BRITISH CHEMICAL ABSTRACTS

A., I.—General, Physical, and Inorganic Chemistry

APRIL, 1937.

Fine structure of the Balmer lines. B. S. M. RAO (Proc. Indian Acad. Sci., 1937, **5**, A, 56—62; cf. Spedding, A., 1935, 271).—In view of the disagreement between calc. and observed term vals. (cf. Williams, A., 1934, 575) the order of magnitude of the corrections obtained by taking into account the interaction of the electron and its own radiation field is estimated on the basis of Born's field theory. Results indicate that the corrections involved are negligible (cf. Meixner, A., 1935, 1050; this vol., 1). N. M. B.

Spectrum of H_2 from 3612 to 4224 A. N. A. KENT (Astrophys. J., 1936, **84**, 585—599).—New $\lambda\lambda$ for 512 lines of H_2 are listed and compared with those given by previous investigators. L. S. T.

Far ultra-violet emitted by electrical discharges in air at reduced pressure. G. DÉCHÈNE (Compt. rend., 1937, **204**, 249—251).—Nine lines in the Lyman and Schumann regions were observed, seven being due to N_2 or O_2. A. J. E. W.

Further study of the Vegard–Kaplan bands. J. KAPLAN (Physical Rev., 1935, [ii], **48**, 482). L. S. T.

Effect of foreign molecules on the absorption of oxygen in the Schumann region. E. G. SCHNEIDER (J. Chem. Physics, 1937, **5**, 106—107).—The adsorption of O_2 at λ of approx. 1450 A. is not influenced by added N_2 at low pressures. W. R. A.

Glow of barrier anodes of aluminium. K. GUMINSKI (Bull. Acad. Polonaise, 1936, **A**, 457—469).—The glow emitted by Al barrier anodes consists of a structureless band in the blue-green, which is extended toward the red by the addition of other metals, and shifted to longer $\lambda\lambda$ by increasing the p.d. The emission of the glow is conditioned by the presence of a well-formed oxide layer. The origin of the glow is discussed, and is correlated with the action of the barrier-layer photo-cell. J. S. A.

Cl-I like spectra. Cl I, A II, K III, Ca IV, Ti VI, V VII, Cr VIII, Mn IX, Fe X, and Co XI. B. EDLÉN (Z. Physik, 1937, **104**, 407—416).—The electron jump $3s^23p^5 - 3s^23p^44s$ gives rise to groups of lines which have been identified and measured from Ti VI to Co XI. From 6 to 11 lines have been measured for each spectrum and the average λ ranges from 200 A. for Ti VI to 83 A. for Co XI. Relative term vals. and ionisation potentials are calc. A. E. M.

High-frequency excitation of a spectrum in the far ultra-violet. M. HELLERMANN (Z. Physik, 1937, **104**, 417—429).—Emission spectra were obtained from A, I, H_2, N_2, and NO in the region

2100 to 500 A. at a pressure $\sim 0\cdot1$ mm. Hg by high-frequency excitation ($\lambda = 6$ m.). New lines are recorded, particularly for I. A. E. M.

Continuous flame spectrum of potassium. T. N. PANAY (Compt. rend., 1937, **204**, 251—253).—Data for the intensity distribution in the range 4100—5600 A. are given. A max. occurs at 4430 A., and a min. at 5210 A. A. J. E. W.

Photometry of electric furnace absorption multiplets. R. B. KING and A. S. KING (Physical Rev., 1935, [ii], **48**, 485).—The intensities of lines in multiplets of Fe of temp. classes I and II between 3650 A. and 4500 A. have been measured in absorption spectra produced in the electric vac. furnace. L. S. T.

Zeeman effect in the arc spectrum of nickel. H. DIJKSTRA (Physica, 1937, **4**, 81—103).—Data are recorded. H. J. E.

Spectrum of singly ionised zinc. P. N. KALIA (Indian J. Physics, 1936, **10**, 463—464).—Extended analysis of the spectrum of Zn II accounts for 33 of the lines discovered by Bloch and Bloch (A., 1934, 1051). O. D. S.

Nuclear moment of the zinc isotope ^{67}Zn. J. M. LYSHEDE and E. RASMUSSEN (Z. Physik, 1937, **104**, 434—439).—Satellites of the 4680, 4722, and 4810 A. lines of the Zn triplet are ascribed to ^{67}Zn. From an analysis of their structure the nuclear spin $i = 5/2$ and the magnetic moment $\mu = 0\cdot9$ nuclear magneton. L. G. G.

Average life of the zinc atom in the 2^3P_1 state, and the method of total absorption. P. SOLEILLET (Compt. rend., 1937, **204**, 253—255).—The interpretation of Billeter's results is criticised, and his val. of $2\cdot64 \times 10^{-5}$ sec. corr. to $2\cdot10 \times 10^{-5}$ sec. A. J. E. W.

Zeeman effect of the cadmium lines $5^3P_{0\,1\,2}$–6^3S_1. S. SATÔ (Sci. Rep. Tôhoku, 1936, **25**, 686—712).—The lines examined are $\lambda\lambda$ 5086, 4800, and 4678 A. H. J. E.

Quadrupole and magnetic moment of $^{115}_{49}In$. H. SCHÜLER and T. SCHMIDT (Z. Physik, 1937, **104**, 468—471).—From fine structure of the In I line 4511 A. the electric quadrupole moment $q = +0\cdot8\pm 0\cdot2 \times 10^{-24}$. The best vals. for the magnetic moment μ of In and Tl are $5\cdot3\pm0\cdot5$ and $1\cdot45\pm0\cdot1$ nuclear magnetons, respectively. L. G. G.

Structure of the spectra Sb VI and Te VII. L. BLOCH and E. BLOCH (Compt. rend., 1937, **204**, 424—426).—$\lambda\lambda$ are tabulated, and an analysis is given. A. J. E. W.

157

Electronic energy transfers between iodine and other molecules. J. R. BATES (J. Physical Chem., 1937, **41**, 57—59).—The quenching efficiencies of various gases on I_2 fluorescence can be explained by assuming that deactivation results in dissociation, this being in accord with other results. J. W. S.

Rydberg series in I I. W. C. PRICE (Physical Rev., 1935, [ii], **48**, 477).—A well-developed series has been found in Turner's data (A., 1926, 550) for the far ultra-violet spectrum of I I. An ionisation potential, but not the lowest, is 10·71 volts. L. S. T.

Electron concentration and spectral intensity distribution in a cæsium discharge. F. L. MOHLER (J. Res. Nat. Bur. Stand., 1936, **17**, 849—857).—The theory of electrical discharge in Cs vapour is discussed, and electron concn. and reversal temp. are calc. from the author's measurements. The effective cross-section of a 0·3-volt electron for recombination into the $6P$ level is $1·71 \times 10^{-21}$ sq. cm. R. S. B.

First spark spectrum of cæsium as excited by electron impact. R. R. SULLIVAN (Physical Rev., 1935, [ii], **48**, 476).—Certain aspects of the optical excitation functions for several Cs II lines have been determined. L. S. T.

Spectra of barium and strontium. (MLLE.) M. PEREY (Compt. rend., 1937, **204**, 244—246).—λλ of new lines in the spark spectra, in the range 2400—3800 A., are tabulated. Variations in the spectra with different methods of excitation are described. A. J. E. W.

Broadening of the green line (5461 A. Hg) in high-pressure mercury-vapour arcs. L. GRILLET (Compt. rend., 1937, **204**, 426—429).—Measurements of the intensity distribution in the neighbourhood of 5461 A., for two commercial arcs, are described and discussed. Extensive broadening of the line may occur. A. J. E. W.

Constancy of wave-length of a spectral line. G. C. OMER, jun., and J. L. LAWSON (Astrophys. J., 1936, **84**, 477—478).—Using a Fabry–Perot etalon, the λ of the 4358 Hg line was found to be const. from June 24 to August 27, 1935. L. S. T.

Optical investigation of discharge in metal vapours. III. Influence of pressure on the radiation from discharges in mercury and cadmium vapour. V. FABRIKANT, A. KANEL, and F. BUTAEVA (Physikal. Z. Sovietunion, 1936, **10**, 315—336; cf. this vol., 104).—In order to estimate the influence of reabsorption and of excitation potential on emission the curves of groups of lines having either the same upper or the same lower level were compared, and the variation with the angle of emission of the curve for the 5461 A. line of Hg was investigated. O. D. S.

Comparative measurements of the anode fall region and the optical and electrical thickness of the anode fall region in light and heavy hydrogen. A. GÜNTHER-SCHULZE and H. SCHNITGER (Z. Physik, 1937, **104**, 395—401).—The thickness of the anode fall region has been measured optically and electrically for $^1_1$H and $^2_1$H. In the pressure range 0·6—2·3 mm. Hg the following relations were found : $p \times d_{opt.} = 1·36$ for $^1_1$H and 1·24 for $^2_1$H ; $p \times d_{elect.} = 5·0$ for $^1_1$H and 6·3 for $^2_1$H (in all cases p in mm. Hg and d in mm.). A. E. M.

A glow discharge. F. H. NEWMAN (Phil. Mag., 1937, [vii], **23**, 239—241).—The new type of glow discharge observed by Günther-Schulze et al. (A., 1934, 125) has also been produced with the C and Fe arcs. A. J. M.

Increase of spark potential by irradiation. W. FUCKS and W. SEITZ (Naturwiss., 1937, **25**, 106).—An increase in the spark potential of A, He, N_2, and air when the discharge was passed with Ag, Cu, Ni, and Zn cathodes was observed on irradiating the cathodes with ultra-violet light. The cathodes were not preheated in vac. The explanation of Schade (this vol., 55) that the increase is due to the presence of grease is unconvincing. A. J. M.

Theory of the broadening of spectral lines in a homogenous gas. Coupling breadth. V. FURSSOV and A. VLASSOV (Physikal. Z. Sovietunion, 1936, **10**, 378—412).—A classical and quantum-mechanical treatment of the coupling broadening at moderate pressures is given and the influence, at high pressures, of emission during collision is estimated. O. D. S.

Effect of the spectrometer on the width of spectral lines. R. C. SPENCER (Physical Rev., 1935, [ii], **48**, 473 ; cf. A., 1936, 814).—Theoretical. L. S. T.

Theoretical interpretation of equivalent breadths of absorption lines. D. H. MENZEL (Astrophys. J., 1936, **84**, 462—473). L. S. T.

Presence of molecular hydrogen in sun-spots. I. G. PICCARDI (Atti R. Accad. Lincei, 1936, [vi], **24**, 212—215).—The conclusions of Swings (A., 1934, 471) are criticised. Both the experimental data of Langmuir and calculations based on Russell's formula show that the concn. of mol. H_2 in sun-spots is appreciable. O. J. W.

Forbidden transition in the spectrum of interstellar ionised titanium. T. DUNHAM, jun. (Nature, 1937, **139**, 246—247).—The ultra-violet spectra of certain stars indicate the presence in interstellar space of ionised Ti with a mean life-time up to several weeks. L. S. T.

Spectrum of the twilight sky. V. TSCHERNIAEV and M. VUKS (Compt. rend. Acad. Sci. U.R.S.S., 1937, **14**, 77—79).—An intense emission at λ 5890 was observed in the spectra of the morning and evening twilight sky and night sky, attributed to H_2O vapour present at great heights. Owing to low dispersion in the green of the spectrograph used, the identity of a faint emission at λ 5610 in the twilight with the line λ 5577 in the night sky could not be established. R. C. M.

Sources of asymmetry in X-ray diffraction grating and refraction measurements. R. C. SPENCER (Physical Rev., 1935, [ii], **48**, 478). L. S. T.

Effect of chemical combination on X-ray emission spectra. J. VALASEK (Physical Rev.,

1935, [ii], **48**, 473).—An extension of previous work (A., 1935, 1046) to Na_2S, CdS, and AgCl.   L. S. T.

K **Absorption spectra of nickel. II.** T. HAYASI (Sci. Rep. Tôhoku, 1936, **25**, 606—620; cf. A., 1936, 1169).—The absorption edges of Ni in $NiCO_3$ and $Ni(OH)_2$ show only one step, corresponding approx. with the short-wave K_2 edge of pure Ni, whilst those of NiAl and NiSn, which also show only one step, correspond with the K_1 edge of pure Ni. Ni_2O_3 shows two absorption edges, one corresponding with the K_2 edge of Ni. The fine structures of the immediate vicinity of the edges differ for the different compounds, indicating differences in energy vals. of the outer electrons. The K_1 absorption edge of Ni is associated with the $K\beta_5$ absorption line, indicating the existence of the quadripole selection law in absorption processes.
J. W. S.

Extra lines of the *K* spectra of nickel and copper. T. HAYASI (Sci. Rep. Tôkoku, 1936, **25**, 785—803).   H. J. E.

X-**Ray *K* absorption spectrum of copper.** T. HAYASI (Sci. Rep. Tôhoku, 1936, **25**, 661—685).—Measurements with Cu, Cu–Ni, α- and β-brass, $CuCO_3$, CuO, Cu_2O, and $CuSO_4.NH_3$ are recorded, variations in the fine structure being discussed.   H. J. E.

Magnitude of the *K* absorption discontinuity for tin and for silver. E. L. HARRINGTON and G. A. WIENSHALL (Physical Rev., 1935, [ii], **48**, 477).
L. S. T.

Auger effect for the *L* level of xenon and krypton. J. C. BOWER (Proc. Roy. Soc., 1936, **A**, **157**, 662—667).—A study has been made of the efficiency of emission of *L* series fluorescence radiation from Xe and Kr, using an expansion chamber. The efficiency is about 20% for Xe and 8% for Kr.
L. L. B.

L **Spectra of iron above the Curie point.** S. S. SIDHU (Indian J. Physics, 1936, **10**, 421—428; cf. Hamer and Sidhu, A., 1928, 1298).—Vals. of the crit. potentials of Fe between 7·15 and 125·8 volts determined at 825° agree within experimental error with those measured by Thomas below the Curie point of Fe (A., 1926, 104).   O. D. S.

L **Absorption spectrum and characteristic levels of mercury.** (MLLE.) Y. CAUCHOIS (Compt. rend., 1937, **204**, 122—125; cf. A., 1935, 676, 800).—Data are given for red HgO, $HgCl_2$, and Hg. Characteristic frequencies of Hg are calc.   A. J. E. W.

Weak emissions in the *L* spectrum of rhenium (75). (MLLE.) Y. CAUCHOIS (Compt. rend., 1937, **204**, 255—257; cf. A., 1936, 1169).—λλ of 21 lines are recorded and classified.   A. J. E. W.

Cathode sputtering in arc discharges. L. R. KOLLER (Physics, 1936, **7**, 225—231).—In the positive column the no. of Th atoms per positive ion sputtered from a thoriated W filament in Hg vapour increases with rise of the filament temp. and with decrease of arc current. The threshold is approx. 35 volts. In the cathode discharge, the relative effectiveness of the ions is Ne > A > Hg. The threshold for sputtering Ba from a cold oxide-coated filament in Ne is approx. 45 volts, and that for Ba from

a hot W filament is <14 volts in A and <15 volts in Ne.   J. G. A. G.

The electron : its intellectual and social significance. K. T. COMPTON (Nature, 1937, **139**, 229—240, and Science, 1937, **85**, 27—37).—An address.
L. S. T.

Energy states of valency electrons in some metals. I (3). The stationary states of valency electrons in zinc crystal. M. SATÔ (Sci. Rep. Tôhoku, 1936, **25**, 771—779; cf. A., 1936, 1316).
H. J. E.

Dissociation of NO and HCl by electron impact. E. E. HANSON (Physical Rev., 1935, [ii], **48**, 476).—Kinetic energies and heats of dissociation of the various processes are summarised.   L. S. T.

Absorption of electrons [in lead]. S. H. NEDDERMEYER and C. D. ANDERSON (Physical Rev., 1935, [ii], **48**, 486).   L. S. T.

Motions of electrons in gases in electric and magnetic fields. L. G. H. HUXLEY (Phil. Mag., 1937, [vii], **23**, 210—230).—Theoretical. A new method shows that the val. of *g* in the equation $w = g(Xe/m)(\bar{l}/U)$ for the mean velocity of drift, *w*, of a group of electrons in the direction of electric force, *X*, is 0·667 instead of 1. Revised formulæ are derived for the velocity of drift when both electric and magnetic fields are applied.   A. J. M.

Theory of motion of electrons in crossed electric and magnetic fields with space charge. S. V. BELLUSTIN (Physikal. Z. Sovietunion, 1936, **10**, 251—256).—The work of Braude (A., 1935, 1294; cf. A., 1936, 540) is criticised on the ground that the conclusions are contained in the assumptions. The case when the magnetic field is > a crit. val. and the electrons do not reach the anode is considered.
A. J. M.

Motion of electrons in crossed electric and magnetic fields with space charge. S. J. BRAUDE (Physikal. Z. Sovietunion, 1936, **10**, 429—430; cf. A., 1935, 1294).—A reply to Bellustin (preceding abstract).   O. D. S.

Velocity distribution of electrons in a high vacuum under the influence of a magnetic field. I. M. VIGDORTSCHIK (Physikal. Z. Sovietunion, 1936, **10**, 245—250).—The effect of a magnetic field of strength > a crit. val. on an electrode in the region of, or between, the anode–cathode system is to cause a stream of electrons to flow to this electrode, especially if it has a negative potential with respect to the cathode.   A. J. M.

Passage of heavy and light hydrogen ions through argon. F. WOLF (Ann. Physik, 1937, [v], **28**, 361—374; cf. this vol., 3).—The variation with velocity of the charge transference cross-section, *I*, and of effective cross-section was determined from 30 to 1200 volts for $D^+ \to A$ and for $D_2^+ \to A$. The curve of *I* against linear ion velocity for D^+ is identical with that for H^+ at high velocities. The max. val. of *I* at low velocity for D^+ is > for H^+, but occurs at the same velocity. The differences between the D^+ and H^+ curves can be explained by the theory of Massey and Smith (A., 1933, 1223). The effective

cross-section of $D^+ \to A$ is equal to I at high velocities. O. D. S.

Dependence of mobility of ions in pure gases on temperature. L. G. H. HUXLEY (Phil. Mag., 1937, [vii], **23**, 208—210).—The variation of mobility (k_p) of ions in pure gases with abs. temp. (T) is represented with considerable accuracy by the formula $k_p = AT^{\frac{1}{2}}/(C + T)$, due to Sutherland ($A$ and C const.). The formula is tested with the experimental data of Tyndall et al. (A., 1935, 909) for N ions in N_2, Cs ions in He, and Na ions in He. A. J. M.

Scattering of potassium ions by mercury vapour. A. G. ROUSE (Physical Rev., 1935, [ii], **48**, 476).—With K^+ ions with energies between 20 and 300 e.v. scattering in the forward direction predominates. L. S. T.

Scattering of high-energy protons by oxygen nuclei. M. G. WHITE (Physical Rev., 1935, [ii], **48**, 481).—Rutherford scattering is probably quite adequate to explain the results obtained with protons of 800 to >1000 kv. energy. Scattering decreases rapidly with an increase in the angle of scattering and increasing energy of the incident proton. L. S. T.

Energy of formation of negative ions in oxygen. L. B. LOEB (Physical Rev., 1935, [ii], **48**, 484).—This energy lies between 0·06 and 0·34 volt, the higher val. being the more probable. L. S. T.

Absorption of positive rays. A. ROSTAGNI (Ric. sci. Prog. tec., 1935, [ii], **6**, 185—186; Chem. Zentr., 1936, i, 1800).—The higher vals. for the effective area in the neutralisation of He^+ found by Wolf (A., 1935, 1048) are attributed to experimental error. J. S. A.

Seventh report of the At. Wt. Commission of the International Union for Chemistry. G. P. BAXTER, O. HÖNIGSCHMID, and P. LEBEAU (Ber., 1937, **70**, [A], 43—56).—The report covers the period 30.9.35 to 30.9.36. The following changes are recommended : C, 12·00 to 12·01; Rb, 85·44 to 85·48; Gd, 157·3 to 156·9; Pb, 207·22 to 207·21; U, 238·14 to 238·07. H. W.

At. wt. of aluminium. J. I. HOFFMANN and G. E. F. LUNDELL (J. Res. Nat. Bur. Stand., 1937, **8**, 1—18).—The at. wt. of Al, determined by converting the metal into $Al(OH)_3$ or $Al_2(SO_4)_3$ and heating to yield Al_2O_3, which was ignited at 1200—1300°, is $26·974 \pm 0·002$. J. W. S.

Radioactive isotope of potassium. W. R. SMYTHE and A. HEMMENDINGER (Physical Rev., 1937, [ii], **51**, 178—182).—^{39}K, ^{40}K, and ^{41}K have been separated by means of a high-intensity mass spectrometer, and activity measurements show that only ^{40}K is radioactive. Comparison of the β-ray emission from the isotopic samples and from KCl shows that ^{40}K is responsible for both of the known β-ray bands. N. M. B.

Loss of energy by α-particles in hydrogen. K. C. KAR and K. K. MUKHERJEE (Phil. Mag., 1937, [vii], **23**, 230—239).—Mathematical. Expressions are derived for the loss of energy by α-particles on coming into the field of a normal H atom, such energy being used for excitation and ionisation. A. J. M.

α[-Ray] magnetic spectra in the actinium series. S. ROSENBLUM, M. GUILLOT, and (MLLE.) M. PEREY (Compt. rend., 1937, **204**, 175—177; cf. A., 1936, 657).—Data for RdAc and Ac-X, obtained by an improved method, are recorded and discussed. A. J. E. W.

Determination of velocities of α-particles from their range, and the relation to the number of ion-pairs produced. S. MEYER (Sitzungsber. Akad. Wiss. Wien, 1935, [iia], **144**, 317—330; Chem. Zentr., 1936, i, 1798—1799).—The Geiger formula is applicable to rays with ranges from 3 to 11 cm. The initial energy required to leave the atom is about 50,000 e.v. The relation between the ranges and the no. of ion-pairs, n, can be applied only roughly to a restricted range, due to deviations from the Geiger formula and to the rise of the ratio n : energy of particle with increasing velocity. J. S. A.

Mass spectrum of positive rays from radium-C'. L. WISSGOTT (Sitzungsber. Akad. Wiss. Wien, 1935, [iia], **144**, 227—241; Chem. Zentr., 1936, i, 1798).—The long-range radiation from Ra-C' is identified as α-particles from its e/m val. $= 1/2$. Comparison with the spectrum of the 6·96-cm. rays from Ra-C' shows the proportion of 9-cm. rays to be 25 per million. Natural H-rays have been recorded photographically. J. S. A.

Number of α-particles emitted from uranium. R. SCHIEDT (Sitzungsber. Akad. Wiss. Wien, 1935, [iia], **144**, 191—211; Chem. Zentr., 1936, i, 1798).—The emission from U_3O_8 is $1·258$—$1·270 \times 10^4$ α-particles per sec. per g. of U I. J. S. A.

Counting of α-particles from uranium. F. HECHT (Sitzungsber. Akad. Wiss. Wien, 1935, [iia], **144**, 213—215; Chem. Zentr., 1936, i, 1798).—The microchemical determination of the wt. of U involved in Schiedt's experiments (cf. preceding abstract) is discussed. J. S. A.

Relation between the half-lifetimes and the at. wts. of the β-ray emitters. H. H. GOLDSMITH (Physical Rev., 1935, [ii], **48**, 478).—Analysis of recent data reveals several regularities connecting half-life, at. no., and at. wt. of nuclei. L. S. T.

Equidistant energy levels in the nuclei of radioactive bodies. S. ROSENBLUM and M. GUILLOT (Compt. rend., 1937, **204**, 345—346; see above).—Regularities in e.v. multiples similar to those found for α-transformations are reported for β-transformations of Th-C and Th-C''. N. M. B.

Secondary radiation from the β-rays of radium-E. G. F. VON DROSTE (Z. Physik, 1937, **104**, 335—356).—Absorption curves in Pb of the secondary radiation produced by β-rays from Ra-E in elements of different at. no. were obtained with a Geiger–Müller counter. The spectrum of the secondary radiation appears to be independent of the nuclear charge of the scattering element and is similar to that of the γ-radiation of Ra-E, which is regarded as an internal secondary radiation produced by the β-rays. Results are compared with the calculations of Bethe and Heitler. H. C. G.

Inner absorption of γ-rays in the L shell. E. STAHEL (Helv. phys. Acta, 1935, **8**, 651—664;

Chem. Zentr., 1936, i, 1799).—The inner absorption coeff. for the γ-radiation of Ra-D is calc. from the no. of excited L shells, as calc. from the emission of L quanta and the known fluorescence yield for L radiation. The absorption coeff. found (17·1) differs entirely from those calc. for dipole (1·8) or quadrupole (2·9) radiation. J. S. A.

Emission of neutrons by minerals. P. DE LA CIERVA (Anal. Fís. Quím., 1936, **34**, 766—769).— Spontaneous emission of neutrons could not be observed with beryl, albite, gadolinite, hambergite, chrysoberyl, cyrtolite, or Canadian pitchblende.
F. R. G.

Back-scattering of neutrons and the production of spaces with high neutron concentration. H. R. VON TRAUBENBERG and H. ADAM (Z. Physik, 1937, **104**, 442—447; cf. this vol., 58).—The possibility of preparing an enclosed space containing neutrons free from other disturbing matter is indicated.
H. C. G.

Energy and intensity of the groups of neutrons emitted from Po + Be. I, II. G. BERNARDINI and D. BOCCIARELLI (Atti R. Accad. Lincei, 1936, [vi], **24**, 59—64, 132—138).—I. The emission of two groups of neutrons from Po + Be with max. energies of 4 and 7·5—8 e.v. has been confirmed. The emission of a third group with max. energy of 6·5 e.v. seems probable.
II. Further evidence is given that three groups of neutrons are emitted by Po + Be. O. J. W.

Absorption of slow neutrons. E. AMALDI and E. FERMI (Ric. sci. Prog. tec., 1935, [ii], **6**, 344—347; Chem. Zentr., 1936, i, 2030—2031).—The selective absorption effect is confirmed for B, Ce, Mn, Br, Rh, Ag, Ir, I, and Hg, using neutrons from Mn, Br, Rh, Ag, In, I, and Ir. J. S. A.

Absorption of slow neutrons. B. PONTECORVO (Ric. sci. Prog. tec., 1935, [ii], **6**, 145—148; Chem. Zentr., 1936, i, 1795—1796).—Measurements on Li, B, Cl, Rh, Ag, and Cd show that each nuclear type absorbs neutrons of certain velocities preferentially, giving "neutron absorption bands." Neutron absorption in Gd is accompanied by emission of γ-rays : the collision area of the Gd nucleus is 3000×10^{-24} sq. cm. J. S. A.

Capture of slow neutrons in hydrogenous substances. W. E. LAMB, jun. (Physical Rev., 1937, [ii], **51**, 187—190).—Mathematical. A study of the effect of the chemical binding of the proton in hydrogenous substances on the capture of slow neutrons shows that, in contrast with scattering cross-section, no change is made by this in the radiative capture cross-section. N. M. B.

Resonance levels of neutrons in silver nuclei. C. Y. CHAO and C. Y. FU (Chinese J. Physics, 1936, **2**, 135—144; cf. A., 1936, 1173).—Using a thinner Ag scatterer to avoid multiple scattering, the β-activity induced in Ag by absorption of resonance neutrons and the apparent absorption coeff. of the neutrons are measured. Taking into account the variation of the capture cross-section within the absorption region, the total effective width of the resonance levels is calc. For the range 1·0—0·10 for one half of the half-val.

width, the average spacing between adjacent levels is of the order 800—80 volts, in good agreement with Bethe's theoretical estimate (cf. A., 1936, 1175).
N. M. B.

Scattering of slow neutrons by heavy atoms. J. H. VAN VLECK (Physical Rev., 1935, [ii], **48**, 475).
L. S. T.

Radioactivity induced in lithium by neutrons. J. VELDKAMP and K. S. KNOL (Physica, 1937, **4**, 166—170; cf. A., 1936, 542).—Saturated aq. $LiNO_3$ was circulated and bombarded with slow neutrons. The radioactive material produced has a half-life of $0·8 \pm 0·2$ sec. H. J. E.

Experiments on lithium, boron, and deuterium. K. D. ALEXOPOULOS (Helv. phys. Acta, 1935, **8**, 601—636; Chem. Zentr., 1936, i, 1797; cf. A., 1936, 6).—By the bombardment of Li with 140-kv. protons, α-rays are produced. The yield of γ-rays, q, in the process is <1 quantum per two disintegrations. With deuteron bombardment, q is <1 in 8. For B, q is $<\frac{1}{2}$. J. S. A.

Attempt to detect radioactivity produced by positrons. G. P. THOMSON and J. A. SAXTON (Phil. Mag., 1937, [vii], **23**, 241—246).—Borax, B_2O_3, Be, MgO, LiF, graphite, and NaF were bombarded by positrons produced in Pb by materialisation of hard γ-rays from RaTh. No induced radioactivity was observed, a result to be expected on the neutrino hypothesis. Some abnormalities in the working of certain counters are noted. A. J. M.

Angular distribution of the transmuted nuclei in transmutation of light nuclei by hydrogen positive rays. I. H. NEUERT (Physikal. Z., 1937, **38**, 122—126).—The distribution in a plane through the positive rays was determined. In the nuclear reaction $^2_1D + ^2_1D \rightarrow ^3_1H + ^1_1H$, the transmuted particles were 1·6 times more frequent in and opposite to the direction of the positive rays than in a direction perpendicular to this. In the process $^6_3Li + ^2_1D \rightarrow ^7_3Li + ^1_1H$, no dependence of the efficiency on the direction of the transmuted nuclei was found over the angular range 40—140°. The frequency in the case of $^{11}_5B + ^1_1H \rightarrow ^8_4Be + ^4_2He$ shows a min. at 90°, and at 30° is 1·8 times > at 90°. A. J. M.

Short-lived β-radioactivity. H. R. CRANE, L. A. DELSASSO, W. A. FOWLER, and C. C. LAURITSEN (Physical Rev., 1935, [ii], **48**, 484).—Bombardment of B and Li with deuterons gives ^{12}B and ^8Li with half-lives $0·02 \pm 0·01$ and $0·5 \pm 0·1$ sec., respectively. These disintegrations are probably accompanied by proton emission. L. S. T.

Nucleus ^8_4Be. R. DE L. KRONIG (Physica, 1937, **4**, 171—174).—A discussion of the properties of ^8_4Be on the basis of its containing two α-particles in the nucleus. H. J. E.

Nuclear γ-radiation of beryllium. F. KOCH and F. RIEDER (Sitzungsber. Akad. Wiss. Wien, 1935, [iia], **144**, 331—337; Chem. Zentr., 1936, i, 2032).—Wilson chamber experiments in a magnetic field are described. Equipartition of energy occurs in the formation of electron–positron pairs, and the energy distribution of the electrons and positrons reveals 5 (possibly 8) γ-ray lines. J. S. A.

Transmutation of beryllium by γ-rays. V. I. MAMASACHLISOV (Physikal. Z. Sovietunion, 1936, **10**, 214—218).—A formula is derived for the effective cross-section of the nuclear photo-effect in Be with respect to the energy of the incident γ-rays. There is satisfactory agreement with experiment.   A. J. M.

Passage of fast neutrons through beryllium. L. I. RUSINOV (Physikal. Z. Sovietunion, 1936, **10**, 219—222).—The artificial radioactivity induced in Ag by neutrons from a Be–Rn source placed within a Be cylinder is 10% > when the source is enclosed in a C cylinder. The effect is due to the disintegration of Be by neutrons, the effective cross-section of the process being approx. 10^{-25} sq. cm.   A. J. M.

Disintegration of beryllium by protons. J. S. ALLEN (Physical Rev., 1937, [ii], **51**, 182—186).— The yield curves for thick and thin Be targets and the ratio of the no. of α-particles and deuterons ejected from the targets have been determined for 45—125 kv. The ranges of both groups of particles were 7·1 mm. From the energy relations the mass of ^{8}Be was 8·0074. The experimental effective collision area was of the same magnitude as that predicted by Gamow's theory of the penetration of a potential barrier by protons of zero angular momentum.   N. M. B.

Nuclear photo-effect in beryllium. L. I. RUSINOV and A. N. SAGAIDAK (Physikal. Z. Sovietunion, 1936, **10**, 203—213).—A method of determining the no. of neutrons emitted from a neutron source (α-rays + Be, and γ-rays + Be) based on the determination of the artificial radioactivity induced in I, Ag, Rh, and Mn is described. The effective cross-sections for the transmutation of Be by γ-rays from Rn were calc. Two vals. for the effective cross-section for the Be photo-effect for γ-rays of different energies were also calc. The theory of the nuclear photo-effect in D derived by Bethe and Peierls (A., 1935, 279) is applied to Be, and there is satisfactory agreement between theory and experiment if the neutron in Be is in the p-level.
   A. J. M.

Radioactivity of oxygen, silicon, and phosphorus. H. W. NEWSON (Physical Rev., 1935, [ii], **48**, 482; cf. A., 1936, 132).—After bombardment with 3·2-mv. deuterons Si and P become radioactive; half-life, 170 min. and 14·5 days, respectively. Reactions, confirmed by chemical analysis, are $^{30}Si + {}^2D \rightarrow {}^{31}Si + {}^1H$ and $^{31}P + {}^2D \rightarrow {}^{32}P + {}^1H$. The max. ranges in Al of the electrons from ^{31}Si and ^{32}P are 0·616 and 0·712 g. per sq. cm., respectively.   L. S. T.

Radiations emitted from artificially produced radioactive substances. III. β-Ray spectrum of ^{32}P. H. C. PAXTON (Physical Rev., 1937, [ii], **51**, 170—177; cf. A., 1936, 542).—The high-energy portion of the distribution of β-rays from ^{32}P, investigated by means of a H_2-filled cloud chamber in a magnetic field, followed a Konopinski–Uhlenbeck distribution (cf. A., 1935, 1048) for approx. 5875— 6950 $H\rho$, after which there is a sharp deviation near the high energy limit. Regular distribution was found for the low-energy part of the spectrum

obtained from a very thin source at the centre of the expansion chamber.   N. M. B.

Formation of radio-phosphorus (^{30}P). J. R. S. WARING and W. Y. CHANG (Proc. Roy. Soc., 1936, A, **157**, 652—661).—The formation of ^{30}P from Al by bombardment with α-particles has been studied for different energies of α-particles and for both thin and thick targets. The observed resonance levels are compared with those found for proton emission. The experimental results are consistent with Bohr's theory of the formation of intermediate products (A., 1936, 403).   L. L. B.

Artificial radioactivity produced by γ-rays. W. BOTHE and W. GENTNER (Naturwiss., 1937, **25**, 90).—γ-Rays of 17 e.mv. obtained from Li by bombardment with protons of energy >450 kv. were used to obtain radioactive substances from Cu, Br, and P by means of the nuclear photo-effect. ^{63}Cu gave ^{62}Cu of half-life 11 min. The substance obtained from Br had half-life 18 min., the same as that of ^{80}Br formed also by the taking up of slow neutrons by ordinary Br ($^{79}Br + {}^{81}Br$). P gives a weak radioactivity of half-life 2—3 min., probably due to ^{30}P. In each case the radioactivity may be assumed to be due to the splitting off of a neutron. For Cu and Br it was shown that the activity followed the resonance curve of the Li γ-radiation as the proton energy was raised.   A. J. M.

Preparation of new isotopes by the nuclear photo-effect. W. BOTHE and W. GENTNER (Naturwiss., 1937, **25**, 126; cf. preceding abstract).— Some previously unknown radioactive isotopes have been obtained by bombarding elements with Li γ-radiation. ^{78}Br, ^{106}Ag, and ^{120}Sb (?) have half-life periods 3·5 min., 24 min., and 13 min., respectively.   A. J. M.

Radioactivity of cobalt, nickel, copper, and zinc induced by neutrons. F. A. HEYN (Physica, 1937, **4**, 160—165; cf. this vol., 5).—Vals. are given for the periods of activities induced in Co, Ni, Cu, and Zn by neutrons of various velocities. The activity of Cu and Zn when irradiated by fast neutrons was shown chemically to be due to isotopes $^{62}_{29}Cu$ and $^{65}_{30}Zn$, respectively, the formation of which entails the production of 2 neutrons.   H. J. E.

Experimental test of the super-nova hypothesis. Intensity of cosmic rays in the earth's crust. J. CLAY, C. G. 'T HOOFT, L. J. L. DEY, and J. T. WIERSMA (Physica, 1937, **4**, 121—137).— A group of very hard rays was detected. The decrease in magnitude of the Hoffmann bursts with increasing depth shows them to have a sp. ionisation about 1% of the ionisation of high-energy electrons. The burst-producing rays may be neutrons. Bursts and showers are essentially different.   H. J. E.

Ionisation in gases by γ-rays and ultra-radiation. J. JUILFS and V. MASUCH (Z. Physik, 1937, **104**, 458—467).—The ionising power of radioactive γ-rays and ultraradiation in the inert gases, air, H_2, O_2, and CO_2 has been measured. Whilst the ionising power of the hard components of ultra-radiation $\propto$ gas density, that of radioactive radiation

increases more rapidly than proportionality to density requires.　　　L. G. G.

Continuous variation of the cosmic-ray intensity in the higher layers of the troposphere. S. ZIEMECKI and K. NARKIEWICZ-JODKO (Bull. Acad. Polonaise, 1936, A, 318—326).—A continuous increase with altitude in the ionisation due to cosmic rays was observed between 6650 and 10,000 m. during a balloon flight. This result is not in agreement with that of Suckstorff (A., 1931, 282). The increase is more rapid than that described by Kolhörster and the ionisation curve shows no sharp max. in the mass absorption coeff.　　　O. D. S.

Absorption of cosmic radiation in matter. A. W. NYE (J. Franklin Inst., 1937, 223, 173—178).—Absorption measurements made with triple-coincidence Geiger counters, near sea level, for cosmic radiation in H_2O, coal, $CuSO_4$, FeS, sand, and $BaSO_4$ show that the coeff. of absorption is not strictly $\propto$ density, divergence being found for substances of higher at. no. The coeffs. per bound electron were const. Showers followed the direction of the primaries, with max. for increasing thickness of shower-producing matter at about 50—100 g. per sq. cm. of material.　　　N. M. B.

Passage of cosmic-ray particles through screens. J. CRUSSARD and L. LEPRINCE-RINGUET (Compt. rend., 1937, 204, 240—242).—The losses of energy of cosmic particles on passing through 1 cm. of Pb were measured, using the large Bellevue electromagnet. Electrons suffered greater losses than positrons.　　　A. J. E. W.

Angular distribution of hard corpuscular cosmic rays. P. AUGER, P. EHRENFEST, jun., A. FREON, and A. FOURNIER (Compt. rond., 1937, 204, 257—259).—The variation of the intensity of the rays with their angle with the vertical was studied. The results are discussed.　　　A. J. E. W.

Ionisation measurements on swarms produced in lead by cosmic radiation. B. ROSSI and R. BOLDRINI (Ric. sci. Prog. tec., 1935, [ii], 6, 327—338; Chem. Zentr., 1936, i, 2033).—The independent measurement of Hoffmann collisions and the accompanying swarms is described.　　　J. S. A.

Theory of the deuteron; proton–neutron interaction with an exponential course. T. KAHAN (Compt. rend., 1937, 204, 414—416).—Mathematical.　　　A. J. E. W.

Self-consistent field, with exchange, for Cu⁺. D. R. HARTREE and W. HARTREE (Proc. Roy. Soc., 1936, A, 157, 590—502; cf. A., 1936, 1046).—Foch's equations for the self-consistent field, with exchange, for Cu⁺ have been solved. The work is complicated by the extreme sensitiveness of the $(3d)^{10}$ group. As in Cl⁻, the main features of the effect of the exchange terms are a considerable contraction of the outermost (nl) groups, and a comparatively small alteration of the other groups of the outer shell. The calc. diamagnetic susceptibility is in good agreement with experiment.　　　L. L. B.

Theoretical derivation of the Fermi constant. K. BECHERT (Naturwiss., 1937, 25, 73).—The universal const. g occurring in Fermi's theory of the spon-

taneous β-decomp. of a nucleus (A., 1934, 579) has been calc. to be 4·06, 3·54, and 3·6 (all $\times 10^{-50}$) erg cm.³, according to the different assumptions made. The last two are considered the most likely.　　　A. J. M.

Effect of nuclear motion in the Dirac equation. I. S. LOWEN (Physical Rev., 1937, [ii], 51, 190—194). —Mathematical. Relativistic corrections to the Dirac equation are derived. The result, for a 1s electron, agrees with that obtained from the Schrödinger treatment.　　　N. M. B.

Laws of distribution of velocities of particles undergoing emission and absorption in a radiation field. J. KISHEN (Indian J. Physics, 1936, 10, 413—419).—Theoretical. It is shown that the general distribution law of velocities of particles moving in a radiation field is a Fermi–Dirac law or a Bose–Einstein law according as the particles have antisymmetric or symmetric wave functions. The application of these theorems to metal physics is discussed.　　　O. D. S.

Relativistic interaction of two electrons in the self-consistent field method. (MISS) B. SWIRLES (Proc. Roy. Soc., 1936, A, 157, 680—696).—The interaction of the spins of the electrons and the effect of retardation are introduced into the relativistic self-consistent field method, which is then applied to the evaluation of the separations of the components of the 2^3P term of He.　　　L. L. B.

Nuclear spins and magnetic moments in the Hartree model. M. E. ROSE and H. A. BETHE (Physical Rev., 1937, [ii], 51, 205—213).—From the data of Feenberg (cf. this vol., 109) for the wave function and term character of the ground state of light nuclei, nuclear spins and magnetic moments are calc. for 15 nuclei ^6Li—^{15}O.　　　N. M. B.

Magnetic moment of the neutron. J. G. HOFFMAN, M. S. LIVINGSTON, and H. A. BETHE (Physical Rev., 1937, [ii], 51, 214—215).—An attempt to observe the magnetic moment of the neutron through its selective scattering from magnetised Fe gave an effect 3·3 times the mean error, in agreement with that obtained from an evaluation of Bloch's theory (cf. A., 1936, 1173).　　　N. M. B.

Theory of light nuclei. H. DOLCH (Z. Physik, 1937, 104, 473).—A correction to previous work (A., 1936, 918).　　　H. C. G.

Production of electromagnetic waves by neutrinos. J. GÉHÉNIAU (Compt. rend., 1937, 204, 235—237; cf. this vol., 60).—Mathematical.　　　A. J. E. W.

Limiting electric charge of very fine particles. M. PAUTHENIER and C. MARTIN (Compt. rend., 1937, 204, 239—240).—Results for particles of diameter 2—20 μ are in agreement with theory.　　　A. J. E. W.

Photo-electric spectrophotometry. G. KORTÜM (Angew. Chem., 1937, 50, 193—204).—A survey is given of the suitability of subjective, photographic, and photo-electric methods of measurement in various analytical and physicochemical processes, the order of accuracy required being correlated with the errors of each method. Particular attention is directed to

photo-electric methods, and precision instruments (direct-throw, compensation, and substitution) are described. Errors due to effect of spectral impurity of light source on the extinction coeff. are discussed and the suitability of different types of photo-cell (boundary-layer, Se, alkali, and vac.) is examined from the point of view of temp. coeff., fatigue, lag (light sources of alternating intensity), and variation in response due to inhomogeneity of the cathode surface. Precision methods for varying light intensity, and methods of amplification of the photo-electric current, are discussed critically. L. G. G.

Inner effect in the ultra-violet. P. TARTAKOVSKI (Bull. Acad. Sci. U.R.S.S., 1936, 611—618; cf. this vol., 114). O. D. S.

Intermolecular forces responsible for pressure broadening of band lines. W. W. WATSON (J. Physical Chem., 1937, **41**, 61—65).—Besides the effects due to collision and van der Waals forces, the pressure broadening observed in the spectra of polar gases may be increased by dipolar forces. J. W. S.

Spectra of diatomic molecules. R. S. MULLIKEN (J. Physical Chem., 1937, **41**, 5—45).—A comprehensive survey. J. W. S.

Spectra of diatomic molecules of elements of the fifth group. G. M. ALMY (J. Physical Chem., 1937, **41**, 47—56).—The spectra of N_2, P_2, PN, AsN, As_2, Sb_2, and Bi_2 mols. are described and discussed. J. W. S.

Nomenclature and symbols for polyatomic molecules. R. S. MULLIKEN (J. Physical Chem., 1937, **41**, 159—173).—Standardised nomenclature for describing the spectra and energy levels of polyat. mols. is suggested. J. W. S.

Comparison of some ultra-violet absorption spectra of polyatomic molecules with those of diatomic molecules. W. A. NOYES, jun. (J. Physical Chem., 1937, **41**, 81—89).—Dissimilarities between the electron states of CO and of the CO: group are pointed out. The agreement between the frequencies does not prove that the types of linkage are identical. The frequencies of double and triple linkages between C, N, and O in other groups are compared with those for the corresponding diat. mols. Such groups show characteristic frequencies for upper electron states just as for the ground states observed in Raman and infra-red spectra. J. W. S.

Emission of ultra-violet rays during slow decomposition of azides. R. AUDUBERT and H. MURAOUR (Compt. rend., 1937, **204**, 431—432; cf. A., 1933, 764; 1936, 407).—Radiation was detected with a CuI photon counter during thermal decomp. of azides of Na, K, Pb, and Ag (strong emission), and Ca and Ba (weak emission). A. J. E. W.

Decomposition of polyatomic molecules by Schumann radiation. G. G. NEUIMIN and A. N. TERENIN (Bull. Acad. Sci. U.R.S.S., 1936, 529—558).—The fluorescence under the action of Schumann radiation of a no. of compounds in the vapour state has been investigated. I_2 emits the line 2062 A. of at. I. TlCl emits the spectrum of at. Tl. H_2O,

MeOH, EtOH, HCO_2H, and AcOH emit bands of the OH radical. McCN emits the CN bands. NH_3 and N_2H_4 emit the α-bands of NH_3; this emission is ascribed to an excited NH_2 radical. Band emissions in the visible were observed with CO and HCO_2H, the latter being ascribed to the HCO radical. The emission of the excited OH radical is quenched strongly by CO and H_2. N_2 and A have little effect. The emission of the CN radical is quenched by N_2, the quenching of the 0—0 band being > that of the band 1—1. The emission of the NH_2 radical is approx. equally quenched by N_2, H_2, and A. O. D. S.

Fourth positive group bands of the carbon monoxide molecule in the Schumann region. V. M. TSCHULANOVSKI and B. I. STEPANOV (Physikal. Z. Sovietunion, 1936, **10**, 292—314; cf. Read, A., 1934, 1287).—Seven bands of the fourth positive group of CO have been measured and analysed. Rotational consts. of the CO mol. are determined. Perturbations were observed in all bands. O. D. S.

Red degraded bands of carbon monoxide in the neighbourhood of 2670-3310 A. R. SCHMID and L. GERÖ (Naturwiss., 1937, **25**, 90).—The strongest band of this type is at 2670 A. A. J. M.

Intense emission photographs of the $a^3\Pi$–$x^1\Sigma$ (Cameron) intercombination bands of carbon monoxide with high dispersion. R. SCHMID and L. GERÖ (Naturwiss., 1937, **25**, 90).—The $a^3\Pi$–$x^1\Sigma$ inter-combination bands of CO were obtained with sufficient intensity to be photographed by passing the discharge between C electrodes in Ne. The 0—0, 0—1, 0—2, 1—3, 0—3, 1—4, 2—5, 3—6, 4—7, and 4—8 bands were identified, the first three being particularly strong. A. J. M.

Thermal equilibrium of the gas in the direct-current carbon arc. W. T. GRAY (Physical Rev., 1935, [ii], **48**, 474).—The rotational temp. of $(CN)_2$ mols. has been determined. The relative intensities of the rotational lines show a Maxwell–Boltzmann distribution of rotational energies in the (0, 0) 3883 A., and (0, 1) 4216 A. CN bands. The temp. corresponding with this distribution is 5300±300° abs. over the range 7 to 21 amp. L. S. T.

Optical excitation of HgH and CN bands. L. O. OLSEN (Physical Rev., 1935, [ii], **48**, 476).—When irradiated by light from an Hg + H_2 or Hg + He discharge, Hg vapour in presence of 0·01 mm. of H_2 and approx. 3 mm. of N_2 gives a weak excitation of $^2\Pi$–$^2\Sigma$ HgH bands. The HgH mol. in its normal state dissociates quickly and the bands are obtained only when the 6^3P states of Hg are excited. L. S. T.

So-called pressure effect in the spectra of hydrides. E. OLSSON (Z. Physik, 1937, **104**, 402—406).—The spectra of AlH and CaH are discussed. A. E. M.

Isolated group of lines in the spectrum of CH and CD. E. FAGERHOLM (Naturwiss., 1937, **25**, 106—107).—The isolated group of lines at 4324 A. occurs in the spectrum of a Meker flame, but disappears in active N_2 mixed with C_2H_2. That the group is, however, due to CH has been shown by comparing the spectra of CH and CD. There is a

displacement of the group from 4323 A. for CH to 4319·7 A. for CD, and there is also a difference in the character of the spectrum, the group for CH being composed of a few lines, whilst that for CD has a better developed band structure.   A. J. M.

Band spectrum of cobalt hydride. A. HEIMER (Z. Physik, 1937, **104**, 448—457).—The emission spectrum of Co in H_2 at 2300—2400° shows two groups of lines ascribed to CoH mols. The band at λ 4492 has P, Q, and R branches; that at λ 4203 is similar but much fainter. Full data for both bands are given and discussed in relation to their origin in the CoH mol.   H. C. G.

Band spectrum of gallium oxide and isotope effect of gallium. M. K. SEN (Indian J. Physics, 1936, **10**, 429—445; cf. Guernsey, A., 1934, 1055).—A no. of new bands have been measured in the spectrum of GaO. The vibrational analysis of Guernsey is confirmed and extended but the double heads observed by her are ascribed to the isotopic mols. ^{69}GaO and ^{71}GaO. The dissociation energies of the mol. in the upper and lower states are calc. to be 4·96 and 3·07 volts, respectively.   O. D. S.

Further relationships between absorption spectra of rare-earth salts and crystal structure. F. H. SPEDDING (J. Chem. Physics, 1937, **5**, 160).—In crystals of rare-earth salts of the type $R_2(SO_4)_3,8H_2O$ and $RCl_3,6H_2O$ the rare-earth atom is usually surrounded by an octahedral arrangement of O atoms although for larger atoms an extra H_2O mol. can enter the lattice. Crystal Stark splitting of the spectra agrees with theory (cf. this vol., 111).   W. R. A.

Rare-earth spectra in solids. J. H. VAN VLECK (J. Physical Chem., 1937, **41**, 67—80).—The sharp lines in the spectra of cryst. rare-earth salts are forbidden lines attributable to several effects, viz., quadrupole radiation, magnetic dipole radiation, and radiation created by cryst. fields. There is probably some interplay between vibration and electronic motion.   J. W. S.

Ultra-violet absorption spectrum of diborane. E. BLUM and G. HERZBERG (J. Physical Chem., 1937, **41**, 91—95).—The ultra-violet absorption spectrum of B_2H_6 has been investigated down to 1550 A. Regions of continuous absorption exist, extending from 2200 and 1700 A., respectively, towards shorter λλ. These correspond with transitions to two different excited states, the possible electron configurations of which are discussed on the basis of Mulliken's theory.   J. W. S.

Photo-dissociation of alkyl halides. II. P. K. SEN-GUPTA (J. Univ. Bombay, 1936, **5**, Part II, 22—33).—The author's earlier determinations of the continuous absorption spectra of the halogeno-methanes (ibid., 1933, **2**, 115) are discussed and compared with those of other investigators.   E. S. H.

Spectra of methyl cyanide and methyl iso-cyanide. R. M. BADGER and S. H. BAUER (J. Amer. Chem. Soc., 1937, **59**, 303—305).—Analysis of the spectra shows that, although the C–N linking in MeNC approximates to a triple linking, it possesses an appreciable amount of double linking character.

This does not produce any deviation from linearity in the C·N:C group, and MeNC appears to possess a threefold axis of symmetry. Absorption spectra of MeNC in the liquid state, and of liquid and gaseous MeCN, have been photographed in the infra-red.   E. S. H.

Spectral-study of ketonic polyenes. Extinction curves of (I) dibenzylideneacetone, (II) benzylideneacetone, (III) benzylideneacetophen-one, and their *para*-substituted derivatives. V. ALEXA (Bul. Soc. Chim. România, 1936, **18**, 67—82, 83—92, 93—101; cf. A., 1931, 1351).—I. The extinction curves for dibenzylideneacetone (I) and 7 *p*-disubstituted derivatives have been measured in C_6H_{14}, decalin, and EtOH. The EtOH enhances absorption and causes deformation of the curves: It is unsuitable as a solvent for comparing different substituents. The displacement of the curves to greater λλ by different groups shows the following order of polarities : Cl < Me < OMe < OH < NMe_2.

II. In accordance with the theory of shared resonators the extinction max. are displaced to smaller λλ than for (I). The effects of substituents in the C_6H_6 nucleus are similar to those for derivatives of (I).

III. The extinction curves and the effects of substituents and solvent are similar to those for $CHPh:CMe_2$, but the absorption max. are displaced approx. 500 A. towards greater λλ.   H. J. E.

Absorption spectra of aromatic esters. H. MOHLER and J. PÓLYA (Helv. Chim. Acta, 1937, **20**, 96—100).—Data are recorded for benzyl hexoate and laurate, Et and lauryl benzoate, lauryl phenyl-acetate, and $CH_2Ph·OBz$.   E. S. H.

Optical absorption of porphyrins. X. A. STERN and H. MOLVIG (Z. physikal. Chem., 1937, **178**, 161—183; cf. A., 1936, 1444).—On hydrogen-ation of the vinyl group in position 2 of the chlorin system to give mesochlorins a new absorption band appears, which represents the red band in the spectrum of the corresponding porphyrin. From the similarity in structure of the spectra of the porphyrins and mesochlorins it is inferred that in the chlorin system the pyrrolenine and pyrroline nuclei are opposite to each other (positions I and III). A new interpret-ation of the absorption spectra of the chlorins and phorbins and the corresponding porphins is advanced. The absorption spectra of the chlorins and meso-chlorins in HCl solution have four bands in the visible. The relation of these spectra to those for solutions in neutral media indicates that salt formation in the mesochlorins occurs at the two opposite N atoms in nuclei I and III.   R. C.

Polymerisation and polymeric adsorption as the cause of new types of absorption bands of organic dyes. G. SCHEIBE, L. KANDLER, and H. ECKER (Naturwiss., 1937, **25**, 75).—Dyes of the pinacyanol and ψ-*iso*cyanine class show, in aq. solution, absorption bands which vary considerably in position and intensity with varying concn. Strong bands may completely disappear, and new ones may be formed. It is suggested that this behaviour is due to ionic dissociation of the dye followed by

polymerisation of the hydrocarbon residues. The polymerides are responsible for the change in the absorption spectrum. In aq. solution of 1 : 1'-diethyl-ψ-isocyanine chloride of sufficiently great concn. the polymerisation leads to the appearance of an extremely narrow but intense band at 5725 A. Simultaneously an intense fluorescence occurs, giving a narrow line at about 5750 A. The polymerisation theory is supported by the marked increase in viscosity of the solution in the concn. range in which the absorption band appears. The polymerisation is completely reversed by raising the temp. by 30°. Dilution also affects all these properties very considerably. In D_2O the position of the absorption band is the same. The absorption and fluorescence bands of the dye are slightly altered when the dye is adsorbed from aq. solution on glass, quartz, gypsum, and mica. No adsorption occurs on freshly split fluorspar or on polystyrene. A. J. M.

Absorption of ultraviolet light by organic substances. XLI. Gossypol. R. GRINBAUM and L. MARCHLEWSKI (Bull. Acad. Polonaise, 1936, A, 367—369; cf. Podolskaja, A., 1936, 912).—EtOH solutions of gossypol show absorption maxima at 2390 and 2780 A., with an indication of a third max. at 2910 A. O. D. S.

Absorption spectra of nitrocellulose. K. MASAKI (Bull. Chem. Soc. Japan, 1937, 12, 1—3).—Films of cellulose nitrate, approx. 0·01 mm. thick, were obtained by evaporating $COMe_2$ or Et_2O–EtOH solutions on a Hg surface. Two regions of absorption, viz., between 3300 and 2500 and below 2500 A., were obtained and attributed to the NO_2 groups.
C. R. H.

Two types of diamond. (SIR) R. ROBERTSON, J. J. FOX, and A. E. MARTIN (Proc. Roy. Soc., 1936, A, 157, 579—593).—The physical properties of diamonds of the two types previously described (A., 1934, 583) have been further studied. The finer structure of the infra-red absorption spectrum has been explored with the aid of a grating, and the photo-electric effect was determined at a lower temp. (20° abs.) than before. At this temp. no abrupt change in the effects observed at 113° abs. was found. A clear differentiation of the two types of diamond in either possessing or not possessing a band at 8 μ was also obtained in emission. Diamonds of each type have the same sp. heat (determined by the method of Nernst and Eucken) throughout the crit range at low temp. and also at higher temp. L. L. B.

Infra-red absorption by H_2S. A. D. SPRAGUE and H. H. NIELSEN (J. Chem. Physics, 1937, 5, 85—89).—From measurements of the band at 3·7 μ (ν_3) with a grating of 3600 lines per in. the evidence of Bailey, Thompson, and Hale that this band has a Q branch is disputed (cf. this vol., 9). The band is ascribed to an oscillation of the electric moment along the axis of intermediate moment of inertia. The band at 8·0 μ (ν_2) has a broad and partly resolved Q branch and arises from a vibration along the axis of least moment of inertia. The presence of a Q branch in ν_2 and the absence of one in ν_3 demand a model with an apical angle <88°. ν_1 is taken as 2615 cm.$^{-1}$ Other bands at 3970, 9911, and 10,100

cm.$^{-1}$ are combination tones. The moments of inertia are evaluated and agree with those of Cross; from these the apical angle is computed as 85° (cf. Cross 92°; Bailey et al., 110°). W. R. A.

Spectrum of hydrogen sulphide in the photographic infra-red. F. D. CARVIN (J. Chem. Physics, 1937, 5, 159).—Photographs of the spectrum of a 60-ft. column of gas at 1·75 atm. were taken in the first order of a 21-ft. concave grating giving a dispersion of 2·6 A. per mm. Measurements of 10 lines around 10,100 cm.$^{-1}$ and 17 around 9900 cm.$^{-1}$ are given. The band at 9900 cm.$^{-1}$ shows a pronounced min. in the centre and the vibration is therefore along the intermediate moment of inertia and must be parallel to the symmetry plane unless the apical angle is <88°, which is unlikely from chemical evidence. Evidence to warrant the classification of the band at 10,100 cm.$^{-1}$ is insufficient (cf. preceding abstract). W. R. A.

Infra-red absorption of heavy acid solutions. D. WILLIAMS and E. R. PLYLER (J. Amer. Chem. Soc., 1937, 59, 319—321).—Infra-red absorption of D_2O, DCl, D_2SO_4, and D_3PO_4 has been measured between 2 and 12 μ. The spectrum of D_2O contains bands at 2·9, 4·0, 6·8, 8·2, and 10·4 μ. The acid solutions show intense absorption bands at 3·4 μ and 5·5 μ in addition to the bands characteristic of the solvent; these are ascribed to hydration. Solutions of D_2SO_4 and D_3PO_4 also show characteristic SO_4 and PO_4 absorption, respectively. E. S. H.

Infra-red absorption spectra of photo-chemically sensitised alkali halide crystals. K. KORTH (Nachr. Ges. Wiss. Göttingen, Math.-physik. Kl., II, 1935, [ii], 1, 221—227; Chem. Zentr., 1936, i, 2038).—KBr crystals with U-centres showed no infra-red absorption, but KCl sensitised with KNO_3 showed bands at 7·15 and 7·18 μ, due to the incorporation of NO_3' ions. The bands disappeared irreversibly after electron migration. Crystals sensitised with KCN similarly showed bands at 4·58, 7·70, and 8·22 μ, agreeing with the Raman spectrum of KCNO (formed in the fusion process). These bands disappear and are replaced by the CO_3'' band at 7·00 μ. It is concluded that K_2O is the photosensitive species. J. S. A.

Rotation–vibrations of polyatomic molecules in the photographic infra-red. H. VERLEGER (Physikal. Z., 1937, 38, 83—103).—A review dealing particularly with the analysis of the photographic infra-red rotation–vibration spectra of CO_2, HCN, C_2H_2, C_2HD, N_3H, MeCl, MeBr, MeI, MeOH, MeN_3, CH:CMe, CH_4, MeD, HCO_2H, NH_3, ND_3, H_2O, HDO, D_2O, and HNCO. A. J. M.

Photographic infra-red spectrum of methylacetylene (allylene) and the C–C single bond distance. G. HERZBERG, F. PATAT, and H. VERLEGER (J. Physical Chem., 1937, 41, 123—132).—A band at 10,304 A. has been found in the absorption spectrum of CMe:CH, of simple type with P, Q, and R branches, the structure of which indicates that the C·C:CH group lies in a straight line. The moment of inertia of the mol. in its ground state is $97·15 \times 10^{-40}$ g. cm.^{2} Assuming the other nuclear distances are

the same as in C_2H_2 and CH_4, respectively, the C–C single linking distance is calc. as $1\cdot462\pm0\cdot005$ A.
<div align="right">J. W. S.</div>

OH band of monomolecules of [ethyl] alcohol in the 3 μ region. J. ERRERA and P. MOLLET (Compt. rend., 1937, **204**, 259—261; cf. this vol., 9).—The absorption band at 3 μ, which disappears on dilution, is attributed to linkings between O and H in separate mols. The bands is not given by McOH vapour. A band at $2\cdot73$ μ is attributed to the single mols.
<div align="right">A. J. E. W.</div>

Absorption spectra in the near infra-red of mixtures of amines and alcohols. Formation of ammonium compounds. (MME.) M. FREYMANN (Compt. rend., 1937, **204**, 261—263; cf. this vol., 131).—The OH absorption band in alcohols disappears or decreases in intensity on mixing with amines. The effect is probably due to the formation of singlet linkages between the hydroxylic H and the N in the amine.
<div align="right">A. J. E. W.</div>

Absorption spectrum of amines in the very near infra-red (6000—9500 A.). P. BARCHEWITZ (Compt. rend., 1937, **204**, 246—249).—Measurements on the third and fourth harmonics of the NH band system at 3 μ are recorded for 10 amines. The effect of the attached groups, and of using H_2O and CCl_4 as solvents, is discussed.
<div align="right">A. J. E. W.</div>

Infra-red absorption spectrum and molecular structure of pyruvic acid. P. BAYARD (Compt. rend., 1937, **204**, 177—179).—λλ of 12 absorption bands in the range $0\cdot8$—$2\cdot5$ μ are given. Bands attributed to both ketonic and enolic forms occur; the ketonic form predominates.
<div align="right">A. J. E. W.</div>

Raman spectra and latent heat of fusion of non-associated substances. C. J. PHILLIPS (Indian J. Physics, 1936, **10**, 447—456; cf. A., 1936, 1318).—Raman shifts ascribed to energy of fusion are calc. to lie between 350 and 1600 cm.
<div align="right">O. D. S.</div>

Critical opalescence of carbon dioxide. S. PARTHASARATHY (J. Univ. Bombay, 1936, **5**, Part II, 34—40).—Determinations of the intensity and polarisation of scattered light in the crit. region are in accordance with the Einstein–Smoluchowski expression.
<div align="right">E. S. H.</div>

Raman spectra of liquid Si_2Cl_6 and gaseous Si_2H_6. F. STITT and D. M. YOST (J. Chem. Physics, 1937, **5**, 90—96).—Raman frequencies of gaseous Si_2H_6 and liquid Si_2Cl_6 and depolarisation factors of Si_2Cl_6 are given. The relation among the modes of vibration of similar mols. having different symmetry is discussed. This and the known assignment of the fundamental frequencies of SiH_4, $SiHCl_3$, and $SiCl_3Br$ lead to a definite assignment of the three observed lines of Si_2H_6. A tentative assignment of the lines of Si_2Cl_6 is made; this mol. appears to possess internal rotation at room temp.
<div align="right">W. R. A.</div>

Raman effect of deuteroammonia. G. GLOCKLER and F. T. WALL (J. Physical Chem., 1937, **41**, 143—147).—ND_3 shows a strong Raman frequency at $2420\cdot0$ cm.$^{-1}$, in accord with its infra-red absorption spectrum. The assignment of type of vibration to vibration frequencies is discussed in detail.
<div align="right">J. W. S.</div>

Effects of sulphuric acid and of zinc chloride on the main Raman band of water. P. A. LEIGHTON and J. BURNHAM (J. Amer. Chem. Soc., 1937, **59**, 424—425).—H_2SO_4 and $ZnCl_2$ produce marked changes in the shape and frequency of the max. of the main band.
<div align="right">E. S. H.</div>

Constitution of acids of elements of group V and their salts. I. H_3PO_4, H_3PO_3, H_3PO_2, and their salts. A. SIMON and F. FEHÉR (Z. anorg. Chem., 1937, **230**, 289—307).—All three acids, after careful purification, give Raman spectra in which neither the general character nor the no. of lines is changed by dilution or, in the case of H_3PO_4 and H_3PO_3, by introduction of the max. no. of K or Na atoms. No OH band is detectable. A frequency about 2400 cm.$^{-1}$ is shown by H_3PO_3 and more strongly by H_3PO_2 and is attributed to a P–H vibration. The results point unambiguously to the formulæ $H_3[PO_4]$, $H_2[HPO_3]$, and $H[H_2PO_2]$ for the main constituents of the acids, although they do not exclude a small proportion of a tautomeric form.
<div align="right">F. L. U.</div>

Raman spectra of crystal powders. I. Halides and sulphate of ammonium. II. Chlorides and sulphates of hydroxylamine and hydrazine. R. ANANTHAKRISHNAN (Proc. Indian Acad. Sci., 1937, **5**, **A**, 76—86, 87—93; cf. A., 1936, 1445, 1480).—I. A new technique for photographing the complete Raman spectra of crystal powders and amorphous substances is described. Raman spectral data are tabulated and discussed for cryst. NH_4F, NH_4Cl, NH_4Br, NH_4I, and $(NH_4)_2SO_4$ at room temp. Spectra of NH_4^+ show marked dependence on cryst. structure of the salt and nature of the anion. Lines for NH_4Cl and NH_4Br are very intense and have their analogues in the infra-red absorption spectra, suggesting lack of tetrahedral symmetry for NH_4^+. NH_4I and NH_4F show different and weaker spectra; the spectrum of NH_4^+ in $(NH_4)_2SO_4$ was extremely feeble.
II. Raman data for the cryst. sulphates and hydrochlorides of NH_2OH and N_2H_4 are tabulated and discussed with reference to ionic vibrations. The N–H bands of the hydrochlorides show multiplicity and diffuseness; in the sulphates they are much weaker and more diffuse. There is a lowering of the N–H frequencies in quinque- as opposed to ter-valent N derivatives, indicating a weakening of the N–H linking when the covalency of N changes from 3 to 4.
<div align="right">N. M. B.</div>

Raman spectra of different modifications of crystals. S. C. SIRKAR and J. GUPTA (Indian J. Physics, 1936, **10**, 473—481; cf. Vuks, A., 1936, 547).—No abrupt change in the scattered spectra of p-$C_6H_4Br_2$ (I) and of S was observed on passing through the temp. of transition between two modifications, i.e., from 32° to —40° and from 85° to 105°, respectively. The spectrum of p-$C_6H_4Cl_2$ (II) was found to be the same at 32° and 45° but by precooling in ice the whole of the Raman spectrum at 32° was shifted. At —180° the lines of (I) and (II) were shifted away from the Rayleigh line. The linear coeff. of expansion calc. from the shift appears to be too high. The line 86 cm.$^{-1}$ of S is shifted to 84 cm.$^{-1}$ at —180°. The conclusions of Venkateswaran (this vol., 9) are criticised.
<div align="right">O. D. S.</div>

Raman spectra of oxalates and oxalato complexes. Vibration of dicarboxyl. J. GUPTA (Indian J. Physics, 1936, **10**, 465—472; cf. A., 1936, 922).—The Raman spectra of KHC_2O_4, $K_2[TiO(C_2O_4)_2]$ (I), and $K_3[Al(C_2O_4)_3]$ (II) have been investigated. Differences from the spectra of normal oxalates in the spectrum of (II) indicate a change in the structure of the C_2O_4 group by co-ordination, but are less marked in the spectrum of (I). The identification of Raman frequencies of oxalates with modes of vibration of the C_2O_4 group is discussed. The possibility of a new type of *cis-trans* isomerism is suggested. O. D. S.

Raman spectra of stereoisomeric complexes of platinum and cobalt. P. SPACU (Bull. Soc. chim., 1937, [v], **4**, 364—367).—Raman spectra have been determined for *cis-* and *trans-*$[Pt(NH_3)_2(C_5H_5N)_2]Cl_2$, -$[Pt(C_5H_5N)_2Cl_2]$, -$[Co\ en_2(NO_2)_2]NO_3$, and -$[Co\ en_2(SCN)_2]SCN$. The results are discussed in relation to the structure of the co-ordination linking and the position of radicals and neutral mols. with respect to the central atom. E. S. H.

Raman spectra of amino-acids and related compounds. II. Guanidine and urea derivatives. J. T. EDSALL (J. Physical Chem., 1937, **41**, 133—141; cf. A., 1936, 269).—The Raman spectra of $CS(NH_2)_2$, $CCl(NH_2)_3$, $CCl(NH_2)_2\cdot NHMe$, $NH_2\cdot CO\cdot NHMe$, and $CSMe\cdot NH_2$ are very similar to that of $CO(NH_2)_2$. The spectrum of the $C(NH_2)_3{}^{\cdot}$ ion indicates that it possesses trigonal symmetry like the CO_3'' and NO_3' ions, in accord with the theory of resonance and X-ray refraction data. $CO(NH_2)_2$ and $CS(NH_2)_2$ have only a twofold axis of symmetry. It is suggested that the HCO_2' ion should have a twofold axis of symmetry, and a tentative analysis of its Raman spectrum is suggested on this basis. J. W. S.

Raman spectrum of benzene vapour. S. BHAGAVANTAM and A. V. RAO (Proc. Indian Acad. Sci., 1937, **5**, A, 18—22; cf. this vol., 113).—A detailed account of results previously reported. N. M. B.

Raman spectrum of thiophen. G. B. BONINO and R. MANZONI-ANSIDEI (Atti R. Accad. Lincei, 1936, [vi], **24**, 207—212; cf. A., 1934, 830).—Previous results are confirmed and a few new weak lines observed. The Raman spectrum data are compared with infra-red data, and the symmetry type of C_4H_4S is discussed. O. J. W.

Raman spectrum of camphor and camphoraldehyde (hydroxymethylenecamphor). G. B. BONINO and R. MANZONI-ANSIDEI (Ric. sci. Prog. tec., 1935, **6**, II, 181—182; Chem. Zentr., 1936, i, 1845).—Hydroxymethylenecamphor gives a diffuse line at 1640 cm.$^{-1}$ in addition to the CO line at 1734 cm.$^{-1}$; this is ascribed to wave-mechanical resonance between the aldehyde and hydroxymethylene structures. H. N. R.

Clustering in simple liquids. S. PARTHASARATHY (J. Univ. Bombay, 1936, **5**, Part II, 16—21).—Scattering of incident horizontally polarised light has been observed in several org. liquids. In AcOH, MeOH, $Pr^\alpha OH$, and $C_5H_{11}\cdot OH$ the ratio of the horizontal to the vertical component of the scattered light is > 1. The result is ascribed to the existence of disc-like clusters in the liquids. E. S. H.

Mitogenetic secondary radiation. A. GURWITSCH and L. GURWITSCH (Protoplasma, 1936, **25**, 1—15).—Such substances as glucose, protein, and nucleic acid give rise to secondary radiations when exposed to mitogenetic rays of similar spectrum to the radiations emitted by these substances during fermentative decomp. M. A. B.

Theory of phosphorescence. D. BLOCHINZEV (Physikal. Z. Sovietunion, 1936, **10**, 424—426).—An extension of a previous paper (A., 1934, 716) O. D. S.

Luminescence and its applications. J. T. RANDALL (J. Soc. Arts, 1937, **85**, 353—381).—A lecture.

Chemiluminescence with two organic reactions.—See A., II, 119.

Luminescence of solutions of terbium salts. A. SEIDEL (Nature, 1937, **139**, 248—249).—$\lambda\lambda$ from 490 to 681 mμ and intensities of the bands are tabulated. The bands have a well-defined structure depending on the nature of the anion. L. S. T.

Influence of electrolytes on the fluorescence of rhodamine solutions in methyl alcohol. A. V. BANOV and S. N. RABOTNOV (J. Phys. Chem. Russ., 1936, **8**, 295—299).—LiCl displaces the bands of absorption and fluorescence of rhodamine B to longer λ. The extinction of the fluorescence by various concns. of LiCl and dye was examined; it is caused rather by increase of the activity of the dye than by collisions of the second kind (cf. A., 1933, 446). J. J. B.

" Concentration extinction " of fluorescence of dye solutions. F. DUSCHINSKI (Compt. rend. Acad. Sci. U.R.S.S., 1937, **14**, 73—76; cf. A., 1935, 1190; 1936, 548, 923).—Theoretical. Perrin's assumption (A., 1931, 998) of energy exchange by resonance between the components of a mol. pair (or higher complex) accounts for all the known phenomena and leads to an expression for the yield as a function of concn. in close agreement with Vavilov's figures for fluorescein in $Pr^\beta OH$. R. C. M.

Phosphorescent glass; influence of crystallisation. M. CURIE (Compt. rend., 1937, **204**, 352—353).—Details are given of the fluorescence, phosphorescence, and thermoluminescence of specimens of glass and the effect, on duration and intensity, due to crystallisation induced by heating for long periods at 800—1200°. The specimens were ordinary glass and a Zn–B glass with the addition of, separately, 1% Mn, Pb, Bi, Sm, and U. Explanations are discussed. N. M. B.

Electrolytic valve action with liquid ammonia as solvent. A. GÜNTHER-SCHULZE and H. BF (Z. Physik, 1937, **104**, 440—441).—Ta does not give an oxide layer with any electrolyte in liquid NH_3. If previously " formed " in aq. solution, the current-voltage relationship in liquid NH_3 follows the equation $j = a \cdot u^{1\cdot 8}$ μ amp. per sq. cm. Al forms imperfectly in liquid NH_3 solutions of H_3BO_3, borates, and ice, the oxide layer tending to flake off. Mg, Cu, and Fe will not form. L. G. G.

Shenstone effect. A. H. WEBER (J. Franklin Inst., 1937, **223**, 215—242).—The variation of photo-electric sensitivity of a metal as a function of electric currents passed through it was investigated. A study of the effect of occluded gases on the total photo-electric emission of Mo and Bi for nil, partial, and thorough outgassing, and of temp. influence on the Shenstone effect, shows that the initial large increases in photo-electric emission with passage of currents is due to the removal of occluded gases, and that the observed sensitivity variations as a function of current are connected with a variation of the gas content superinduced by temp. change, and, for outgassed Mo, are attributed to the formation and evaporation of an adsorbed electropositive gas layer.

N. M. B.

Photo-electric emission. H. C. RENTSCHLER and D. E. HENRY (J. Franklin Inst., 1937, **223**, 135—145).—Investigations of the reaction of Ti, Mo, W, Fe, Th, U, Ca, and Cs surfaces with O_2 show that the shift in sensitivity towards longer $\lambda\lambda$ is due to a reaction and not to the physical nature of the surface. The similar shift when an alkali metal deposits on another metal is explained in the same way.

N. M. B.

Dyes of the anthracene group and their photosensitive capacity. (MLLE.) H. T. NGA (Compt. rend., 1937, **204**, 429—430).—Among eight derivatives of anthraquinone examined, only those containing N gave measurable photo-potentials.

A. J. E. W.

Electron theory of metals. II. S. SCHUBIN and S. VONSOVSKI (Physikal. Z. Sovietunion, 1936, **10**, 348—377; cf. A., 1935, 1298).—Mathematical.

O. D. S.

Influence of a concentrated space charge on the electrical insulation of calcite. A. VENDEROVITSCH and A. VOROBJOV (Physikal. Z. Sovietunion, 1936, **10**, 413—420).—The discharge potential of calcite in a homogenous field is decreased by preliminary polarisation of the crystal when the discharge occurs in the direction of the polarisation and is increased when the directions of polarisation and discharge are opposite. The results are best explained by Fowler's theory (cf. A., 1933, 887).

O. D. S.

Electrical conductivity of real dielectrics at high field strengths. F. QUITTNER (Bull. Acad. Sci. U.R.S.S., 1936, 600—610).—The conductivity of mica perpendicular to the cleavage faces is purely electronic at high field strengths and temp. about 60°. At temp. >250° the conductivity is electrolytic. The conductivity parallel to the cleavage faces due to impurities is electrolytic. The conductivity of quartz cut parallel to the optic axis is electronic at 250°. The Faraday laws are not obeyed by natural rock-salt at 150°, and 100 kv. per cm., indicating that under these conditions the crystal is a mixed conductor.

O. D. S.

Conductivity of solid insulators in strong electric fields. A. F. WALTHER and L. D. INGE (Bull. Acad. Sci. U.R.S.S., 1936, 561—578).—The conductivity, γ, of rock-salt (I) and of glass was measured up to 10^6 volts per cm. and 2×10^6 volts per cm., respectively. Between 0° and 160° γ of (I)

increases with field strength and varies with temp. according to $\gamma = Ae^{-bT}$. For field strengths up to 5×10^5 volts per cm. b is 9500—10,000; at higher field strengths b decreases to approx. 7500 at 10^6 volts per cm. Crystals annealed at 700° show a less sharp rise in γ with field strength and have higher initial conductivity. γ of glass increases less rapidly with field strength than that of (I). The relation $\gamma = Ae^{-bT}$ is approx. obeyed and the curves of γ against T for all field strengths are parallel.

O. D. S.

Dipole moment, configuration, and reactivity of aromatic nitro-derivatives.—See A., II, 140.

Dipole moment and structure of tellurium dimethyl di-iodide. C. YAO and C. E. SUN (J. Chinese Chem. Soc., 1937, **5**, 22—24).—The dipole moment of the " *trans* " form of $TeMe_2I_2$ at 25° is 2.26×10^{-18} e.s.u. from measurements of C_6H_6 solutions. The presence of a moment eliminates a planar structure, in agreement with Drew's result (A., 1929, 546).

R. S. B.

Dielectric polarisation of chloronitrobenzene in liquid state. A. JAGIELSKI (Bull. Acad. Polonaise, 1936, **A**, 451—456).—The dielectric polarisation P of o- and m-$C_6H_4Cl\cdot NO_2$ between 40° and 170° is practically independent of temp. From the temp. variation of P for p-$C_6H_4Cl\cdot NO_2$, the dipole moment $(0.92 \times 10^{-18}$ e.s.u.) is $\leqslant$ is found in solution.

J. S. A.

Mechanism of current conduction in liquids of low dielectric constant. K. H. REISS (Ann. Physik, 1937, [v], **28**, 325—352; cf. Nikuradse, A., 1932, 983).—The photoconductivity of a solution of anthracene in C_6H_{14} (10^{-4} g. mol. per litre) varies with the distance between the electrodes while the dark current remains const. The mobilities of the carriers of the current are U_c 9.9×10^{-4}, U_a 1.3×10^{-3} cm.^{2} per volt per sec. U_a is strongly decreased by impurities, especially unsaturated mols. It is deduced that U_a corresponds with the mobility of electrons which enter into temporary combination with mols. of the solution or impurities. Up to 300 kv. per cm. the photo-electric current does not increase with potential. From measurements at 400 kv. per cm. it is calc. that the max. ionisation produced by collision is 20 new ions per negative ion. Illumination of the cathode causes a small increase in the conductivity of Et_2O. The effect does not increase with voltage in the same degree as the dark current. The variation with potential of the conductivity of C_6H_{14}, PhMe, Et_2O, and PhCl is interpreted on the theory of Onsager (A., 1935, 1176).

O. D. S.

Optical rotation and refractivity of nicotine and nicotine sulphate in dilute aqueous solution. F. G. H. TATE and L. A. WARREN (J.S.C.I., 1937, **56**, 39—40T).—Pure nicotine (I) has d_4^{20} 1.0096, $[\alpha]_D^{20}$ −169.4°, $[\alpha]_{5461}^{20}$ −204.1°. In 0—10% aq. solutions pure (I) and nicotine sulphate (II) have $[\alpha]_D^{20}$ −79.4°, $[\alpha]_{5461}^{20}$ −96.1° and $[\alpha]_D^{20}$ +14.3°, $[\alpha]_{5461}^{20}$ +17.2°, respectively. The rotations of mean yellow light are stated in sugar (Ventzke) degrees. The Zeiss immersion refractometer readings of (I) and (II) solutions become higher as the concn. is raised. From 0 to 10% the increase in reading ∝ increase in concn.,

the increment for (I) solutions being 5·41 units, and for (II) solutions 5·13 units, per 1% increase.

Rotatory dispersion. XXX. Campholic aldehyde. T. M. LOWRY and W. C. G. BALDWIN (J.C.S., 1937, 233—236; cf. A., 1936, 1184).—The rotatory dispersion of campholic aldehyde, measured in *cyclo*hexane and in $CHCl_3$, is unusually complex. The difference curve is of the same sign as the ·CHO contribution. The circular dichroism is a max. at 2995 A. and has at least two components. The main rotation is divided into three parts associated with the ·CHO and the two asymmetric C groupings.
F. L. U.

Relations between optical rotatory power and constitution in the steroids.—See A., II, 147.

Complex salts of racemic and optically active 1 : 2-diamino*cyclo*hexanes with tervalent cobalt and rhodium. I. *trans*-1 : 2-Diamino*cyclo*hexane and its fission into optically active antipodes. F. M. JAEGER and L. BIJKERK (Proc. K. Akad. Wetensch. Amsterdam, 1937, **40**, 12—23).—*trans*-1 : 2-Diamino*cyclo*hexane (A., 1936, 717) has been resolved by means of the neutral *d*-tartrates. Crystallographic data are given for the i-, d-, and l-*hydrochlorides* and -*nitrates*. The rotatory dispersion of the molten *l*-base has been measured at 55° in the range λ 6480—4950 A. Crystallographic measurements are given for *cyclo*hexane-1 : 2-dione dioxime and bistetramethylenepiperazine hydrochloride.
F. L. U.

Relative and absolute spatial configuration of isomorphous optically active complex salts of tervalent cobalt and rhodium. I. Comparison of triethylenediamine and tri*cyclo*hexanediamine salts. F. M. JAEGER (Proc. K. Akad. Wetensch. Amsterdam, 1937, **40**, 2—11; cf. A., 1928, 1172).—The validity of Werner's solubility rule is demonstrated in the case of the triethylenediamine (cne) and tri*cyclo*hexanediamine (cx) salts of Co and Rh. L-$[Co(d\text{-}cx)_3]Cl_3$ (L denotes rotation of resolved complex ion in red light) forms an apparent exception, caused by the superimposed action of the active base present in the complex. Salts isolated from the least sol. chloro- or bromo-*d*-tartrates all possess the spatial configuration characteristic of the *d*-ene ion. Substitution of Rh for Co causes inversion of the sign of rotation when the ions in which the substitution occurs have the same abs. spatial configuration.   F. L. U.

Magnetic birefringence of solutions of rare-earth salts. C. HAENNY (Ann. Physique, 1937, [xi], **7**, 230—290).—Data are tabulated and plotted for measurements of birefringence over a range of concns. of aq. solutions of the nitrate, chloride, perchlorate, and acetate, and alcoholic solutions of the nitrates for the rare-earth elements, of the comparative effect in a no. of Ce salts, and for the abs. magnetisation coeffs. in the temp. range 20—70°, from which magnetic moments are calc. The birefringence is interpreted in conjunction with data for n and solution density. Results are in agreement with the known magnetic properties of the rare earths and the magnetic rotatory power of the solutions, with the Langevin theory of birefringence of paramagnetic

liquids, and with the temp. variation relation deduced from the Curie–Weiss law.   N. M. B.

Molecular structure of quinhydrone. J. PALACIOS and O. R. Foz (Anal. Fís. Quím., 1936, **34**, 779—781; cf. A., 1936, 784).—The subperiodicity previously observed is attributed to the difference in the size of the benzoquinone and benzene rings observed by Robertson (A., 1935, 921).   F. R. G.

Nature of the hydrogen bond. II. Rôle of resonance. General considerations. A. SHERMAN (J. Physical Chem., 1937, **41**, 117—122; cf. A., 1936, 1051).—Abnormalities in physical properties and the absence of characteristic OH absorption bands in the infra-red are not satisfactory criteria of the presence of H-bonds in mols., since they are not always consistent with thermochemical data. A H-bond is defined as one the energy of which is derived from the resonant energy of quantum mechanics, the electron of a H atom being part of the resonating system. Experimental tests for the presence of such a bond must involve determination of the heat of combustion or formation and comparison of this val. with that expected for the mol. without the bond.   J. W. S.

Kinetic equation for the case of Coulomb interaction. L. LANDAU (Physikal. Z. Sovietunion, 1936, **10**, 154—164).—Mathematical. The kinetic theory is applied to a system of charged particles, taking the Coulomb interaction into account.
A. J. M.

Crossing of potential surfaces. E. TELLER (J. Physical Chem., 1937, **41**, 109—116).—The difference between diat. and polyat. mols. in respect of the possible crossing of electronic energy levels is discussed mathematically.   J. W. S.

Ionisation potential of carbon monoxide. J. SAVARD, M. DE HEMPTINNE, and P. CAPRON (Compt. rend., 1937, **204**, 354—356).—Investigations previously reported for N_2 (cf. A., 1935, 1047) are extended to CO, using a Ta apparatus to obviate N_2 occlusion errors. Observed and calc. vals. and interpretations are tabulated in the range 12·5—19·1 e.v. Evidence supports the val. 13·5 e.v. as the ionisation potential of the normal mol.   N. M. B.

Force constants and fundamental vibrations of diacetylene. T. Y. WU and S. T. SHEN (Chinese J. Physics, 1936, **2**, 128—134).—A new assignment of fundamental frequencies in accordance with the selection rules is suggested (cf. Timm, A., 1935, 681), and 9 force consts. for the mol. are calc.   N. M. B.

Characteristics associated with the constants of the diatomic halogen and alkali molecules. N. R. TAWDE (J. Univ. Bombay, 1936, **5**, Part II, 7—15).—A simple, empirical relation, particularly applicable to groups of analogous mols. such as halogens and alkalis, expresses roughly the nuclear frequencies of non-symmetrical mols. in terms of those of symmetrical mols. Other consts. associated with these groups are discussed in terms of the harmonic force law.   E. S. H.

Lattice energies, equilibrium distances, compressibilities, and characteristic frequencies of alkali halide crystals. M. L. HUGGINS (J. Chem.

Physics, 1937, **5**, 143—148).—Using re-calc. consts. in the Born and Mayer exponential expression for the repulsion between two ions, lattice energies and equilibrium distances between the ions of alkali halide crystals have been computed. Expressions have been derived from which compressibilities and max. infra-red frequencies have been calc. and the relation between these two quantities is approximated by Madelung's empirical equation (Physikal. Z., 1910, **11**, 898). W. R. A.

Photometric determination of the intensity of X-rays diffracted by sodium chloride. O. R. Foz (Anal. Fís. Quím., 1936, **34**, 748—765).—Measurements made with Cu $K\alpha$ rays differ slightly from those for Mo $K\alpha$ obtained by Havighurst (A., 1927, 95). The possibility that the scattering factor may $\propto \lambda$ (cf. Hönl, A., 1934, 3) is discussed. F. R. G.

X-Ray ionisation chamber materials. J. N. Sayler (Physical Rev., 1935, [ii], **48**, 472—473).—The rates of discharge of α-particles from rolled steel, electroplated metals, Pt foil, Mo, and Pyrex glass are recorded. L. S. T.

Intensities of X-ray reflexions from bismuth crystals between 25° and 530° abs. A. Goetz and R. B. Jacobs (Physical Rev., 1937, [ii], **51**, 151—159).—Full data for the temp. variation of the integrated intensities, J_T/J_N, of reflexions of Mo $K\alpha$ radiation from Bi crystals on (111) are given. The ratio J_T/J_N follows the Debye–Waller relation. The calc. characteristic temp. of Bi are 92·5° and 95·9° without and with consideration of the zero-point energy, respectively. Measurements support the assumption of zero-point energy. No indication of a discontinuity of J_T/J_0 was found in the region of the pseudo-allotropic transformation point at 75°, but a deviation begins 50—80° below the m.p. N. M. B.

Effect of chlorine ions on X-ray diffraction in aqueous solution. G. W. Stewart (Physical Rev., 1935, [ii], **48**, 473).—The structure of Cl' is discussed in the light of measurements of its effect on the X-ray diffraction of aq. NH_4Cl. L. S. T.

Effect of thermal agitation on the reflexion of X-rays by crystals. S. Y. Sze (Chinese J. Physics, 1936, **2**, 124—127).—Mathematical. A simplified wave-mechanical derivation of the temp. factor is given (cf. Zener, A., 1936, 273). N. M. B.

Determination of the gas-covered part of a surface of contact. R. Fricke and R. Mumbrauer (Naturwiss., 1937, **25**, 89—90).—The emanation from certain active kinds of α-Fe_2O_3 when treated by the emanation method of Hahn, and the total surface of the substance per g.-mol. determined by X-ray methods, give smaller vals. of the recoil range of the short-lived Th emanation than those obtained by other methods. This indicates that the surface area calc. from X-ray observations is about 2% < that from the emanation method. Secondary structure must play a great part in the latter. Hahn's method is of special val. in the investigation of contacts. A. J. M.

o (A., I.)

Computations related to liquid structure by the methods of trial and of Fourier series analysis. G. A. Boyd (Physical Rev., 1935, [ii], **48**, 473). L. S. T.

Nucleus formation in recrystallisation. III. Orientation of recrystallisation nuclei. M. Kornfeld (Physikal. Z. Sovietunion, 1936, **10**, 142—153).—The structure of single crystals of Al deformed by extension has been examined with special reference to the orientation of its various parts. The velocity of formation of recrystallisation centres is a max. at those parts of the plastically deformed crystal where the orientation is altered. A. J. M.

Crystals of sodium ferrocyanide decahydrate. O. M. Ansheles and M. P. Golovkov (Trans. State Inst. Appl. Chem. U.S.S.R., 1935, No. 23, 13—17).—$Na_4Fe(CN)_6$ crystallises with 10 and not with $12H_2O$. Ch. Abs. (e)

Generalisation of the Bravais law. J. D. H. Donnay and D. Harker (Compt. rend., 1937, **204**, 274—276).—A generalised form of the law is given, and its application to orthorhombic S, granite, and pyrites discussed. A. J. E. W.

Chemical constitution and crystal structure, especially with intermetallic compounds. J. M. Bijvoet (Chem. Weekblad, 1937, **34**, 95—107).—A lecture. S. C.

Structure of liquid metals. V. Danilov and I. Radtschenko (Physikal. Z. Sovietunion, 1936, **10**, 260).—X-Ray structure diagrams of the free plane surfaces of liquid Bi, Sn, and Pb in an evacuated vessel indicate that the structure of Pb is similar to that of Hg, and that of Bi and Sn is similar to the structure of the metal in the cryst. state. A. J. M.

Scattering of X-rays in liquid alloys. V. Danilov and I. Radtschenko (Physikal. Z. Sovietunion, 1936, **10**, 261).—X-Ray scattering diagrams have been obtained for the eutectic mixtures of Bi–Sn, Bi–Cd, Sn–Pb, Sn–Zn, and Bi–Pb systems. Sn–Pb and Bi–Sn alloys give a diffraction pattern similar to Pb and Bi, respectively. A. J. M.

Crystal chemistry. III. Structure of binary compounds. AX compounds. IV. AX_2, A_2X_3, AX_3, AX_4 compounds. C. W. Stillwell (J. Chem. Educ., 1936, **13**, 521—525, 566—575; cf. A., 1936, 1464).—III. The structures of CsCl, NaCl, NiAs, ZnO, and ZnS are discussed in detail, as well as that of BN. The influence of polarisation on the ionic and covalent linkings is also discussed.

IV. A summary and discussion. L. S. T.

Crystal structure of $NaOH,BF_3$ and of the alkali borofluorides and $TlBF_4$. L. J. Klinkenberg (Rec. trav. chim., 1937, **56**, 36—40; cf. A., 1936, 275).—Crystallographic data are : $NaBF_4$, a 6·25, b 6·77, c 6·82 A.; $CsBF_4$, a 9·43, b 5·83, c 7·65 A.; $TlBF_4$, a 9·47, b 5·81, c 7·40 A. The unit cells contain 4 mols. Space-group, $V_h^6 = D_{2h}^{10}$. The borofluorides are isomorphous with the corresponding perchlorates. $NaOH,BF_3$ (I) is $Na[BF_3(OH)]$. Dissociation pressures and heats of dissociation of (I) and $NaBF_4$ are given, and their stability is discussed. A. J. E. W.

Crystal structure of thiophosphoryl bromide. I. NITTA and K. SUENAGA (Sci. Papers Inst. Phys. Chem. Res. Tokyo, 1937, **31**, 121—124).—The X-ray crystal structure of $PSBr_3$ has been determined. The unit cube, of edge 11·03 A., contains 8 mols., giving $d_{calc.}$ 2·99 ($d_{obs.}$ 2·97). The atoms of P and S are on the trigonal axes. The possibility of the existence of double mols. is discussed.   R. S. B.

Substitution of water by ammonia and pyridine in complexes. P. SPACU (Bull. Soc. chim., 1937, [v], **4**, 307—311).—X-Ray powder diagrams and mol. vols. of $[CdCl_4][Cu(H_2O)_4]$ and $[CdCl_4][Cu(NH_3)_4]$ are similar, whilst those for $[CdCl_4][Cu(C_5H_5N)_4]$ are different. The results are discussed in relation to structure.   E. S. H.

Crystal structure of silver diammino-tetranitro-cobaltiate $Ag[Co(NH_3)_2(NO_2)_4]$. A. F. WELLS (Z. Krist., 1936, **95**, 74—82).—The structure is tetragonal, a_0 6·97, c_0 10·43 A., space-group $P4/nnc$, 2 mols. in cell. It is essentially a deformed face-centred cubic packing; interionic distances are given. The complex ion $[Co(NH_3)_2(NO_2)_4]^-$ is in the *trans* configuration, whereas chemically the *cis* configuration was expected.   B. W. R.

Structure of dichlorodibromomethane. P. CAPRON and S. L. T. PERLINGHI (Bull. Soc. chim. Belg., 1936, **45**, 730—731).—Of two suggested structures which agree with diffraction data, a tetrahedron with the following dimensions is preferred. C–Cl, 1·75; C–Br, 1·93; Cl–Cl, 1·86; Br–Br, 3·15; Cl–Br, 3·01 A.   C. R. H.

Unit cell and space group of acetylsalicylic acid. I. NITTA and T. WATANABÉ (Sci. Papers Inst. Phys. Chem. Res. Tokyo, 1937, **31**, 125—128).—The X-ray crystal structure has been determined. The unit cell (4 mols.) has a 11·37, b 6·54, and c 11·57 A., giving $d_{calc.}$ 1·41 ($d_{obs.}$ 1·396 at 30°). A chain-like structure parallel to [010] is suggested.   R. S. B.

X-Ray investigation of triphenylmethane. M. PRASAD, L. A. DE SOUSA, and J. SHANKER (J. Univ. Bombay, 1936, Part II, **5**, 109—113).—The dimensions of the unit cell are : a 14·71, b 25·72, c 7·55 A. Calculation of d shows that the no. of mols. per unit cell is double that required by the space-group C_{2v}^9. It appears that 2 mols. polymerise to form an asymmetrical unit of the elementary cell.   E. S. H.

Crystal structure of the aliphatic compounds. I, II. Y. TANAKA and R. KOBAYASI (J. Soc. Chem. Ind. Japan, 1936, **39**, 411—417B).—I. The diamond lattice structure explains the crystallographic properties of n-paraffins. The derivation of the paraffin wax lattice from the diamond lattice is discussed and the main diameter of n-C_nH_{2n+2} calc.

II. Various structural characteristics of n-paraffins according to the paraffin wax lattice are calc.
          T. W. P.

X-Ray study of phthalocyanines. III. Quantitative structure determination of nickel phthalocyanine. J. M. ROBERTSON and I. WOODWARD (J.C.S., 1937, 219—230; cf. A., 1936, 1186).—The structure of Ni phthalocyanine (I), determined from X-ray crystal data for the (*hOl*) zone of reflexions, is expressed by a contoured electron-density

map in which every atom is separately resolved. The orientation of the planar mol. in the crystal is nearly identical with that of free phthalocyanine (II). The structures also are closely similar, but each of the *iso*indole N atoms in (I) is shifted inward towards the Ni atom. The C–N interat. distance is 1·38 A. The mol. is more nearly tetragonal than that of (II).
          F. L. U.

X-Ray study of linear polyesters. C. S. FULLER and C. L. ERICKSON (J. Amer. Chem. Soc., 1937, **59**, 344—351).—Debye–Scherrer photographs of polyethylene sebacates of increasing average mol. wt. are identical and show the same interplanar spacings as the fibre diagrams of the oriented materials. Fibre diagrams of six highly-oriented polyesters show that the chain mols. are parallel to the axes of the fibres. Polyethylene succinate has a helical arrangement of the chain atoms, whilst polyethylene adipate, azelate, and sebacate possess similar configurations which deviate only slightly from the planar zig-zag form. The sebacate polyesters of trimethylene glycol and diethylene oxide glycol also appear to have a non-planar configuration of chain atoms. Deviations from the planar zig-zag type of chain are ascribed to attractive forces in the ester groups.   E. S. H.

Highly polymerised compounds. CLIII. Constitution of cellulose. H. STAUDINGER (Svensk Kem. Tidskr., 1937, **49**, 3—23).—A review. A. G.

Structure of proteins as revealed by X-rays. H. MARK and H. PHILIPP (Naturwiss., 1937, **25**, 119—124).—A review.

Dynamical theory of electron diffraction and its application to some surface problems. J. W. HARDING (Phil. Mag., 1937, [vii], **23**, 271—294).—A theory of electron diffraction based on that of Darwin for X-ray diffraction has been developed. A generalisation of Darwin's treatment has been made to allow for an arbitrary arrangement of planes near the crystal surface, and application is made to the case of thick and thin crystals, and to crystals with a base structure within the fundamental cell. The discrepancy between the observed breadth of the region of selective reflexion in the case of the diamond and that calc. by the theory of Bethe (A., 1928, 1303) is discussed. The few planes at the surface of the crystal are probably out of phase with the rest of the crystal, an effect which may be produced by the contraction of crystal spacings near the surface, or by the adsorption of a film of foreign matter. Calculation indicates the second to be the more probable.
          A. J. M.

Electron diffraction of long-chain organic compounds. L. H. STORKS and L. H. GERMER (J. Chem. Physics, 1937, **5**, 131—134).—The electron diffraction pattern of lard points to the axes of the hydrocarbon chains being inclined at 27° to the surface normal and to a C–C separation of 2·50 A. Tristearin, stearic acid (I), and Me stearate (II) have also been investigated. The chain of (I) is inclined at 33° and that of (II) at 25° to the surface normal. In both these mols. the C–C separation is 2·50 A., in good agreement with the known distance between alternate C in a zig-zag chain.   W. R. A.

Dependence of magnetic after-effect on inner strains. H. KINDLER (Ann. Physik, 1937, [v], **28**, 375—384).—The after-effect loss angle ε_n of a 50% Fe–Ni alloy increases with applied tension to a max. val. at 14 kg. per sq. mm. (elastic limit). Above this tension ε_n decreases with increasing tension. For Heusler's alloy (Al 17·7, Mn 16·0, Cu 65·3 at.-%) ε_n varies with the temp. T at which the alloy was annealed. ε_n for T 181° is > for T 123°. O. D. S.

Variation of the magnetic anisotropy of iron with temperature. E. F. TITOV (Physikal. Z. Sovietunion, 1936, **10**, 337—347).—On the basis of Akulov's theory (cf. A., 1929, 1224) it is deduced that the character of the anisotropy of a crystal does not vary with temp. and that the anisotropy const., K, $\propto J^{10}$, where J is the saturation intensity. Measurements of the variation from 0° to 400° of K for single crystals of Fe and polycryst. Fe agree with this theory. O. D. S.

Effect of stretching and twisting on the discontinuous process of magnetisation in nickel, iron, and nickel–iron alloys. J. ÔKUBO and M. TAKAGI (Sci. Rep. Tôhoku, 1936, **25**, 426—479).—The discontinuities occur mainly in the steep portion of the hysteresis loop. The effects of increased stretching or twisting stress can be explained by considering the distribution of the magnetic axes of atoms in the material to be of a prolate or oblate spheroidal type. J. W. S.

Behaviour of thermal current in galena crystals on one-sided pressure. K. BALYI (Föld. Köz., 1935, **65**, 153—162; Chem. Zentr., 1936, i, 2044).—The electric current produced by non-homogeneous pressure is parabolically related to the stress. The direction of the current is towards or away from the pressure in different crystals, and for any one crystal coincides with the direction of the thermal current. J. S. A.

Index of refraction of cerussite for X-rays. J. E. FIELD and G. A. LINDSAY (Physical Rev., 1937, [ii], **51**, 165—169).—Vals of n for fourteen $\lambda\lambda$ in the range 2500—3600 and 4800—5400 X were measured, and the five M absorption limits of Pb were found. The decrease in δ/λ^2, where $\delta = 1 - n$, in the vicinity of an absorption edge is examined. N. M. B.

Indicatrices of reflecting power of crystals of low absorbing power. L. CAPDECOMME and G. JOURAVSKY (Compt. rend., 1937, **204**, 137—139).—Theoretical. A. J. E. W.

Crystallo-optical study of aluminium hydroxide obtained at the experimental plant of GIPKH. M. P. GOLOVKOV (Trans. State Inst. Appl. Chem. U.S.S.R., 1935, No. 23, 8—10).—Synthetic $Al_2O_3,3H_2O$ resembles natural gibbsite in its optical and crystallographic properties. CH. ABS. (e)

Optical investigation of thin silver and silver iodide layers. G. ESSERS (Ann. Physik, 1937, [v], **28**, 297—318).—A method is described by which the thickness of thin transparent and absorbing layers (e.g., AgI films from 10 to 100 mμ, and Ag films from 5 to 25 mμ) can be determined by measurement of the polarisation of light reflected from the layers.

Vals. for AgI films agree with those found by Newton's rings. The optical consts. of Ag films were determined and are in qual. agreement with those of Murrmann (A., 1933, 332). An increase in n and a decrease in absorption were observed at thicknesses <7 to 8 mμ. For AgI films n was found to decrease at thicknesses <15 mμ. O. D. S.

Optical properties and crystal structure of some compounds of type R_xMX_4. D. P. MELLOR and F. M. QUODLING (J. Proc. Roy. Soc. New South Wales, 1936, **70**, 205—210).—Compounds R_xMX_4 show much stronger double refraction when MX_4 is square (by X-ray analysis) than tetrahedral. This relationship has been investigated for $K_2[Ni(CN)_4],H_2O$, $NMe_4[AuCl_4]$, $K[AuBr_4]$, $Cs_2[CuCl_4]$, and $[Pd(NH_3)_4]Cl_2,H_2O$ and the results are correlated with known data for other Au, Cu, Pd, and Pt compounds. A. LI.

Solidity and elasticity of thin quartz threads. O. REINKOBER (Physikal. Z., 1937, **38**, 112—122).—The effect of various surface conditions on the solidity and elasticity of quartz threads is considered. Adsorbed surface films lower the solidity of the thread. A. J. M.

Influence of temperature on the plasticity of crystals. P. E. DUWEZ (Physical Rev., 1935, [ii], **48**, 484).—The theory of the plasticity of crystals (A., 1935, 572) is extended to take account of the effect of temp. on the stress–strain curve. L. S. T.

Structure of a heavy deposit of solid selenium condensed from the vapour, the liquid being at about 250°. L. E. DODD (Physical Rev., 1935, [ii], **48**, 479—480; cf. A., 1936, 1450).—In general, the deposit is microcryst., with a grosser structure of (?) crystal units. L. S. T.

Physical properties of thin metal films. H. LANGE (Kolloid-Z., 1937, **78**, 231—240).—A review.

Rate of polymorphic transformations. V. Effect of mechanical deformation on rate of transformation of polymorphic metals. III. Effect of metallic admixtures. II. E. COHEN and A. K. W. A. VAN LIESHOUT (Z. physikal. Chem., 1937, **178**, 221—226; cf. A., 1936, 1452).—Minute amounts of Co, Mn, and Te greatly accelerate the transformation of deformed white into grey Sn. Fe, Ni, and Cu have practically no effect. Pb, Cd, and Au retard. Al and Bi present together in equal amounts cause retardation. Small amounts of foreign metals also affect the rate of transformation of cast white Sn. R. C.

Allotropy of the chemical elements. A. SCHULZE (Chem.-Ztg., 1937, **61**, 87—88, 108—110).—A review. H. J. E.

Variety and mutual conditions of polymorphous transformations of potassium nitrate. W. BORCHERT (Z. Krist., 1936, **95**, 28—53).—With rising temp. rhombic KNO_3 (β) changes into trigonal KNO_3 (α) at 128°. With falling temp., α at 123° suddenly acquires a mosaic character (α^*) and at 113° changes into a finely-divided β-variety (β_μ). Other varieties (α_0 and β^*) appear, the difference being one essentially of grain size and orientation. The transformations of these various phases are complicated and require

> a single diagram for their statement; they may be traced by the help of Laue pictures. B. W. R.

Superconducting state. J. C. SLATER (Physical Rev., 1937, [ii], **51**, 195—202).—The hypothesis that the superconducting state of metallic electrons may arise by application of perturbation theory to Bloch's theory of the metallic state is examined. Known cases of absence of superconductivity in certain metals are accounted for. N. M. B.

Critical values of field strength and current for the superconductivity of tin. L. V. SCHUBNIKOV and V. I. CHOTKEVITSCH (Physikal. Z. Sovietunion, 1936, **10**, 231—241).—The superconductivity of a Sn ring is destroyed if the current produces a field at the surface of the wire > a crit. val. If an external field is applied, the superconductivity of the Sn disappears when the tangential component of the field reaches the crit. val. In an external magnetic field the superconductivity of a ring through which a current is flowing is destroyed when the sum of the tangential components of the external field and that due to the current becomes > the crit. val., at any one place in the ring. A. J. M.

Absorption of infra-red light in superconductors. J. G. DAUNT, T. C. KEELEY, and K. MENDELSSOHN (Phil. Mag., 1937, [vii], **23**, 264—271).—Neither Pb nor Sn showed any change in absorption of infra-red light on being transformed from the superconductive into the normal state. It is concluded that the no. of superconducting electrons is very small or, more probably, all electrons pass into the superconductive state, but are not by any means entirely free. A. J. M.

Temperature variation of the abnormal unidirectional diamagnetism of graphite crystals. K. S. KRISHNAN and N. GANGULI (Nature, 1937, **139**, 155—156).—The magnetic anisotropy of graphite, $\chi\| - \chi\perp$, diminishes from approx. -28×10^{-6} at 140° abs. to approx. -7.8×10^{-6} at 1270° abs.; $\chi\perp$ varies from -1.4×10^{-6} at 100° abs. to -0.5×10^{-6} at room temp., and -0.4×10^{-6} at 940° abs. L. S. T.

Paramagnetic susceptibility of colloidal powder of platinum. N. TAKATORI (Sci. Rep. Tôhoku, 1936, **25**, 489—503).—The paramagnetic susceptibility of Pt decreases from 1·01 to 0·78 $\times 10^{-6}$ during change of particle size from 15 to 0·20 $\times 10^{-4}$ mm. The particle size of colloidal Pt is 1·8—3·0 $\times 10^{-5}$ mm., and its lattice const. is 0·018% > for the same powder annealed. J. W. S.

Magnetochemical investigations. II. Complex platinum compounds. J. A. CHRISTIANSEN and R. W. ASMUSSEN (Kong. dansk. Vid. Selsk., mat.-fys. Medd., 1935, **13**, No. 11, 14 pp.; Chem. Zentr., 1936, i, 1817; cf. A., 1935, 573).—A large range of complex Pt^{II} compounds has been examined and found to be uniformly diamagnetic. J. S. A.

Active iron. X. Magnetic characterisation of the ferric monodipyridyl complex and the magnetism of complex ferrous pentacyanides. A. SIMON, G. MORGENSTERN, and W. H. ALBRECHT (Z. anorg. Chem., 1937, **230**, 225—238; cf. this vol., 94).—Susceptibilities of [Fe(dip)]Cl$_3$ have been measured at temp. between 95° and 289° abs. Potential measurements and electrometric titration with $AgNO_3$ show that all three Cl atoms are ionisable. Susceptibilities of $Na_3[Fe(CN)_5X]$ (X = NH_3, H_2O, NO_2, AsO_2, CO, SO_3, C_5H_5N) are also given. F. L. U.

Magnetochemical studies. XXIII. Rhenium compounds. W. KLEMM and G. FRISCHMUTH (Z. anorg. Chem., 1937, **230**, 220—222; cf. A., 1936, 786).—Susceptibilities $\times 10^6$ of the following compounds are given at 20°: $[Re(NH_3)_6]Cl_3$, 0; $[Re(NH_3)_6]Br_3$, +90; $Rb[ReCl_4]$, −65; Na_2ReO_3, +20 and −5; $[Re(NH_3)_6]Cl_5$, −190; $K_3[ReO_2(CN)_4]$, −40; $Tl_3[ReO_2(CN)_4]$, −270. F. L. U.

Magnetic behaviour of alums of the iron group. II. A. SIEGERT (Physica, 1937, **4**, 138—152; cf. A., 1936, 417).—Theoretical. H. J. E.

Directions of easy magnetisation in ferromagnetic cubic crystals. R. M. BOZORTH and L. W. McKEEHAN (Physical Rev., 1937, [ii], **51**, 216).—An explanation of the stable directions of magnetisation in terms of the distribution of magnetic dipoles in the atoms of Fe and Ni is proposed. N. M. B.

Conditions of coherence in the [optical] diffraction spectrum produced by stationary ultrasonic waves in liquids. R. BÄR (Helv. phys. Acta, 1935, **8**, 591—600; Chem. Zentr., 1936, i, 1793).—Any pair of spectra, both of odd or both of even order, possess some proportion of coherent light, but odd and even spectra are mutually incoherent. Results agree with Brillouin's theory. J. S. A.

Absorption of ultrasonic waves in benzene. E. BAUMGARDT (Compt. rend., 1937, **204**, 416—418).—Vals. of the absorption coeff. in the frequency range 850—2100 kc. per sec. were determined. A. J. E. W.

Physical properties of isoprene. N. BEKKEDAHL, L. A. WOOD, and M. WOJCIECHOWSKI (J. Res. Nat. Bur. Stand., 1936, **17**, 883—894).—The following have been determined: b.p. (T) 34·076±0·003°, $dT/dp = 0.0382°$ per mm., f.p. = −146·8±0·2°, $d^{20} = 0.6805±0.0001$, $n^{20} = 1.42160±0.00005$, mol. refraction 25·39, d between b.p. and f.p. $= 0.7002 - 0.9754 \times 10^{-3}t - 0.592 \times 10^{-6}t^2 + 0.525 \times 10^{-9}t^3 + 9.66 \times 10^{-12}t^4$, where t = temp., latent heat of vaporisation from the Clausius–Clapeyron equation 6·17 kg.-cal. per mol., n_D from 0° to b.p. $1.43472 - 0.656 \times 10^{-3}t$. R. S. B.

Ebulliometric and tonometric researches on chemically pure liquids. III. Carbon tetrachloride as a physico-chemical standard. A. ZMACZYŃSKI (Rocz. Chem., 1936, **16**, 486—501).—Pure CCl_4 has b.p. 76·686°, d_4^{25} 1·58445, and n_D^{20} 1·46044. CS_2 and H_2O, but not $CHCl_3$, are readily separated from CCl_4 by fractionation; $CHCl_3$ is absent from CCl_4 prepared from CS_2. CCl_4 is resistant to light and atm. O_2 at high temp. and pressures, and is a suitable ebulliometric standard. R. T.

Determination of certain physico-chemical constants of benzene. M. WOJCIECHOWSKI (Rocz. Chem., 1936, **16**, 524—534).—The purest C_6H_6 obtained by fractional crystallisation or distillation

methods has m.p. $5.51\pm0.01°$, b.p. $80.093\pm0.002°$, n_D^{25} 1.49807 ± 0.00006, and d^{25} 0.873670 ± 0.000004.
R. T.

Influence of the terminal group on the m.p. of normal chain aliphatic compounds. P. CARRÉ and H. PASSEDOUET (Compt. rend., 1937, **204**, 347—349).—A curve of m.p. plotted against the no. of C in a series of urethanes corresponding with normal primary alcohols C_1—C_{16} shows irregularities which are discussed in relation to the occurrence of odd or even nos. of C. N. M. B.

Specific heat of iodine. L. G. CARPENTER and T. F. HARLE (Phil. Mag., 1937, [vii], **23**, 193—208).—C_p and C_v have been obtained for solid and liquid I between $202.2°$ and $432.7°$ abs. The C_v–T curve is of the usual general form, but passes through a flat max. about $300°$ abs., and decreases slightly as the m.p. is approached. Up to a temp. $10° <$ m.p., C_v is $\not> 3R$. The average val. of the mean sp. heat of solid I from room temp. to $100°$ is about 3% $<$ true sp. heat. No evidence for the existence of two forms of I with a transition temp. at $47°$ could be found. For liquid I, C_p is approx. 10 g.-cal. per g.-atom, and C_v is approx. $3R$. Hence the no. of degrees of freedom in the liquid is $\not>$ the no. in the solid. A. J. M.

Ammonia. Heat capacity and vapour pressure of solid and liquid. Heat of vaporisation. Entropy values from thermal and spectroscopic data. R. OVERSTREET and W. F. GIAUQUE (J. Amer. Chem. Soc., 1937, **59**, 254—259).—Heat capacities have been determined at $15°$ abs. to the b.p. NH_3 has m.p. $195.36°$ abs., b.p. $239.68°$ abs., heat of fusion 1351.6 g.-cal. per mol., heat of vaporisation at the b.p. 5581 g.-cal. per mol. The v.p. of solid NH_3 (176.92—$195.36°$ abs.) is given by $\log_{10} P = -1630.700/T + 0.00593$, and that of liquid NH_3 (199.26—$241.59°$ abs.) by $\log_{10} P = -1612.500/T -0.0123117T + 0.000012521T^2 + 10.83997$. The calc. mol. entropy of the gas at the b.p. is 44.13 ± 10 e.u. The abs. entropy at $298.1°$ abs. is 52.22 g.-cal. per degree per mol. E. S. H.

Test of the third law of thermodynamics by means of two crystalline forms of phosphine. Heat capacity, heat of vaporisation, vapour pressure, and entropy of phosphine. C. C. STEPHENSON and W. F. GIAUQUE (J. Chem. Physics, 1937, **5**, 149—158).—A new *form* of PH_3 stable at $<49.43°$ abs. is reported. Heat capacities of the stable and unstable forms have been measured down to $15.0°$ abs. and results verify the third law. A region of abnormally high heat capacity in the metastable form exists between $30.29°$ and $35.66°$ abs. which cannot be explained by assuming a change of state. B.p., m.p., and transition points and corresponding heats of vaporisation, fusion, and transition have been measured. The entropy of solid PH_3 at $49.43°$ abs. has been calc. from measurements in the stable and unstable forms and the vals. so obtained agree. The entropy at $298.1°$ abs. agrees well with the spectroscopically determined val. The odd moment of inertia, the P–H distance, and the bond angle ($98\pm5°$) are evaluated. W. R. A.

Heat capacity of ethane from $15°$ abs. to the b.p. Heat of fusion and heat of vaporisation. R. K. WITT and J. D. KEMP (J. Amer. Chem. Soc., 1937, **59**, 273—276).—Heat capacities are recorded. C_2H_6 has m.p. $89.87\pm0.1°$ abs., heat of fusion 682.9 g.-cal. per mol., heat of vaporisation at the b.p. 3514 g.-cal. per mol. The calc. entropy of the gas at the b.p. is 49.54 e.u., and at $298.1°$ abs. is 54.85 e.u. E. S. H.

Entropy of ethane and the third law of thermodynamics. Hindered rotation of methyl groups. J. D. KEMP and K. S. PITZER (J. Amer. Chem. Soc., 1937, **59**, 276—279).—The entropy of C_2H_6 has been calc. from the heat and free energy of hydrogenation of C_2H_4, considering C_2H_6 as a restricted internal rotator. Comparison of the vals. with those obtained from calorimeter measurements extending to low temp. by the use of the third law of thermodynamics proves the correctness of the third law val. Evidence of the existence of a potential barrier of about 315 g.-cal. per mol., restricting the internal rotation of the Me groups in C_2H_6, has been obtained. E. S. H.

Entropy and the symmetry of the benzene molecule. R. C. LORD, jun., and D. H. ANDREWS (J. Physical Chem., 1937, **41**, 149—158).—From the vibrational frequencies of C_6H_6 and C_6D_6, and assuming a symmetry no. of 12, the entropies of translation, vibration, rotation, and symmetry are calc. The total entropy is in good agreement with the val. calc. from thermal data. J. W. S.

Density of liquid selenium. S. DOBINSKI and J. WESOŁOWSKI (Bull. Acad. Polonaise, 1936, **A**, 446—450).—d, determined by a displacement method between $228°$ and $345°$, is given by $d = 3.987 - 0.0016(t - 220)$. J. S. A.

Comparative densities of fresh and aged lead sulphate. (MME.) S. T. PERLINGHI and C. ROSENBLUM (J. Chinese Chem. Soc., 1937, **5**, 25—34).—For aged $PbSO_4$ $d^{16.4}$ is 6.17, whereas d for the freshly prepared salt is 1.8—6.5% less, the greatest difference being obtained when H_2O is used as a covering liquid. R. S. B.

Densities of fine powders. J. L. CULBERTSON and A. DUNBAR (J. Amer. Chem. Soc., 1937, **59**, 306—308).—The apparent d of charcoal and SiO_2 gel in H_2O, CCl_4, C_6H_6, and light petroleum have been determined. The vals. for SiO_2 are highest in H_2O and lowest in light petroleum, but the reverse order holds for charcoal. The influences of interfacial tension and compression of liquids at the interface are discussed. E. S. H.

Carbon rings. XXIX. Density curves of cyclic diketones. L. RUZICKA (Helv. Chim. Acta, 1937, **20**, 128—132; cf. A., 1934, 1220).—d has been determined for *cyclo*hexane-1 : 3-dione and *cyclo*decane-1 : 5-dione. With cyclic diketones d decreases continuously as the no. of ring members increases. A continuously falling d graph is not therefore characteristic solely of heterocyclic systems but also generally of those with relatively low H content whether carbocyclic or heterocyclic. The abnormally great d of certain rings with 10—14 members is

ascribed to the large sphere of activity of the H atoms or of the ring members united with H.

H. W.

Hexane and some hydrocarbons. A. MAMAN (Publ. sci. tech. Min. de l'Air, 1935, No. 66, 1—55; Chem. Zentr., 1936, i, 2332).—Accurate physical properties and solubilities for many hydrocarbons are recorded.

H. N. R.

Vaporisation of hydrocarbons and hydrocarbon mixtures. M. SCHMITT (Publ. sci. tech. Min. de l'Air, No. 54, 1—139; Chem. Zentr., 1936, i, 2061—2062).—Static measurements give the following results : for PhMe, $\log p = 6 \cdot 06446 - 1414 \cdot 26/(227 \cdot 82 + t)$; for *cyclo*hexane, $\log p = 5 \cdot 97843 - 1274 \cdot 32/(230 \cdot 17 + t)$; for *n*-hexane, $\log p = 5 \cdot 99209 - 1235 \cdot 31/(231 \cdot 50 + t)$; for methyl*cyclo*pentane, $\log p = 5 \cdot 88543 - 1205 \cdot 89/(229 \cdot 09 + t)$. Results for C_6H_6 are more complex and depend on the ratio of vapour to liquid vol.

H. N. R.

Vapour pressure of hydrogen deuteride. R. B. SCOTT and F. G. BRICKWEDDE (Physical Rev., 1935, [ii], **48**, 483).—Data for 99·95% HD in the range 13·92—20·38° abs. are given. After 15 days no reversion to the equilibrium mixture of H_2, HD, and D_2 could be detected by a change in v.p. L. S. T.

Vapour isotherms and the condensation line of carbon dioxide. VIII. K. JABŁCZYŃSKI (Rocz. Chem., 1936, **16**, 566—573).—Theoretical. R. T.

Vapour pressures of aluminium iodide. E. MOLES and A. VIÁN (Anal. Fís. Quím., 1936, **34**, 782—786; cf. A., 1936, 945).—The author's earlier data are in agreement with those of Fischer *et al.* (A., 1932, 565). F. R. G.

Heat conduction in rarefied gases. E. FRED-LUND (Ann. Physik, 1937, [v], **28**, 319—324).—Theoretical. An expression for the temp. drop coeff. of polyat. gases is obtained by comparison of the formulæ of Knudsen and of Smoluchowski for the heat conductivity of rarefied gases. O. D. S.

Thermal conductivity of unsaturated gaseous hydrocarbons at low pressure. R. DELAPLACE (Compt. rend., 1937, **204**, 263—265; cf. this vol., 125).—Comparative data for seven hydrocarbons and H_2, for the pressure range 0—0·3 mm., are given. κ for the hydrocarbons is const. at pressures >0·15 mm. A. J. E. W.

Thermal conductivity of tungsten. W. C. MICHELS and (MISS) M. COX (Physics, 1936, **7**, 153—155).—The theory of heat losses from an electrically heated wire (Proc. Roy. Soc., 1931, A, **131**, 320; 1932, A., **135**, 192) is extended to include a wire supported by springs. The method has been applied to the determination of the thermal conductivity of W over the temp. range 78—273° abs., and indicates that the Wiedemann–Franz law breaks down in this region.

J. W. S.

Thermal expansion of the Bi lattice between 25° and 530° abs. R. B. JACOBS and A. GOETZ (Physical Rev., 1937, [ii], **51**, 159—164).—Using the X-ray diffraction method with a Bragg spectrometer and movable slit, the expansion of the Bi lattice gave vals. $8 \cdot 3 \times 10^{-6}$—$17 \cdot 4 \times 10^{-6}$ at 25°

to 120° abs., respectively, thereafter remaining unchanged to the m.p. An anomalous drop to $13 \cdot 8 \times 10^{-6}$ in the range between −15° and 75° indicates the existence of a separate phase not characterised by a change of the lattice configuration. The change in the lattice spacing for each temp. is calc. A divergence between lattice and integral expansion beginning 30° < m.p. is found. The Grüneisen rule is obeyed to a first approximation over the whole temp. range.

N. M. B.

Anomalous expansion of Seignette salt. J. HABLÜTZEL (Helv. phys. Acta, 1935, **8**, 498—500; Chem. Zentr., 1936, i, 2049).—The thermal expansion deviates considerably from linearity between −20° and 25°, the max. anomaly occurring at the electrical Curie point. Expansion in the crystal is locally non-homogeneous. J. S. A.

Interrelations of compressibility, m.p., solubility, valency, and other properties of the halides of the alkalis and alkaline earths. S. BALCE (Philippine J. Sci., 1936, **60**, 251—254).—The following formulæ are considered to give better agreement with data than others more complicated : $K = V/5 \cdot 6 \times 10^{12} Z$; $S = (5 \cdot 7 - P)^3/10$; $T = 1500 \times (\Delta V)^{1/3} = 0 \cdot 0113 H/Z$; $H = 23330 ZP$, where K = compressibility, V = mol. vol. of the solid, Z = valency, S = solubility in g. per c.c., P = electrolytic decomp. potential, T = m.p., ΔV = shrinkage in vol. per unit vol. incident to compound formation, H = heat of formation in g.-cal. (cf. A., 1935, 303).

C. R. H.

Influence of magnetic field on the viscosity of liquids in the nematic phase. M. MIESOWICZ (Bull. Acad. Polonaise, 1936, A, 228—247; cf. A., 1935, 1198).—The viscosities in the nematic phase of *p*-azoxy-anisole and -phenetole (I), measured by the damping of a plate vibrating perpendicularly in the liquid, are increased by the application of a horizontal magnetic field. The effect of the field decreases with rising temp., becoming zero at the transition point to the isotropic phase. With increasing field a saturation val. is reached, at about 3000 gauss for (I) at 143°. The effect is greatest when the magnetic field is perpendicular to the plane of the vibrating plate and least when the two are parallel. O. D. S.

Copper–zinc diagram. J. SCHRAMM (Metall-wirts., 1935, **14**, 995—1001, 1047—1050; Chem. Zentr., 1936, i, 2819).—The occurrence of the peritectic reaction α + melt ⇌ β at approx. 900° is confirmed. Congruent crystallisation or melting occurs at 834° (melt ⇌ γ). The reported formation of Cu_2Zn_3 is not confirmed (cf. B., 1927, 939). H. J. E.

Phase diagram of Cu–Zn at low temperatures. S. KONOBEJEVSKI and V. TARASSOVA (Physikal. Z. Sovietunion, 1936, **10**, 427—428).—The solubility of the α-phase of Cu–Zn has been determined from 167° to 400° by X-ray analysis of specimens brought to equilibrium by prolonged annealing after deformation; it decreases with falling temp. O. D. S.

Equilibrium diagram of the copper–antimony system. I. Thermal analysis and microscopical examination. T. MURAKAMI and N. SHIBATA (Sci. Rep. Tôhoku, 1936, **25**, 527—568).—This

system embraces five branches with max. m.p. 683° (corresponding with Cu_5Sb_2) and eutectics at 645° (69·0% Cu) and 526° (23·5% Cu). The compounds $Cu_{11}Sb_2$, Cu_9Sb_2, Cu_5Sb_2, and Cu_2Sb are found to be present in the solid phase, forming solid solutions η, δ, β, and γ, respectively. The ranges of stability of the various phases are discussed. J. W. S.

K Absorption spectra of the elements nickel and copper in certain nickel–copper alloys. T. HAYASI (Sci. Rep. Tôhoku, 1936, **25**, 598—605).— The fine structure of the absorption spectra of Ni and Cu in alloys (50% and 75% Ni) is similar to that for the pure metals, and shows no connexion with the magnetic properties. J. W. S.

Constitution of alloys of copper, aluminium, and silicon. I. Equilibrium diagrams of three binary systems. C. HISATSUNE (Tetsu-to-Hagane, 1935, **21**, 726—742).—The equilibrium diagrams are described. CH. ABS. (e)

Zinc-rich portion of the system iron–zinc. E. C. TRUESDALE, R. L. WILCOX, and J. L. RODDA (Amer. Inst. Min. Met. Eng., Inst. Met. Div., 1935, Tech. Publ. 651, 37 pp.).—The solid solubility of Fe in Zn varies from 0·0009 to 0·0028%. The m.p. of Zn is 419·45° and the eutectic temp. $\nleqslant 419·40 \pm 0·05°$. The lower and upper peritectic temp. are $672 \pm 1°$ and $782 \pm 1°$ and the solubilities of Fe in molten Zn at 419·4°, 672°, 782°, and 875° are 0·018, 3·0, 7·4, and 9·2%, respectively. CH. ABS. (e)

Equilibrium diagram of the silver-rich silver–aluminium alloys : nature of the transformations. I. OBINATA and M. HAGIYA (Kinz.-no-Kenk., 1935, **12**, 419—429).—In alloys with 5·6—8·2% Al a eutectoid and a metatectoid reaction take place at 615° and 420°, respectively. The latter ($\alpha + \gamma \rightleftharpoons Ag_3Al$) can easily be suppressed by H_2O-quenching the alloy, but the former ($\beta \rightleftharpoons \alpha + \gamma$) is only slightly affected by this means. Alloys quenched from the β-field consist of the γ-phase supersaturated with Ag. Quenched hypoeutectoid alloys show an anomalous increase of electrical resistance when heated at about 200°, which is attributed to the formation of Ag_3Al. The β-phase (7·98% Al) forms a body-centred cubic lattice (a 3·295 A. at 700°). CH. ABS. (e)

Systems tin–germanium and tin–beryllium. W. GUERTLER and M. PIRANI (Tech. Publ. Internat. Tin Res. & Dev. Counc., 1937, A, No. 50, 23 pp.).— Technique for the prep. of Sn–Ge alloys is described. The Sn-rich end of the Sn–Ge equilibrium diagram has been examined microscopically and thermally. The alloys consist of Ge crystals in a ground-mass of Sn containing 0·1—0·01% of Ge. The prep. of Sn–Be alloys is described. The alloys consist of Be crystals in a ground-mass of Sn containing a few tenths % of Be. The mechanical properties of Sn-rich Sn–Ge and Sn–Be alloys have been determined. E. S. H.

Anomalous mixed crystals in the system SrF_2–LaF_3. J. A. A. KETELAAR and P. J. H. WILLEMS (Rec. trav. chim., 1937, **56**, 29—35).— X-Ray measurements show that mixtures containing 0—30 mol.-% LaF_3 give mixed crystals with a SrF_2 lattice. These are formed by replacement of $Sr^{..}$ by $La^{...}$, the additional F' ions occupying vacant lattice spaces. A. J. E. W.

Viscosity of mixed salt solutions. T. ISHIKAWA (Bull. Chem. Soc. Japan, 1937, **12**, 16—24).— Published η data are successfully applied to the testing of the author's η formula (cf. A., 1929, 387), and comparison is made with 14 other η formulæ. C. R. H.

Flow and structural properties of sodium silicate solutions. I. N. SAVJALOV (J. Phys. Chem. Russ., 1936, **8**, 411—419).—The viscosities of two Na silicate solutions ($SiO_2 : Na_2O = 2·78$ and 3·05) have been found to obey Poiseuille's law and afford no evidence of "structural viscosity." The dependence of η on temp. has also been investigated. E. R.

Applicability of the viscosity law of Staudinger to solutions of synthetic rubber. I. I. SHUKOV, V. A. KOMAROV, and E. I. GRIBOVA (Kolloid. Shurn., 1936, **2**, 113—118).—The viscosity of solutions in C_6H_6 of a Na isoprene, a chloroisoprene, and three Na–C_2H_4 polymerides increases more rapidly than the concn., so that Staudinger's "const." is variable. In very dil. solutions, however, the variation is small. J. J. B.

Experiments on the compressibility of binary solutions by electro-acoustic methods. V. V. TARASSOV, V. P. BERING, and A. A. SIDOROVA (J. Phys. Chem. Russ., 1936, **8**, 372—382).—Compressibilities (β) of mixtures (1) $H_2O + PhOH$, (2) $H_2O + EtOH$, (3) $H_2O + MeOEt$, (4) $COMe_2 + C_6H_6O_3$, and (5) $EtOAc + NH_2Ph$ have been calc. from measurements of sound velocity. The β–composition curve has a min. at 25 mol.-% EtOH for (2), a sharp min. at 13 mol.-% MeOEt for (3), a min. at 50 mol.-% for (4), and three min., corresponding with the molar ratios 3 : 1, 3 : 2, and 1 : 1, in system (5). E. R.

Thermal dilatation of the system $K_2B_4O_7 + B_2O_3$ in the fused state. A. A. LEONTEVA (J. Phys. Chem. Russ., 1936, **8**, 339—344).—The sp. vols. of mixtures containing 25, 45, 50, 55, 77, and 92 mol.-% B_2O_3 vary linearly with the temp. over the range 800—1250°. The isothermals afford indications of the existence of $K_2O,3B_2O_3$ and $K_2O,4B_2O_3$. G. R.

B.p. relation of mixtures of ethyl alcohol and water beyond the azeotropic point. K. R. DIETRICH and H. GRASSMANN (Chem. Fabr., 1937, **10**, 106—108).—Data have been obtained for the b.p. and composition of mixtures containing 90·2—100% EtOH. At 78·15° and 95·6% EtOH the vapour and liquid phases have the same composition. The distillation of aq. EtOH is discussed. R. S. B.

Volatility of fatty acids in aqueous solution. P. JAULMES and H. MAZARS (J. Chim. phys., 1937, **34**, 37—45).—Coeffs. of distillation and volatility consts., X (cf. A., 1933, 770), have been determined at several temp., pressures, and concns. The ionisation consts. at 100° derived from vals. of X are : HCO_2H 1·2 × 10⁻⁴, $AcOH$ 1·2 × 10⁻⁵, $EtCO_2H$ 1 × 10⁻⁵, Pr^aCO_2H 3 × 10⁻⁶, Bu^aCO_2H 1·2 × 10⁻⁶ and $Bu^\beta CO_2H$ 8 × 10⁻⁶. The separation of mixtures of fatty acids is discussed. J. G. A. G.

Stable unmixing in binary systems : salt + water. H. G. B. DE JONG and L. W. J. HOLLEMAN (Proc. K. Akad. Wetensch. Amsterdam, 1937, **40**, 69—71; cf. A., 1935, 1320).—The saturation curve for the (condensed) system novocaine dichromate (I)–H_2O has been determined. Crystals of (I) (m.p. 133°) melt under H_2O at 74° and form a separate liquid layer in equilibrium with a more dil. solution. The layers are completely miscible above 98°. Areas of limited miscibility also occur with novocaine perchlorate and thiocyanate. The phenomenon is discussed with reference to complex coacervation.
F. L. U.

Solubility. XV. Solubility of liquid and solid stannic iodide in silicon tetrachloride. J. H. HILDEBRAND and G. R. NEGISHI (J. Amer. Chem. Soc., 1937, **59**, 339—341).—Data for the range 0—140° are recorded. The system is regular and shows no effects which could be ascribed to mol. fields.
E. S. H.

Solubility coefficients of *cyclo*propane for water, oils, and human blood. F. S. ORCUTT and M. H. SEEVERS (J. Pharm. Exp. Ther., 1937, **59**, 206—210).—Solubility coeffs. of *cyclo*propane (I) are briefly discussed in relation to anæsthetic action of (I). The abs. solubilities as well as the oil–H_2O ratios of (I) for olive, cod-liver, and paraffin oils are approx. the same.
J. N. A.

Diffusion of colouring matter into artificially coloured phthalic acid crystals under the influence of heat. P. GAUBERT (Compt. rend., 1937, **204**, 599—601).—Uniformly coloured crystals are obtained by adding colouring matter to the mother-liquor during crystallisation. On heating, the colouring matter separates as inclusions, and after cooling remains in the form of crystals with orientation similar to that of the $C_6H_4(CO_2H)_2$ crystals.
A. J. E. W.

Adsorption of gases and vapours by active carbon. W. C. BOKHAVEN and H. O. LÖCKER (Chem. Weekblad, 1937, **34**, 124—130).—A review dealing with the rôles of absorption, chemosorption, adsorption, and capillary condensation in this phenomenon.
S. C.

Adsorptive properties of iron hydroxide. A. S. SCHACHOV (Kolloid. Shurn., 1936, **2**, 215—223).—If, when $m_1 + m_2$ mols. of $Fe(OH)_3$ are shaken with $C_1 + C_2$ mols. of aq. $H_2C_2O_4$, m_2 mols. of $Fe(OH)_3$ are dissolved and C_2 mols. of $H_2C_2O_4$ are adsorbed, the fractions C_2/m_1 and m_2/C_1 are const. for a given gel.
J. J. B.

Adsorption of ions and physical character of precipitates. II. Ferric oxide and bentonite precipitates. G. E. CUNNINGHAM, H. E. GABLER, and W. S. PEACHIN (J. Physical Chem., 1936, **40**, 1183—1189; cf. A., 1929, 390).—The sedimentation vols. of ppts. of hydrous Fe_2O_3 and of bentonite produced by different coagulating ions, and in presence of different stabilising ions, have been measured. The observed vols. are symbatic with the degree of hydration of the adsorbed ions.
F. L. U.

Sorption of gases by titania gel. III. Relation between the pressure and sorbed amount of ammonia. I. HIGUTI (Bull. Inst. Phys. Chem. Res. Japan, 1937, **16**, 42—52; cf. A., 1936, 791).—Sorption and desorption isotherms have been determined at −50° to 40°. At 20—40° the curves agree with Freundlich's isotherm, but at lower temp. inflexion points and a hysteresis loop are observed. Results are discussed in reference to capillary condensation, the mean pore radius at the beginning of the loop being 9·5 A. (independent of temp.). Vols. of liquid adsorbate are approx. the same for equal pore radius, the max. val. being 0·36 c.c. per g. of gel. The differential heat of sorption in the high-pressure range is const. at 6070 g.-cal. per mol., which is approx. the latent heat of condensation of NH_3 at −40°, viz., 5670 g.-cal.
R. S. B.

Influence of the total volume of pores in silica gels on the adsorption of SO_2. M. O. CHARMANDARIAN and E. L. KOPELIOVITSCH (J. Phys. Chem. Russ., 1936, **8**, 300—305).—Measurements have been made of the d and adsorptive capacity of SiO_2 gels prepared in various ways (cf. A., 1933, 1242). Addition of $FeCl_3$ increases the adsorptive capacity for SO_2.
J. J. B.

Adsorption of alkalis by cellulose at different temperatures as a method of analysing the boundary between cellulose and solution. I. R. KLJATSCHKO (Kolloid. Shurn., 1936, **2**, 197—214).—Mercerised cotton reacts with NaOH eight times as fast as raw cotton. The interaction between cotton and NaOH may be explained either on the basis of adsorption or in terms of hydrolysis. The isotherms consist of several sections corresponding with different nos. of active spaces on the adsorbent surface. The temp. range examined was 15—45°.
J. J. B.

Mechanism of co-precipitation of anions by barium sulphate. F. SCHNEIDER and W. RIEMAN (J. Amer. Chem. Soc., 1937, **59**, 354—357).—Differences between ppts. which are contaminated by occlusion and by mixed-crystal formation, respectively, are enumerated. In accordance with the principles formulated, it is shown that I', Br', Cl', NO_3', and ClO_3' are occluded by $BaSO_4$ ppts., whilst NO_2' is co-pptd. by mixed-crystal formation.
E. S. H.

Ideal adsorption isotherm. F. DURAU, H. KRÄCHTER, and K. KOOPMANN (Physikal. Z., 1937, **38**, 157—158).—Data obtained for adsorption by $PbCl_2$ in the form of spheres and powder, the surface of which has been measured by the radioactivity method, can be used to derive the ideal adsorption isotherm. This is linear from the origin, but at a certain pressure becomes convex to the pressure axis and the slope increases more rapidly as the saturation limit is approached. The effect of lattice distortion caused by adsorption is discussed.
A. J. M.

Influence of magnetic field on adsorption. S. S. BHATNAGAR, P. L. KAPUR, and A. N. KAPUR (Phil. Mag., 1937, [vii], **23**, 256—264).—The amount of $KMnO_4$, $K_2Cr_2O_7$, and $K_4Fe(CN)_6$ adsorbed by sugar C is increased, and that of $FeCl_3$ decreased, by a strong magnetic field. The adsorption of $KMnO_4$ and $K_4Fe(CN)_6$ by $BaSO_4$ is not affected. The theory of Burrage (A., 1933, 457, 898, 1112), according to

which adsorption by C is due to a complex C_xO_y on the surface, is applied to the above examples. MnO_2, which is found in the filtrate after adsorption of $KMnO_4$, is ascribed to the interaction of $KMnO_4$ with C_xO_y. Similarly Cr^{III} is found in the system $K_2Cr_2O_7$–C but $K_4Fe(CN)_6$ is partly oxidised to $K_3Fe(CN)_6$, so that the oxidising or reducing nature of C_xO_y depends on the nature of the adsorbate. The magnetic properties of C_xO_y are discussed and it is suggested that the magnetic field affects adsorption according to the rules deduced by Bhatnagar *et al.* (A., 1929, 1394).　　A. J. M.

Adsorption forces and their electrical nature. III. Nature of the forces of wetting. B. V. ILJIN, A. A. LEONTEEV, and S. V. BRAGIN (Phil. Mag., 1937, [vii], **23**, 294—301).—The heat of wetting of KCl, KBr, and KI by CCl_4, and of $BaSO_4$ by H_2O, EtOH, and CCl_4 has been determined for powders of varying degrees of fineness. The heat of wetting $\propto$ sp. geometrical surface. The vals. in g.-cal. $\times 10^{-5}$ per sq. cm. of surface of the adsorbent are H_2O, 3·8; EtOH, 2; CCl_4, 1·5. An approx. calculation, which takes account only of electrostatic forces, gives vals. of the same order as those obtained by experiment.　　A. J. M.

Desorptive action of radon. E. L. HARRINGTON and H. H. PENLEY (Physical Rev., 1935, [ii], **48**, 473—474).—Adsorbed gases which are not easily removed by reduction of pressure are found to be released (or possibly formed) when Rn is admitted to the system.　　L. S. T.

Thermodynamics of spherical capillary layer of a pure substance. G. BAKKER (Z. physikal. Chem., 1937, **178**, 193—213).—The capillary layer between a drop of a pure liquid and its vapour is considered. The thermodynamic potential of the capillary layer, defined as $u - Ts + p_Tv$, where u is the total energy, s the entropy, and v the vol. of unit mass of the layer and p_T is the tangential pressure in it, may be shown to be equal to the thermodynamic potentials of the extended phases and to have similar properties. Confirmation has been obtained of the theory of the labile portion of the liquid–gas isotherm previously advanced (A., 1904, ii, 540). The max. capillary rise of a liquid occurs in a capillary of radius ~2·5 mμ, which is approx. equal to the pore radius of SiO_2 gel (A., 1914, ii, 632).　　R. C.

Theory of surface tension of Debye–Hückel electrolyte. K. ARIYAMA (Bull. Chem. Soc. Japan, 1937, **12**, 32—37).—Mathematical. A general σ formula is derived which accounts satisfactorily for the behaviour of aq. solutions of chlorides and sulphates.　　C. R. H.

Theory of surface tension of ternary solutions. K. ARIYAMA (Bull. Chem. Soc. Japan, 1937, **12**, 38—43).—Mathematical. Data for ternary solutions have been examined in relation to surface free energy attributable to interionic forces.　　C. R. H.

Osmotic coefficient and the activity coefficient at the surface. K. ARIYAMA (Bull. Chem. Soc. Japan, 1937, **12**, 44—51).—Mathematical. The coeffs. applicable to the surface of solutions of strong electrolytes are calc. on the basis of the Debye–Hückel theory.　　C. R. H.

Linear or edge energy and tension as related to the energy of surface formation and of vaporisation. W. D. HARKINS (J. Chem. Physics, 1937, **5**, 135—140).—The mol. energy associated with the edges of a lens of non-volatile oil on H_2O or of a crystal is considerable although only a small fraction of the total surface energy. It is of importance in many chemical phenomena and biological processes.　　W. R. A.

Surface salting-out by electrolytes. IV. Surface salting-out and temperature. V. K. SEMENTSCHENKO and A. RUSTAMOV (J. Phys. Chem. Russ., 1936, **8**, 383—386).—The surface tensions, σ, of $MgSO_4$ solutions (0—2 mols. per litre) have been measured at 0—60° in presence of 0—0·02 mols. per litre of iso-C_5H_{11}·OH. Regions characterised by $d\sigma/dc = 0$ ($c = $ concn. of electrolyte) previously (*ibid.*, 1935, **6**, 45) detected in NaBr solutions are also found in the case of $MgSO_4$ solutions. These become narrower with rising temp.　　E. R.

Surface activity of ions. II. P. EKWALL (Acta Acad. Abo. math. phys., 1935, **8**, No. 2, 11 pp.; Chem. Zentr., 1936, i, 2517).—The surface tension and the properties of the surface layer for aq. solutions of Me-, Et-, and Pr-substituted NH_4 picrate have been examined.　　H. J. E.

Heats of wetting of activated charcoal and silica. J. L. CULBERTSON and L. L. WINTER (J. Amer. Chem. Soc., 1937, **59**, 308—310).—Data are recorded for wetting by H_2O, $PhNO_2$, C_6H_6, CCl_4, CS_2, and light petroleum. The results are correlated with the apparent d of the solids in the same liquids (cf. this vol., 175).　　E. S. H.

Disperse hysteretic differential wetting. Kinetics of removal of adsorbed films as a method of investigating chemical reactions in the surface layer. I. R. KLJATSCHKO (Kolloid-Z., 1937, **78**, 171—184; cf. A., 1936, 284).—Further data for the differential wetting of flat surfaces and powders of different minerals are presented. The adsorption films can be washed off the surfaces, irrespectively of whether the polar groups are attached to the surface or turned outwards. The results are discussed in reference to a quant. theory of flotation.　　F. L. U.

Mechanism of flotation. Adherence of particles to the boundary between two phases. Z. V. VOLKOVA (J. Phys. Chem. Russ., 1936, **8**, 197—207).—The floating of loaded and unloaded glass, calcite, and barytes plates in the surface of H_2O has been measured and the results are compared with theory.　　J. J. B.

Adherence of bubbles to solid surfaces. V. S. VESELOVSKI and V. N. PERTZOV (J. Phys. Chem. Russ., 1936, **8**, 245—259).—Along the line l of contact between solid, liquid, and air a tension exists which is similar to surface tension. It represents a force tending to decrease the perimeter of the bubble along l; this force $\propto 1$/radius of curvature of l. The observed dependence of the contact angle on the radius agrees with this view. The friction involved in moving

bubbles on the surface, and the adherence of bubbles in aq. solutions to glass, mica, talc, graphite, Hg, and paraffin, were also measured.   J. J. B.

Dielectric potential of a potassium chloride solution at different hydrogen-ion concentrations. B. Kamienski and J. Inglot (Bull. Acad. Polonaise, 1936, A, 255—257; cf. following abstract). —The dielectric potential V at the air–solution interface of $0.1N$-KCl is const. at p_H from 1·8 to 12·2. V decreases at p_H <1·8 and increases at p_H >12·2.
          O. D. S.

Dielectric potential and surface tension of cholic acids at different hydrogen-ion concentrations. B. Kamienski and J. Inglot (Bull. Acad. Polonaise, 1936, A, 248—254; cf. A., 1936, 933).—The influence of [H·] from p_H 0·8 to 13 on the surface tension, σ, and on the dielectric potential, V, at the air–solution interface of solutions of dehydro-, deoxy-, and glyco-cholic acid in $0.1N$-KCl is described. The changes in σ and in V are not ∝ each other. Increase in [H·] causes a decrease in the abs. val. of V which is inconsistent with the hypothesis that the anion of the acid is adsorbed at the surface.
          O. D. S.

Influence of hydrogen ions on the dielectric potential and the surface tension of cinchonine and cinchonidine solutions. W. Goslawski (Bull. Acad. Polonaise, 1936, A, 370—377; cf. Kamienski, A., 1936, 933).—A parallelism is observed between the effects of [H·] on the surface tension and on the dielectric potential V at the air–solution interface of aq. solutions of cinchonine and cinchonidine hydrochlorides. Vals. of V in OAc′ buffer solutions are > in $0.1M$-KCl solutions.   O. D. S.

Built-up films of proteins and their properties. I. Langmuir, V. J. Schaefer, and D. M. Wrinch (Science, 1937, 85, 76—80).—Unimol. layers of proteins can be transferred from a H_2O surface to one of Cr-plated brass covered by many layers of Ba stearate (I), and their thicknesses measured optically. The thickness of a film of ovalbumin obtained thus is approx. 2×10^{-7} cm. Multiple films containing ⇂30 layers can be built up, and single protein layers can be made to alternate with layers consisting of an even no. of stearate monolayers. Protein films are more impermeable to C_6H_6, stearic acid, and the lower aliphatic hydrocarbons than are equally thick films of neutral (I). They are practically impervious to petrolatum mols. The effect of surface pressure on the thickness of protein films has also been studied. The properties of proteins are in accord with the view that the protein monolayer is a two-dimensional network held together by elastic forces, and not with a structure consisting of polypeptide chains.
          L. S. T.

Formation of hair-silver on charcoal surface. M. S. Belenki (Kolloid. Shurn., 1936, 2, 225—227).— This occurs when active charcoal is added to $AgNO_3$ solution containing McOH, EtOH, or C_8H_{17}·OH.
          J. J. B.

Capillary systems. XVIII (1). **New technique and apparatus for the preparation, characterisation, and use of membranes.** E. Manegold (Kolloid-Z., 1937, 78, 129—148; cf. A., 1935, 1200).—

A general description is given of methods and apparatus devised by the author. The characterisation of membranes by measuring their permeability to H_2O and gases, and by determining the vol. of their free spaces, is described in detail.   F. L. U.

Change of molecular refraction of alcohol with concentration in benzene. P. Tratteur (Nuovo Cim., 1935, [ii], 12, 444—447; Chem. Zentr., 1936, i, 2731).—Mol. association appears to be without effect.   H. N. R.

Determination of the mol. wt. of casein in phenol solutions. V. A. Vilenski and T. L. Kastorskaja (Kolloid. Shurn., 1936, 2, 193—196).— Measurements of the osmotic pressure with a collodion membrane lead to a mol. wt. >25,000.   J. J. B.

Absorption spectrum of aqueous solutions between 0·70 and 0·90 μ. II. E. Ganz (Z. physikal. Chem., 1937, B, 35, 1—10; cf. A., 1936, 1179).— Solutions of alkali halides and alkaline-earth chlorides have been examined. In chloride solutions the displacement, Δ, of the H_2O band at 0·77 μ is approx. ∝ the radius of the cation, and in solutions of bivalent cations is approx. twice as great as in solutions of univalent cations of the same normality. For K halide solutions Δ is independent of the radius of the anion. In general, the effect of dissolved ions on the solvent H_2O depends on their structure as well as on their size, a fact which supports the theory that liquid H_2O has a quasicryst. structure. Depolymerisation of the H_2O by the ions and ionic hydration tend to shift the above band in opposite directions; the predominating effect when both are present depends on the mol. state of the pure solvent at the particular temp. Reversal of the direction of Δ with rising temp. may be explained by depolymerisation of the H_2O rendering more single H_2O mols. available for hydration.   R. C.

Estimation of drop-size in water clouds. N. Fuchs (Physikal. Z. Sovietunion, 1936, 10, 421—423). —The drops were collected on a glass plate covered with a mixture of vaseline and mineral oil (d 0·9).
          O. D. S.

Stabilisation of aerosols of ammonium chloride and mercuric iodide. K. N. Samochvalov and O. S. Kozuchova (J. Phys. Chem. Russ., 1936, 8, 420—437).—The stabilisation and sensitisation of air suspensions of NH_4Cl and HgI_2 by H_2O, octyl alcohol, and I vapour have been examined by counting the particles deposited on a given surface, by measuring the diameter of the particles, and by microphotographic methods. Substances which act as stabilisers at low concns. may have a sensitising action at higher concns. The possibility of separating two substances (e.g., NH_4Cl and HgI_2) by means of the selective stabilisation of their suspensions is indicated.   E. R.

Mechanical properties of foams. II. A. Siehr (Kolloid-Z., 1937, 78, 156—158; cf. A., 1936, 1459).— The stability of foams of saponin is not affected by compression. They can, however, be destroyed by unilateral pressure causing distortion of the individual bubbles.   F. L. U.

Study of disperse systems by methods of quantitative filtrational analysis. V. A. POKROVSKI (Zavod. Lab., 1936, 5, 1164—1166).—Apparatus and methods are described. R. T.

Size and cataphoretic migration velocity of disperse particles. J. PROSZT (Mitt. berg-hüttenm. Abt. kgl. ung. Palatin.-Joseph-Univ. Sopron, 1935, 7, 26—32; Chem. Zentr., 1936, i, 2305).—For spherical particles of a paraffin emulsion, the cataphoretic velocity increases with size over the range 1—10 μ. J. S. A.

Sedimentation volume, dilatancy, thixotropic and plastic properties of concentrated suspensions. H. FREUNDLICH and A. D. JONES (J. Physical Chem., 1936, 40, 1217—1236; cf. A., 1934, 487; 1935, 701).—The above-mentioned properties of conc. suspensions of 30 inorg. substances in H_2O, N-HCl, N-NaOH, and N-NaCl have been examined. In all cases the diameter of the particles was 1—10 μ. The general rule that a small sedimentation vol., positive dilatancy, and absence of both thixotropy and plasticity are associated with close packing, and the converse properties with loose packing, is confirmed. Exceptions to the rule are recorded and discussed. The best criterion for judging the probable behaviour of a paste is the degree of independence of its particles. A high degree of independence, such as is shown by very hard substances (diamond, corundum, quartz), always leads to close packing. Markedly anisometric particles, especially when laminar (SnS_2, graphite, mica), always give thixotropic pastes. F. L. U.

Preparation and properties of highly concentrated sols. V. Stannic hydroxide sols. N. R. DHAR and C. I. VARADANAM (J. Indian Chem. Soc., 1936, 13, 602—608; cf. A., 1935, 820).—Sols containing up to 9·8% of SnO_2 have been prepared by peptising well washed freshly pptd. hydrous SnO_2 with conc. aq. NH_3 and evaporating on a water-bath. The sols yield jellies when concentrated further or when treated with HCl, KCl, or $BaCl_2$. The η is only about 50% > that of H_2O. The sols become less stable to electrolytes on dialysis. Electrical conductivities are given. F. L. U.

Particle size and optical properties of emulsions. E. D. BAILEY, J. B. NICHOLS, and E. O. KRAEMER (J. Physical Chem., 1936, 40, 1149—1155).—A method is described for calculating, by means of a mechanical product-integraph, the relation between the optical absorption coeff. of a colourless emulsion and the radius of the particles, from a series of "wt.-optical" distribution curves. The latter are determined with a Svedberg low-speed ultracentrifuge, using a series of Nujol–aq. glycerol emulsions in which the refractive index of the aq. phase is varied. A generalised curve is given to show the relation between the absorption coeff. and the concn., particle size, n vals. of the phases, and λ. F. L. U.

Ultrafiltration through Cellophane of porosity adjusted between colloidal and molecular dimensions. J. W. McBAIN and R. F. STUEWER (J. Physical Chem., 1936, 40, 1157—1168).—In order to make sheet cellulose as now manufactered freely permeable to ordinary mols. it must be soaked in aq.

$ZnCl_2$ of 63—65 wt.-% concn. Donnan effects are observed in the ultrafiltration of very dil. electrolytes. The previously reported (A., 1931, 303) presence of colloid in aq. $NaIO_3$ and KIO_3 is now shown to have been erroneous. CdI_2 is, however, retained by a membrane to a greater extent in conc. than in dil. solutions. The influence of pressure and rate of stirring on the retention of sucrose has been determined. F. L. U.

Thixotropy. I. Method for measuring particle-size distribution in colloidal systems. E. A. HAUSER and C. E. REED (J. Physical Chem., 1936, 40, 1169—1182).—With a view of studying the influence of particle size on the thixotropic sol–gel transformation, a laboratory supercentrifuge of the Sharples type has been used to obtain the distribution function. The theory of the machine is worked out and applied to the data obtained by fractionating a suspension of bentonite. F. L. U.

Action of pectic substances on sugars. T. K. GAPONENKOV and V. N. MIMRIKOVA (Kolloid. Shurn., 1936, 2, 243—246).—Diffusion of sucrose, glucose, and fructose through a collodion membrane is found to be retarded by the presence of pectic substances. J. J. B.

Preparation of colloidal gold by the Borowskaya process. Results in neuro-syphilis. A. PRUNELL (Compt. rend. Soc. Biol., 1937, 124, 594—596).—The Borowskaya process (reduction of aq. $AuCl_3$ by Na citrate) is simpler and more trustworthy than that of Lange. H. G. R.

Highly purified chromic hydroxide sol. G. MILAZZO and W. PAULI (Kolloid-Z., 1937, 78, 158—164; cf. A., 1936, 1200).—The prep. and behaviour of a sol containing 0·1 mol. of Cr per litre are described. The sol, which is highly sensitive, is coagulated at unusually low electrolyte concns., viz., KCl 8, Na_2SO_4 0·3, $K_3Fe(CN)_6$ 0·29, $K_4Fe(CN)_6$ 0·1 millimol. per litre. Unlike $Fe(OH)_3$, the sol is stable when heated to ⇥200°. Analysis shows the neutral part of the colloid to consist of $Cr(OH)_3,2H_2O$, and it is probable that the stabilising ion is $Cr(OH)_2^{\cdot}$. F. L. U.

Peptisation of ferric hydroxide in quaternary ammonium bases and the behaviour of different ferric oxide sols towards alkaline solutions of polyhydroxy-compounds. K. E. STUMPF (Kolloid-Z., 1937, 78, 193—200; cf. A., 1935, 1073).—$Fe(OH)_3$ is dissolved by aq. $OH\cdot CH_2\cdot CH(OH)\cdot CH_2\cdot NMe_3\cdot OH$ to the extent of 1·24 mol. Fe per litre, and to a greater extent by $[CH(OH)]_4(CH_2\cdot NMe_3\cdot OH)_2$. Complex formation occurs in both cases, but is ≪ with $Cu(OH)_2$. Part of the $Fe(OH)_3$ is peptised by the base and can be separated from the complex compound by dialysis, in the course of which it is coagulated. Addition of NaOH to the base increases the proportion of Fe in true solution, owing to the formation of "zwitterions," e.g., $OH\cdot CH_2\cdot CH(OH)\cdot CH_2\cdot NMe_3^{\cdot} + OH' \rightleftharpoons OH\cdot CH_2\cdot CHO'\cdot CH_2\cdot NMe_3^{\cdot} + H_2O$. F. L. U.

Binding of water in ferric hydroxide and aluminium hydroxide sols. E. SCHURIGINA (Kolloid. Shurn., 1936, 2, 55—59).—Refractometric determination of bound H_2O in the sols indicates that

they may be classified as lyophilic colloids. Ageing of the sols and rise in temp. lead to diminution in the bound H_2O content, but transition to a thixotropic gel, or the reverse process, does not affect the bound H_2O. Parallel results are obtained by viscosimetric and refractometric obervations. R. T.

Direct examination of sols by X-ray diffraction methods. W. O. MILLIGAN and H. B. WEISER (J. Physical Chem., 1936, 40, 1095—1102; cf. A., 1936, 287).—An arrangement for obtaining X-ray diagrams of particles in an unenclosed flowing column of sol is described. The method has been used to study sols of hydrous oxides, Ag, Argyrol, and AgI. In agreement with previous studies of moist gels, the particles are found to consist in general of simple compounds and not complexes. F. L. U.

[Refraction of light by colloidal solutions.] M. KATALINIĆ (Kolloid-Z., 1937, 78, 191—193).— The conclusion of Menon (A., 1936, 1067) regarding the applicability of Rayleigh's formula is erroneous, owing to his omission of the sin θ correction.
F. L. U.

Refraction of light by colloidal solutions. II. Sols of copper, cupric hydroxide, and mercuric sulphide. A. S. MENON (Kolloid-Z., 1937, 78, 185— 191; cf. A., 1936, 1067).—The polarisation max. is at right angles to the direction of the incident light in all three sols. Rayleigh's equation is valid for sols having particles with radius <115 mμ, and for sols during the initial stages of coagulation. The time–intensity curve during coagulation is S-shaped, indicating an auto-catalytic effect. F. L. U.

Dispersion of depolarisation of light-scattering in colloids. I. Gold sols. R. S. KRISHNAN (Proc. Indian Acad. Sci., 1937, 5, A, 94—107).— Measurements of the dispersion of depolarisation and of the extinction coeffs. have been made for six Au sols with λ range 2500—7000 A. The optical anisotropy of the particles is relatively low in the shorter λ region and higher in the green region where absorption is a max. Polarisation data and extinction coeffs. are compared with those calc. on Gans' theory, and indicate that the particles behave optically like elongated ellipsoids of approx. axial ratio 0·75.
N. M. B.

Spectral transformations undergone by solutions of colouring matter under the influence of another dissolved substance. A. BOUTARIC (J. Chim. phys., 1937, 34, 1—17).—Theoretical. Equations connecting changes of concn. with changes of optical absorption are developed. There is only partial accord with the data of Vlès (A., 1928, 14, 36) and the origin of the anomalies is discussed.
J. G. A. G.

Effect of departure from spherical shape on the viscosity caused by colloidal particles and large molecules. J. W. McBAIN and M. E. L. McBAIN (J. Amer. Chem. Soc., 1937, 59, 342— 344).—When a sphere is elongated to a fibre 2500 times as long as its diameter, the resistance to movement is too low to explain the high η of sols such as cellulose nitrate. The chief factor determining the high η of such sols is probably structural η due to entanglement and local adherence of mols. and

particles immobilising a relatively large amount of solvent. E. S. H.

Conductivity and cataphoretic speed measurements of colloidal Prussian-blue and arsenious sulphide from the viewpoint of origin of charge on colloidal particles. G. F. MANKODI, C. B. JOSHI, P. M. BARVE, and B. N. DESAI (J. Univ. Bombay, 1936, 5, Part II, 53—61).—Observations on the influence of dilution, dialysis, ageing, and exposure to sunlight on the conductivity and electrophoresis of the sols support the view that the charge on the particles is due to preferential adsorption of ions of the electrolytes in the sol, rather than to dissociation of ionogenic complexes at the surface of the particles.
E. S. H.

Influence of ionic flow on the stability and coagulation of colloidal systems. E. I. SOLOVIEV (Kolloid. Shurn., 1936, 2, 149—155).—Bubbling of ionised air through sols does not affect their stability. Dropping of sols through ionised air gives irregular results. J. J. B.

Variations in the electrophoretic behaviour of gelatin-protected silver halide sols. L. F. TICE and W. G. BATT (Amer. J. Pharm., 1937, 109, 29— 35).—The addition of gelatin prepared from material which has had a preliminary liming treatment to a AgI hydrosol confers a negative charge at any p_H $>4·8$ (isoelectric point) and gelatin which has had an acid pretreatment confers a positive charge at p_H $<7·5$ (isoelectric point), both irrespective of the initial charge of the hydrosol. As a consequence of the different isoelectric points of the two types of gelatin, mutual flocculation occurs when their solutions are mixed so that the p_H falls within the limits 4·8 and 7·5. E. H. S.

Multiple emulsions and spontaneous formation of emulsion systems. F. M. SCHEMJAKIN (Compt. rend. Acad. Sci. U.R.S.S., 1937, 14, 23— 26).—Observations on the system PhMe–gelatin– H_2O are recorded and the formation of $CHCl_3$ emulsions by allowing KOH to diffuse into gelatin or agar gel containing chloral hydrate has been investigated.
J. G. A. G.

General theory of lyophobic colloids. II. H. C. HAMAKER (Rec. trav. chim., 1937, 56, 3—25; cf. this vol., 78). A. J. E. W.

Structure viscosity and properties of solutions of cellulose esters. II. Influence of ash content of cellulose nitrate on the viscosity of collodion solutions. S. ROGOVIN and M. SCHLACHOVER (Kolloid-Z., 1937, 78, 224—230; cf. A., 1935, 1074).— Addition of $Ca(OH)_2$ to cellulose nitrate has no effect on the η of dil. (0·25%) sols in $EtOH-Et_2O$ or $COMe_2$, but markedly increases that of conc. (2—16%) sols. Treatment with HCl produces the reverse effect, again observable only with conc. sols. The results are consistent with the view that a compound with $Ca(OH)_2$ is formed whereby the degree of aggregation is increased, and that the action of HCl is due to the destruction of the compound.
F. L. U.

Hydrophilic properties of cellulose. IV. Damp-proof Cellophane. I. Sorption isotherms

for mercerised cellulose treated with solutions of salts with multivalent cations. K. KANAMARU and T. NAKAMURA. **V. Damp-proof Cellophane. II. Regeneration of cellulose from viscose in an electrically neutral state.** K. KANAMARU and Y. FUKUHARA (Kolloid-Z., 1937, 78, 209—218, 218—224; cf. this vol., 133).—IV. Sorption isotherms of H_2O vapour on viscose threads and Cellophane sheets have been determined after treatment with aq. $AlCl_3$, $ThCl_4$, $Th(NO_3)_4$, and $TiCl_4$. Except with $TiCl_4$, the hygroscopicity decreases parallel with the ζ-potential and attains a min. at $\zeta = 0$, after which it again increases as ζ becomes more positive. With $TiCl_4$ hygroscopicity is reduced to a smaller extent, and no reversal of charge occurs.

V. Viscose sols spun into a bath containing $Al_2(SO_4)_3$ yield filaments, the ζ-potential of which, and the properties associated with it, vary with the Al salt concn. in the manner indicated above. Extensibility and fineness are at a min. at $\zeta = 0$, whilst the tensile strength continues to increase, although very slowly, after the charge is reversed. The degree of impermeability to H_2O of electrically neutral cellulose regenerated from viscose sols is approx. the same as that of commercial waterproof Cellophane.   F. L. U.

Emeraldin sols. IV. Dependence of the stabilising capacity of gelatin on acidity of the solution in the oxidation of aniline. V. PTSCHELIN (Kolloid-Z., 1937, 78, 204—209; cf. this vol., 133).—In the formation of emeraldin sols by the oxidation of aq. NH_2Ph,HCl with CrO_3 in presence of varying amounts of HCl gelatin has a stabilising influence at low and a sensitising (coagulating) action at higher concns. of HCl.   F. L. U.

Molecular properties of lignin solutions from viscosity, osmotic pressure, b.p. elevation, diffusion, and spreading measurements. D. L. LOUGHBOROUGH and A. J. STAMM (J. Physical Chem., 1936, 40, 1113—1132).—Lignin, prepared from maple and spruce by three different methods, gives a mol. wt. 3900 ± 300 by the osmotic pressure and ebullioscopic methods, and $10,000 \pm 1000$ by diffusion measurements. The vals. obtained are independent of the method of prep. and of the solvent (MeOH, EtOH, $COMe_2$, $CHCl_3$), and viscosity measurements indicate that the solutions are approx. unidisperse. It is therefore inferred that the true mol. wt. is about 3900 and that the higher val. is due to the non-sphericity of the mols. Spreading measurements, on H_2O and $0.1N$-HCl, give a mol. area of 318 sq. A., and a shape of the order $3 \times 16 \times 100$ A.   F. L. U.

Emulsions. Regions of heterogeneity in the system sodium oleate, phenol, xylene, and water, and in binary systems of these components. J. WEICHHERZ and N. PLETENEVA (Kolloid. Shurn., 1936, 2, 133—148).—The systems investigated are $PhOH$–xylene–H_2O, Na oleate–$PhOH$, and $PhOH$–Na oleate–H_2O.   J. J. B.

Numerical definition of lyotropic series of univalent cations. A. VOET (Kolloid-Z., 1937, 78, 201—204).—The lyotropic properties of the alkali-metal ions, with respect to their coagulating action on a hydrophobic sol, can be expressed as nos.

which bear a linear relation to the coagulating val., defined as the concn. at which the no. of particles is reduced in a given time to a specified fraction of the original.   F. L. U.

Structure of silicic acid gels. A. V. KISELEV (Kolloid. Shurn., 1936, 2, 17—25).—The H_2O content and heat of wetting of SiO_2 gel (I) fall, and the heat of wetting per g. of H_2O rises, as the temp. of preheating of (I) increases from 120° to 1100°. The sp. active surface of (I) prepared at 260° from $SiCl_4$ amounts to 10^6 sq. cm.; the amount of H_2O adsorbed at saturation corresponds with saturation of the surface with OH groups. Prolonged heating of (I) at 1100° does not appreciably affect its crystal structure.   R. T.

Movement of crystalline iodine in silica gel. M. A. MILLER (J. Chem. Educ., 1936, 13, 532—533).—Deposition of cryst. I in SiO_2 gel may be periodic or non-periodic and depends on the rate of diffusion of the entering reagent, e.g., K_2CrO_7 or $KMnO_4$ and H_2SO_4, HNO_3, Cl_2, or Br–H_2O, and also on the nature of the reaction. Crystallisation occurs in the rear of the diffusion front, and the movement of I crystals in SiO_2 gel appears to be the result of re-dissolution at the rear of the crystal mass and deposition at the crystal front.   L. S. T.

Magnesium hydroxide formation in gelatin. F. M. SCHEMJAKIN and A. I. LAZAREVA (Compt. rend. Acad. Sci. U.S.S.R., 1936, 4, 369—372; cf. A., 1936, 29).—Further observations on the formation of periodic structures in the interaction of $MgCl_2$ and aq. NH_3 are recorded.   J. G. A. G.

Refraction law in periodic precipitates. V. K. NIKIFOROV and A. P. RUNTZO (Kolloid. Shurn., 1936, 2, 229—238).—When two agar gels of different concns., both containing KI, are in contact along a straight boundary and a drop of aq. $Pb(NO_3)_2$ is added it is found that the directions of propagation of rings are different in the two gels. If α_1 and α_2 be the angles formed by these directions and the perpendicular to the boundary, the relative velocities of ring propagation in the gels (v_1 and v_2) are connected by $\sin \alpha_1 / \sin \alpha_2 = v_2/v_1$.   J. J. B.

Mechanism of gelation of the system pectin, sugar, and acid. T. K. GAPONENKOV (Kolloid. Shurn., 1936, 2, 239—242).—The rigidity of gels formed by interaction of pectin, sucrose, and tartaric acid has been investigated. Greater rigidity is produced by pectins having a high capacity for binding H_2O.   J. J. B.

Influence of salts on gelation in the system pectin–sugar–acid. T. K. GAPONENKOV and V. N. MIMRIKOVA (Kolloid. Shurn., 1936, 2, 47—50).—The effect of adding K, Na, Mg, Ca, Ba, and Al chlorides on the rigidity of the gels formed in the system apple pectin–sucrose–tartaric acid has been studied.   R. T.

Spreading of urease and Bence-Jones protein. E. GORTER and L. MAASKANT (Proc. K. Akad. Wetensch. Amsterdam, 1937, 40, 73—76; cf. following abstract).—Area–p_H curves of both proteins show max. at a p_H which independent methods indicate as the isoelectric point. The abs. val. of the area is greatly influenced by time.   F. L. U.

Spreading of protamine insulinate. E. GORTER and L. MAASKANT (Proc. K. Akad. Wetensch. Amsterdam, 1937, **40**, 71—73; cf. A., 1935, 161).—An insulin–clupein complex, as also a special prep., "Leo Insulin Retard," differ from uncombined insulin in that the area per mg.–p_H curves for the former show no min. on the alkaline side.   F. L. U.

Hydration of gum arabic and glycogen. H. B. OAKLEY (Biochem. J., 1937, **31**, 28—34).—The degrees of hydration of Na- and Ca-gum arabic and of glycogen, calc. from the distribution of an indifferent reference substance ($COMe_2$) between 10% solutions of the colloids and H_2O across a membrane, are respectively, $1·1 \pm 0·05$, $0·9 \pm 0·05$, $0·27 \pm 0·05$ g. H_2O per g. of colloid. The $COMe_2$ was determined analytically, and in the concn. range used (M—$0·002M$) the calc. hydration is const. within the experimental error. The diameter of a gum arabic particle of "mol. wt." 240,000 (A., 1936, 1200), assumed spherical, is 11 mμ.   F. L. U.

Coacervation of amylophosphoric acid and proteins. P. KOETS (J. Physical Chem., 1936, **40**, 1191—1200).—Amylophosphoric acid (P_2O_5 0·5%), unlike amylose, yields complex coacervates with gelatin, leucosin, and potato albumin, when the p_H is < that of the isoelectric point of the protein. Curves showing the viscosity of the respective mixtures at different p_H vals. and with varying proportions of the constituents are given. Reasons are adduced for regarding amylopectin as itself a complex coacervate.   F. L. U.

" Hydrophoby " of the hair.—See A., III, 119.

Thermodynamic treatment of systems, particularly solutions, from the point of view of activity and related functions. R. W. GORANSON (J. Chem. Physics, 1937, **5**, 107—112).—The bearing of activity conceptions on the thermodynamics of solutions and gas mixtures is discussed with special reference to dissociated and undissociated components.   W. R. A.

Thermodynamic treatment of chemical equilibria in systems composed of real gases and its application to the ammonia equilibrium. G. SEMERANO (Mem. R. Accad. Italia, 1936, **7**, 61—79).—A survey of thermodynamic methods. For the NH_3 equilibrium the experimental results are best represented by the formula of Gillespie and Beattie (A., 1930, 1508) over the whole pressure range.   O. J. W.

Dissociation constants of ascorbic acid. J. C. GHOSH and P. C. RAKSHIT (Biochem. Z., 1937, **289**, 395—396; cf. Birch and Harris, A., 1933, 646; Karrer *et al.*, A., 1934, 564).—Conductometric data for Na ascorbate show that the first and second dissociation consts. for ascorbic acid are $6·3 \times 10^{-5}$ and $2·7 \times 10^{-12}$, respectively. Vals. of p_{K_1} and p_{K_2} at 29° are 4·20 and 11·57, respectively. W. McC.

Dissociation constants of diaquotetrammine-cobaltic cation as an acid. A. B. LAMB and E. B. DAMON (J. Amer. Chem. Soc., 1937, **59**, 383—390).—Concordant vals. can be obtained by measuring with the glass electrode the $[H^·]$ in solutions of $[Co(NH_3)_4(H_2O)_2]^{···}$ to which various amounts of

NaOH have been added. The velocity of decomp. of $[Co(NH_3)_4(H_2O)_2]^{···}$ in these solutions $\propto$ the concn. of $[Co(NH_3)_4(OH)_2]^·$ in equilibrium with it.   E. S. H.

One-third basic aluminium acetate. II. Degree of hydrolysis and activities of hydrogen and acetate ions in relation to concentration and temperature. C. ROHMANN and W. MIRUS (Arch. Pharm., 1937, **275**, 103—113; cf. A., 1933, 569).—The degree of dissociation of aq. $Al(OAc)_2·OH$ has been shown to depend on the concn. and temp. by ascertaining the composition of the Et_2O–$AcOH$ solution with which it is in equilibrium. The influence of temp. is greater in the more conc. solutions. The $[H^·]$ is $\leqslant$ would be expected from the degree of dissociation and the solution is an excellent buffer; its p_H renders it very suitable for medicinal purposes, being close to the optimum for many proteins.   R. S. C.

X-Ray determinations of structure of some complex ions in solutions of electrolytes. V. DANILOV, V. FINKELSTEIN, and M. LEVASCHEVITSCH (Physikal. Z. Sovietunion, 1936, **10**, 223—230).—Observations have been made on aq. solutions of K_2ZnI_4, ZnI_2, and K_2HgI_4. In consequence of the high at. no. of I these solutions scatter X-rays in the same way as gases. The intensity curves agree with those calc. on the assumption that HgI_4'' and ZnI_4'' are tetrahedral and the curve for ZnI_2 solutions indicates the presence of ZnI_4''. The Hg–I distance in HgI_4'' is 3·04 A., and the Zn–I distance in ZnI_4'' is 2·82 A.   A. J. M.

Uninuclear tripropylenediaminechromic ion, binuclear tripropylenediaminecobaltic ion, and their sulphato-, oxalato-, phosphato- and arsenato-complexes. H. BRINTZINGER and F. JAHN (Z. anorg. Chem., 1937, **230**, 416—418).—Determinations of ion-wt. by diffusion experiments show the existence of the ions : $[Cr\{C_3H_6(NH_2)_2\}_3]^{3+}$, $[Cr\{C_3H_6(NH_2)_2\}_2X_4]^{5-}$, $[Co_2\{C_3H_6(NH_2)_2\}_6]^{6+}$, and $[Co_2\{C_3H_6(NH_2)_2\}_6X_4]^{2-}$, where $X = SO_4$, C_2O_4, HPO_4, or $HAsO_4$.   E. S. H.

B.p.–composition diagram for dilute aqueous solutions of deuterium oxide. E. R. SMITH and M. WOJCIECHOWSKI (J. Res. Nat. Bur. Stand., 1936, **17**, 841—848).—For 0·3—7% aq. solutions of D_2O the elevation in b.p. (ΔT) is given by mol.-% $D_2O = 70·9\Delta T$. The calc. ratio $[D_2O/H_2O]_{liquid}/[D_2O/H_2O]_{vapour}$ varies between 1·13 and 1·03 for 0·01—0·07 mol. fraction of D_2O.   R. S. B.

Kinetic and thermodynamic activity of protons and deuterons in water–deuterium oxide mixtures. W. J. C. ORR and J. A. V. BUTLER (J.C.S., 1937, 330—335; cf. A., 1936, 1346).—Rates of hydrolysis of acetal in $H_2O(HCl)$–$D_2O(DCl)$ mixtures, and in H_2O–D_2O solutions of half-neutralised HCO_2H, have been determined. On the assumption that the activity coeffs. do not vary with the composition of the solvent the relative dissociation consts. of HCO_2H can be obtained and a function which expresses the variation of the thermodynamic activity of protons and deuterons with the composition of the water is calc. The rates of hydrolysis of acetal in HCl–DCl solutions are shown to be expressible by the same

function, and must therefore be determined by the thermodynamic proton and deuteron activities of the solutions. It would seem therefore that the hydrolysis of acetal is an example of sp. H-ion catalysis.

<div align="right">F. L. U.</div>

Relative atomic weight of oxygen from air and water determined by an interchange reaction. T. O. JONES and N. F. HALL (J. Amer. Chem. Soc., 1937, **59**, 259—261).—Exchange equilibrium between H_2O vapour and O_2 is established rapidly on a hot wire at $\not< 1800°$ abs., but much more slowly at lower temp. The d of H_2O, thus equilibrated with excess of air, increases by about 7 p.p.m.; the Dole effect is confirmed. The procedure may be used to prepare H_2O having a high d due to isotopic O.

<div align="right">E. S. H.</div>

Equilibrium between nitric oxide, nitrogen peroxide, and aqueous solutions of nitric acid. F. S. CHAMBERS, jun., and T. K. SHERWOOD (J. Amer. Chem. Soc., 1937, **59**, 316—319).—Equilibrium in the reaction $3NO_2 + H_2O = 2HNO_3 + NO$ has been studied at 25° for 37—59% HNO_3 and at 15—35° for 54—55% HNO_3. The results, considered with reference to $K_1 = (P_{NO})/(P_{NO_2})^3$, agree with the data of Abel, Schmid, and Stein (A., 1930, 1370), but not with those of Burdick and Freed (A., 1921, ii, 313).

<div align="right">E. S. H.</div>

Chemistry of oxygen. R. SCHENCK (XIV Congr. Chim. ind., 1935, Comm. 2, 6 pp.; Chem. Zentr., 1936, i, 2518).—A discussion of the oxygen pressure over metallic oxides and of the effect of added substances.

<div align="right">H. J. E.</div>

Dissociation of lithium nitrate. M. CENTNERSZWER and M. BLUMENTHAL (Bull. Acad. Polonaise, 1936, **A**, 470—481).—$LiNO_3$ dissociates reversibly above its m.p. into $LiNO_2$ and O_2. Dissociation pressures are recorded from 355° to 435°; the calc. heat of dissociation is —12,545 g.-cal. per mol.

<div align="right">J. S. A.</div>

Dissociation of silver nitrate. M. CENTNERSZWER and M. BLUMENTHAL (Bull. Acad. Polonaise, 1936, **A**, 482—492).—The gas mixture $2NO_2 + O_2$ reacts with " mol. " Ag at 100°, forming $AgNO_3$. It thus appears that the dissociation of $AgNO_3$ is reversible, and dissociation pressures are recorded between 248° and 290°. The calc. heat of dissociation is —32,750 g.-cal.

<div align="right">J. S. A.</div>

Systems of sulphur dioxide and the isomeric xylenes. W. F. SEYER, K. MARTIN, and L. HODNETT (J. Amer. Chem. Soc., 1937, **59**, 362—363).—F.-p. data for mixtures of SO_2 with o-, m-, and p-xylene, respectively, are recorded. No compounds are formed. Comparison of the calc. latent heats of fusion with experimental vals. shows that the m- and p-solutions deviate from ideal mixtures.

<div align="right">E. S. H.</div>

Potassium hydrogen sulphate. H. HAGISAWA and T. TAKAI (Bull. Inst. Phys. Chem. Res. Japan, 1937, **16**, 29—41).—The eutectic mixture of $KHSO_4$ (I) and $K_2S_2O_7$ (II) has m.p. 203·5° and a mol. ratio (I)/(II) of 9/1; the m.p. of (I) and (II) are 211·7° and 413·7°, respectively. The solubility of (I) in conc. H_2SO_4 has been determined at 135—200°; transition points of (I) are shown at 164·2° and 184°.

The rate of dissociation of (I) increases much more in the interval 300—350° than in 350—400°, and the reaction is bimol., corresponding with $2(I) = (II) + H_2O$. The dissociation pressure of (I) at 140—210° is given by $\log p_{mm.} = -3965·60/T + 9·36683$.

<div align="right">R. S. B.</div>

Alkali phosphates and arsenates. II. Tertiary sodium phosphate. H. MENZEL and E. VON SAHR [with W. HAGEN] (Z. Elektrochem., 1937, **43**, 104—119; cf. A., 1932, 582).—A real $Na_3PO_4.12H_2O$ (denoted $o\text{-}Na_3PO_4,12H_2O$) (I) does not exist in equilibrium with aq. solutions. A series of homogeneous solid phases of varying composition occurs in the system $Na_2O\text{--}P_2O_5\text{--}H_2O$ at 20°, near the transition point of secondary and tertiary phosphate. With increasing $Na_2O : P_2O_5$ ratio in the solution the $Na_2O : P_2O_5$ ratio in the solid phase increases rapidly to 3·20 : 1 and then approaches asymptotically a limit of 3·25 : 1. These solid phases are denoted $\psi\text{-}Na_3PO_4,12H_2O$ (II). (II) exists over the range 0—50° and in solutions containing $>26\%$ Na_2O. The solid phase in equilibrium with solutions containing 26—31% Na_2O is $o\text{-}Na_3PO_4,6H_2O$ (III), and with $>31\%$ Na_2O is $o\text{-}Na_3PO_4,0·5H_2O$ (IV). When heated, (II) passes reversibly through $\psi\text{-}Na_3PO_4,8H_2O$ to $\psi\text{-}Na_3PO_4,0·5H_2O$. The latter is similar in structure to (IV), but does not give up all its H_2O on heating at 150—800°. The residue has a similar structure to $o\text{-}Na_3PO_4$ (V). The residual H_2O can be removed only by raising to a very high temp. and vaporising the excess of Na_2O. Above 75°, (III) is the stable solid phase in the system $Na_2O\text{--}P_2O_5\text{--}H_2O$. $o\text{-}Na_3PO_4,8H_2O$ (VI) has, at the most, a very narrow range of stability in contact with solution. Above 100°, the stable phase is (IV), which dehydrates completely to (V). On absorption of H_2O, (IV) yields (III), (VI), and finally (I), of similar crystal structure to (II).

<div align="right">J. W. S.</div>

Reduction equilibria of titanium dioxide by hydrogen. N. NASU (Sci. Rep. Tôhoku, 1936, **25**, 510—526).—Using a new gas circulation pump (involving entrainment of gas bubbles between mercury droplets passing through a narrow tube) and a new method of analysing $H_2\text{--}H_2O$ mixtures (measurement with a McLeod gauge at ordinary temp. and in liquid N_2), the equilibrium $TiO_2\text{--}H_2\text{--}Ti_2O_3\text{--}H_2O$ has been investigated at 1022—1280° abs. The equilibrium const. K_p is given by $\log K_p = 1·9305 - 2·754/T$. The vals. of ΔH, ΔF, and ΔS are deduced for several reactions. The lattice energy of Ti_2O_3 calc. by the Born–Haber thermodynamical cycle is 3569·51 kg.-cal. per g.-mol., a little $>$ the theoretical val.

<div align="right">J. W. S.</div>

Oxidation equilibrium of magnesium chloride by water vapour. K. SANO (Sci. Rep. Tôhoku, 1936, **25**, 745—754).—The equilibrium $MgCl_2 + H_2O \rightleftharpoons MgO + 2HCl$ has been studied statically at 525—621°. Equilibrium consts. for the reactions $MgO + C + Cl_2 \rightleftharpoons MgCl_2 + CO$ and $MgO + CO + Cl_2 \rightleftharpoons MgCl_2 + CO_2$ are calc. The entropy of $MgCl_2$ at 298° abs. = 28·96 e.u.

<div align="right">H. J. E.</div>

Equilibrium reaction of water vapour with several metallic fluorides at high temperatures. L. DOMANGE (Ann. Chim., 1937, [xi], **7**, 225—297).—

The reaction between H_2O vapour and fluorides at high temp. has been followed by passing the vapour at known rates over the fluoride and determining the liberated HF. Extrapolation to zero rate of flow enables the equilibrium conditions at const. pressure to be determined. From the equilibrium consts. the following vals. have been calc. for Q in the equations of the type $MF_2 + H_2O \rightleftharpoons 2HF + MO + Q$ (M = bivalent metal): CuF_2, $-25,200$; MgF_2, $-44,300$; CaF_2, $-48,500$; BaF_2, $-37,250$; ZnF_2, $-25,800$; CdF_2, $-28,450$; PbF_2, $-37,200$; CrF_2, $-66,500$; FeF_2, $-61,300$; CoF_2, $-29,850$; NiF_2, $-30,500$ g.-cal. The calc. chemical const. for HF is 2·6. The calc. heats of formation of anhyd. fluorides compare favourably with recorded vals. C. R. H.

Equilibrium constant of the reaction between barium oxalate and sulphate ion. N. A. TANA-NAEV and A. T. PILIPENKO (Zavod. Lab., 1936, 5, 1161—1164).—The equilibrium in the reaction $BaC_2O_4 + Na_2SO_4 \rightleftharpoons Na_2C_2O_4 + BaSO_4$ corresponds with 99·94% formation of $BaSO_4$. SO_4'' may be determined as $BaSO_4$ in 0·2N-acid solution in presence of $\not> 0.1N$-oxalate and $\not> 0.01M$-$BaCl_2$. R. T.

Melting of danburite : liquid immiscibility in the system, CaO–B_2O_3–SiO_2. G. W. MOREY and E. INGERSON (Amer. Min., 1937, 22, 37—47).—Phase equilibrium data in and near the region of immiscibility are recorded. The composition of danburite (I) falls within this region. (I) is unaffected by heat up to 996° when sintering begins. After several days at 1002°, it is decomposed with the formation of two layers. It can be synthesised by hydrothermal means, but not by heat-treatment below the melting temp. L. S. T.

The section CaO,SiO_2–MnO,SiO_2 in the ternary system SiO_2–CaO–MnO. E. VOOS (Veröff. Kaiser Wilh.-Inst. Silikat-Forsch., 1935, 7, 65—81; Chem. Zentr., 1936, i, 2722).—A continuous series of mixed crystals is formed by β-CaO,SiO_2 and MnO,SiO_2. The m.p. of MnO,SiO_2 is $1205\pm2°$. The temp. of the α–β transition of CaO,SiO_2 is raised considerably by MnO,SiO_2. The max. temp. at which the β mixed crystals are stable is $1374\pm4°$. Lattice dimensions as a function of composition are recorded. H. J. E.

Equilibrium diagram of the system CaO,TiO_2,SiO_2–MnO,TiO_2. K. IWASE and U. NISIOKA (Sci. Rep. Tôhoku, 1936, 25, 504—509).—Microscopical examination of quenched samples, combined with thermal and X-ray analysis, indicates that CaO,TiO_2,SiO_2 takes up MnO,TiO_2 to form a solid solution with a limit of 18 wt.-% at a eutectic point which corresponds with 1210° and 49 wt.-% of MnO,TiO_2. J. W. S.

Phase equilibria in ternary organic mixtures. XIV. Ternary system of isomerides of aceto-toluidide. K. HRYNAKOWSKI and H. STASZEWSKI (Rocz. Chem., 1936, 16, 542—550).—The composition of the ternary eutectic mixture of o-, m-, and p-acetotoluidide corresponds with that calc. from Kordes' formula (A., 1927, 1132). R. T.

Pictet–Trouton rule for monatomic substances. A. EUCKEN (Nachr. Ges. Wiss. Göttingen, Math.-physik. Kl., III, 1935, [ii], 1, 127—135; Chem. Zentr., 1936, i, 2302).—Variations in the ratio L/T are explained on the classical statistical theory. An approximation formula for L/T is advanced which gives fair agreement for 23 monat. elements. J. S. A.

Specific heat of concentrated aqueous salt solutions. J. D'ANS and H. TOLLERT (Z. Elektrochem., 1937, 43, 81—91).—The sp. heats (c_p) of aq. NaCl, KCl, Na_2SO_4, K_2SO_4, $MgCl_2$, $MgSO_4$, $NaNO_3$, KNO_3, NH_4Cl, and NH_4NO_3 have been measured for various concns. at 21°, and for nearly saturated solutions at 41° and 86°. The vals. of c_p for solid $Na_2CO_3,10H_2O$ and $Na_2SO_4,10H_2O$ at 3—19° indicate that each mol. of H_2O of crystallisation has C_p about 9·7 g.-cal. per mol., independently of the type of lattice and no. of H_2O mols. A mixture rule is developed which gives c_p for a mixed salt solution in terms of the vals. for the components, independently of double decomp. J. W. S.

Integral heat of dissolution of sodium chloride in H_2O–D_2O mixtures at 25°. E. LANGE and W. MARTIN (Z. physikal. Chem., 1937, 178, 214—220).—The integral heat of dissolution for a final concn. of 0·45 mol. NaCl per 100 mols. water changes linearly with increasing D content from $-1·019$ for pure H_2O to $-1·577\pm0·008$ kg.-cal. for pure D_2O. It is inferred that for ionic hydration in H_2O–D_2O mixtures, HDO mols. are midway between D_2O and H_2O mols. in respect of energy content. R. C.

Relative partial molal heat content of zinc sulphate in aqueous solution. H. S. HARNED (J. Amer. Chem. Soc., 1937, 59, 360—361).—Calculations from published e.m.f. data (A., 1933, 466) are in agreement with those from determinations of heats of dilution (A., 1934, 149). E. S. H.

Heats of formation of silver chloride, bromide, and iodide. A. BERTRAM and W. A. ROTH (Z. physikal. Chem., 1937, 178, 227—238).—The following vals. have been obtained for 18° and const. pressure : $[Ag] + \frac{1}{2}(Cl_2) = [AgCl] + 30·1_3\pm0·05$ $(dQ/dT = -0·0024)$, $[Ag] + \frac{1}{2}(Br_2) = [AgBr] + 27·5_6\pm0·05$, $[Ag] + Br_{liquid} = [AgBr] + 23·7_0\pm0·06$ $(dQ/dT = -0·0009)$, $[Ag] + [I] = [AgI] + 15·3_4\pm0·03$ $(dQ/dT = -0·0003)$. R. C.

Thermochemistry of boron. W. A. ROTH and E. BÖRGER (Ber., 1937, 70, [B], 48—54).—The heat of formation of solid, probably amorphous, B_2O_3 from B and O_2 is $+349$ kg.-cal. as determined by a new method. The heat of decomp. of B_2H_6 by H_2O to H_2 and solid B_2O_3 is about 100 kg.-cal.; the heat of formation of B_2H_6 is therefore twice that of C_2H_6. This is due to the high lattice energy of graphite; the minimal val. is 40 kg.-cal. per g.-atom C and the true val. is probably about 100 kg.-cal. The sequence of lattice energies is C, B, Si, Be, Al. The most probable heats of formation of a series of compounds of these elements are given; many of the vals. differ considerably from those recorded previously. H. W.

Dioximes. CXVIII. [Heats of combustion.] M. MILONE and G. VENTURELLO (Gazzetta, 1936, 66, 808—812).—The mol. heats of combustion of glyoxime,

the Me, Me_2, the α and β forms of the Ph and $p\text{-}C_6H_4Me$, and the α, β, and γ forms (I) of the Ph_2 derivatives have been determined. The mol. heat of combustion of the group $C\overset{..}{N}\cdot OH$ in dioximes varies from 130·8 to 158 kg.-cal. If a and b are heats of combustion of α and β forms, $b > a$; for (I) the differences are very small.   E. W. W.

Conductivities of concentrated binary mixtures of electrolytes with a common anion and at least one ion of charge two. P. VAN RYSSELBERGHE, S. W. GRINNELL, and J. M. CARLSON (J. Amer. Chem. Soc., 1937, **59**, 336—339).—Sp. and equiv. conductivities of 8 groups of binary mixtures of 2 : 1, 2 : 2, and 1 : 1 electrolytes with a common anion at a total equiv. concn. 0·5—9N have been measured at 25°. A parallelism between the difference of the conductivities of the pure salts and the max. departure from the mixture rule in mixtures of the same total concn. is pointed out.   E. S. H.

Conductivities of one-molal mixtures of alkali halides and nitrates. P. VAN RYSSELBERGHE and L. NUTTING (J. Amer. Chem. Soc., 1937, **59**, 333—336).—Measurements of d and conductivity have been made for 9 pairs of alkali halides and nitrates at a total concn. of $1M$. The mixture rule is more nearly correct when the conductivities of the component salts differ but slightly. Wide discrepancies between measured and calc. conductivities of solutions containing simultaneously $Na^{\cdot}$, $K^{\cdot}$, Cl', and NO_3' are reported.   E. S. H.

Electrochemical study of alkali halides in benzene and nitrobenzene solutions of aluminium bromide and chloride. V. A. PLOTNIKOV and E. J. GORENBEIN (Mem. Inst. Chem. Ukrain. Acad. Sci., 1936, **3**, 471—487).—The sp. conductivity κ of solutions of $AlBr_3$ or $AlCl_3$ in C_6H_6 or $PhNO_2$ rises with dilution and with increasing [MX] (M = K, Rb, Li; X = Cl, Br) and falls with increasing [AlX_3]. The val. of κ in C_6H_6 is $>$ in $PhNO_2$. Electrolysis in $PhNO_2$ results in deposition of M, and in C_6H_6 of Al, at the cathode. The decomp. potentials in solutions containing both chlorides and bromides approximate to those for the bromides in both solvents.   R. T.

Electrochemical study of the systems KCl–$AlBr_3$, KBr–$AlBr_3$, and KI–$AlBr_3$, in benzene. V. A. KIKETZ (Mem. Inst. Chem. Ukrain. Acad. Sci., 1936, **3**, 489—507).—The sp. conductivity in equiv. concns. falls in the series I > Br > Cl. Electrolysis of the system KI–$AlBr_3$–C_6H_6 results in the deposition of Al at the cathode, but KCl and $AlBr_3$ are also deposited in the case of the system KCl–$AlBr_3$–C_6H_6; Cl and Br are liberated at the anode in all cases. The cryst. products obtained by evaporation have the general composition MX,$2AlBr_3$,nC_6H_6. Cryoscopic data suggest the presence of polymerised complexes of the type $(MX,2AlBr_3)_m,nC_6H_6$ in the solutions.   R. T.

Electrode potential of the iodine–iodate electrode at 25°. W. O. LUNDBERG, C. S. VESTLING, and J. E. AHLBERG (J. Amer. Chem. Soc., 1937, **59**, 264—268).—The standard electrode potential $E^0_{298\cdot1}$ = −1·195 volts. The free energy, entropy, and heat

of formation of IO_3' are −32,251 g.-cal., 76·20 g.-cal. per degree, and −54,966 g.-cal., respectively.   E. S. H.

Electric potentials at crystal surfaces, and at silver halide surfaces in particular. I. M. KOLT-HOFF and H. L. SANDERS (J. Amer. Chem. Soc., 1937, **59**, 416—420).—The e.m.f. of cells involving Ag halide membranes of the type $Ag|AgX$ (s),X' $(a_1)|$ $AgX|X'$ $(a_2)|KNO_3$ (sat.)$|KCl$ (sat.),$Hg_2Cl_2|Hg$ is given by $E = E_0 + (RT/F) \log_e a_2$. Experimental results with fused Ag halide membranes are in agreement with theory.   E. S. H.

Potential of copper in solutions of copper benzenesulphonate. (MLLE.) M. QUINTIN (Compt. rend., 1937, **204**, 422—424).—E.m.f. measurements for the cell Cu amalgam$|(PhSO_3)_2Cu$ $(c)|KCl$ sat.$|KCl$ $0·1N$, Hg_2Cl_2, Hg are recorded. For dil. solutions, the variation of E with c follows the limiting law of Debye and Hückel. $E_0 = -0·3454$ volt.   A. J. E. W.

Determination of the individual potentials of metals dissolved in aluminium bromide. J. K. DELIMARSKI and V. A. ISBEKOV (Mem. Inst. Chem. Ukrain. Acad. Sci., 1936, **3**, 541—561).—The potentials of the electrodes $M|0·1N$-MBr in $AlBr_3$–KBr, measured against a Hg_2Cl_2 electrode, rise in the series Tl < Al < Zn < Pb < Cd < Sn < Ag < Cu < Fe < Hg < Co < Ni < Sb < Bi, whilst the decomp. potentials vary in the inverse order.   R. T.

Potentials at the interface of two liquid phases. V. K. KARCZEWSKI (Rocz. Chem., 1936, **16**, 560—565).—The potential effects at the H_2O-$iso\text{-}C_5H_{11}\cdot OH$ interface due to Na or K salts (MCNS, MI, MBr, and MCl) follow the addition rule when mixtures of salts are added.   R. T.

Kelvin single potential differences. W. D. BANCROFT and J. D. PORTER (J. Physical Chem., 1936, **40**, 1201—1216).—The single p.d. at the various junctions in a voltaic cell have been determined within 0·1 volt by inserting an ionised air gap at each junction successively. The examination in this manner of a AgCl concn. cell, Daniell cell, Pb storage battery, and Pt–H_2 electrode is described in detail. It is found, e.g., that in a Daniell cell the single p.d. at the metal–electrolyte and liquid–liquid junction is approx. zero, and that nearly the whole of the observed p.d. is due to the Zn–Cu junction.   F. L. U.

Adsorption condenser and electromotive force. J. F. CHITTUM and H. HUNT (J. Physical Chem., 1936, **40**, 1083—1093).—Theoretical. Single electrode potentials are supposed to involve a metal-surface work function and a colloidal absorption condenser. The theory advanced permits an explanation of overvoltage, electrokinetic potential, e.m.f., and the mechanism of conduction at a metal–solution interface.   F. L. U.

Electrolytic reduction potential of pyrrole aldehydes. II. G. B. BONINO and G. SCARAMELLI (Ric. sci. Prog. tecn. Econ. naz., 1935, **6**, II, 180—181; Chem. Zentr., 1936, i, 2324—2325).—The reduction potentials of 2 : 4-dimethyl-3-ethyl- (1·342 volt), 2-methyl-3 : 4-diethyl- (1·340 volt), and 2 : 3 : 4-tri-

methyl- (1·338 volt) -pyrrole-5-aldehyde have been measured. The results suggest that C-alkylation causes enhanced distortion of the ·CHO group.

H. N. R.

Polarographic studies with the dropping mercury cathode. LXIII. Verification of the equation of the polarographic wave in the reversible electro-deposition of free cations. J. TOMEŠ (Coll. Czech. Chem. Comm., 1937, **9**, 12—21; cf. A., 1935, 305).—The potential at which the current reaches $1/p$ of the val. of the limiting ("diffusion") current is independent of the concn. of the ion, the rate of dropping of the Hg or the scale of co-ordinates (cf. *ibid.*, 936), and by choosing suitable vals. of p, the valency of the ion can be deduced from the polarographic wave. The general equation has been verified for the deposition of Tl', Pb'', Cd'', and In''', and the "half-wave" ($p = 2$) potentials are -0.521, -0.473, -0.684, and -0.636 volt, respectively, in relation to the normal Hg_2Cl_2 electrode.

J. G. A. G.

Polarisation capacity and electrode condition. I. WOLFF (Physics, 1936, **7**, 203—210).—The polarisation capacity, C, of a single cell with Pt electrodes has been measured at intervals during 6 months with frequencies of 200—200,000 cycles. The relation between C and frequency is controlled mainly by the concn. of the electrolyte (H_2SO_4 or HCl). In general, C rises as $[H_2SO_4]$ and temp. are increased. C may be greatly diminished by treating the electrodes with H_2S or CO and subsequently restored to approx. the initial val. by the action of electrolytic H or O.

J. G. A. G.

Polarographic studies. IV. Exaltation of limiting currents. Influence of oxygen on the limiting currents for different cations. W. KEMULA and M. MICHALSKI (Rocz. Chem., 1936, **16**, 535—541).—Exaltation of the limiting current is observed in the electrolysis of $0.001N$-KCl saturated with O_2, as compared with solutions saturated with H_2. The reverse effect is obtained with $0.001N$-HCl; this is ascribed to the reactions $O_2 + 2H_2O \rightarrow H_2O_2 + 2OH'$; $H_2O_2 + 2H_2O \rightarrow 2H_2O + 2OH'$; $OH' + H' \rightarrow H_2O$.

R. T.

Azide potential. P. C. BLOKKER (Rec. trav. chim., 1937, **56**, 52—58).—The potential at platinised and bright Pt anodes during the electrolysis of N-NaN_3 solution, with and without added KCNS, has been determined. KCNS lowers the positive potential, the oxidation of NaN_3 by I in presence of KCNS thus being explained. A carbylamine is detectable when electrolysis takes place in presence of PhOH.

A. J. E. W.

Anode potential of chromium during alternating current electrolysis. II. Interpretation of the results and supplementary experiments. A. GELDBACH and M. SCHLÖTTER (Z. Elektrochem., 1937, **43**, 91—103; cf. this vol., 84).—The anode potential v of Cr has been measured with superimposed a.c. and d.c. for varying vals. of a.c.d. (i_a) and d.c.d. (i_d) at frequencies (n) of 15—5000 cycles in N-H_2SO_4 and N-HCl solutions. At const. i_d the val. of i_a required for activation increases with increasing n. Curves which connect the mean v with

i_a at const. i_d and n can be divided into three groups, according to the crit. c.d. determined by the anodic d.c. polarisation. The interpretation of the results is discussed.

J. W. S.

Electromotive force of cells with non-aqueous solvents. II. Lithium amalgam electrodes in non-aqueous solvents. G. SPIEGEL and H. ULICH (Z. physikal. Chem., 1937, **178**, 187—192; cf. A., 1936, 1206).—By means of the cells Li amalgam dropping electrode $(x_1)|$LiCl solution in MeOH, MeCN, or $COMe_2|$Li amalgam dropping electrode (x_2), the activity coeffs. of the Li in the amalgams have been determined. The coeffs. for LiCl in MeCN, derived from measurements with concn. cells without transport, agree with the Debye–Hückel–Bjerrum formulæ. LiCl seems to be almost completely ionised in MeCN.

R. C.

Poisoning of hydrogen electrodes by hydrogen sulphide. H. JABŁCZYŃSKA-JĘDRZEJEWSKA and J. DOMAŃSKI (Rocz. Chem., 1936, **16**, 574—581).—The potential of a H_2 electrode rises immediately after addition of aq. H_2S, owing to adsorption of H_2S, followed by ionisation, the S anions remaining on the electrode. This effect is followed by inactivation of the electrode at a rate $\propto [H_2S]$, and inversely $\propto$ thickness of the layer of Pt-black. The effect in equiv. concns. of different acids varies in the order $HCl = HBr = H_2SO_4 > H_3PO_4$. The phenomena are unaffected by illumination of the electrode. R. T.

Influence of colloids on cathodic polarisation. Electrodeposition of nickel in presence of Paal's mixture. G. S. VODVISHENSKI and F. F. FAJSULIN (J. Phys. Chem. Russ., 1936, **8**, 472—476).—Cathodic polarisation of a Ni electrode in presence of Paal's mixture (product of alkaline hydrolysis of albumin) has been measured by a method in which the equilibrium potential is determined immediately after each measurement at a given c.d. E. R.

Passivity of iron and steel in nitric acid solution. XIV. Y. YAMAMOTO (Bull. Inst. Phys. Chem. Res. Japan, 1937, **16**, 59—90; cf. this vol., 141).— The dissolution of Fe in HNO_3 of concn. $>40\%$ is accelerated by the addition of $CO(NH_2)_2$ (I) owing to increase in the degree of ionisation, but the dissolution of Cu in HNO_3 of concn. $<50\%$ is suppressed by (I) owing to removal of HNO_2. With $HNO_3 >50\%$ the dissolution of Cu is accelerated by (I) probably owing to the formation of a Cu–NH_3 complex from NH_3 formed during the reaction. $AgNO_3$ increases the dissolution of Fe in the active state as well as the ability to render Fe passive. Cu can act as an O electrode in a cell containing 21—30% HNO_3 and $AgNO_3$ owing to the reaction $2AgNO_3 + 4HNO_3 = 2Ag(NO_3)_2 + 2HNO_2 + H_2O + O$.

R. S. B.

Platinum–nickel system in electrometry. IV. Reactions in acid titrations. I. A. ATANASIU and A. I. VELCULESCU (Bul. Soc. Chim. România, 1936, **18**, 53—58; cf. A., 1935, 952).—Vals. for the potential of the system Pt–Ni in aq. NaOH and aq. HCl are recorded. This electrode may be used in titrating strong acids with strong or weak bases, and weak

bases with weak acids. Examples are given. It resembles the Pt–W system.   H. J. E.

Electrical conductivity of solutions containing sodium hydroxide and phosphoric acid. S. M. MEHTA and S. M. SHETH (J. Univ. Bombay, 1936, **5**, Part II, 83—90).—Titration curves at 30° show breaks corresponding with NaH_2PO_4 and Na_2HPO_4. Na_3PO_4 is almost completely dissociated in dil. solutions.   E. S. H.

Hydrogen-ion concentration of solutions containing sodium hydroxide and phosphoric acid. S. M. MEHTA and S. M. SHETH (J. Univ. Bombay, 1936, **5**, Part II, 91—100).—The p_H–composition curve, determined by the glass electrode, shows breaks at NaH_2PO_4, $2NaH_2PO_4,3H_3PO_4$, and, in conc. solutions, at $2NaH_2PO_4,H_3PO_4$ and NaH_2PO_4,H_3PO_4.   E. S. H.

Effect of temperature on solutions of sodium phosphate in presence of organic acids. A. N. MELDRUM and N. M. SHAH (J. Univ. Bombay, 1936, **5**, Part II, 102—104).—With rise of temp. between 25° and 60°, the amount of Na_2HPO_4 required to give a standard tint to phenolphthalein in presence of a const. amount of org. acid decreases linearly.   E. S. H.

Streamline scattering in electrolytes. W. KANGRO and K. M. WAGNER (Z. Elektrochem., 1937, **43**, 119—127; cf. A., 1936, 1341).—The fall in c.d. outside the electrode zone has been measured and a scattering const. calc. For aq. $CuSO_4$, $ZnSO_4$, and $ZnCl_2$ this has the val. 0·2—0·5 cm.$^{-1}$ at room temp. Its dependence on total c.d., conductivity, ionic strength, concn., and the chemical nature of the ions is discussed. For the electrode zone, the deviation of the current distribution curve from the "ideal" curve is logarithmic, the const. being dependent on the angle of the cathode. Measurements made with 30° and 60° conical cathodes indicate max. of c.d. at the apex and around the base of the cone.   J. W. S.

Formation of aluminium–copper and zinc–iron alloys in galvanic elements. V. A. PLOTNIKOV and D. P. ZOSIMOVITSCH (Mem. Inst. Chem. Ukrain. Acad. Sci., 1936, **3**, 509—519).—The e.m.f. of the cell $Al|AlCl_3$–$NaCl|Cu$, at 200—500°, falls with time, as a result of formation of a layer of Al–Cu alloy at the cathode. Substitution of a Pb or Cd for the Cu electrode results in a similar fall in e.m.f., but the initial val. is almost immediately established on breaking the circuit; this points to the formation of unstable Al–Pb or –Cd alloys. Very little diminution in e.m.f. is shown by the cell $Zn|N$-$ZnSO_4|Fe$ (11—90°), but Fe electrodes thus treated exhibit augmented resistence to corrosion. The layer of brass formed in the cell $Cu|ZnCl_2|Zn$ is more resistant to corrosion than the original Cu surface.   R. T.

Structure of metal ketyls. V. Conductance function. C. B. WOOSTER (J. Amer. Chem. Soc., 1937, **59**, 377—383; cf. A., 1935, 345).—The conductance of the Na derivative of $COPh_2$ in liquid NH_3 can be interpreted quantitatively by assuming certain equilibria. The structure of the ion pair is discussed.   E. S. H.

P* (A., I.)

Electrochemical studies of humate formation. I. A. CHAINSKI (Kolloid. Shurn., 1936, **2**, 61—83).—Ionic exchange between humic acid sols and alkali or alkaline-earth hydroxides takes place during 9—10 days after mixing. The potentiometric titration curves of humic acid exhibit only one break, corresponding with simultaneous neutralisation of all four available CO_2H groups. Alkaline-earth humates are not appreciably hydrolysed at p_H <7, in contrast to alkali-metal humates. Peptisation of the sols by alkali hydroxides or coagulation by alkaline-earth hydroxides is complete at p_H 7.   R. T.

Simpler aspects of electrochemistry. C. W. BENNETT (J. Chem. Educ., 1936, **13**, 516—520).   L. S. T.

Bimolecular reactions. Calculation of the duration of chemical reactions. II. H. SCHWERDTFEGER (Österr. Chem.-Ztg., 1937, **40**, 106—109).—A mathematical treatment based on the law of mass action.   C. R. H.

Theory of thermal explosions. I. Thermal explosion for reactions of " zero " order. O. M. TODES (Acta Physicochim. U.R.S.S., 1936, **5**, 785—806).—The induction period, the ignition of adiabatic and partly adiabatic explosions, and ignition by means of adiabatic compression are considered mathematically.   C. R. H.

Variation of velocity of detonation waves with temperature and water content of explosive mixtures. S. GRIBKOVA (J. Exp. Theor. Phys. U.S.S.R., 1934, **4**, 734—743).—Induction periods and initial propagation velocities of H_2–O_2 mixtures are determined under varying conditions.   CH. ABS. (p)

Frequency of detonation spin. K. SCHTSCHELKIN (J. Exp. Theor. Phys. U.S.S.R., 1934, **4**, 729—733).—Mathematical.   CH. ABS. (p)

Ignition of a methane–air mixture by electric sparks of direct and alternating currents. N. I. BRASCHNIK, A. E. MALINOVSKI, and K. A. SKRUIPNIKOV (J. Tech. Phys. Russ., 1934, **4**, 1485—1492).—With similar p.d. and current strength the effects of a.c. and d.c. are the same in principle; safety requirements are the same.   CH. ABS. (p)

Kinetics of the combustion of methane. R. G. W. NORRISH and S. G. FOORD (Proc. Roy. Soc., 1936, **A**, **157**, 503—525).—The reaction between CH_4 and O_2 exhibits a marked induction period, during which no appreciable change of pressure occurs, at about 480°. This is followed by a pressure increase in the system which reaches a steady max. rate given by $k[CH_4]^2[O_2]P$, where P = total pressure. The magnitude of k is strongly dependent on the catalytic activity of the surface of the vessel; the reaction is almost completely inhibited by packing the vessel with small-diameter quartz tubing. Ignition occurs by a thermal process when the velocity of the slow reaction reaches a val. high enough for the system to become adiabatic. The inhibiting and catalytic properties of various added substances have been determined by their effect on both the slow reaction and the ignition temp. A combination of the atom chain hypothesis and the theory of

degenerate branching gives a complete interpretation of the kinetic relationships.   L. L. B.

Mechanism of the decomposition of ethane. A. V. FROST (J. Phys. Chem. Russ., 1936, 8, 290—294).—The scheme proposed by Rice and Herzfeld (A., 1934, 369) is completed by considering reactions of the type $H + C_2H_4 \rightarrow C_2H_5$.   J. J. B.

Change of temperature of spontaneous inflammability of hydrocarbon–air mixtures with experimental conditions. M. PRETTRE (XIV Congr. Chim. ind. Paris, 1934, Comm. 2, 6 pp.; Chem. Zentr., 1936, i, 2482).—Increased pressure lowers the temp.; it is suggested that the reaction chains might be broken by alkali or alkaline-earth salts.   H. N. R.

Explosion of hydrocarbon mixtures.—See B., 1937, 206.

Burning of gases. V. F. KOPITOV (Acta Physicochim. U.R.S.S., 1936, 5, 813—818).—Data for the distribution of temp. in flames of burning air–coal gas mixtures have been successfully applied to the verification of the law of Mallard and Le Chatelier.   C. R. H.

Temperature of open flames. W. T. DAVID (Phil. Mag., 1937, [vii], 23, 251—256).—The temp. reached in the combustion of CO–O_2 mixtures in closed vessel explosions was determined during the " pre-pressure " interval by a Pt resistance method. The results are compared with those obtained by the Na method (A., 1929, 534) in the region of the open flame where the temp. is uniform. Allowing for the fact that in the Na method damp gases were employed, the results of the two methods correspond closely in the neighbourhood of the " correct " mixture, but as the mixtures become richer in CO there is a considerable difference between them. It is concluded that the Na method does not provide a means of obtaining true temp. The accuracy of the val. obtained by the Pt resistance method is discussed.   A. J. M.

Explosion limits of hydrogen and chlorine with oxygen, carbon monoxide, and nitrous oxide, and of carbon monoxide and oxygen with chlorine and nitrogen, also of carbon monoxide with nitrous oxide. E. W. LINDEIJER (Rec. trav. chim., 1937, 56, 105—118).—The apparatus and technique are described, and ternary diagrams for the above systems given.   A. J. E. W.

Determination of explosion limits. E. W. LINDEIJER (Rec. trav. chim., 1937, 56, 97—104).—The influence of the ignition intensity on the apparent explosivity of gas mixtures is discussed. If the ignition intensity is too low, the experimentally determined explosion limit may be an " ignition limit," distinct from the true explosion limit, which is an inherent property of the mixture.   A. J. E. W.

Explosion regions at reduced pressure. II. Influence of pressure on the explosion limits of binary and ternary systems containing CH_4, MeCl, O_2, and N_2O; quenching action of CO_2 and SO_2. III. Applicability of simple formulæ to experimental data in binary and ternary systems. J. DROP (Rec. trav. chim., 1937, 56, 71—85, 86—96; cf. A., 1935, 1080).—II. Data for the following systems, at pressures $\rightthreetimes 60$ cm., are given : CH_4–O_2–CO_2, CH_4–O_2–SO_2, CH_4–N_2O–CO_2, CH_4–N_2O–SO_2, CH_4–MeCl–O_2, CH_4–O_2–N_2O, and MeCl–N_2O. Repeated explosions at low pressure caused the reaction vessel walls to become catalytically active.

III. A discussion and mathematical analysis of previous results. The explosion regions of ternary systems containing an inhibitor possess rectilinear diameters, the explosion limits lying on hyperbolæ. The effect of inhibitors is discussed.   A. J. E. W.

Thermal decomposition of gaseous hydrogen peroxide. G. B. KISTIAKOWSKY and S. L. ROSENBERG (J. Amer. Chem. Soc., 1937, 59, 422).—Decomp. of 70% H_2O_2 in a quartz flask at 85° and 98° is heterogeneous, with an almost negligible temp. coeff.   E. S. H.

Inhibitory effect of packing on the methyl ether decomposition. R. N. PEASE (J. Amer. Chem. Soc., 1937, 59, 425).—The rate of decomp. of Me_2O at 481° is decreased when the reaction tube is packed with Pyrex chips (cf. A., 1927, 630).   E. S. H.

Mechanism of vinyl polymerisations. P. J. FLORY (J. Amer. Chem. Soc., 1937, 59, 241—253).—The polymerisation is explained by a mechanism consisting in (1) chain initiation, (2) chain propagation, (3) chain transfer, and (4) destruction of active centres. On this basis the kinetics of polymerisation have been analysed. Equations representing the course of the conversion have been deduced; they agree with available experimental data. The variation of mol. wt. with temp. agrees with the proposed mechanism. Activation energies of the individual processes have been evaluated and heats of polymerisation calc.   E. S. H.

Thermal decomposition and explosion of methyl nitrate vapour. A. APPIN, J. CHARITON, and O. TODES (Acta Physicochim. U.R.S.S., 1936, 5, 655—678).—The decomp. of MeO·NO_2 vapour between 210° and 240° and at 5—15 mm., as deduced from pressure measurements, is unimol., with $K = 2.5 \times 10^{14}e^{-39500/RT}$. The pressure limit of explosion rises from 4·2 mm. at 324° to 163 mm. at 246°, and is greatly increased by increase in the ratio surface/vol. of the containing vessel. The relationships deduced by integrating the equation of thermal explosion agree with those observed.   F. L. U.

Effect of nitrogen peroxide and methyl nitrite on the spontaneous inflammation of ethane and oxygen. G. GIMMELMAN, M. NEUMANN, and P. SOKOV (Acta Physicochim. U.R.S.S., 1936, 5, 903—917, and J. Phys. Chem. Russ., 1936, 8, 458—467).—NO_2 and MeO·NO reduce the temp. at which C_2H_6–O_2 mixtures spontaneously ignite, the effect of MeO·NO being approx. twice that of NO_2, due partly to formation of NO_2 on decomp. of MeO·NO. An optimum concn. of 1·5% NO_2 or MeO·NO was observed at low pressures. The velocity of C_2H_6 oxidation increases with increase of pressure. The kinetics of the reactions are discussed.   C. R. H.

Rate of dehydration of ethyl alcohol using metallic calcium. G. F. SMITH and C. A. GETZ

(Ind. Eng. Chem. [Anal.], 1937, **9**, 100—102).—With $<0.5\%$ of H_2O the products are $Ca(OH)_2$ and H_2; with $<0.2\%$ of H_2O they are $Ca(OH)_2$ and H_2. The reaction $Ca(OEt)_2 + 2H_2O \rightarrow Ca(OH)_2 + 2EtOH$ is more rapid than the preceding reactions. The crit. solution temp. of the system kerosene–EtOH has been used to determine the H_2O content of EtOH.
                                                                E. S. H.

Homogeneous reactions with an undulating velocity curve. E. H. Riesenfeld and T. L. Chang (Z. anorg. Chem., 1937, **230**, 239—252; cf. A., 1934, 848).—When $KMnO_4$ is reduced by H_2O_2, $H_2C_2O_4$, NH_2OH, N_2H_4, or H_3PO_2, the reaction-velocity curve has a wave form. A detailed study of these reactions shows that they can proceed either normally or autocatalytically, and then in a certain concn. range the velocity is reduced owing to removal of the catalyst in a side reaction. The usual assumption that $Mn^{..}$ ions act as a direct catalyst in the reduction of $KMnO_4$ is incorrect. The catalyst is actually a product formed by interaction of $Mn^{..}$ and MnO_4' in which the Mn has a valency of 3, 4, or 5.
                                                                F. L. U.

Transmission of a detonation between initiating explosive substances. I. General aspect of the phenomenon. A. F. Belaev and J. B. Chariton. **II. Influence of the distance between the charges and the effect of the surface area of the passive charge on the probability of transmission of a detonation.** A. F. Belaev, J. B. Chariton, and E. Rdultovskaja. **III. Size of the particles transmitting the detonation.** A. F. Belaev and J. B. Chariton (Acta Physicochim. U.R.S.S., 1936, **5**, 757—766, 767—776, 777—784).—I. The detonation of a 0.002-g. crystal of PbN_6 (active charge) is transmitted in vac. through distances of the order of 40 cm. to another crystal of PbN_6 (passive charge). The detonation of the passive charge can be prvented by a screen placed between the two charges, whilst the detonation can be transmitted through apertures in the screen. The sensitivity of PbN_6 is affected by exposure to air. The probability of transmission over a given distance depends on the method of preparing the passive charge and on its surface area. Detonation appears to be transmitted by microscopic particles scattered at a velocity of the order of 3 km. per sec. in vac., and at approx. half this velocity in air at a pressure of 12 mm. of Hg.

II. On the assumption that a single microscopic particle is sufficient to detonate the passive charge, the probability of detonation by transmission has been calc. for various distances between the charges, and for various surface areas of the passive charge. The data suggest that the transmission of particles is non-uniform, and is less uniform than that of a random distribution.

III. Calculation gives the no., linear dimensions, and mass of particles ejected from 0.0017 g. active charge as being of the order of 4×10^5, 10^{-4} cm., and 10^{-11} g., respectively. The law of retardation of a high-speed microscopic particle in air has been deduced. The mechanical action of the particles when they strike a glass surface is described.
                                                                C. R. H.

Temperature coefficient of thermal decomposition of silver oxalate. J. Y. Macdonald (J.C.S., 1937, 273—274; cf. A., 1936, 940).—Contrary to the statement of Benton and Cunningham (*ibid.*, 37), the rate of decomp. of $Ag_2C_2O_4$ at 80° shows no abnormality, and the temp. coeff. for 80—110° (2.77) agrees with that previously found.   F. L. U.

Application of the thermochemical method to the study of the corrosion of metals. (Mlles.) A. Dorabialska and E. Turska (J. Chim. phys., 1937, **34**, 28—36).—Microcalorimetric experiments show that when Fe is placed in 2.5 or 5% H_2SO_4, the rate of evolution of heat, δ, falls rapidly to a val. which then gradually decreases to zero. C_5H_5N eliminates the high initial val. of δ, but heat is evolved during a long period. δ increases with temp. and $[H_2SO_4]$.   J. G. A. G.

Influence of the velocity of detonation of an explosive on the velocity of the explosion wave. P. Laffitte and A. Parisot (Compt. rend., 1937, **204**, 179—181; cf. A., 1924, ii, 399).—Relationships between the velocity of detonation and the initial velocity of the explosion wave were examined for four explosives.   A. J. E. W.

Rates of dissolution of gold and silver in cyanide solutions.—See B., 1937, 246.

Decomposition of solutions of sodium sulphide. G. Bulfer, A. J. Boyle, and L. H. Baldinger (J. Amer. Pharm. Assoc., 1936, **25**, 1104—1106).—The decomp. of Na_2S is partly inhibited by the presence of 15—30% of glycerol or $(CH_2 \cdot OEt)_2$.
                                                                F. O. H.

Acid catalysis in liquid ammonia. II. Kinetics of ammonolysis of desmotroposantonin and diethyl tartrate in liquid ammonia in presence of ammonium salts. A. I. Schattenstein (Acta Physicochim. U.R.S.S., 1936, **5**, 841—852).—Data were obtained at 20° in presence of NH_4Cl, NH_4Br, and NH_4I, and, in the case of Et_2 tartrate, in presence of NH_4NO_3 and NH_4ClO_4. The salt effect increases in the same order as was observed in the ammonolysis of santonin (cf. A., 1936, 1075), *i.e.*, in the reverse order of increase of activity, conductivity, and osmotic coeffs.   C. R. H.

Influence of high concentrations of sulphuric acid on the velocity of oxidation of sulphur dioxide by oxygen in presence of bivalent manganese ions.—See B., 1937, 236.

Reactions catalysed by aluminium chloride. XVI.—See A., II, 152.

Catalytic dehydrogenation of dihydrocoumarins.—See A., II, 163.

Catalytic polymerisation of ethylenic derivatives.—See A., II, 141.

Kinetics of the ammonia synthesis on technical iron catalyst. V. Finkelstein and M. Rubanik (Acta Physicochim. U.R.S.S., 1936, **5**, 921—923).—A theoretical error previously made (cf. B., 1935, 801; 1936, 985) is corr. without necessitating any change in the vals. of the apparent activation

energy. The foundation on which a mechanism for the synthesis of NH_3 was based is considered invalid.
C. R. H.

Catalytic action of metallic rhenium on ammonia synthesis. C. ZENGHELIS and E. STATHIS (Österr. Chem.-Ztg., 1937, **40**, 80—81).—The catalytic action of Re on a $N_2 + 3H_2$ mixture at 85° and 1 atm. is small. Using nascent N from $NH_4Cl + NaNO_2$, a considerable catalytic activity which is promoted by the addition of Fe is displayed.
J. S. A.

Variation of catalytic power of ferromagnetic substances at the Curie point. H. FORESTIER and R. LILLE (Compt. rend., 1937, **204**, 265—267).—The effectiveness of Fe_3O_4, Fe_2O_3,SrO, and Fe_2O_3,NiO in catalysing the reaction $CO_2 + H_2 \rightleftharpoons CO + H_2O$ showed an abrupt increase in the neighbourhood of the Curie point.
A. J. E. W.

Rare earths as catalysts. B. S. HOPKINS and W. A. TAEBEL (Trans. Electrochem. Soc., 1937, **71**, Preprint 6, 45—51).—A summary of the uses of Ce and other rare earths as catalysts.
J. W. C.

Cobalt as a catalyst. C. G. FINK (Trans. Electrochem. Soc., 1937, **71**, Preprint 5, 39—44).—An explanation of the catalytic properties of Co_2O_3 and other Co compounds, and of the behaviour of insol. Co–Si anodes, is advanced. Applications are discussed.
J. W. C.

Rate of reaction in the vanadium contact sulphuric acid process.—See B., 1937, 234.

Catalytic decomposition of hydrogen peroxide by aluminium oxyiodide hydrosols. A. W. THOMAS and B. COHEN (J. Amer. Chem. Soc., 1937, **59**, 268—272).—The catalytic activity of Al oxyiodide sols is much $>$ that of I' solutions of equiv. concn., and is lowered by adding certain K salts, the order of effectiveness being tartrate $> SO_4'' > OAc' > NO_3'$. This is also the order of effectiveness in increasing the I' activity of the sols. The added anions probably displace I from the micelle, converting it into I'.
E. S. H.

Preparation of metal catalysts. I. Active copper and its hydrogenating and dehydrogenating reactions. II. Active cobalt and its hydrogenating and dehydrogenating reactions. L. FAUCOUNAU (Bull. Soc. chim., 1937, [v], **4**, 58—63, 63—67).—I. Active Cu, prepared from Al–Cu–Zn alloy and NaOH (A., 1936, 1212), behaves like reduced Cu as a catalyst for the hydrogenation of double linkings at the end of a chain. It does not assist the hydrogenation of the C_6H_6 nucleus.

II. Active Co, prepared as formerly described (loc. cit.), is a slightly more efficient catalyst than Cu for dehydrogenation reactions; for hydrogenation its activity is at least equal to that of reduced Co. At 100° C:C or C:C linkings can be saturated and aldehydes or ketones reduced to alcohols. With C_6H_6 derivatives the chains are hydrogenated at 100°, but at 200° the ring is also hydrogenated. E. S. H.

Kinetics of the oxidation of nitrogen oxide in presence of activated charcoal. G. K. BORESKOV and S. M. SCHOGAM (J. Phys. Chem. Russ., 1936, **8**, 306—325).—Mixtures of NO, O_2, and NO_2 were passed through charcoal. The approx. equation $K = [NO]^{1.5}[O_2]/[NO_2]^{0.5}$ holds in the presence or absence of CO_2 or N_2. H_2O vapour strongly diminishes K. From 8° to 70° K rises, and from 70° to 120° decreases, with activation energy 3400 g.-cal. J. J. B.

Relationship between spatial structure and biocatalytic properties of allotropic iron oxides. O. BAUDISCH (Ber., 1937, **70**, [B], 218—223).—Molten carbonyl Fe is freed from traces of C by prolonged ignition in H_2 and the spectroscopically pure Fe thus obtained is dissolved in HCl and transformed into γ-Fe_2O_3,H_2O (I) : $Fe + HCl \rightarrow FeCl_2$; $FeCl_2 + C_5H_5N \rightarrow FeCl_2(C_5H_5N)_4$ which on autoxidation gives (I). When heated in an open Pyrex tube at 240° (I) passes into γ-Fe_2O_3 (II) whereas in a sealed tube it affords α-Fe_2O_3 (III). (II) is brown, cubic, and ferromagnetic, free from FeO and foreign electrolytes. It strongly accelerates the decomp. of H_2O_2 and becomes blue by autoxidation in presence of 2 : 7-diaminofluorene hydrochloride (IV). It yields black magnetite in presence of N_2H_4,H_2O. It strongly promotes the growth of *B. lepisepticum* in presence of x-factor and greatly prolongs the life of the pneumonia bacillus. (III) is tile-red, rhombohedral and paramagnetic, free from FeO and foreign electrolytes. It very slightly accelerates the decomp. of H_2O_2 and remains unchanged in the presence of (IV). It retains its colour in contact with N_2H_4,H_2O and is without influence on the growth of *B. lepisepticum* or the life period of the pneumonia bacillus. H. W.

Relationship between spatial structure and biological action of allotropic iron oxides. V. Action of hydrazine hydrate on spectroscopically pure, magnetic iron oxides prepared by different methods. O. BAUDISCH and S. HOLMES (Ber., 1937, **70**, [B], 223—227).—Magnetically soft γ-Fe_2O_3 (I) and α-Fe_2O_3 (II) are obtained by heating spectroscopically pure γ-Fe_2O_3,H_2O at 240° in an open or closed vessel, respectively. Magnetically hard γ-Fe_2O_3 (III) is obtained by reducing hæmatite in molten NaOAc at 460° to black magnetite, which is oxidised by molten KNO_3 at 360°, whereby minimal amounts of $Fe^{..}$ usually remain. Under identical conditions (I), (III), and (II) are reduced by aq. N_2H_4 to the extent of 7·31%, 3·66%, and 1·26%, respectively. γ-Fe_2O_3 is immediately reduced by aq. ascorbic acid, whereby $Fe^{..}$ passes into solution. H. W.

Electrolysis of aqueous solutions of ammonium bromide. F. JIRSA (Z. Elektrochem., 1937, **43**, 77—81).—The initial products of the electrolysis of aq. NH_4Br are H_2 and Br_2, but the latter reacts with NH_4Br, thus : $NH_4Br + Br_2 \rightarrow NH_2Br + 2HBr$, the NH_2Br decomposing catalytically, $4NH_2Br \rightarrow 2NH_4Br + N_2 + Br_2$, or at higher temp. reacting with H_2O to yield NH_4OBr, which further reacts with HBr, with liberation of Br_2. The current yields of Br_2, HBr, N_2, and O_2 have been measured at various concns., c.d., and temp. J. W. S.

Electrolytic oxidation. IX. Anodic oxidation of chromic salts to chromates. R. F. J. GROSS and A. HICKLING (J.C.S., 1937, 325—330; cf. A., 1936, 1472).—Using a smooth Pt anode in 0·1M-$KCr(SO_4)_2$ and 0·5N-H_2SO_4, and c.d. 0·01 amp. per

sq. cm., the current efficiency (E) in the reaction $Cr''' \to CrO_4''$ rises from 1% at 20° to 77% at 69°, above which no further increase occurs. E at room temp. for different anode materials was : smooth Pt 1%, PbO_2 100%, gas C 1%, platinised Pt (cathodically polarised) 97%, anodically polarised 43%. E increases with increasing [Cr''']. Oxidation with a Pt anode is greatly favoured by working in neutral and alkaline solution. Catalysts for H_2O_2 decomp. increase E in acid and diminish it (except Pb and Ag salts) in neutral solution. No definite oxidation–reduction potential appears to be associated with the reaction. The results can be satisfactorily explained by assuming that oxidation is due in part to O, through the intermediate formation of a metal peroxide, in both acid and alkaline solutions. In neutral or alkaline solution it is also partly due to the formation of H_2O_2, which is shown to oxidise Cr''' to CrO_4'' under these conditions.   F. L. U.

Electrolysis of germanochloroform or hydrochlorogermanic acid. A. TCHAKIRIAN (Compt. rend., 1937, **204**, 117—118).—Electrolysis of a solution of $GeHCl_3$ in 7N-aq. HCl gives $Ge(OH)_2$ or a solution containing bivalent Ge at the anode, according to the [HCl] at the electrode. The existence of $[Ge^{++}Cl_3]^-$ is deduced.   A. J. E. W.

Anode reactions. W. D. BANCROFT (Trans. Electrochem. Soc., 1937, **71**, Preprint 7, 53—63).— The theory of the electrolytic production of $H_2S_2O_8$ and its compounds is discussed and the anodic reactions involved in the electrolysis of Na_2SO_4, Na_2SO_3, and $Na_2S_2O_3$ are considered in detail. There is no evidence to suggest that H_2O_2 is an intermediate product in the formation of $H_2S_2O_8$.   J. W. C.

Application of electrolytic polishing to the study of metallic deposits. P. JACQUET (Compt. rend., 1937, **204**, 172—174).—Electrolytic deposition of Cu on electrolytically polished Cu surfaces (A., 1936, 571) occurs initially on surface irregularities or on grains of certain orientations. The deposit has cryst. structure.   A. J. E. W.

Quantum yield of the photosensitised decomposition of water and of ammonia. H. W. MELVILLE (Proc. Roy. Soc., 1936, A, **157**, 621—624). —Measurements have been made of the quantum yields of the decomp. of H_2O, D_2O, and NH_3 at various temp. The results for water indicate that the exchange does not take place appreciably by the dissociation and subsequent re-formation of H_2O mols. With NH_3 above 300°, the chain mechanism is the correct interpretation.   L. L. B.

Mercury-photosensitised exchange reactions of deuterium with ammonia, methane, and water. A. FARKAS and H. W. MELVILLE (Proc. Roy. Soc., 1936, A, **157**, 625—651).—The Hg-photosensitised exchange reactions of H_2 and D_2 with H_2O, NH_3, and CH_4 have been investigated over a wide range of operating conditions. Variations have been made in (1) the time of reaction up to the establishment of equilibrium; (2) the temp. (30—600°); (3) the partial pressure of the components at a total pressure of 100 mm.; (4) the components (e.g., D_2 + NH_3 and H_2 + ND_3); (5) the intensity

of illumination. In each case the rate of the exchange reaction was compared with the abs. intensity of the light and the rate of the ortho–para conversion in order to obtain the stationary H or D atom concn. With CH_4 and NH_3 the exchange above 300° takes place according to : $D + XH \to DX + H$, followed by $H + D_2 \to HD + D$, and so on. Whereas the rates of the exchange reactions involving CH_4 and NH_3 are completely characterised by the corresponding energies of activation (13 and 11 kg.-cal., respectively), the exchange reaction involving H_2O proceeds much more slowly than would be expected from the apparent energy of activation (7 kg.-cal.).   L. L. B.

Photochemical activity of the quartz mercury arc towards the reactions CO + O_2 and CO + NO. M. SISKIN, V. KONDRATEEV, and T. SUSCHKEVITSCH (J. Phys. Chem. Russ., 1936, **8**, 281—289).— Filtration of the arc radiation through CO diminishes the rate of reaction. NO absorbs the active radiation as well and emits two series of the γ-band; the activation of NO is presumably produced by the line 2258·9 A. and other weak lines. The dependence of the fluorescence of the O_2 on the pressure accords with Rasetti's theory (A., 1929, 866).   J. J. B.

Critical number of quanta in photography. S. P. SCHUVALOV (J. Phys. Chem. Russ., 1936, **8**, 387—402).—The probability of a single grain in a monodisperse uni-layer emulsion absorbing a certain min. no. of light quanta is calc. by statistical methods (Poisson's law). The results agree qualitatively with experiments on counting of grains after development. A method is indicated for determination of the min. no. of quanta absorbed by a grain which make its development possible.   E. R.

Photometric measurements of X-ray reflexions. IV. Comparison of widely differing intensities. J. PALACIOS, P. DE LA CIERVA, and L. RIVOIR (Anal. Fís. Quím., 1936, **34**, 743—747).— The blackening of "Agfa Laue" film by the K doublet of Ni $\propto$ the time of exposure up to 0·6 blackening. The effect on an under layer of film is 1/3·13 that on the upper. The X-ray tube was automatically maintained at 7·5 ma. and 40 kv. by means of a special circuit (described).   F. R. G.

[Photographic] sensitisation and desensitisation.—See B., 1937, 292.

Sensitisation of photochemical decomposition of iron pentacarbonyl in non-aqueous solution. F. P. FEDOROV and D. L. TALMUD (Acta Physicochim. U.R.S.S., 1936, **5**, 727—728).—Preliminary. Addition of pinacyanol (1 : 50,000) to a xylene solution of $Fe(CO)_5$ promotes its decomp. by red (>640 mμ) light.   F. L. U.

Photochemical reactions in the fluorite region. I. Photochemical decomposition of ethylene. R. D. McDONALD and R. G. W. NORRISH (Proc. Roy. Soc., 1936, A, **157**, 480—489).—Light from a H_2 lamp was passed into C_2H_4 through a fluorite window at pressures usually <1 mm. A polymeride was deposited on the window, and H_2 and a condensible gas were formed, the latter being separable into one fraction evaporating at −170° to −160° and another at −140° to −130° at the low pressures involved.

The total pressure remained practically const. The variation of the rate of H_2 formation with the C_2H_4 pressure indicates that the light is not completely absorbed at the lowest pressures. L. L. B.

Photochemistry of polyatomic molecules. J. FRANCK and K. F. HERZFELD (J. Physical Chem., 1937, **41**, 97—107).—It is deduced theoretically that the thermal energy can contribute much more than generally assumed to photochemical reactions of polyat. mols. able to emit fluorescent light. The application of this result to photosynthesis is discussed. J. W. S.

Oxidation of alpha-ray cuprene. S. C. LIND and C. H. SCHIFLETT (J. Amer. Chem. Soc., 1937, **59**, 411—413).—The reaction of cuprene (I) (prepared by polymerisation of C_2H_2 by means of Rn) with O_2 at room temp. has been followed manometrically and gravimetrically. The approx. reaction is $(C_2H_2)_{20} + 5 \cdot 5O_2 \rightarrow C_{39}H_{40}O_{10} + CO$. The heat of combustion of $C_{39}H_{40}O_{10}$ is approx. 30% < that of (I). E. S. H.

Structural relations in solid reactions. J. PALACIOS and J. GARRIDO (Anal. Fis. Quím., 1936, **34**, 739—742).—Reactions in crystals are classified chemically in four groups: no chemical change, loss or gain of substance, and replacement of some atoms by others. They are classified crystallographically according as the structure is retained in one, two, or three dimensions, or in isolated units. F. R. G.

Influence of organic materials on chemical corrosion of metals.—See B., 1937, 246.

Determination of corrosive power (aggresivity) of waters.—See B., 1937, 298.

Spectroscopic study of the thermal dissociation of $NaNO_2$, $HgNO_3$, and $Ba(NO_3)_2$. K. BUTKOV and V. TSCHASSOVENNI (Acta Physicochim. U.R.S.S., 1936, **5**, 645—650).—Absorption spectra of vapours arising from heated $NaNO_2$, $HgNO_3$, and $Ba(NO_3)_2$ have been studied by means of the arrangement previously described (A., 1936, 1474). In no case is absorption due to the undecomposed mol. observed. $NaNO_2$ near its m.p. gives NO, but no NO_2 between 16° and 600°. $HgNO_3$ gives traces of NO at 40°, of NO_2 at 70°, and the resonance line Hg 2537 above 150°. $Ba(NO_3)_2$ shows NO and NO_2 at 590°. The appearance of lines due to NO when NO_2 is absent is attributed to dissociation of NO_2 at very low pressures. F. L. U.

Basic magnesium carbonates. (MME.) L. WALTER-LÉVY (Ann. Chim., 1937, [xi], **7**, 121—224).—The account previously given (cf. A., 1932, 697) of the decomp. of $MgCO_3,3H_2O$ on heating in sealed tubes between 100° and 200° to form magnesite (I) has been amplified (cf. also B., 1933, 345). Aq. solutions of $Mg(HCO_3)_2$, similarly heated, decompose at 100° into (I) and finally $MgCO_3$, but if heated in open vessels the $MgCO_3$ is hydrolysed to $Mg(OH)_2$. $MgCO_3,K_2CO_3,4H_2O$ is decomposed by aq. K_2CO_3 or $KHCO_3$ at 100—200° forming (I) and two new basic *carbonates*, viz., $4MgO,3CO_2,3H_2O$ and (provisionally) $8MgO,K_2O,6CO_2,6H_2O$. The first is formed in dil. solutions of K_2CO_3 and $KHCO_3$, and the second in

conc. solutions of K_2CO_3. Addition of small quantities of K_2CO_3 to conc. solutions of $MgSO_4$ gives $4MgO,2CO_2,SO_3,7H_2O$, $6MgO,SO_3,8H_2O$, and $4MgO,SO_3,11H_2O$ (cf. A., 1936, 689). The double decomp. of $MgSO_4$ and K_2CO_3 or $KHCO_3$ has been studied for varying concns. of the reactants. For equimol. proportions, (I) and brucite (II) are the dominant phases. There is no evidence for the formation of $MgCO_3$ or $4MgO,3CO_2,3H_2O$ as a result of double decomp. in open vessels. Magnesia alba is considered to be a mixture of 3 mols. of (I) and 1 mol. of (II). C. R. H.

Reaction between iodine and various metallic oxides. I. Magnesium oxide in aqueous media. II. Magnesium and calcium oxides in anhydrous media and in the dry condition. A. GIACALONE and R. INDOVINA (Annali Chim. Appl., 1936, **26**, 489—494, 494—499).—I. Studies of the reaction between $MgSO_4$, NaOH, and I indicate that the red ppt. formed is due to adsorption of I on $Mg(OH)_2$ which, however, reacts slowly with I to give a coloured hypoiodite.

II. MgO or CaO with I in $CHCl_3$, CCl_4, or C_6H_6 yields a red adsorption product but iodide and iodate (probably with hypoiodite as intermediary) are formed; similar reactions occur on mixing the dry oxides with I. F. O. H.

Hydrated compounds in the system CaO–Al_2O_3–H_2O(liq.) and the hydration of anhydrous calcium aluminates. G. ASSARSON (Sverige geol. Undersök., Ser. C, Årsbok 30, No. 399, 1936, 202 pp.).—At low temp., solutions containing Ca aluminate and $Ca(OH)_2$ can deposit pure hydrated CaO,Al_2O_3, and at higher temp. a series of higher Ca aluminates is formed together with Al hydroxide (*n* of which increases according to the temp. of pptn.). By shaking the low-CaO compounds with $Ca(OH)_2$ solution they are converted into hydrated tri- and tetra-aluminates. The invariant points could not be determined owing to the slowness of reaction. At 90° hydrated $3CaO,Al_2O_3$ is the most stable compound and it can coexist with $Al(OH)_3$. The hydration of anhyd. compounds leads first to the production of hydrated $2CaO,Al_2O_3$ and a gel the composition of which could not be ascertained. At higher temp. or in presence of much $Ca(OH)_2$ this gel resolves itself into hydrated $2CaO,Al_2O_3$ and $3CaO,Al_2O_3$. At lower temp. hydrated CaO,Al_2O_3, and at higher temp. $Al(OH)_3$, may be formed. Conductivity and p_H measurements indicate that at low CaO contents, CaO,Al_2O_3 is the principal compound existing in solution, and the mobility of the monoaluminate ion is 32. G. H. C.

Reduction of zinc oxide with hydrogen. F. SCHACHERL (XIV Congr. Chim. ind. Paris, 1935, Comm. 2, 3 pp.; Chem. Zentr., 1936, i, 2780; cf. A., 1933, 28).—Taylor and Starkweather's results were confirmed (cf. A., 1930, 1002). H_2O must be removed rapidly. H. J. E.

Mercurous fluoride. E. MONTIGNIE (Bull. Soc. chim., 1937, [v], **4**, 342—344).—Reactions of Hg_2F_2 with many reagents are described. E. S. H.

Hydrates of aluminium perchlorate. E. MOLES and J. GONZÁLEZ DE BARCIA (Anal. Fís. Quím., 1936,

34, 802—812).—$Al(ClO_4)_3,6H_2O$ over P_2O_5 at 35°/ 0·001 mm. gives the *trihydrate*, which at 145° yields the *anhyd. salt*. *d* are recorded for these and the compounds with $9H_2O$ and $15H_2O$, whence it is concluded that the hydrates are $Al(ClO_4,OH_2),xH_2O$. The existence of the $12H_2O$ compound (Dobroserdov *et al.*, A, 1927, 530) could not be confirmed.

F. R. G.

Thallium phosphide. E. MONTIGNIE (Bull. Soc. chim., 1937, [v], **4**, 295—296).—Tl_3P is prepared by heating Tl and P in a sealed tube at 400°. No other Tl phosphides have been identified. The properties of Tl_3P are described. E. S. H.

Total radiation in explosions of mixtures of carbon monoxide and air. V. I. BLINOV (J. Phys. Chem. Russ., 1934, **5**, 1333—1352).—The total radiation during explosion of CO–air mixtures in narrow tubes is determined by the amount of CO_2 produced; max. vals. correspond with a stoicheiometric mixture. Formulæ expressing radiation intensity in dry and moist mixtures are established. CH. ABS. (*p*)

Silicon oxybromides. W. C. SCHUMB and C. H. KLEIN (J. Amer. Chem. Soc., 1937, **59**, 261—264).— The prep. and properties of $(SiOBr_2)_4$, f.p. 123— 123·5°, b.p. 155°/7 mm., Si_2OBr_6, f.p. 27·9±0·1°, b.p. 118°/15 mm., $Si_3O_2Br_8$, f.p. 17·5±0·2°, b.p. 159°/12 mm., $Si_4O_3Br_{10}$, f.p. $-91\pm2°$, b.p. 122°/ $<0·5$ mm., and $Si_5O_4Br_{12}$, f.p. $-82\pm2°$, b.p. 150°/ $<0·5$ mm., are described. The existence of $Si_6O_5Br_{14}$ is indicated. The compounds are readily hydrolysed and completely miscible with CS_2, CCl_4, $CHCl_3$, and $SiBr_4$. E. S. H.

Topochemical reactions. N. I. GLISTENKO (Kolloid. Shurn., 1936, **2**, 249—254).—Pb tartrate, $(BiO)_2(OH)NO_3$, and Hg_2Cl_2 may, without changing their external form, be converted by aq. H_2S into PbS, Bi_2S_3, and Hg_2S; $Hg(CN)_2$ and I in $CHCl_3$ also afford HgI_2 having the form of $Hg(CN)_2$. The *X*-ray diagram of the sulphides is, however, normal.

J. J. B.

Nitrosyl of A. Angeli. G. ODDO (Ber., 1937, **70**, [*B*], 412; cf. A., 1936, 460).—The experimental conditions employed by Cambi (A., 1936, 1350) differ from those used by the author. H. W.

Phosphates of the type $M^{II}NH_4PO_4$. V. AUGER and (MLLE.) N. IVANOFF (Compt. rend., 1937, **204**, 434—436).—$MgNH_4PO_4,6H_2O$ at 100° in presence of NH_3 gives $MgNH_4PO_4,H_2O$; this decomposes at $>210°$, giving a product which is highly incandescent on heating. $CaNH_4PO_4,7H_2O$ gives $CaHPO_4$ at 100°. $BaNH_4PO_4,7H_2O$ (prep. described) is similar. A pure Sr compound was not obtained. $Cu(NH_3)_2(NH_4)_4(PO_4)_2,7H_2O$ (prep. described) gives $CuNH_4PO_4,H_2O$ in aq. solution at 35°.

A. J. E. W.

Condensed phosphoric acids. P. BONNEMAN (Compt. rend., 1937, **204**, 433—434).—Schwarz's salt, $Na_5P_3O_{10},6H_2O$ (A., 1895, ii, 445), was prepared by heating an equimol. mixture of $Na_4P_2O_7$ and Na_3PO_4 at 300°. The prep. of the *salts* $Na_3CdP_3O_{10},12H_2O$ and $Na_2CrP_3O_{10},6H_2O$ is described. A. J. E. W.

Preparation of hypophosphoric acid from phosphorous acid. J. H. KOLITOVSKA (Z. anorg.

Chem., 1937, **230**, 310—314).—When PBr_3 is hydrolysed in an ice-cold OAc′ buffer at p_H 5·7, and the product oxidised by I in excess, 55% of the P is found as $H_4P_2O_6$ (cf. A., 1935, 715). F. L. U.

Rose's phospham. H. MOUREU and G. WÉTROFF (Compt. rend., 1937, **204**, 436—439; cf. A., 1936, 440, 810, 1476).—Previous work is discussed. P_4N_6, not PN_2H, is formed on heating the product of the reaction of PCl_3 and NH_3. A. J. E. W.

Light of combustion of metals. J. A. M. VAN LIEMPT and J. A. DE VRIEND (Rec. trav. chim., 1937, **56**, 126—128; cf. A., 1934, 972; 1935, 459).—Vals. for the light yield obtained on combustion in O_2 are : W, 9·0; Mo, 8·7; Ta, 32; Ce, 9·3; C, 1·9 lumens per watt. Wire-form specimens were used; ignition was effected electrically, or by chemical means.

A. J. E. W.

Dichlorine hexoxide. C. F. GOODEVE and F. D. RICHARDSON (J.C.S., 1937, 294—300; cf. A., 1936, 786).—The prep. of Cl_2O_6 from O_3 and ClO_2 is described. The m.p. is $3·50°\pm0·05°$, and the v.p. in the range $-40°$ to 20° is given by $\log_{10} p_{mm.} = -2070/T + 7·1$ for the liquid and $-2690/T + 9·3$ for the solid. Heats of evaporation and sublimation are calc. The heat of activation for the decomp. of the liquid is 22 ± 2 kg.-cal. The products of decomp. contain Cl_2 and Cl_2O_7 as well as ClO_2 and O_2. The physical properties are tabulated and compared with those of the other Cl oxides. F. L. U.

I_2O_5 and its hydrates. III. E. MOLES and P. VILLAN (Anal. Fís. Quím., 1936, **34**, 787—801).— Contrary to Bahl *et al.* (A., 1935, 1334) I_2O_5 can be obtained only by thermal decomp. of HIO_3 or $3I_2O_5,H_2O$, and the supposed I_2O_4 is a mixture containing free HNO_3. The following vals. of d^{18} are $\propto$ the H_2O content : HIO_3, 4·4662; $3I_2O_5,H_2O$, 5·055; I_2O_5, 5·278. F. R. G.

Complex rhenium oxycyanide. W. KLEMM and G. FRISCHMUTH (Z. anorg. Chem., 1937, **230**, 215— 219).—Addition of KCN in excess to conc. aq. K_2ReCl_6, followed by oxidation with H_2O_2, gives an orange solution which yields monoclinic crystals of the *compound* $K_3[Re^VO_2(CN)_4]$. Physical and chemical properties are described. F. L. U.

Ammoniates of rhenium trihalides. W. KLEMM and G. FRISCHMUTH (Z. anorg. Chem., 1937, **230**, 209—214; cf. A., 1932, 988).—By isothermal degradation the following *compounds* have been prepared : $ReCl_3$ with 14, 7, and 6 mols.; $ReBr_3$ with 20, 14, 9, and 7 mols. NH_3. Ammonolysis of the halides occurred above 100°. With $ReCl_5$ ammonolysis takes place at room temp. F. L. U.

Complex cobaltammine perrhenates. E. NEUSSER (Z. anorg. Chem., 1937, **230**, 253—256).—The following *compounds* are described :

$[Co(NH_3)_6](ReO_4)_3,1·5H_2O$;

$[Co(NH_3)_5H_2O](ReO_4)_3,3H_2O$ (I);

$[Co(NH_3)_5Cl](ReO_4)_2$; $[Co(NH_3)_5NO_2](ReO_4)_2$; $[Co(NH_3)_4C_2O_4]ReO_4$. The formation of (I) by mixing solutions of the roseo-chloride and a perrhenate on a microscope slide can be used to detect $1·4 \times 10^{-6}$ g. of Re. F. L. U.

Corrosion of iron. G. Chaudron and E. Herzog (Bull. Soc. chim., 1937, [v], **4**, 370—371).—Polemical (cf. A., 1936, 1218). E. S. H.

Preparation of pure ferrous chloride not containing ferric chloride. L. G. Berg (Zavod. Lab., 1936, **5**, 235—236).—Fe and HCl are added to hot saturated aq. $FeCl_2$ (containing $FeCl_3$), the solution is filtered into a receiver containing 2—3 ml. of Et_2O, and the filtrate is cooled, when pure $FeCl_2.4H_2O$ crystallises. The solution is filtered in a CO_2 or Et_2O atm., and the crystals are dried in vac. R. T.

Amorphous and crystallised hydrated oxides and oxides. XXX. A röntgenographically amorphous and ferromagnetic ferric hydroxide of definite composition which does not age. Structure of ageing and non-ageing ferric hydroxides. A. Krause, S. Gawrych, and L. Mizgajski (Ber., 1937, **70**, [B], 393—401; cf. this vol., 89).—A non-ageing Fe^{III} polyorthohydroxide (I) is obtained by addition of 25% aq. NH_3 (15 c.c.) to $FeCl_3,6H_2O$ (5 g.) in H_2O (100 c.c.) at 20°. One fourth of the well-washed gel ($=$ about 0·25 g. Fe_2O_3) is suspended in H_2O (100 c.c.) and added rapidly to 100 c.c. of briskly boiling, CO_3''-free 2N-NaOH contained in a 1-litre flat-bottomed flask ("alborex" or "Eserco"). The flask is heated continuously with a powerful flame. The temp. falls temporarily to about 77° and rises in 1·5 min. to 103° at which it is maintained for 3 min., the H_2O lost being replaced by hot H_2O. The liquid is then decanted, and the ppt. filtered off and washed with warm or better with cold H_2O until the filtrate gives no reaction with phenolphthalein. $Fe(NO_3)_3,9H_2O$ can also be used as initial material. Slight departures from this procedure can readily lead to failure. (I) is stable even with respect to H_2O content and retains this condition for years if preserved under H_2O or N-NaOH at 20°. Only the power of uniting with Ag and decomposing H_2O_2 catalytically diminish somewhat. Such subtle changes cannot be detected röntgenographically and the hydrogel remains amorphous. (I) is unchanged when boiled for many hr. with N-NaOH and only slightly altered by long boiling with H_2O in a Pt vessel or short treatment in an autoclave at 150°. The constitutional formula of (I) is discussed. H. W.

Walden inversion in substitution reactions on inorganic complex compounds. E. Bergmann (J. Amer. Chem. Soc., 1937, **59**, 423).—The reaction studied by Bailar *et al.* (this vol., 42) does not involve a substitution by ions; the theory previously proposed (A., 1933, 574; 1936, 803) does not make any prediction for such cases. H. B.

Action of nitric oxide on nickel carbonyl. H. Reihlen (Z. anorg. Chem., 1937, **230**, 223—224).—The formula assigned by Anderson (this vol., 95) to the green compound (A., 1930, 1539) formed from NO and $Ni(CO)_4$ in MeOH is criticised. F. L. U.

Reduction of nickel and copper oxides with solid carbon. W. Baukloh and F. Springorum (Z. anorg. Chem., 1937, 230, 315—320; cf. B., 1931, 802).—Reduction of CuO or Cu_2O by C (graphite) is first noticeable about 550°, and of NiO or Ni_2O_3

about 800°. Reduction in the case of Cu oxides is superficial and never reaches 100%. With Ni oxides the course of the reaction is determined by diffusion of C through the Ni formed. F. L. U.

Reduction of ammonium ruthenate. Alkali ruthenium tetrahalides. II. M. Buividaite (Z. anorg. Chem., 1937, **230**, 286—288).—The following *salts* are described : $NH_4RuBr_4,2H_2O$; $RbRuBr_4,4H_2O$; $CsRuBr_4,4H_2O$. They resemble the corresponding Cl compounds (A., 1935, 594). F. L. U.

Progress in analytical chemistry with the use of complex compounds. E. Tschirch (Chem.-Ztg., 1937, **61**, 225—228).—A review.

Tswett's adsorption analysis (chromatographic analysis). W. Koschara (Chem.-Ztg., 1937, **61**, 185—188).—A review.

Theory of gravimetric analysis. E. Schröer (Naturwiss., 1937, **25**, 81—87).—A review of the physico-chemical conditions governing pptn., the occurrence and avoidance of impurities in ppts., ageing, and quant. separation. A. J. M.

Increasing the accuracy of micro-volumetric determinations. I. M. Korenman (Zavod. Lab., 1936, **5**, 32—36).—The indicator error Δa is a function of the final vol. of the titrated solution, and of the nature of the indicator; it is equal to $2V - V_1$, where V is the vol. used for titrating a given vol. of solution, and V_1 is the vol. used for twice the concn., the amount of indicator and the final vols. of the solutions being const. The vals. of Δa are recorded for a no. of acidimetric indicators, and for iodometric and $KMnO_4$ titrations. R. T.

Adaptation of volumetric analysis to the Stakhanov movement. N. A. Tananaev and I. N. Langer (Zavod. Lab., 1936, **5**, 1039—1042).—Considerable economy of time and reagents is effected, with the same accuracy, when the ordinary titrations are performed with vols. 0·1 of the usual. R. T.

Reactive groups in organic reagents and their application in inorganic analysis. L. A. Sarver (J. Chem. Educ., 1936, **13**, 511—514).—A discussion. L. S. T.

Petrographic method of dust analysis.—See B., 1937, 297.

p_H indicators. C. E. Mullin (Textile Col., 1935, **57**, 518—520, 589—592, 668—670).—A summary of dyes used. Ch. Abs. (*e*)

Standard solution for p_H measurements. A. K. Airola (Suomen Kem., 1937, **10**, A, 19—21).—Aq. $0·01N$-NaHCO_3, saturated with CO_2 at various pressures, is suggested. A theoretical expression is derived. M. H. M. A.

Spectrophotometric determination of the p_H of a coloured medium (without standard). A. Leclère (J. Pharm. Chim., 1937, [viii], **25**, 117—122).—By means of the Zeiss step-photometer (a suitable light filter being employed) the extinction coeff. of the solution containing an indicator (Me-red or bromothymol-blue) is determined. From a knowledge of the coeff. of the indicator on the acid

and alkaline sides of its range, the unknown p_H may then be calc. The modifications necessary in the case of a coloured liquid are described. W. O. K.

[Determination of] p_H of electroplating solutions.—See B., 1937, 247.

Interferometric analysis of heavy water. N. S. FILIPPOV and M. M. SLUZKAJA (J. Phys. Chem. Russ., 1936, 8, 468—471).—A method for the determination of D_2O in mixtures with H_2O by measuring the refractivity with a Haber–Loewe interferometer is described. E. R.

Potentiometric study of the reaction between solutions of halogens and sodium thiosulphate. C. DEL FRESNO and L. VALDÉS (Anal. Fís. Quím., 1936, 34, 813—817).—The reaction described by Beckurts (" Massanalyse," 1st ed., 1913, p. 262) cannot be used to determine Cl or Br owing to loss of these by evaporation. F. R. G.

Use of potassium hydrogen sulphite in volumetric determinations. A. SCHWICKER (Z. anal. Chem., 1937, 108, 89—96).—(i) ClO_3', BrO_3', IO_3', and IO_4' are determined by adding excess of $KHSO_3$, which is oxidised to $HSO_4' + Cl'$ (Br' etc.). The excess of $KHSO_3$ is bound by adding aq. CH_2O, and the HSO_4' is titrated with NaOH. Alternatively, the excess of $KHSO_3$ may be decomposed by boiling, and the Cl' formed may then be titrated with $AgNO_3$. (ii) H_2O_2 oxidises $KHSO_3$ to HSO_4', which may be titrated with NaOH. (iii) For determination of CH_2O, N-KOH is neutralised with $KHSO_3$ (thymolphthalein), a neutralised solution of CH_2O is added, and then $KHSO_3$ to restore neutrality. Alternatively M-Na_2SO_3 is acidified with a measured insufficient amount of N-HCl. The solution is then titrated with CH_2O until neutral (thymolphthalein). J. S. A.

Volumetric determination of bromide after oxidation to bromate in presence of much chloride. I. M. KOLTHOFF and H. YUTZY (Ind. Eng. Chem. [Anal.], 1937, 9, 75—76).—Modified procedure is recommended. With 10 c.c. of $0.01M$-Br' the accuracy is about 0.3%. E. S. H.

Determination of bromide in mineral waters containing chloride and iodide. F. DI STEFANO (Annali Chim. Appl., 1936, 26, 515—518).—The H_2O is first freed from I' by HNO_2 and CS_2; Na_2CO_3 and aq. Cl_2 are added, and the solution is evaporated to dryness, Br' thus being converted into BrO_3'. The residue is dissolved in H_2O, KI and HCl are added, and the liberated I (equiv. to the BrO_3' present) is titrated with $0.1N$-$Na_2S_2O_3$. F. O. H.

Indirect volumetric determination of bromate. I. VON STETINA (Z. anal. Chem., 1937, 108, 85—89).—To the bromate excess of $0.1N$-As_2O_3 is added, and the solution is strongly acidified. The excess of As_2O_3 is then titrated back with $0.1N$-$KBrO_3$. J. S. A.

Catalytic determination of iodine. H. P. LUNDGREN (J. Amer. Chem. Soc., 1937, 59, 413—416).—Small amounts of I' can be determined by measuring the rate at which the decolorisation of methylene-blue by Na_2SO_3 proceeds in the presence of I' as catalyst. Apparatus and procedure are described. E. S. H.

Determination of oxygen in copper.—See B., 1937, 246.

Determination of colloidal and polysulphide sulphur in sulphurous waters. E. CHERBULIEZ and (MME.) A. HERZENSTEIN (Compt. rend., 1937, 204, 269—272).—Colloidal S is hydrolysed in alkaline solution to H_2S (determined as CdS) and alkali thiosulphate, which is determined iodometrically. S in polysulphides is converted into CdS and S_2O_3'' by an alkaline suspension of $Cd(OH)_2$ or $CdCO_3$. Results for five natural waters are given. A. J. E. W.

Determination of sulphate, calcium, and magnesium in salt samples of high purity. A. C. SHUMAN and N. E. BERRY (Ind. Eng. Chem. [Anal.], 1937, 9, 77—79).—Modifications of standard procedures for determining SO_4'' gravimetrically as $BaSO_4$, Ca volumetrically by $(NH_4)_2C_2O_4$ and $KMnO_4$, and Mg volumetrically by 8-hydroxyquinoline have been adapted to the analysis of NaCl. The precision obtainable is $\pm 0.0048\%$ for Ca and $\pm 0.0036\%$ for SO_4'' and Mg. E. S. H.

Determination of mixtures of [sodium] sulphite, thiosulphate, and carbonate. A. BRIAU (Ann. Chim. Analyt., 1937, [iii], 19, 38—40).— (a) $Na_2CO_3 + Na_2SO_3$ are determined acidimetrically. (b) $Na_2SO_3 + Na_2S_2O_3$ are titrated with I. (c) The acid formed in (b) is titrated with NaOH. J. S. A.

Micro-determination of ammonia in presence of aliphatic amines. C. E. M. PUGH and J. H. QUASTEL (Biochem. J., 1937, 31, 282—285; cf. A., 1907, ii, 503).—The volatile amine and NH_3 in a special apparatus are passed, by aëration at 100° in presence of K_2CO_3, into $0.1N$-H_2SO_4; HgO, which combines with NH_3 but not with amines, is added, and the NH_3 after liberation from the pptd. complex with conc. aq. NaOH is passed into $0.1N$-H_2SO_4 and determined by nesslerisation. A blank determination is also made. W. McC.

Detection and determination of ammonia in waters. N. D. COSTEANU (J. Pharm. Chim., 1937, [viii], 25, 101—103).—Strips of filter-paper impregnated with the H_2O to be tested and allowed to dry in the air are treated with a drop of Nessler's reagent. The yellowish-brown colour which develops is compared with that formed on comparison strips treated with standard solutions. W. O. K.

Determination of small quantities of nitrous oxide and of carbon monoxide mixed with oxygen. Application to the determination of these substances in gaseous combustion products of nitrogenous substances. M. BADOCHE (Bull. Soc. chim., 1937, [v], 4, 232—239).—N_2O is separated by liquefaction and determined by combustion. CO is determined by reduction of I_2O_5. The gaseous combustion products of certain org. N compounds contain CO (although in insufficient amount to affect the calc. heat of combustion), but no detectable N_2O. E. S. H.

Rapid determination of small amounts of yellow in red phosphorus. A. A. KORINFSKI and

Z. F. Golubeva (Zavod. Lab., 1936, 5, 23—24).— 20 g. of red P are extracted (12 hr.) with 40 ml. of C_6H_6, the suspension is filtered, a drop of filtrate is placed on $AgNO_3$ paper, and the intensity of the stain appearing is compared with those given by a series of standard yellow P solutions.   R. T.

Determination of phosphorus in silver phosphate. N. Rubin and W. N. McNabb (Analyst, 1937, **62**, 123—124).—The P is pptd. as Ag_3PO_4 in presence of NaOAc, and after a wash with a saturated solution of Ag_3PO_4 it is dissolved in HNO_3 and the $Ag^{.}$ titrated with $0.1N$-KI using 3 drops of $0.1N$-$Ce(SO_4)_2,2(NH_4)_2SO_4$ and 5 ml. of 0.5% starch as an internal indicator; the end-point is a permanent bluish-green colour. The max. error on 0.2 g. of KH_2PO_4 was -0.2 mg.   J. G.

Volumetric determination of arsenic acid as ammonium arsenomolybdate. I. Wada, S. Kitajima, and J. Takagi (Sci. Papers Inst. Phys. Chem. Res. Tokyo, 1937, **31**, 133—146).—$(NH_4)_3AsO_4,12MoO_3$ is pptd. by $(NH_4)_2MoO_4$ (I), and the ppt. is titrated with $0.1N$-NaOH, as for P. 6 g. of NH_4NO_3 and 9 c.c. of conc. HNO_3 per 20 c.c. must be present, and (I) must be used in excess to ensure complete pptn. The influence of the concn. of NH_4NO_3 and HNO_3 on the wt. of the ppt. has been studied.   R. S. B.

Adaptation of Gutzeit's method for the detection of arsenic to its determination in series experiments. K. Uhl (Angew. Chem., 1937, **56**, 164—165).—The test paper should be stretched by a rubber band over the plane-ground walls of the glass tube, which should be equally thick in all cases. Granulated Zn is preferable to Zn sticks and H_2SO_4 to HCl. Test paper prepared with 5% $HgBr_2$ in EtOH is considerably more sensitive than that obtained with $HgCl_2$. Direct sunlight must be avoided and reaction continued for 1.5 hr. at $25°$. 2 or 3 samples of the substance must be used, preferably in different amounts. The distribution of As in solids is irregular; hence a relatively large sample should be taken.   H. W.

Rapid determination of silica, by means of hydroxyquinoline, in quartzite, emery, or clay. M. I. Volinetz and S. S. Bernschtein (Zavod. Lab., 1936, **5**, 1071—1072).—0.25 g. of substance is fused with 2.5 g. of NaOH, the melt is extracted with 400 ml. of H_2O, the solution is heated at $90°$ with 42—47 ml. of conc. HCl, and the vol. is made up to 1 litre. 12.5 ml. of 20% $(NH_4)_2MoO_4$ are added to 100 ml. of solution at 60—65°, followed by 30 ml. of 1.6% hydroxyquinoline (I) in 34.5% HCl. The pptd. (I)-silicomolybdate complex is collected, washed with 0.016% (I) in 0.7% HCl, and dissolved in 200 ml. of 50% HCl. 8 g. of $H_2C_2O_4$ are added to the boiling solution, which is diluted to 500 ml., 35 ml. of $0.2N$-NaBrO_3 are added, and excess of $NaBrO_3$ is titrated with $0.1N$-$Na_2S_2O_3$.   R. T.

(A) **Micro-volumetric determination of silicic acid in soluble silicates.** (B) **Microchemical determination of silicic acid in presence of other substances.** A. D. Vorobieva (Zavod. Lab., 1936, **5**, 165, 166—167).—(A) The solution (in a paraffined flask) is made neutral with $0.01N$-HCl,

and 2—8 ml. of 2.5% NaF in 25% KCl are added, followed by 1—55 ml. of $0.01N$-HCl. 5—10 ml. of EtOH are added after 20 min., and excess of HCl is titrated. The sol. SiO_2 content is calc. on the basis of the equation $Na_2SiO_3 + 6NaF + 6HCl \rightarrow Na_2SiF_6 + 6NaCl + 3H_2O$. Trustworthy results are obtained for 0.14—7 mg. of SiO_2.

(B) Fe^{III} and Al, but not Mn^{VI}, Cr^{III}, Mo^{VI}, W^{VI}, V^V, and Fe^{II}, interfere with the above method.
    R. T.

Determination of quartz in presence of silicates. W. R. Line and P. W. Aradine (Ind. Eng. Chem. [Anal.], 1937, **9**, 60—63).—The use of HBF_4 in place of H_2SiF_6 (cf. Knopf, U.S. Publ. Health Rep., 1933, **48**, 183) is recommended. HBF_4 decomposes silicates, but has less action on SiO_2 than has H_2SiF_6. SiO_2 can be determined with a precision of approx. 1% in mixtures with silicates.
    E. S. H.

Determination of carbon dioxide in closed atmospheres. R. Dubrisay and L. Gion (XIV Congr. Chim. ind. Paris, 1935, Comm. 1, 2 pp.; Chem. Zentr., 1936, i, 2780).—The decolorisation of aq.-EtOH fuchsin solution by N_2H_4 is reversed by the presence of CO_2. The reagent is shaken in a separating funnel with the air to be examined, and the colour matched against standards.
    H. J. E.

Use of chemiluminescence of phosphorus in gas analysis. F. Schacherl (XIV Congr. Chim. ind. Paris, 1935, Comm. 2, 3 pp.; Chem. Zentr., 1936, i, 2721).—Tausz and Görlacher's method (A., 1931, 587) may be vitiated by traces of impurities.
    H. J. E.

Detection of residues of hydrocyanic acid gas. —See B., 1937, 235.

Measurement of radon content of springs and other natural waters. W. Kosmath (Arch. Hyg. Bakt., 1935, **114**, 75—81; Chem. Zentr., 1936, i, 2603).—The Rn is removed in an air stream and measured with an electrometer.   H. J. E.

Determination of sodium. Removal of phosphorus before determining sodium by the uranyl zinc acetate method. O. R. Overman and O. F. Garrett (Ind. Eng. Chem. [Anal.], 1937, **9**, 72—73).—PO_4''' is removed from the solution by treating with powdered $ZnCO_3$ and filtering.   E. S. H.

Determination of lithium in sea-water. J. Bardet, A. Tchakirian, and (Mlle.) R. Lagrange (Compt. rend., 1937, **204**, 443—445; cf. A., 1933, 927; 1934, 987).—Sea-H_2O from Roscoff contained 0.17 mg. Li per litre.   A. J. E. W.

Complete analysis of apatite rock.—See B., 1937, 236.

Simultaneous volumetric determination of calcium and magnesium. G. A. Korsheniovski (Zavod. Lab., 1936, **5**, 24—26).—The solution is neutralised and AcOH is added, followed by 15 ml. of reagent [4 g. of $(NH_4)_2C_2O_4$ in 100 ml. of H_2O, mixed with 10 g. of Na_2HPO_4 in 10 ml. of AcOH]. The solution is heated at $100°$ for 30 min., 25 ml. of 10% aq. NH_3 are added, the solution is left overnight at room temp., the ppt. is collected, washed with 0.5% aq.

NH_3 and EtOH, dried, and suspended in H_2O. $0.1N$-HCl is added, and the excess of HCl is titrated (1 ml. $0.1N$-HCl = 2.016 mg. MgO). 25 ml. of 10% H_2SO_4 are then added, and the solution is titrated at 80° with $0.1N$-$KMnO_4$.   R. T.

Detection of barium ion in presence of phosphate ion. T. W. DAVIS and N. KORNBLUM (J. Chem. Educ., 1936, **13**, 587).—Small amounts of Ba·· are adsorbed on the pptd. phosphates and basic acetates in the usual PO_4''' separation and escape detection. The ppt. is treated with Na_2O_2 to remove Al and Cr phosphates and Ba·· is detected by pptn. with $(NH_4)_2SO_4$ in the HCl solution of the residual Fe salts.   L. S. T.

Photo-electric determination [of barium and sulphate]. A. DEL CAMPO, F. BURRIEL, and L. G. ESCOLAR (Anal. Fís. Quím., 1936, **34**, 829—834).—The course of pptn. of $BaSO_4$ in an agitated solution containing agar-agar is measured by an ammeter in a photo-electric circuit. Ba·· and SO_4'' may be determined within specified concns.   F. R. G.

Determination of barium and lead. H. N. TEREM (Bull. Soc. chim., 1937, [v], **4**, 259—264).—In absence of other metals, Ba and Pb can be determined by titration with Na hexametaphosphate.   E. S. H.

Iodometric determination of magnesium. I. RIBAS and E. TAPIA (Anal. Fís. Quím., 1936, **34**, 835—841).—Organo-Mg compounds are determined by a modification of the method of Job et al. (A., 1924, i, 24) using a large excess of 11% I in C_6H_6 in an atm. of N_2. The results are consistently 2% < by the method of Gilman et al. (A., 1926, 535).   F. R. G.

Bearing of the reaction between iodine, alkali, and magnesium salts on analytical processes. A. GIACALONE and R. INDOVINA (Annali Chim. Appl., 1936, **26**, 499—502).—The reaction between I, alkali hydroxide (I), and Mg·· (cf. Augusti, A., 1933, 1024) is diminished by excess of OH'; the substitution of (I) by aq. $Ca(OH)_2$ is therefore recommended.   F. O. H.

Micro-reactions of lead. I. M. KORENMAN and S. S. MESONSHNIK (Zavod. Lab., 1936, **5**, 168—169).—The smallest amounts of Pb detectable by adding a drop of the given reagent to a drop of solution, and subjecting the crystals formed to microscopical examination, are : 5—$8N$-HCl 0.2 (Sn, Cu, and Bi interfere); 0.1—$0.2N$-KI 0.075 (Bi interferes); 0.25—$1.0N$-H_2SO_4 0.02 (Ba and Sr interfere); cupriplumbinitrite reagent [equal vols. of 30% AcOH, saturated aq. KNO_2, $Cu(OAc)_2$, and NH_4OAc] 0.009×10^{-6} g. (Sn^{II}, but not Sn^{IV}, interferes).   R. T.

Rapid determination of lead. L. M. JOLSON and E. M. TALL (Z. anal. Chem., 1937, **108**, 96—105). —Metallic Pb is pptd. by Al foil at 100° from a solution containing $\ll 0.05$ g. of Pb and $\gg 2$ c.c. of conc. HCl in 15 c.c. The Pb is dissolved in 25% HNO_3, neutralised with aq. NH_3, and titrated at 80° in AcOH solution with aq. $(NH_4)_2MoO_4$, with tannin as external indicator. Cu, Sb, Bi, As, and Sn are pptd. with the Pb. As, Sn, and <0.02 g. of Cu in 15 c.c. do not affect the titration; Sb and Bi cause high results. In presence of >0.02 g. of Cu, titration

with $(NH_4)_2MoO_4$ is not possible. Oxidised ores, concentrates, etc. are evaporated down with conc. HCl, dissolved in dil. HCl, and treated as above. Sulphide ores etc. are first treated with conc. HCl and evaporated down. The residue is treated with NH_4Cl, and Pb determined in the filtrate. J. S. A.

Accuracy and cost of determination of lead by various methods. L. M. JOLSON (Zavod. Lab., 1936, **5**, 1196—1201).—Jolson and Tall's method (preceding abstract) is recommended.   R. T.

Bromopotentiometric determination of thallium with chloramine-T. O. DEL FRESNO and A. AGUADO (Anal. Fís. Quím., 1936, **34**, 818—822).—The reaction used in the volumetric method of Berry (A., 1935, 56) has been adapted to potentiometry. Tl may thus be determined with an error $\not> 1\%$.   F. R. G.

Conductometric study of the reaction between the cupric ion and potassium ferrocyanide. J. IBARZ and A. FEYTO (Anal. Fís. Quím., 1936, **34**, 823—828).—Two points of inflexion are obtained of which the first is used to determine Cu··, as within certain limits it is independent of concn. and temp.; it corresponds with 1.1 equiv. $Fe(CN)_6''''$. A second point of inflexion is attributed to adsorption of $Fe(CN)_6''''$ by the ppt.   F. R. G.

Applications of confined spot tests in analytical chemistry. H. YAGODA (Ind. Eng. Chem. [Anal.], 1937, **9**, 79—82).—In the technique described, the spot test is confined within a uniform area of definite cross-section, by the aid of a H_2O-repellent barrier embedded in the fibres of the paper. By this means, Cu and Ni can be determined in their salts with an accuracy of 1—3%.   E. S. H.

Electrometric methods of determining rare earths. G. JANTSCH (Österr. Chem.-Ztg., 1937, **40**, 77—80).—In addition to potentiometric titration with $H_2C_2O_4$ (cf. this vol., 149), small amounts of rare earths may be titrated conductometrically, in about 0.5% solution, against NaOH or $Na_2C_2O_4$ at 70—90°.   J. S. A.

Colorimetric determination of aluminium in water.—See B., 1937, 298.

Polarographic determination of iron. S. G. MICHLIN (Zavod. Lab., 1936, **5**, 1167—1170).—Fe^{II} is determined polarographically, at p_H 5—6, in presence of tartaric acid; Al does not interfere.   R. T.

Determination of iron. Colorimetric o-phenanthroline method. L. G. SAYWELL and B. B. CUNNINGHAM (Ind. Eng. Chem. [Anal.], 1937, **9**, 67—69).—The red colour produced by Fe·· and o-phenanthroline has been adapted to the determination of small amounts of Fe in biological or inorg. substances. Results given for wines show that when [Fe] is <5 p.p.m. the accuracy is about 10%. Cu in concns. twice that of Fe, and Al and Mg up to 10 times that of Fe, do not interfere.   E. S. H.

Micro-magnetic determination of iron and its application to biology. C. COURTY (Bull. Soc. chim., 1927, [v], **4**, 311—324).—Technique is described.   E. S. H.

Micro-determination of nickel. I. M. KOREN-
MAN, A. L. TENENBAUM, and S. M. LIALIUSCHKO
(Zavod. Lab., 1936, **5**, 1051—1053).—30—40 ml. of
3% $Na_4P_2O_7$, followed by aq. NH_3 to a slightly alkaline
reaction, are added to 1—10 ml. of solution, con-
taining 0·02—5 mg. of Ni. Starch solution, $AgNO_3$,
and KI are added, and the solution is titrated with
0·1N-KCN, according to Moore (A., 1895, ii, 534).
The method is applicable in presence of ≯40 mg. of
Fe or Zn, 60 mg. of Mn, and 30 mg. of Cr.　　R. T.

Chemical analysis by X-rays. I. P. DE LA
CIERVA and L. RIVOIR (Anal. Fís. Quím., 1936, **34**,
770—778).—Precautions necessary to detect 10^{-6} g.
of Ni in Zn are described. By employing the coeff.
of weakening through successive films (cf. this vol., 193)
of the blackening due to X-rays to determine the
const. in Glocker's formula (A., 1927, 999; see also
Tellez Plascenia, A., 1936, 926), Mn in steel may be
determined.　　F. R. G.

**Colorimetric determination of tungsten and
cerium.** F. M. SCHEMJAKIN, A. V. VESELOVA, and
M. I. VLADIMIROVA (Zavod. Lab., 1936, **5**, 231—232).
—2 ml. of approx. 0·01N-tungstate solution and 2 ml.
of 0·1N-$CuSO_4$ are added to 6 ml. of H_2O, the solution
is heated at 74—75° for 30 min., cooled to 17°,
filtered, and the ppt. of Cu tungstate is washed with
80% EtOH, and dissolved in 10 ml. of 28% HCl.
The coloration of the solution is compared with that
of standard Cu solutions. Minor modifications of
Schemjakin's method for determination of Ce (A.,
1935, 464) are described.　　R. T.

**Separation of small amounts of tin from
arsenic and antimony.** N. I. TSCHERVIAKOV and
E. A. OSTROUMOV (Zavod. Lab., 1936, **5**, 1173—1176).
—The acid solution, containing tartaric acid and
group IV and V cations, is made neutral with NaOH,
and poured into hot 4% aq. Na_2S, and the solution
is filtered from group IV sulphides. As, Sb, and Sn
sulphides are pptd. from the acidified filtrate. The
washed ppt., suspended in 80—100 ml. of H_2O, is
dissolved by adding 2 g. of KOH per 0·1 g. of As +
Sb + Sn. H_2O_2 (1 ml. > required to oxidise the sul-
phides) is added, and the solution is boiled for 15
min. Me-red is added, followed by HCl to a red
colour, after which 8 ml. of conc. HCl are added per
100 ml. of solution. Excess of 5% aq. cupferron is
added to the solution at 3—5°, the ppt. is collected,
washed with 0·05% cupferron at 5°, ignited with
HNO_3, and weighed. Good results are obtained for
0·3—30 mg. of Sn, in presence of considerably greater
amounts of Sb and As.　　R. T.

**Photometric determination of titanium and
vanadium in steel and iron.**—See B., 1937, 246.

Phenylanthranilic acid as a redox indicator.
V. S. SIROKOMSKI and V. V. STEPIN (Zavod. Lab.,
1936, **5**, 144—147).—o-$NHPh·C_6H_4·CO_2H$ (I) has a
normal oxidation potential of +1·08 volts; its solu-
tions exhibit a colour change from colourless to violet
in presence of excess of Cr_2O_7'' or MnO_4'. (I) can be
used in place of phenanthroline indicators in the
volumetric determination of V, Au, Tl, Cr, Mn, Ce,
and Co.　　R. T.

**Gravimetric determination of vanadium and
uranium by means of ammonium benzoate and
salts of other organic acids.** F. M. SCHEMJAKIN,
V. V. ADAMOVITSCH, and N. P. PAVLOVA (Zavod.
Lab., 1936, **5**, 1129—1131).—Aq. $(NH_4)_2S$ is added
to 0·1 g. of NH_4VO_3 in 35 ml. of 0·6N-HCl, at the
b.p., and 12 ml. of 8% NH_4 cinnamate are added.
The ppt. of V^{IV} cinnamate is collected after 3—4 hr.,
washed with aq. cinnamic acid, ignited, and the
residue of V_2O_5 is weighed. 4 ml. of 0·05N-NH_4OBz
and 1 ml. of 10% aq. NH_3 are added per ml. of
0·05N-UO_2 salt (both solutions at the b.p.). The
ppt. is collected, washed with 2% NH_4NO_3 (made
alkaline with NH_3), and ignited, and the residue of
U_3O_8 is weighed. Na_2CO_3 (>0·05N), Al, Cr, and Fe
alums, $Th(NO_3)_4$, and Na_2HPO_4, but not $Ca(NO_3)_2$,
interfere with determination of U by this method.
　　R. T.

***apo*Morphine as redox indicator in determin-
ation of antimonite ion with potassium bromate.**
L. SZEBELLÉDY and K. SIK (Z. anal. Chem., 1937,
108, 81—85).—SbO_3''' is titrated with $KBrO_3$ at
45—50°, the solution being acidified to contain 5%
of HCl. 0·3 c.c. of 0·1% aq. *apo*morphine is added,
giving a rose-red coloration at the end-point.
　　J. S. A.

**Detection and determination of gold in solu-
tions.** N. D. COSTEANU (Bul. Fac. Ştiinţe Cern.,
1935, **8**, 68—70; Chem. Zentr., 1936, i, 2785).—
Filter-papers soaked in aq. tannin give a blue colour
with Au solutions. Quant. vals. are obtained with
paper soaked in $SnCl_2$ and a series of comparison
solutions. Ag, if present, gives AgCl which fluoresces
in ultra-violet light.　　H. J. E.

**Detection and determination of traces of gold
in presence of copper.** L. M. KULBERG (Zavod.
Lab., 1936, **5**, 170—175).—5—6 g. of reagent (0·5 g.
of leuco-nitrobrilliant-green are dissolved in 5 ml. of
80% AcOH, 15 ml. of H_2O are added, and the solu-
tion is boiled for 3—4 min. and extracted with $CHCl_3$
until colourless) are added to 2—3 ml. of solution,
which is boiled for 2 min.; a blue coloration appears
in presence of ≮5 × 10^{-7} g. of Au. In presence of
coloured ions, Au can be detected by extracting the
solution with $CHCl_3$, which becomes coloured blue.
The procedure is applied to the colorimetric deter-
mination of Au (0·005—0·1 mg.).　　R. T.

**Application of Feigl's drop reactions to the
analysis of assay beads.** R. JIRKOVSKÝ (Chem.
Listy, 1937, **31**, 37—38).—Au, Ag, Cu, Pb, Fe, Sb,
Bi, and Zn are readily detected by Feigl's drop
reactions.　　R. T.

**Temperature correction in micro-m.p. deter-
mination.** H. T. LIEM (Pharm. Tijds. Ned.-Ind.,
1935, **12**, 337—339; Chem. Zentr., 1936, i, 2777).—
A claim for priority.　　H. J. E.

Heat transfer in calorimetry. J. M. STURTE-
VANT (Physics, 1936, **7**, 232—235).—Mathematical.
The lags in heat transfer have been investigated in a
medium of finite thermal conductivity enclosed in an
infinitely long perfectly conducting cylindrical case
when heat is introduced uniformly into the case, and
when heat is evolved uniformly within the medium.
　　J. G. A. G.

Determination of thermal diffusivities. C. STARR (Rev. Sci. Instr., 1937, [ii], **8**, 61—64).—A sinusoidal temp. is impressed on one end of a wire specimen, and the thermal diffusivity is determined from the measured decrement of the temp. wave travelling along it. C. W. G.

Apparatus for heating and opening sealed tubes. J. F. DURAND and Y. R. NAVES (Bull. Soc. chim., 1937, [v], **4**, 305—306).—A safety device is described. E. S. H.

Vacuum furnace for the production of large refractory metal single crystals. H. E. FARNSWORTH (Physical Rev., 1935, [ii], **48**, 972).—A Ni single crystal 0·75 in. in diameter and 2 in. long has been obtained. L. S. T.

Cold laboratory. L. V. SCHUBNIKOV (Physikal. Z. Sovietunion, Spec. No., June, 1936, 1—5).—The equipment of the low-temp. laboratory at the Ukrainian Physico-Technical Institute is described. J. W. S.

Rôle of spectrophotometry in colorimetry. M. G. MELLON (Ind. Eng. Chem. [Anal.], 1937, **9**, 51—56).—A discussion. E. S. H.

Anomalous diffraction gratings. II. U. FANO (Physical Rev., 1937, [ii], **51**, 288; cf. A., 1936, 1355).—Theoretical. N. M. B.

Fluorometer. L. BRÜNINGHAUS (Compt. rend., 1937, **204**, 118—120).—Gaviola's apparatus for measuring the rate of extinction of fluorescence (A., 1926, 335) is modified by the use of birefringent quartz plates instead of Kerr cells. A. J. E. W.

Optical microvibrometer. L. S. SCHMUSCHKOVITSCH (Zavod. Lab., 1936, **5**, 98).—Apparatus is described. R. T.

Simple projector for measuring weak spectral lines. A. SIMON and F. FEHÉR (Z. anorg. Chem., 1937, **230**, 308—309). F. L. U.

Microscopy with ultra-violet light. J. E. BARNARD and F. V. WELCH (J. Roy. Microscop. Soc., 1936, [iii], **56**, 365—371).—A survey of the progress and simplification of technique and a description of a new apparatus. N. M. B.

Fluorescence microscopy with high powers. J. E. BARNARD and F. V. WELCH (J. Roy. Microscop. Soc., 1936, [iii], **56**, 361—364).—A visible light, or fluorescence image, may accompany and hinder the formation of an image in the unaltered λ of the incident radiation. The merits of various sources of ultra-violet illumination for obtaining a fluorescent image are examined, and the use of a high-tension discharge between Mg electrodes to give a small area of high and uniform intensity is described. N. M. B.

Technique for making Schumann plates. P. N. KALIA (Indian J. Physics, 1936, **10**, 457—462).—Modified technique for laboratory use in hot and humid climates is described. O. D. S.

Apparatus for " optical " demonstration of some geometrical features of electron diffraction photographs. W. G. BURGERS and J. J. A. PLOOS VAN AMSTEL (Z. Krist., 1936, **95**, 54—73).—By replacing the sphere of reflexion (if of large radius) by a flat sheet of light, and representing the reciprocal lattice as a set of white highly-reflecting points on a system of wooden rods on an otherwise dark background, the chief features of many types of electron diffraction photographs can be displayed. B. W. R.

Appliance for evaluating Debye diagrams and determination of parameters. S. L. NUDELMAN (Zavod. Lab., 1936, **5**, 192—195). R. T.

Influence of error of centring of samples on the accuracy of determination of the constant in the Debye–Scherrer method. A. I. KRASNIKOV, D. A. ORECHOV, and A. D. SCHULENINA (Zavod. Lab., 1936, **5**, 1103—1105).—The importance of exact centring of sections is established. R. T.

X-Ray defectoscope. V. VEKSLER, A. BIBERGAL, B. ISAEV, and V. CHRUSCHTSCHEV (Zavod. Lab., 1936, **5**, 1108—1111).—Apparatus and methods are described. R. T.

Separation of the characteristic from the continuous X-ray spectrum. M. A. BLOCHIN (Zavod. Lab., 1936, **5**, 1126).—Structural modifications eliminating continuous spectra are described. R. T.

Comparator for measurement of roentgenograms. A. D. EVSEEV (Zavod. Lab., 1936, **5**, 1128).—An instrument is described. R. T.

Preferred conditions for taking X-ray photographs. E. A. W. MÜLLER (Arch. Eisenhüttenw., 1936—7, **10**, 267—273).—Graphs are constructed for determining the time of exposure of the specimen according to its thickness and d, the voltage of the X-ray tube, the sensitivity of the film and intensifying foil, and the distance between the film and the tube in examining steels for porosity and slag inclusions. A. R. P.

Photo-electric cell. G. A. BOUTRY (Compt. rend., 1937, **204**, 120—122).—Causes of lack of proportionality between photo-electric current and the incident light flux are discussed, and the construction of an improved cell is described. A. J. E. W.

Limits of performance of selenium barrier-layer cells. H. KÖNIG (Helv. phys. Acta, 1935, **8**, 505—507; Chem. Zentr., 1936, i, 2704—2705).—An accuracy of 1—2% in comparing light sources is obtainable by a suitable choice of filters. H. J. E.

Behaviour of electrolytic oxide layers. R. STÖRMER (Z. tech. Physik, 1935, **16**, 508—513; Chem. Zentr., 1936, i, 2705—2706).—The Al cell shows a lag which is not observed in a Cu_2O cell, and is attributed to the absorption or setting free of O. H. J. E.

Neutron generator. A. BOUWERS, F. A. HEYN, and A. KUNTKE (Physica, 1937, **4**, 153—159).—A modified form of Oliphant and Rutherford's apparatus (A., 1933, 883) and a cascade type high-tension generator are described. H. J. E.

Counting of electrons by means of a discharge tube. J. H. GISOLF (Physica, 1937, **4**, 69—70).—Certain commercial discharge tubes (e.g., a Philips Ne-filled telephone signal tube) will respond to γ- and to β-rays. H. J. E.

High-sensitivity mass spectrograph with automatic recorder. P. T. SMITH, W. W. LOZIER, L. G. SMITH, and W. BLEAKNEY (Rev. Sci. Instr., 1937, [ii], 8, 51—55).—A motor-driven continuously variable potentiometer is synchronised with a moving photographic plate, and the position of a spot of light reflected from a galvanometer is recorded as a function of the potential applied by the potentiometer. C. W. G.

Apparatus and experiments for instruction in potentiometric measurements. J. G. MILLER and W. W. LUCASSE (J. Chem. Educ., 1936, 13, 581—585).—A potentiometer, H_2 generator, and calomel electrode are described. The titration of NaOBz with HCl and of NH_4Cl with NaOH is discussed in detail. L. S. T.

Testing of details by means of magnetic powders. A. V. SHIGADLO and L. E. PEVZNER (Zavod. Lab., 1936, 5, 182—187).—The application of known methods is discussed. R. T.

Reducing vibration of analytical balances. I. S. SACHIEV (Zavod. Lab., 1936, 5, 99).—Vibration is greatly reduced by placing the balance on a glass plate resting on a layer of rubber sponges. R. T.

Saturation by water in gas-analysis compensators. J. R. BRANHAM (J. Res. Bur. Stand., 1937, 18, 59—67).—The effects of convection, diffusion, and evaporation of H_2O from the glass surface in the compensators used in volumetric gas analysis are discussed. Serious errors may result when, for thermal similarity, the compensator used is of the same shape as the bulbed burette. J. W. S.

Device for reading burettes. V. A. ASTAFIEV (Zavod. Lab., 1936, 5, 1136). R. T.

Analysis of gas mixtures by determination of density by the gas balance method. P. Z. BURDO and I. P. ISCHKIN (Zavod. Lab., 1936, 5, 1073—1078).—Known methods are described. R. T.

Determination of the instantaneous radon content of the open air in the neighbourhood of the earth's surface, and the vertical distribution of radon in the atmosphere. W. KOSMATH (Physikal. Z., 1937, 38, 82—83).—A portable apparatus, employing adsorption of Rn by coconut C and subsequent desorption, is described. A. J. M.

Microviscosimeter for non-Newtonian liquids. G. W. S. BLAIR (Kolloid-Z., 1937, 78, 231).—Errata in a recent paper (this vol., 101) are corr. F. L. U.

Principle of the suspended level. Applications to the measurement of viscosity and other properties of liquids. L. UBBELOHDE (Ind. Eng. Chem. [Anal.], 1937, 9, 85—90).—The construction and use of the suspended-level viscosimeter are described. E. S. H.

Support for perforated platinum crucibles. W. M. THORNTON, jun., and J. G. SMITH (Ind. Eng. Chem. [Anal.], 1937, 9, 95). E. S. H.

Rapid cleaning of mercury. H. F. EASLY (Ind. Eng. Chem. [Anal.], 1937, 9, 82).—Hg is cleaned by shaking with $Hg_2(NO_3)_2$ and H_2O. E. S. H.

Preparation of semipermeable membranes. A. GRUMBACH and P. VIDAL (Compt. rend., 1937, 204, 237—239).—A $Cu_2Fe(CN)_6$ membrane is deposited in a sintered glass plate having its pores partly filled with gelatinous SiO_2. A. J. E. W.

Small continuous still.—See B., 1937, 196.

Determination of solubility of gases in pure liquids or solutions by the Van Slyke–Neill manometric apparatus. F. S. ORCUTT and M. H. SEEVERS (J. Biol. Chem., 1937, 117, 501—507).—The Van Slyke correction for residual gas not expelled from the liquid is eliminated by an adaptation of technique and calculation. R. M. M. O.

Automatic control of corrosive fluids. M. M. FAINBERG (Zavod. Lab., 1936, 5, 7—12, 136—142).—Appliances for automatic measurement and delivery are described. R. T.

High-vacuum cut-off. O. H. SOHMITT (Rev. Sci. Instr., 1937, [ii], 8, 68—69).—A steel "hat" dropping on to an annular Hg seal is manipulated by means of an external magnet. C. W. G.

Model correlating four variables. M. D. SCHMID (Rev. Sci. Instr., 1937, [ii], 8, 69).—By means of Me_2O vapour sheets of celluloid are caused to collapse over plaster moulds protected by oiled paper. The moulds are removed and the sheets mounted on three-dimensional axes. C. W. G.

Modification of the Bunsen apparatus, and its application. N. U. KAZAKOV (Zavod. Lab., 1936, 5, 1135—1136).—Apparatus is described. R. T.

Electrically driven ultracentrifuge. J. W. BEAMS and L. B. SNODDY (Science, 1937, 85, 185—186). L. S. T.

Ultrafiltration apparatus. G. L. ABKIN and S. M. LIEPATOV (Kolloid. Shurn., 1936, 2, 85—87).—Apparatus is described. R. T.

Transparent mounting for micro-sections. E. A. ERDMAN (Met. & Alloys, 1937, 8, 27).—The technique of the use of Me methacrylate as a mounting medium for small metallurgical specimens is described. A hydraulic press similar to that used for mounting specimens in bakelite is required. The mounting is tough, hard, resistant to etching reagents, adheres excellently to the specimen, and is as transparent as glass. A. J. K.

Carbon dioxide "generator." C. R. CONARD (J. Chem. Educ., 1936, 13, 539—540).—An arrangement for the use of solid CO_2 as a source of supply of gas is described. L. S. T.

Density and surface tension by the capillary elevation method. L. E. DODD (Physical Rev., 1935, [ii], 48, 487).—In order to avoid temp. difficulties in weighing, capillary elevations under a range of gas pressures are determined. The consts. of the linear curve so obtained enable both d and γ to be computed. L. S. T.

Laboratory stirrer and m.p. bath. L. S. KEYSER (J. Chem. Educ., 1936, 13, 590—591). L. S. T.

Automatic gas generator. I. FINE (J. Chem. Educ., 1936, 13, 588—589). L. S. T.

Apparatus for diffusion measurements. N. S. SCHEINKER (Acta Physicochim. U.R.S.S., 1936, **5**, 729—738; cf., A., 1935, 1072, 1201).—Improvements in design, whereby a sharp interface between solvent and solution is obtainable, are described. F. L. U.

Multiple-column mercury manometer. J. R. ROEBUCK and W. CRAM (Physical Rev., 1935, [ii], **48**, 474). L. S. T.

Manometer for low gas pressures, particularly between 10^{-3} and 10^{-5} mm. F. M. PENNING (Physica, 1937, **4**, 71—75).—The pressure is deduced from the current through a glow discharge tube in a magnetic field, or, less exactly, from the length of the negative glow on a rod-shaped cathode. H. J. E.

Aluminium reduction experiments. R. A. KARGES (J. Chem. Educ., 1936, **13**, 593).—Reduction of MnO_2 and sand to Mn and cryst. Si, respectively, is described. L. S. T.

Early history of Liebig's laboratory. H. G. GOOD (J. Chem. Educ., 1936, **13**, 557—562). L. S. T.

Geochemistry.

Chemical exploration of the stratosphere. F. A. PANETH (Nature, 1937, **139**, 180—182, 220—223).—A lecture. L. S. T.

Heavy water content of atmospheric moisture. K. OKABE and T. TITANI (Bull. Chem. Soc. Japan, 1937, **12**, 11—15).—22 samples of atm. moisture condensed and purified by several distillations were 1—7×10^{-6} g. per g. lighter than Osaka conductivity H_2O. C. R. H.

Applications of the polarimetric method to the study of the upper layers of the atmosphere. I. A. CHVOSTIKOV and A. N. SEVTSCHENKO (Compt. rend. Acad. Sci. U.R.S.S., 1936, **4**, 359—363).—Measurements of the polarisation of the light diffused from the sky indicate ionised layers at altitudes of approx. 95 and 135 km. at dawn, and 80, 115, and 150 km. at dusk. The results are discussed with reference to the altitude of the Heaviside layer. J. G. A. G.

Constancy of the atmosphere with respect to carbon dioxide and oxygen content. T. M. CARPENTER (J. Amer. Chem. Soc., 1937, **59**, 358—360).—Analysis of 1156 samples of air showed an average content of 0.031% CO_2 and 20.939% O_2. Variations in season or proximity of fuel combustion do not cause measurable differences in these vals. E. S. H.

Coal dust and rock dust as constituents of the atmosphere. M. STIPANITS (Berg- hüttenmänn. Jb. montan. Hochschule Leoben, 1935, **83**, 77—92; Chem. Zentr., 1936, i, 2402).—Concns., microscopic analyses, and settling phenomena of surface and mine dusts, sampled on a cotton-wool filter, are described. Atm. dust is colloidal in nature, its stability being dependent on particle size and electric charge. Colloid aspects of dust explosions are discussed. J. S. A.

Waters of the " dry " region of N.E. Brazil. I. F. W. FREISE (Chem. Erde, 1937, **11**, 45—72).—Many analyses of waters from rivers, ponds, and springs are given. L. J. S.

Acetous Ostian water from the Laurentine Way near Rome. M. TALENTI and A. RAGNO (Annali Chim. Appl., 1937, **27**, 18—30).—Chemical and physico-chemical analysis of the H_2O, which is radioactive and contains $Na^{\cdot}$, $K^{\cdot}$, $Ca^{\cdot\cdot}$, $Mg^{\cdot\cdot}$, $Fe^{\cdot\cdot}$, Cl', SO_4'', HCO_3', SiO_2, and CO_2, has been made.

κ, calc. from the partial conductivities of the individual ions by the Porlezza method (A., 1924, ii, 603), agrees closely with that determined experimentally. L. A. O'N.

Waters of Eritrea. C. TOFFOLI (Annali Chim. Appl., 1937, **27**, 30—52).—Chemical and physico-chemical analyses of the waters have been made. H_2O from the high plain, in contact with basaltic rocks, and H_2O from the lower eastern plain are salt and highly mineralised, the former containing appreciable NO_3'. H_2O, from the high plain in cryst. schists, and from the high plain and lower western plain in the granite zone, are less mineralised; the first-named is usually turbid, the turbidity being in inverse ratio to the mineralisation, and contains Mn in suspension. The thermal H_2O of Sabarguma, temp. 50—66°, is radioactive and contains $Na^{\cdot}$, Cl', and HCO_3'. L. A. O'N.

Chemical and physico-chemical analysis of the mineral water of Fontevivo (Parma). U. SBORGI, A. GALANTI, and Z. CONTINI (Annali Chim. Appl., 1936, **26**, 502—515).—Data are tabulated. Spectrographic and colorimetric photo-electric methods and the quant. separation of small amounts of Br' from large quantities of Cl' are described. F. O. H.

Oceanographical observations of Simoda Bay, Izu Peninsula. S. YOSHIMURA (Sci. Rep. Tokyo Bunrika Daigaku, III, 1936, **1**, 127—155).—Salinity, temp., O_2 content, and p_H are recorded. C. W. G.

Radioactivity of bottom sediments. I. Radioactivity of ferromanganese formations in seas and lakes of the U.S.S.R. L. M. KURBATOV (Amer. J. Sci., 1937, [v], **33**, 147—153).—Data for sediments from 9 sources are given and discussed. The range of results is : Ra content $(1.2—31.8) \times 10^{-10}\%$; emanating power $31.0—70.1\%$; Th-X content $(1.6—<1.0) \times 10^{-3}\%$. N. M. B.

Arsenic content of ocean bed samples of the Atlantic " Meteor " expedition. B. F. VON BÜLOW (Ann. Hyd. marit. Met., 1935, 395—397; Chem. Zentr., 1936, i, 2523).—Data for 57 samples are recorded (mean As content 0.0004%). H. J. E.

Spectroscopic examination of meteorites. A. S. KING (Astrophys. J., 1936, **84**, 507—516).—Spectrograms of 4 Ni-Fe, 8 stony, and one graphite type show that of the 32 elements identified > half are

not usually detected in chemical and mineralogical analyses; some consist of the rarer elements. Estimates of the abundances of the elements agree essentially with those found chemically by Noddack and Noddack (A., 1930, 1341). The differences in composition of Fe and stony meteorites are discussed. The band spectra of meteoritic and of terrestrial graphites indicate no difference in the relative abundance of the C isotopes.   L. S. T.

Heavy minerals from Front Range granite. M. F. Boos (J. Geol., 1935, 43, Part II, 1033—1048; Chem. Zentr., 1936, i, 2317).—The oldest pre-Cambrian granites contain radioactive minerals, and are characterised by the association of titanite (I), apatite (II), hornblende, and monazite. Granites of medium age contain (II), (I), zircon (III), and allanite (IV). The youngest granites contain coloured (III), (II), (IV), and tourmaline.   J. S. A.

Origin of the S.E. Missouri lead deposits. I, II. W. A. Tarr (Econ. Geol., 1936, 31, 712—754, 832—866).—Mode of occurrence, mineralogy, and paragenesis of the ores are discussed as well as the origin of the Pb deposits. The meteoric H_2O hypothesis is untenable and the ores are believed to be of magmatic origin.   L. S. T.

Contact ore deposition at the Calumet iron mine, Colorado. C. H. Behre, jun., E. F. Osborn, and E. H. Rainwater (Econ. Geol., 1936, 31, 781—804).—Contact metamorphism and contact metamorphic ore deposition are discussed, together with the causes of localisation of ore in the Calumet mine.   L. S. T.

Fusion relations of iron-orthoclase, with a discussion of the evidence for the existence of an iron-orthoclase molecule in felspars. G. T. Faust (Amer. Min., 1936, 21, 735—763).—The equilibrium relations along the section $K_2O + 6SiO_2$ (glass)–Fe_2O_3 of the system K_2O–Fe_2O_3–SiO_2 show that Fe orthoclase (I) ($KFeSi_3O_8$) and Fe leucite (II) ($KFeSi_2O_6$) exist, and can be prepared from dry melts. When heated, (I) dissociates into (II) + liquid, and (II) dissociates into hæmatite (III) + liquid. (III) is the stable phase at the liquidus 1265°. X-Ray powder-diffraction patterns indicate the similarity of the two K Fe silicates with the corresponding Al compounds. The relation between n and the Fe_2O_3 content in the $K_2O + 6SiO_2$ glasses is linear.   L. S. T.

Earth's core. J. Lynch (Science, 1937, 85, 15—16).—A solid metallic core heavily occluded with gas such as H_2 best fulfils the necessary requirements.   L. S. T.

Contrasted differentiation. S. R. Nockolds (Geol. Mag., 1936, 73, 529—535; cf. A., 1936, 1356).   L. S. T.

Adamite from Chloride Cliff, California. J. Murdoch (Amer. Min., 1936, 21, 811—812).—The adamite has d 4·3 approx., n 1·720, n_β 1·740, n_γ 1·745+.   L. S. T.

X-Ray study of pucherite. W. F. De Jong and J. J. de Lange (Amer. Min., 1936, 21, 809).—Pucherite from Schneeburg, Saxony, has a 5·38, b 5·04, c 11·98 A. (all ±0·03 A.).   L. S. T.

New property of matter: reversible photosensitivity in hackmanite from Bancroft, Ontario. O. I. Lee (Amer. Min., 1936, 21, 764—776).—Hackmanite undergoes a colour intensification from colourless or pale pink to violet following a brief exposure to a suitable source of ultra-violet light. The exciting radiation is ≯4800 A. and extends to 2250 A. and perhaps lower. The induced colour fades slowly in the dark and rapidly and almost completely in strong light. Intensification and reversal can be repeated indefinitely, and may be due to the presence of a trace of Mn.   L. S. T.

Oriented inclusions of tourmaline in muscovite. C. Frondel (Amer. Min., 1936, 21, 777—799).   L. S. T.

Opals. J. W. Howard (J. Chem. Educ., 1936, 13, 553—556).—Modes of occurrence, sources and mining, composition and properties, and uses are described.   L. S. T.

Identification of beryl and emerald by means of the "Universal" lens. O. Holstein (Zentr. Min., 1936, A, 26—28; Chem. Zentr., 1936, i, 2399).—A light filter for the Zeiss "Universal" lens is described, enabling green-coloured beryls (aquamarine) to be distinguished from emerald.   J. S. A.

Composition of sanidine anorthoclase from Drachenfels, Siebengebirge. A. Engels (Zentr. Min., 1936, A, 9—13; Chem. Zentr., 1936, i, 2316).—Analyses are recorded.   J. S. A.

Density and composition of plagioclases on ternary basis. K. Chudoba (Zentr. Min., 1936, A, 1—8; Chem. Zentr., 1936, i, 2317).—Satisfactory vals. may be calc. by the application of the extended Tschermak formula.   J. S. A.

Optical and double refraction of a-zircon. K. Chudoba (Zentr. Min., 1935, A, 362—367; Chem. Zentr., 1936, i, 2317).—For an a-zircon from Ceylon (d 4·150), with Na light, $\omega = 1·8629$, $\varepsilon = 1·8739$; for c-zircon (d 2·276), $\omega = 1·8784$, $\varepsilon = 1·8949$. Simultaneous occurrence of a- and b-zircon in the same crystal is reported.   J. S. A.

Crystallisation of rhombic and monoclinic pyroxenes from artificial silicate melts. D. P. Grigoriev (Zentr. Min., 1935, A, 353—357; Chem. Zentr., 1936, i, 2317).—In melts of MgO, $CaCO_3$, and SiO_2, in the proportions $Mg_2SiO_4 : MgCaSi_2O_6 = 1 : 1$, $+10\%$ of CaF_2, rhombic pyroxene-enstatite and monoclinic diopsidic pyroxene were detected. Conversion of enstatite (I) into diopside is promoted by CaF_2. In the absence of a flux, (I) does not crystallise from $CaO + MgO + SiO_2$, since the inversion point klinoenstatite–(I) is < the f.p. of the melt.   J. S. A.

Chemical-mineralogical investigation of crystalline rocks from the Bondo region, near l'Uelé, N. Belgian Congo. E. Polinard (Publ. Congo belge Régions vois., 1934—1935, 122—131; Chem. Zentr., 1936, i, 2317).—Analyses are recorded.   J. S. A.

Symmetry and crystal structure of the minerals of the arsenopyrite group. M. J. Buerger (Z. Krist., 1937, 95, 83—113).—Several arsenopyrite specimens are examined in detail; the apparent

orthorhombic symmetry cannot satisfy the intensity data, and a superstructure based on the marcasite type is necessary. The usual crystals are really twinned, the components being of only monoclinic symmetry; this fact permits good agreement between calc. and measured intensities to be obtained. Crystal and cell characteristics are tabulated. The Fe must be present as Fe^{III}, ionic radius 1·13 A., explaining the ability of arsenopyrite to take As^{III} instead into proxy-solution.   B. W. R.

Composition of pollucite. H. STRUNZ (Z. Krist., 1936, **95**, 1—8).—The formula, deduced by a combination of X-ray and chemical methods, is $(Si_4Al_2O_{12})Cs_2,H_2O$; probable space-group $Ia3d$, and a_0 13·71 A. The structure is probably a scaffolding of $(Si,Al)O_2$ tetrahedra with included Cs and H_2O.
B. W. R.

Naturally occurring neutral and basic hydrates of magnesium carbonate. M. FENOGLIO (Atti R. Accad. Lincei, 1936, [vi], **24**, 219—222).—The existence of the following compounds has been confirmed : nesquehonite, $MgCO_3,3H_2O$, rhombic, symmetry D_{2h}, a 7·68, b 11·93, c 5·39 A.; lansfordite, $MgCO_3,5H_2O$, monoclinic, C_{2h}, a 12·48, b 7·55, c 7·34 A.; artinite, $MgCO_3,Mg(OH)_2,3H_2O$, structure not certain; hydromagnesite, $4MgCO_3,Mg(OH)_2,4H_2O$, rhombic, D_{2h}, is more correctly represented as $5MgO,4CO_2,5H_2O$.
O. J. W.

Lead–uranium–thorium ratio of a single crystal of Wilberforce uraninite. C. M. ALTER and L. A. YUILL (J. Amer. Chem. Soc., 1937, **59**, 390—391).—The composition of a single crystal of uraninite varies greatly in different parts. The ratio Pb : U + Th is higher in the core than in the outer layers of the crystal. The bearing of the observations on the estimation of the age of minerals is discussed.
E. S. H.

Magnetisation of ignited earths. Intensity of the terrestrial magnetic field in the past. E. THELLIER (Compt. rend., 1937, **204**, 184—186).— The magnetic properties of clays after ignition in a magnetic field, and the effects of subsequent re-ignition, were investigated. A method of estimating the intensity of the earth's magnetic field in past ages is proposed.   A. J. E. W.

Spectrographic examination of colourless and blue halite. T. G. KENNARD, D. H. HOWELL, and M. P. YAECKEL (Amer. Min., 1937, **22**, 65—67).—No difference in chemical composition of the colourless and blue varieties from the same specimen of halite from Stassfurt was observed. The blue colour is structural rather than pigmental. Sr, Ti, and Ba were present.   L. S. T.

Crystallised powellite from Tonopath, Nevada. F. H. POUGH (Amer. Min., 1937, **22**, 57—64).—A suite of powellite crystals, which are rare, is described.
L. S. T.

Zonal gold mineralisation in Nova Scotia. W. H. NEWHOUSE (Econ. Geol., 1936, **31**, 805—831).— Au deposits hypothermal, mesothermal, and one group near to epithermal in type occur in Nova Scotia in sedimentary and metamorphosed sedimentary rocks which have been intruded by large masses of granite, and locally by granite and pegmatite dykes. The zonal mineralisation is described. The solutions which formed the Au veins probably came from granite at depth. The relations with the W minerals, which in small amounts are widely distributed in these veins, are discussed.   L. S. T.

Bituminous schists of Quartellari, Rodi (Messina). G. LABRUTO and A. LANDI (Annali Chim. Appl., 1937, **27**, 14—18).—The schists have d^{15} 2·218 and composition : H_2O 3·79, volatile matter 14·81, fixed C 10·18, and ash 71·22%. Total S = 3·88% of which 2·89% is pyritic and 0·42% is SO_4-S. Analysis of the org. matter gives C 76·96, H 9·75, N 0·41, S 0·57, and O 12·31%. Distillation yields 4% of ammoniacal H_2O and 11% of oil, d^{15} 0·928, calorific val. 10,000 g.-cal., b.p. 150—300° (40%), 300—340° (30%).   L. A. O'N.

Puzzuolana. V. Microscopy of some Italian puzzuolanas. L. SANTARELLI (Annali Chim. Appl., 1937, **27**, 3—14; cf. B., 1936, 885).—Puzzuolana from the lazial zone contains crystals of leucite, augite, and brown mica, and is leucitic in origin. Flegrea puzzuolana consists of trachitic material in various stages of transformation. Vulture puzzuolana contains augite, felspar, and hauyne and is derived from leuco-tephritic material in which the leucite is replaced by hauyne. Material of recent origin and weak puzzuolanic activity differs from that of ancient origin only in content of cryst. material. Technical evaluation by microscopy is suggested.   L. A. O'N.

Geological occurrence of organic calcium compounds. W. FABER and K. KREJCI-GRAF (Tsch. Min. Petr. Mitt., 1937, **48**, 305—316).—The occasional presence of small amounts of bitumen in the casts of fossil shells has suggested that org. Ca salts may be present in limestone. Extracts with EtOH and xylene gave only doubtful traces. They were, however, found in adipocere.   L. J. S.

Basaltic rocks from the Tátika hills, Hungary. B. MAURITZ and H. F. HARWOOD (Mat. Term.-tud. Értesítő, 1936, **55**, 75—103; Tsch. Min. Petr. Mitt., 1937, **48**, 373—401).—Six new chemical analyses of basalts showing 23 constituents are given.
L. J. S.

Water content of kaolinite, halloysite, and montmorillonite. M. MEHMEL (Chem. Erde, 1937, **11**, 1—16).—Loss of H_2O was determined at different v.p. and at different temp., and n of the dehydrated material was determined. Halloysite $(Al_2O_3,2SiO_2,4H_2O)$ loses $2H_2O$ at zero v.p. or at 50°, and then has the composition of kaolinite but a different crystal structure (A., 1935, 571). This metahalloysite then loses H_2O at 400—450° like kaolinite. Montmorillonite shows a steady loss up to about 200°, and the remainder of the H_2O is lost at 400—450°.   L. J. S.

Vanadiferous muscovite from Schmiedefeld, Thuringia. H. JUNG (Chem. Erde, 1937, **11**, 38—44).—A green fine-scaly mineral in quartz veins in the iron-ore deposits, previously thought to be pyrophyllite, is proved by chemical analysis and optical and X-ray data to be muscovite. It contains V_2O_2 1·08%.   L. J. S.

Changes in the chemistry of eruptive rocks by weathering. G. GROSSER (Chem. Erde, 1937, **11**, 73—216; cf. A., 1932, 596).—Results of many analyses of fresh and weathered granitic rocks are plotted on diagrams. L. J. S.

Montmorillonite from Dolmar, Meiningen. H. JUNG (Chem. Erde, 1937, **11**, 217—222).—Pockets and crevices in basalt contain a white to brown clay with pink streaks. Analysis of the pink material proves it to be montmorillonite. L. J. S.

Ben Bullen plutonic complex, N.S.W. G. A. JOPLIN (J. Proc. Roy. Soc. New South Wales, 1936, **70**, 69—94).—The complex has an earlier basic nucleus surrounded by a later more acid intrusion. Chemical peculiarities (high Al_2O_3, with FeO consistently $>$ MgO) and the type of hybridisation indicate that it is probably co-magmatic with the Hartley complex. Analyses are recorded. A. LI.

Structure of catapleiite. B. BRUNOVSKI (Acta Physicochim. U.R.S.S., 1936, **5**, 863—892).—A structure based on the space-groups C_{6v}^4, D_{3h}^4, and D_{6h}^4 is suggested. The following at. distances were calc. O_{II}—O_{II}, 2·55; O_I—O_I, 3·03; Si—O_{II}, 1·52; Si—O_I, 1·70; Na—O_{II}, 2·58; Na—O_I, 2·51 A. C. R. H.

Geology of southern Saskatchewan. F. J. FRASER, F. H. MCLEARN, L. S. RUSSELL, P. S. WARREN, and R. T. D. WICKENDEN (Can. Dept. Mines, 1935, Geol. Survey Mem. No. 176, 137 pp.). CH. ABS. (e)

Scotland: the Tertiary volcanic districts. J. E. RICHEY. **The south of Scotland [geology].** J. PRINGLE. **Welsh Borderland.** R. W. POCOCK and T. H. WHITEHEAD. **Northern Wales.** B. SMITH and T. NEVILL. **Northern England.** T. EASTWOOD. **Grampian highlands.** H. H. READ (Geol. Survey Gt. Brit., 1935, **115**, 97, 84, 92, 76, 81 pp.). CH. ABS. (e)

Geology of Ceylon. J. S. COATES (Ceylon J. Sci., 1935, **B**, **19**, 101—187).—A discussion and summary of data. CH. ABS. (e)

Porosity of Ceylon rocks. J. S. COATES (Ceylon J. Sci., 1935, **B**, **19**, 189—191).—The porosity was in the approx. ascending order: garnetiferous khondalite, dolerite, charnockite, khondalite, biotite-gneiss, pink granitoid gneiss, leptynite, and pink granulite. Vals. for charnockite corresponded with those for Aberdeen and Stonehaven granite. CH. ABS. (e)

Magmatic associations. III. Rôle of titanium and zirconium in rock-forming silicates. W. KUNITZ (Neues Jahrb. Min., 1936, **A**, **70**, 385—466; Chem. Zentr., 1936, i, 2724—2725).—A discussion of isomorphism observed in various minerals containing Ti and Zr. H. J. E.

Composition of Vaskö-Dognácska granites. L. VON ZOMBORY (Math. nat. Anz. ung. Akad. Wiss., 1935, **52**, 179—187; Chem. Zentr., 1936, i, 2523). H. J. E.

Kaolinitic weathering of felspar rocks. A. VASEL (Zentr. Min., 1936, **A**, 13—15; Chem. Zentr., 1936, i, 2523). H. J. E.

Accelerated weathering of felspars. F. H. NORTON (Amer. Min., 1937, **22**, 1—14).—The action of $H_2O + CO_2$ on orthoclase (I), anorthite (II), and albite at const. temp. under conditions in which fresh solute is continuously supplied and sol. reaction products are continuously removed has been investigated. At temp. $\Rightarrow 320°$, (I) is converted into sericite, and up to 300° (II) is converted into pyrophyllite. (III) is partly decomposed into products not yet identified. L. S. T.

Petrology of the Salsette Island, Bombay. A. S. KALAPESI and G. P. CONTRACTOR (J. Univ. Bombay, 1936, **5**, Part II, 151—171).—Chemical compositions of the rocks have been determined. E. S. H.

Petrology of the syenite stock of Cherry Mountain, New Hampshire. R. W. CHAPMAN (Amer. J. Sci., 1937, [v], **33**, 174—186).—The mountain consists of an elliptical mass of syenite of the White Mountain magma series (A., 1935, 1345) about 35 miles square intruding into older granites, and probably formed by cauldron subsidence. The petrological composition of the syenites and granite is given. R. C. M.

Silicates. IV. Behaviour of pyrophyllite, $Al_2(Si_4O_{10})(OH)_2$, on heating and the existence of an anhydrous pyrophyllite, $Al_2(Si_4O_{10})O$. E. THILO and H. SCHÜNEMANN (Z. anorg. Chem., 1937, **230**, 321—335; cf. A., 1936, 39).—Pyrophyllite (I) loses H_2O of constitution at 400°, the rate depending on the degree of subdivision; H_2O is not absorbed at low partial pressures of H_2O. The solubility of (I) in aq. NaOH or HCl is unchanged by previously heating at 400°; when dehydrated at 400—1100° the solubility increases slightly, and at higher temp. very greatly; this change corresponds with a lattice transformation. X-Ray evidence shows that dehydration causes no essential change in lattice structure up to 1150°, but at higher temp. a transformation occurs and the components mullite and cristobalite are recognised. E. S. H.

Origin of Don basin Tertiary siliceous sandstones. D. BOBROVNIK (Ukrain. Chem. J., 1936, **11**, 469—482).—The sandstones originated from agglutination of SiO_2 particles, formed as the final product of acid weathering of clays in lakes. R. T.

Gallium in specimens collected by expeditions of the Lomonosov Institute of the Academy of Science of the U.R.S.S. S. A. BOROVIK and A. F. SOSEDKO (Compt. rend. Acad. Sci. U.R.S.S., 1937, **14**, 31—34).—0·0001—0·1% of Ga was found spectroscopically in samples of muscovite collected in Asia. Other minerals contained <0·01% of Ga. J. G. A. G.

Mineralogy of Mecklenburg soils. W. VON ENGELHARDT (Chem. Erde, 1937, **11**, 17—37).—Soils taken at three depths were separated according to grain size and the amounts of the different minerals determined in each, the extent of alteration of the felspars being also noted. Plant-available K is related to the amount of K minerals in grains <3·16 μ. Nontronite is the essential material for base exchange. L. J. S.