat evolved on adding increasing amounts of COMe₂ to $C_{20}H_{21}O_2N_{2,}2HI,2BiI_3$ (I) it is shown that a definite compound, (I),6COMe₂ (II), is formed, containing 20% COMe₂. With $\Rightarrow 60\%$ COMe₂ (I) forms a clear solution, but with more two layers are formed, the heavier being (II) saturated with COMe₂, the lighter a solution of (II) in COMe₂. (I) is sol. in *cyclohexanone* forming an increasingly viscous red solution by means of which small quantities of Bi or quinine can be determined colorimetrically. C. A. S.

Improved syntheses of physiologically important amines. IX. Synthesis of papaverine and tetrahydropapaverine. K. KINDLEB and W. PESCHKE (Arch. Pharm., 1934, 272, 236-241).-Acetoveratrone with anhyd. NHMe2 and S at 145° (special apparatus described) gives a 65% yield of homoveratrodimethylthioamide, m.p. 121°, hydrolysed by 10% KOH to homoveratric acid (I) in 84% yield. Distilled with homoveratrylamine in tetralin in a current of H_2 (I) gives a 96% yield of its homoveratrylamide, converted (quant. yield) by $POCl_3$ in boiling C_6H_6 into dihydropapaverine (II). Dehydrogenation of (II) with Pd-black in boiling dihydrophellandrene or tetralin gives an 86% yield of papaverine (III), whereas reduction with Pd-black-H₂ gives a 63% yield of tetrahydropapaverine, similarly J. W. B. dehydrogenated to (III).

Structural formulæ of the morphine alkaloids and the genetic relationships of the opium alkaloids to one another. W. Awe (Arch. Pharm., 1934, 272, 466-469).—Theoretical. J. W. B.

Synthesis of 11:12-dimethoxy-2:3-methylenedioxytetrahydroprotoberberine, an isomeride of tetrahydroberberine, and of 2:3:11:12-tetramethoxytetrahydroprotoberberine, an isomeride of tetrahydropalmatine. S. N. CHAKRAVARTI and M. SWAMINATHAN (J. Indian Chem. Soc., 1934, 11, 107-113).-2:3-Dimethoxyphenylacetic acid (prepared by way of the azlactone of o-veratrylidenehippuric acid and 2:3-dimethoxyphenylpyruvic acid) and 3:4-CH₂O₂:C₆H₃·CH₂·CH₂·NH₂ at 180° give 2:3-dimethoxyphenylacet- β -3:4-methylenedioxyphenylethylamide, m.p. 108°, converted by POCl₃ at 100° and subsequent reduction (Zn dust, dil. H₂SO₄) into 2':3'-dimethoxy-6:7-methylenedioxy-1-benzyl-1:2:3:4-tetrahydroisoquinoline (hydrochloride, m.p.



O-CH₂ 160°). Successive treatment of this with HCO₂H at 200°, POCl₃ in PhMe, and Zn dust + dil. HCl gives 11:12-dimethoxy-2:3-methylenedioxytetrahydroprotoberberine (I), m.p. 127°, converted by I in EtOH+NaOAc into

11: 12-dimethoxy - 2: 3 - methylenedioxyprotoberberinium iodide (II), m.p. 252° {chloride (III), m.p. 220° [from (II) and AgCl]}. (III) and aq. KOH afford oxy-11: 12-dimethoxy-2: 3-methylenedioxyprotoberberine, m.p. 230–231°. 2: 3-Dimethoxyphenylacet- β -3: 4dimethoxyphenylethylamide, m.p. 131°, is similarly converted into 6: 7: 2': 3'-tetramethoxy - 1 - benzyl-1:2: 3: 4-tetrahydroisoquinoline (hydrochloride, m.p. 204°), and thence into 2: 3: 11: 12-tetramethoxytetrahydroprotoberberine, m.p. 163°. H. B.

Ergoclavine, a new specific alkaloid of ergot. W. KUSSNER (Arch. Pharm., 1934, 272, 503-504).- Extraction with CHCl:CCl₂ of the basified motherliquor after removal of ergotinine and ergotoxin affords ergoclavine, $C_{31}H_{39}O_6N_5$, m.p. 177—178°, $[\alpha]_{\overline{16}} + 124^{\circ}$ in CHCl₃, which constitutes 16—20%, 20%, and 6%, respectively, of the total alkaloids of Spanish, Russian, and Hungarian ergot.

J. W. B.

 $p_{\rm H}$ determinations of solutions of certain alkaloidal salts. A. F. PETERS and A. OSOL (J. Amer. Pharm. Assoc., 1934, 23, 197—201).—The $p_{\rm H}$ of an alkaloidal hydrochloride or sulphate solution is practically const. over a wide range of concn. Since ppts. are formed with quinhydrone, colorimetric methods should be used, the vals. obtained being in good agreement with those from titration curves.

A. E. O.

Alkaloids of pereiro bark. II. Constitution of geissospermine. Pereirine. A. BERTHO and F. Moog (Annalen, 1934, 509, 241-258).-Geissospermine (I), probably C₄₀H₅₀O₃N₄ (cf. A., 1931, 1313), isolated (as sesquihydrate) in 0.2% yield from the dry bark, is hydrolysed (2N-HCl) to a phenolbetaine hydrochloride (II), $C_{13}H_{12}O_2NCl$, m.p. > 350° (which is OMe- and NMe-free), and MeOH. A pure product could not be isolated from the free betaine and MeOH-MeI at 100°. (I) is converted by EtOH-HCl into an amorphous base, C₂₀H₂₆O₂N₂,0.5H₂O, m.p. 115°, [a] -57.4° in EtOH (methiodide, m.p. 230-235°), which contains 1 OMe (no NMe) and is hydrolysed (2N-HCl) to (II); the change $C_{40}H_{50}O_3N_4+H_2O \longrightarrow 2C_{20}H_{26}O_2N_2$ probably involves fission of an ether linking. (I) does not contain NMe (cf. loc. cit.). Distillation of (II) with Zn dust gives 2-methyl-4-ethylpyridine (?) (platinichloride, m.p. 191-192°) and a substance resembling 3-methylindole. (I), NaOH, and KOH at 250° afford 2:3-dimethylindole (?). (I) could not be reduced (H₂, Pd-BaCO₃, EtOH).

Pereirine, $C_{20}H_{26}ON_2,0.5H_2O$ [methiodide, decomp. 233-235° (darkens from 200°); Me ether (CH₂N₂), m.p. 195-197° (decomp.) (darkens at 175°)], is isolated from the mother-liquors from the crystallisation of (I) as an amorphous powder, m.p. 134-135° (decomp. from 123°), $[\alpha]_{10}^{\infty}$ +137.5° in EtOH; it contains a phenolic OH, is OMe- and NMe-free, and is stable to dil. mineral acid. H. B.

Arsinic and stibinic acids derived from quinoline and acridine. I. (MISS) M. M. BARNETT, A. H. C. P. GILLIESON, and W. O. KERMACK (J.C.S., 1934, 433—435).—3-Aminoacridone (I) is prepared by heating with 96% H₂SO₄ either 4'-aminodiphenylamine-2-carboxylic acid or its Ac derivative, m.p. 240°, obtained by condensing o-C₆H₄Br·CO₂H and p-NH₂·C₆H₄·NHAc. (I) gives acridone-3-arsinic and -stibinic acids. 6-Amino-2-hydroxyquinoline forms 2-hydroxyquinoline-6-arsinic and -stibinic acids.

F. R. S.

Dissociation constants of chlorophenyl- and phenetyl-boric acids. G. E. K. BRANCH, D. L. YABROFF, and B. BETTMAN (J. Amer. Chem. Soc., 1934, 56, 937-941).--o-C₆H₄Cl·B(OH)₂ (I), m.p. 97-98° (all m.p. are corr.) (lit. 149°) (anhydride, m.p. 171-172°), is prepared (method: Bean and Johnson, A., 1933, 79) from Bu^a borate (II) and o-C₆H₄Cl·MgBr. m-Chlorophenylboric acid (III), m.p. 189–190°, and $p-C_6H_4Cl\cdot B(OH)_2$ (IV), m.p. 306– 307° (lit. 275°), are obtained from BF₃ and $C_6H_4Cl\cdot MgBr.$ m-Phenetylboric acid (V), m.p. 130° (decomp.) (anhydride, m.p. 152-153°), and o- (VI), m.p. 102—103° (lit. 171°), and p- (VII), m.p. 150° (decomp.) (lit. 159°) (anhydride, m.p. 171°), $-OEt \cdot C_{e}H_{4} \cdot B(OH)_{2}$ are prepared from (II) and $OEt \cdot C_{e}H_{4} \cdot MgBr$. The following dissociation consts. $(K_a \times 10^{10} \text{ at } 25^\circ)$ are determined in 25% (vol.) aq. EtOH as previously described (A., 1933, 962): H₃BO₃ 1·34 (6·53 in H₂O), PhB(OH), 1·97 [13·7 in H_2O (cf. loc. cit.)], (I) 14.0, (III) 14.5, (IV) 6.23, (V) 3.05, (VI) 0.91, (VII) 0.608, and o., 7.97, m., 3.3, and p-, 1.46, -C6H4Cl·OH. These vals. are discussed on the basis of the negativities and resonances of the groups involved. $RB(OH)_2$ of $K \leq 10^{-10}$ can be titrated (accuracy 2-4%) with aq. NaOH in presence of glycerol. H. B.

Organo-derivatives of bismuth and thallium. F. CHALLENGER and O. V. RICHARDS (J.C.S., 1934, 405-411).-BiPh₃Cl₂ with Ag₂O under suitable conditions affords triphenylbismuthine dihydroxide, decomp. 100–120° into C_6H_6 , BiPh₃, and Bi(OH)₃; with KCN it gives the hydroxycyanide, m.p. 136°, and with Na azide yields the diazide, which decomposes to BiPh₃, phenylazoimide, and diphenylazidobismuthine, m.p. 168°. TlPhCl₂ and KCN give K phenylthalli-cyanide, m.p. 265.5° (decomp.), a solution of which on boiling forms thallium diphenyl cyanide, m.p. 318° (decomp.), and TlCl₃. Thallium phenyl dicyanide, m.p. 228°, dithiocyanate, diazide, and dihydroxide, decomp. 280-285°, are similarly obtained. p-Tolylboric acid and TlCl₃ give thallium p-tolyl dichloride, m.p. 223-224°. Excess of p-bromophenylboric acid and TlCl₃ give thallium di-p-bromophenyl chloride, decomp. above 300°, whilst excess of TlCl₃ yields thallium p-bromophenyl dichloride, m.p. 262—263°. TlPhCl₂ with C_5H_5N gives an additive compound, m.p. 172° (decomp.), and TlPhBr₂ similarly forms a com-pound, m.p. 85°. MgEtBr and TlPhCl₂ yield Ph₂ and Et₂ halides and no mixed halide, whilst Mg cyclohexyl bromide and TlPhCl₂ form a chloride, converted by KI into thallium dicyclohexyl iodide, m.p. above 300°. Thallium phenyl p-tolyl chloride is formed from TlPhCl₂, and *p*-tolylboric acid and from p-C₆H₄Me·TlCl₂ and phenylboric acid. The properties of arylboric acids have been examined : m-nitrophenylboric acid and HgO give mercury dim-nitrophenyl, m.p. 286-287°. BiPh₃ and AgNO₃ yield a yellow unstable compound, probably PhAg,2AgNO₃, the Ph group being mobile.

F. R. S.

Therapeutic substances derived from unsymmetrical diphenyl compounds. I. S. E. HARRIS and W. G. CHRISTIANSEN (J. Amer. Pharm. Assoc., 1933, 22, 723—727; see this vol., 663).—The following compounds have been prepared and the Hg derivatives all show marked bactericidal properties: 2-acetoxymercuri-3-nitro-4-hydroxy- (Na salt), 3-nitro-4-anhydromercuri-5-acinitro-2-hydroxy-, 4-nitro-2hydroxy-, m.p. 123—124°, and 5-bromo-2-hydroxy-diphenyl, b.p. 158—160°/4 mm.; 4-bromo-2-phenylphenoxyacetic acid, m.p. 138—139° (Et ester), 4-bromo2-phenyl-6-acetoxymercuriphenoxyacetic acid; 3:3'. diphenylphenolphthalein [di-(2-hydroxy-4-diphenylyl)phthalide], m.p. 234—235°, brominated to the 5:5'. Br_2 -, m.p. 110—111°, and nitrated to the 5:5'-(NO_2)₂. derivatives, m.p. 135°, and 3:3'-dinitrophenolphthalein, m.p. 110—111°; 4-acetoxy- and 4:6-diacetoxy-mercuri-3:5-dinitro-, and diacetoxymercuri-4'. nitro-2-hydroxydiphenyl; 5:5'-dibromo-3:3'-diphenylhydroxymercuri-, 5:5'-dinitro-3:3'-diphenyldiacetoxymercuri-, and 3:3'-dinitro-mono- and -di-acetoxymercuri-phenolphthalein. The Hg compounds decompose above 300°. F. R. S.

Polarity of the co-ordinate linking. E. J. CHAPLIN and F. G. MANN (Nature, 1934, 133, 686– 687).—In their reaction with chloramine-I' the tert. phosphines (I) come midway between the org. sulphides and tert.-arsines, the final product depending primarily on the nature of (I); e.g., tri-o-tolylphosphine gives a true phosphinimine

 $(C_6H_4Me)_3PN\cdot SO_2\cdot C_6H_4Me$ (II) with no other detectable product, tri-*p*-tolylphosphine gives a mixture of the phosphinimine isomeric with (II) and the corresponding hydroxysulphonamide

(C₆H₄Me)₃P(OH)·NH·SO₂·C₆H₄Me (III), whilst tri-mtolylphosphine apparently gives no phosphinimine, but only the hydroxysulphonamide isomeric with (III). The results are apparently determined mainly by the position of the Me relative to P. The coordinate linking (IV) in (II) tends to give the P and N atoms a weak positive and negative charge, respectively; simultaneously, the polarity induced by the three o-Me groups will tend to give the P atom a negative charge. The polarity of (IV) is thus suppressed and a stable phosphinimine results. In the p-compound, the effect of the Me groups is similar but weaker, and hence both phosphinimine and hydroxysulphonamide are formed, whilst in the m-compound the polarity induced by the Me groups reinforces that of (IV) and the hydroxysulphonamide L. S. T. alone is produced.

Stannonic acids. M. LESBRE and (MLLE.) G. GLOTZ (Compt. rend., 1934, 198, 1426-1427).-Extending the reaction $RX + KHSnO_2 \longrightarrow RSnO_2H$ +KX (J.C.S., 1922, 121, 1859), phenyl-, benzyl-, α -naphthyl-, allyl-, dichloromethyl-, bromoethyl-, and acetonyl-stannonic acids are obtained from the appropriate chlorides or bromides. The stannonic acids are insol. in H₂O or org. solvents, sol. in dil. acid or in alkali, from which they are pptd. by CO2. Salls of type RSnO₂Na, RSnO₂K, RSnO₂Ag are obtained, as are complexes of type CoO, (RSnO₂)₂Co, correspond. ing Ni compounds, and more complex Hg, Zn, or Mn salts, from the sulphates etc. From solution in dil. HCl or HBr, acids of type [RSnCl₅]H₂ and [RSnBr₅]H₂ crystallise, from which salts [RSnX5]K2 and additive compounds of type [RSnX₅](C₅H₅N)₂ are formed. In conc. solution, the reaction $[RSnI_5]H_2 \longrightarrow SnI_4 +$ RH+HI occurs, and when strongly alkaline solutions of alkylstannonic acids are boiled, the insol. stannones E. W. W. R_oSnO are deposited.

Coagulation of albumin by water vapour. E. JUSTIN-MUELLER (J. Pharm. Chim., 1934, [viii], 19, 348—353).—Coagulation of albumin by certain pigments may be due to the formation of NH₂OH in presence of an alkaline salt of a weak acid or of an easily reducible substance. H. G. R.

Absorption and phosphorescence spectra of fabrein. M. FONTAINE (Compt. rend., 1934, 198, 1077–1079).—Fabrein, freed from dunalin by Et_2O , in C_5H_5N has absorption bands at λ 612, 566, and (?) 524, and phosphorescence bands at λ 666, 618, and 636 (order : decreasing intensity). R. S. C.

Determination of the homogeneity of proteins by coagulation experiments. B. JIRGENSONS (Biochem. Z., 1934, 268, 406—413).—The coagulation of various proteins by varying concn. of MeOH, EtOH, PrOH is surveyed. Plotting the concn. (x) of the alcohol against the degree of coagulation (y), coagulation curves of two chief types are obtained, one having a single max. and min., the other having several max. and min. Homogeneous proteins, e.g., ovalbumin, give curves of the first, whilst heterogeneous proteins, e.g., caseinogen, oxy- or met-hæmoglobin, give curves of the second, type. P. W. C.

Kyrins. W. GRASSMANN and O. LANG (Biochem. Z., 1934, 269, 211–222; cf. Siegfried, Z. physiol. Chem., 1916, 97, 233).—Glutokyrin sulphate (I), prepared by Siegfried's method, consists chiefly of basic di- and tri-peptides composed of NH_2 -acids [arginine (II), proline (III), glycine, lysine (IV), and leucine, 1 mol. of each] and $3H_2SO_4$. Elementary analysis suggests the presence of OH-compounds and homologues of these NH_2 -acids. Free (II) and (III) are certainly, other free NH_2 -acids probably, absent. The α -NH₂ of (II) and the NH of (III) are united in peptide linking (V) and the free NH_2 of (I) belong to (IV) and $(NH_2)_1$ -acids. Kidney peptidase readily attacks (I), hydrolysing the (V) of (III) and liberating all the (II). W. McC.

Hydrolysis of iodoproteins. G. BARKAN and G. KINGISEPP (Arch. exp. Path. Pharm., 1934, 174, 444-452).—Iodoprotein ("iodtropon") (I) is hydrolysed by H_2O at 100°, approx. 60% of the total I being liberated in 20 hr., the p_1 of the solution falling from 5.9 to 4.9. Approx. 80% of the liberated I can be electrometrically titrated. Hydrolysis of (I) with Ba(OH)₂ liberates more I than that with trypsin (cf. A., 1931, 1090), the I in the ultrafiltrate (35-49% of the total I) being 60-80% precipitable by Ag^{*}. The products include 3:5-di-iodotyrosine, the separation of which [0.26 g. from 150 g. of (I)] is described. The partition of I in the hydrolysates is discussed. F. O. H.

Behaviour of aqueous solutions of domestic cocoons. XV. Apparent specific gravities of sericin-A and -B. XVI. Sericin as a protective colloid. XVII. Separation of sericin. H. KANEKO (J. Agric. Chem. Soc. Japan, 1933, 9, 905-907, 1049-1055, 1056-1059).-XV. Vals. of d¹⁵ (apparent) are 1.356 and 1.309, respectively.

(apparent) are 1.356 and 1.309, respectively. XVI. The Au val. (I) (0.02-0.038) is approx. equal to that of ovoglobulin, ovalbumin, and gelatin. The more reelable the cocoon is, the smaller is (I). (I) is max. at the isoelectric point $(p_{\rm H} 4.2-4.3)$, and falls with rise in temp. (I) of sericin-A is usually < that of -B. Sericin prevents the oxidation of pyrogallol by Co complex salts and the decomp. of H_2O_2 by colloidal Pt.

 $\tilde{X}\tilde{V}II$. By electrodialysis sericin-A is rapidly coagulated whilst -B remains dissolved. CH. Abs.

Specific characteristics of proteins. N. N. IVANOV (Izvest. Tzentr. Nauch.-Issledov. Inst. Pisch. Vkus. Prom., 1931, 36 pp.).—A discussion. Analytical data are tabulated. CH. Abs.

Collagens. I. Preparation and properties of collagens. G. FLORENCE and J. LOISELEUR (Bull. Soc. Chim. biol., 1934, 16, 52–63).—The proteins of conjunctive tissue, extracted at room temp. with HCO_2H containing a small amount of EtOH-HCl and pptd. with EtOH, are in their colloidal character and N content similar to those obtained by extraction with H_2O in an autoclave. According to their origin, they show different neutralisation curves, buffering power, and N content. A. L.

Fractions of caseinogen. B. JIRGENSONS (Biochem. Z., 1934, 268, 414–421).—The fraction of caseinogen sol. in 60-70% alcohol and poor in P gives a coagulation curve having a single max. and min. typical of a homogeneous protein, whilst the fraction rich in P gives a flat curve. Fractionation is found to be especially easy by 50-60% PrOH in presence of 0.03 mol. NaCl per litre. P. W. C.

Fractionation of protein catalysts by the aid of organic extraction media. II. V. S. SADIKOV, V. A. VADOVA, and R. G. KRISTALLINSKAJA (Compt. rend. Acad. Sci. U.R.S.S., 1934, 1, 500—504).— Products obtained by partial fission of ovalbumin with 2% H₂SO₄, HCl, H₃PO₄, and Na₂CO₃ give definite yields of extracts with Et₂O, CHCl₃, BuOH, and C₅H₁₁·OH, these extracts containing cyclopeptide and heterocyclic substances without NH₂-N, but including considerable fractions of the total N. BuOH is a particularly effective solvent. The residue still contains about 60% of cyclopeptide substances. J. W. S.

Determination of carbon in the wet way. H. ENGEL (Z. anal. Chem., 1934, 96, 319–321; cf. A., 1931, 1258).—An improved form of reaction flask is described. J. S. A.

Micro-determination of active hydrogen by Zerevitinov's method. W. LUTTGENS and E. NEGELEIN (Biochem. Z., 1934, 269, 177–181; cf. Roth, A., 1932, 709).—1 mg. of substance suffices for a determination if PhMeO replaces Hg in the special manometer, and the concn. of the Grignard solution is increased to 1.4N so that a reaction temp. of about 20° is sufficient. Equilibrium between gas and liquid must be attained by shaking. The method is inapplicable to picric acid. A quartz reaction vessel is used. W. McC.

Argentometric semi-micro-determination of chlorine and bromine in organic substances. F. HÖLSCHER (Z. anal. Chem., 1934, 96, 308—314).— The substance is burned in O_2 over a Pt catalyst, and Cl or Br absorbed in 5% H_2O_2 . Absorbed halogen is titrated with 0.02N-AgNO₃, using dichlorofluorescein (Cl) or cosin (Br) as adsorption indicator. J. S. A. Use of methoxyacetic anhydride for determination of hydroxyl groups. D. W. HILL (J. Amer. Chem. Soc., 1934, 56, 993).—Di(methoxyacetyl)quinol, m.p. $89\cdot5$ —90°, p-methoxyacetoxybenzoic acid, m.p. 164—165°, p-methoxyacetoxyacetophenone, m.p. 56— 57°, penta(methoxyacetyl)quercetin, m.p. 97—98°, and methoxyacetoxychalkone (?), $C_{18}H_{16}O_4$, m.p. 93°, are prepared using (OMe·CH₂·CO)₂O (I). It is suggested that the no. of OH groups in a compound can be determined by treatment with (I) and subsequent determination of OMe. H. B.

Reactions with vanadium chloride. K. Wov-NOFF (Ber., 1934, 67, [B], 554).—A solution of VCl₅ (5 g.) in H₂O (100 c.c.) gives an amethyst-violet colour with o-OH·C₆H₄·CO₂H (1 in 6000) which becomes orange (1 in 12,000). o-OH·C₆H₄·CO₂Na gives a reddish-brown colour. BzOH and PhOH do not give colours. Meconic acid gives a dark red colour (pale pink at 1 in 10,000), not impeded by HCl or H₂SO₄ but destroyed by H₂C₂O₄ or HPO₃. Either test is readily applied as a ring reaction. H. W.

Determination of phenol, salicylic acid, and cresols, and the products obtained in the reactions. M. BEUKEMA-GOUDSMIT (Pharm. Weekblad, 1934, 71, 380-397, 438).-Koppeschaar's bromometric method for the determination of PhOH (I) (A., 1877, i, 746) gives satisfactory results even with very low concns. if only a slight excess of KI is used (cf. B., 1930, 648). The bromometric method for determining o-OH·C₆H₄·CO₂H (II) described in the Dutch Pharmacopœia is liable to give low results due to the formation of dibromosalicylic acid (III), but accurate results are obtained if sufficient H₂O is used to keep (III) in solution. The iodometric method of Messinger and Vortmann (A., 1889, 1150; 1890, 1473) gives satisfactory results with (I) and (II) at 50-75° if \neq 6 mols. of NaOH are used, the resultant product being tetraiododiphenoquinone; if less alkali is used C₆H₂Br₃·OH is formed. Mixtures of (I) and (II) can be determined and the components separated by Na_2CO_3 . Of the cresols, only *m*- can be determined by both methods; o- and p- do not react quantitatively. S. C.

Reactions to differentiate between resorcinol and hexylresorcinol. G. REVILLON (Bull. Soc. Chim. biol., 1934, 16, 305–306).—The colorations produced by hexylresorcinol and Denigès' reagent, sucrose and H_2SO_4 , Fe^{III} alum, $Fe(ClO_4)_3$, Na_2CO_3 , H_2SO_4 and HCO_2H , and AcCHO are different from those given by resorcinol. A. L.

Reactions of adrenaline and ephedrine. L. EKKERT (Pharm. Zentr., 1934, 75, 208–209).— Adrenaline (I) and ephedrine (II) give similar colour reactions with aldehydes and H_2SO_4 (*p*-OMe·C₆H₄·CHO, violet-red; *o*-OH·C₆H₄·CHO, orange; vanillin, lemon-yellow; piperonal or CH₂O bright red). Differences are noted with SeO₂-H₂SO₄ [(I) gives a red colour on warming, (II) brown turning to olive-green], diazobenzene-*p*-sulphonic acid [(I) couples much more rapidly than (II)], KOH in EtOH [(I) gives a transient red coloration, (II) remains colourless]. S. C. Determination of anabasine. A. WENUSCH and G. BILOWITSKI (Biochem. Z., 1934, 270, 15-16).— Anabasine is pptd. from dil. HCl solution with silicotungstic acid, from dil. AcOH solution with saturated aq. picric acid (I) or with saturated aq. picrolonic acid. With (I) the procedure is as in nicotine determination and the factor 0.29 must be used.

W. McC.

Alkaloid determination by displacement titration. F. SCHLEMMER and H. KOCH (Arch. Pharm., 1934, 272, 394-405).—Alkaloid salts may be accurately determined by chemical (phenolphthalein) or, better, electrometric (buffer solution p_{π} 8.4) titration of the acid with 0.025N-KOH in 90% EtOH solution, or by similar titration (thymol-blue: or buffer p_{π} 1.8) of the base with 0.025N-HCl in 90% COMe₂ solution. The potentiometric EtOH titrations are not appreciably affected by the presence of inert material such as starch or sugar. Full details are given and the accuracy of the methods is tested with a large no. of alkaloids. J. W. B.

Micro-chemistry of quinine ethyl carbonate (Euchinine). M. WAGENAAR (Pharm. Weekblad, 1934, 71, 435–438).—Quinine Et carbonate (I) when dissolved in dil. mineral acids does not give the usual microchemical reactions of quinine. (I) may be identified by crystallisation and by the formation of herapathite with I-KI solution, CHI_3 with I after hydrolysis with NH_3 , and the green coloration with Cl_2 and NH_3 .

Detection of strychnine salts. D. VON KLOBU-SITZKY (Biochem. Z., 1934, 270, 120—121).—To 0.05%solutions (2—3 c.c.) of strychnine salts [sulphate, hydrochloride (I), nitrate, phosphate, glycerophosphate] an equal vol. of 4% aq. Na glycerophosphate is added and the mixture is boiled for 0.5 min. The characteristic cryst. ppts. which separate on cooling are at once microscopically examined while moist. 0.01—0.05 mg. is detectable. Except with (I) other alkaloids do not interfere. W. McC.

Determination of strychnine and brucine as hydroferrocyanides and their separation by means of ferrocyanide. I. M. KOLTHOFF and J. J. LINGANE (J. Amer. Pharm. Assoc., 1934, 23, 302– 308).—Strychnine can be pptd. and determined as hydroferrocyanide (I), even at great dilutions. (I) contains only 1 H_2O of crystallisation (cf. B., 1925, 226). The determination of brucine is less accurate (hydroferrocyanide more sol.). A. E. O.

Determination of gelatin. G. FARKAS (Magyar Orvosi Arch., 1933, 34, 269—273).—In solutions containing proteins and collagen the former are pptd. by heating to 40° and adding two vols. of saturated picric acid solution (I). To the filtrate 1.5 vols. of (I) are added and the whole is left for 24 hr. at 8°, when the pptd. gelatin is collected and its N content determined (Kjeldahl). NUTR. ABS. (m)

Colorimetric micro-determination of arginine. G. JEAN (Bull. Soc. Chim. biol., 1934, **16**, 307–309).– Using Jorpes' modification (A., 1932, 1270) of the method of Weber, 0.015-0.035 mg. of arginine in protein hydrolysates can be determined with an accuracy of 3-4%. A. L.

Biochemistry.

Identification of traces of old blood-stains by means of the hæmatoporphyrin spectrum. M. WAGENAAR (Pharm. Weekblad, 1934, 71, 478—482).— Details are given for observing the spectrum of hæmatoporphyrin microscopically after treating a blood-stain with H_2SO_4 . S. C.

Oxygenation of concentrated versus normal blood. G. B. RAY, C. I. THOMAS, and J. E. STRONG (J. Clin. Invest., 1933, 12, 1051–1062).—The tension of O_2 required to produce a given saturation is the same for normal and polycythæmic blood. On perfusion through the surviving lung the former becomes completely oxygenated, whilst the latter is never fully saturated owing to more rapid passage and delayed diffusion. CH. ABS.

Ultra-violet spectrum of oxyhæmoglobin. G. A. ADAMS, R. C. BRADLEY, and A. B. MACALLUM (Biochem. J., 1934, 28, 482—485).—Laked rabbits' erythrocytes (I) absorb strongly between 4200 and 3900 Å. with a max. at 4100 Å. Unlaked (I) absorb very much less at all λ with no marked band. It is concluded that oxyhæmoglobin is in a different state when outside (I) from that when inside. H. D.

Resistance of hæmoglobin to antiseptics. I-V. A. MAISANI (Boll. Chim.-Farm., 1933, 72, 761-769, 804-809; 1934, 73, 246-259).-I. The common antiseptics (I) are reviewed, and those suitable for testing indicated.

II, III. The properties of hæmoglobin (II) are reviewed, and the procedure is described.

IV, V. The resistance of human and other (II) to various (I), as shown by the time of persistence of the (II) absorption band, varied with the species and the (I). The (II) was destroyed in some cases, and denatured and pptd. in others. The effect of the (I) was diminished by dilution, except for $Na_2B_4O_7$, when it was increased. R. N. C.

Osmotic pressures and mol. wts. of hæmocyanins. A. and MME. G. S. ADAIR and M. and MME. J. ROCHE (Compt. rend., 1934, 198, 1456— 1458).—Osmotic pressures of dialysed snail, octopus, and crab hæmocyanins gave approx. mol. wts. comparable with Svedberg's determinations (this vol., 92). B. W. B.

Penetration of glucose into erythrocytes. W. FLEISCHMANN and H. KAUNITZ (Pflüger's Archiv, 1933, 233, 148—153; Chem. Zentr., 1933, ii, 3003).— The vol. increase of human erythrocytes in isotonic glucose solutions has been measured between 9° and 25°. H. J. E.

Determination of uncombined water of the erythrocytes of human blood. A. SLAWINSKI (Bull. Soc. Chim. biol., 1934, 16, 96—104).—By the author's method (A., 1929, 1142), the vol. of free H_2O in the erythrocytes is 59%. A. L.

Permeability of erythrocytes. H. DAVSON (Biochem. J., 1934, 28, 676-683).—Ox erythrocytes (I) lose K in 0.9% NaCl, glucose solution (II), and diluted serum (III). (I) lose NaCl in 1.5% KCl, (II), and (III). The corpuscle-Na and -K rise in 1.5% NaCl and KCl, respectively. C. G. A.

Influence of carbonic acid on the permeability of [blood-corpuscles to] ammonium salts. S. L. ÖRSKOV (Biochem. Z., 1934, 269, 349—366).—A method for following the vol. of blood-corpuscles by means of a photo-cell is described, and is used to show that the velocity of swelling is greatly increased by solutions of NH_4 salts, the action being due to the cation. CO_2 does not affect the permeability to anions, but greatly increases that to NH_4 salts and the salts of various amines, e.g., the hydrochlorides of NH_2Et , $NHEt_2$, and piperidine. P. W. C.

Specific resistance of the interior of the red blood-corpuscle. H. FRICKE and H. J. CURTIS (Nature, 1934, 133, 651).—The sp. resistance of the interior of the corpuscle of sheep, rabbit, and chicken is $140(\pm 10\%)$ ohms at 20°. L. S. T.

Solubility of ethyl iodide in human blood and its correlation with the erythrocyte count. R. D. COOL, C. J. GAMBLE, and I. STARR, jun. (J. Biol. Chem., 1934, 105, 97–105).—The average distribution coeff. for EtI between air and human blood was 6.7 ± 0.36 . H. G. R.

Blood of fish and turtles. H. M. VARS (J. Biol. Chem., 1934, 105, 135—137).—The blood-non-protein-N, -urea- +-NH₃-N, -uric acid, -Cl', and total plasma- and serum-N were determined in *Esox lucius*, *Cyprinus* carpio, and *Chelydra* serpentina.

H. D. Blood-alkali reserve, -sugar, -urea, and -iron in newborn pigs. A. TRAUTMANN and C. KOCH (Z. Tierzüchtung Züchtungsbiol., 1933, 28, 29–39).—In three litters alkali reserve was high at birth, fell at first, and was again high at 5—6 weeks. The level did not vary with body-wt. or sex. Blood-sugar (133 mg. per 100 c.c.) was >, and urea (9—15 mg. N per 100 c.c.) similar to, that in adults. Fe fell during the first 7 days and then rose. In 38-dayold pigs an average of 35.6 mg. of Fe per 100 c.c. was found. NUTR. ABS. (m)

Blood-sugar of healthy Korean adults. Y. C. LEE and C. Y. CHOI (Korean Med. J., 1933, 3, 65—70).—Vals. are: male 0.09-0.109, female 0.079-0.128%. The average val. in each sex is 0.107%.

CH. ABS. Step-photometric determination of bloodsugar. C. URBACH (Med. Klin., 1933, 29, 1381— 1382; Chem. Zentr., 1933, ii, 2865). L. S. T.

Determination of volatile aldehydes in blood. J. DUFILLE and M. LACHAUX (Bull. Soc. Chim. biol., 1934, **16**, 194—210).—The method of Bougault and Gros (A., 1922, ii, 666) for the determination of volatile aldehydes applied to blood gives a val. of 3—6 mg. CH₂O per litre for the dog. Whilst injection of $(CH_2)_6N_4$ into dogs results in the liberation of small amounts of volatile reducing substances, its methiodide is not decomposed. A. L.

Volumetric determination of small amounts of phosphatides, free cholesterol, cholesteryl ester,

neutral fat, and total lipin of blood, plasma, and corpuscles. S. KATSURA, T. HATAKEYAMA, and K. TAJIMA (Biochem. Z., 1934, 269, 231–240).—The method combines the authors' earlier methods for determination in 0.5 ml. of blood or plasma of total fatty acids and cholesterol (A., 1931, 858) and of phosphatides (A., 1933, 294) and gives reproducible results, the error being $\pm 5\%$. P. W. C.

Amino-acids in maternal blood and that of the umbilical cord. P. DONEDDU (Arch. Farm. sperim., 1934, 57, 105—127).—Blood-NH₂-acids (I) remain normal during the first half of the pregnancy period, but rise rapidly during the second; the difference between the (I) in starvation and after protein feeding is unaltered. The (I) remain high during labour, but fall rapidly to normal afterwards. The (I) of the umbilical cord are independent of the maternal (I), but dependent on the wt. and size of the fœtus. R. N. C.

Micro-determination of iron in blood. F. RAPPAPORT and E. HOHENBERG (Klin. Woch., 1933, 12, 1810—1811).—The blood is ashed with H_2SO_4 and H_2O_2 , the solution transferred to a modified Parnas-Wagner apparatus, KI in aq. CdSO₄ is added, and the liberated I is steam-distilled into aq. NaOH+ Na₂SO₃. I' is oxidised to IO₃' by Br in AcOH and the I determined titrimetrically with Na₂S₂O₃. 0·1—0·2 c.c. of blood suffices. NUTR. ABS. (m)

Iron determination in blood. B. R. BURMESTER (J. Biol. Chem., 1934, 105, 189–198).—The volumetric Ti^{II} (McFarlanc, A., 1932, 1182) (I), the colorimetric CNS' (II), and the colorimetric thioglycollic acid (Hanzal, this vol., 122) (III) methods are compared in the determination of Fe in ashed blood and Wong filtrates (A., 1928, 785). The accuracy of (III) in ashed blood equals that of (II), and is > that of (I), and is maintained in the Wong filtrate.

H. D.

Demonstration of copper in snail's blood by electrolytic coloration of a protein membrane. M. CHANOZ, P. PONTHUS, and R. NIEL (Compt. rend. Soc. Biol., 1933, **114**, 1109—1112).—After ashing the blood with H_2SO_4 and HNO_3 , removal of excess acid by ignition, and taking up the ash in H_2SO_4 , it is possible, by use of the electrolytic cell previously described (*ibid.*, 1928, **98**, **313**), to detect Cu using 0.05 c.c. of blood. NUTR. ABS. (m)

Micro-determination of magnesium in bloodserum. L. VELLUZ (J. Pharm. Chim., 1934, [viii], 19, 346—348).—Mg is pptd. by 8-hydroxyquinoline in presence of $(NH_4)_2C_2O_4$, without removal of Ca. H. G. R.

Blood-calcium of earthworms. K. AOKI (Proc. Imp. Acad. Tokyo, 1934, **10**, 121–124).—The blood-Ca (I) and -Na of *Pheretima hilgendorfi* average, respectively, 32.9 and 213 mg. per 100 c.c. The level of (I) increases with increasing [CO₂] of the air. F. O. H.

Alterations in calcium content of blood in relation to the menstrual cycle. R. F. MATTERS and E. U. HUBBE (Austral. J. Exp. Biol., 1934, 12, 19-23).—Alterations in the Ca content previously reported (A., 1929, 1101) have not been confirmed. A. E. O. Quick dry ashing of blood-serum for determination of sodium by uranyl zinc acetate method. W. E. WILKINS (J. Biol. Chem., 1934, 105, 177–179).—Serum is boiled with a $Mg(NO_3)_2$ -MgCO₃ solution in a SiO₂ crucible and when dry heated strongly. H. D.

Determination of blood-chlorine and the erythro-plasma coefficient. J. BOTTIN (Bull. Soc. Chim. biol., 1934, 16, 145-151). A. L.

Determination of iodine in blood with alkaline and acid combustion. H. LÜCKER (Deut. Arch. klin. Med., 1933, 175, 681-690).—Pfeiffer's method gives higher and more accurate results than does von Fellenberg's. 100 c.c. of normal blood contain 0.02-0.04 mg. of I. NUTR. ABS. (m)

Proteins of blood and subcutaneous lymph in dogs. A. A. WEECH, E. GOETTSCH, and E. B. REEVES (J. Clin. Invest., 1933, 12, 1021-1030).-Vals. of albumin : globulin in serum and lymph are related. The entrance of serum-proteins into the lymphatics is discussed. CH. ABS.

Formula and nonogram for determining the osmotic pressure of colloids from the albumin and total protein concentrations of human blood-sera. H. S. WELLS, J. B. YOUMANS, and D. G. MILLER (J. Chin. Invest., 1933, **12**, 1103–1117).— $P=C(21\cdot4+5\cdot9A)$, where P is the osmotic pressure (mm. H₂O), C is the total protein, and A is the albumin (g. per 100 c.c.). CH. ABS.

Determination of the $p_{\rm H}$ of blood-plasma. P. DU NOUY and V. HAMON (Bull. Soc. Chim. biol., 1934, 16, 177–193).—By means of the inclined rotating electrode (A., 1932, 135) determinations of the $p_{\rm H}$ of blood-plasma can be made with an error of ± 0.01 . A. L.

Alleged reversal of the denaturation of serumalbumin. L. F. HEWITT (Biochem. J., 1934, 28, 575-579).—The claim of Anson and Mirsky (A., 1931, 1080) to have reversed the heat-denaturation of serumalbumin (I) has not been confirmed, and there is no evidence that the recovered (I) has been denatured. (I) may be heated in acid solution without being appreciably denatured. H. G. R.

Filtration of serum-proteins through membranes of graduated porosity. P. GRABAR (Compt. rend., 1934, 198, 1640—1641).—The pore diameters in m μ which permit no and total passage of proteins on ultra-filtration are for horse serum 9 and 90 (very little with 40), for solutions of lipin-free serum 15 and > 90, of serum-albumin 9 (10, if free from lipins) and 30, and of pseudoglobulins 17 and 80, respectively. Correlation of these figures with particle size is dependent on the (unknown) amount of absorption by the membrane. R. S. C.

Ultra-filtration of proteins through graded collodion membranes. I. Serum-proteins. W. J. ELFORD and J. D. FERRY (Biochem. J., 1934, 28, 650-662).—The filtration curve, end-point curve, and a quant. measure of filterability are defined. The influence of the nature of the solvent medium, $p_{\rm H}$ neutral salts (I), concn. of protein (II), and filtration pressure on the ultrafiltration of serum-albumin (III) and pseudoglobulin (IV) is described. The results indicate two types of filtration, termed normal (a true sieving mechanism occurring at the extreme acid or alkaline portion of the $p_{\rm H}$ range) and abnormal [when at an early stage the pores are blocked by large deposits of (II) within them]. (I) improve filterability by a peptising action at, and on the alkaline side of, the isoelectric point. Hartley's broth (V) at $p_{\rm H}$ 7.6—7.8 is the best solvent for the filtration of (II). The ratios, particle size/end-point average pore diameter, are given for (III) and (IV) under optimum filtration conditions. The filtration endpoint of (III) and (IV) is the same in pure solution in (V) at $p_{\rm H}$ 7.8 as in native horse serum. A. E. O.

Serum differences of various animal species. H. IGARASHI (Japan. J. Gastroenterol., 1933, 5, 128— 131).—The binding capacity of various sera for dyes falls in the order: man>rabbit>goat, cow, pig, horse>pigeon, chicken. CH. Abs.

Is thrombin a proteolytic enzyme? H. STRUG-HOLD and E. WÖHLISCH (Z. physiol. Chem., 1934, 223, 267-280).—In a simplified clotting system, consisting of isolated fibrinogen and thrombin (I) low in protein, trypsin-kinase (II) in small amounts has no action, and in larger amounts delays or prevents clotting. The accelerating effect of (II) on wholeblood clotting is probably indirect, and due to protein breakdown-products. The hypothesis of Waldschmidt-Leitz (cf. A., 1929, 89, 951) that (I) is a proteolytic enzyme is untenable. (I) may be a "fibrinogen denaturase." J. H. B.

Kinetics of hæmolytic systems. V. Lytic effect of mixtures of two lysins. E. PONDER (Biochem. J., 1934, 28, 384—390).—The total hæmolytic effect is rarely the same as the sum of the two individual activities. The lysins probably interact with each other. A. E. O.

Kinetics of hæmolytic systems. VI. Inhibition produced by plasma and serum. E. PONDER and A. S. GORDON (Biochem, J., 1934, 28, 748— 753).—The inactivation of saponin by plasma can be accounted for by a reaction between the lysin and plasma-proteins, whereby the former is removed from the system. H. D.

Effect of sodium cyanide on complement hæmolysis. W. H. RANDALL (Proc. Soc. Exp. Biol. Mcd., 1933, 30, 1412—1413).—Addition of neutralised NaCN solution to red cells (I), sp. hæmolysin (II), and complement (III) inhibits hæmolysis. When (I) are washed after contact with (II) and NaCN, addition of (III) causes hæmolysis. The effect of NaCN is on the (III) and is independent of the $p_{\rm H}$ of the cyanide. CH. ABS.

Influence of $p_{\rm H}$ on action of hæmolytic complement. T. W. B. OSBORN (Biochem. J., 1934, 28, 423-425).—A max. rate of hæmolysis of sheep's corpuscles by guinea-pig's serum occurs near $p_{\rm H}$ 7.5. Inorg. and org. ions retard hæmolysis, whilst BO₂' is hæmolytic to both sensitised and unsensitised corpuscles. H. D.

Volume of precipitate in precipitin reactions. F. S. JONES and R. B. LITTLE (J. Immunol., 1933, 25, 381-396). CH. ABS. Local organ hypersensitiveness. V. Fate of antigen and the appearance of antibodies during the development of hypersensitiveness in the rabbit eye. B. C. SEEGAL, D. SEEGAL, and D. KHORAZO (J. Immunol., 1933, 25, 207-220).

CH. ABS.

Species specificity of fibrinogens. H. B. KEN-TON (J. Immunol., 1933, 25, 461-470).—Pigeon, sheep, horse, and rabbit fibrinogens are not of identical protein structure. "Group" antibody reactions were obtained only with sheep and ox fibrinogen. CH. ABS.

Existence of antigenic determinants of diverse specificity in a single protein. I. Tyrosine- and histidine-diazoarsanilic acids as haptens. S. B. HOOKER and W. C. BOYD (J. Immunol., 1933, 25, 61-69).—Injection of a single "complete" protein coupled with diazotised arsanilic acid probably leads to the production of two different antihaptens, one corresponding more closely with the tyrosine- and the other with the histidine-diazoarsanilic acid group. With gelatin, only one antihapten is produced.

CH. ABS.

Methylated glycinin as an antigen. H. LEONT-JEV and M. ZNAMENSKAJA (Biochem. Z., 1934, 270, 116—119; cf. A., 1933, 292).—The structure of glycinin is not appreciably affected by methylation. The product is an antigen; in dil. solutions it produces anaphylactic shock in guinea-pigs.

W. McC.

Biochemistry of carbohydrates. III. Microdetermination of glucosamine in blood, tissue, and urine. K. KAWABE. IV. Enzyme hydrolysing conjugated glycuronic acids. H. MASA-MUNE (J. Biochem. Japan, 1934, 19, 319–327, 353– 375).—III. Blood and tissue are deproteinised by $CCl_3 \cdot CO_2H$, the filtrate is extracted with Et_2O , and the aq. layer treated successively with NaOMe, Ac_2O , EtOH-KOH, and *p*-NMe₂ $\cdot C_6H_4 \cdot CHO$, the resulting colour being compared with that of phenol-red in borate buffer at $p_{II} \otimes 6$. With urine, urea, allantoin, and alloxan interfere and must first be removed.

IV. Pptn. of extracts of autolysates of ox kidney with 95% EtOH (3 vols.) yields preps. which hydrolyse β -menthol- (I) (but not α -menthol-), phenol- (II), β -naphthol-, borneol-, and phloroglucinol-glycuronic acid, the optimum $p_{\rm H}$ (III) being 5·3—5·6. Emulsin (IV) hydrolyses (I) and (II), (III) being approx. 4. The enzyme (for which the name " β -glycuronosidase " is suggested) does not hydrolyse α - and β -glucosides and is less stable to heat than (IV). F. O. H.

Carbohydrate content of egg-white. M. SÖREN-SEN (Biochem. Z., 1934, 269, 271–284).—Eggwhite, which contains 0.45% of free glucose, is composed of 7% of globulin containing 4% of mannose (I), 2% of mucin containing 14.9% of a mixture of equal parts of (I) and galactose (II), 70% of albumin containing 1.7% of (I), 9% of conalbumin containing 2.8% of a mixture of 3 parts of (I) and 1 part of (II), and 13% of mucoid containing 9.2% of a mixture of 3 parts of (I) and 1 part of (II). The possibility that this carbohydrate is present in the form of trisaccharides composed of 1 mol. of glucosamine with 2 mols. of (I) or (II) is discussed. P. W. C. Phosphorus, sulphur, and alkali content of hens' eggs. J. GROSSFELD and G. WALTER (Z. Unters. Lebensm., 1934, 67, 510-529).—The mean P_2O_5 contents (I) of the yolk (Y) and white (W) are 1.42 and 1.36%, respectively. The lecithin- P_2O_5 (II) of Y=1.01%. Extraction with EtOH, C_6H_6+ EtOH (4:1), Pr^aOH, Pr^bOH, and MeOH gives approx. identical yields of (II). Most previous results are too low. W contains no inorg. P_2O_5 . W contains 0.212%, Y 0.222% of S. Simple ashing, with or without addition of alkali, causes loss of S. Details of ashing with the addition of KOH and KNO₃ are given. Y contains 0.112% of K and 0.045% of Na; W contains 0.153% of K and 0.179% of Na. E. C. S.

Composition of eel-fat. H. WIEHR (Fettchem. Umschau, 1934, 41, 71–72). Eel-fry, long-headed and broad-headed eels yielded 27.9, 66.7, and 27.7% of Et₂O-extractable fat (on dry basis), respectively, having I vals. (Margosches) 90.6, 97.4, and 105.8 : sap. val. 205, Reichert-Meissl val. 1.9. The fat contained about 2.8% of phosphatides and 0.74% of cholesterol, and yielded 86.5% of fatty acids [66.2%saturated acids, mainly palmitic acid, and 20.3%unsaturated (oleic) acids]. E. L.

Constituents of menuke oil. I. Fatty acids. S. UENO and M. IWAI (J. Soc. Chem. Ind. Japan, 1934, 37, 52—53B).—Palmitic, stearic, and myristic acids are the principal saturated fatty acids. Zoomaric (?), gadolinic (?), cetolinic (?), and mainly oleic acid are the unsaturated acids. J. L. D.

Fatty substances of shell-fish. I. Asari (Tapes philippinarum), shijimi (Corbicula leana) karasugai (Cristaria plicata), and hamaguri (Meretrix meretrix). II. Fatty substances of ear- (Haliotis gigantea) and top-shells (Turbo cornutus). M. TSUJIMOTO and H. KOYANAGI (J. Soc. Chem. Ind. Japan, 1934, 37, 81—85B, 85—86B).— I. EtOH and Et₂O extract fatty substances (I) and phosphatides (II) from the shell-fish (freed from shells). (I) (separated by COMe₂) consist of highly unsaturated fatty acids (III) and an unsaponifiable portion (IV) (up to 45%), from which is isolated a sterol, m.p. 135—136° (Ac derivative, m.p. 130— 130·7°), different from cholesterol (V), although some (V) is also present.

II. (I) from the two sources contain 20 and 38% of (IV) [which contains (V)], respectively, and are rich in (III). J. L. D.

Occurrence and secretion mechanism of cetyl alcohol in the animal organism. R. SCHOEN-HEIMER and G. HILGETAG (J. Biol. Chem., 1934, 105, 73—77).—Cetyl alcohol was isolated from the fæces of man, dogs, and eats and was demonstrated in human intestinal wall, meconium, and sterile cysts of the large and small intestine. It is secreted through the intestinal mucosa into the lumen and may constitute an endogenous purgative. H. G. R.

Lipochromes of animals. R. FABRE and E. LEDERER (Bull. Soc. Chim. biol., 1934, 16, 105– 118).—Astacene, isolated from the shell of the Norwegian lobster (A., 1933, 509), is also present as ester in other Crustaceæ examined, viz., *Palinurus* vulgaris, Leander serratus, Portunus puber, Cancer pagurus, Nephrops, and Potamobius astacus. The foot of the scallop, Pectunculus glycymeris, contains a brownish-violet pigment glycymerin, m.p. 148– 153°, extracted with $COMe_2$. The absorption spectrum shows a single band with a max. at 495 mµ. The red anemone, Actinia equina, contains a violet pigment, Actinioerythrin (I), m.p. 85°, present as the ester of an unstable acid. The absorption spectrum of (I) in light petroleum shows three bands having max. at 534, 497, and 470 mµ. A. L.

Extractives of liver. R. KAPELLER-ADLER and A. LUISADA (Biochem. Z., 1934, 269, 397-414).-The total acidity (expressed as CO₂H) in aq. extracts of fresh calves' liver is 0.2%, and increases on autolysis, part of the acid being Et_2O -sol. When such extracts are evaporated at ordinary pressure or in vac., the acidity is increased 2—3 times, the extra acid not being due to the formation of H_3PO_4 , NH_2 -acids, or polypeptides. During evaporation the NH_2 -N is decreased to one third the original val. Tables show the albumose, NH4, purine, creatinine, and base contents of the phosphotungstic acid ppt. and the creatine, urea, NH2-acid, and polypeptide contents of the corresponding filtrates of ox liver extracts. The content of volatile base is also determined. The albumose fraction contained tyrosine 3.28%. phenylalanine 1.08%, but no histidine. The results of similar N fractionation of four commercial antianæmia liver preps. are tabulated. **P**. W. C.

Glycogen in the liver of young larvæ of anurid amphibia. R. FARAGGIANA (Atti R. Accad. Lincei, 1933, [vi], 18, 580—582).—Both in the rat and in the anurid amphibia, glycogen appears in the liver before the endocrine islets of the pancreas have assumed the typical structure they show in the adult. T. H. P.

Determination of glycogen in liver tissue. A. CARRUTHERS and S. M. LING (Chinese J. Physiol., 1934, 8, 77–83).—The aq. extraction procedure (A., 1931, 642) for the total sugar and glycogen (I) fails to extract about 0.20% of (I) from liver, and is therefore inaccurate with material containing <4.0% of (I). C. G. A.

Extractives of muscle of *Dromaeus* sp. D. ACKERMANN and F. A. HOPPE-SEYLER (Z. physiol. Chem., 1934, 223, 257–258).—Polemical against Tolkatschevskaya (this vol., 431). J. H. B.

Constitution of muscle-proteins. II. Nitrogen distribution in protein starvation. III. Composition of muscle-proteins in protein starvation and muscle-nitrogen stores. A. ROCHE (Bull. Soc. Chim. biol., 1934, 16, 257–269, 270– 284).—II. The N content of the EtOH extract (I) of the muscles of totally starved rats (II) is 39%, that of protein-starved animals (III) 21%, above normal. The N content of the C₆H₆ extract of (I) in (II) is 15%, and in (III) 100%, > normal. The total muscle-N of (II) is 16·27–17·14%, of (III) 15·09– 17·38%, and of normal animals 15·38–16·00%; whilst the ratio of the nuclei acid-P to the protein-N diminishes in (II), it increases in (III).

III. The N distribution of the muscle-proteins of

(II) is normal, but that of (III) shows increases in NH_2 -acid content and decreases in $(NH_2)_2$ -acids, tryptophan, tyrosine, and lysine. The arginine, cystine, and histidine content is normal. A. L.

Difference in creatine concentration of the left and right ventricular cardiac muscles. D. P. SEECOF, C. R. LINEGAR, and V. C. MYERS (Arch. Int. Med., 1934, 53, 574–593).—The left ventricular muscle has a concn. of creatine (I) > the right. When (I) of voluntary muscle exceeds the saturation point a corresponding elevation in (I) of cardiac muscle occurs. H. G. R.

Diadenosinepentaphosphoric acid [from horse heart]. P. OSTERN (Biochem. Z., 1934, 270, 1-5).-1 kg. of fresh horse heart yields 0.2 g. of the Ba salt of a diadenosinepentaphosphoric acid. Pig heart, treated in a similar way, yields adenosine-5-phosphoric acid. W. McC.

Filtration of thymonucleic acid under pressure. T. CASPERSSON (Biochem. Z., 1934, 270, 161—163).— Adherent protein is removed and a non-opalescent filtrate obtained when 4% thymonucleic acid is filtered under 75—100 atm. pressure through 25—50 sheets of Swedish filter-paper. Purity much > 90% is attained. W. McC.

Isolation of cytosine from [pig's] spleen. C. MONCORPS and O. GÜNTHER (Klin. Woch., 1933, 12, 979-981; Chem. Zentr., 1933, ii, 1199). A. A. E.

Mucoid substance of the cock's comb. A. BERDNIKOW and C. CHAMPY (Comp. rend. Soc. Biol., 1933, 106, 804—805; Chem. Zentr., 1933, ii, 2842).— Extraction of fat-free tissue of the cock's comb with 15% NaCl solution, dialysis of the acidified filtrate, and appropriate solvent treatment of the dialysate yielded a grey, amorphous powder giving no carbohydrate on hydrolysis, positive biuret reaction, P 1.5, N 14.5%. Thin layers give the same histochemical reactions as sections of cock's comb, but are different from ovalbumin solution. The cock's comb contains a substance not possessed by the comb of the capon. L. S. T.

Physiology of the thyroid. Iodine-containing substances of the thyroid. F. BLUM, F. A. LEH-MANN, and W. LEISTNER (Endokrinol., 1933, 13, 250-255).—Thyreoglobulin solutions, on treatment with aq. $(NH_4)_2SO_4$ in varying concn., yield two fractions, which, after repeated pptn. and dialysis involving elimination of a nucleoprotein, differ in solubility in H_2O , I content, and therapeutic efficiency. NUTR. ABS. (m)

Thyroid iodine. G. ANDREASSI and M. TALENTI (Arch. Farm. sperim., 1934, 57, 169–185).—In thirty cases examined *post mortem* there was a correlation between the wt. of the human thyroid gland (I) and the mean I content (II), wt. decreasing as (II) increased. The mean (II) of (I) in females was > in males. (II) increased with the stature of the subject, but diminished in senility. R. N. C.

Electrical phenomena of the cornea. III. Electrical charge. IV. Isoelectric point. K. HAYASHI (J. Biochem. Japan, 1934, 19, 173-183, 185-199; cf. this vol., 432).-III. The charge (I) of fresh (II) or formolised cornea (III) (ox, rabbit) in H_2O is indefinite, but appears to be negative. The negative (I) is more marked in Ringer's solution or aq. KCl, LiCl, NaCl, MgCl₂, BaCl₂, and CaCl₂, whilst in aq. Cu(NO₃)₂, Th(NO₃)₄, CeCl₃, AlCl₃, and HCl, (I) is positive.

IV. Variations in (I) and the diffusion and membrane potentials of (II) and (III) at $p_{\rm H}$ 3.8—8.5 (OAc' buffer) were determined and the effect of variations in electrolyte concn. on the two sides was investigated. The isoelectric point of (II) and (III) measured by the membrane effect is $p_{\rm H}$ 4.7, by electroendosmosis $p_{\rm H}$ 4.3, and by imbibition $p_{\rm H}$ 4.2—4.4.

F. O. H.

Solubility of [dental] enamel. J. C. FORBES (J. Dental Res., 1933, 13, 349–358).—Solubility in H_2O is increased by $MgSO_4$; [Mg] in saliva is not an important factor in the etiology of dental caries. In absence of Ca^{**} and PO₄^{***}, CO₂ has a solvent effect. Decalcification occurs in presence of glucose and acidogenic organisms. CH. ABS.

Behaviour of dyes towards blood and organ pulp. R. OHTA (Japan. J. Gastroenterol., 1933, 5, 113—122).—Organ pulps combine more readily with basic than with acid dyes. CH. Abs.

Acid versus neutral formaldehyde solution as a neurological fixative. H. A. DAVENPORT (Stain Tech., 1934, 9, 49–52).—Better fixation and staining were realised with acid than with neutral CH_2O . AcOH was most effective in concess of 3-5%; stronger acids (HCO₂H, $CH_2Cl \cdot CO_2H$, $CCl_3 \cdot CO_2H$, lactic acid) were effective in concess of 0.5-1%. H. W. D.

Variation of the Pal-Weigert method for staining myelin sheaths. S. L. CLARK and J. W. WARD (Stain Tech., 1934, 9, 53-55).—The variation consists in treating the sections with 4% aq. $Fe(NH_4)_2(SO_4)_2,12H_2O$ before and after staining with hæmatoxylin. H. W. D.

Oil of cloves for differentiation in Mallory's phloxine-methylene-blue stain. L. A. MARGO-LENA (Stain Tech., 1934, 9, 71).—Clove oil is better than EtOH for differentiation. H. W. D.

Taurocholic acid from fish-bile. H. MAKINO (J. Biochem. Japan, 1934, **19**, 249–251).—From 30 c.c. of the fresh bile of *Seriola quinqueradiata* was isolated 0.5 g. of taurocholic acid (Na salt, m.p. 230– 231°, $[\alpha]_{10}^{\infty} + 24.44^{\circ}$ in H₂O). F. O. H.

Effects of diet on salivary phosphate. W. H. EDDY, H. L. HEFT, S. ROSENSTOCK, and R. RALSTON (J. Dental Res., 1933, 13, 511—519).—Variations in P content of human saliva are > those in $p_{\rm H}$. In man, salivary P is decreased by ingestion of sugar and other carbohydrates, or protein, unaffected by fat, and increased by Ca phosphate. In fasting rats ingestion of sugar decreased [P], increased $p_{\rm H}$, and produced little change in [Ca] of the blood.

CH. ABS.

Gastric juice of natives of the Japanese South Sea Island. I. K. NAGASAKI (Japan. J. Gastroenterol., 1933, 5, 111–114).—After a rice gruel test meal the HCl and total acidity were 18.5 and 19.4, respectively, and total Cl 0.3–0.44 g. per 100 c.c. CH. ABS. Comparison of pepsin and rennin activities of gastric secretions. H. HOLTER 2nd B. ANDERSEN (Biochem. Z., 1934, 269, 285-300).—Whilst the pepsin content (I) of gastric juice varied from 12 units in pig to 75 units in a puppy, the rennin activity (II) varied from 1.05 units in an adult dog to 30 units in the pig. The ratio (I): (II) varied from 0.13 in calf to 12.5 in dog, and for man and dog was almost the same whether young or adult. The presence of relatively large amounts of rennin appears to be typical for calf. P. W. C.

Secretagogues in the gastric juice of dogs. M. MIYAZAKI (J. Biochem. Japan, 1934, 19, 329-344).— The gastric juice (I) secreted by dogs on sham feeding has no action on the isolated frog's heart and rabbit's intestine or uterus. (I) secreted after subcutaneous or intravenous injection of histamine, choline, muscarine, neurine, pilocarpine, eserine, or methylguanidine has an action resembling that of the drug used. Hence the component of (I) functioning as a secretagogue [the "gastrin" of Edkins (A., 1905, ii, 730; 1906, ii, 238; 1909, ii, 414)] probably consists of a mixture of substances varying with the food and condition of the stomach. F. O. H.

Quantitative relationships between oxyntic and other gastric component secretions. A. C. LIU, I. C. YUAN, and R. K. S. LIM (Chinese J. Physiol., 1934, 8, 1—36).—The oxyntic HCl is secreted at a const. concn. of 0.176 millimol., together with an equal concn. of saline secretion. C. G. A.

Mechanism of the inhibition of gastric secretion by fat. Rôle of glucose, insulin, and the parasympathetic system. M. C. LI (Chinese J. Physiol., 1934, 8, 37—51).—Both fat and the intestinal extract "enterogastrone" inhibit gastric secretion induced by feeding, histamine, insulin, or shamfeeding, without causing any change in the bloodsugar; *i.e.*, the central parasympathetic inhibitory mechanism is not involved. C. G. A.

Effect of adenylic acid on gastric secretion. J. VANDOLAH (Proc. Soc. Exp. Biol. Med., 1933, 31, 28—29).—Injection of adenylic acid or of the vasodepressor substance present in blood after ingestion of meat produced no gastric response. CH. Abs.

Regulation of gastric acidity. I. Influence of acid on the secretion of hydrochloric acid by fundic pouches and by the whole stomach. C. M. WILHELJ, I. NEIGUS, and F. C. HILL (Amer. J. Physiol., 1933, 106, 381-397).—In dogs with intact stomach (I) or with fundic pouches (II) receiving intramuscular injections of 1 mg. of histamine, the presence in (I) or (II) of HCl in concns. of 0.024-0.173N does not affect, either in concn. or amount, the acid secretion of the gastric glands. HNO₃ and H₂SO₄ are similarly without effect. Increasing [H^{*}] of the (I) contents causes a parallel increase in its emptying time. NUTR. ABS. (m)

Effect of alkalosis on acid secretion by the stomach. G. DELRUE and A. LACQUET (Compt. rend. Soc. Biol., 1933, 114, 570-572).—The acid secretion (I) of the stomach, produced by injection of histamine into gastric fistula dogs, has been studied by determining the blood- $p_{\rm H}$ after ingestion of

NaHCO₃. The reduction of (I) observed during the first days at high altitudes is not accompanied by an increase in blood- $p_{\rm H}$. NUTR. ABS. (m)

Heavy water content of biological fluids. H. ERLENMEYER and H. GARTNER (Helv. Chim. Acta, 1934, 17, 549—550).—The H₂^oO content of H₂O from milk or fresh orange juice does not differ from that of normal H₂O. J. W. B.

Trophic activity of mammary gland during functional repose. M. PIETTRE (Compt. rend., 1934, 198, 1454—1456).—During rest after lactation, the mammary gland of the cow secretes, often very abundantly, a thick liquid, almost entirely free from caseinogen, and very rich in proteins, including globulin, albumin, and a myxoprotein of lower C content. E. W. W.

Physicochemical phenomena accompanying the physiological stimulus of the udder in primiparous females. M. PIETTRE (Compt. rend., 1934, 198, 1551—1553).—A trophic stimulus, independent of functional stimulus of the mammary gland in heifers, is associated with the occurrence in the colostrum of a myxoprotein (I) containing more H and less C and N than the globulin or albumin. With approaching parturition the proportion of (I) declines and none occurs in normal milk. A. G. P.

Yield and composition of the milk of the merino ewe. A. W. PERCE (Austral. J. Exp. Biol., 1934, 12, 7—12).—Yields (I) of milk from six merino ewes during the ninth week of lactation were only half those obtained during the third week when max. (I) were reached, but total solids increased by 9%, due chiefly to increases in caseinogen and fat. The P content also increased. A. E. O.

Colorimetric determination of milk-proteins. A. D. STEWART and D. D. MITRA (Indian Med. Gaz., 1933, 68, 556—558).—Comparisons are made between the blue colour produced when Folin's PhOH reagent (I) is added to milk and to a standard tyrosine solution. The % of protein (II) is then calc. by the use of a factor, relating the colour given with (I) to the amount of (II) in the milk as determined by Kjeldahl's method. NUTR. ABS. (m)

Correlation between composition of blood and that of milk. M. S. AVDEJEVA, E. J. BORISSENKO, E. I. IVANOVA, N. A. MESSINEVA, E. L. PROVATOBOVA, and N. I. SAVITSCH (Z. Tierzücht., 1933, 28, 61-83).-In the blood of cows there is considerable daily variation in hæmoglobin content, serum-K, -Ca, -Cl, dry matter (I), protein (II), creatine and creatinine, NH2-acids, cholesterol, depression of f.p., conductivity (III) and surface tension (IV), and in the milk of (I), (II), Cl, K, Ca, (III), and (IV), but there is no close correlation between changes of blood and milk. In cows of two different races high blood concn. in general paralleled milk concn. but without close correlation. There were differences, not referable to differences in environmental conditions, between the two races. NUTR. ABS. (m)

Correlation between fat content of milk and absolute fat production in dairy cows. J. KRIŽ-ENECKÝ (Věst. Česk. Akad. Zeměd., 1933, 9, 519– 522).—Since the correlation (I) between milk yield (II)

and % fat content (III) is low and negative, whilst that between (II) and fat yield (IV) is positive and high, it follows that with improvement of dairy breeds there will be an increase of milk production and a consequent increase of abs. fat production, whilst the fall of (III) will be considerably smaller. Hence (II) can serve as a basis of selection. Coeffs. of (I) between (IV) and (III) vary from 0.04 (Danish Red, West Finnish) to 0.17 for the Finnish Ayrshire and 0.22 for Bohemian cattle. The average val. for ten breeds is 0.1085. The (I) between (II) and (IV) in the same breeds varies from 0.8824 (East Finnish) to 0.9642 (Swedish Ayrshire), with an average of 0.9379. The ratio of the first coeff. to the second is on the average 1:11.7, i.e., an increase of (IV) will be twelve times as successful through an increase of (II) than of (III). NUTR. ABS. (m)

Distribution of cholesterol and cholesteryl ester between fat and plasma in cow's milk. H. DAM (Biochem. Z., 1934, 270, 112—115).—The fat contains about 0.3% of cholesterol (all free), the plasma about 0.002% (about 90% free).

W. McC. Human milk. XII. Vitamin- B_1 and $-B_2$ contents before and during maternal consumption of yeast. E. G. DONELSON and I. G. MACY (J. Nutrition, 1934, 7, 231-249).—The vitamin- B_2 content of milk was increased 0.1 unit by additions of 10 g. of yeast to the maternal diet, but the vitamin- B_1 content remained unchanged. Rats receiving vitamin- B_1 and $-B_2$ from breast milk showed greater N retention during the yeast administration period. A. G. P.

Comparison of the leucocyte count, the bromothymol-blue reaction, and the catalase content of ireshly drawn milk. C. C. PROUTY (J. Dairy Sei., 1934, 17, 75—81).—A general relationship exists between the leucocyte count and the response to the bromothymol-blue (I) and catalase (II) tests. Among many samples examined, fewer reacted normally to the (II) than to the (I) test. The average cell count of milk from normal udders is much lower than is generally supposed. The % of animals giving milk reacting normally to (I) and (II) from all quarters and at all times is very small. A. G. P.

Significance of true B. coli (B. coli communis) and B. lactis aerogenes in samples of milk. C. H. CHALMERS (Zentr. Bakt. Par., 1934, II, 89, 459-474).—Infection of mille with these organisms is discussed. Indole is not produced in milk by B. coli communis, which probably utilises lactose in preference to the side-chain of tryptophan. Telluric acid, added to the medium for the presumptive test, inhibits the activity of B. aerogenes, whereas brilliantgreen inhibits B. coli. Distinction between these organisms is thus possible. A. G. P.

Influence of mastitis on the curd tension of milk. H. C. HANSEN, D. R. THEOPHILUS, F. W. ATKESON, and E. M. GILDOW (J. Dairy Sci., 1934, 17, 257-264).—The curd tension of milk was lowered by mastitis when the latter was caused by infection with Streptococcus, but was not altered when infection was with Staphylococcus. No relationship was apparent between development of fibrous tissue in the udder and curd tension in the milk. A. G. P.

Absorption of pigment by the intestines. I, II. Behaviour of the lymphatic vessels. S. KAWAWAKI (Japan. J. Gastroenterol., 1933, 5, 101— 107, 108—110).—Pigments were introduced into the intestines of dogs and their appearance in the urine, bile, and lymph was recorded. CH. Abs.

Dye excretion through the liver and kidneys. Y. YANO (Japan. J. Gastroenterol., 1933, 5, 123— 127).—Acid dyes are excreted through the kidneys if they diffuse readily in sera. Of dyes excreted with difficulty by the liver and kidneys only acid dyes can be detected for a long period in the blood. Lipin solubility of basic dyes interferes with a direct relation between diffusibility and excretion. CH. ABS.

Excretion of dyes through the liver and kidneys. Y. TADA (Japan. J. Gastroenterol., 1933, 5, 143—186).—Most dyes when injected intravenously into dogs appear in the urine or bile. The more diffusible is the dye the greater is the concn. in the urine and the shorter is the time of excretion. The concn. in the blood is related to that in the urine and bile. CH. ABS.

Absorption and excretion of water and salts by the elasmobranch fishes. IV. Secretion of exogenous creatinine by the dog-fish, Squalus acanthias. J. A. SHANNON (J. Cell. Comp. Physiol., 1934, 4, 211-220).—The clearance of injected creatinine (I) exceeds that of xylose or sucrose by an amount depending on the concn. of (I) in the plasma, the difference decreasing as the plasma level falls. Phloridzin depresses the secretion of creatinine at both high and low plasma levels.

A. G. P. Mercury-reducing power of the sulphur-containing pigment of normal urine. B. Gwozdz (Bull. Soc. Chim. biol., 1934, 16, 211-219).—The ppt. (I) containing the colouring matter obtained by Cu(OAc)₂ from human urine freed from SO_4'' and PO_4''' has 29-42% of the reducing power (II) of normal urine as determined by the method of Baudouin (A., 1927, 476), and 32-53% of the total neutral S. The (II) due to the neutral S component of (I) is 17-25% of that of (I). A. L.

Osazone reaction in glucosuria and lactosuria. R. FORTI (Boll. Chim.-Farm., 1933, 72, 802-804).— In non-defecated urine, glucose can be detected in concn. 0.02%, and lactose in concn. 0.05%, by the osazone reaction (I), using NHPh·NH₂,HCl instead of the free base. The two osazones (II) can be separated in their typical cryst. forms from the pptd. mixture by eliminating the substances promoting polymorphic crystallisation of (II), and adjusting the $p_{\rm H}$ to the optimum for (I). R. N. C.

Determination of chloride in urine. G. GLO-MAUD and G. BON-BERNATETS (J. Pharm. Chim., 1934, [viii], 19, 437–442).—Direct titration with 0.1N-AgNO₃ using K₂Cr₂O₇ as indicator gives vals. > those obtained by the normal Volhard method (I), the difference being partly due to uric acid. The method of Votoček (A., 1918, ii, 238) gives vals. slightly nearer to gravimetric determinations than those by (I). F. O. H.

Influence of bile acids on the [H^{*}] of urine. T. KURAMOTO (J. Biochem. Japan, 1934, **19**, 245–248).—Intravenous injection (I) of Na cholate (10 mg. per kg. body-wt.) into dogs produces parallel increases in the $p_{\rm H}$ and d of the urine lasting for 8–10 hr., max. vals. occurring 4–5 hr. after (I). F. O. H.

Detection of blood in fæces. M. E. STAS (Pharm. Weekblad, 1934, 71, 489–495).—Fæces are extracted 3 times with $COMe_2$ to remove H_2O and colouring matter, dried, and re-extracted with AcOH-EtOAc (1:3). The filtrate is evaporated and the residue tested spectroscopically for porphyrins and, after heating to 175°, by the benzidine reaction for hæmatin. S. C.

Determination of phosphorus in fæces. G. ZARDO (Arch. Farm. sperim., 1934, 57, 139—152).— A description of standard methods. R. N. C.

Changes of colorimetric-, volume-, and saturation-index on administration of copper in experimental anæmia [produced by feeding] milk. E. E. Fog (Biochem. Z., 1934, 269, 301— 307).—Administration to young rats, rendered anæmic by milk feeding, of Cu + Fe effects a rapid, and of Fe alone a slow, regeneration of red cells. The changes during treatment of the % hæmoglobin, no. and vol. of red cells, etc. are tabulated. P. W. C.

Constancy of iron in the blood-plasma and urine in health and in anæmia. A. MARLOW and F. H. L. TAYLOR (Arch. Int. Med., 1934, 53, 551— 560).—Blood-plasma and urine contain 0.4-0.7 and 0.03-0.8 mg. Fe per 100 c.c., respectively. Cases of hypochromic and pernicious anæmia showed no variation, and administration of Fe^{III} NH₄ citrate caused no definite increase. H. G. R.

Action of gastric juice on beef muscle-globulin, with reference to anæmia. W. J. GRIFFITHS (Biochem. J., 1934, 28, 671-675).—Normal gastric juice produces larger amounts of sol. N from beef muscleprotein at $p_{\rm H}$ 6 than does that from cases of pernicious anæmia. The effect is not due to trypsin or pepsin, but possibly to Castle's intrinsic factor (Amer. J. Med. Sci., 1931, 182, 741). C. G. A.

Calcium and phosphorus metabolism in certain diseases of bone. W. DE M. SCRIVER and E. M. VENNING (J. Clin. Invest., 1934, 13, 139— 153).—In Paget's disease, bone cyst, and bone sarcoma Ca metabolism was normal. CH. ABS.

Glutathione in circulatory diseases. S. J. MALKIN (Z. ges. exp. Med., 1933, 89, 193—199; Chem. Zentr., 1933, ii, 3586).—Normally, bloodglutathione is 45—55 mg. per 100 c.c. Low vals. in circulatory diseases are increased by administration of glucose. A. A. E.

Creatine content of the heart in experimental cardiac hypertrophy. D. W. COWAN (Proc. Soc. Exp. Biol. Med., 1934, 31, 417-418).—The creatine concn. in hypertrophied ventricles (wt. 36% > normal) in rats in nutritional anæmia was $26\cdot6\% <$ in controls. In normal growth hypertrophy the concn. of creatine in the ventricles was approx. const. CH. ABS. Electrolytes in human tissue. III. Congestive heart failure. W. E. WILKINS and G. E. CULLEN (J. Clin. Invest., 1933, 12, 1063—1074).—The H_2O content of the right ventricle is normally slightly > that of the left; it is higher in both ventricles in congestive heart failure. Differences in P, Na, and K also exist. CH. ABS.

Nature of the pathological principle contained in malignant tumours. A. BESREDKA and L. GROSS (Compt. rend., 1934, 198, 1460—1462).—The cell-free liquid obtained by grinding and centrifuging an Ehrlich mouse-sarcoma is, even after filtration, capable of causing tumours when subcutaneously injected, and presumably contains a virus. This is easily destroyed, since the ground and suspended tumour loses its activity in $\frac{1}{2}$ hr. at 42—43°, or in 48 hr. at room temp. The liver and blood of inoculated animals, as well as the tumours, are virulent. E. W. W.

Nitrogen metabolism in white mice in the course of tumour development. I. A. PARFENTJEV (Proc. Soc. Exp. Biol. Med., 1933, 30, 1064—1067).— The urine of the normal mouse contains approx. 1.4 g. per 100 c.c. of a chondromucoid-like protein. The protein, and urea, decrease during growth of sarcoma 180. CH. ABS.

Metabolism of normal and tumour tissue. XII. Action of phenylhydrazine on the Pasteur reaction and on tissue respiration. F. DICKENS (Biochem. J., 1934, 28, 537—549).—NHPh·NH₂ (I), in low concn., has no effect on the anaërobic glycolysis of tissues (II) or the anaërobic fermentation of yeast; in presence of O_2 the lactic acid is increased to a val. equal to that of the same cells anaërobically. (II), the respiration (III) of which depends on oxidation of glucose or lactate, give a fall in (III) after heating with (I). The high aërobic glycolysis of tumour (II) is increased to the anaërobic val. by (I). H. G. R.

Calcium and phosphorus [and caries]. VIII. Rat. D. H. SHELLING and D. E. ASHER (J. Dental Res., 1933, 13, 363—378).—Caries-like lesions are frequent in rats receiving a ration containing much coarsely ground maize, and absent when the ration contains caseinogen and starch or grains with particles finer and softer than those of maize. The occurrence is not related to the Ca or P content, or to the bloodserum-Ca and -inorg. P. CH. ABS.

Use of Solanum Indicum in diabetes. I. S. KLEINER (Science, 1934, 79, 273).—The fruit has no permanent effect in lowering blood-sugar.

L. S. T.

Salt and water in the treatment of diabetic acidosis. D. M. KYDD (J. Clin. Invest., 1933, 12, 1169—1183).—Treatment of diabetics with insulin and carbohydrate alone is unsatisfactory. NaCl gives a rapid recovery with hyperchloræmia, retention of Cl until the base level is normal, followed by excretion of Cl' with excess of base. CH. ABS.

Basal metabolism in asthma and epilepsy. A. TOPPER and H. MULLER (Amer. J. Dis. Children, 1933, 46, 963—968).—In children subnormal vals. are observed. CH. ABS. Hypoglycæmia in the etiology of idiopathic epilepsy. R. L. H. MINCHIN (J. Mental Sci., 1933 (October), 18 pp.).—Epilepsy is associated with low fasting blood-sugar due to hyperinsulinism.

• C. G. A.

Chlorine metabolism in Graves' disease. F. HEIMANN (Arch. Verdauungs-Krankh., 1933, 54, 176—182).—Severe cases of Graves' disease exhibit a true achylia after caffeine (I) and after histamine (II). The Cl' of the resting gastric contents is low in very toxic conditions, normal in less severe cases. (I) and (II) have no uniform influence on gastric Cl' secretion; the blood-Cl' remains unaltered or occasionally falls. NUTE. ABS. (m)

Peculiarity of thyroid extracts in exophthalmic goitre with respect to increased oxygen consumption. III. Rabbits injected with exophthalmic goitre extract. K. SAITO (Tôhoku J. Exp. Med., 1933, 22, 227—251).—Injection of splenic extract (I) or irradiation of the splenic area (II) has only a slight effect on the increased O_2 consumption of rabbits after injection of goitre extracts, but such rabbits react to KI in doses (0.25—0.5 mg. per kg.) which have little effect on normal rabbits. Hyperthyroid rabbits react promptly to (I), (II), or KI. CH. ABS.

Effect of di-iodotyrosine on basal metabolism in myxœdema. W. O. THOMPSON, J. M. ALPER, P. K. THOMPSON, and L. F. N. DICKIE (J. Clin. Invest., 1934, 13, 29—36).—Intravenous administration of di-iodotyrosine (I) has no effect on basal metabolism in myxœdema. (I) is not the limiting factor in thyroxine (II) formation in individuals with very small amounts of active thyroid tissue, and it cannot be synthesised to (II) outside the thyroid. CH. ABS.

Maintenance requirements of myxœdema patients. Clinical and chemical assay of commercial thyroid preparations. J. LERMAN and W. T. SALTER (J. Pharm. Exp. Ther., 1934, 50, 298-309).—Determination of the equiv. maintenance doses of various thyroid preps. for twenty patients with myxœdema indicates that the activity per unit wt. varies considerably. The calorigenic action of whole thyroid is dependent on the total I, rather than on the thyroxine-I content. A. L.

Gastric acidity in thyroid dysfunction. S. A. WILKINSON (J. Amer. Med. Assoc., 1933, 101, 2097— 2099).—In hyperthyroidism (I) in man the acidity of the gastric juice (determined every 30 min. after subcutaneous injection of histamine acid phosphate) is below normal, but returns to normal after thyroidectomy. In hypothyroidism there is hyperacidity. The hypoacidity in (I) may be due to over-activity of the sympathetic nervous system. NUTR. ABS. (m)

Phosphatase activity of bones and kidneys in thyrotoxicosis. M. B. Low, R. O. WILSON, and J. C. AUB (Proc. Soc. Exp. Biol. Med., 1934, 31, 447-450).—In rats the kidney-phosphatase was slightly diminished; the kidneys were increased in size. Bone-phosphatase was normal. CH. ABS.

Calcium of milk and serum in thyroparathyroidectomised bitches. C. I. PARHON, R. CARNATESCO, and I. ORNSTEIN (Compt. rend. Soc. Biol., 1933, 114, 323).—The Ca content of milk and serum is reduced. NUTR. ABS. (m)

Blood-lactic acid in thyroparathyroidectomised dogs. C. I. PARHON and C. URZICA (Compt. rend. Soc. Biol., 1933, 114, 751-752).-Blood-lactic acid decreases progressively until death ensues. The decrease is due to absence of the parathyroids. NUTR. ABS. (m)

Adrenaline content of the adrenals in parathyroidectomised animals. L. BINET and G. WELLER (Compt. rend. Soc. Biol., 1933, 114, 985– 987).—Progressive reduction, which may be prevented by Ca administration, occurs. NUTR. ABS. (m)

Magnesium metabolism in hyperparathyroidism. H. A. BULGER and F. GAUSMANN (J. Clin. Invest., 1933, 12, 1135—1142).—There is a negative Mg balance. The effect of the parathyroid hormone on Mg metabolism may be secondary to that on Ca metabolism. CH. ABS.

[Cause of] hæmorrhagic lipæmia. U. STARUP (Biochem. Z., 1934, 270, 74—92).—Lipæmia (I) of the same kind is produced in rabbits (II) by repeated bleeding, subcutaneous injection of NHPh·NH₂, injection of large amounts of H₂O, or diminution to 340 mm. of the atm. pressure in which (II) live. The decreases in the total protein, neutral fat, cholesterol, lecithin, and hæmoglobin (III) contents of the blood which accompany (I) are similar in all cases, although with NHPh·NH₂ (I) is a secondary phenomenon, a consequence of the anæmia caused by the poisoning involved. In all cases (I) is due to the lack of O₂ caused by the reduced (III) content of the blood. W.McC.

Lactic acid metabolism in ileus. I. Time course of the lactic acid level. II. Lactic acid metabolism in the liver. J. IZUMI (Tôhoku J. Exp. Med., 1933, 22, 201-216, 217-226).—I. After ligation of the intestine in rabbits at the pyloric level, blood-lactic acid rises, reaching a max. (50-60 mg. per 100 c.c.) immediately before death.

II. After experimental ileus arterial (I), portal (II), and hepatic (III) venous blood-lactic acid rises; the order becomes (III)>(I)>(II) instead of (I)>(II)>(III). The results are ascribed to impaired resynthesis of lactic acid in the liver, its increased formation from hepatic glycogen, and disturbed metabolism in organs drained by the portal vein.

CH. ABS.

Blood-brain barrier in infectious diseases; its permeability to toxins in relation to their electrical charges. U. FRIEDEMANN and A. ELKELES (Lancet, 1934, 226, 775—777; of. this vol., 548).— Cataphoresis shows that at the $p_{\rm fl}$ of blood the toxins which do not pass the barrier are negatively charged, whilst those which do are neutral (lamb-dysentery toxin) or positively charged (cobra toxin). The incubation period of toxins appears to be related to electrical charge. L. S. T.

Action of cinchona and other alkaloids in bird malaria. G. A. H. BUTTLE, T. A. HENRY, and J. W. TREVAN (Biochem. J., 1934, 28, 426-441; cf. A., 1930, 1310).—In tests on canaries infected with bird malaria, the anti-malarial potency of dihydroquinine is > that of quinine, of dihydroquinidine, quinidine, and cinchonidine < that of quinine, and of dihydro-cinchonine and -cinchonidine < that of all the others. The toxicities of the drugs to mice are approx. the same. H. D.

Titration of sexual hormones in mental diseases. H. SAETHRE (Klin. Woch., 1933, 12, 1409—1410; Chem. Zentr., 1933, ii, 2999).—The female urine had a very high hormone content, usually due to increased excretion of prolan-A. H. J. E.

Chlorides and inorganic constituents of the serum and cerebrospinal fluid in nephritis. G. C. LINDER (Biochem. J., 1934, 28, 416-417).—A high cerebrospinal fluid- (I) -Cl' titre in uræmia indicates a disturbance of the normal serum (I) relationships, and also a high serum-Cl' with a severe acidosis. A. E. O.

Amino-nitrogen changes in the blood in nephritis. E. KIRK (J. Clin. Invest., 1933, 12, 1091-1102).—Rise in plasma-NH₂-N, probably due to breakdown in NH₂-acid metabolism elsewhere, is frequent as renal disease becomes more advanced.

CH. ABS.

Trypsin poisoning in acute pancreatic necrosis. Determination of trypsin. J. BAUMANN (Z. ges. exp. Med., 1933, 91, 120-177).-The smallest concn. of trypsin (I) capable of digesting within 30 min. at 38° 0.2 mg. of caseinogen (II) made up to 1 c.c. with phosphate buffer $(p_{H} 8.5)$ is determined. A solution contains one unit when 1 c.c. digests 0.2 mg. of (II): this is equiv. to 0.125 Willstatter unit. The (I) content of normal human urine is \geq 1 unit per c.c.; in conditions where the pancreas (III) is affected, as indicated by increased urinary diastase, the urinary (I) is > normal. In dogs with acute fatal necrosis (IV) of (III) produced by injection of oil the (I) concn. of the urine is increased 1000-fold or more. Simple ligation of the pancreatic duct does not cause increase of urinary (I), but nonfatal oil (IV) produces a moderate increase. Probably (I) passes in active form from (III) to kidney, and so is responsible for the pathological manifestations in acute pancreatic (IV). NUTR. ABS. (m)

Iron metabolism in a normal subject and in a polycythæmic patient. P. REZNIKOFF, V. TOSCANI, and R. FULLARTON (J. Nutrition, 1934, 7, 221-230).—A normal subject stored Fe with a daily intake of 26 mg. and was in balance with 15 mg. Parenteral administration of liver extract (I) caused retention with a 10 mg. intake and increased Fe storage with a 17 mg. intake. With heavy Fe dosages (I) caused a marked increase in Fe excretion. CuSO₄ reduced the Fe elimination. During a remission stage a polycythæmic subject showed an Fe balance with an intake of 14-18 mg. Urinary Fe maintained a const. and low level. Fæcal Fe was const., except when heavy dosages of Fe were given. A. G. P. cinchona and othin

Relationship between oxygen consumption and nitrogen metabolism. III. In polycythæmia vera. A. BARER, W. D. PAUL, and C. W. BALDRIDGE (J. Clin. Invest., 1934, 13, 15–28). Following administration of NHPh·NH₂ in poly. cythæmia vera there were observed: temporary negative N balance due to increased excretion of urea, slightly increased proteinuria, retention of Fe liberated by destruction of red cells, formation of urea and bilirubin more rapidly than they were excreted, intermittent urobilinuria, and decrease in blood-viscosity. CH. ABS.

Blood in normal pregnancy. V. Conductivity, total base, chloride and acid-base equilibrium. VI. Plasma-cholesterol, variations in total amount. W. J. DIECKMANN and C. R. WEGNER (Arch. Int. Med., 1934, 53, 527-539, 540-550).--V. The serum-conductivity, total base, and CO₂ content are decreased, reaching a min. at term. There is no change in $p_{\rm H}$ or NaCl, and there is no acidosis of pregnancy. There is, however, a mean total increase in NaCl and total base of $22.7 \frac{9}{0}$ and $20.6 \frac{9}{0}$, respectively, with a similar increase in plasmavol.

VI. Plasma-cholesterol shows an increase of 33.9%at 26 to 35 weeks and of 27.9% at term. There is then a decrease amounting to 21.2% at 8 weeks post partum. H. G. R.

Factors influencing nitrogen economy during pregnancy. C. M. COONS and G. B. MARSHALL (J. Nutrition, 1934, 7, 67–78).—N retention was somewhat lower than formerly suggested unless the diet was supplemented by additional protein or vitamin-B. Various other factors concerned are discussed.

A. G. P. Interaction of vitamin-D and dietary factors in the healing of rickets in rats. H. M. BRUCE and R. K. CALLOW (Biochem. J., 1934, 28, 512-516).-The effect of simultaneously administering vitamin-D to rats on a rachitic diet low in P and of increasing the amount of P in the diet is approx. represented by the

product of two factors rather than by the sum.

W. O. K.

Cereals and rickets. Rôle of inositolhexaphosphoric acid. H. M. BRUCE and R. K. CALLOW (Biochem. J., 1934, 28, 517-528).-Addition of inositol hexaphosphate (I) to high-Ca low-P rachitogenic diets does not appreciably prevent rickets in rats, although the addition of inorg. P does. The action of diets rich in oatmeal in developing rickets in spite of a non-rachitic Ca : P ratio is attributed to much of the P being in the form of (I), and therefore not available to the animal. The addition of (I) to low-Ca diets appears to have a rachitogenic effect possibly due to non-absorption of Ca in consequence of the low solubility of Ca (I). The effect of acid treatment on the rachitogenic substance present in oatmeal and other cereals (cf. A., 1928, 333) is probably dependent on the acid hydrolysis of (I). W. O. K.

Surra. I. Blood chemistry in equine trypanosomiasis (Trypanosoma evansi). R. RANDALL (Philippine J. Sci., 1934, 53, 97—105).—In horses with T. evansi infection (surra), the CO₂ capacity of the blood decreases, whilst the lecithin, non-protein-N, and creatinine increase. The changes in the bloodsugar are irregular. Death is due to asphyxia from an uncompensated acidosis. F. O. H.
Blood-glutathione in chronic pulmonary tuberculosis. L. BETHOUX and G. CARRAZ (Bull. Acad. Med., 1933, 110, 51-57; Chem. Zentr., 1933, ii, 3586).—Total, particularly S·S-, glutathione diminishes, but not proportionally to the anæmia or to the severity of the disease. A. A. E.

Changes in the lipolytic activity of different organs during tuberculosis. A. I. VIRTANEN and P. SUOMALAINEN (Nature, 1934, 133, 532-533).— Lipolytic activity (I) of liver, pancreas, and bloodserum (II) of guinea-pigs decreases considerably as tuberculosis (III) develops. A decrease in (I) occurs only in (II) when (III) is not general. The destructive action of the tubercle bacilli on the tissues appears also to destroy the lipases. L. S. T.

Immunobiological study of fats. I. Formation of antibodies against lipins in tuberculous rabbits. II. Effect of enteral and parenteral lipins on the serum-lipase of normal and tuberculous rabbits. Y. TOKUNOYAMA (Tôhoku J. Exp. Med., 1933, 22, 252—262, 263—292).—I. Repeated intravenous injection of hydnocarpus oil (I), liver oil (II), tristearin (III), tripalmitin (IV), and triolein (V) into rabbits causes the appearance of complement-fixing antibodies in very low titre, the response decreasing in the above order, and increasing when the lipin was previously mixed with pig serum. Response was more pronounced in animals inoculated with human *B. tuberculosis* (VI).

II. Intravenous or parenteral injection of (I) and (II) increased serum-lipase. Decoic acid and (III) were less effective; (IV) and (V) had no effect. The effect was diminished by previous admixture of the lipin with pig serum and increased by simultaneous inoculation with (VI). Cholesterol causes a decrease, and lecithin a slight decrease, in serum-lipase; lipase (enteral) has no effect. Reticulo-endothelial blockade causes a decrease, and prevents normal reaction to injection of (II). CH. ABS.

Daily secretion of water, hydrochloric acid, and chloride in the normal and ulcerated human stomach. K. P. BECKER and J. FELDHAUS (Deut. Arch. klin. Med., 1933, 176, 138—148).—The total vol. of gastric secretion, the average [HCI], the average [Cl'], the total HCl secreted, and the total Cl' secreted during 12 hr. in the stomachs of sufferers from ulceration are > the corresponding amounts in those of healthy persons. NUTR. ABS. (m)

Sheep ailment in the Westhaven-Cape Farewell district, Collingwood County, Nelson. T. RIGG and H. O. ASKEW (New Zealand J. Sci. Tech., 1934, 15, 258—262).—The ailment, somewhat resembling bush-sickness, is associated with soils deficient in Ca and P; sheep on calcareous pastures are not affected. Applications of Ca and P and the use of bone-meal licks are beneficial. Both soils and pastures in affected areas have a low Fe content. A. G. P.

Sheep sickness in the Pakawau district of the Collingwood County, Nelson. H. O. ASKEW and T. RIGG (New Zealand J. Sci. Tech., 1934, 15, 305– 308).—Sickness is related to deficiencies of Ca and P in the soils concerned. Liming, application of P fertilisers, and the provision of bone-meal licks improved the condition of the sheep. A. G. P.

Physiology of the Blue Whale. A. KROGH (Nature, 1934, 133, 635-637).—A summary dealing with rate of growth, metabolism, circulation, and respiration. L. S. T.

Chemistry of respiration. A. J. KLUYVER (Chem. Weekblad, 1934, 31, 295–308).—Historical development of modern theory. S. C.

Respiratory quotient of the eviscerate cat. J. M. PETERSON (J. Physiol., 1933, 79, 508—518).— In simultaneous determinations of blood-CO₂ (I) and -lactic acid (II) in decerebrate eviscerate cats (III), there is very high correlation and equimol. relationship between (I) fall and (II) increase. The more rapid the rate of fall of (I) the higher is the observed R.Q., and by extrapolation, at the point of zero CO₂ change the R.Q. would be 0.825. The true oxidative quotient is thus of this order, and the higher vals. frequently obtained are due to displacement of CO₂ from the tissues. Calculation from the relative vals. of the R.Q. in decerebrate cats and in (III) shows the R.Q. of the removed viscera to be 0.69, a val. probably associated with liver gluconeogenesis.

NUTR. ABS. (m)

Influence of previous exercise on the metabolism, rectal temperature, and body composition of the rat. K. HORST, L. B. MENDEL, and F. G. BENEDICT (J. Nutrition, 1934, 7, 251–275).— Severely exercised rats had 3.5% less fat and 3%more H₂O (fresh wt.) than unexercised controls. On a dry matter basis, (I) had higher ash and N and low fat contents. Variations in basal metabolism showed no relationship to those in ash, N, or fat contents.

A. G. P. Effects of some external factors on the metabolism of the rat. K. HORST, L. B. MENDEL, and F. G. BENEDICT (J. Nutrition, 1934, 7, 277–303).----Variations in O_2 consumption and metabolic rates during day and night are examined. Sex differences are recorded. A. G. P.

Effects of fasting on the composition of the blood and respiratory exchange in fowls. K. M. HENRY, H. E. MAGEE, and E. REID (J. Exp. Biol., 1934, 11, 58-72).-No relation exists between the 4-day peak for blood-glucose in fasting chickens and the changes in cholesterol, lipin-P, uric acid, and nonprotein-N. Liver-glycogen may fall from 2.6 to 0.13% (const.) after 24 hr., and blood-lipin-P from 18.7 to 13.4 mg. per 100 c.c. on the 3rd day (thereafter, 16·1—17·9). Ingestion of glucose decreases hyperglycamia (I) during fasting. Adrenaline produces greater (I) in fowls which had fasted for 96 hr. than <96 hr. During 7 days' fasting the R.Q. fell to <0.7; it was unaltered by protein feeding but increased after fat feeding. During fasting uric acid was 50% of urinary N, and after a protein meal 30%. Hence the low R.Q. during fasting is due to uric acid synthesis. CH. ABS.

Fasting metabolism of various breeds of hog. I. Introductory: age, weight, length data, etc. T. DEIGHTON (J. Agric. Sci. 1934, 24, 326-334).-- Changes in length and wt. of fasting hogs of nine breeds are recorded and discussed. A. G. P.

oxidation-reduction Intracellular studies. VII. Mechanism of reduction potentials in starfish sperm. S. MACHLIS and D. E. GREEN (J. Cell. Comp. Physiol., 1933, 4, 61–78).—Respiratory poisons (KCN, H_2S , CO) shift the aerobic potential (I) of starfish sperm to a more negative range, but do not affect the rate of anaerobic reduction or the intensity factor. Et urethane shifts (I) to a more positive range. The anaërobic potential (II) is not changed, but the rate of reduction is lowered. Neither (1) nor (II) is affected by $CH_2I \cdot CO_2H$. Boiling does not change the val. of (I). (I) of heated sperm is not altered by anaërobiosis, KCN, H₂S, or Et urethane with respect to the corresponding changes in normal A. G. P. sperm.

Influence of thiol groups and respiration on the rate of cell division. E. L. ELLIS (J.-Cell. Comp. Physiol., 1933, 4, 127–139).—The rate of division of fertilised eggs of *Urechis caupo* or *Strongylocentrotus purpuratus* is not affected by treatment with $CH_2I \cdot CO_2'$ or F' or by cystine or glutathione. The retardation of fertilised *Urechis* eggs by CN' is partly overcome by oxidation-reduction dyes having potentials of -0.17 to -0.02 volt. A. G. P.

Influence of raw and cooked vegetable foods on oxidation in the body. I. KANAI (Z. ges. exp. Med., 1933, 89, 131—140; Chem. Zentr., 1933, ii, 3304).—With raw vegetables (I) rats attained a positive N balance; urinary C: N and vacat-O: N were <, and increase in body wt. >, with cooked (I). A. A. E.

Physiology of the adrenals. L. BINET and G. WELLER (Paris med., 1933, No. 26, 31-32).—The adrenal is the organ with the highest content (I) of reduced glutathione (II). Perfusion with citrated blood with added cystine and glutamic acid gives an increase in the gland and in the perfusion fluid. Hence (II) is synthesised. Determinations of S indicate that the cortex is the more active part. External factors (pancreatectomy, pregnancy) alter (I). NUTR. ABS. (m)

Dynamic action of amino-acids on the function of individual organs and on the gaseous exchange of the lungs in man. J. SCHUBERT (Biochem. Z., 1934, 269, 241–253).—A table summarises the effect on the tonus and rhythmic movement of the guineapig's intestine of varying concn. of glycine, alanine, valine, leucine, aspartic and glutamic acids, asparagine, NMe₃, histamine, and of a purified (I) and a crude (II) sample of mixed NH₂-acids obtained by hydrolysing a plant protein. (I) and (II) in concns. of 0.05-0.025 g. N per kg. body-wt. given orally to man always caused a rapid and considerable increase of basal metabolism. P. W. C.

Fission of choline in the organism. K. TODA (J. Biochem. Japan, 1934, 19, 201-216).—The NH₂Me excretion of rabbits (normally approx. 3-5 mg. per day) is increased for approx. 2 days by the intravenous injection of lecithin, whilst the NH₂Me contents of the liver (I) and spleen (II), but not that of the kidney, also markedly increase. The formation (probably enzymic) of NH_2Me from added choline occurs in normal, but not heated, macerates of (I) and (II), a max. occurring at $p_{\rm H}$ 7—8.

F. O. H.

Synthesis of purine in mammals. R. KAPELLER. ADLER, E. LAUDA, and K. VON MÉGAY (Biochem. Z., 1934, 269, 254—262).—The allantoin (I) and purine (II) contents of the urine of dogs receiving diets rich and poor in (II) are large and small, respectively, (I) forming the end-product of dog's (II)-metabolism. The urinary (II) of an animal in equilibrium is always > the (II) intake, indicating (II)-synthesis, and the view that a diet rich in carbohydrate leads to (II) synthesis is confirmed. P. W. C.

Uric acid synthesis in the bird. T. BENZINGER and H. A. KREBS (Klin. Woch., 1933, 12, 1206– 1208; Chem. Zentr., 1933, ii, 3006).—Uric acid (I) is formed from NH_3 in the liver and kidneys in pigeons, and in the liver in hens. Urea and tartronic acid cannot form (I). H. J. E.

Inability of the bird to condense urea with pyruvic acid and propionic acid. D. TORRISI and F. TORRISI (Arch. Sci. biol., 16, 589–602; Chem. Zentr., 1933, ii, 3005–3006).—No increased uric acid excretion followed from daily dosage with 0.5 g. of $EtCO_2H$ or $AcCO_2H$. Urea administered with $EtCO_2H$ and $AcCO_2H$ was excreted unchanged.

H. J. E.

Protein metabolism in man. H. BORSOOK and G. KEIGHLEY (Proc. Nat. Acad. Sci., 1934, 20, 179– 183).—Protein (I) metabolism is largely endogenous in the sense that it is immediately derived not from ingested (I), but from (I) (or its fission product) already in the body. The sp. dynamic action of (I) depends on a factor associated with oxidative deamination and a second factor relating to the metabolism of the deaminised residues. NH_3 is one of the sources of urinary uric acid. W. O. K.

Replacement of part of the protein in the food of cows by ammonium hydrogen carbonate. III. P. EHRENBERG and A. SCHOLZ (Biochem. Z., 1934, 270, 188—202; cf. A., 1933, 309).—Provided that the rest of the diet is suitable and palatable, much of the protein of the food of milch-cows may be replaced by NH_4HCO_3 without lowering appreciably the quantity or quality of the milk. W. McC.

Supplementary relationships between proteins of wheat and rye breads and those of *Pisum* sativum. Z. MARKUZE (Biochem. J., 1934, 28, 463—466).—Using the biological tests previously described (A., 1931, 1451), the biological val. (I) of pea-meal protein is $1\cdot 2 - 1\cdot 4$, a wheat-pea mixture $1\cdot 6 - 1\cdot 9$, a rye-pea mixture $1\cdot 6 - 2\cdot 1$, rye bread $1\cdot 1$, wheat-gluten protein $1\cdot 0$, and a gluten-pea mixture $2\cdot 2$. H. D.

Biological values of proteins. V. Comparative biological values of the proteins of whole wheat, whole maize, and maize gluten, measured by the growth of young rats. M. A. BOAS-FIXSEN, J. C. D. HUTCHINSON, and H. M. JACKSON (Biochem. J., 1934, 28, 592-601).—The nutritive val. (I) and biological val. (II) of the proteins (III) of whole wheat are only slightly > the corresponding vals. for the (III) of whole maize for support of growth in young rats (IV), the criterion for (II) being the ratio g. wt. increase/(g. protein ingested -10). The (II) of the (III) of cooked and raw cereals were the same, but the (I) of the former appeared to be slightly the greater. The (I) of "maize-gluten" is inferior to that of the whole grain, doubtless due to the greater proportion of zein in the former. The results are in accord with previous work on the maintenance of the adult rat (cf. A., 1933, 182). A. E. O.

Food value of seeds of Cicer arietinum, L. V. ZAGAMI (Atti R. Accad. Lincei, 1933, [vi], 18, 403— 406).—These seeds are deficient in salts and probably in vitamin-A and -D. Proteins and vitamin-B and $\cdot B$ are present in sufficient and suitable proportions for the nourishment of adult rats. T. H. P.

Nutritive value of seed of corn-cockle (Agrostemma githago). F. ROGOZIŃSKI and Z. GŁÓWCzyński (Bull. Acad. Polonaise, 1933, B, 189– 203).—In small quantities corn-cockle seed has no effect on the growth or the mineral content of the bones of rats. On a diet containing 87% of the seed the rats remain at const. wt. and in good health.

C. G. A. Comparative physiological evaluation of milk powder. E. S. LONDON, A. I. KOLOTILOV, R. M. KUTOK, A. G. GAGINA, and N. I. SHOKHOR (Schr. zentr. biochem. Forschungsinst. Nahr. Genussm., U.S.S.R., 1933, 3, 121-140).—In dogs protein assimilation was 94.6% for dried, and 96% for fresh, milk; digestion of the former was slower.

CH. ABS.

Utilisation of dietary protein in the intestine and protein enrichment of the body. A. BICKEL (Z. Volksernähr., 1933, 8, 213–214; Chem. Zentr., 1933, ii, 1209).—A discussion. A. A. E.

Nutritive value of animal tissues in growth, reproduction, and lactation. I. Alcohol-extracted ox liver. II. Presence of a new dietary principle in liver. H. G. SMITH and W. H. SEEGERS (J. Nutrition, 1934, 7, 195—207, 209—219).—I. With rations containing EtOH-extracted liver as the protein source normal growth of rats occurred with 20% protein. At a 15% level growth was subnormal. In the second generation growth was subnormal at both protein rates. Lactation was deficient in the first and failed in the second generation. Growth was improved by supplementary feeding of dried whole liver and lactation by raw liver. Extracted liver also induced other serious derangements of the reproductive mechanism.

II. The substance necessary for normal growth and lactation removed from liver by EtOH is not associated with the lipins, but may form a constituent of the vitamin-B complex. A. G. P.

Nutritional requirements of Zootermopsis (Termopsis) angusticollis. S. F. COOK and K. G. SCOTT (J. Cell. Comp. Physiol., 1933, 4, 95—110).— Termites cannot live indefinitely on diets consisting of purified cellulose (cotton), hemicellulose (agar), sugars (I), or protein (II). The presence of (I), (II), mineral salts, and vitamin-A, $-B_1$, $-B_2$, and -D is necessary. (II) in the diet prevents cannibalism and probably increases the N content of the termites. A. G. P.

Metabolism of fowls with artificial anus. W. MAAS (Arch. Geflügelk., 1933, 7, 225-261).—The following digestibility coeffs. (I) were found : rye, crude protein 71.28, crude fat 26.10, crude fibre 2.37, and N-free extractives (II) 92.39%; wheat (III), 71.60, 47.24, 3.60, and 89.99%. (I) for meat meal, soyabean meal, linseed cake meal and maizena, mixed with rye or wheat, were similar to those found by Lehmann with pigs, but those for (II) were lower. When peat litter was used the birds on (III) did better than those on rye. NUTR. ABS. (m)

Changes in muscle volume in tetanic contraction as an expression of the accompanying chemical processes. H. HARTMANN (Biochem. Z., 1934, 270, 164-187; cf. Meyerhof and Möhle, A., 1933, 742).-By making measurements on muscles (I) (frog gastrocnemius) suspended in paraffin oil the differences (due to absorption of H₂O and swelling) in vol. change (II) between muscle extract and living muscle on contraction are avoided. Molar (II) during enzymic and acid hydrolysis of creatinephosphoric acid (III) has been measured. In (I) poisoned with CH₂I·CO₂H (IV) the sum of (II) at various stages until exhaustion serves as a measure of the extent of decomp. of (III) and of adenyl pyrophosphate. In normal and (IV)-poisoned muscle there is close agreement between (II) found and that expected from consideration of the chemical transformations involved. W. McC.

Phosphagen and pyrophosphate metabolism in muscle poisoned with iodoacetic acid. E. LUNDS-GAARD (Biochem. Z., 1934, 269, 308-328).-Muscle poisoned with CH₂I·CO₂H utilises more energy than can be provided by the phosphagen (I) mechanism. The extra energy cannot be derived from pyrophosphate (II), since utilisation of (II) becomes perceptible only after considerable fatigue. Calc. vals. for heat formation, as with normal muscle, are > vals. by direct determination using the frog's gastrocnemius (III). In poisoned muscle, hydrolysis of (I) does not decrease on shortening, and 25% of the hydrolysis occurs subsequently. Hydrolysis of (I) is a recovery process. Anaërobic synthesis of (I) and hydrolysis of (II) were not detected. The mean of fifty-seven resting vals. for the (I) content of (III) corresponded with 1.8 mg. P_2O_5 per g., and for the (II) content 0.68 mg. per g. P. W. C.

Lactic acid formation in striated muscle under the action of direct current. F. LIPPAY and C. RAND (Pflüger's Archiv, 1933, 233, 17—34; Chem. Zentr., 1933, ii, 3007).—The observed increase in lactic acid, which is considerably higher near the anode, is not due to heating. H. J. E.

Lactic acid content of frog muscle washed with solutions of lithium lactate, lactic acid, and hydrochloric acid. P. ROWINSKI (Arch. Sci. biol., 16, 483-500; Chem. Zentr., 1933, ii, 3007).-On washing frog muscle (I) with Ringer's solution for 1 hr. it contains 40-47 mg. of lactic acid (II) per 100 g. On washing with aq. Li lactate (III), the amount of (II) in (I) increases with the concn. of (III). HCl has no effect on the amount of (II). H. J. E.

Relations between glycolysis and respiration in animal tissue. E. BUMM, H. APPEL, and K. FEHRENBACH (Z. physiol. Chem., 1934, 223, 207– 214).—Glycolysis (I) in the mucous membrane of the large intestine of the guinea-pig increases with decreasing O_2 pressure, although respiration (II) is const. (I) and (II) are thus independent. The glutathione system may be responsible for the effect of O_2 on (I). J. H. B.

Role of citric acid in carbohydrate metabolism. O. FURTH, H. MINNIBECK, E. EDEL, E. H. MAJER, and H. REISNER (Biochem. Z., 1934, 269, 379-396).—Urine (mixed human) contains 0.009—0.21% of citric acid (I) (the vals. for one individual varying from 0.07 to 0.11%), rabbit and guinea-pig urines contain only traces, that of the dog on a carbohydrate (II)-rich diet 0.007-0.009 g. daily and on administration of NaHCO₃ 0.01-0.014 g. A dog showing adrenaline glucosuria on administration of Na citrate excreted (I), but a phloridzinised dog did not show either a glucosuric or antiketogenic action of (I). With young pigs, the urinary (I) decreased during fasting and on a (II)-free diet, and considerably increased on a (II)-rich diet or on adding NaHCO₃ or NaOAc to the diet. Of various supposed precursors of (I) only NaOAc gave any considerable increased exerction of (I). Determination of the C and N distribution in the urine after administration of 2 g. of (I) per kg. showed that it had been destroyed. Experiments with rats show that administration of (I) did not lead to (II) synthesis. P. W. C.

Ketosis. IV. Comparative ketolytic effect of galactose, glucose, and lactose in rats. J. S. BUTTS (J. Biol. Chem., 1934, 105, 87—96).—Administration of galactose causes a lower exerction of ketonic substances than glucose, and there is also a greater decrease in urinary N. Lactose has an intermediate effect. H. G. R.

Amount of water stored with glycogen in the liver. E. M. MACKAY and H. C. BERGMAN (J. Biol. Chem., 1934, 105, 59–62).—In young albino rats, of $3\cdot8$ g. H₂O are stored in the liver with each g. of glycogen after sugar feeding. There is no measurable amount stored with fat, but for each g. of caseinogen fed about 2 g. of H₂O are stored. H. G. R.

Glycogen formation after oral administration of mannitol to white rats. A. K. SILBERMAN and H. B. LEWIS (Proc. Soc. Exp. Biol. Med., 1933, 31, 253-255).—No increase in liver-glycogen was observed. CH. Abs.

Liver-glycogenesis and bile acids. T. KURA-MOTO (J. Biochem. Japan, 1934, 19, 315—318).— Whilst small amounts of Na cholate subcutaneously injected into rabbits enhance the glycogenesis due to small doses of adrenaline, large amounts have an inhibitory action (cf. A., 1933, 528). F. O. H.

Passage of substances produced in the liver to the blood-stream. I. Urea content of blood and lymph. II. Sugar content of blood, lymph, and bile. S. TSUNOO, H. MACHIDA, and K. KUSUI (J. Biochem. Japan, 1934, 19, 231–235, 237–243).–I. In dogs with thoracic fistulæ, administration of NH_{2} acids (hydrolysed caseinogen) produces a rise in the urea content of the blood (I) and lymph (II). The rate and extent of these changes indicate that urea passes from the liver to (II) partly directly and partly by way of (I).

II. Adrenaline hyperglyczmia in dogs with thoracic and biliary fistulæ is accompanied by an increase in the sugar (III) content of (I), (II), and bile. The rate and extent of these changes indicate that the mobilised (III) passes from the liver to (I) both directly and via (II). F. O. H.

Carbohydrate metabolism. M. INUTSUKA (J. Biochem. Japan, 1934, 19, 217-229).-Oral administration of glucose (I) (10 g. per kg. body-wt.) to dogs produces a rapid rise in the blood-sugar (II), the hyperglycamia (III) (of 4 hr. duration) being followed by a slight hypoglycæmia (of 4-12 hr. duration). The liver-glycogen is max. after 6 hr., returning to normal levels in approx. 24 hr. The muscle-glycogen varies only slightly. The reducing powers of the contents of the stomach (IV) and intestines follow a course parallel to, but respectively > and <, that of (II). The presence of fat does not influence the removal of (I) from (IV) nor the (II) curve. Prolonged starvation produces a marked increase in the degree F. O. H. of (III).

Carbohydrate metabolism in the lymph and blood vessels of the intestine and in the mesenteric lymph glands. F. P. FISCHER and K. A. WINTER (Biochem. Z., 1934, 270, 157–160).—In fasting cats (I) the sugar content (II) of the peripheral lymph is > those of the intestinal artery (III) and vein (IV), that of (III) being > that of (IV). (II) of the lymph entering is > that of the lymph leaving the lymphatic glands. If sugar is introduced into the stomach of (I), (II) of the lymph is > that of the blood from the same part of the intestine.

W. McC. Artificial feeding of the beet leaf-hopper; its ability to synthesise glycerides. R. A. FULTON and J. C. CHAMBERLIN (Science, 1934, 79, 346– 348).—*Eutettix tenellus* (Baker) can synthesise glycerides for a limited time when fed only on glucose and fructose. L. S. T.

Metabolism of ducks (Anas platythyncha, L.). I. Adiposity through forced and voluntary feeding. T. C. SHEN (Chinese J. Physiol., 1934, 8, 65-76).—The gain in wt. ∞ the food intake and is independent of the method of feeding. The fat is deposited in the liver and subcutaneous tissues and around the viscera. The metabolism corresponds with 1400 g.-cal. per sq. m. of body surface, about twice this val. as food being required for max. gain in wt. C. G. A.

Absorption of *n*-hexadecane from the alimentary tract of the cat. H. J. CHANNON and J. DEVINE (Biochem. J., 1934, 28, 467–471).—The unsaponifiable residues from the tissues of a cat which had taken 33.64 g. of *n*-hexadecane (I) were distilled in vac. after removal of cholesterol, giving 2.7 g. of (I). 3.81 g. were excreted in the faces. None was found in the liver. It is concluded that the remainder was metabolised. H. D.

Effect of linoleic acid and yeast on the growth of rats on high fat diet. Y. SAHASHI (Sci. Papers Inst. Phys. Chem. Res. Tokyo, 1934, 23, 264—269).— Satisfactory growth of rats was secured only with a diet containing butter. With eleven other animal and vegetable fats and oils, addition of yeast did not improve growth, but supplementary feeding of linoleic acid+yeast resulted in almost normal growth.

Resorption of fatty acids. F. VERZAR and L. LASZT (Biochem. Z., 1934, 270, 24—34).—In rats the resorption (I) of oleic acid in the small intestine is increased by simultaneous injection of bile acids (II) (glycocholic, taurocholic). In presence of (II), glycerol (III) with phosphate (IV) or glycerophosphoric acid [but neither (III) nor (IV) alone] greatly increases (I) (up to 150%). The increase is inhibited by CH_2I ·CO₂H, which, however, does not affect (I) in presence of (II) alone. W. McC.

Inhibition of fat resorption by iodoacetic acid and phloridzin. F. VERZÁR and L. LASZT (Biochem. Z., 1934, 270, 35–43).—In rats resorption of olive oil, given orally, is inhibited by subcutaneous administration of $CH_2I \cdot CO_2H$ or phloridzin. Since the inhibition is not due to action on lipase or to insufficiency of fat in the intestine, it is probable that a phosphorylation, which normally occurs, is prevented. W. MCC.

Diffusibility of blood-fat. H. SULLMANN and F. VERZAR (Biochem. Z., 1934, 270, 44-51).—Through membranes which have permeabilities similar to that of blood-capillaries and permit diffusion of waterblue and Congo-red about 25% of the lipins (I) of lipæmic blood-serum (dog) pass. There is no preferential diffusion of unsaturated or other fractions of (I). W. McC.

Selective Fat metabolism in fishes. III. formation of fat deposits. J. A. LOVERN (Biochem. J., 1934, 28, 394-402).-Porpoise (I) and dolphin (II) fats are similar in type to those from the zoologically related sperm whale. (I) and (II) depôt fats are unique in containing much isovaleric acid (III) (80% of which is combined in glyceride mols. containing at least one unsaturated acid) and are quite different in type from (I) and (II) organ fats. The foctal blubber of (I) contains little (III) and is highly unsaturated. The analyses do not support the theories of fat transfer to and desaturation in the liver before utilisation. The depôt fats show a mol. size gradation which suggests that one cause of specificity may be a mol. filtration. Further evidence is adduced (cf. A., 1933, 183) in support of the theory of interconvertibility of saturated and unsaturated acids of the same no. of C atoms in the depôt itself. A semi-micro-method of fatty acid analysis, suitable for 10 g. of fat, is described. A. E. O.

Production of phosphatides in the intestine during resorption of fats. H, SÜLLMANN and W. WILBRANDT (Biochem. Z., 1934, 270, 52-62).—In rabbits during resorption (I) of fat (olive oil, triolein) the phosphatide (II) and fat contents of the intestinal lymph increase equally, about 20-30% of the total lymph fat being (II). The increase is not due to the passage of leucocytes or to inflammation (experimental), but probably to production of (II) in the wall of the intestine. Transport of lecithin through the portal vein during (I) may occur, but could not be detected. W. McC.

Blood-lipins in the post-absorptive state and after the ingestion of fat in normal human subjects and in a case of disseminated cutaneous xanthomata. I. L. CHAIKOFF, T. H. MCGAVACK, and A. KAPLAN (J. Clin. Invest., 1934, 13, 1-13).-Ingestion of olive oil (100 g.) is in both cases followed by variations in blood-fatty acids. In 6 of 7 normal cases the blood-cholesterol was unchanged.

CH. ABS.

Effect of specific dietary fats on the bloodlipins of lactating goats. H. H. WILLIAMS and L. A. MAYNARD (J. Dairy Sci., 1934, 17, 223-232).—On fat-free diets (I) the total lipins, phospholipins, free and combined cholesterol (II) in the blood-plasma declined. Inclusion of fats in the ration caused a return towards normal vals. irrespective of the nature of the fat supplied. The I val. of plasmafat fell during the feeding of (I), but on readministration of fats changed in accordance with the I val. of the fat given. Lipins in the cells tended to remain const. The (II) of the cells was almost entirely in the free, and that of the plasma in the combined, form. A. G. P.

Effect of adrenal lipins on the chemical composition of blood and organs. C. I. PARHON and G. WERNER (Compt. rend. Soc. Biol., 1933, 114, 749—751).—Changes in blood-sugar, Ca, K, P, lecithin, and cholesterol (I) on subcutaneous injection into dogs of suprarenal lipins are recorded. (I) appears to increase. The H₂O content of the organs decreases, K increases, and P decreases in brain and muscles, but increases in testicle. NUTR. ABS. (m)

Bile acids. II. Effect of ingestion of food on the bile acids in the blood. S. BOKU and K. GON (J. Chosen Med. Assoc., 1933, 23, 111-112).-In healthy persons, but not in those suffering from liver disease, there is a decrease in the bile acids (I) content of the blood during food ingestion. Possibly the liver reabsorbs (I) to aid production of bile.

NUTR. ABS. (m)

Human physiology. V. Urine chemistry; comparison of 24-hour and short-period excretion: correlations between urine constituents and menstrual and seasonal variation. VI. Variations in blood chemistry over long periods of time, including those characteristic of menstruation. G. W. PUCHER, F. R. GRIFFITH, jun., K. A. BROWNELL, J. D. KLEIN, and M. E. CARMER

A. E. O.

BRITISH CHEMICAL ABSTRACTS .- A.

(J. Nutrition, 1934, 7, 131-167, 169-193).--V. Data showing the N distribution, sugar, acid, PO₄", and Cl' contents of 24-hr. and short-period urines are recorded and correlated with other basal metabolic functions. At about the time of menstruation excretion of urea, creatinine, NH2-acid, total and undetermined N, sugar, and Cl' reaches a min., and rises to a max. in the latter half of the intermenstrual period. Variations in NH₃, and possibly total and org. acids and PO4, are of a reverse order. Creatine and uric acid are much less affected. Seasonal variations in 24-hr. urines were not observed. In short-period, basal urines the total N and most of its partition products and Cl' show max. vals. in winter and min. vals. in late summer or early autumn. Total and org. acids show min. excretion in spring and max. in late summer.

VI. Statistical examination is recorded of data concerning variations in N distribution, sugar, cholesterol (I), inorg. P (II), Ca, Cl', and corpuscle vol. in blood. No correlation is found between day-to-day, intra-individual variations in any blood constituents and similar variations in basal metabolic rates. Cycles of menstrual variation are found in (I), Ca, Cl', uric acid, and total creatinine, and of seasonal variation in (I), (II), Cl', and most of the N partition products. Uric acid, Ca, and sugars are not definitely influenced by season. A. G. P.

Chemical character of the blood and urine of colts. W. W. DIMOCK and D. J. HEALY (J. Amer. Vet. Med. Assoc., 1933, 83, 806-809).-Serum of normal yearling thoroughbred fillies contains Ca 11.7-12.2, K 14.2-16.3, P 4.7-5.2, non-protein-N 25.8-32.9, SO₄-S 11.6-15.6, sugar 106 mg. per 100 c.c. Their urine has d 1.033 - 1.045, $p_{\rm H} 7.0 - 7.6$, NH₃ 20-100, Ca 75-180, and SO₄-S 78-85 mg. per 100 c.c. Animals forced on for early development by heavy feeding of grain and the use of haliver oil and "violet rays" have slightly higher K and sugar and a lower non-protein N and SO4-S of serum, with no significant change in serum-Ca or -P, whilst the urine reaction varies greatly $(5 \cdot 0 - 8 \cdot 6)$; the urinary level of NH₃ and Ca rises and that of SO₄-S decreases. After 11 weeks of rational feeding these animals recover and the blood shows a further rise in K and a slight rise in serum-P. In both urine and serum the SO_4 -S remains low. NUTR. ABS. (m)

Thiocyanic acid metabolism. II. B. STUBER and K. LANG (Deut. Arch. klin. Med., 1933, 176, 213—218).—Most of the HCNS in fasting gastric juice (I) is derived from saliva. Injection of histamine does not increase it. The HCNS excreted in the fæces is much < that in (I). HCNS is not decomposed by intestinal bacteria or by extracts of organs. Hence reabsorption from the intestine appears to occur. The intake of HCNS with food is considerable. Meat contains 0.05—0.07 mg. per 100 g., milk 0.10—0.12 mg. per 100 c.c., and plantfood larger amounts; beet contains 1 mg. per 100 g. 2—3 mg., apparently not derived from protein, are produced daily in the body. Intravenous HCNS is very slowly excreted, and large doses by stomach tube greatly reduce the excretion of Cl.

NUTR. ABS. (m)

Metabolism and the inorganic elements. J. S. HEPBURN (Hahnemannian Monthly, 1933, 68, 836– 867).—A review. CH. Abs.

Inorganic salts in nutrition. VIII. Variations in proportion of reticulocytes in blood of rats receiving a diet deficient in inorganic salts. J. M. ORTEN and A. H. SMITH (J. Biol. Chem., 1934, 105, 181—187).—Rats fed on a salt-deficient diet exhibit a polycythæmia without reticulosis (I) followed by anæmia and (I). An inverse relationship between the pigment concn. and the proportion of reticulocytes was observed. H. D.

Relationship of iron to the ageing of cells. S. G. ZONDEK and J. KARP (Biochem. J., 1934, 28, 587-591).—The Fe content (I) of the epithelial organs (II) of many animals is const. During the middle period of life, and within a short time, the (I) of (II) is increased by >100%, this latter Fe val. being then maintained until death. From the (I) of the kidney and testis, the age-group of the animal may be deduced. A. E. O.

Effect of acid-ash and alkaline-ash foodstuffs on the acid-base equilibrium of man. F. BISCHOFF, W. D. SANSUM, M. L. LONG, and M. M. DEWAR (J. Nutrition, 1934, 7, 51-65).—The min. amount of ingested Na citrate necessary to cause a slight change in the acid-base equilibrium in prebreakfast blood was 30 g. daily. The effects of milk, oranges, bananas, etc. were small. A. G. P.

Protein, calcium, and phosphorus intakes of college women as indicated by nitrogen, calcium, and phosphorus outputs. M. M. KRAMER, H. F. EVERS, M. G. FLETCHER, and D. I. GALLEMORE (J. Nutrition, 1934, 7, 89–96).—Data for twenty-five subjects are given. Average vals. for protein used were below, and those for Ca and P above, accepted standards. No significant seasonal variations were apparent. A. G. P.

Calcium balance. C. O. GUILLAUMIN (Bull. Soc. Chim. biol., 1934, 16, 152—155).—A criticism of methods frequently employed. A. L.

Absorption of calcium in normal animals. N. B. TAYLOR, C. B. WELD, and J. F. SYKES (Brit. J. Exp. Path., 1933, 14, 355—366).—The fæcal Ca of normal dogs on a diet of meat and biscuit alone, or with addition of $CaCl_2$ up to nearly 3 g. daily, or during an interpolated week of starvation, is fairly const., so that most of the added Ca is absorbed, even though no irradiated ergosterol (I) is given. Dogs on low-Ca diet excrete more Ca by the bowel than is ingested; (I) in therapeutic doses does not alter this amount, hence (I) in such amounts does not reduce excretion or increase absorption of Ca by the alimentary tract. NUTR. ABS. (m)

Phosphorus requirement of dairy cattle. II. Phosphorus, calcium, and nitrogen metabolism of dairy cattle when lucerne furnishes the principal source of protein. L. W. LAMB, O. B. WINTER, C. W. DUNCAN, C. S. ROBINSON, and C. F. HUFFMAN (J. Dairy Sci., 1934, 17, 233—241).—Comparison is made of the effect on heifers of a basal ration of low P content (I) and the same supplemented with bone meal (II). Prior to calving, positive P, Ca, and N balances were obtained on both rations, 10.8-12.3 g. of P furnishing the daily requirement from 18 to 30 months of age. During heavy milking the P balance on (I) was negative even when blood meal was added, but became positive when (II) was added to the ration. Utilisation of P from (I) was > when the P content was higher. A. G. P.

Phosphorus requirements of sheep. I. Effect on young merino sheep of diet deficient in phosphorus but containing digestible proteins and vitamins. C. J. MARTIN and A. W. PEIRCE (Coun. Sci. Ind. Res. Australia, 1934, Bull. No. 77, 1-44).-Sheep receiving a low-P diet (I), having Ca: P ratio 4.5, show 60% of the gain in wt. of those receiving adequate P diet with Ca: P ratio 1.7, decreased inorg. blood-P, and rachitic bone lesions. Increasing the Ca: P ratio of (I) to 10.7 by CaCO₃, with or without cod-liver oil, causes 50% loss in wt. The wool is unaffected in quantity and quality. Pregnancy and lactation are unaffected, although the lambs from ewes on (I) are smaller and gain wt. more C. G. A. slowly.

Influence of phosphorus deficiency in dairy cows on the coefficient of digestibility and the balance of calcium and phosphorus. W. H. RIDDELL, J. S. HUGHES, and J. B. FITCH (J. Agric. Res., 1934, 48, 167—170).—Lactating dairy cows on a diet low in P and suffering from a phosphorosis gave coeffs. of digestibility not significantly different from the control. The balances of P and of Ca were negative. W. O. K.

Effects of injection of salts on calcium, magnesium, and inorganic phosphoruc of the serum of the rabbit. R. W. BROOKFIELD (Biochem. J., 1934, 28, 725-733).—Successive hæmorrhages produced slight decreases in the serum-Ca (I), -Mg (II), and inorg. P (III). Changes due to the injection of NaCl solutions were negligible. Injection of Ca salts produced a rise in (I) and a decrease in (II) with an unchanged (III). Mg salts produced a rise in (III) and a lowered (I). Na₂SO₄ lowered (I) and (III). Na₂HPO₄ produced a decreased (I) and (II) and a rise in (III). H. D.

Name for bio-hydraulic activities. D. L. Fox (Science, 1934, 79, 292-293).—" Hydrosyntaxis" (or hydrosyntaxy) is suggested to signify the sum total of functions within an organism which are operative in producing and maintaining the H_2O balance between protoplasm and its external environment. L. S. T.

Skin irritation by hydrocarbons. W. HEUBNER (Arch. Pharm., 1934, 272, 379—383).—A discussion of the classification of the so-called "sp. irritant action" of hydrocarbons on the skin and of the relation of this property to physical properties and structure. J. W. B.

Site of narcosis in a cell; action of a series of paraffin oils on Amæba dubia. D. MARSLAND (J. Cell. Comp. Physiol., 1933, 4, 9-33).—Do- and tetra-decane produced narcotic effects when injected into the protoplasm. The narcotic action of paraffins is localised in the surface (non-aq.) layer of the protoplasm. A. G. P.

Local anæsthetic properties of some aliphatic alcohols. D. I. MACHT and M. E. DAVIS (Proc. Soc. Exp. Biol. Med., 1933, 30, 1294—1295).—Octyl, heptyl, nonyl, decyl, undecyl, dodecyl, and hexyl alcohols (in descending order of potency), but not PrOH, BuOH, C_5H_{11} ·OH, or C_{13-18} alcohols, have local anæsthetic properties. CH. ABS.

Correlation of visceral and somatic activity following administration of hypnotics, (A) barbital compounds and (B) tribromoethanol (avertin). J. P. QUIGLEY, O. W. BARLOW, and C. K. HIMMELSBACH (J. Pharm. Exp. Ther., 1934, 50, 425-439).—With doses of barbiturates causing equal hypnosis the relative durations of gastro-intestinal depression were barbital (I), 1.0; amytal (II), 0.6; pentobarbital (III), 0.3. The frequency of restlessness is in the order (II) > (I) > (III). Avertin also depressed the gastro-intestinal tract, the fluid being more powerful than the crystals. C. G. A.

Influence of pyramidone on carbohydrate metabolism. G. KRAUSE and H. MARX (Z. klin. Med., 1933, 125, 341—350; Chem. Zentr., 1933, ii, 3307).—In health, human blood-sugar is scarcely affected by pyramidone; in diabetes it is decreased by small, and increased by large, doses. Insulin hypoglycæmia is accentuated; so also are glucose hyper- and the eventual hypo-glycæmia. A. A. E.

Effect of some barbiturates and urethane [on blood constituents]. N. RAKIETEN, L. H. NAHUM, D. DUBOIS, E. F. GILDEA, and H. E. HIMWICH (J. Pharm. Exp. Ther., 1934, 50, 328–335).—Amytal, nembutal, and luminal administered to dogs in narcotic doses increase the CO₂ content (I), the CO₂ capacity (II), and sugar of blood, and decrease the O₂ content (III), O₂ capacity (IV), and $p_{\rm II}$ (V). "Dialciba" and urethane decrease (I), (II), and (V) and increase (III) and (IV). A. L.

Determination of veronal in urine. J. STRAUB and E. MIHALOVITS (Pharm. Zentr., 1934, 75, 226— 228).—The method of van Itallie and Steenhauer (A., 1921, ii, 607) is liable to give high results. In the approved method, urine (100 c.c.), acidified with 5 c.c. of 10% AcOH and 20 c.c. of 10% H_2SO_4 , is oxidised with 5% aq. KMnO₄ at 80—90° and the pptd. MnO₂ dissolved by adding H_2O_2 . The solution is clarified at 70—80° with 0·1 g. of C, filtered, and the veronal extracted with EtOAc and weighed after evaporating the solvent. S. C.

Toxicity and anæsthetic efficiency of thiocaine. L. S. FOSDICK and H. L. HAUSEN (J. Pharm. Exp. Ther., 1934, 50, 323—327).—The anæsthetic efficiency of thiocaine hydrochloride (I) (A., 1933, 948) is 4—6 times that of procaine hydrochloride (II) when used for injection, and approx. twice that of cocaine (III) as a topical anæsthetic. The toxicity is, however, $2\cdot7$ — $3\cdot7$ times that of (II), and half that of (III).

Comparative pharmacology of some thiomorpholine derivatives. D. I. MACHT (Proc. Soc. Exp. Biol. Med., 1933, 31, 234-236).—Thiomorpholine-ethanol (I) and its esters were compared

A. L.

with the sulphoxy-compound (II) and its esters. The benzoate of (I), but none of the (II) derivatives, had an anæsthetic effect. CH. ABS.

Effects of morphine and its derivatives on intestinal movements. I. Morphine and the codeine isomerides. H. M. KRUGER (J. Pharm. Exp. Ther., 1934, 50, 254—276).—In dogs the effectiveness of morphine, *iso*codeine, codeine, ψ -, and allo- ψ codeine in decreasing the rhythmic frequency is as 100:25:8:3:1, respectively, and in increasing the tone of the ileum 100:19—58:8—15:4—5:2, respectively. All these compounds increase the rhythmic amplitude and peristalsis. A. L.

Effect of morphine, caffeine, and strychnine on the serum-calcium of the rabbit. R. HAZARD and C. VAILLE (Bull. Soc. Chim. biol., 1934, 16, 235— 247).—Whilst non-lethal doses of morphine (I) lower the serum-Ca (II) of rabbits, during sleep, in chloralised and in partly asphyxiated animals very little change in (II) occurs. Sparteine, caffeine, and strychnine (III), which increase respiration rate, like (I) reduce (II). (I) and (III) in lethal doses increase (II). A. L.

Action of mezcaline and related compounds. G. S. GRACE (J. Pharm. Exp. Ther., 1934, 50, 359– 372).—3:5-Dimethoxy-4-ethoxy- (I) and 5-methoxy-3:4-diethoxy-phenylethylamine (II) are twice as toxic as the 3:4:5-(OMe)₃-compound (mezcaline), producing fall of blood-pressure (prevented by vagotomy or atropine), motor paralysis, and death from respiratory failure. (I) and (II) paralyse voluntary muscle of the frog at 1:4000 dilution; at 1:500 all three cause contracture with loss of excitability. They stimulate contraction of the intestine and uterus *in situ*, but not when exsected. C. G. A.

Pressor actions of ephedrine and ψ -ephedrine in man. S. B. DIMSON (Quart. J. Pharm., 1934, 7, 23-31).—Subcutaneous injection of 0.067 g. of ψ -ephedrine into hospital patients produced a slight rise in blood-pressure followed by a fall; that of 0.134 g. produced a marked rise approx. equal to that due to 0.067 g. of ephedrine. F. O. H.

Ephedrine and ψ -ephedrine in spinal anæsthesia. J. E. MONRO (Quart. J. Pharm., 1934, 7, 32—35).—In spinally anæsthetised men, ephedrine (50 mg. intramuscularly) produced a rise (10—15 mm.) in the systolic blood-pressure, whilst ψ -ephedrine had a much less marked effect. The action of subsequent injections was variable. F. O. H.

Influence of sinomenine, parasinomenine, and quinine on the action of (a) adrenaline, calcium, nicotine, yohimbine, and ergotoxin, (b) diuretin, pilocarpine, glucose, and insulin, on the bloodpicture in rabbits. Y. ARAKAWA (Folia Pharmacol. Japon., 1933, 17, No. 1, 1-12, 13-20).—Insulin hypoglycæmia is increased; in other cases except ergotoxin (increased) the hyperglycæmia is diminished. CH. ABS.

Effect of concentrations of nicotine on growth and development. II. Growth and development of chicks as influenced by the addition of ground tobacco to the ration. J. E. HUNTER, D. E. HALEY, and H. C. KNANDEL (Poultry Sci., 1934, 13, 91—94).—*Nicotiana rustica*, containing 5% (dry wt.) of nicotine, added to the ration at the rate of $1\cdot2\%$ did not affect the growth of chicks and gave effective control of round worms. Ground eigar leaf (0.86% nicotine) supplied at the rate of 4.65% in the ration retarded growth and increased mortality. Cæcal worms (*Heterakis gallinae*) were not controlled by tobacco treatment. A. G. P.

Tobacco-smoking and blood-sugar. D. L. THOMSON (Science, 1934, 79, 386; cf. this vol., 557). L. S. T.

Effects of cigarette smoking on the blood-sugar. H. W. HAGGARD and L. A. GREENBERG (Science, 1934, 79, 274; cf. this vol., 557).—Acknowledgment of prior observations is made (A., 1932, 1284). L. S. T.

Carbon monoxide content of tobacco smoke. O. EHRISMANN and G. ABEL (Z. Hyg., 1934, 116, 4—10).—Cigarette tobaccos yielded an average of 17.25 c.c. and other varieties up to 35.0 c.c. of CO perg. A. G. P.

Effect of ethylene glycol on the serum-calcium of the rabbit. J. M. DILLE (J. Amer. Pharm. Assoc., 1934, 23, 202—205).—[\cdot CH₂ \cdot OH]₂ is oxidised to H₂C₂O₄ so slowly that no change in serum-Ca could be detected. A. E. O.

Influence of various synthetic thymol and carvacrol derivatives on sugar metabolism, and the point of attack of these derivatives ; relation between chemical structure and pharmacological action, and comparison with the action of ergotamine. U. SAKURA (Folia Pharmacol. Japon., 1933, 17, 129-170).-In small doses the derivatives produced hypoglycæmia; those in which H in the sidechain NH₂Et is replaced by Me are most active (Me > Et or alkyl), whilst those in which the sidechain contains ethylpiperidine in place of ethylalkylamine are weakest. The thymoxyethylamine derivative with an alkyl group introduced is the most active, but somewhat labile. Thymol derivatives are more active than corresponding carvacrol derivatives. Like ergotamine, the derivatives decrease adrenaline hyperglycæmia, but are weaker in action.

CH. ABS.

Action of phloridzin on the excretion of glucose, xylose, sucrose, creatinine, and urea by man. H. CHASIS, N. JOLLIFFE, and H. W. SMITH (J. Clin. Invest., 1933, 12, 1083—1090).—The min. requirement of phloridzin by man for raising the glucose to the xylose clearance level is 10—20 mg. per kg. The ratio creatinine : xylose clearance is not depressed. CH. ABS.

Influence of anæsthetics on the biological assay of *Digitalis*. J. C. DAVID and N. RAJAMANIC-KAM (Quart. J. Pharm., 1934, 7, 36—40).—When comparisons with standard preps. are made under identical conditions, the use of anæsthetics other than Et₂O is applicable to the cat method of Burns (see B., 1926, 719). The highest vals. of the average lethal dose are obtained with chloretone and the lowest with chloralose. F. O. H.

Pharmacology of some members of the tropane group. G. S. R. RAO (Quart. J. Pharm., 1934, 7,

690

46-56).—The approx. min. lethal dose by intraperitoneal injection into mice of selenotropinone (I), 8:9-benz- $\Delta^{8:9}$ -homogranaten-3-one (II), and benzoyl- ψ -8:9-benz- $\Delta^{8:9}$ -homogranaten-3-ol (III) (A., 1933, 729) are, respectively, 0.20, 0.50, and 0.42 g. per kg. (II) and (III), but not (I), paralyse the isolated uterus and heart and decrease the blood-pressure and respiration. (III), but not (II) or (I), completely anæsthetises the rabbit's cornea. The influence of structure on pharmacological action is discussed.

F. O. H.

Action of St. John's wort. C. H. HORSLEY (J. Pharm. Exp. Ther., 1934, 50, 310-322).—A method for the isolation of hypericin (I), the fluorescent red pigmen tof St. John's wort, is described. Injection of (I) into rats causes photosensitisation with development of erythema and, with large doses (40 mg.), prostration and death. The spectrum of the EtOH extract of young plants which contain less (I) is different from that of older plants. A. L.

Toxicity of derivatives of rotenone to goldfish. W. A. GERSDORFF (J. Amer. Chem. Soc., 1934, 56, 979-980).—Rotenone, acetyldihydrorotenone, dihydro-, acetyldihydro-, and acetyl-rotenolone are decreasingly toxic to goldfish (method : A., 1930, 1316). H. B.

New Guinea fish poison. A. K. MACBETH (Nature, 1934, 133, 649—650).—The root of a Derris (New Guinea) poisonous to fish and to mammals contains 4 to 5% of rotenone. L. S. T.

Heat regulation and water exchange. XVII. Serum osmotic pressure and the onset of fever. H. G. BARBOUR and A. GILMAN (J. Pharm. Exp. Ther., 1934, 50, 277–285).—Fever in rabbits produced by cocaine (I), tetrahydro- β -naphthylamine (II), and hay infusion is accompanied by corresponding increases in serum osmotic pressure (III), this tending to retard loss of surface H₂O. Serum sp. gr., while usually increasing, sometimes shows no change in mild cases. Whilst the increases in (III) cannot be accounted for by blood-sugar increase, in the case of (I) they are of the same order as the lactic acid increase, with (II), however, much larger. Increased muscular activity may therefore be a factor.

A. L.

Comparison of the antipyretic action and toxicity of *d*-glucono-*p*-phenetidine and acetophenetidide. W. E. HAMBOURGER (Proc. Soc. Exp. Biol. Med., 1933, 31, 365-367).—Equimol. proportions have approx. the same action on rabbits. The former has the wider separation of therapeutic and toxic doses. CH. ABS.

Effect of chaulmoogric acid derivatives on lipolytic activity in vitro. G. A. EMERSON, H. H. ANDERSON, and C. D. LEAKE (Proc. Soc. Exp. Biol. Med., 1933, 31, 272—273).—If the chaulmoogrates exert an indirect action in leprosy therapy apart from bactericidal action, it is improbable that the fat-splitting enzyme is involved. CH. ABS.

Comparative biological activity of seven new water-soluble chaulmoogric acid derivatives. G. A. EMERSON, H. H. ANDERSON, and C. D. LEAKE (Proc. Soc. Exp. Biol. Med., 1933, 31, 274-277).

CH. ABS.

Dinitrophenol hyperglycæmia. I. Its independence of asphyxia. V. E. HALL, C. A. BROWN, and M. SAHYUN (Proc. Soc. Exp. Biol. Med., 1933, 31, 380—382).—The hyperglycæmia is not secondary to a general asphyxia. CH. ABS.

Absorption of salicylic esters by the human skin. E. W. BROWN and W. O. SCOTT (J. Pharm. Exp. Ther., 1934, 50, 373—385).—The degrees of cutaneous absorption of the esters, based on Me salicylate as unity, are monoglycol (spirosol) 1.20, Me 1.00, OMe·CH₂ (mesotan) 0.49, Et 0.34, Pr^{β} 0.20, Bu 0.26, and *iso*amyl 0.15. Increasing adsorption corresponds with decreasing partition coeff. between oil and H₂O, rising surface tension, and falling viscosity. C. G. A.

Toxicology of solvents. F. FLURY and W. WIRTH (Arch. Gewerbehyg. Gewerbepath., 1933, 5, 1— 90).—A no. of aliphatic and aromatic acetates, Et_2 phthalate, MeOH, COMe₂, and [·CH₂·OH]₂ are examined. A. G. P.

Physiological action of tolylenediamine and its relation to experimental jaundice. H. J. WOLFF (J. Pharm. Exp. Ther., 1934, 50, 407— 419).—The absence of icterus in hepatectomised dogs indicates that the liver (I) is the site of the icterogenic activity of tolylenediamine (II); (I) undergoes necrosis. Protection is afforded by excretion of (II) in the urine and secretion into the gastric juice, causing emesis.

C. G. A.

Origin of naphthalene cataract. T. NAKASHIMA (J. Biochem. Japan, 1934, 19, 281-314).-Following administration of $C_{10}H_8$ to rabbits (I) in doses sufficient to cause cataract, the urinary inorg. SO₄ (II) rises and ethereal SO_4 falls, both levels returning to normal vals. within 7-8 days. Both levels rapidly increase after ingestion of $C_{10}H_8 + cystine$ or Na_2SO_4 , the return to normal levels (within 3 days), being followed by a secondary rise in (II). Marked changes also occur in the reduced (but not the oxidised) glutathione content of the liver and optic lens, but not in that of the muscle. Both the neutral SO_4 and glycuronic acid of the urine are significantly increased in both non-diabetic and diabetic (I). The bearing of the results on the incidence of cataract and retinal dysfunction is discussed (cf. A., 1932, F. O. H. 641).

Behaviour of blood-serum in presence of chemotherapeuticals. B. BRUNELLI (Arch. Farm. sperim., 1934, 57, 186—200).—Salvarsan and many of its derivatives, Bayer 205, and triparosan enter into stable combination with the euglobulin fraction, and to a smaller degree with the pseudoglobulin fraction of serum-proteins, which are no longer coagulated by heat. Combination does not take place with inactivated plasma. It depends on $p_{\rm H}$, being most complete on the alkaline side, whilst at the isoelectric point of globulin ($p_{\rm H}$ 5.5) it does not occur. R. N. C.

Toxicity of some azoarsenic compounds. S. BERLINGOZZI and F. P. MAZZA (Arch. Sci. biol., 1933, 16, 404-410; Chem. Zentr., 1933, ii, 2853).—The toxic doses for white rats for each 20 g. are 0.005, 0.0053, 0.0066, 0.007, 0.0085, and 0.0045 g. with 1-amino-3-hydroxybenzene-4- (22.25% As), 1:3-dihydroxybenzene-6- (22.2% As), 1:3-dihydroxybenzene-2:4:6-tris- (28.3% As), 1-phenyl-3-methyl-5hydroxypyrazole-4- (18.66% As), 2-methyl-3-hydroxyquinoline-4- (19.38% As), and 2-phenyl-3-hydroxyquinoline-4-azo-*p*-phenylarsinic acid (16.7%) (I), respectively. Excretion after 72 hr. amounts to 80-95% except in the case of (I). The connexion between structure and toxicity is discussed.

L. S. T.

Laxative principle in prunes. G. A. EMERSON (Proc. Soc. Exp. Biol. Mcd., 1933, 31, 278—281).— The substance resembles dihydroxyphenylisatin and caffeic and chlorogenic acids. CH. ABS.

Synthesis of medicinal products. VII. Theory of laxatives. II.—See this vol., 663.

Anthelmintics.—See this vol., 652.

Sodium chloride metabolism. IV. Diuretics. H. SATO (Japan. J. Gastroenterol., 1933, 5, 85-90).-Salyrgan (I) and pituitrin act as diuretics in rabbits and remove NaCl from the body. Blocking the reticulo-endothelial system inhibits the action of (I). CH. ABS.

Influence of alkyl- and alkylene-mercaptan groups on the therapeutic activity of organic compounds. I. Methylthioatophan.—See this vol., 665.

Reactions of blood and tissue cells to colloidal thorium dioxide. I. C. WEN and T. S. JUNG (Chinese J. Physiol., 1934, 8, 85—95).—Intravenous injection of ThO_2 is followed by an increase in the no. of monocytes and neutrophile leucocytes (I) which take up the particles as do cells of the liver, suprarenal cortex, and the reticulo-endothelial system (II). Subcutaneous injection is followed by migration of (I) to the connective tissue. (I), clasmatocytes, and fibroblasts show active phagocytosis of the ThO_2 particles. ThO_2 -laden cells can still take up trypanblue or Li-carmine, showing that (II) is not "blocked." From mixed injections the various phagocytic cells take up dye particles more readily than ThO_2 , due to greater diffusion of the dye. C. G. A.

Reticulo-endothelial system and metabolism. T. LEIPERT (Biochem. Z., 1934, 270, 93—111).—In rabbits, blockade (I) of the reticulo-endothelial system (II) with 25% ThO₂ sol has no effect on enzymes which degrade purines, but interferes with excretion of purine, causing it first to increase and then to decrease before gradual restoration to normal. The oxidative degradation of tyrosine, the bloodsugar level, the carbohydrate tolerance, and the oxidation of *d*-lactic acid remain unaffected. In rats (I) does not interfere with the passage of lipins through (II). Hence there is no evidence that (I) inhibits oxidations or that (II) plays any active part in NH₂acid, carbohydrate, or fat metabolism. W. McC.

Effect of reticulo-endothelial blockade on blood chemistry. R. I. KLEIN and S. A. LEVINSON (Proc. Soc. Exp. Biol. Med., 1933, 31, 353–355).— In the dog blood-cholesterol decreases and -sugar increases; blood- $p_{\rm ff}$, -CO₂, n, and viscosity fall more slowly. With continued injection of India ink suspension blood-sugar decreases, whilst -non-protein. N increases. CH. Abs.

Effect of heavy water of low concentration on Euglena. T. C. BARNES (Science, 1934, 79, 370).— Cells of *E. gracilis* multiply more rapidly in H_2O containing a low % of H_2^2O (*d* 1.000061) than in ordinary distilled H_2O . A small proportion of H^2 may be a necessary constituent of living systems. L. S. T.

Combination of amyl nitrite with sodium thiosulphate in the treatment of potassium cyanide poisoning. A. Buzzo and R. E. CARRATALÁ (Semana méd., 1933, ii, 1772—1775).—Inhalation of C_5H_{11} ·NO₂ causes formation of methæmoglobin, which forms a stable compound with CN' and facilitates the action of the (intravenously injected) Na₂S₂O₃. NaNO₂ is more effective than C_5H_{11} ·NO₂, but less easily applied. CH. ABS.

Action of natural arsenical waters on seed germination and larval growth. J. GODONNÈCHE and G. DASTUGUE (Bull. Soc. Chim. biol., 1934, 16, 248—256).—Growth of seeds in two natural waters containing 0.007 (I) and 0.028% of As was increased (except in the case of wheat) and retarded, respectively. Both, however, accelerated the development of tadpoles, the effects being in the same order as those of aq. solutions of Na₂HAsO₄ of equal concn., (I) being the most favourable for growth. A. L.

Behaviour of lead in the animal organism. III. Colloidal lead compounds. R. A. KEHOE and F. THAMANN (J. Lab. Clin. Med., 1933, 19, 178– 194).—After injection of H₂O-sol. Pb salts into rabbits, Pb was detected in all tissues, especially blood, kidneys, liver, and spleen. Thereafter there is gradual loss from the tissues until equilibrium is established between the amount excreted and that absorbed with food. Colloidal Pb behaves similarly. Pb phosphates are not redistributed or excreted in large amounts. Much of the Pb₃(PO₄)₂ injected into a human subject was found in the liver and little in the skeleton, whilst injected colloidal Pb was found in appreciable quantity in the skeleton. CH. ABS.

Intake of lead and its distribution in the organism during experimental poisoning. F. WEY-RAUCH, A. NECKE, and H. MULLER (Z. Hyg., 1934, 116, 28—35).—Characteristic differences in the distribution and accumulation of lead in various organs of different animals are recorded. A. G. P.

Volatilisation, solubility, and oxidation [and retention by lungs] of metallic mercury.—See this vol., 613.

Detection of dangerous dusts. E. H. KETTLE (Lancet, 1934, 226, 889—890).—Microscopical examination of the lungs of guinea-pigs injected with various dusts shows that finely-ground flint and kaolin, but not wellingtonite or a sample of Fe-coated SiO₂, are harmful. L. S. T.

Determination of fluorides in waters. [Effect on dental enamel.]—See this vol., 618.

Spectroscopic determination of fluorine in bones, teeth, and other organs, in relation to fluorine in drinking water. C. H. BOISSEVAIN and W. F. DREA (J. Dental Res., 1933, 13, 495-500).- The method (I), which is described, agrees with the chemical only when the sample dissolves readily in $HClO_4$. When fusion is necessary considerable loss of F occurs, and hence the higher vals. of (I) are more accurate. For inhabitants of Colorado Springs (II), where the H_2O contains 2 p.p.m. of F, the average % of F in enamel is 0.065 and in dentine 0.112; for those of New York City, where the H_2O contains no detectable F, the % are nil and 0.068. Human bones from (II) contain 0.7% of F and from the eastern United States, 0.13%. No F can be detected in liver, spleen, kidney, thyroid, heart, or lung of samples from (II). Ingested F is eliminated in urine and fæces; none can be detected in saliva or milk. NUTR. ABS. (m)

Effects of diets containing fluorine on jaws and teeth of swine and rats. R. M. BETHKE, C. H. KICK, T. J. HILL, and S. W. CHASE (J. Dental Res., 1933, 13, 473—493).—Addition of F compounds to the diet of swine and rats produced hypoplasia of the enamel and dentine proportional to the amount of F and varying according to the compound used. The skull of rats was unaffected. In swine, rock phosphate or NaF increased the thickness of the mandible and the size of the medullary spaces, and increased the width of the dental arch. CH. ABS.

Influence of fluorine ingestion on nutritional qualities of milk. P. H. PHILLIPS, E. B. HART, and G. BOHSTEDT (J. Biol. Chem., 1934, 105, 123-134).— The average F content of milk from cows on normal diets was 0.138 mg. per litre, and was scarcely influenced by adding F to the diets. Rats fed on milk containing $4.5-132\times10^{-6}$ g. of F per day showed no toxicosis. H. D.

Fate of enzymes in the digestive tract. W. HEUPKE and H. WIRTZ (Klin. Woch., 1933, 12, 1866— 1867).—Myrosin, emulsin, urease, and catalase introduced into the digestive tract remain intact and active as far as the large intestine; zymase and peroxidase are rapidly destroyed. These enzymes do not appear to be absorbed through the intestinal wall.

NUTR. ABS. (b)

Carboxy-catalase and its decomposition by monochromatic light. L. CALIFANO (Naturwiss., 1934, 22, 249—250).—The action of catalase preps. (I) [purified by fractional pptn. with EtOH and CHCl₃, adsorption on $Ca_3(PO_4)_2$, and elution] is inhibited by CO. (I) are markedly inactivated by white and blue (405 and 436 mµ) light, to a smaller extent by blue-green light (492 mµ), and not at all by green or yellow light (546 and 578 mµ). CO-(I), however, are partly re-activated by radiations of λ 405 and, to a smaller extent, of 492 mµ.

F. O. H.

Equilibrium of the fumarase system. K. P. JACOBSOHN and J. TAPADINHAS (Biochem. Z., 1934, 269, 225—230).—Tables show the final rotation and equilibrium const. for liver-fumarase-fumaric-malic acid systems and the influence thereon of glycerol and [·CH₂·OH]₂. In the presence of these substances the formation of fumarate is favoured at the 'expense of malate. P. W. C.

Liver-dehydrogenase attacking higher fatty acids. II. F. P. Mazza and C. ZUMMO (Atti R. Accad. Lincei, 1933, [vi], 18, 461–463; cf. A., 1933, 747).—Addition of stearic or oleic acid increases the consumption of O_2 by surviving liver by 85 or 82%, respectively, the dehydrogenase of the liver playing a part in the oxidation of these acids.

T. H. P.

Liver enzymes. I. Aldehydrase. L. REICHEL [with H. KÖHLE and R. WETZELL]. II. Alcoholdehydrase [with H. KÖHLE] (Naturwiss., 1934, 22, 219—220).—I. A dry, stable aldehydrase has been prepared from liver. It catalyses dehydrogenation (I) of aldehydes as well as their dismutation : (I) occurs with the aid of benzoquinone or methyleneblue anaërobically or aërobically, or with cytochrome aërobically in presence of indophenol-oxidase. In fresh liver only a small part of added aldehyde is transformed in this way. Anaërobically the alcohol and acid formed are equiv.; aërobically more acid is found, owing to the presence of alcoholdehydrase.

II. An alcoholdchydrase has been prepared which converts alcohol into aldehyde under aerobic conditions only. HCN does not inhibit the action. Benzoquinone and methylene-blue accelerate the action; of natural substances, only "omega" and a dry spleen prep. increase the amount of alcohol transformed. R. K. C.

Effect of temperature on activity of amylase. S. TRAUTMANN and L. AMBARD (Bull. Soc. Chim. biol., 1934, 16, 35-51).—Changes in the Q_{10} of amylase caused by the addition of Cl', Br', or I' at const. $p_{\rm H}$ and by change of $p_{\rm H}$ at const. Cl', Br', or I' concn. are explained on the basis that the enzyme action takes place in two stages, firstly the combination (I) of the enzyme with the co-enzyme, H', and the anion, and secondly the actual hydrolysis (II). The Q_{10} is therefore made up of the Q_{10} of (I) with the Q_{10} of (II). The speed of (I) is inversely proportional to that of (II) and independent of the anion concn. A. L.

Effect of ligature of the pancreatic duct on the amylolytic activity of saliva and blood. T. GAYDA (Arch. Sci. biol., 1933, 19, 62).—Ligature of the pancreatic duct in rabbits causes no change in the amylase (I) content of saliva. Serum-(I) is increased and returns to normal as the gland atrophies. Blood-(I) is therefore not derived from the pancreas.

NUTR. ABS. (b) Enzymic fission of sucrose and its derivatives. R. WEIDENHAGEN (Chem.-Ztg., 1934, 58, 287—289).---A summary of the specificity etc. of sugar enzymes, especially those of the invertase type (see A., 1928, 1157, 1281; 1929, 352, 722; 1930, 499, 1065; 1931, 653, 873, 1331; 1932, 91, 1063; 1933, 92, 749, 1080). F. O. H.

Increase in glycogen during autolysis of meat. J. A. SMORODINCEV and L. A. PHILIPPOVA (Bull. Soc. Chim. biol., 1934, **16**, 140—144).—The glycogen content of beef undergoing autolysis at 4° or 34° first decreases and then increases, reaching about half the original val. after 18 days. The amount of glucose increases to a max., then after decreasing slightly increases progressively. Lactic acid after increasing steadily reaches a max. A. L. Enzymic hydrolysis of phosphatides. III. Hydrolysis of natural and synthetic phosphatides E. J. KING (Biochem. J., 1934, 28, 476–481; cf. A., 1931, 984).—The rate of hydrolysis (I) of lecithin (II) by lecithinase from intestinal mucosa and kidney is > that of kephalin, phosphatidic acid, synthetic (II), and distearyl phosphate (III). No $p_{\rm H}$ optimum was found for the hydrolysis of (II) and (III). The (I) of lyso- and bromo-lecithin is > that of (II) and = that of hydrolecithin. H. D.

Physiology of digestion in infants. XVII. Bile activator of prolipase in breast milk. E. FREU-DENBERG (Z. Kinderheilk., 1933, 55, 714—719).— Of the bile acids tested, only litho- and dehydrocholic acid showed no activation of the prolipase of human milk. The bile of the pike had less effect than that of other animal species. NUTR. ABS. (b)

Serum-lipases. J. NITZULESCU, I. ORNSTEIN, and D. HERESCU (Compt. rend. Soc. Biol., 1933, 114, 747-749).—With advance of age the serumlipases decrease in quantity in an irregular manner. Abnormal lipases, hepatic or pancreatic, are not found. NUTR. ABS. (m)

Effect of injected lipase on lipase content of blood in the rabbit. T. OLIARO and J. ADLER (Z. ges. exp. Med., 1933, 91, 362—365).—Repeated subcutaneous or intravenous injections of lipase (I) (from pancreas) produce in rabbits an increase in serum-lipase lasting for several days followed by a fall below the original val. The blood-fat varies inversely with (I). NUTR. ABS. (m)

Asymmetric hydrolysis of esters by enzymes. IX. Optical selection by liver-esterase in the system of "equalising activators." E. BAMANN and P. LAEVERENZ (Z. physiol. Chem., 1934, 223, 185—188; cf. A., 1931, 874).—Ca oleate-albumin scarcely influences the optical selection by liveresterase (I); Na oleate has a marked effect. This is removed by addition of $CaCl_2$, which forms the Ca soap. The (I) of the Arabian baboon is affected by *l*-mandelic acid, which favours the fission of the *d*ester in the racemate. The *d*-acid shows a slight effect in the opposite sense. EtOH is without effect, but the selective action is influenced by the concn. of the substrate. J. H. B.

Enzymic histochemistry. VIII. Micro-determination of the activity of lipolytic enzymes. D. GLICK (Z. physiol. Chem., 1934, 223, 252-256; cf. this vol., 561).—The lipolysis, conducted in glycine-NaOH buffer at $p_{\rm H}$ 8.7, is stopped at the desired time by addition of 1.5-2% PhOH. The solution is titrated with 0.05N-HCl to $p_{\rm H}$ 6.5.

J. H. B.

Lipolytic enzymes. I. Mechanism of lipolytic enzyme actions. II. Influence of $p_{\rm H}$ on activity of liver-esterase. H. SOBOTKA and D. GLICK (J. Biol. Chem., 1934, 105, 199—219, 221— 230).—I. Enzyme solutions were obtained by digesting COMe₂-Et₂O-dried pig's gland in aq. NH₃ and neutralising with AcOH. Pancreas-globulin (I) and liver-albumin (II) fractions were separated by half and complete saturation, respectively, with (NH₄)₂SO₄. The hydrolyses by liver-esterase (III) are zeroorder reactions, whilst the curves for pancreasesterase (IV) flatten after an initial steep rise, further rises being obtained by successive additions of more substrate. The solubilities of butyrins and C_8H_{17} OH (V) are increased by (I) and (II). The affinities of the butyrins for (II) as expressed by their Michaelis consts. are > those for (I); (V) exerts both competitive and non-competitive inhibition, and the affinity const. for (V) with (III) is calc. from the inhibition observed. Under certain conditions (V) accelerates the hydrolysis of tributyrin with either (III) or (IV) and of monobutyrin with (IV).

II. The $p_{\rm H}$ -activity curves for human (III) and pig's (III) and (IV) on EtOAc, PrOAc, and the monoand di-acetates of ethylene and propylene glycols, using (NH₄)₂HPO₄ buffers, show two max. at $p_{\rm H}$ $6\cdot7$ — $7\cdot3$ and $7\cdot6$ — $8\cdot2$. The max. at $6\cdot7$ disappears on using borate buffers, and the min. disappears with borate-HPO₄" mixtures. With the (III) from COMe₂-Et₂O-dried human liver the max. at $6\cdot7$ vanishes at a definite stage when the stability of (III) has been greatly diminished. H. D.

Effect of halogen salts on steaptic digestion. W. M. CLIFFORD (Biochem. J., 1934, 28, 418–422).— The lipolytic activity of pancreas substance (I) is strongly inhibited by 0.008-0.5M-NaF, -KF, or -NH₄F, but not by the corresponding salts of HCl, HBr, or HI. Inhibition varies directly with [F'], NH₄F being more inhibitory than NaF or KF at 0.06-0.25M. All three fluorides show an equal effect at 0.5M and at 0.008-0.03M. Halogen salts exert a coagulating effect on milk in presence of the very weak trypsin of (I). A. E. O.

Action of iodoacetic acid on diastase, lipase, and pepsin. F. BARTH (Biochem. Z., 1934, 270, 63-65).—Aq. CH₂I·CO₂H (0·2% upwards) has no inhibiting effect on diastase (I), lipase, or pepsin. (I) is also unaffected by phloridzin. W. McC.

Normal substrates for the determination of soluble enzymes. H. PÉNAU and R. AUDIC (J. Pharm. Chim., 1934, [viii], **19**, 329—345).—A special prep. of fibrin is recommended for the assay of pepsin and papain. Details are also given of the determination of diastase, using a special potato-starch, and of panereatin on the basis of its amylase, lipase, and proteolytic activity. H. G. R.

Plasteins. A. V. BLAGOVESTSCHENSKI and G. V. JEREMEJEV (Biochem. Z., 1934, 270, 66-73; cf. Folley, A., 1932, 651).—The products of the action of pepsin (I) on caseinogen, ovalbumin, and globulin from sunflower seeds on further treatment with (I), at $p_{\rm H}$ 4·6-4·8, yield plasteins (II), precipitable by CCl₃·CO₂H, containing CO₂H and NH₂ decreased by equiv. amounts, and having less N than the original proteins (III). Production of (II) is complete in 4-5 hr. As compared with (III) the distribution of N in (II) is only slightly altered, the free NH₂ being here higher in the mono- and diamino-acid fractions. At $p_{\rm H}$ 1·5 (I) hydrolyses (II), restoring the original amount of free NH₂. W. McC.

Parallel adsorption of crystalline pepsin and peptic activity on caseinogen and ovalbumin. J. B. SUMNER (Proc. Soc. Exp. Biol. Med., 1933, 31, 204—206).—Complete adsorption was achieved. Northrop's cryst. pepsin is not simply an enzyme adsorbed on protein. CH. ABS.

Inactivation of crystalline trypsin. M. KUNITZ and J. H. NORTHROP (J. Gen. Physiol., 1934, 17, 591— 615).—Reversible inactivation (I) of trypsin corresponding with a reversible denaturation of the protein increases with $p_{\rm H}$ from 2.3 to 13.0 at 0°. (I) is also obtained by heating. On keeping, (I) becomes irreversible. Between $p_{\rm H}$ 2.0 and 9.0 a bimol. hydrolysis occurs; at $p_{\rm H} < 2$ or >13 the trypsin protein is changed into an inactive form irreversibly denatured by heat, and at $p_{\rm H}$ 9—12 both reactions occur. Min. rates of inactivation occur at $p_{\rm H}$ 13 and 2.3.

H. D. Hydrolysis of lecitho-vitellin by pepsin and by trypsin-kinase. J. H. BLACKWOOD and G. M. WISHART (Biochem. J., 1934, 28, 550–558).—With pepsin the liberation of acid-sol. N is > that of acidsol. P, whereas with trypsin these vals. depend on the enzyme concn. The max. hydrolysis yields 80% of the total N and 70% of the total P. The vitellin mol. must contain two dissimilar P complexes, one of which is resistant to enzymic action. H. G. R.

Activation of pancreatic juice by acid. M. LISBONNE (Ann. Physiol. Physico-chim. biol., 1933, 9, 723-733).—The optimum $p_{\rm H}$ for activation is 4-1. The mechanism of activation by acids is discussed.

NUTR. ABS. (b)

Proteolytic enzymes of Rana temporaria at different stages of metamorphosis. V. DOLJAN-SKI (Virchow's Archiv, 1933, 291, 418—426).—Tadpoles contain trypsin before and during (but not after) metamorphosis (I) except in the degenerating tail, cathepsin [which is most active during (I)] and dipeptidase (at all stages), but no pepsin.

NUTE. ABS. (m) Action of the enzymes of Crotalus adamantcus on the proteins of blood and milk. E. E. DUNN (J. Pharm. Exp. Ther., 1934, 50, 386—392).—The venom (I) contains enzymes which digest plasmaand serum-proteins and, more slowly, serum-albumin and fibrin. (I) has weak rennin action. Pure caseinogen is digested rapidly and completely, but that of coagulated milk only slightly. (I) converts hæmoglobin in hæmolysed erythrocytes and in solution into methæmoglobin. C. G. A.

Separation of the enzymes and toxic principles of the venom of *Crotalus adamanteus*. E. E. DUNN (J. Pharm. Exp. Ther., 1934, 50, 393-406).— Cephalinase (I) is separated from the proteinases (II) by adsorption on $Al(OH)_3$ -*C* (aged for 8 months) or by heating to 85° and pptn. with EtOH. (I) retains part of the toxicity of the venom and is hæmolytic. The enzyme oxidising hæmoglobin to methæmoglobin can be separated from (I) and (II) by adsorption on $Al(OH)_3$ -*A* or -*C*, and is not eluted by phosphate buffer or very dil. alkali. C. G. A.

Intermediary metabolic products and arginase activation. A. PURR and L. WEIL (Biochem. J., 1934, 28, 740-744).—The degrees of activation of arginase (I) by Fe^u compounds with cysteine, ascorbic acid, uric acid, and other metabolic products are determined; Fe^{u} in complex combination does not activate (I). The activation may be dependent on a redox potential. H. D.

Relation between the activity of urease and the oxidation-reduction potential. H. FISCHGOLD (Biochem. J., 1934, 28, 406–410).—The activity of urease is unaffected by H_2 or air, or by the oxidation-reduction potential (I) of the medium within the range covered by the systems $Pd-H_2$ (II), methylene-blue-leucomethylene-blue, and ferricyanide-ferrocyanide. Inhibition by quinol is probably due to a sp. chemical reaction [being absent in presence of (II)] and is not related to (I). A. E. O.

Lævorotatory allantoin. R. Fosse, P. E. THOMAS, and P. DE GRAEVE (Compt. rend., 1934, 198, 1374— 1376).—As well as that of the soya bean (cf. this vol., 534), allantoinase of skate liver will preferentially hydrolyse *d*-allantoin, leaving an excess of the *l*-form; in neutral or alkaline solution the latter quickly racemises. E. W. W.

Phosphatase activity of spleen extracts. D. R. DAVIES (Biochem. J., 1934, 28, 529-536).—The phosphatase (I) action of extracts of spleen (II) with β -glycerophosphate as substrate has two max. at $p_{\rm H}$ $4\cdot5$ -5·0 and 9·0, respectively, and is very low at $p_{\rm H}$ 7·0. The ratio of the two activities of the same extract at the two max. is not const. from animal to animal even of the same species. Mg^{••} activates the (I) of (II) and of red blood-cells at $p_{\rm H}$ 6·0-9·5. These results as well as the relative rates of hydrolysis of α - and β -glycerophosphate at various $p_{\rm H}$ vals. suggest that (I) of (II) consists of two enzymes, one of which with its max. activity at $p_{\rm H}$ 9·0 is identical with blood-(I). W. O. K.

Calcification of hypertrophic cartilage in vitro. R. ROBISON and A. H. ROSENHEIM (Biochem. J., 1934, 28, 684-698).-α- and β-Glycerophosphates, hexose monophosphate, fructose diphosphate, and trehalose monophosphate, but neither diphosphoglycerate nor lecithin can act as substrates for bonephosphatase (I) in calcification in vitro (II). Ba, Sr, and Mg salts can be deposited in cartilage in vitro. The second mechanism (III) is not completely inhibited by KCN. The activity of (III) falls more rapidly than that of (I) in excised bone stored in salt solutions at 37°; HCO3' exerts a protective effect. Vitamin-D and hormone preps. are without effect on (II). Glucose inhibits (II), but fructose, sucrose, dulcitol, erythritol, glycine, and urea do not. NaF (0.00001M) and $CH_2I \cdot CO_2Na$ (0.0001M) strongly inhibit (IIÍ) but not (I). C. G. A.

Effect of serum-proteins on calcification in vitro. A. H. ROSENHEIM (Biochem. J., 1934, 28, 699—707).—A Ca: P ratio (I) of 10:6 is necessary for calcification (II) in presence of 7% horse serumprotein (III), compared with 10:3 alone. The inhibitory effects of glucose and Mg on (II) are still apparent in presence of (III). Glycerophosphoric ester lessens the effect of protein. (II) occurs in serum from rats, rabbits, and man if the Ca×P product is sufficiently high, added inorg. $PO_4^{\prime\prime\prime}$ usually being necessary. C. G. A. Variability in the activity of the calcifying mechanism in the bones of rachitic rats. A. H. ROSENHEIM (Biochem. J., 1934, 28, 708—711).—The calcifying power of the cartilage of the bones of rachitic rats decreases with increasing period on a rachitogenic diet. C. G. A.

Calcification in vitro of kidney, lung, and aorta. A. H. ROSENHEIM and R. ROBISON (Biochem. J., 1934, 28, 712-719).—Calcification (I) occurs more slowly than in hypertrophic cartilage, and deposition is irregular. Phosphoric ester seems to be necessary for (I) in kidney and lung, but aorta calcifies in very highly supersaturated inorg. solutions. The deposits resemble those found *in vivo* in hypervitaminosis-D. C. G. A.

Phosphatase activity of animal tissues. M. G. MACFARLANE, L. M. B. PATTERSON, and R. ROBISON (Biochem. J., 1934, 28, 720—724).—Vals. of the ratio phosphatase activity : dry wt., in presence and absence of Mg, for various tissues of rat, rabbit, guinea-pig, mouse, cat, and dog are given. The bladder of all species is active. In the rat only does the aorta show activity. C. G. A.

Effect of parathormone on bone-phosphatase activity in vitro. H. BAKWIN and Ö. BODANSKY (Proc. Soc. Exp. Biol. Med., 1933, 31, 64-65).— Parathormone, in concess of 0.1-2.5 units per c.c. of hydrolysing mixture, has no effect in vitro on the β -glycerophosphatase activity of aq. extracts of ratand cattle-bone. NUTR. ABS. (m)

Appearance of triose in desmolytic hexose degradation. M. KOBEL and C. NEUBERG (Biochem. Z., 1934, 269, 441–446).—Tables summarise the yields of triose or triose phosphate (up to 31%) and of AcCO₂H (up to 46%) from hexose diphosphate using an EtOH-Et₂O prep. of a top yeast under varying conditions. P. W. C.

Direct fermentation of maltose. H. SOBOTKA and M. HOLZMAN (Biochem. J., 1934, 28, 734— 739).—Maltose vals. (I) for various yeasts were determined. A German yeast with a small (I) ferments maltose, after an initial induction period, as fast as glucose. H. D.

Storage of carbohydrate and fat by Saccharomyces Frohberg when incubated in sugar solutions. R. A. MCANALLY and I. S. MAOLEAN (Biochem. J., 1934, 28, 495-498).-Carbohydrate storage of similar extent took place when S. Frohberg (I) was incubated in solutions of glucose (II), galactose (III), fructose (IV), sucrose (V), and maltose (VI) of equal concns. Increasing concns. of (II) and (III) resulted in increased carbohydrate storage. (I) stored more fat when incubated in solutions of (II) than of (III), (IV), (V), or (VI), the amounts increasing in the cases of (II) and (III) with increased concns. of the sugars. Phosphate added to the medium did not increase fat storage as with brewer's yeast (cf. A., 1924, i, 352; 1925, i, 204). W. O. K.

Glycogen in yeast. A. HEIDUSCHKA and G. SCHÄFER (Arch. Pharm., 1934, 272, 137-142).-Glycogen (I) in yeast is accurately determined by Warkany's method (A., 1925, i, 105). Determination of (I) and of the yeast-gum (II) (Salkowski) in similar specimens of yeast stored at temp. varying between 2° and 26° shows that the amount of (I) decreases, and of (II) increases, with time, and, above 10° , both vals. become constant after about 10 days. Thus the disappearance of (I) is not due to its change into other carbohydrates, but to the respiration of the yeast, which is very rapid at > 5°. J. W. B.

Simple method for the isolation of glutathione from yeast. A. KOZLOWSKI (Science, 1934, 79, 388—389).—Glutathione is obtained from yeast by treatment with EtOH, H_2SO_4 , and $CuSO_4$.

L. S. T. Investigations in the region of high frequency. II. Biochemical action of ultra-short electromagnetic waves. F. PIRRONE (Atti R. Accad. Lincei, 1934, [vi], 19, 165—168).—Although feebler and variable, the action of Lakhovsky oscillating circuits on brewer's yeast is analogous to that of radio-emitting apparatus capable of transmitting waves of $\lambda = 1.7$ m. For continuous exposures of 10—40 min., or discontinuous up to 90 min., the subsequent development of the yeast is accelerated, the effect being ∞ the intensity of the radiation. The action falls with longer exposures. T. H. P.

Bios and factor-Z. H. VON EULER and H. LARSson (Z. physiol. Chem., 1934, 223, 189-206).-In the prep. from different sources and purification (by extraction and pptn. with EtOH, Ba(OH)₂ and EtOH, COMe₂) of the Z-factor (I) stimulating fermentation (II) and of the B(=bios)-factor (III) stimulating cell-increase (IV) of yeast the velocities of (II) and (IV) show a parallel increase and the ratio is unchanged after dialysis. Br at room temp. or aq. $Ba(OH)_2$ at 100° affects neither activity. Acid KMnO4 and CuSO4-Ca(OH)2 do not influence (I), but inhibit (III), possibly owing to poisoning by an SH derivative, which cannot be completely removed. (I) and (III) are not adsorbed by acidclay. The mean mol. wt. of (I) by diffusion is about 200. There are no characteristic differences between (I) and (III); the stimulation of (II) and (IV) probably represents two different phases of the action of one activator. J. H. B.

Synthesis from inorganic compounds of starch, fats, proteins, and protoplasm in the colourless animal, *Chilomonas paramecium*. S. O. MAST and D. M. PACE (Protoplasma, 1933, 20, 326– 358).—*C. paramecium* shows normal growth and synthetic ability when supplied with N, C, O, H, Mg, K, S, and P. Other elements, if necessary for growth, suffice in extremely minute amounts. The organism can utilise N from NH₂-acids, urea (I), or NH₄ salts, but not NO₃', NO₂', or atm. N₂. Glycine, glucose (I), acetates (II), formates (III), or CO₂ (but not CO₃'') are sources of C, (II) being more suitable than (III) or (I). The optimum concn. of CO₂ is 1 vol. to 5 vols. of air. Deviations from this val. cause changes in reaction, higher acidity being associated with increased synthesis of starch (IV) and fat (V), but retarded reproduction and lower acidity with lowered synthesis of (IV) and (V) and slower reproduction only after stored nutrient has been consumed. Si in nutrients appears to function as a catalyst and very dil. solutions are effective. In this respect Si cannot be replaced by Fe, Al, or B. The oxidation of NH_4Cl in the nutrient to NO_3' provides much of the energy expended in synthesis. A. G. P.

Relation between inorganic salt concentration, hydrogen-ion concentration, and physiological processes in Amæba proteus. II. Rate of locomotion, gel/sol ratio, and hydrogen-ion concentration in solutions of single salts. R. F. PITTS and S. O. MAST (J. Cell. Comp. Physiol., 1934, 4, 237—256).—The effects of solutions of K, Na, and Ca salts of varying concn. and $p_{\rm H}$ on the rate of locomotion (I) and on the gel/sol ratio (II) are recorded. (I) is probably independent of the kind and concn. of the anions present. No sp. correlation exists between (I) and (II) in any of the solutions examined. A. G. P.

Sugar metabolism and the ability of moulds to accumulate acids. T. CHRZASZCZ and D. TIUKOW (Polish Agric. Forestal Ann., 1931, 26, 71—86).—The amount of acid accumulated is characteristic of the species and independent of sugar consumption. Max. accumulation usually takes place within 10 days. CH. ABS.

Growth of Penicillium roqueforti on synthetic media. N. S. GOLDING (J. Dairy Sci., 1934, 17, 61-74).—Methods are described for obtaining a conc. enzyme extract from *P. roqueforti* and its use in producing a Roquefort flavour in processed cheese after heating. Reaction changes in culture media range from $p_{\rm H} 2.05$ to 7.7, depending on the proportion of glucose and caseinogen present. Acid reaction was maintained until all glucose was utilised, and subsequent changes were toward the alkaline side. The $p_{\rm H}$ of the medium did not materially affect the course of caseinogen breakdown brought about by the mould. A. G. P.

Composition of fat produced by Penicillium javanicum, van Beijma. G. E. WARD and G. S. JAMIESON (J. Amer. Chem. Soc., 1934, 56, 973— 975).—The oil obtained in 11% yield from the light petroleum extract of the dry mycelium has m.p. about 15°, des 0.9145, n^{23} 1.4680, acid val. 10.6, sap. val. 191, I val. (Hanus) 84, Reichert-Meissl val. 0.3, Ac val. 10.7, and contains 2% of unsaponifiable matter. The saturated acids (30.8%) isolated (hydrolysis) are palmitic (69.5%), stearic (28%), and n-tetracosoic (2.5%); the unsaturated acids (60.8%) are oleic (52.1%) and α - and β -linoleic (47.9%).

H. B.

Nutrient and toxic action on Aspergillus niger. G. LOHMANN (Arch. Mikrobiol., 1934, 5, 31-56).— The effects of Zn (considered as an essential nutrient) on the growth of A. niger under varying nutritional conditions are recorded, and the nature of Zn-yield curves is compared with those for N and P. The toxic action of Zn and other poisons is influenced not only by the concn. of toxin present, but also by the relative proportions in which other essential nutrients are supplied. A. G. P.

Mould tissue. IV. Lipins of Aspergillus sydowi. F. M. STRONG and W. H. PETERSON (J. Amer. Chem. Soc., 1934, 56, 952–955).—The oil from the Et₂O-EtOH extract of the dry mycelium has d_4^{15} 0.9198, n_2^{10} 1.4682, I val. (Hanus) 114.4, sap. val. 169.5, acid val. 43.4, ester val. 126.1, and contains P (0.26%) and N (0.39%). A phospholipin is separated as a complex with MgCl₂. The fatty acids (80.8% of oil) obtained by hydrolysis are palmitic (8.8%), stearic (11%), *n*-tetracosoic (0.9%), oleic (29.6%), linoleic (16.3%), and higher unsaturated acids (1.7%). The unsaponifiable matter (8.18%) contains about 66% of sterols; ergosterol is present. H. B.

Mould tissue. V. Fractionation of the nitrogen in the mycelium of Aspergillus Fischeri. H. J. GORCICA, W. H. PETERSON, and H. STEENBOCK (Biochem. J., 1934, 28, 504—511).—Fresh mycelium of A. Fischeri contained 30% H₂O-sol. non-protein-N, 55% alkali-sol. protein-N, and 12% of alkali-insol. residue-N. The alkali-sol protein contained one fraction pptd. by acids (ash 1·2%, N 11·8%, P 0·4%) and a second, acid-sol. and pptd. by CuSO₄ (ash 12·37%), N 12·3% (ash-free basis), P 2·4% (ash-free basis). The residue contained 2·3% N of which 62% was isolated as glucosamine-N. W. O. K.

Biochemistry of micro-organisms. XXXVII. (a) Production of hydroxyanthraquinones by species of *Helminthosporium*. (b) Isolation of tritisporin, a metabolic product of H. triticivulgaris, Nisikado. (c) Molecular constitution of catenarin. H. RAISTRICK, R. ROBINSON, and A. R. TODD (Biochem. J., 1934, 28, 559-572).-The mycelium (I) of H. catenarium, Drechsler, contains catenarin (II) (formerly hydroxyisohelminthosporin), m.p. 246°. Distillation of (II) with Zn dust in H₂ affords 2-methylanthracene. Oxidation of (II) with MnO_2 and H_2SO_4 yields hydroxycatenarin, m.p. about 320° (Ac₅ derivative, m.p. 233-234°), which must from its properties be 1:4:5:8-tetrahydroxy - 2 - hydroxymethylanthraquinone. With HNO₃, (II) gives a *product* (tetranitrocatenarin?), chars about 250°. (II) gives no Me or definite Br derivative with MeI or HBr in AcOH, respectively. (II) is probably a 1:5:8-trihydroxy-β-hydroxymethylanthraquinone. H. velutinum, Link, produces (II) but the (I) also contains appreciable amounts of ergosterol (ΠI). *H. avenæ*, Eidam, produces cynodontin and (III) in small amount. H. tritici-vulgaris, Nisikado, yields (II) and tritisporin (IV), C₁₅H₁₀O₇, m.p. 260-262° (pyridine salt; Ac5 derivative, m.p. 215°). On distillation with Zn dust, (IV) affords 2-methylanthracene. (IV) is regarded as 1:3:5:8tetrahydroxy-6-(or 7-)hydroxymethylanthraquinone. H. G. R.

Anaërobic fermentation of lignin. C. S. BORUFF and A. M. BUSWELL (J. Amer. Chem. Soc., 1934, 56, 886—888; cf. B., 1930, 117, 1043).—Anaërobic fermentation of lignin (I) [isolated from cornstalks (II) by various methods] proceeds very slowly and incompletely; the ratio $CH_4: CO_2$ is approx. 1:2, indicating abnormal fermentation (cf. A., 1933, 752). Anaërobic fermentation of (II) removes an appreciable amount of the natural (I). H. B.

Synthesis of cellulose by Acetobacter xylinum from polyhydric alcohols. Y. KHOUVINE (Compt. rend., 1934, 198, 1544—1546).— C_3 — C_7 polyhydric alcohols afford celluloses with A. xylinum (cf. A., 1933, 640). Glycerol, erythritol, arabitol, and duleitol are converted to the extent of 60, 50, 20, and 20%, respectively, and the others completely. J. L. D.

Propionic acid bacteria. Mechanism of glucose dissimilation. H. G. WOOD and C. H. WERK-MAN (J. Biol. Chem., 1934, 105, 63—72).—Fermentation of glucose (I) by *Propionibacterium arabinosum* yields a non-reducing substance, which, after removal of all (I), is converted into $EtCO_2H$, AcOH, CO_2 , and possibly $C_2H_4(CO_2H)_2$. As long as dissimilation of (I) continues a non-volatile, Et_2O -sol. substance containing a CO group is present. H. G. R.

Pyruvic acid in the dissimilation of glucose by propionic bacteria. H. G. WOOD and C. H. WERK-MAN (Biochem. J., 1934, 28, 745-747).—NaHSO₃ and CaSO₃ when added to an incubation mixture of *Propionibacterium arabinosum* with glucose fix the AcCO₂H formed. No MeCHO was detected.

H. D. Acetic bacteria. Action of B. gluconicum on galactose. S. HERMANN and P. NEUSCHUL (Biochem. Z., 1934, 270, 6–14; cf. A., 1932, 545).— Species of acetic bacteria (I) differ in the rate at which they oxidise galactose to d-galactonic acid (II). B. gluconicum differs from other (I) in producing steadily increasing (up to 78%) yields of (II) on continued propagation. W. McC.

Determination of volatile fatty acids by distillation. J. VAN BEYNUM (Vereen. Exploit. Proef., Hoorn, Ann. Rep., 1932, 1933, 33—51).—In a milk culture of bacteria producing AcOH the determination is made by distilling 50 c.c. of mcdium + 50 c.c. of H₂O + 10 c.c. of N-H₂SO₄, collecting fractions of 50 c.c., restoring with 50 c.c. of hot H₂O after each distillation, and titrating. NUTR. ABS. (m)

Acidophilus milk. C. N. STARK, R. GORDON, J. C. MAUER, L. R. CURTIS, and J. H. SCHUBERT (Amer. J. Publ. Health, 1934, 24, 470–472).—The consumption of acidophilus (I) milk by normal and constipated subjects caused an increase in the no. of lactobacilli and (I) bacteria in, and in the wt. and H_2O content of, the fæces, and a decrease in other types of bacteria and in the indole content. Certain of these effects were due to the increased ingestion of lactose. E. C. S.

Effect of temperature of incubation on agar plate count of milk. C. S. PEDERSON and M. W. YALE (Amer. J. Publ. Health, 1934, 24, 477-484).— Incubation at 32° for 48 hr. gives better results than does incubation at 37°. E. C. S.

Presence of acraldehyde in cider and perry. G. WARCOLLIER, A. LE MOAL, and J. TAVERNIER (Compt. rend., 1934, 198, 1546-1548).—From cider and perry containing acraldehyde (I) a bacterium capable of producing (I) from glycerol was isolated. A. G. P.

Standard methods and new procedures for the isolation of colon bacilli from water. C. E. A. WINSLOW (Amer. J. Publ. Health, 1934, 24, 456– 469).—A review. E. C. S. Differential reactions in the colon group of bacteria. M. LEVINE, S. S. EFSTEIN, and R. H. VAUGHN (Amer. J. Publ. Health, 1934, 24, 505– 510).—A modification of O'Meara's test (J. Path. Bact., 1931, 34, 401) for CHAcMe OH, and other improvements of the Voges–Proskauer reaction, are described. *Escherichia, Citrobacter*, and *Aerobacter* are differentiated (i) by the use of a medium containing Fe^{III} citrate for detecting H_2S ; (ii) by incubation at $45-46^\circ$; (iii) by the use of a medium containing H_3BO_3 . E. C. S.

Lysis of fibrin by streptococci. G. HADFIELD, V. MAGEE, and C. B. PERRY (Lancet, 1934, 226, 834– 839).—Broth cultures of eleven out of thirty strains of hæmolytic streptococci (I) rapidly liquefy human fibrin. The liquefaction of human plasma clot by (I) is not related to its fibrin content. Total immunity to fibrinolysis (II) appears to be a sp. immunity response to infection by (I). The plasma clot of children suffering from rheumatism frequently shows total resistance to (II). L. S. T.

Decomposition of nitrogenous substances in horse excrement and manure. B. CHROSTOWSKI (Bull. Acad. Polonaise, 1933, B, 83—89).—During the aërobic decomp. of fresh excrement or of farmyard manure in the presence or absence of nitrifying bacteria (I), no marked liberation (II) of N_2 occurs when the N content is low or the C/N ratio is high: with a high N content or a low C/N ratio, (II) occurs independently of the presence of (I). F. O. H.

Hydrolysis of certain polysaccharides and proteins by the endospores of aërobic bacilli. H. L. A. TARR (Biochem. J., 1934, 28, 391–393).– At $p_{\rm H}$ 7·3, endospores (I) of *B. subtilis* and *B. mesentericus*, previously heated at 80°, hydrolyse starch and glycogen to maltose (II), and various proteins with increase of NH₂-N. (II) is not hydrolysed by (I).

A. E. O.

Nitrogen balance in cultures of aërobic bacteria. M. LEMOIGNE, P. DOPTER, and R. DESVEAUX (Bull. Soc. Chim. biol., 1934, 16, 18—34).—The N content in cultures of several aërobic bacteria in peptone broth remains const. for about 10 to 15 days, and then decreases, in some cases to about 30% of the original val. A. L.

Respiration and fermentation of pathogenic bacteria. I. Determination of respiration coefficients for pathogenic bacteria. A. FUJITA and T. KODAMA (Biochem. Z., 1934, 269, 367–374).— Tables summarise the Q_{0} , etc. vals. for a variety of pathogenic organisms. With *B. diphtheriæ* and *B. paradysenteriæ*, Ohara-Mita, the quotient varies considerably with the cultural conditions, and no parallelism could be detected between the respiration and catalase content. P. W. C.

Assimilation of carbon dioxide by red sulphur bacteria. I. H. GAFFRON (Biochem. Z., 1934, 269, 447-453).—For red S bacteria (I) org. substances cannot replace H_2S and other oxidisable S compounds as H donators in the hydrogenation of CO_2 , the organisms being therefore very different from the purple S bacteria (II). (I), however, grow well in a medium in which H_2S is replaced by org. compounds. Whereas (II) cannot use $PrCO_2Na$ in the dark, (I) use it for reduction of SO_4'' to S'', the H₂S then making possible the assimilation of CO_2 on irradiation. P. W. C.

Dehydrogenases of the filterable organism of Agalactia. A. PIRIE (Biochem. J., 1934, 28, 411–415).—Like B. coli (I) (A., 1925, i, 1015) Agalactia (a very much smaller organism) oxidises many substances if the substrate concn. is high enough. The most active dehydrogenases (II) are those attacking lactate, adenylic acid, adenosine, fructose, and hexose diphosphate in concn. < 0.1N. The relative strengths of (II) vary with the culture, and do not depend entirely on the medium or the phase of growth at which (II) are determined. The lactate (II), like that of (I), is strongly inhibited by gluconate and C_2O_4'' .

Halophilic bacteria. L. M. HOROVITZ-VLASSOVA and M. I. LIVSHITZ (Izvest. Tzentr. Nauch.-Issledov. Inst. Pishch. Vkus. Prom., 1931, 39—46).—Of thirtyfive organisms examined four were obligate and thirty facultative; *Micrococcus citreus agilis* will grow without NaCl, but only very slowly. CH. ABS.

Salt-tolerant bacteria L. S. STUART and T. L. Swenson (J. Amer. Leather Chem. Assoc., 1934, 29, 142-158; cf. B., 1934, 31).-The appearance of growths on media containing 1% and 25% NaCl differed. The reactions of the parent cultures and the derived cultures were the same on three different sugars. Gelatin (G) was hydrolysed at all $p_{\rm H}$ vals. by the enzymes produced by the bacteria grown on a 1% NaCl medium, but not by those produced by bacteria grown on a 25% NaCl medium at $p_{\rm H}$ < 7.2. The former enzymes liberate additional CO₂H groups from G at $p_{\rm H}$ < 6.8, whereas fewer such groups were formed by the latter. Although no chemical action in G treated with either type of enzyme at $p_{\rm H}$ 6.5 could be detected by the changes in the Van Slyke NH₂-N or CO₂H vals., the rate of subsequent alkaline hydrolysis and trypsin digestion differed from that of untreated G, and hence chemical change must have taken place. D. W.

Micrococcus eykmanii, n. sp., a bacterium utilising vitamin-like substances for growth. L. E. DEN D. DE JONG (Arch. Mikrobiol., 1934, 5, 1-13).—Growth of *M. eykmanii* on peptone-agar is stimulated by additions of sterile extracts of plant and animal matter and of cultures of various microorganisms. No stimulus results in the absence of peptone. The growth-promoting substance is not auxin. A. G. P.

Presence of a glycol in the wax of the tubercle bacillus. N. STENDAL (Compt. rend., 1934, 198 1549-1550).—A glycol ("phytoglycol") $C_{26}H_{54}O_2$, m.p. 73° (diacetate, m.p. 34°), was isolated.

A. G. P. Activation of "methylic" antigen in vivo and in vitro. C. NINNI (Ann. Inst. Pasteur, 1934. 52, 502-532).—The *in-vivo* antigenic action of the MeOHsol. fraction of the lipins (I) of Koch's bacillus is slightly increased by addition (*in vitro*) of PhOH (when the specificity is unaltered) or by preliminary conjugation with horse- or pig-serum. Admixture with certain bacterial proteins (II) yields a more marked activation, the extent of which is dependent on the time of contact of (I) and (II), on the physical state of (I), and on the adsorbed impurities of (I). Conjugation of a lipin-hapten with a protein reduces the antigenic action (*in vitro* and *in vivo*) of the latter, but does not modify its specificity. F. O. H.

Pneumococcus antibodies. L. D. FELTON (Science, 1934, 79, 277—278).—The antibodies found in antipneumococcus horse-serum are protein in nature, and one antibody reacting with a single antigen is responsible for the usual immunological reactions. L. S. T.

Specific carbohydrates of Vibrio choleræ and related organisms. R. W. LINTON and D. L. SHRIVASTAVA (Proc. Soc. Exp. Biol. Med., 1933, 31, 406-409).—In most cholera vibrios the characteristic sugar was galactose (I); others contained arabinose (II). Others (non-agglutinable) from H₂O contained (II). Polysaccharides containing both (II) and (I) were isolated from "rice H₂O" and fæces of cholera patients. CH. ABS.

Autolysis. Specific autolysins. E. WOLLMAN (Compt. rend., 1934, 198, 1642-1643).

Reversible inactivation of bacteriophage by mercuric chloride. A. P. KRUEGER and D. M. BALDWIN (J. Gen. Physiol., 1934, 17, 499—505).— The curve of inactivation of antistaphylococcal phage by 0.01% HgCl₂ is pseudo-unimol. down to 0.5%of the initial phage concn. 100% reactivation can be obtained even after 216 hr. exposure to 2.8%HgCl₂. H. D.

Specific inhibition of bacteriophage action by bacterial extracts. P. LEVINE and A. W. FRISCH (J. Exp. Med., 1934, 59, 213—228).—Sp. inhibition of phage by sol. products of bacteria, probably carbohydrates, is more rapid at 37° than at 0°.

CH. ABS.

Detection of arsenicals in spirochætes and trypanosomes. E. SINGER and V. FISCHL (Z. Hyg., 1934, 116, 36—40).—Org. matter is destroyed by heating with H_2SO_4 and HNO_3 . The resulting solution is treated with Zn in a tube containing paper soaked in HgCl₂ and the intensity of the stain compared with standards. A. G. P.

In-vitro leprocidal activity of some nonchaulmoogryl compounds. G. A. EMERSON and A. J. SALLE (Proc. Soc. Exp. Biol. Med., 1934, 31, 428-433).—Merthiolate, metaphen, mercurochrome, solganol, CHPh₃ dyes, methylene-blue, and octylresorcinol are highly active; trypan-blue and the aliphatic alcohols are inactive. CH. ABS.

Germicidal and antiseptic activities of some derivatives of 8-hydroxyquinoline.—See this vol., 664.

Antiseptic properties of amino-derivatives of styryl- and anilo-quinoline.—See this vol., 664.

Relationship between chemical constitution and bactericidal activity. XII. 3-Nitro- and 3-amino-4-hydroxy- and -alkoxy-benzoic esters. —See this vol., 650. Can the Endo medium be standardised? H. J. CONN and M. A. DARROW (Stain Tech., 1934, 9, 61-69).—If the ratio of Na_2SO_3 to basic fuchsin is $12 \cdot 5 : 1$ a greater no. of different specimens of fuchsin are satisfactory for the medium than is the case when the ratio is 3 : 1. H. W. D.

Staining of acid-fast bacilli. Effects of fixatives and $p_{\rm H}$ on acid-fastness. J. W. FIELDING (Austral. J. Exp. Biol., 1934, 12, 1-5).—Ehrlich's original observations on the necessity for alkali treatment are sound. Autolytic action in tissues lowers the $p_{\rm H}$ of the fixative; this should be kept alkaline (for Ziehl-Neelsen stain) or alkaline fuchsin should be used. Treatment with CH₂O or COMe₂ does not destroy acid-fastness. A new method of staining formolised tissues is described. A. E. O.

Destaining agents for iron alum hæmatoxylin. S. H. HUTNER (Stain Tech., 1934, 9, 57—59).— Saturated aq. pieric acid is recommended for bringing out the nuclei in protozoa. A mixture of 1 pt. of 30% H₂O₂ and 2 pts. of 95% EtOH differentiates cytoplasmic structures. H. W. D.

Modification of the Dorner spore stain. M. A. SNYDER (Stain Tech., 1934, 9, 71–72).—A thin film of the organisms on a slide is covered with blotting paper, and Ziehl's carbol-fuchsin is applied while the slide is heated for 5—10 min. After decolorisation with 95% EtOH and washing with H_2O , a drop of saturated aq. nigrosin is spread over the film. It is then dried on a hot plate. Spores are stained red, and the vegetative parts of the cells are almost colourless. H. W. D.

Filtration of [solutions of] hormones. E. BELANI (Chem.-Ztg., 1934, 58, 289-290).—The solution (either alone or with clarifying agents of the kieselguhr type), under a pressure of 2 atm., passes through a disc-shaped cloth-covered filtration device, a series of which is connected to a common collecting pipe. The capacity of the apparatus is 4.2 litres and the filtration area 0.5 sq. m. F. O. H.

Chemistry of the active principle of the lymph glands (lymphoganglin). P. MARFORI, G. DE NITO, and G. AURISICCHIO (Biochem. Z., 1934, 270, 219—226).—8 kg. of fresh lymphatic gland, after drying, powdering, and removing impurities by CHCl₃, anhyd. Et₂O, and EtOH, yield 6 g. of a hormone (I) (platinichloride; aurichloride) NMe₃Cl·CH₂·CHMe·O·PO₃Ca. With Ag₂O (I) yields a quaternary base (II) (picrate; tannate; hydrochloride) identical with neosine. (I) is free in the glands; it is produced there by degradation of lecithin and it has a powerful depressant effect on the blood-pressure acting as an antagonist to adrenaline. W. McC.

Callicrein. E. WERLE (Biochem. Z., 1934, 269, 415–434).—Callicrein (I) was detected in the juices from human and dog's pancreatic fistulæ, in human duodenal juice, and in human and dog's fæces, and its action on the circulation investigated. Human duodenal juice contains 10 units of (I) per c.c. and the juice of a post-operative pancreatic fistula in man several thousand units per day, which is four times the daily urinary excretion of (I) by a healthy man. (I) from human sources (urine, fæces, duodenal juice, blood) is different from (I) of dog (cf. A., 1930, 1069, 1624). P. W. C.

Comparative investigation of callicrein and trypsin concentrations in human duodenal juice. E. WERLE and P. ECKEY (Biochem. Z., 1934, 269, 435-440).—Both trypsin and callicrein are present in human duodenal juice, blood, and urine, the concess and abs. amounts of these substances in duodenal juice varying considerably from time to time and in the same sense. The physiological importance of the hormone during digestion is discussed. P. W. C.

Electrochemical character of insulin.—See this vol., 602.

Lactic acid, sugar, and inorganic phosphorus in the blood of ruminants (a) following adrenalectomy and (b) after intravenous injection of insulin. R. STRAND, W. ANDERSON, and W. M. ALLCROFT (Biochem. J., 1934, 28, 642-649).-In adrenalectomised sheep, the blood-sugar (I) and blood-lactic acid (II) levels were lowered, whilst that of inorg. P (III) was raised, and the sensitivity to insulin (IV) increased in comparison with normals. No change in the (I) and (II) occurred when the sheep were subjected to types of excitement and muscular exercise known to raise (I) and (II) in normal sheep (V). The changes in (III) and the hypoglycæmia produced by injection of (IV) into (V) were similar to those in other animals, except that no sign of convulsions was observed even after large doses of (IV). There was no definite change in (II) after injection of (IV) into (V). A. E. O.

Biological properties of adrenaline. A. C. MARIE (Ann. Inst. Pasteur, 1934, 52, 481–487).– Neutral solutions of adrenaline (I) and its salts inhibit the action of bacterial and vegetable toxins, but do not appreciably influence the toxicity of cobra-venom or the lytic power of a bacteriophage (bacillus of Shiga). With filterable bacteria, (I) inhibits the development to a visible form. Whilst many pathogenic bacteria are unaffected, the virulence of pneumococci, *Trypanosoma lewisi*, and *T. brucei* is diminished. Repeated injection of (I) into rabbits produces marked increases in the blood-urea and cholesterol content of the aorta. F. O. H.

Influence of dopa (dihydroxyphenylalanine) on adrenaline glycogenesis in the surviving toad liver. J. HORIMI (Folia Pharmacol. Japon., 1933, 17, 99–103).—The perfused liver exhibited glycogenesis less pronounced than that caused by adrenaline. CH. ABS.

Blood-cholesterol of rabbits after unilateral and bilateral adrenalectomy. H. TADA (Tôhoku J. Exp. Med., 1933, 22, 385–394).—Increase in bloodcholesterol is more marked after bilateral adrenalectomy, reaching 25—75% in 5—7 days.

CH. ABS. Diuretic-antidiuretic activity of posterior pituitary extracts. E. E. NELSON and G. G. WOODS (J. Pharm. Exp. Ther., 1934, 50, 241-253).—The urine excretion of groups of mice kept under uniform conditions and injected intraperitoneally with H₂0 (5% of body-wt.) varies widely, the curve of distribution of the variation being S-shaped. Injection of such animals with small amounts of pituitary extract (I) causes decreases in diuresis proportional to the amount of (I). Large doses, however, are less effective, but the abs. amount of Cl' excretion increases until a val. of about 1% is reached; the diuresis is still < that caused by H_2O alone. The procedure described may be used for comparing the antidiuretic activity of (I) preps. A. L.

Anterior pituitary growth-hormone and the composition of growth. M. O. LEE and N. K. SCHAFFER (J. Nutrition, 1934, 7, 337-363).—The gain in wt. of rats receiving the hormone extract differed markedly in respect of N, fat, fat-free tissue, H_2O , and ash from that of rats on normal diet. The γ_0 composition of the carcases of treated rats was similar to that at the commencement of treatment, and the N retention was closely paralleled by the live-wt. gains. The energy expenditure per unit gain in both total wt. and protein was higher in the controls. Of the body-constituents, N and the fatand ash-free dry matter were most specifically affected by the hormone. A. G. P.

Pancreatropic substance from the anterior pituitary lobe. I. Preparation and properties. II. Effects on metabolism. K. J. ANSELMINO and F. HOFFMANN (Klin. Woch., 1933, 12, 1435— 1436, 1436—1438; Chem. Zentr., 1933, ii, 3000).— Ox pituitary is dehydrated with COMe₂, and pulverised, extracted with H₂O, and filtered. To 100 c.c. of the filtrate 20 c.c. of aq. NaOAc of $p_{\rm H}$ 5.2 are added, and the solution is separated from protein by ultrafiltration. The pancreatropic hormone (I) is insol. in CHCl₃, COMe₂, or EtOH, but is sol. in 50% EtOH, and is destroyed by heating or by acids and alkalis. (I) is absorbed by kieselguhr, but not by animal C or kaolin. Subcutaneous injection of (I) lowers the blood-sugar in dogs and rabbits. The effect on alimentary and adrenaline hyperglycamia is similar. (I) lowers the liver-glycogen of rats. These effects do not occur in depancreatised dogs. H. J. E.

Contra-insulin hormone of the anterior pituitarylobe and pancreas diabetes. Effect of various pituitary preparations on pancreas diabetes in dogs. H. LUCKE, E. R. HEYDEMANN, and O. BERGER (Z. ges. exp. Mcd., 1933, 90, 120—129, 162—172; Chem. Zentr., 1933, ii, 3000).—The bloodsugar increase in pancreas-diabetic dogs after intramuscular injection of contra-insulin hormone (I) (e.g., Praphyson) is > in normal animals. An animal rendered normal by diet and by insulin is rendered temporarily diabetic by (I). The same effects are observed with oral administration of (I). Prolan and thyrotropic hormone contain no (I).

H. J. E. Parathyrotropic action of anterior pituitary extracts. K. J. ANSELMINO, F. HOFFMANN, and L. HEROLD (Klin. Woch., 1933, 12, 1944).—Injection of anterior pituitary extracts into young male rats causes large increases in the size of the parathyroids, alteration in the histological picture, and increased blood-Ca. NUTR. ABS. (m) Disturbances of phosphorus metabolism in rickets. IX. Effect on blood-inorganic phosphate and -calcium of thyroid secretion and thyrotropic hormone. W. HEYMANN and E. MAIER (Z. Kinderheilk., 1933, 55, 512—517).—Thyroxine in sufficient doses causes, after a latent period, an inerease in blood-PO₄^{'''} in infants, without affecting the Ca. This change occurs independently of those in metabolic rate. NUTR. ABS. (m)

Thyrotropic hormone and fat metabolism. F. SILBERSTEIN, F. GOTTDENKER, and G. GEIGER (Klin. Woch., 1933, 12, 1225; Chem. Zentr., 1933, ii, 3583).—Injection of thyrotropic hormone into the cat frequently leads to a rise in blood-fat. If olive oil is also given orally alimentary hyperglycamia is diminished and the increase in blood-fat is sometimes absent; frequently it falls. A. A. E.

"Fat-metabolism" hormone and hyperglycæmia. B. HARROW (Nature, 1934, 79, 272— 273).—An extract containing "fat-metabolism hormone" prepared by Funk's method (Proc. Amer. Soc. Biol. Chem., 1933, 8, 43) produces a marked hyperglycæmia, comparable with that which results from Doisy's extracts (A., 1933, 98), as well as an increase in COMe₂ in the blood. Both authors appear to be dealing with the same substance.

L. S. T.

Preparation and properties of an antithyrotropic substance. E. M. ANDERSON and J. B. COLLIP (Lancet, 1934, 226, 784—786; cf. this vol., 332).—An extract of an antithyrotropic substance (I) has been prepared from the serum of a horse injected with thyrotropic hormone (II). (I) depresses the metabolic rate of normal animals and inhibits the action of (II) in normal and hypophysectomised rats. (I) does not antagonise the action of thyroxine. Hypophysectomised rats treated with (I) in conjunction with (II) have a depressed metabolic rate associated with cellular activity in the thyroid gland. (I) is not produced by the pituitary. L. S. T.

Metabolism of water and endocrine extracts. "Plasmohæmiatic" action of thyroid ex-I. tract. M. PAGET, L. LANGERON, and J. LEDIEU (Bull. Soc. Chim. biol., 1934, 16, 125-139).-The effect of the administration of thyroid extract (I) to man differs according as the ratio (II), vol. of plasma/vol. of erythrocytes, is > or < normal (1.3— When (II) is > 1.3 (I) increases (II) whilst the 1.4). total blood-Cl', the plasma-Cl'/corpuscle-Cl' ratio (III), and blood-serum-protein are unchanged. Diuresis diminishes and does not increase until several days after cessation of (I) administration. When (II) > 1.4 the effect of (I), except on diurcsis which is much increased, is not const., and when apparent is much < in the above case. Whilst administration of theobromine (IV) results in a decrease in (II) and (III), with an increase in diuresis, administration of (I) with (IV) causes an increase in (II), with no change in (III). The increased diuresis also is much < that produced by (IV) alone. (I) may therefore, in its action, be regarded as an internal diuretic. A. L.

Effect of thyroid and bone-marrow on plasmaproteins. S. LANG (Z. ges. exp. Med., 1933, 92, 102—107).—Administration of thyroid extract produces no change in the plasma-protein : injection of thyroxine causes a decrease in all the fractions parallel with the increased H_2O content. No change follows thyroidectomy, but injection of NHPh·NH₂ causes an increase of total protein and globulin in the thyroidectomised animals, as does injection of red bone-marrow extract in the intact dog.

NUTR. ABS. (m)

Co-operation of cells and colloid in secretory activity of the thyroid. W. GRAB (Klin. Woch., 1933, 12, 1637—1640).—One third of the I in normal colloid (I), which constitutes 65% by wt. of the gland, is in active form. In thyroid activity induced by thyrotropic hormone the cellular elements increase, but (I) remains almost unchanged. (I) has then, however, an increased I content, although two thirds of it is in inactive form, presumably as di-iodotyrosine. (I) is only a vehicle carrying the internal secretion. NUTR. ABS. (m)

Effect of desiccated thyroid, irradiated ergosterol, and ammonium chloride on excretion of calcium in rats. L. I. PUGSLEY and E. ANDERSON (Biochem. J., 1934, 28, 754—758).—Administration of 0.12 g. of thyroid gland (I) daily to rats produced an increased fæcal Ca excretion (II); large doses of irradiated ergosterol + (I) increased the urinary (II). 0.25 g. of NH₄Cl administered daily to rats increased the urinary (II). H. D.

Injury to heart-muscle by thyroxine. C. MAT-TONET (Z. ges. exp. Med., 1933, 90, 237-244; Chem. Zentr., 1933, ii, 3001).—Guinea-pigs, injected daily for 4—11 days with 1 mg. of thyroxine, showed after short treatment a decrease of the total PO_4 , $H_4P_2O_7$, phosphagen, and residual H_3PO_4 in the heart-muscle, and an increase in H_3PO_4 . With prolonged treatment the decrease in the total PO_4 ceases. The decrease in phosphagen corresponds quantitatively with an increase in the H_3PO_4 . H. J. E.

Efficacy coefficients of the thyroxine effect in biological experiments. H. EUFINGER and J. GOTTLIEB (Klin. Woch., 1933, 12, 1397-1402; Chem. Zentr., 1933, ii, 3001).-The factor in blood interfering with the thyroxine (I) effect in tadpole metamorphosis is associated with the blood-protein. In toxic conditions during pregnancy the antithyroidal protective action (II) of the blood is reduced. Vitamin-A (as Vogan) (III) exerts the same influence on the action of (I) in tadpole experiments as normal blood. Subjects whose blood has a low val. for (II) are rendered normal by (III). The reduction of (II) in toxicosis of pregnancy is attributed to disturbance of the function of the liver in providing (III). Guanidine influences the (I) effect by strengthening the components accelerating development. Choline, carbamyl- and acetyl-choline allow the growth-hindering component of the action of (I) to develop. The reduced antithyroidal action of blood during pregnancy is due to increased amounts of choline derivatives in the blood. H. J. E.

Form in which iodine is excreted in the urine after oral administration of thyroxine in man. A. W. ELMER and M. SCHEPS (Compt. rend. Soc. Biol., 1933, **114**, 350—351).—Thyroxine cannot be recovered in significant amount from the urine. NUTR. ABS. (m)

Decomposition by the liver of thyroxine injected intravenously. A. W. ELMER and Z. LUC-ZYNSKI (Compt. rend. Soc. Biol., 1933, 114, 351-352).—In anæsthetised rabbits about one half of the I of the liver bile is thyroxine-I. NUTR. ABS. (m)

Effect of hormones on creatine-creatinine metabolism; behaviour of total nitrogen, uric acid, and allantoin. S. BUADZE (Z. ges. exp. Med., 1933, 90, 762-804; Chem. Zentr., 1933, ii, 3581).-In dogs, injection of thyroxine increases excretion of creatine-creatinine (I) and allantoin (II), but not total N (III). Adrenaline increases (I), (II), and uric acid, but not (III). Menformone increases (I). Insulin in non-convulsive doses decreases (II), total creatinine (IV), and (III). Guanidine carbonate diminishes (III), (IV), and (II). Parathormone increases (IV) and (III); when it is given with guanidine the effect of the latter is not observed. A. A. E.

Eight year old testicular transplantation with maintained secretory function. B. ROMEIS (Klin. Woch., 1933, 12, 1640—1642; Chem. Zentr., 1933, ii, 3581).—In the cat the male sexual hormone was still secreted after 8 years. A. A. E.

Occurrence of the α -follicular hormone (3hydroxy-17-keto- $\Delta^{1:3:5}$ -cestratriene) in stallion's urine. E. P. HAUSSLER (Helv. Chim. Acta, 1934, 17, 531—535).—Fractional crystallisation of the crude sexual hormone isolated from stallion's urine affords the α -follicular hormone. J. W. B.

Estrus-producing hormone. II. Identity of the substance from the urine of pregnant women with that from the urine of pregnant mares. S. E. DE JONGH, S. KOBER, and E. LAQUEUR (Biochem. Z., 1934, 270, 17—23; cf. A., 1931, 1462).—The α -follicular hormone (I) of pregnant mares' urine has $[\alpha] >$ that of women and can be separated by recrystallisation into two fractions. The benzoate of mares' (I) exhibits the double m.p. characteristic of Butenandt's β -hormone (A., 1933, 870). The activity of mares' (I) is identical with that of women's (I). The rat unit for subcutaneous injection of menformone=10 international units, the equiv. oral administration dose being 40 rat units. W. McC.

Estrogenic substances of vegetable origin. B. SKARŹYŃSKI (Bull. Acad. Polonaise, 1933, B, 347—353).—7·2 mg. of trihydroxyœstrin (1000 mouse units per mg.) were extracted from 65 kg. of the female flowers of the willow. C. G. A.

Action of follicular hormone on tetany and blood-calcium in bitches with chronic parathyroid insufficiency. F. MATHIEU (Compt. rend. Soc. Biol., 1933, 114, 164—166).—Pure follicular hormone causes a fall in blood-Ca and some recurrence of tetany in these animals. It is normally without action in this respect. NUTR. ABS. (m)

Sexual variation in carbohydrate metabolism. IV. Effect of ovariectomy and theelin administration on the glycogen content of rats. M. GULICK, L. T. SAMUELS, and H. J. DEUEL, jun. V. Metabolism of acetoacetic acid in normal and castrated male and female rats with and without theelin. C. F. GRUNEWALD, C. H. CUTLER, and H. J. DEUEL, jun. VI. Rôle of the anterior pituitary in the metabolism of acetoacetic acid. J. S. BUTTS, C. H. CUTLER, and H. J. DEUEL, jun. (J. Biol. Chem., 1934, 105, 29–34, 35–43, 45– 58).—IV. After administration to ovariectomised rats of 5 mg. of glucose per sq. cm. body-surface, liverglycogen (I) rose from 0.25% for the normal animal to 0.55%. No variation in muscle-glycogen was observed. Injection of theelin gives a val. for (I) < that of the controls.

V. The ketonuria (II) following administration of $CH_2Ac \cdot CO_2H$ to ovariectomised female rats, which is one fourth that of normal females and one half that of normal males, is not affected by administration of theelin. (II) is also decreased by castration.

VI. Injection of neutralised alkaline extract of anterior pituitary (III) increases (II) in fasting rats receiving $CH_2Ac\cdot CO_2Na$, which is completely suppressed by small amounts of sugar. Injection of (III) when NaCl is fed gives a marked increase in (II). H. G. R.

Interrelation of a gonadotropic hormone and vitamin-A. S. B. D. ABERLE (Amer. J. Physiol., 1933, 106, 267—272).—Human placenta yields an EtOH extract (I) which, when injected, produces mucoid cells in the vagina of spayed rats. (I) has no effect on persistent cornification established in rats on a diet deficient in vitamin-A.

NUTR. ABS. (m)

Fate of vitamins in hay on drying. I. O. RYGH (Biochem. Z., 1934, 270, 227-228).—Hay (I) prepared by drying grass for 2 hr. at 68° contains about ten times as much carotene as does field-dried grass (II) and twenty times as much as frame-dried (III). (I) also contains six times as much vitamin-D as do (II) and (III). W. McC.

Effect of household cooking and canning on the vitamin content of vegetables. J. J. HOFF (Z. Ernährung, 1933, 3, 355–359).—Growth tests on rats showed no significant difference between the vitamin-A content of cooked (I) and canned (II) spinach. As tested on pigeons there was less vitamin- B_1 in (I) than in (II), and in both < in raw. In both processes less vitamin- B_2 was lost, probably owing to its greater heat-stability. There was great loss of vitamin-C in cooking, 90 g. of (I) being needed to protect a guinea-pig from scurvy to the same degree as 10 g. of raw spinach; in (II), 30 g. was the protective dose. Canning is thus less destructive to the vitamin content of vegetables than ordinary household cooking.

NUTR. ABS. (b)

Tuberculosis and vitamin deficiency. N. K. BASU (Z. Vitaminforsch., 1934, 3, 91—93).—Inclusion of vitamin-A, -B, -C, and -D in the diet of guineapigs inoculated with tubercle bacilli reduces the mortality from 90 to 33%. All four vitamins appear to participate in the prophylaxis (cf. A., 1933, 973).

F. O. H. Purification of vitamins. Fractional distribution between immiscible solvents. R. E. CORNISH, R. C. ARCHIBALD, E. A. MURPHY, and 3 A H. M. EVANS (Ind. Eng. Chem., 1934, 26, 397-406).-By means of a special machine, which is described, vitamin-A, -D, and -E are purified by fractional distribution between immiscible non-polar (I) and polar (II) solvents. The mathematical theory of purification by this process is developed. (I) are CS₂, n-C₅H₁₂, n-C₆H₁₄, n-C₇H₁₆, and ββδ-trimethylpentane. (II) are MeOH, MeCN, C2H4(NH2)2, Et_2O , $Pr_2^{\beta}O$, $OH \cdot C_2H_4 \cdot OMe$, and $C_2H_4CI \cdot OH$. The prep. of the pure anhyd. solvents is described. Many accepted val. of crit. solution temp. are too high, owing to incomplete removal of H₂O; e.g., $C_2H_4(NH_2)_2$ and Et_2O are completely miscible at all temp. above the f.p. The distribution ratios (III) of ergosterol, cholesterol, sitosterol, and vitamin-A, -D, -E, and -F between (I) and (II) are given. -A exists in $\ll 3$ forms, of equal therapeutic val. -D and -E are single substances, or mixtures of substances of equal (III). E. C. S.

Attempt to isolate vitamin-A. H. N. HOLMES, H. CASSIDY, E. HARTZLER, and R. MANLY (Science, 1934, 79, 255—256).—Vitamin-A concentrates (I) ranging from 10,500 to 14,400 times the potency of standard cod-liver oil have been obtained from the unsaponifiable portion of halibut-liver oil. (I) are pale yellow, viscous oils. L. S. T.

Biological activity of some carotene preparations. H. N. HOLMES, R. CORBET, H. CASSIDY, C. R. MEYER, and S. I. JACOBS (J. Nutrition, 1934, 7, 321-329).—Carotene (I) adsorbed on Al(OH)₃ improved the growth rate of vitamin-A-deficient rats to almost the normal standard, but did not completely cure xerophthalmia. When adsorbed on SiO₂ gel (II) or norit (III) (I) was inactive in this respect. When desorbed from (II), (I) showed greatly reduced activity, and that from (III) was almost inactive. Rats probably do not utilise the whole of the (I) fed whether the dose is large or small. A. G. P.

Vitamin of growth. VI. Cryptoxanthin of yellow maize. R. KUHN and C. GRUNDMANN (Ber., 1934, 67, [B], 593—595).—The isolation is described of zeaxanthin, m.p. 206°, and cryptoxanthin (I), m.p. 168°, from yellow maize which contains only traces of carotenes. Its growth-promoting qualities are attributed to (I), administration of which to rats supplied with a vitamin-A (II) -free diet causes occurrence of (II) in the liver. H. W.

Properties of carotene. Is local avitaminosis possible? S. BALACHOVSKI and F. RACHEVSKI (Bull. Soc. Chim. biol., 1934, 16, 220—228).—The curative action of carotene in the treatment of forty-four cases of ocular affections is reported. A. L.

Rôle of carotene in the organism. S. BALA-CHOVSKI and V. SOLIANIKOVA (Bull. Soc. Chim. biol., 1934, 16, 119—124).—The presence of carotene accelerates the uptake of O_2 by blood *in vitro*.

A. L.

Influence of carotene (vitamin-A) on the purine content of growing normal and pathological tissue. H. VON EULER and G. SCHMIDT (Z. physiol. Chem., 1934, 223, 215—228).—The val. of the purine-N/total N quotient (I) is high in spleen. In rats, absence of vitamin-A (II) or carotene from the diet depresses the (I) of the spleen, liver, kidney, and muscle by 15%. (II) favours development and purine content (III) of Jensen sarcoma. Embryonic organs have a higher (III) than normal organs.

J. H. B.

Effect of mineral oil on assimilation of vitamin-A from spinach. H. S. MITCHELL (Proc. Soc. Exp. Biol. Med., 1933, 31, 231-233).—Rats fed on a vitamin-A-deficient diet with a daily supplement of 10 mg. of fresh green spinach (I) with 0.25-1.0 c.c. of mineral oil (II) fail to grow and die in 3-11 weeks, whilst those receiving (I) alone gain about 3 g. weekly. Increasing the amount of (I) to 40 mg., fcd with (II) supplement, does not permit growth. When (II) is fed 6 hr. after a dose of 80 mg. of (I), the resulting growth is about equiv. to that on 10 mg. of (I) alone. Hence (II) seems to inhibit assimilation of vitamin-A. Paraffins of higher m.p. appear to have a less detrimental effect than fluid (II).

NUTR. ABS. (m)

Human milk. XIII. Vitamin potency as influenced by supplementing the maternal diet with vitamin-A. S. S. McCosH, I. G. MACY, H. A. HUNSCHER, B. N. ERIKSON, and E. DONELSON (J. Nutrition, 1934, 7, 331-336).—The vitamin-A content of milks of three women receiving a well-balanced ration was not altered by supplements of 15 g. of cod-liver oil daily. A. G. P.

Transmission of vitamin-A from parents to young in mammals. III. Effect of the fat content of diet during pregnancy on the transmission of vitamin-A to the fœtal rat. W. J. DANN (Biochem. J., 1934, 28, 634-637).—Young rats have only a small store of vitamin-A (I) in their livers at birth, even when the parent doe had received large amounts of (I) before and during gestation. Transmission of (I) to the fœtal rat increases with the fat content (II) of the diet, but for ordinary variations of (II) the increase is probably negligible.

A. E. O.

Fat-soluble vitamins. XXXIX. Influence of breed and diet of cows on carotene and vitamin-A content of butter. C. A. BAUMANN, H. STEEN-BOCK, W. M. BEESON, and I. W. RUPEL (J. Biol. Chem., 1934, 105, 167—176; cf. A., 1933, 986).—The carotene (I) and vitamin-A (II) contents of butter fats determined spectroscopically were 4.3 and $10\cdot1 \times$ 10^{-6} g. per g., respectively, for Holstein cows, and 7.8 and 5.1 for Guernseys on a winter ration. Higher vals. were obtained on pasture. Individual variations in one breed were > 100%. Assuming that 0.6 g. of (II) is equiv. to 1 g. of (I), it is found that breed differences for total activity (III) are small, and that the (III) of July fat is > that of June fat.

H. D.

(a) Distribution of vitamin-A in the human organism. (b) Vitamin-A content of the human liver in relation to age. R. DEBRÉ and A. BUSSON (Compt. rend. Soc. Biol., 1933, 114, 1162—1164, 1164—1166).—(a) Vitamin-A (I) was found in the liver (II) and in one case in the kidney of subjects dying by accident. Extracts of suprarenal and of pancreas were inactive. One subject in decline through anæmia was treated with large quantities of carotene (III): after death (II) contained (I) corresponding with two "rat units" per 0.5 g. The (II) from another subject who had not received (III), after death, was devoid of (I). Thus in man, as in animals, the ingestion of (III) results in the storage of (I) in the (II).

(b) The (II) of only two out of nine infants showed the presence of (I); in sucklings that had been ill for more than 23 days none could be detected, but there was a little in those who had been ill < 15 days. In six children eating for themselves there was slightly more (I), and in the maternal (II) there was a much greater concn. The (I) reserve is evidently low at birth, and increases during the suckling period, but even when the maternal reserve is high the (I) content of the milk does not pass a prescribed limit. The reserve is considerably increased when the child starts to eat for itself. NUTR. ABS. (b)

Factors affecting the assay of vitamin-A by the spectrographic method. R. J. MACWALTER (Biochem. J., 1934, 28, 472—475).—The curve of absorption at 3280 Å. (I) of a cod-liver oil (II) against time of aëration passes through a min., and then increases linearly with time. The intercept on the ordinate obtained by producing back the straight part of this curve may give a val. for the non-vitamin-A absorption (III). The (I) of the unsaponifiable fraction of (II) decreases with time of aëration, attaining a const. val. at 5 hr. assumed to be that due to (III). By plotting blue val. against (I) a straight line is obtained; no oil studied gives any marked deviation from this relationship. H. D.

Chemical and physical determination of vitamin-A in liver oil. H. R. V. LINDHOLM (Dansk Tidsskr. Farm., 1934, 8, 73—100).—A comparison of determinations of vitamin-A in a no. of specimens of cod-liver oil biologically, colorimetrically, and spectrographically (using the colour reaction with SbCl₃). The acid val., I val., sap. val., and amount of unsaponifiable material (I) were also determined. The colour reaction was carried out both with the oil itself and with (I). The acid val. does not appear to modify the spectrographic results, but for very dark-coloured oils the colorimetric and spectroscopic determinations must be made on (I).

R. P. B. Fat-soluble vitamins. XL. Growth method of determining vitamin-A. C. A. BAUMANN, B. M. RIISING, and H. STEENBOCK (Z. Vitaminforsch., 1934, 3, 81—89).—With rats on basal diet with the addition (I) of graded doses of carotene (II) (3—70× 10^{-6} g. weekly), a fourfold increase in (II) within the range 5— 20×10^{-6} g. of (II) per week produces an increase in the rate of growth. With (I) of 10^{-5} g. per week, the average gain in wt. is S g. per week, whilst xerophthalmia (III) is practically absent. With 5×10^{-6} g. the gain in wt. is the same, but (III) frequently occurs. With $> 20 \times 10^{-6}$ g. no further increase in wt. occurs. Growth data are better calc. from the day on which the max. wt. during the depletion period is regained than from that on which (I) of (II) commences. F. O. H. Irradiation of a turbot vitamin-A concentrate with homogeneous ultra-violet light. E. BOYLE (Biochem. J., 1934, 28, 573-574).—Initially both Eand the blue val. (I) of the concentrate decrease, then increase to a max. at 21 min., the absorption band (II) of the blue solutions shifting from 565 to 575 mµ. On further irradiation E and (I) decrease and (II) shifts to 570 mµ. H. G. R.

Experiments on rats as evidence of the toxicity of cod-liver oil to man? E. AGDUHR (Z. Vitaminforsch., 1934, 3, 99—102).—Ingestion of cod-liver oil (I) in therapeutic doses by children for periods of 2—24 months produces lesions of cardiac and other tissues. Hence the negative results obtained with rats (A., 1933, 987) do not justify the continuous use of (I) in man. F. O. H.

Third vitamin-D. O. RYGH (Nature, 1934, 133, 533; cf. this vol., 459).—Vitamin-D in extracts of hay, cow's liver, and butter has the same properties. L. S. T.

Irradiated sterols and ultra-violet rays. Physiological and therapeutic differences. P. DUHEM and E. HUAUT (Presse méd., 1933, 76, 1472— 1474; Bull. Soc. Pédiat. Paris, 1933, 7, 310—315).— Results obtained on the same subjects by ingestion of irradiated sterols and by direct ultra-violet irradiation showed the neuro-vegetative action of the former to be negligible in comparison with the latter, whilst the antirachitic action of both was the same. The criteria used were observation of the oculo-cardiac reflex, and cardiac reaction to adrenaline and atropine. NUTR. ABS. (b)

Effect of daily massive doses of viosterol on calcium and phosphorus metabolism and bloodcalcium and inorganic phosphorus in calves. C. W. DUNCAN and C. F. HUFFMAN (J. Dairy Sci., 1934, 17, 83—91).—Heavy dosage of viosterol (I) lowered the total excretion of Ca and P. Absorption of Ca and P from the intestine increased. Excretion of Ca in urine declined, but that in fæces increased. Feeding of (I) increased the inorg. PO₄^{'''} of the blood-plasma to a greater extent than the Ca content. A. G. P.

Absorption of vitamin-D from the skin. F. J. AMRHEIN (J. Amer. Pharm. Assoc., 1934, 23, 182-190).—Vitamin-D, in vegetable or mineral oil solution, is absorbed through the skin of the rat's tail.

A. E. O.

Evaluation of vitamin-D preparations. P. SCHOORL (Z. Vitaminforsch., 1934, 3, 97-99).-With pigs weaned when a wt. of ≤ 25 kg. is attained and ied on a normal balanced diet (e.g., barley and maize grist, wheat bran, flesh-meal, and CaCO₃) until their wt. is approx. 95 kg., the rate of wt.-increase is not enhanced by addition to the diet of cod-liver oil or any other source of vitamin-A and -D. F. O. H.

Occurrence of vitamin-E in soya-bean oil. U. SUZUKI, W. NAKAHARA, and Y. SAHASHI (Sci. Papers Inst. Phys. Chem. Res. Tokyo, 1934, 23, 270-273).—Incorporation of a liberal amount of soya-bean oil to a synthetic diet deficient in vitamin-E(I) prevents the development of testicular degeneration characteristic of (I)-deficiency. A. E. O. Vitamin-E in leguminous seeds. V. ZAGAMI (Atti R. Accad. Lincei, 1934, [vi], 19, 186—190).— Vitamin-E is present in seeds of *Cicer arietinum*, L., *Ervum lens*, L., and *Vicia faba*, L., and, to a smaller extent, of *Lathyrus sativus*, L. T. H. P.

Isolation of oryzanin (antineuritic vitamin) from yeast. S. ONDAKE (Proc. Imp. Acad. Tokyo, 1934, 10, 95—98).—Aëration of a suspension of fresh living yeast (I) in aq. vitamin- B_1 (II) yields (I) with a (II) activity approx. ten times the normal which, by a given method [extraction with dil. H₂SO₄, adsorption on acid-clay, removal by aq. Ba(OH)₂, successive fractionation with EtOH, AgNO₃, phosphotungstic acid, etc.], affords cryst. oryzanin hydrochloride [0.7 g. from 142 kg. of wet (I)] identical with that from rice-polishings (A., 1931, 881; 1932, 973). F. O. H.

Formaldehyde-azo test for vitamin- B_1 . H. W. KINNERSLEY and R. A. PETERS (Biochem. J., 1934, 28, 667-670).—By suitable choice of alkalinity and use of CH₂O for stabilisation the Pauly reaction is rendered highly sp. for vitamin- B_1 . C. G. A.

Bradycardia in the vitamin- B_1 -deficient rat and its use in vitamin- B_1 determinations. T. W. BIRCH and L. J. HARRIS (Biochem. J., 1934, 28, 602— 621).—The technique of determining vitamin- B_1 (I) by the heart-rate method is described. Results from the latter correspond with those given by curative tests on polyneuritic convulsions in rats, and by the growth-rate method. It is suggested that traces of (I) act by keeping the heart rate at a high enough level to enable the animal to survive and so permit the more slowly developing chronic symptoms to develop. The bradycardia is correlated with accumulation of lactic acid in the (I)-deficient animal. A. E. O.

Activation of lactic dehydrogenase and its relation to the role of vitamin- B_1 . T. W. BIRCH and P. J. G. MANN (Biochem. J., 1934, 28, 622-633).—Two factors are necessary for the activation of a cell-free lactic dehydrogenase from heart muscle (improved prep. described). Yeast contains considerable amounts of the complete co-enzyme (I) (fractionation described). The first factor (II) [probably identical with Szent-Györgyi's (I) (cf. A., 1933, 748)] can be obtained relatively free from the second factor (III) which is unstable except in presence of (II). Neither factor appears to be identical with co-zymase. (III) may be concerned with the removal of AcCO₂H and shows some temporary curative effect on the bradycardia produced in vitamin- B_1 -deficient rats, although (I) contains no B_1 . Addition of methylene-blue is necessary before the system enzyme + lactate + (I) can take up O_2 . A. E. O.

Effect of washing and steaming on the vitamin- B_1 content of rices differently milled. A. G. VAN VEEN (Geneesk. Tijdschr. Ned.-Ind., 1933, 73, 945—957).—A biological test using rice birds (bondols), the Lugol colour reaction, and the chemical method of von Spruyt were used for determination of vitamin- B_1 (I); the results agreed fairly well. With unpolished rice, washing (II) and steaming (III) had no very significant effect, at least half the (I) content remaining intact. Quite short (II) had a great effect on slightly polished rice (ground by hand), whilst a single (III) did not cause much change. Prolonged (II) removed almost all the (I), although cooking with H_2O caused very little destruction. The samples of highly polished rice used were not as poor in (I) as is generally assumed, but the (I) was easily removed by (II), although (III) was less effective.

NUTR. ABS. (b) Determination of the beri-beri quotient Q_b : notes on technique. G. AMANTEA (Atti R. Accad. Lincei, 1933, [vi], 18, 399—402; cf. this vol., 460).— Detailed procedure for determining this quotient is given. T. H. P.

Oat hulls as source of vitamin- B_1 and $-B_2$. N. B. GUERRANT and R. A. DUTCHER (Poultry Sci., 1933, 12, 373-377).—Appreciable quantities are present. CH. ABS.

Vitamin- B_1 and vitamin- B_2 contents of Bosc pears. Use of the Munsell method of assaying foods for vitamin- B_2 . R. DOUGLAS, M. HALLOWAY, J. C. WILLIAMS, and A. GARRISON (J. Nutrition, 1934, 7, 27-40).—Vitamin contents are determined. A technique for the evaluation of vitamin- B_2 is described. A. G. P.

Flavins and flavoproteins as vitamin- B_2 . P. GYÖRGY, R. KUHN, and T. WAGNER-JAUREGG (Z. physiol. Chem., 1934, 223, 241-244).-Lactoflavin (I) and tetra-acetyl-lactoflavin have a strong vitamin- B_2 (II) action. Ovoflavin, which is less active, is probably a mixture containing some (I). In liver and in yeast a large proportion of the (II) is present as flavoprotein and is not dialysable until the complex has been broken down by boiling or (to some extent) by aq. COMe₂. J. H. B.

Cataract in albino rats resulting from the withdrawal of vitamin- B_2 from the diet. P. L. DAY and W. C. LANGSTON (J. Nutrition, 1934, 7, 97— 106).—In nearly all cases examined rats receiving a diet free from vitamin- B_2 (I) developed cataract (II). The appearance of the latter was delayed where small but insufficient amounts of (I) were given. The delayed appearance of (II) is correlated with growth-rate data. The occurrence of (II) is probably a better criterion of deficiency of (I) than is dermatitis. A. G. P.

Behaviour of rats of different ages on a diet deficient in vitamin- B_2 . E. P. DANIEL and H. F. MUNSELL (J. Nutrition, 1934, 7, 117-130).—The divergence from the normal of the growth rate of rats following the administration of vitamin- B_2 deficient diets varied with the age of the animals. Up to 6 months the intensity of the effect increased with age. Younger rats survived for rather longer periods. Differences in the response of the sexes to the diets were insignificant. A. G. P.

Application of the Bourquin-Sherman diet to the determination of vitamin- B_2 and $-B_4$. P. GYÖRGY, F. W. VAN KLAVEREN, R. KUHN, and T. WAGNER-JAUREGG (Z. physiol. Chem., 1934, 223, 236-240).—This diet lacks vitamin- B_2 and $-B_4$. It may be used for determination of either vitamin if supplemented by a sufficiency of the other.

J. H. B.

Assay for vitamin-B complex in the presence of interfering substances. L. K. RIGOS, B. J. G. CHIEGO, W. L. SAMPSON, and A. BEATY (J. Amer. Pharm. Assoc., 1934, 23, 191-197).—The vitamin-B complex (I) is extracted from yeast extract etc. by glacial AcOH (II). After removal of (II) in vac. below 70° in atm. of N₂, the residue is mixed with starch for feeding experiments. In the assay of (I) each rat may be used as its own control by feeding an adequate daily dose of dried brewers' yeast (III) at the end of the test period. (III) is a stable and suitable standard of reference for (I). A. E. O.

Pharmacodynamic action of beer-yeast and its influence on general metabolism in experimental B-avitaminosis. O. KAUFFMANN-COSLA and S. OERIU (Bull. Soc. Chim. biol., 1934, 16, 85-95).-B-Avitaminosis (I) in the pigeon causes increases in total N, total C, urea, uric acid, and NH2-acids of the blood which reach a max. coincident with the appearance of the first symptoms of paralysis (II) and polyneuritis (III). Administration of insulin has no effect on these vals., but with additions of yeast to the diet there is a return to normal vals. and (II) and (III) disappear. The symptoms of (I) and periodic (II) are similar, and both may be due to the toxic action of N compounds accumulating in the blood. A. L.

Occurrence of endogenous vitamins in animal organisms. P. DI MATTEI (Arch. Sci. biol., 1933, 16, 531-562; Chem. Zentr., 1933, ii, 2847).--Extracts of the liver and kidneys, but not of the brain, muscles, or viscera, and the urine of chickens and rabbits fed on a diet free from vitamin-B and -C give reactions for these vitamins. Formation of endogenous vitamin is probable. L. S. T.

Vitamin-C in the germinating seeds of peas. N. I. GRIAZNOV, E. N. ALIEXEEVA, L. F. GORINA, and Z. V. GORBUNOVA (Nutrition Problems, U.S.S.R., 1933, 2, No. 6, 74—79).—Germinated peas complete with roots protected guinea-pigs from scurvy in doses of fifteen to twenty peas daily raw, or forty peas daily cooked. About 100 peas was calc. as the daily dose for man. NUTR. ABS. (b)

Vitamin-C in pine needles. N. I. GRIAZNOV and E. N. ALIEXEEVA-RUKINA (Nutrition Problems, U.S.S.R., 1933, 2, No. 5, 30—31).—An extract of pine needles, made by grinding the needles with an equal quantity of H_2O and straining through gauze, protected guinea-pigs from scurvy on Bezssonoff's diet in doses of 2 c.c. (orange juice 1.5 c.c.). NUTR. ABS. (b)

Antiscorbutic properties of fir needles. N. SHEPILEVSKA (Nutrition Problems, U.S.S.R., 1933, 2, No. 5, 24-30).—A decoction of fir needles (1 part to 9 parts of H_2O) was antiscorbutically active for guinea-pigs in doses of 4-7 c.c. Large doses, up to eight times the min. prophylactic dose, had no harmful effects. NUTR. ABS. (b)

Vitamin-C content of raw and pickled pumpkin. A. IVANOVA (Nutrition Problems, U.S.S.R., 1933, 2, No. 5, 31-34).-40 g. of raw or 60 g. of pickled pumpkins were required to protect a guinea-pig from scurvy on a diet of oats and autoclaved hay.

NUTR. ABS. (b)

Potatoes as source of antiscorbutic vitamin. B. JANOVSKA (Nutrition Problems, U.S.S.R., 1933, 2, No. 6, 69—72).—Min. protective doses for guineapigs were 20 g. of stored or 5 g. of fresh potato, cooked in steam. NUTR. ABS. (b)

Antiscorbutic potency of new and late potatoes grown in Czechoslovakia. H. PELC and M. POD-ZDIKOVA (Trav. Inst. Hyg. pub. Tchécoslov., 1933, 4, 119—138).—Tested on guinea-pigs, the freshly expressed juice of new potatoes ("Erstling" variety) was fairly rich in vitamin-C, 1 e.e. containing 1 international unit. The juice from a later variety ("Industrie kerkovska"), tested in the spring, contained only about 0.05 unit per e.e. When cooked late potatoes formed 50% of the diet, daily consumption of 30 g. furnished about 0.75 unit. Even the late varieties may thus be regarded as valuable prophylactics against scurvy. NUTR. ABS. (b)

Vitamin-C content of the medlar and winter cherry. E. CASERIO (Z. Vitaminforsch., 1934, 3, 93-97).—The medlar (*Mespilus germanica*) contains little vitamin-C, whilst the juice of ripe winter cherries (*Physalis alkeckengi*) contains twice as much as normal lemon juice. F. O. H.

Relation of reducing value and extent of browning to the vitamin-C content of orange juice exposed to air. M. A. JOSYLN, G. L. MARSH, and A. F. MORGAN (J. Biol. Chem., 1934, 105, 17–28). —The loss of vitamin-C and browning of orange juice (I) run parallel to the reducing val. (II). (II) of navel (I) is > that of Valencia (I) and is probably due to a higher concn. of reducing substances other than ascorbic acid. Partly oxidised (I) has inferior keeping properties in cold storage. H. G. R.

Ascorbic acid in the eye-lens and aqueous humour of the ox. T. W. BIRCH and W. J. DANN (Biochem. J., 1934, 28, 638—641).—The presence of ascorbic acid has been confirmed by biological tests (cf. A., 1933, 541). A. E. O.

Structure of vitamin-C (ascorbic acid) and a theory of its formation. P. P. T. SAH (Sci. Rep. Nat. Tsing Hua Univ., 1933, 2, 167-190).—The formation of *l*-ascorbic acid in the plant is discussed and methods of synthesis are suggested. F. R. S.

Reversible enzymic oxidation of vitamin-C. S. S. ZILVA (Biochem. J., 1934, 28, 663-666).— Ascorbic acid is reversibly oxidised by a thermolabile enzyme (I), present in apples, without loss of activity. (I) is inactive anaërobically, is inhibited only by very high concn. of KCN, and is not a peroxidase. C. G. A.

Capability of tissue to fix ascorbic acid (in normal condition and in *C*-avitaminosis). L. DE CARO (Z. physiol. Chem., 1934, 223, 229—235).— After intravenous injection of ascorbic acid (I) into normal guinea-pigs, the (I), as measured by the reducing power, of the adrenals, ovary, liver, kidney, skeletal muscle, and blood increases, returning to the normal val. in 1 hr. In *C*-avitaminosis (II), the organs etc. show a diminished power of fixation of (I), in proportion to the extent of (II). J. H. B. Experimental scurvy. XVII. Glycuronic acid formation in guinea-pigs fed on a vitamin-C-free diet. XVIII. Carbohydrate tolerance and blood-sugar changes due to insulin and adrenaline in guinea-pigs fed on a vitamin-C-free diet. J. SHIMADA (J. Biochem. Japan, 1934, 19, 253— 256, 257—279).—XVII. The theory of Rygh and Rygh (A., 1932, 1294) that the scorbutic guinea-pig (I) is unable to synthesise glycuronic acid is refuted.

XVIII. The carbohydrate tolerance and the changes in the blood-sugar due to adrenaline or insulin in (I) do not differ from those of normal animals.

F. O. H.

Capillary resistance test as a measure of vitamin-C nutrition. R. E. STOCKING (Arch. Pediatr., 1933, 50, 823—831).—In spring, when the supply of foods rich in vitamin-C is less plentiful, slightly reduced capillary resistance is observed.

CH. ABS.

Amide-nitrogen in germinating seeds. A. G. McCALLA (Canad. J. Res., 1934, 10, 430-434).— During the germination of wheat, barley, rye, and maize there is a marked elimination of amide-N from the protein. No accumulation of amide-N occurs in the non-protein fraction of seeds or seedlings. These changes do not occur in germinating peas.

A. G. P.

Transport of nitrogenous substances in the cotton plant. VI. Storage in bark. T. G. MASON and E. PHILLIS (Ann. Bot., 1934, 48, 315-333; cf. A., 1930, 1323).-Restriction of supplies of N to the plant limits the growth of young tissue and apical organs and causes a movement of N from mature leaves upwards to young leaves and stems, and also to the bark and wood of older sections of stem which increase in N concn. During flowering and boll formation N is withdrawn from vegetative tissue. Loss of N from bark is more marked in the lower than in upper sections. A reversal of the N gradient results. No withdrawal of Ca from vegetative parts occurs during bolling. Normally Ca does not move in the phloem. Storage of N in bark is probably unaffected by the supply to the roots.

A. G. P.

Growth and differentiation. V. Histological and metabolic changes during wound-healing in *Kleinia articulata*, Haw. N. WOODHEAD (Ann. Bot., 1934, 48, 467—480).—Cells exposed by injury become impregnated with fatty material which completely covers the injured surface. A phellogen occurs close to the fatty deposit and formation of cork initials and phelloderm commences. Partial "collenchymatization" of the phelloderm layer is coincident with the deposition of CaC_2O_4 crystals. In tissue immediately beneath the injured area, initial wounding causes rapid removal of Ca and P and some temporary withdrawal of K. No PO_4 " or Ca occurs in the phellogen. A. G. P.

Reaction of protoplasm. T. SPEK and R. CHAMBERS (Protoplasma, 1933, 20, 376-406).— Determinations of $p_{\rm H}$ are made by injection of indicators. The effects of solutions of a no. of acids and salts on reaction changes are recorded and their significance is discussed. A. G. P. Do relationships exist between carbohydrate formation and nodulation in legumes. A. RIPPEL and W. KRAUSE (Arch. Mikrobiol., 1934, 1, 14-23).—Exposure to light of pea plants previously kept in darkness results in a considerable accumulation of carbohydrates which is more pronounced in plants with roots than in those from which roots were removed. Of the dry matter of the nodules approx. $\frac{1}{3}$ consists of N-free material, hydrolysable with difficulty yielding some reducing sugars.

A. G. P. Physico-chemical conditions of formation of amylogenic vacuoles in the plastids. A. MAIGE (Compt. rend., 1934, 198, 1537—1539).—The rôle of sugar concn. in, and H_2O -imbibition by, plastids in starch formation is discussed. A. G. P.

Modification by temperature of the lipoid concretions (Mirande's sterinoplasts) in the bulb of *Lilium candidum*. R. REILHES (Compt. rend., 1934, 198, 1629—1631).—Transformation of these concretions into fatty acids (I) is greatly accelerated by heat. The equilibrium between (I) and carbohydrates (II) thus gives mainly (I) at high and (II) at low temp. R. S. C.

Methylene-blue and gassed plants. C. G. DEUBER (Science, 1934, 79, 389–390).—Methyleneblue supplied to the roots assists in the recovery of tomato plants which have been exposed to illuminating gas and to C_2H_4 . L. S. T.

Changes produced in living plant cells by chemical agencies. I. Ultramicroscopic study of cells of Allium sativum. M. N. MEISEL (Bull. Acad. Sci. U.R.S.S., 1933, 7, 983—994).—The nuclei (I) of normal cells are faintly opalescent when viewed in dark-field illumination. With increasing concn. of EtOH or CHCl₃ the opalescence (II) becomes more intense, and the structure of (I) becomes granular; during the first stages of narcosis ultramicroscopic granules are extruded into the cytoplasm. The (II) of the (I) of dead cells is > that of living ones, and their structure is more granular. The (II) of cells is greatly reduced by KCN or H₃AsO₃, and is augmented by plasmolytic agents. Within limits, the vital activity of the cells varies parallel with the intensity of (II) of the (I). R. T.

Effect of light on the respiration of starved leaves. P. PARIJA and A. B. SARAN (Ann. Bot., 1934, 48, 347—354).—Short exposure to light of plants starved in darkness increases respiratory rates. The action of blue and violet is similar to that of white light but red light is ineffective. The effect increases with the prolongation of starvation for a definite period, then becomes approx. const., and finally declines. The increased sugar content of leaves following short exposure (7.5 mins.) is not due to photosynthesis but may result from hydrolysis of reserve carbohydrate, activation of enzymes or altered cell permeability. A. G. P.

Effect of X-rays on growth substance and plant growth. F. SKOOG (Science, 1934, 79, 256).— The primary action of X-rays on the growth of plants is through inactivation of growth substance probably by oxidation. L. S. T. Absorption and accumulation of solutes by living plant cells. VI. Absorption of potassium bromide from dilute solution by tissue from various plant storage organs. W. E. BERRY and F. C. STEWARD (Ann. Bot., 1934, 48, 395-410).-No simple relationship exists between the total respiration and the absorption of KBr from 0.00075M solutions by discs of cut tissue. Only those tissues containing cells capable of renewed growth are able to accumulate KBr. A. G. P.

Absorption of manganese by plants. C. OLSEN (Biochem. Z., 1934, 269, 329—348).—Plants grown in alkaline soil contain only a few mg. of Mn, but in acid soil > 200 mg. Mn per 100 g. dry leaf substance, the Mn content in the latter case being > that of Fe. Plants grown in H₂O culture at varying $p_{\rm II}$ but the same content of MnSO₄,4H₂O (I) absorb most Mn at $p_{\rm II}$ 6—7. With increasing concn. of (I), more (I) is absorbed, but at a concn. of 2.5 mg. (I) per litre, toxic action and inhibition of growth are observed with Lemna polyrhiza. Plants growing in marshes usually contain large amounts of Mn. P. W. C.

Histochemical detection of iron and zinc in Citrus leaves. H. S. REED and J. DUFRENOY (Compt. rend., 1934, 198, 1535—1537).—In leaf sections after micro-incineration (in a manner to retain as far as possible the histological formation) the presence of Fe is established (Prussian-blue) in the plastids of both "mottled" (I) and normal leaves (II). In (II) Zn is detected by the nitroprusside test, at the periphery of palisade cells, especially in those bordering vacuoles containing CaC_2O_4 crystals. Zn was absent from (I) leaves. A. G. P.

Effect of mineral salts on growth and metabolism of plants. II. Osmotic pressure of the press-juice of tobacco leaves in relationship to the mineral salt nutrition. K. BÖNING and E. BÖNING-SEUBERT (Biochem. Z., 1934, 270, 122– 156; cf. A., 1932, 785).—The osmotic pressure (I) of the press-juice of the leaves of tobacco plants varies according to the amount and nature of the mineral salts absorbed; the anions (II) form the series $PO_4''' < SO_4'' < NO_3' < CI'$ and the cations (III) Ca''<K'. The effect of Na' is < that of K', probably only because less is absorbed; Mg'' and NH₄' also affect (I). The simultaneous action of (II) and (III) causes ionic antagonism : excess of (II) reduces absorption of (III), and conversely. The degree of activity of (II) and (III) varies according to position in the lyotrope series. W. McC.

Hydration film of cellulose in cell walls. N.H. KOLLSMEIJER and A. N. J. HEYN (Proc. K. Akad. Wetensch. Amsterdam, 1934, 37, 92–93).—X-Ray observations indicate that the hydration film shows the structure of ice. E. S. H.

Pharmacological diagnosis of Sarothamnus scoparius, Koch, and similar drugs. R. JARET-ZKY and B. AXER (Arch. Pharm., 1934, 272, 152– 167).—Sparteine (I) is best detected by extraction with dil. H_2SO_4 , steam-distillation (until distillate gives no KI₃ reaction) after making alkaline, and (a) testing with osmic acid, (b) pptn. with H_2CrO_4 , K Cd bromide, and HI, or, (c) by Jorissen's method

(A., 1911, ii, 1144). Contrary to the lit. (I) is destroyed by KMnO4 oxidation, and it is best determined by isolation as above, and pptn. with silicotungstic acid as SiO₂,12WO₃,2H₂O,2C₁₅H₂₆N₂+H₂O. The presence of (I) in 23 species (amounts tabulated) of Lupinus, Genista, Cystisus, and Sarothamus is proved. The amount of (I) in the twigs of S. scoparius increases from 2.33% in March to 3.0% in May, decreases to 1.25% in June, and then increases gradually to 2.84% in Nov., and then remains const. until Feb. Similar variations occur in the leaves, but not in the buds (0.33-0.35%) or pods (0.37-0.40%). The muscle test (Fühner) for cytisine (II) is valid only in absence of (I). (II) is present in Genista monosperma, but not in S. scoparius. J. W. B.

[Constituents] of the roots of Arctopus echinatus. T. M. MEIJER (Rec. trav. chim., 1934, 53, 443-450).-The rhizomes of this plant yield to lowboiling ligroin arctopusol (I), C20H30O2, m.p. 171-172.5°, [a]²⁰ -82.2° in EtOH [Na salt; Me ether (II), m.p. 98-99°], and then to EtOH sucrose and a hamolytic substance, m.p. 240°, probably a saponin. (I) is a mono-unsaturated (AcO₂H), phenolic diterpene, substituted by I, giving the Salkowsky reaction and a violet colour with Ac₂O-H₂SO₄. It is slowly hydrogenated (Pd-black) in AcOH at 61° to a dihydro-derivative, m.p. 204-206°. It gives indefinite products with HBr, Pd-black at a high temp., and oxidising agents. The nature of the second O is unknown. (II) with HI gives a substance, m.p. 216-224.5°. R. S. C.

Detection of hesperidin-like compounds and flavones in plants. R. WASICKY, G. ROTTER, and A. THUMER (Arch. Pharm., 1934, 272, 290—296).— The behaviour of hesperidin-like glucosides (I) and other flavone derivatives in filtered ultra-violet light in the luminescence microscope is discussed as a means of locating (I) in various plant organs.

J. W. B. Orthosiphon stamineus, Benth. O. KELLER with W. BIEDERMANN] (Arch. Pharm., 1934, 272, 242-256).—The ash $(25.49\% \text{ of } \text{H}_2\text{O} \text{ extract})$ of the drug contains CaO 1.118%, Na₂O 0.1379%, K₂O 3.569%, Fe, Mn, Al, Mg, SO4, Cl, PO4, NO3, and SiO₂. The following are present : tartaric and citric acids; small amounts of glucosides isolated only as an amorphous hygroscopic powder from the EtOHextract; saponin, detected but not isolated; hexoses, probably d-glucose and d-fructose; pentoses (but not methylpentoses); d-glycuronic acid; small amounts of essential oils having a ·CHO reaction; fatty oils (1.6%), acid val. 34.51, sap. val. 93.64, I val. 78.48, the unsaponifiable portion (37%) of which yields a phytosterol, m.p. 139° (Ac derivative, m.p. 124°; digitonide, m.p. 226°), proved by regeneration from the acetate dibromide to be a single sterol. Alkaloids are absent. The H₂O-extract contains the most active constituents, viz., the alkali salts and the glucosides.

J. W. B. Materials in the bark of Lophopetalum toxicum. II. H. DIETERLE, H. LEONHARDT, and K. DORNER (Arch. Pharm., 1934, 272, 172—190).— Physiological activity of the drug (I) is conc. in the crude glucosides (II) (1.5%), isolated from the 90% EtOH extract after separation of the phytosterol, and from which dulcitol is separated. From the MeOH-sol. portion of (II) are isolated *lophopetalid*, $C_{59}H_{78}O_{25}$ (0.03%), m.p. 195—197° (decomp.) (min. dose 0.03 mg. per g. of frog), which gives only amorphous products by HCl hydrolysis. The H₂Osol. glucosides, containing hexoses (purified by yeast fermentation), after hydrolysis with 5% HCl give fractions (a) b.p. 58—69°/13 mm., C₇H₁₂O₂, and (b) b.p. 60—62°/13 mm., C₈H₁₄O₂, probably aglucones, and a residual resin. 0.8% of tannin is also present, and Et₂O extracts from (I) physiologically inactive bases (0.25%) from which a cryst. substance, m.p. 166°, is isolated. J. W. B.

Formation of sucrose [in plants]. J. BURKARD and C. NEUBERG (Biochem. Z., 1934, 270, 229— 234).—Although beet with high sugar content contains only traces of org. P the leaves of the sugar beet (and of related species) contain glucose and fructose monophosphate (0.025 g. per kg. of fresh leaves).

W. McC.

Glucoside of Coronilla seeds. G. TANRET (Compt. rend., 1934, 198, 1637—1639).—C. scorpioïdes (I) and varia (II) contain stachyose and sucrose [3:7 from (II), < 3:7 from (I)], and coronillin (III), $C_{23}H_{33}O_{10}$, amorphous, $[\alpha]_D - 17.6^{\circ}$ [0.7— 0.8% from (I), 0.08% from (II)]. (III) with dil. H₂SO₄ gives glucose and an amorphous aglucone, $C_{17}H_{23}O_5$. (III) is unaffected by emulsin or yeast, but is hydrolysed by A. niger or snail's digestive juices. With the latter it gives a cryst. compound, $C_{14}H_{18}O_3$, m.p. 243°, $[\alpha]_D + 38^{\circ}$, and amorphous products. The purity of the amorphous substances is doubtful. (III) is very toxic, and has a moderate cardiac and low diuretic action. R. S. C.

Nucleic acid of rye-ergot. M. GATTY-KOSTYAL and J. TESARZ (Bull. Acad. Polonaise, 1933, B, 1—12). —Various Polish ergots contained H₂O $6\cdot45$ —7.06, total P₂O₅ $1\cdot399$ — $1\cdot597$ (of dry material), lecithin-P₂O₅ $0\cdot096$ — $0\cdot118$, total sol. (in 1% aq. HCl) P₂O₅ $1\cdot01$ — $1\cdot14$, nuclein-P₂O₅ $0\cdot29$ — $0\cdot32\%$. Nucleic acid ($1\cdot5$ g.), N 15·21, P 8·73\%, was isolated from ergot (1200 g.). F. O. H.

Nitrogenous compounds of the white gourd melon and the musk melon. K. YOSHIMURA and T. IWATA (J. Agric. Chem. Soc. Japan, 1933, 9, 1235— 1238).—White gourd melon contains H_2O 97·10, crude protein 0.57, protein 0.193, crude fat 0.086, crude fibre 0.513, crude ash 0.375, total N 0.092, protein-N 0.031, NH₃-N 0.002, N pptd. by phosphotungstic acid 0.020, N not so pptd. 0.039%. Adenine and trigonelline were isolated. CH. ABS.

Isolation of the active principles of Urginea burkei, Bkr. F. STEPHEN (Quart. J. Pharm., 1934, 7, 57-62).—Extraction of the dry bulbs with 70% aq. EtOH yields a H₂O-sol., N-free, resinous substance 0.4 mg. of which is lethal for frogs. A similar substance is yielded by extraction with 90% EtOH, the resin on treatment with MeOH giving a cryst. substance, m.p. 300-317°, lethal to frogs in doses of 0.1 mg. Two toxic glucosides, differing in their solubilities in aq. EtOH and colour reactions with H_2SO_4 -Ac₂O, appear to exist. F. O. H. Occurrence and distribution of saponin in plant drugs. II. Leaves, fruits, bark, wood, roots, and rhizomes. L. KOFLER and G. STEIDL (Arch. Pharm., 1934, 272, 300-312).—Four species out of 52 leaves, 0 out of 44 fruits, 5 out of 30 barks, 1 out of 10 woods, and 13 out of 71 roots and rhizomes examined contained saponin. J. W. B.

Coffee-bean. II. Composition of glycerides of coffee-bean oil. R. O. BENGIS and R. J. ANDER-SON (J. Biol. Chem., 1934, 105, 139–151; cf. A., 1932, 975).—The light petroleum extracts of green, freshly roasted, and aged beans (I) on hydrolysis gave linoleic, oleic, and palmitic acids with small amounts of stearic and tetracosoic acids. Glycerol was the chief H_2O -sol. constituent of the COMe₂sol. fat. The rancid odour of (I) is probably due to volatile fatty acids. H. D.

Chemical composition of some plants used by Australian aborigines as food. I. W. DADSWELL (Austral. J. Exp. Biol., 1934, 12, 13–18).—The org. composition of the vegetable foods eaten by the natives of Central Australia does not greatly differ from that of corresponding cultivated foods. Their P content is inadequate, but other inorg. constituents are plentifully supplied. A. E. O.

Physiology of sandal (Santalum album, Linn.). I. Nature and extent of parasitism. II. Influence of host on nitrogen metabolism. Y. V. S. RAO (J. Indian Inst. Sci., 1933, 16A, 167–177, 178– 184).—I. Sandal derives its N, P, and K from the host (I) and its Ca, Fc, and Al from the soil. The tissue fluids (II) have higher osmotic pressure and lower $p_{\rm II}$ than the corresponding (II) of (I). The chemical composition of (II) depends on the nature of (I).

II. Host-fed sandal (III) has higher protein and lower H_2O -sol. and basic N than the hostless plant (IV). (IV) resembles spike-diseased sandal (V) in having high H_2O -sol. N and low protein-N but differs in that the NH₃ content is >, and the amide-N content <, that of (III), the vals. being approx. the same for (III) and (V). C. G. A.

Iodine content of Black Sea algæ. A. S. KOMAROVSKI, A. F. TJULPINA, and G. B. FISCHER (Ukrain. Chem. J., 1933, 8, 151—154).—The I content per 100 g. of dry substance of Black Sea *Phyllophora* varied from 0.15 to 0.52 g.; other algæ contained only traces of I. R. T.

Pigment of Cucurbita maxima Duch. (giant pumpkin). L. ZECHMEISTER and P. TUZSON (Ber., 1934, 67, [B], 824—828).—Chromatographic analysis of the polyene hydrocarbons of Cucurbita maxima, Duch, using Ca(OH)₂, establishes the presence of much β - and little α -carotene. The polyene alcohols consist of lutein and violaxanthin. The terms "cucurbitene" and "curcurbita-xanthin" introduced by Suginome et al. (A., 1931, 1200) are unnecessary.

H. W.

Formation of aromatic substances and terpenes in plants. T. WEEVERS (Proc. K. Akad. Wetens. Amsterdam, 1934, 37, 183—188).—Theoretical. It is suggested that gum-formation and secretion of terpenes etc. are analogous. The former

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results from the side-tracking of pectin and cellulose formation, and the latter is an alternative to the formation of lignin in older cells. R. K. C.

Development of hydrogen cyanide in cholam (Sorghum vulgare). C. N. ACHARYA (Indian J. Agric. Sci., 1934, 3, 851-869).—The HCN developing in plant tissue is best determined by permitting the auto-enzymic decomp. of cyanogenetic substances in H₂O extracts of maccrated material (48 hr.) with subsequent distillation and determination of HCN by customary methods. Addition of CHCl₃ or PhMe to extracts, as a preservative, does not check the action of the enzyme. The HCN content of cholam in the early stages of growth is high and declines steadily to a min. at the flowering stage. High vals. occur in droughted plants and secondary growths. Leaves contain more HCN than stems or roots. The total HCN and the % in dry matter are low in early morning, rising to a max. at approx. 2 p.m. and declining rapidly after 6 p.m. Secdlings grown in darkness have as much HCN as those grown in light. Drying cut plants in the sun reduces their HCN content by 30-40%, and in the shade by 10%. Heating at 100° for several hr. or brief immersion in 10% aq. H_2SO_4 destroys the cyanophoric substance, and only traces of HCN remained in plants after ensilage for 2 months. Poisonous plants are detected by means of the starch accumulation in the stems (I test). The presence in cholam of CN-substances in forms other than glucosides is indicated. A. G. P.

Purification of plant viruses. D. MACCLEMENT (Nature, 1934, 133, 760).—Details of a modification of the Warburg-Christian method (A., 1932, 1285) of purifying a H_2O -sol. enzyme are described for preparing a purified suspension of any of the "x" group of plant viruses from the extracted juice of the diseased plant. L. S. T.

Tobacco plant. IV. Effect of the curing process on the organic acids of tobacco leaves. H.B. VICKERY and G. W. PUTCHER (Connecticut Agric. Exp. Sta. Bull., 1933, No. 352, 649-685).-In the customary methods of extraction of acids from leaves for analysis much $H_2C_2O_4$ may be lost, since the acid is moderately volatile in H_2O or EtOH vapour. A method is described for the determination of H₂C₂O₄ which is extracted from acidified leaf tissue with Et₂0 and collected as CaC_2O_4 . 85-90% of the titratable acid of H2O-extracts appears in the Ba salts fraction, which also includes N as dicarboxylic NH₂-acids and other unknown forms, reducing substances (some fermentable carbohydrate) and a considerable portion of unknown non-N material. During curing of leaves there is a reduction in malic acid and a large increase in citric acid content. The proportion of $H_2C_2O_4$ changes little. The total acidity, monobasic acids and acids precipitable as Ba salts by 60% EtOH remained approx. const. but the proportion of unknown acids decreased considerably; they were replaced by citric acid. Both malic and citric acids remain in the residue from the distillation of esters even at temp. > b.p. of Et_3 citrate and also in the "unesterifiable" fraction. Small amounts of fumaric, succinic, and probably maleic acids occur in the leaves. A. G. P.