BRITISH CHEMICAL AND PHYSIOLOGICAL ABSTRACTS

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MARCH, 1943

A., I.—GENERAL, PHYSICAL, AND INORGANIC CHEMISTRY

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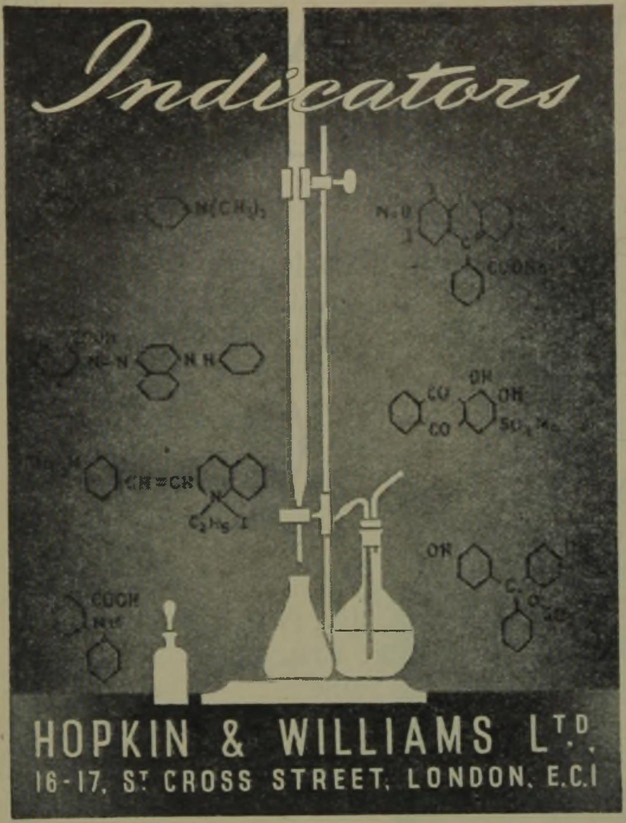
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A., I.—General, Physical, and Inorganic Chemistry

MARCH, 1943.

I.—SUB-ATOMICS.

Fibre-spectrometer. Concave grating spectrograph. Timing device for spectrographic exposures.—See A., 1943, I, 71.

Interaction of three spectral terms. I. Kovacs and S. Singer (*Physikal. Z.*, 1942, **43**, 362—371).—Solutions of the general secular equation of the third order, expressed as convergent series, are derived, and applied to the calculation of perturbation effects in mol. systems involving three interacting states. A. J. E. W.

Arc lines of copper in flame spectra. N. L. Singh (*Current Sci.*, 1942, **11**, 330—331).—The line 4651 A. in the flame spectrum of Cu does not belong to the Cu atom but is one of the strong structure lines near the head of the (0—1) CuH band at 4650 A. W. R. A.

Continuous radiation of high-pressure mercury discharge. P. Schulz (*Z. Physik*, 1942, **119**, 167—173).—New data for temp. in high-pressure Hg discharges, derived from electron-collision broadening of spectrum lines, give good agreement between observed radiation intensities in the continuum and vals. calc. from Unsöld's Hg ion recombination mechanism (A., 1939, I, 50). L. J. J.

Carbon arc at high current density. VI. Spectral energy distribution in radiation from the high-current carbon arc. W. Finkelnburg and H. Schluge (*Z. Physik*, 1942, **119**, 206—222, 527—528).—Spectral energy distribution measurements with a quartz double monochromator at 3000—13,000 A. give temp. of 5600—6000° K. for the emitting vapour-cloud of the Beck arc. Measurements with the homogeneous C arc give a min. val. of 4120° K. for the sublimation temp. of C at atm. pressure. L. J. J.

Energy values of the $3d^8 4p$ electronic configuration of cobalt. M. T. Antunes (*Physical Rev.*, 1942, [ii], **62**, 362—368).—Mathematical. The calc. energy vals. confirm the assignments of Russell *et al.* (cf. A., 1940, I, 423). N. M. B.

Origin of the coronium lines. A. Hunter (*Nature*, 1942, **150**, 756—759).—A review of all previous attempts to trace the origin of the broad bright lines superposed on the continuum in the spectrum of the inner solar corona and Edlén's (*Arkiv astron., mat. fysik*, 1941, **28B**, 1) recent attribution of 22 lines (practically the whole spectrum) to forbidden transitions in very highly ionised atomic emitters, namely, Fe X, Fe XI, Fe XIII, and Fe XIV; Ni XII, Ni XIII, Ni XV, and Ni XVI; Ca XII and Ca XIII; the prominent green line at 5303 A., for example, being ascribed to Fe XIV ($^2P_{1/2}$—$^2P_{3/2}$). W. J.

Night illumination and energy distribution in the spectrum of the night sky. P. P. Feofilov (*Compt. rend. Acad. Sci. U.R.S.S.*, 1942, **34**, 228—232).—Curves are given showing the variation during one night of the total illumination on a horizontal surface, obtained by photometric comparison with the const. luminosity of K uranyl sulphate crystals. Variations not due to cloud are discussed. A spectral energy distribution curve, showing pronounced max. at ~5600 and 5900 A., is also given; the night sky radiation is yellower than that of a black body at 4000° K. A. J. E. W.

Method for study of variation of emission lines in the spectrum of the night sky. G. Schain (*Compt. rend. Acad. Sci. U.R.S.S.*, 1942, **35**, 138—141).—Difficulties involved in photographing the spectrum of the night sky are discussed, and a procedure for avoiding them is outlined. Improvements include the widening of the slit and the use of a step-slit. The method suggested is reliable for lines of strong intensity in the visual region. A. J. M.

Investigation of *X*-radiation from ^{121}Te (125 days) by critical absorption and fluorescence. R. D. O'Neal and (Mrs.) G. Scharff-Goldhaber (*Physical Rev.*, 1942, [ii], **62**, 401).—A correction of Fig. 1 (cf. A., 1942, I, 381). N. M. B.

Intensities of monochromatic continuous *X*-rays from atomic targets of nickel. K. Harworth and P. Kirkpatrick (*Physical Rev.*, 1942, [ii], **62**, 334—339).—Measurements with an A-filled ionisation chamber of intensities from a thin (199 A.) Ni target under 12—180-kv. electron bombardment were corr. for all absorptions in the path of the radiation, for radiation from sources other than the target, and for finite target-thickness. The corr. relative intensities per unit λ interval as produced by electron bombardment of independent Ni atoms show variation with bombardment energy in excellent agreement with the Sommerfeld theory, and variation with λ in approx. agreement. N. M. B.

Determination of life of metastable excited states of neon from residual current measurements in luminous discharges. A. Hoffmann (*Z. Physik*, 1942, **119**, 223—236).—Metastable excited atoms remaining after extinction of luminous discharges in Ne and Ne–A mixtures give rise to residual currents from which their life and mechanism of deactivation can be found. Ionisation arises by collision between two such metastable atoms. The effect of pressure shows deactivation to be a wall and not a homogeneous reaction. Metastable Ne, with a mean life of 0·3 sec., has a smaller effective area in diffusion than normal Ne. The ionisation probability on collision with A is 3×10^{-3}. L. J. J.

Ranges of secondary electrons in magnesium. R. Truell (*Physical Rev.*, 1942, [ii], **62**, 340—348).—An examination, with high-energy primary electrons, of the secondary electron emission ratio as a function of the thickness of Mg layers evaporated on a C backing leads to an expression for the ranges of secondary electrons as a function of their energy at the point of production. An analysis of results leads to relations between, and vals. for, the quantities involved in the expression. The depth of origin of secondary electrons in the energy range 10—200 v. is 2×10^{-7}—4×10^{-5} cm. N. M. B.

Cathodic sputtering. II. Determination of the edge factor. III. Incomplete covering of the cathode with the anomalous glow discharge. IV. Dispersion of the primary vaporised particles. A. Günther-Schulze (*Z. Physik*, 1942, **119**, 79—86, 86—92, 92—99; cf. A., 1943, I, 2).—II. Correction for the fact that the cathode and receiving surfaces are not infinite parallel planes is worked out.

III. If the cathode is near the walls of the vessel, as it is if the cathode is to be cooled, the discharge is repelled electrostatically. There is a dead zone on the cathode, the width of which is $\propto$ dark space. This leads to erroneous results for c.d.

IV. Up to drops of 1000 v. all the metals investigated behaved according to the normal law of diffusion, even close to the cathode, but at 3000 v. no metal shows normal diffusion at 30 cm. from the cathode. A. J. M.

Measurement of electronic charge. T. H. Laby (*Nature*, 1942, **150**, 648—649).—The most reliable measurements of e by oil-drop and *X*-ray methods are briefly reviewed. The result of the most recent determination (Hopper and Laby, A., 1942, I, 2) by an oil-drop method, $(4{\cdot}802_0 \pm 0{\cdot}001_3) \times 10^{-10}$ e.s.u., agrees with the mean of four independent determinations (Bäcklin, Tyrén, Söderman, and Bearden) by the *X*-ray method, namely $(4{\cdot}802_3 \pm 0{\cdot}001) \times 10^{-10}$ e.s.u. The chief source of error in oil-drop methods is still the uncertainty of η for air. W. J.

Theory of the mass-radiator. A. A. Glagoleva-Arkadieva (*Compt. rend. Acad. Sci. U.R.S.S.*, 1941, **32**, 540—542).—A theoretical treatment is given of a radiation source which consists of a suspension of metal particles in a dielectric liquid subjected to a high p.d., which affords radiation of frequency $\not> \sim 3{\cdot}6 \times 10^{12}$ H., excited by sparking between particles. The radiation is emitted by Hertz vibrators comprising pairs of the particles or aggregates. Expressions for the λ of the radiation and the energy stored in the system are considered. A. J. E. W.

Mobilities in nitrogen at high current densities. W. H. Bennett (*Physical Rev.*, 1942, [ii], **62**, 369—371; cf. A., 1942, I, 161).—A point-to-hemisphere discharge was used for measuring free electron mobility coeffs. in mixtures of H_2 and N_2 and in pure N_2. Consistent results require the presence of a trace of H_2 or a preliminary clean-up of the tube with H_2. N. M. B.

Did radioactive cæsium exist at an earlier period in the earth's history? Barium and strontium from pollucite. O. Hahn, F. Strassmann, J. Mattauch, and H. Ewald (*Naturwiss.*, 1942, **30**, 541—542).—If a radioactive isotope of Cs existed at some earlier time in the earth's history, but has now completely disintegrated, Ba should have been formed from it by β-ray disintegration. Wahl has found ^{132}Ba, but no ^{138}Ba, in the residue from the action of H_2SO_4 on the Cs mineral, pollucite. The investigation has been repeated by a different method with pollucite from a different source. No line due to ^{132}Ba could be found, and the distribution of Ba isotopes in the mineral was the same as for ordinary Ba.

The line for ^{87}Sr was particularly strong and that for ^{88}Sr weak, in the Sr from pollucite, in contrast to ordinary Sr. A. J. M.

Experimental evidence of the existence of element 85 in the thorium family. A. Leigh-Smith and W. Minder (*Nature*, 1942, **150**, 767—768).—The emanation was blown between oppositely charged Cu sheets, element 85 then being sublimed from the negative electrode on to a cooled Ag wire which was afterwards placed in a Wilson expansion chamber. Consideration of the α- and β-tracks observed leads to the conclusion that a hitherto unknown element, probably 85, had thus been separated. The mechanism proposed involves thoron → Th-*A*; then mainly Th-*A* → Th-*B*, but to a small extent Th-*A* → 85 → $^{216}_{86}$Th-*n* → Th-*C′* → Th-*D*. The name "anglo-helvetium" is proposed for element 85. A. A. E.

Molecular transformations accompanying the Szilard effect. R. Daudel (*Compt. rend.*, 1942, **214**, 547—549).—The anions ClO_4', IO_4', SeO_4'', TeO_4'', AsO_4''', and SbO_4''' in salts were subjected to the action of thermal neutrons and the state of the active atoms after dissolution in H_2O was examined. Initial and final electrovalencies for the elements Cl, I, Se, Te, As, and Sb are tabulated and plotted and results are discussed. N. M. B.

γ-Rays from ^{24}Na. C. E. Mandeville (*Physical Rev.*, 1942, [ii], **62**, 309—312).—Measurements with a γ-ray spectrograph of high resolving power give energies 0·84, 1·31, 1·66, and 2·90 Me.v. with relative intensities 0·28, 0·41, 0·45, and 1·00. Results indicate excitation levels in the ^{24}Mg residual nucleus at 1·3, 2·9, and 3·7 Me.v. in partial agreement with experiments on proton scattering by Mg, but disagreeing with level schemes based on available α-ray measurements. Accuracy was checked by measurements on γ-rays from Th-(*C′* + *C″*). N. M. B.

Disintegration products from uranium irradiated with fast neutrons. Y. Nishina, K. Kimura, T. Yasaki, and M. Ikawa (*Z. Physik*, 1942, **119**, 195—200).—Radioactive Rh, Ru, and Sn have been separated by chemical methods from U_3O_8 after exposure to fast neutrons obtained by bombarding Li with deuterons of energy 3 Me.v. The half-life vals. of the products are: Rh 34 hr., Ru 4 hr. and ~45 days, Sn ~70 min. and ~60 hr. The 4-hr. Ru is the parent element of the 34-hr. Rh. L. J. J.

Migration of ionium under natural conditions.—See A., 1943, I, 74.

Angular relation between two γ-quanta radiated cascade-wise from an atomic nucleus. S. Kikuchi, Y. Watase, and J. Itoh (*Z. Physik*, 1942, **119**, 185—187).—Comparison of no. of coincidences in two counters at angular separations 180° and 90° with respect to ^{38}Cl and ^{24}Na γ-sources with the no. of single deflexions in one of the counters shows an angular relation between successive γ-quanta with ^{38}Cl, but not with ^{24}Na. L. J. J.

Multiple scattering of fast electrons. C. W. Sheppard (*Physical Rev.*, 1942, [ii], **62**, 313—316).—In view of discrepancies between available data and theory, the multiple scattering of electrons from ^{12}B was studied by Geiger–Müller coincidence counters in Pb and C scatterers (differing by 20% in theoretical scattering power) of equal NTZ^2, where N = no. of atoms per c.c. of scatterer, T = thickness, and Z = at. no. of scatterer. Comparison of the mean scattering angles showed a ratio nearly that given by the Williams theory. N. M. B.

Scattering of rapid electrons at nuclei. P. Urban (*Z. Physik*, 1942, **119**, 67—78).—Re-investigation of the problem on the lines suggested by Mott (cf. A., 1932, 441) brings it into agreement with the results of Sexl (cf. A., 1933, 443). Experimental results are compared with theory. A. J. M.

Elastic scattering of fast positrons by heavy nuclei. H. S. W. Massey (*Proc. Roy. Soc.*, 1942, **A**, **181**, 14—19).—The angular distribution of fast positrons scattered elastically by Hg nuclei is investigated theoretically. The ratio of the scattered intensity to that given by the Rutherford formula is obtained as a function of the angle for positrons of energy from 25,000 to $1{\cdot}7 \times 10^6$ e.v. The ratio is <1, decreases with increasing angle of scattering, and is nearly independent of the nuclear charge. It is suggested that experimental investigation of the scattering of fast positrons would help to resolve divergences between experimental and theoretical results for scattering of fast electrons. G. D. P.

Spectrum of cosmic radiation at 2200 m. above sea level. G. Cocconi and V. Tongiorgi (*Naturwiss.*, 1942, **30**, 328—329).—Investigation of the absorption of cosmic rays at 2200 m. does not support the presence of bands in the primary mesotron spectrum between 1·7 and $2{\cdot}7 \times 10^9$ e.v., or of the fine structure formerly supposed to be present from observations at different zenith angles. A. J. M.

Variation of cosmic-ray showers with altitude. Photons in the showers. S. Gorodetsky, P. Chanson, and H. Denamur (*Compt. rend.*, 1942, **214**, 310—312).—Determinations with various arrangements of counters are reported. Results are discussed in relation to theory and to available data. N. M. B.

Preponderance of positively charged particles in the cosmic-ray spectrum. L. Leprince-Ringuet, E. Nageotte, and M. Lhéritier (*Compt. rend.*, 1942, **214**, 545—547).—Measurements of the energy spectrum at 1000 m. altitude confirm an excess in the ratio 1·35 : 1. Explanations are discussed. N. M. B.

Detection of nuclear disintegration products of cosmic rays with the ionisation chamber. G. Hoffmann (*Z. Physik*, 1942, **119**, 35—42).—The formation of ions by cosmic rays has been investigated with a large ionisation chamber. Two types of apparatus are described. The results show the presence of ions from showers, with superimposed effects due to protons and heavy disintegration particles. A. J. M.

Transition effect air-water for heavy particles due to cosmic rays. N. N. Dmitriev (*Compt. rend. Acad. Sci. U.R.S.S.*, 1941, **33**, 207—209).—The effect of H_2O layers of various thicknesses on the intensity of isolated heavy particles and fission forks produced by cosmic rays has been investigated. The no. of tracks increases very rapidly at the transition from air to H_2O, and goes on increasing with depth, up to a max. at a depth of ~4 m., after which the no. of tracks slowly decreases. The primary radiation produces a secondary radiation with a considerably higher absorption coeff. on passing from air to H_2O. Probably both radiations consist of neutrons. Similar experiments with earth as absorbent show a similar transition effect, though less pronounced. A. J. M.

Transition effects of the soft components of cosmic rays in lead. O. N. Vavilov (*Compt. rend. Acad. Sci. U.R.S.S.*, 1941, **33**, 202—206).—The transition effects of the soft component of cosmic rays in Pb were determined at a height of 4200 m., by comparing the ionisation in a chamber when Pb absorbers were placed above and/or below it, with that when the absorbers were absent. The absorption curve in Pb differs from that obtained by previous observers, but resembles more closely the theoretical cascade curves. Experiments were also carried out with Al absorbers. A. J. M.

Connexion between the penetrating non-ionising component of cosmic radiation and penetrating showers. L. Jánossy and G. D. Rochester (*Nature*, 1942, **150**, 633).—A new counter investigation, briefly described, indicates that the rate of incidence is ~1% of the rate of ionising radiation observed with a previous arrangement (cf. A., 1942, I, 129), and that 1/3 of the penetrating showers near sea-level are produced by the penetrating non-ionising radiation. W. J.

Nature of the mesotron. H. Yukawa (*Z. Physik*, 1942, **119**, 201—205).—A general theoretical discussion. L. J. J.

Dipole character of mesons and polarisation of vacuum. L. Ivanenko and A. Sokolov (*Compt. rend. Acad. Sci. U.R.S.S.*, 1942, **35**, 107—109).—Theoretical. A. J. M.

Direct method for evaluation of the lifetime of the meson. P. V. Auger, R. Maze, and R. Chaminade (*Physical Rev.*, 1942, [ii], **62**, 307—308).—The method of delayed impulses from Geiger–Müller counters is applied to the study of meson instability. The decay curve of the mesons at rest can be traced, as in the case of a radioactive element, and an evaluation of the lifetime given. N. M. B.

Non-central forces in the nuclear two-body problem. W. Hepner and R. Peierls (*Proc. Roy. Soc.*, 1942, **A**, **181**, 43—57).—The problem is discussed on the assumption that the range of the forces is small compared with the size of the deuteron, but without sp. assumptions about the forces. The formulæ for the electric and magnetic photo-effect in the deuteron remain the same as for central forces, with only minor modifications. The same is found for the scattering of neutrons by protons at energies of a few Mv. or less. G. D. P.

II.—MOLECULAR STRUCTURE.

Molecular spectra of deuterium-hydrogen in the ultra-violet region and isotope effect in the normal state of the deuterium molecule. Y. Fujioka (*Z. Physik*, 1942, **119**, 182—184).—Mol. consts. of the $1s1'\Sigma$ state of D_2 are calc. from vibrational and rotational analysis of 32 new bands in the ultra-violet. L. J. J.

Occurrence of carbon isotope bands in spectra of *N*-type stars. G. Schain (*Compt. rend. Acad. Sci. U.R.S.S.*, 1942, **35**, 90—93).—The position of isotope bands in the different sequences of the Swan and CN bands has been investigated in the spectra of *N*-type stars. The main and isotopic bands have also been investigated spectrophotometrically. The intensity ratios of the pairs of bands $^{12}C^{12}C$ (1—0) : $^{13}C^{12}C$ (1—0), $^{12}C^{12}C$ (0—1) : $^{13}C^{12}C$ (0—1), and $^{12}C^{12}C$ (0—2) : $^{13}C^{12}C$ (0—2) are nearly equal in the spectrum of a given *N*-type star. There is an anomaly for the ratio $^{12}C^{12}C$: $^{13}C^{12}C$ of different sequences. The relative abundance of heavy mols. $^{13}C^{12}C$ varies from star to star. A. J. M.

Structure of the band spectrum of phosphorus and nuclear spin. K. N. Rao (*Current Sci.*, 1942, **11**, 357).—The band spectrum of P, excited in a discharge tube, has been photographed and the bands (9, 21), (5, 21), (5, 18), and (4, 18) have been measured and, from their rotational structure, the consts. have been evaluated. Quant. measurements on the alternating intensities of rotational structure lines in the first three bands and in the (6, 22) band show that only the (5. 21) band has an anomalous ratio of **3·3**, whilst all the others have 3·6. The nuclear spin is $\frac{1}{2}h/2\pi$. W. R. A.

Band spectrum of bismuth monochloride. S. K. Ray (*Indian J. Physics*, 1942, **16**, 35—48).—A no. of new bands of the shorter-λ system (*i.e.*, that between 3600 and 4000 A.) of BiCl have been measured in emission and absorption, extending the system to $\lambda\lambda$ between 4300 and 5700 A. Morgan's analysis of the two band systems of BiCl (A., 1936, I, 267) is confirmed. O. D. S.

Structure of the electronic bands of the OD molecule. IV. Spin doubling. M. G. Sastry (*Indian J. Physics*, 1942, **16**, 27—34; cf. A., 1942, I, 223).—Contrary to the view of Johnston (A., 1934, 237) the theory of Hill and Van Vleck (A., 1928, 1076) is found to represent the energy difference between the components of the Π-state of the OD mol. with fair accuracy. The spin doublet widths are > those of the OH mol. although the OD mol. is the heavier. This agrees with Hill and Van Vleck's formula. O. D. S.

Complete analysis of absorption spectra. VII. Mutual influence of chromophoric groups in systems with closed π electron groups. E. Hertel and U. Siegel (*Z. physikal. Chem.*, 1942, **B**, **52**, 167—183).—The absorption spectra of a large no. of azo- and other coloured compounds have been measured. When two similar groups are linked through azo- or ·CH:CH· groups to *p*-positions of a C_6H_6 nucleus or to 1 : 5- or 2 : 7-positions of a $C_{10}H_8$ nucleus the long-λ absorption region of the chromophoric group is shifted towards longer λ. For 2 : 7-derivatives of $C_{10}H_8$ the formulation of a system of conjugated double bonds between the chromophoric groups is impossible. When different groups are linked to the two azo-groups, however, the absorption of the two groupings is additive. The results are discussed theoretically. The prep. of 1-p-*dimethylaminobenzeneazo*-5-, m.p. 201—202°, and -4-*nitronaphthalene*, broad needles or plates, m.p. 181°, 1 : 5-, dark red needles, m.p. >300°, and 1 : 4-*di-p-dimethylaminobenzeneazonaphthalene*, rust-brown, m.p. 263°, and 2 : 7-*dibenzylidenenaphthylenediamine*, bright yellow needles, m.p. 167—168°, is described. J. W. S.

Absorption spectra of phenylalanine and tyrosine in connexion with the absorption in toluene and *p*-cresol. (Miss) H. Sponer (*J. Chem. Physics*, 1942, **10**, 672—676).—Comparison between the spectra of PhMe and phenylalanine and between those of *p*-cresol and tyrosine is made, and an interpretation of individual bands is proposed. C. R. H.

Structure of indigoids on the basis of spectral data. N. Dokunichin and E. Levin (*Compt. rend. Acad. Sci. U.R.S.S.*, 1942, **35**, 110—113).—The absorption curves of the sulphuric esters of indigo and thioindigo leuco-bases have been investigated. The curves for these substances are very similar, whereas those of the corresponding dyes differ considerably. This is probably due to the existence in the indigo mol. of a weakened internal H bond, which gives rise to the intense colour of the compound. A. J. M.

Ultra-violet absorption spectra of some solid cyanides. F. Gallais (*Compt. rend.*, 1942, **214**, 552—553).—The absorption spectra are examined by reflexion from fine powders of the cyanides of K, Hg, Ag, and Cu. The ratio of incident to reflected intensities is plotted against λ and the differences shown are discussed. N. M. B.

Ultra-violet absorption of sulphur compounds. B. Sjöberg (*Z. physikal. Chem.*, 1942, **B**, **52**, 209—221).—The ultra-violet absorption spectra of the following are recorded and discussed: α-monothioglycerol, γ-chloro-β-hydroxypropylthiol, $\alpha\beta$- and $\alpha\gamma$-dithioglycerol; di(*iso*propylideneglyceryl) sulphide, oxytrimethylene sulphide; EtOH solutions of α- and β-acetylchlorohydrin, $\alpha\beta$-diacetylthiochlorohydrin, γ-chloro-α-acetylpropylthiol, *iso*propylidene-α-monothioglycerol, -thiochlorhydrin, -β- and -γ-hydroxypropylthiol. W. R. A.

New bands in the ultra-violet absorption spectrum of gelatin. M. Abribat (*Compt. rend.*, 1942, **214**, 417—419).—All specimens of gelatin examined show very weak bands at 2600, 2660, and 2700 A., with slight inflexions at ~2535 and ~2790 A. These are independent of pH and temp. The same bands appear in the spectrum of ovalbumin, and are attributed to a sterol group. L. J. J.

Ultra-violet absorption of surface anæsthetics.—See A., 1943, III, 140.

Interpretation of vibrational spectra of propane and butane. M. Eliaschevitsch and B. Stepanov (*Compt. rend. Acad. Sci. U.R.S.S.*, 1941, **32**, 481—485).—Vibrational frequencies of C_3H_8 and C_4H_{10}, in agreement with experimental infra-red and Raman data, are calc. from force consts. derived from CH_4 and C_2H_6 and their D derivatives. L. J. J.

Fluorescence of solutions and dielectrical properties of solvents. S. Sambursky and G. Wolfsohn (*Physical Rev.*, 1942, [ii], **62**, 357—361; cf. A., 1940, I, 192).—Because of different red shifts of the absorption and fluorescence spectrum of anthracene in solution, the longest-wave absorption band is separated from the shortest-wave fluorescence band. This "(0—0) separation" and the red shift are explained as effects of interaction between mols. in the liquid state and are discussed on Onsager's theory of liquids. N. M. B.

Polarisation of fluorescence and law of its decay. L. A. Tumerman (*Compt. rend. Acad. Sci. U.R.S.S.*, 1941, **32**, 474—477).—The temp.–degree of polarisation relation of EtOH solutions of fluorescein, eosin, and rhoduline-orange can be calc. from data obtained with solutions to which a small concn. of KI, sufficient to destroy the initial "dark pause" but insufficient to cause appreciable quenching, has been added. Rhodamine-*G* extra shows no effect of KI on polarisation, in harmony with the absence of "dark pause" in its fluorescence. L. J. J.

Theory of concentrational depolarisation of fluorescence in solutions. S. I. Vavilov and P. P. Feofilov (*Compt. rend. Acad. Sci. U.R.S.S.*, 1942, **34**, 220—223).—The relation $1/p' - 1/p = Ac\tau$ (p', p = degree of polarisation of fluorescence respectively with and without concn. depolarisation; τ = mean life of excited state; c = solute concn.; A const.) is deduced theoretically on the basis of excitation energy transfer by quantum-mechanical resonance. A. J. E. W.

Fluorescence of manganese in glasses and crystals. S. H. Linwood and W. A. Weyl (*J. Opt. Soc. Amer.*, 1942, **32**, 443—453).—The use of coloured ions as indicators affording information on the lattice structure of glasses is discussed. In base glasses which favour 6- or 4-co-ordination, respectively, Co$^{\cdot\cdot}$ produces a pink or blue colour. Ni gives a yellow colour with 6- and a purple with 4-co-ordination. Comparison of fluorescent Mn glasses with Co glasses having similar bases indicates that Mn is 4-co-ordinate in glasses having green fluorescence, orange or red showing higher co-ordination; this is confirmed by the behaviour of the Mn glasses on heating, and by a marked susceptibility to concn.-quenching in the green-fluorescent glasses. The structure of Zn_2SiO_4 phosphors containing Mn as activator is discussed; the existence of an unstable form of Zn_2SiO_4 with a cristobalite structure is indicated. The effect of lattice imperfections on the fluorescence of Mn is also discussed. A. J. E. W.

Photo-luminescence in liquid and solid solutions of thallium salts. I. I. Kondilenko and A. A. Schischlovski (*Compt. rend. Acad. Sci. U.R.S.S.*, 1942, **35**, 163—166).—Dil. aq. solutions of Tl$^{\cdot}$ salts have a photoluminescent spectrum with max. at 364, 397, and 430 mμ. The same structure is shifted to shorter $\lambda\lambda$ in Tl–alkali halide monocrystals. In aq. solution, increasing [Cl′] causes a decrease in intensity of the first, and an increase in that of the second and third, max., so that the spectrum of TlCl in saturated KCl solution resembles that in solid KCl. Increasing [Br′] in solution produces a new max. at 470 mμ. It is concluded that interaction with the Cl′ field deforms the electronic shell of luminescent Tl$^{\cdot}$, whilst with Br′ formation of $TlBr_3$ gives a new electronic shell. Ultra-violet emission occurs only in spherically-symmetrical fields. L. J. J.

Raman effect. CXXXVI. Nitrogen compounds. XXIV. Alkyl nitrates. H. Wittek (*Z. physikal. Chem.*, 1942, **B**, **52**, 153—166).—Raman frequencies and polarisation data for MeO·NO$_2$, EtO·NO$_2$, Pr$^{\alpha}$O·NO$_2$, Pr$^{\beta}$O·NO$_2$, Bu$^{\alpha}$O·NO$_2$, and Bu$^{\beta}$O·NO$_2$ are recorded. From these results it is inferred that the two N–O linkings of the NO$_2$-group are identical, as in EtNO$_2$, but the valency angle between them is 10—15° greater. J. W. S.

Raman effect. CXXXVII. Structure of dimeric aluminium trimethyl and trihalides. K. W. F. Kohlrausch and J. Wagner (*Z. physikal. Chem.*, 1942, **B**, **52**, 185—201).—Raman spectra of Al_2Me_6, NMe_3, C_2Br_4, and C_2Cl_6 are reported. The structures of tri-derivatives of Al are discussed; Me and halogen derivatives have probably the same structure. An ethylene-like structure with symmetry D_{2h} is favoured. W. R. A.

Change in Raman spectra of chloroprene and isoprene in the polymerisation process. A. Gantmacher and S. Medvedev (*Acta Physicochim. U.R.S.S.*, 1942, **16**, 1—11).—Raman data are given for chloroprene (**I**), a 30% solution of polymerised (**I**) in the monomeride, a solution of the polymeride in C_6H_6 or CCl_4, and the pure polymeride; corresponding data are also given for isoprene (**II**). In each case polymerisation gives rise to a non-conjugate double-bond line [1660 cm.$^{-1}$ in (**I**) and 1665 cm.$^{-1}$ in (**II**)] not given by the monomeride; a conjugate double-bond line (1630, 1640 cm.$^{-1}$) decreases in intensity as polymerisation proceeds, but remains much stronger than the 1660—1665 cm.$^{-1}$ line when >50% of polymeride is present. The 1020 cm.$^{-1}$ C–H line given by (**I**) is displaced to 1005 cm.$^{-1}$ on polymerisation, and its intensity increases considerably. Changes in C–C and C–Cl lines are discussed. Polymerisation does not increase the background intensity of the spectrograms. A. J. E. W.

Raman spectra of betaine. N. A. Slovochotova, J. K. Sirkin, and M. V. Volkenstein (*Compt. rend. Acad. Sci. U.R.S.S.*, 1942, **35**, 146—148).—The Raman spectrum of a 6 mol.-% aq. solution of betaine has been obtained, and compared with that of NH$_2$-acids. There is no frequency corresponding to the presence of a :C:O group. The data agree with the dipole structure of betaine. A. J. M.

Intensity of Raman lines and nature of the chemical bond. M. V. Volkenstein (*Acta Physicochim. U.R.S.S.*, 1942, **16**, 120—122).—Comparative intensity data are recorded for characteristic Raman lines of the C–X linkings in EtCl, Bu$^{\alpha}$Cl, Bu$^{\alpha}$Br, Bu$^{\alpha}$I, $C_6H_{11}Cl$,

$C_8H_{17}Cl$, and of CO in AcCl, $COMe_2$, COPhMe, and $COPh_2$, and of the C_6H_6 ring in C_6H_6, PhMe, COPhMe, and $COPh_2$. The correlation of the intensities with structural features of the mols. is briefly discussed. A. J. E. W.

Quantitative molecular spectral analysis. P. Schorigin (*Acta Physicochim. U.R.S.S.*, 1942, **16**, 12—25).—The practicability of quant. analysis by measurement of Raman line intensities is discussed, and a theoretical treatment is given of the effect of various factors on the observed line intensities and contours. The light source used should be of const. intensity and afford narrow (2—3 cm.$^{-1}$) exciting lines. The spectrograph slit width should be ~10 cm.$^{-1}$ Typical data are given for two seven-component liquid hydrocarbon mixtures and three Grozny petroleum fractions. Intensity standardisation is best effected by adding a reference substance to the liquid under examination. Data are given for the intensity distribution in the Raman spectra of PhMe and methyl*cyclo*hexane. A. J. E. W.

Ionisation of gases by collisions of their own accelerated molecules. H. W. Berry (*Physical Rev.*, 1942, [ii], **62**, 378—382; cf. A., 1942, I, 161).—Ionisation of A, N_2, He, and H_2 by fast neutral atoms in their own gases occurs at 1000—8000 e.v. The efficiencies of ionisation are represented in terms of an approx. cross-section. The vals. of the cross-sections at 5000 e.v. are, respectively, for A, N_2, H_2, and He, 1·5, 0·9, 0·2, and 0·05 sq. cm. per c.c. at 1 mm. pressure. In this range A shows a continuously decreasing efficiency with energy of the particle, while H_2 and He show increasing functions. N_2 shows a max. and a min. N. M. B.

Measurement of dielectric constant and loss factor of dielectrics at a wave-length of 14 cm. with hollow resonators. F. Borgnis (*Physikal. Z.*, 1942, **43**, 284—291).—ϵ for a thin rod is deduced from the change in resonance frequency of a hollow cylinder on introducing the rod along its axis. The theory of the method is given, and apparatus (including an oscillator) is briefly described. Loss angles may be determined from the change of shape of the resonance curve. A. J. E. W.

Electrical properties of solids. XIII. Polymethyl acrylate, methacrylate, and α-chloroacrylate, and polychloroethyl methacrylate. D. J. Mead and R. M. Fuoss (*J. Amer. Chem. Soc.*, 1942, **64**, 2389—2393).—The dielectric const. and loss factors of polymethyl acrylate, methacrylate (alone and plasticised with 20 and 30% of CH_2Ph_2), and α-chloroacrylate and polychloroethyl methacrylate have been determined from −70° to 100° and from 60 to 8000 cycles. A correlation between structure and electrical properties for polymerides of the type $(\cdot CH_2\cdot CXY\cdot)_n$ is given. *β-Chloroethyl methacrylate*, b.p. 170°, was prepared by ester interchange between $CH_2\colon CH\cdot CO_2Me$ and $OH\cdot[CH_2]_2\cdot Cl$. W. R. A.

Dielectric polarisation of complex compounds of platinum. M. M. Jakschin (*Compt. rend. Acad. Sci. U.R.S.S.*, 1941, **32**, 555—557).—The dielectric consts. (ϵ) of 23 cryst. complex Pt compounds at 25° have been determined at 1000 kH. by an immersion method; vals. of ρ^{25}_{40} and n data are also given in some cases. With *cis–trans* isomerides the *trans*-form has the smaller ϵ. ϵ is decreased by increased polarisability of the coordinated groups. Substitution of these groups affects ϵ far more than replacement of the acid groups. Loss of H_2O from $[Pt(NH_3)_4]Cl_2,H_2O$ reduces ϵ; such a reduction may be a criterion of zeolitic H_2O. Vals. of the mol. polarisability (P) and $[R]$, and of the ionic coeff. P/P_e (P_e = electronic polarisation), are calc., and the relations between P/P_e and the linking types and configurations in the mols. are discussed. The linkings in *cis*-isomerides appear to be more covalent than those in corresponding *trans*-isomerides. A. J. E. W.

Validity of the Clausius–Mosotti formula. G. B. Brown (*Nature*, 1942, **150**, 661—662).—Only a macroscopic treatment should be applied, and the Clausius–Mosotti formula $(\epsilon - 1)M/(\epsilon + 2)\rho$ for the molar polarisation P should be replaced by $(\epsilon - 1)M/3\rho$, where ϵ, M, and ρ are dielectric const., mol. wt., and density. W. J.

Theory of optical polarisability and natural rotatory power. J. P. Mathieu (*Compt. rend.*, 1942, **214**, 420—421).—The polarisability tensor of a mol. can be resolved into symmetrical and anti-symmetrical tensors, the latter containing only imaginary coeffs. and determining optical activity. For very high or very low frequencies the imaginary coeffs. vanish, leaving a symmetrical tensor. For $\lambda\lambda$ remote from absorption bands, the polarisability of any mol. can be represented by an ellipsoid. L. J. J.

Scattering of light and Kerr constant of spherically symmetrical molecules. T. Neugebauer (*Z. Physik*, 1942, **119**, 114—135).—Mathematical. The scattering of light by asymmetrical mols. is investigated using the rotation Raman effect, and applying quantum mechanics. The connexion between the degree of polarisation and the Kerr effect is obtained. The behaviour of the Voigt part and the polarisation part of the Kerr effect is investigated. The anisotropy due to rotation is negligible. It is shown how the various effects can be distinguished in practice. A. J. M.

Quantum theory of ammonia molecule. M. A. Kovner (*Compt. rend. Acad. Sci. U.R.S.S.*, 1942, **35**, 177—179).—Mathematical. L. J. J.

Intramolecular rotation in simple carbon–carbon linking. S. Mizushima and Y. Morino (*Z. Physik*, 1942, **119**, 188—194).—Raman spectra of dihalogeno-ethers in gas, solution, and solid states show varying proportions of *trans*-form in solution [measured by relative intensities of frequencies 654 and 754 cm.$^{-1}$ for $(CH_2Cl)_2$] and 100% *trans*-form in the solids. Dipole moment measurements show a greater rotational hindrance energy coeff. in the gas than in C_7H_{16} or Et_2O solution. CMe_3Et exists in only one form. L. J. J.

Spectroscopic evidence of intramolecular transfer of protons. D. Williams and W. D. Stallcup (*J. Amer. Chem. Soc.*, 1942, **64**, 2684—2686).—Fractionation of a MeOH–BuOD mixture yields MeOH + MeOD and BuOH + BuOD fractions, indicating that intermol. H bonds involve the actual transfer of protons between mols. W. R. A.

Molecular transformations accompanying the Szilard effect.—See A., 1943, I, 47.

Stereochemistry. II. Steric strains as a factor in relative stability of some etherates of boron fluoride. H. C. Brown and R. M. Adams (*J. Amer. Chem. Soc.*, 1942, **64**, 2557—2563).—The prep. and characterisation of BF_3 additive compounds with Me_2O, Et_2O, Pr^{β}_2O, and tetrahydrofuran (I) are given. The dissociation of these compounds has been studied over a range of temp., and ΔH, ΔG, and ΔS have been obtained. The basic strength of the ethers decreases in the order: (I), Me_2O, Et_2O, Pr^{β}_2O. The factors generally believed to control base strength do not explain this order but the anomalies may be accounted for by considering the probable steric strains resulting from spatial limitations within the mols. W. R. A.

Constitution and formulation of dimeric compounds of group III elements. B. Eistert (*Z. physikal. Chem.*, 1942, **B**, **52**, 202—208).—The mechanism of dimerisation of Al_2X_6 is discussed; these dimerides appear to have a C_2H_4 structure with the additional two X groups attached to the double linking by a special kind of bond. The intermediate position of Al compounds in the series $MgCl_2$, Al_2Cl_6, $SiCl_4$ and $MgMe_2$, Al_2Me_6, and $SiMe_4$ is considered. W. R. A.

Equivalence of chemical bonds of multivalent atoms. A. Polesitski, M. Jastschenko, and N. Barantschik (*Compt. rend. Acad. Sci. U.R.S.S.*, 1942, **34**, 83—87).—By using radioactive ^{81}Br as an indicator and measuring the activities of the decomp. products of $CuBr_2$, $AuBr_3$, and PBr_5 prepared from Br which had been subjected to neutron bombardment, it has been shown that the bonds of the multivalent atoms in the bromide mols. are all equiv., as was to be expected from theoretical considerations which are discussed. J. L. E.

Stereochemistry of some metallic complexes, with special reference to their magnetic properties and the Cotton effect. D. P. Mellor (*J. Proc. Roy. Soc. New South Wales*, 1941, **75**, 157—168).—Magnetic moments have been determined for bis-salicylaldehydepropylenedi-imine-nickel (~0), -cobalt (2·48), and -copper (1·76), bis-salicylaldehyde-*o*-phenylenedi-imine-nickel (~0), bisformylcamphor-nickel (3·15), -cobalt + $2H_2O$ (5·05), -copper, + dioxan (1·89), bisformylcamphorethylenedi-imine-nickel, + $3H_2O$ (~0), -copper, + $2H_2O$ (2·08), and *trisformylcamphor-cobalt* (1·15). The incidence of the Cotton effect is used to determine the orientation and character of the metal–non-metal linkings as the effect is shown to be absent in ionic complexes. F. R. G.

Stereochemistry of square complexes. D. P. Mellor (*J. Proc. Roy. Soc. New South Wales*, 1942, **76**, 7—46).—A review of the evidence for the square structure of metallic complexes. F. R. G.

Surface tensions, densities, and parachors of aliphatic nitroparaffins. G. E. Boyd and L. E. Copeland (*J. Amer. Chem. Soc.*, 1942, **64**, 2540—2543).—At 25° γ of aliphatic nitroparaffins varies from 35·78 for $MeNO_2$ to 29·20 dynes per cm. for $Bu^{\alpha}NO_2$. The *sec.* isomerides exhibit characteristically lower free surface energies, with $Bu^{\beta}NO_2$ giving 28·65 ergs per sq. cm. The total surface energies of the nitroparaffins at 25·0° vary from 77·11 for $MeNO_2$ to 58·39 ergs per sq. cm. for $Bu^{\alpha}NO_2$. A higher surface energy is shown by the isomerides, with $Bu^{\beta}NO_2$ giving 60·46 ergs per sq. cm. The parachor vals. calc. from the measured γ and ρ are in good agreement with the predictions of Sugden. Vals. of the crit. temp. calc. from the Ramsay–Shields equations are: $MeNO_2$, 623°; $EtNO_2$, 662°; $Pr^{\alpha}NO_2$, 675°; $Pr^{\beta}NO_2$, 618°; $Bu^{\alpha}NO_2$, 669°; and $Bu^{\beta}NO_2$, 624° K. W. R. A.

III.—CRYSTAL STRUCTURE.

Quantitative determination of the energy of X-ray reflexions in crystal structure analysis. IV. Further development of methods of micro- and integral-photometering of reflexions. A. Brager and V. Kotov (*Acta Physicochim. U.R.S.S.*, 1942, **16**, 34—42).—The applicability of the method of micro-photometering is extended to a blackening of $S_m \not> 1·0$ by introduction of corrections for systematic errors; the method is developed for use with a microphotometer slit longer than the width of the spot. Data for an intensity scale show the method to be accurate to ~10%. The method of integral photometering is applied to Debye–Hull rings with an accuracy of 10—15%. A consideration of limiting errors involved when the slit size is considerably increased shows that the corrections required are $\ngtr 100\%$ for $S_m \ngtr 1{\cdot}0$. Typical correction curves for microphotometering of spots and powder rings are given. A. J. E. W.

Diffuse scattering of *X*-rays. L. M. Brechovskich (*Compt. rend. Acad. Sci. U.R.S.S.*, 1941, **32**, 478—480).—Both Zachariasen's and Preston and Bragg's interpretations of diffuse non-Laue max. in *X*-ray photographs predict their positions correctly, but only the former gives correct vals. for their half-widths. L. J. J.

Crystalline diffusion of *X*-rays resulting from Bragg reflexions with change of frequency at thermal vibration planes. J. Laval (*Compt. rend.*, 1942, **214**, 431—433).—Mathematical. L. J. J.

Calculation of Debye–Scherrer diagrams of very small crystals by the gas-interference method. H. Boersch (*Z. Physik*, 1942, **119**, 154—163).—The Debye–Ehrenfest interference function for a single rotating mol. is applied to the calculation of intensity distribution in the Debye–Scherrer diagram of cryst. particles containing 1, 2, and 8 unit cells for the case of simple, body-centred, and face-centred cubic lattices. The method gives new max. at low dispersion angles, not present in Bragg reflexions from cryst. planes. L. J. J.

Use of the three-dimensional reciprocal lattice for determination of translation- and space-groups. M. Straumanis (*Z. Krist.*, 1942, **104**, 18—27).—A convenient graphical method for construction of a three-dimensional reciprocal lattice from rotation photographs is outlined. 1—3 photographs are required with orthogonal systems. The space-group is determined from the lattice by comparison of the observed reciprocal period with the theoretical periods for different space-group classes; the final selection depends on the crystal class. Since the method uses positive observations it is preferable to the method of absent reflexions. A. J. E. W.

Peculiarities of Weissenberg photographs of higher layer-lines. F. Halla (*Z. Krist.*, 1942, **104**, 44—46).—The formation of the Weissenberg photograph of the pseudo-equator is considered, and it is shown that the " optical " reflexion curve does not coincide with the line representing conjunction of *X*-ray reflexions and counter-reflexions. Divergent " tails " in the *X*-radiogram are thus explained. A. J. E. W.

Comparison of *X*-ray line breadth and internal friction for α-brass as affected by cold-working and annealing. F. Niemann and S. T. Stephenson (*Physical Rev.*, 1942, [ii], **62**, 330—333).—*X*-Ray line breadth measurements for samples of α-brass cold-stretched to different extents and then annealed at various temp. differ markedly from internal friction measurements on the same samples. For small amounts of cold-work, line breadths appear to be affected by the rate of cold-working, whereas internal friction seems more dependent on the amount of cold-work. The internal friction introduced by cold-work is removed by low-temp. annealing. Line breadth changes little with annealing until just before recrystallisation, when it shows a fairly sharp decrease. N. M. B.

Ionic radii and the periodic system. II. Calculation of ionic radii from physical atomic data. E. Kordes (*Z. physikal. Chem.*, 1940, **B, 48**, 91—107).—Ionic radii agreeing with known vals. are calc. from a formula based on the Bohr at. model, taking into account the screening effect of *d*- and *s*-electrons. This effect is approx. const. for each period (beginning with an inert gas or Cu, Ag, or Au). Max. and lower valencies are covered by the method. L. J. J.

Tabulated diffraction data for cubic isomorphs. L. K. Frevel (*Ind. Eng. Chem.* [*Anal.*], 1942, **14**, 687—693).—Representative diffraction patterns of 33 cubic crystal structures designated as in the " Strukturbericht " are represented diagrammatically. Structures having comparable powder patterns are tabulated. Lattice consts. for 705 cubic substances are given. The data indicate possible ambiguities of a chemical analysis by diffraction methods. L. S. T.

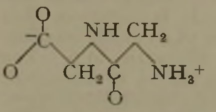
Structure of graphite. H. Lipson and A. R. Stokes (*Proc. Roy. Soc.*, 1942, **A, 181**, 101—105).—To account for the presence of extra lines on *X*-ray powder photographs a new structure is proposed. It has hexagonal layers similar to those of graphite, but arranged in a different sequence. About 14% of the new structure is present in the specimens examined. G. D. P.

***X*-Ray determination of unit cell of $K_3Co(CN)_6$ crystals.** V. Barchatov and H. Shdanov (*Acta Physicochim. U.R.S.S.*, 1942, **16**, 43—58).—$K_3Co(CN)_6$ is pseudorhombic, with the apparent cell dimensions *a* 13·6, *b* 10·4, *c* 8·4 A.; *V* 1202 cu. A.; $\rho_{obs.}$ 1·9; 4 mols. per unit cell; space-group D_{2h}^{17}. The true cell contains 2 mols. and has *a* 7·1, *b* 10·4, *c* 8·4 A., β 107° 20′; *V* 600 cu. A.; space-group C_{2h}^{5}. The unit cells given by Gottfried *et al.* for compounds of the type $K_3M^{III}(CN)_6$ (cf. A., 1931, 27; 1933, 215) are incorrect. A. J. E. W.

***X*-Ray examination of the structure of $K_3Co(CN)_6$.** V. Barchatov (*Acta Physicochim. U.R.S.S.*, 1942, **16**, 123—124; cf. preceding abstract).—The Co and K parameters are deduced by consideration of the pseudorhombic symmetry of the crystal, and by one-dimensional Patterson analyses based on visually-estimated intensities. The CN′ positions are found by assuming the configuration of the $Co(CN)_6'''$ group and determining its orientation from intensities and space-filling conditions. K˙ ions are of two types, surrounded by 6 CN′ arranged octahedrally or in a trigonal prismatic configuration, respectively; each CN′ adjoins 3 K˙ and 1 Co˙˙˙. The M^{III} atom positions in structures of compounds of the type $K_3M^{III}(CN)_6$ deduced by Gottfried *et al.* are incorrect. A. J. E. W.

***X*-Ray examination of *d*-pyramic acid, $C_{20}H_{30}O_2$.** N. Sevastianov and H. Shdanov (*Acta Physicochim. U.R.S.S.*, 1942, **16**, 59—62).—*d*-Pyramic acid has *a* $20{\cdot}6_7$, *b* $10{\cdot}7_6$, *c* $7{\cdot}7_6$ A.; $\rho_{obs.}$ 1·13; 4 mols. per cell; space-group D_2^3—$P2_12_12$. A. J. E. W.

Crystal structure of β-glycylglycine. E. W. Hughes and W. J. Moore (*J. Amer. Chem. Soc.*, 1942, **64**, 2236—2237).—This is compatible only with the structure shown, the mol. being held together by H–O linkings. The terminal N is surrounded by three O (two CO_2H, one CO); the N–H linkings are tetrahedral within 10°. The NH forms a H–O linking with a neighbouring CO. The unit cell contains 8 mols. and has *a* 17·89, *b* 4·62, *c* 17·06 A., β 125° 10′. The space-group is *A*2/*a* (or *Aa*) (cf. Bernal, A., 1931, 1002). R. S. C.



Macromolecular disorder in linear polyamides. Relation of structure to physical properties of copolyamides. W. O. Baker and C. S. Fuller (*J. Amer. Chem. Soc.*, 1942, **64**, 2399—2407).—31 linear polyamides and copolyamides of varying cryst. structures and concn. of polar linkings along the chains have been investigated as fibres and as polycryst. sections by *X*-ray diffraction. Elastic moduli and moisture sorption have been determined for typical samples ranging from soft to porcelain-like polymers. Polar linkings which join the paraffin sections of the base units together in the long chains associate in adjacent macromols. to form H-bonded dipole layers, and this interaction governs the physical properties and leads to an interpretation of m.p., hardness, elastic modulus, and moisture sorption in terms of the concn., separation, population, and perfection of the dipole layers. Copolymerisation introduces disorder and causes softening and unexpected variation of *X*-ray identity periods along the chains. Macromol. solids containing some cryst. regularity may be treated as defect systems in which the position and organisation of interacting polar groups govern physical properties. W. R. A.

Structure of boron hydrides. M. E. Diatkina and J. K. Sirkin (*Compt. rend. Acad. Sci. U.R.S.S.*, 1942, **35**, 180—183).—Electron diffraction intensity curves of B_2H_6, calc. for the author's model (A., 1941, I, 401), compared with Bauer's data (A., 1937, I, 397), agree as well as do those given by Bauer's C_2H_6-like model for the mol. dimensions 1·80 ± 0·04, 1·23 ± 0·03, and 1·33 ± 0·03 A. for B—B, $B—H_{ext.}$, and $B—H_{int.}$, and the angles 125 ± 8° and 95 ± 5° for $HBH_{ext.}$ and $HBH_{int.}$, respectively. L. J. J.

Structures of boron dimethyl fluoride and boron methyl difluoride. S. H. Bauer and J. M. Hastings (*J. Amer. Chem. Soc.*, 1942, **64**, 2686—2691).—From electron diffraction measurements BMe_2F and $BMeF_2$ are planar. In BMe_2F B—F = 1·29 ± 0·02; B—C = 1·55 ± 0·02; C—F = 2·48 ± 0·03 A.; in $BMeF_2$ B—F = 1·30 ± 0·02; B—C = 1·60 ± 0·03; C—F = 2·53 ± 0·03 A. W. R. A.

Structure of diphenylene.—See A., 1943, II, 58.

Constitution of pirylene. Electron diffraction investigation. R. Spurr and V. Schoumaker (*J. Amer. Chem. Soc.*, 1942, **64**, 2693—2696).—Electron diffraction measurements on pirylene indicate that it is α-methyl-β-vinylacetylene. Structural parameters have been found. An approximation to the radial distribution integral is described. W. R. A.

Hall effect and conductivity of cuprous oxide. S. J. Angello (*Physical Rev.*, 1942, [ii], **62**, 371—377).—Measurements show that the exponential law of temp.-dependence is not obeyed and that the divergence is caused by a loss of conduction holes with time and an anomalous decrease in the mean free path at ∼100°. An experiment is described which indicates that the rate of ageing at 100° is increased by the application of an electric field. N. M. B.

Contacts between metals and between a metal and a semiconductor. H. Y. Fan (*Physical Rev.*, 1942, [ii], **62**, 388—394; cf. A., 1942, I, 229).—Mathematical. The problem is treated classically with the help of the results of wave-mechanical theory of electron energy states in solids. The potential and electron density distributions in the two bodies near the contact are discussed. The problem of a body in vac. and of two bodies separated by a gap is discussed qualitatively. N. M. B.

Theory of anomalous reflexion of atomic rays at crystal surfaces. II. Calculation of the form of trough for discontinuous potential curves. K. Artmann (*Z. Physik*, 1942, **118**, 659—676; cf. *ibid.*, 624).—Theoretical. Using a crystal model with a discontinuous potential curve, theory leads to positions of troughs in agreement with Stern's experiment, but there are considerable differences between the form of the trough indicated by theory and experiment. A. J. M.

Theory of anomalous reflexion of atomic rays at crystal surfaces. III. Transition to continuous potential curve. K. Artmann (*Z. Physik*, 1942, **119**, 49—66 ; cf. preceding abstract).—Mathematical. With a continuous potential curve the position of troughs remains the same, but the form does not agree in detail with the observations of Stern. A. J. M.

Theory of anomalous reflexion of atomic rays at crystal surfaces. IV. Consideration of energy exchange between lattice and particles. K. Artmann (*Z. Physik*, 1942, **119**,137—153 ; cf. preceding abstract). —Mathematical. Theoretical and observed reflexion distributions of He atoms at cryst. surfaces agree when energy exchange with vibrating lattice atoms is taken into account. L. J. J.

Behaviour of non-polar crystals just below the m.p. and at the m.p. I. N. Stranski (*Z. Physik*, 1942, **119**, 22—34).—Equilibria at the surfaces of non-polar crystals are discussed. It is supposed that the loosely bound structural units at the surface of a crystal undergo a change corresponding to melting at a temp. below the m.p. The appearance of new surfaces under these conditions is discussed. Small crystals must in general have a higher m.p. than a large cryst. mass. The theory is compared with experiment on certain metallic crystals. A. J. M.

Melting process in non-polar crystals. I. N. Stranski (*Naturwiss.*, 1942, **30**, 425—433).—A lecture in which recent work is summarised and theories are discussed. C. R. H.

Elastic constants of crystals from X-ray studies of thermal agitation of atoms. J. Laval (*Compt. rend.*, 1942, **214**, 623—625).—Mathematical. L. J. J.

Elastic constants of β-quartz. E. W. Kammer and J. V. Atanasoff (*Physical Rev.*, 1942, [ii], **62**, 395—400 ; cf. A., 1941, I, 105).—A new method for quickly locating and measuring weak resonance points of a plate of piezoelectric material is described and applied with a dynamical method to determine all elastic consts. of β-quartz. Vals. obtained and all available data are tabulated. N. M. B.

Active substances. LVI. Allotropic change of finely divided metals on carriers. R. Fricke and H. Müller (*Naturwiss.*, 1942, **30**, 439—440).—The α-Co–β-Co transformation is discussed. Co_2O_3,H_2O or $Co(OH)_2$ mixed with co-pptd. $Al(OH)_3$ was reduced by H_2 at various temp. (300—870°). When reduced above ~450° and cooled to room temp. the cubic (β) structure always resulted. At all reduction temp. the product from $Co(OH)_2+Al(OH)_2$ was spontaneously pyrophoric, but that from Co_2O_3,H_2O was spontaneously pyrophoric only for reduction temp. $<\sim 400°$. The cubic β-Co from Co_2O_3,H_2O was partly transformed into α-Co when rubbed in a mortar, but the β-Co–Al_2O_3 was unchanged after rubbing. C. R. H.

Nature of low-temperature transformation of ND_4I. A. Smits and D. Tollenaar (*Z. physikal. Chem.*, 1942, **B**, **52**, 222—229).—The low-temp. transformation of ND_4I, investigated dilatometrically, is continuous; the vol. effect is $\sim 6\% >$ that in NH_4I; the min. and the max. V, respectively, are 3·9° and 2·8° lower than in NH_4I. The V–T line in ND_4I is displaced to lower temp. as compared with NH_4I and has a steeper slope. The mol. vols. of NH_4Br, NH_4I, ND_4Br, and ND_4I have been determined by X-ray methods. W. R. A.

Pseudocomponents of ammonium halides. A. Smits (*Z. physikal. Chem.*, 1942, **B**, **52**, 230—233).—Postulation of the simultaneous existence of two components in equilibrium in the NH_4 halides is considered to be premature. W. R. A.

IV.—PHYSICAL PROPERTIES OF PURE SUBSTANCES.

Determination of the mol. wt. of cellulose by an end-group method. —See A., 1943, II, 58.

Electrical properties of lead sulphide. H. Hintenberger (*Z. Physik*, 1942, **119**, 1—21).—The conductivity and its variation with temp., the thermo-electric power, and the Hall const. of PbS have been investigated in order to discover how these properties vary with changes in the stoicheiometric composition of the PbS. The conductivity of pure PbS is increased when there is an increase of either Pb or S. The thermo-electric power varies between 700 and -500 μv. per degree, and the Hall const. between 156 and -23 c.c. per coulomb. Treatment of PbS in a vac., thereby leading to removal of S, gives negative vals. With excess of S the vals. are positive. In the first case there is excess semi-conduction, in the second there is defect semi-conduction. The temp. coeff. of conductivity is largely dependent on the stoicheiometric composition of the PbS. A. J. M.

Temperature-dependence of resistance of electrical conductors and semi-conductors. H. Voelkner (*Z. tech. Physik*, 1942, **23**, 100—103).—The dependence of the electrical resistance of W and glowing C filaments on temp. is discussed. W. R. A.

Superconductivity. M. von Laue (*Physikal. Z.*, 1942, **43**, 274—284).—A review and theoretical discussion of superconductivity and related topics, including free energy of order, change of direction of current flow and diamagnetism in superconductors, thermodynamics of superconductivity, and the intermediate state. A. J. E. W.

Theory of superconductivity. K. Ariyama (*Z. Physik*, 1942, **119**, 174—181).—The application of Welker's magnetic interaction relations (A., 1939, I, 132) to the Bloch–Hartree electronic model for metals gives a qual. explanation of superconductivity. L. J. J.

Superconductivity. II. Evaporated lead films. W. F. Brucksch, jun., and W. T. Ziegler. **III. Tin, niobium, tantalum, and lead wires.** W. T. Ziegler, W. F. Brucksch, jun., and J. W. Hickman (*Physical Rev.*, 1942, [ii], **62**, 348—353, 354—356 ; cf. A., 1942, I, 377).—II. Electrical and magnetic properties of evaporated Pb films of thicknesses 1000—3000 A. were studied in the superconducting state. The films show transition temp. (in zero magnetic field) of 7·23 ± 0·03° K., irrespective of thickness. The disappearance of resistance usually occurs within a range of 0·10°. The depression of the transition temp. T_c with increase in measuring current I_c is the greater the thinner is the film. The depression of T_c in magnetic fields of 0—80 oersteds perpendicular to the plane of the film depends on thickness, the thinner films requiring larger external fields to produce unit depression. I_c–T_c curves show new inflexion points, and these are supported by the H_c–T_c curves.

III. Corresponding properties of wires 25—250 μ. in diameter were investigated. Results show that a low resistance ratio R/R_0 (R_0 = room-temp. resistance), high T_c, and small transition range are always found together for a given metal. Pb wires of different thicknesses all gave $T_c = 7{\cdot}20 \pm 0{\cdot}01°$ K., a fact attributed to the similar cryst. character of the wires. N. M. B.

Superconductivity of liquid helium II. J. G. Daunt and K. Mendelssohn (*Nature*, 1942, **150**, 604 ; cf. A., 1939, I, 362, 410).—The theoretical interpretations of the superconductive state and the λ-phenomenon in liquid He II should be fundamentally similar. There is a striking analogy, not merely a superficial similarity, between the two, and this supports the hypothesis (i) that the transfer film of liquid He II extends to all solid surfaces not only above the liquid level but also below it, (ii) that the anomalous transport phenomena (high thermal conductivity, low η, and fountain effect) take place in this film, and (iii) that the λ-phenomenon is due to the existence of He atoms of very low (or zero) thermal energy separated to a certain extent from the bulk liquid, as indicated by the mechano-caloric effect. W. J.

Thermomagnetic properties of magnesium, silver, and lithium. S. R. Rao and (Miss) K. Savithri (*Proc. Indian Acad. Sci.*, 1942, **16**, **A**, 207—220).—Vals. of χ (Curie method) at different temp. from 30° to 270° are given. $\chi_{Mg}^{30°} = 1{\cdot}08 \times 10^{-6}$ and decreases as temp. is raised in a manner similar to rare-earth elements. $\chi_{Li}^{30°} = 2{\cdot}5 \times 10^{-6}$ and increases slowly and slightly until the m.p. is reached, when there is a fall of $\sim 0{\cdot}15 \times 10^{-6}$. $d\chi/d\theta$ agrees with Stoner's theory. The g.-at. susceptibility of Ag is $-19{\cdot}9 \times 10^{-6}$, giving 5·1 v. for the width of the energy band of the free electrons, in good agreement with the calc. val. for max. Fermi energy. The valency electron in Ag approximates very closely to the ideal condition of a free electron. W. R. A.

Magnetic susceptibility of peroxides. (Miss) K. Savithri and S. R. Rao (*Proc. Indian Acad. Sci.*, 1942, **16**, **A**, 221—230).—Vals. of χ for aq. H_2O_2 (at $\not> 32\%$ H_2O_2) and for Na_2O_2 and BaO_2 have been determined and the mol. structures are discussed. H_2O_2 consists of two tautomeric forms, the relative amounts of each depending on $[H_2O_2]$. In Na_2O_2 and BaO_2 the O is linked to the metal by a single linking. W. R. A.

Dispersion of high-frequency acoustic waves in liquids. V. L. Ginzburg (*Compt. rend. Acad. Sci. U.R.S.S.*, 1942, **36**, 8—13).—Possible mechanisms are considered, to account for the decrease in acoustic velocity with increase in frequency (negative dispersion). F. R. G.

Reflectivities of aluminium and silver films. M. V. S. Ramakrishnan (*Indian J. Physics*, 1942, **16**, 12—22).—The reflectivity of evaporated Al films has been compared with that of chemically deposited and sputtered Ag mirrors. The reflectivity of Ag mirrors is improved by polishing but deteriorates rapidly with the tarnishing of the film. Al films have lower reflectivity than Ag films in the infra-red and visible regions but their reflectivity is the higher in the ultra-violet. The reflectivity of Al throughout the region 4000—7000 A. is const. at 90%. Al films do not tarnish. O. D. S.

Relation of the Debye theory and the lattice theory of specific heats. M. Blackman (*Proc. Roy. Soc.*, 1942, **A**, **181**, 58—67).—In the Debye theory of sp. heat of solids the val. of θ calc. from the elastic consts. should be the same as that found from sp. heat data. The ratio of these vals. of θ is calc. from lattice theory and is found to be very nearly unity for NaCl lattices provided that the crystals are not very anisotropic. For other crystal types the val. unity occurs only in isolated cases. G. D. P.

Specific heats and latent heats of fusion and transition of the condensed gases CD_4 and CH_3D. K. Clusius and L. Popp (*Z. physikal. Chem.*, 1940, **B**, **46**, 63—81).—A H_2 liquefaction apparatus which includes facilities for determining thermal changes at ≮10° K. is described. The vol. of the calorimeter is 3 c.c., thereby permitting the use of only 0·06 g.-mol. of gas. The prep. of pure CD_4 from D_2 and CO_2 and of MeD from MgMeI and D_2O is described. The triple-point pressures, m.p., mol. latent heats of fusion, transition points, and sp. heats at various temp. of solid and liquid CD_4 and MeD are recorded and compared with corresponding data for CH_4. Besides the two forms corresponding to the solid forms of CH_4, solid CD_4 and MeD also exist in a third low-temp., double refracting form. J. W. S.

Linear speed of crystallisation of potassium, sodium, and lithium disilicates. A. Leonteeva (*Acta Physicochim. U.R.S.S.*, 1942, **16**, 97—101; cf. A., 1941, I, 331, 408).—Crystallisation speed–temp. curves for the compounds $M^I{}_2O,2SiO_2$ (M^I = Na, K, Li) are given; max. occur at 762°, 930°, and 760°, respectively. The relation of crystallisation to viscosity is discussed. A. J. E. W.

Density of selenium. A. N. Campbell and S. Epstein (*J. Amer. Chem. Soc.*, 1942, **64**, 2679—2680).—ρ of metallic and liquid Se have been measured from 20° to 277°. The measurements give no indication of a shifting internal equilibrium, and agree with the conclusions of Dobinski *et al.* (A., 1937, I, 175). The rise of m.p. with pressure has been calc. W. R. A.

Representation of vapour pressures. J. P. E. Duclaux (*Compt. rend.*, 1942, **214**, 619—621).—Data for H_2O are in better agreement with the author's formula (cf. A., 1942, I, 357) than with the Dupré formula $\log P = -A/T + B + C \log T + DT + \ldots$ L. J. J.

Mathematical correlation of the paraffins. P. Buthod, L. Rowell, E. Stewart, jun., and W. S. Foster (*Oil and Gas J.*, 1942, **41**, No. 21. 38).—For the lighter paraffins the v.p. (P) may be calc. from the equation $\log P = 0{\cdot}08522n + 5{\cdot}18573 + 853{\cdot}4n^{0{\cdot}6625}/\theta$, where P is lb. per sq. in. abs.; n = no. of C atoms in the mol.; θ = temp. °F. abs. J .W.

Critical pressure from b.p. and parachor data. M. S. Telang (*J. Indian Chem. Soc.*, 1942, **19**, 366—368).—The crit. pressure (P_c) can be obtained from the formula $P_c = k \,.\, T_b/[P]$, where T_b is the abs. b.p. at 760 mm. and $[P]$ is the parachor. If P_c is in cm. k has a mean val. of 1952 for 25 non-associating liquids, for which the agreement between calc. and observed vals. of P_c is fairly good. F. L. U.

Liquid state. (Sir) C. V. Raman (*Current Sci.*, 1942, **11**, 303—310). —A review. W. R. A.

Tensile stress of water and liquid structure theory. R. S. Silver (*Nature*, 1942, **150**, 605).—Consideration of Fürth's hole theory suggests that the liquid should maintain a tensile stress up to the limit corresponding to the hydrostatic pressure p^*, but that owing to the disturbing influence of evaporation nuclei (particles and dissolved gases) the actual limit may be much less, and in water negligible. A tensile stress above the limit imposed by the nuclei may, however, persist for a short time, the val. attained depending on the relative times for the evaporation and for the growth of the stress. The ultimate limit corresponding to p^* could be maintained for an infinitesimal time and transmitted as a tensile wave. In H_2O a very steep tensile wave-front would be expected, and observations of explosion waves and erosive action afford evidence of the transmission of such a wave, several hundred kg. per sq. cm. W. J.

Failure of elastic-viscous material in the process of relaxation. G. M. Ivanov (*Compt. rend. Acad. Sci. U.R.S.S.*, 1942, **35**, 142—145).—Theoretical. The relaxation process in an elastic-viscous material in which elastic deformation, plastic flow, and rate of plastic flow are finite is discussed. A. J. M.

V.—SOLUTIONS AND MIXTURES (INCLUDING COLLOIDS).

Thermal diffusion of radon–gas mixtures. G. E. Harrison (*Proc. Roy Soc.*, 1942, **A**, **181**, 93—100; cf. A., 1937, I, 558).—Thermal diffusion of Rn–Ne and Rn–A mixtures has been studied. Vals. for the force field between dissimilar mols. are deduced. The results show that Rn is the " softest " of the inert gas mols. G. D. P.

Partial pressures. E. C. Craven (*Chem. and Ind.*, 1943, 27—28).—Difficulties in the practical interpretation of Dalton's law are noted. For most indifferent gases Amagat's additive vol. law is more nearly true. Where combination or increased mol. attraction occurs the total vol. will increase, and vice versa. F. L. U.

Physical effects of substances highly diluted according to a power law. K. Wintersberger (*Naturwiss.*, 1942, **30**, 330).—The special properties of solutions diluted according to a power law (cf. Heintz, A., 1942, I, 393) are doubted. Impurities from the conductivity vessel might account for the variation in conductivity. The effect of light on the conductivity of EtOH, and the use of platinised Pt electrodes with alcoholic solutions, are also possible sources of error. A. J. M.

Very dilute liquid mixtures. H. Harms (*Z. physikal. Chem.*, 1940, **B**, **46**, 82—104).—The densities of dil. solutions of MeOH and EtOH in *cyclo*hexane, C_6H_6, and CCl_4 have been measured by the float method. The departures from vol. additivity are deduced and are compared with the heats of mixing of the liquids at these concns. From measurements of the heats of evaporation and of mixing, the energies of solvation of the solute mols. and the energy of transference of the solute mols. from the solution to the vapour state are deduced. J. W. S.

Light yield of photoluminescence of aqueous solutions of thallous salts. I. I. Kondilenko and A. A. Schischlovski (*Compt. rend. Acad. Sci. U.R.S.S.*, 1942, **35**, 236—240).—The abs. energy yield of photoluminescence of aq. TlCl (5×10^{-5} g. per c.c.) drops from 36·0% (≡61.7% quantum yield) in absence of added chloride to 18·3% (≡31·5% quantum yield) in presence of 2·5M-KCl. EtOH has a strong quenching action. The calc. mean period of the excited state of the hydrated $Tl^{\cdot}$ ion = $1{\cdot}14 \times 10^{-8}$ sec., the val. usual for spontaneous radiation. C. R. H.

Dipole swarm formation in solution. H. Hartmann (*Z. physikal. Chem.*, 1942, **B**, **51**, 309—318).—Mathematical. Swarm formation of polar mols. in non-polar solvents has been calc. and the vals. have been used to derive thermodynamic properties of the solutions in qual. agreement with experimental data. The possibility of distinguishing experimentally between swarm and association theories is discussed. W. R. A.

Osmotic pressure and diffusion. R. Lucas (*Compt. rend.*, 1942, **214**, 536—538).—Mathematical. From the osmotic pressure wave expression (A., 1942, I, 393), the osmotic pressure is evaluated with the help of experimental data. Results show the conditions under which solutions are normal and those under which they deviate from van't Hoff's law. N. M. B.

Propagation of ultrasonic waves in liquid mixtures and intermolecular forces. II. R. Prasad (*Indian J. Physics*, 1942, **16**, 1—11; cf. A., 1942, I, 201).—The compressibility–concn. curves for mixtures of EtOH and C_6H_6 and of C_6H_6 and Et_2O have been determined. These results and those of previous workers for C_7H_{16}–BuOH, C_6H_6–CCl_4, and EtOAc–CCl_4 mixtures are interpreted qualitatively on a theory of mol. force fields. O. D. S.

Theory of concentrational quenching of fluorescence in solutions. S. I. Vavilov (*Compt. rend. Acad. Sci. U.R.S.S.*, 1942, **35**, 100—106).—Theories of concentrational quenching of fluorescence are reviewed and a new one is developed. The probability of there being no quenching during a certain interval of time for a given concn. for a mol. that has absorbed one quantum is computed, and in a similar way, the chance of there being no transfer of energy under the same conditions is obtained. A law is obtained for the decay of fluorescence in the case of concentrational quenching. It is in satisfactory agreement with experimental results with fluorescein, rhodamine-B, and eosin in glycerol. A. J. M.

Cryoscopic and viscosity studies of poly*iso*butylene. Cryoscopic deviation of poly*iso*butylene solutions from Raoult's law. A. R. Kemp and H. Peters (*Ind. Eng. Chem.*, 1942, **34**, 1192—1199).—The val. of K_{cm} in the mol. wt.–η equation $M = (\log \eta_r \times K_{cm})/C$ for poly*iso*butylene in n-C_6H_{14} increases from $0{\cdot}60 \times 10^4$ for the trimeride to a const. val. of $0{\cdot}75 \times 10^4$ at mol. wt. 1000; above 2300 negative deviations from Raoult's law are observed. Extrapolation of cryoscopic data from non-ideal solutions to infinite dilution gives inordinately high mol. wt. vals. compared with those based on f.p. measurements of ideal solutions. For mol. wt.–η measurements n-C_6H_{14} is the best solvent; C_6H_6 behaves anomalously. A slight decrease in η on shaking n-C_6H_{14} solutions of polymerides of mol. wt. 10^5 and greater was observed. Fractionation of polymerides may be effected by diffusion of n-C_6H_{14} solutions into a mixture of n-C_6H_{14} and $COMe_2$. D. F. R.

Viscosity of dilute solutions of long-chain molecules. IV. Dependence on concentration. M. L. Huggins (*J. Amer. Chem. Soc.*, 1942, **64**, 2716—2718).—Modification of previous theoretical treatment of η of dil. solutions of long-chain mols. (cf. A., 1939, I, 318) yields an equation for the initial concn.-dependence of η identical with that proposed empirically by Schulz and Blaschke (A., 1942, I, 364). The form of the equation at low concns. is discussed and compared with existing equations. W. R. A.

Magnetic studies of colour changes in cupric chloride. N. A. Yajnik, R. Chand, A. N. Kapur, and D. C. Jain (*J. Indian Chem. Soc.*, 1942, **19**, 357—362).—The variation of magnetic susceptibility (χ) with concn. was measured for solutions of $CuCl_2$ in H_2O, MeOH, EtOH, Pr^aOH, and Bu^aOH. In H_2O, Pr^aOH, and Bu^aOH the curves are made up of two straight lines meeting at an angle which corresponds with a sharp colour change (blue–green), whilst in MeOH and EtOH the change of χ is represented by a single straight line, and the solutions are green at all concns. between 1·3 and 32% (MeOH) and between 2·4 and 13% (EtOH). The results are regarded as consistent with the theory that the colour change is due to the formation or dissociation of complex ions, but not with that which attributes the change to solvation. F. L. U.

Partial molal volumes of nickel sulphate solutions. R. W. Gelbach and H. M. Louderback (*J. Amer. Chem. Soc.*, 1942, **64**, 2379).—At 25° the aq. solubility of $NiSO_4$ is 28·42 g. per 100 g. of solution. Vals. of ρ^{25} have been determined for aq. $NiSO_4$ (0·0634 to 2·525M.). The partial molal vols. conform to the Debye–Hückel limiting law. W. R. A.

System aluminium–zinc. O. Tiedemann (*Z. physikal. Chem.*, 1942, **A**, **191**, 133—144; cf. B., 1926, 160, 751).—Recent work by Röhrig and Rock (*Metallwirts.*, 1941, **20**, 383) and Feldmann (*ibid.*, 501) is discussed and shown to support the existence of a metastable region of Al–Zn alloys with <29% Zn. F. L. U.

Composition–thermostability diagram of the ternary solid solution of iron–chromium–aluminium alloys. I. Kornilov and R. Minz (*Compt. rend. Acad. Sci. U.R.S.S.*, 1942, **34**, 78—82).—The relation of the thermostability of the system Fe–Cr–Al to its composition has been studied by measuring the rate of loss of wt. per unit surface when alloys of varying composition were held at 1100°, 1200°, 1300°, and 1400° for 240 hr. The results were the same at all four temp. and the rate of oxidation was decreased by increased amounts of Cr and Al. Curves of const. loss of wt. in the Fe–Cr–Al system are reproduced; at a Cr content of 15—20% they almost become straight lines parallel to the Fe–Cr binary system. J. L. E.

Chromium–silicon system. N. N. Kurnakov (*Compt. rend. Acad. Sci. U.R.S.S.*, 1942, **34**, 110—113; cf. A., 1940, I, 291).—Thermal analysis data, and data on hardness and temp. coeff. of electrical resistivity, are recorded; they indicate the existence of Cr_3Si, Cr_2Si, Cr_3Si_2, CrSi, and $CrSi_2$, which is also supported by the microstructure of cast and annealed alloys. L. S. T.

System chromium–silicon–iron in the region of silicochrome. N. N. Kurnakov (*Compt. rend. Acad. Sci. U.R.S.S.*, 1942, **34**, 158—159).—Sections of the ternary system Cr–Si–Fe are shown for 15 and 25% Fe and a tentative ternary diagram for alloys with >25% Si. The silicides (Cr,Fe)Si and $(Cr,Fe)Si_2$ form a eutectic system, as also does the latter with Si. A. R. P.

Solubilities of weak acids in salts of weak acids. W. V. Bhagwat, M. Varma, and H. G. Hermalkar (*J. Indian Chem. Soc.*, 1942, **19**, 363—365).—Solubilities of BzOH and of $o\text{-}OH{\cdot}C_6H_4{\cdot}CO_2H$ in solutions of K salts of various weak acids have been determined (vals. not given), and the solubility–concn. curves are discussed. F. L. U.

Solubility maximum of boric oxide in concentrated nitric acid. F. Trombe (*Compt. rend.*, 1942, **214**, 488—490).—Solubility (*S*) data for B_2O_3 in HNO_3 (0—100%) at 30° are recorded in triangular diagrammatic form. *S* has a min. val. of 0·6% in 30% HNO_3 and a max. val. of 25% in 91% HNO_3. *S* decreases rapidly as $[HNO_3]$ increases above 94%, the ratio B_2O_3/H_2O remaining const. and ~1. C. R. H.

Solubility relations of mercuric oxide in aqueous solutions of hydrogen chloride. A. B. Garrett and J. Lemlet (*J. Amer. Chem. Soc.*, 1942, **64**, 2380—2383).—In dil. HCl the solubility curve for HgO shows a break due to formation of a new solid phase, $2HgO,HgCl_2$ (**I**), but the exact val. of [HCl] at the transition point has not been determined. (**I**) has solubility of $11{\cdot}4 \times 10^{-4}$ mol. per 1000 g. of H_2O. The relative distribution of dissolved Hg among Hg(OH)Cl, $HgCl_2$, $HgCl^{\bullet}$, and $HgCl_3'$ is discussed. W. R. A.

Solubility of strontium chromate and the detection of strontium.—See A., 1943, I, 42.

Solubility of potassium and zinc iodates in dioxan–water mixtures. Effect of sorting of solvent molecules. J. E. Ricci and G. J. Messe (*J Amer. Chem. Soc.*, 1942, **64**, 2305—2311).—Solubilities of KIO_3 and $Zn(IO_3)_2$ at 25° have been determined in H_2O–dioxan (0—100 wt.-%) mixtures and agree with the empirical rule of the constancy of the activity coeff. of electrolytes at saturation (A., 1940, I, 207). Agreement between observed and calc. vals. is satisfactory. The results are used to test modified equations of Born and Debye. W. R. A.

Solubilities of orthanilamide, metanilamide, and sulphanilamide. R. H. Kienle and J. M. Sayward (*J. Amer. Chem. Soc.*, 1942, **64**, 2464—2468).—Aq. solubilities in the temp. range 23—50° have been measured and yield heats of dissolution: *o*- 7820, *m*- 9570, $p\text{-}NH_2{\cdot}C_6H_4{\cdot}SO_2{\cdot}NH_2$ (**I**) at <37° 10,860 and at >37° 9050 g.-cal. per mol. The solubility curve of (**I**) shows a discontinuity at 37°, confirmed dilatometrically, and represents a transition involving a monohydrate. In buffered solutions of pH 1·2—12·4 at 37° solubilities are min. at pH 4·5—5·0 and increase rapidly at pH >9 and <3. W. R. A.

Absorption of hydrogen by monocrystalline and polycrystalline iron. L. Moreau, G. Chaudron, and A. Portevin (*Compt. rend.*, 1942, **214**, 554—555).—A comparison and discussion of the changes in surface properties due to H_2 penetration of specimens of Fe heated at ~800° for 0—100 hr. in H_2. N. M. B.

Adsorption of gases at low temperature and pressure on smooth silver. M. H. Armbruster (*J. Amer. Chem. Soc.*, 1942, **64**, 2545—2553).—Adsorption of H_2, N_2, A, CO, CO_2, and O_2 at pressures up to 0·1 cm. on a substantially plane reduced surface of Ag has been measured from −195° to 20°. H_2 is not measurably sorbed at any temp. A, N_2, and CO are sorbed at −195° and −183° but not at −78° or 20°. CO_2 is sorbed at −78° to a slight extent at 0·02 cm., but not at 20°. The adsorption is always instantaneous and reversible. O_2 is sorbed at −195° and −183° and, although most of the gas appears to be held by van der Waals forces, some cannot be removed by pumping at higher temp. At −78° and 20° there is activated adsorption of O_2. All the isotherms are satisfactorily represented by the Langmuir equation and are of the type observed with a plane surface of other metals. The vals. of the limiting vol., V_6, derived from the slope of the p/v–p isotherm, correspond with a surface only partly covered, to an extent varying from ~20 to 90% of a close-packed unilayer. Results of force–area curves, derived by two different methods, differ considerably. The adsorption of O_2 on smooth Ag and the adsorption of O_2 on finely-divided Ag as reported by Benton *et al.* (A., 1927, 118; 1934, 370) are compared. W. R. A.

Sorption of carbon monoxide by metals. Temperature variation experiments. C. W. Griffin (*J. Amer. Chem. Soc.*, 1942, **64**, 2610—2613).—Sorption of CO on supported Cu and on massive and supported Pb has been measured with temp. variation. Results are similar to those for H_2 on massive and supported metals and indicate that dissolution occurs as well as adsorption. W. R. A.

Adsorption and energy changes at crystalline solid surfaces. G. E. Boyd and H. K. Livingston (*J. Amer. Chem. Soc.*, 1942, **64**, 2383—2388).—The change in free energy on immersion in a saturated vapour has been determined for non-porous cryst. TiO_2, SiO_2, $BaSO_4$, SnO_2, and graphite by graphical integration of vapour adsorption data utilising the Gibbs adsorption relation. The free energy change on immersion in a liquid and the work of adhesion of a liquid to a solid surface have also been derived. If the equilibrium contact angle is >0° a duplex angle cannot exist, but a unilayer may cover the surface of the solid. W. R. A.

Fibrous aluminium oxide and its use as an adsorbent in adsorptiometry and chromatoscopy. H. Wislicenus (*Kolloid-Z.*, 1942, **100**, 66—82).—A summary of the properties, evaluation, prep. (given in detail), and applications of activated Al_2O_3. F. L. U.

Relative surface tension of potassium chloride solutions by a differential bubble pressure method. F. A. Long and G. C. Nutting (*J. Amer. Chem. Soc.*, 1942, **64**, 2476—2482).—Vals. of relative γ of KCl solutions, measured by a differential max. bubble pressure apparatus (described), differ from recorded data. The γ–concn. curve has no min. and the results are in accord with the Onsager–Samaras predictions. W. R. A.

Attachment and detachment of dropping mercury under various conditions. I. M. Kolthoff and G. J. Kahan (*J. Amer. Chem. Soc.*, 1942, **64**, 2553—2557).—An abnormally large drop time was found when electrically disconnected Hg drops into air-saturated H_2O or when Hg connected with a pool of Hg drops into air-free H_2O. The drop of Hg remains attached to the glass. The smaller is the bore of the capillary the more pronounced this abnormal behaviour becomes. The results obtained with an abnormally dropping capillary are badly reproducible and depend greatly on the degree of inclination of the capillary. The abnormal behaviour has been interpreted on the basis of interaction between the electrical double layers at the glass– and at the Hg–aq. phase interfaces. W. R. A.

Spontaneously forming emulsions. Mechanism of formation of soluble oils. Adsorption layers in disperse systems. K. Pospelova and P. Rehbinder (*Acta Physicochim. U.R.S.S.*, 1942, **16**, 71—87).—Systems consisting of Na oleate or a naphthenic soap, a mineral oil, and a soap of a sulphonated castor oil are studied, and regions of stability for emulsols and sol. oils are plotted. Dispersity data are also recorded and discussed. Sol. oils are systems containing hydrocarbon sufficient only to build up a firmly-bound "superstructure" of mols. on the soap micelles; emulsols contain a larger quantity of hydrocarbon, the excess being held to the micelles by weak wetting forces. Transformation of a mineral oil–soap mixture into an emulsol occurs by a phase inversion process at a crit. $[H_2O]$. When an emulsol is diluted with H_2O the excess oil mols. become detached from the micelles and coalesce to droplets, the sol. oil formed simultaneously acting as an emulsifier. A. J. E. W.

Calculation of dimensions of colloidal particles from the scattering of *X*-rays at small angles. O. Kratky (*Naturwiss.*, 1942, **30**, 542—543).—The investigation is carried out for a close-packed system in which the space between the colloidal particles is small compared with the vol. of the particles. An expression is obtained by which it is possible to calculate the size of colloidal particles from the small-angle diffraction diagram. A. J. M.

Solubility of substances of high mol. wt. VIII. Dependence of solubility on mol. wt. G. V. Schulz and B. Jirgensons (*Z. physikal. Chem.*, 1940, **B**, **46**, 105—136; cf. A., 1940, I, 24).—The variation of the solubility of high-mol. wt. substances with mol. wt. and with the concn. of the pptg. liquid has been studied for the systems cellulose nitrate–$COMe_2$–H_2O, starch triacetate–$CHCl_3$–Et_2O, polystyrene–C_6H_6–MeOH, and polymerised $CH_2{:}CMe{\cdot}CO_2Me$–C_6H_6–

*cyclo*hexane. The results are in accord with the relationship derived previously, and the mol. wt. of such substances can be determined by pptn. measurements. The equilibrium between the two phases produced on adding the precipitant is discussed with reference to the energy of transfer of the macromols., their association in the solutions, and the effect of temp. on the compositions of the phases. J. W. S.

Sedimentation and diffusion measurements with the water-soluble polysaccharide from larch wood. H. Mosimann and T. Svedberg (*Kolloid-Z.*, 1942, **100**, 99—105).—The polysaccharide consists of two components, of which one (α) was obtained in a pure state by centrifuging in a cell of special design as well as by fractional pptn. with EtOH. Determinations of the mol. wt. of α by Lamm's diffusion method and by sedimenting in the ultracentrifuge gave the same val., 16,000. The mol. wt. of the second component (β), which could not be obtained free from (α), is 100,000. The α component (an araban) is certainly, and the β (galactan) probably, homodisperse. F. L. U.

Colloid chemistry of the amyloses. M. Samec (*Kolloid-Z.*, 1942, **100**, 106—110).—A summary. Further fields for investigation are indicated. F. L. U.

Deformation and orientation of isotropic cellulose nitrate fibres. III. Double refraction of swollen and soaked fibres. H. R. Kruyt, D. Vermaas, and P. H. Hermans (*Kolloid-Z.*, 1942, **100**, 111—121; cf. A., 1942, I, 397).—Measurements of the double refraction (δ) of cellulose nitrate fibres stretched to varying extents after immersion in EtOH, EtOH–COMe$_2$ mixtures, and other org. liquids are recorded. Relations between the rod-δ and adsorption-δ and extension are discussed. The observations lead to the conclusion that during extension of the swollen fibre breaking down of cryst. material, recrystallisation of amorphous material, and orientation of micelles occur. In EtOH–COMe$_2$ mixtures these processes occur simultaneously, in 100% EtOH consecutively. F. L. U.

Syneresis of silica gels containing addition agents. L. A. Munro and G. E. Monteith (*Canad. J. Res.*, 1942, **20**, **B**, 212—220).—A standardised method of measuring syneresis is described. Investigations on SiO$_2$ gels containing MeOH, EtOH, (CH$_2$·OH)$_2$, or glycerol show that the total vol. of syneretic liquid at equilibrium is the same as for the gel without addition, and that the concn. of the alcohol in the liquid is the same as in the initial gel, indicating that no adsorption of the alcohol occurs in the gel itself. J. W. S.

New type of double refraction in oriented gels. D. Vermaas (*Z. physikal. Chem.*, 1942, **B**, **52**, 131—141).—Analysis of the double refraction exhibited by oriented cellulose nitrate swollen in various solvents indicates the presence of a fourth component arising from the mols. of the imbibed liquid oriented under the influence of the colloidal material. The variation of this "adsorption double refraction" with the degree of swelling of the gel has been investigated. J. W. S.

Physicochemical and electrokinetic properties of gels of silicic acid and aluminium hydroxide and some synthetic and natural aluminosilicates, especially in relation to ion exchange phenomena. S. P. Raychaudhuri and A. K. M. Qudrat Ghani (*J. Indian Chem. Soc.*, 1942, **19**, 311—330).—Data are recorded for the electro-osmotic behaviour, base exchange capacities, and buffer curves of dialysed gels of SiO$_2$ and Al$_2$O$_3$ and of dialysed gels obtained by mixing sols of SiO$_2$ and Al$_2$O$_3$ in varying proportions. These properties are compared with corresponding properties of natural aluminosilicates. F. L. U.

VI.—KINETIC THEORY. THERMODYNAMICS.

Third dissociation constant of phosphoric acid and its variation with salt content. R. C. Wells (*J. Washington Acad. Sci.*, 1942, **32**, 321—326).—H electrode measurements of solutions of phosphate mixtures have been made and the effect of added chlorides investigated. The effect of temp. on pH is small. For Na$_2$HPO$_4$ + Na$_3$PO$_4$ $pK_3 = 11{\cdot}57 - 0{\cdot}50\sqrt{M_P}$ at 27°, where M_P = combined molality of HPO$_4''$ + PO$_4'''$. In presence of NaCl $pK_3 = 11{\cdot}57 - 0{\cdot}50\sqrt{M_P} - 0{\cdot}98\sqrt[3]{M_{NaCl}}$. The effect of sea salts (s) is very similar to that of NaCl and M_s can replace M_{NaCl} in the second equation. Since M_P is negligible in sea-H$_2$O, the equation for sea-H$_2$O at 27° becomes $pK_3 = 11{\cdot}57 - 0{\cdot}98\sqrt[3]{M_s}$. C. R. H.

Spectrophotometric determination of dissociation constants of diphenylselenium dibromide and di-iodide. J. D. McCullough (*J. Amer. Chem. Soc.*, 1942, **64**, 2672—2676).—Spectrophotometric studies of SePh$_2$Br$_2$ and SePh$_2$I$_2$ show that in CCl$_4$ they dissociate into SePh$_2$ and free halogen. Vals. of dissociation consts. at 26° ± 1° are $5{\cdot}02 \times 10^{-4}$ and $3{\cdot}60 \times 10^{-2}$. Molar extinction coeffs. for SePh$_2$, SePh$_2$Br$_2$ and SePh$_2$I$_2$ are given. An accurate volumetric procedure for the determination of Se diaryl dihalide is described. W. R. A.

Revised constants for the Debye–Hückel theory. H. I. Stonehill and M. A. Berry (*J. Amer. Chem. Soc.*, 1942, **64**, 2724—2725).—Revised vals. for h and g in the Debye–Hückel equation are h 0·5103, g $0{\cdot}3290 \times 10^8$. W. R. A.

Individual activities of thallium and nitrogen ions in solutions of thallium nitride [azide]. (Mme.) M. L. Brouty (*Compt. rend.*, 1942, **214**, 480—483).—E.m.f. data lead to the vals. $E_0 = 0{\cdot}3339$ and $-0{\cdot}2950$ v. for Tl$^\cdot$ and N$'''$ respectively, the ionic radii being 0·6 and 8·5 A., respectively. C. R. H.

System ethanol–methanol at 40°. A. C. Morris, L. T. Munn, and G. Anderson (*Canad. J. Res.*, 1942, **20**, **B**, 207—211).—The total and partial v.p. of the system EtOH–MeOH have been measured at 40° over the entire concn. range. Within experimental error the partial pressure curves accord with Raoult's law and the total pressure–mol. composition curve is linear. J. W. S.

Equilibrium pressure of certain univariant systems. M. Dodé (*Compt. rend.*, 1942, **214**, 549—551).—Mathematical. An examination of the passage of the univariant dissociation of a solid A into a solid A' not forming solid solutions with A, into the bivariant dissociation of liquid A when it forms a homogeneous solution with A'. Equations for the equilibrium pressure are derived, which account for the max. in the pressure–temp. relation and are in accord with experimental data for the dissociation of oxides of Cu. N. M. B.

Phase equilibria at high temperatures. R. R. White and G. G. Brown (*Ind. Eng. Chem.*, 1942, **34**, 1162—1174).—Experimental liquid–vapour phase equilibrium data are given for petroleum fractions of b.p. 95—750° F. at temp. from 300° to 820° F. and at pressures from 50 to 700 lb. per sq. in. The results are used to extend the estimated ideal equilibrium vaporisation consts. to hydrocarbons of b.p. up to 925° F. at temp. from 0° to 1000° F. and at pressures from 15 to 1000 lb. per sq. in., and to develop a relation for estimating the vals. of the vaporisation consts. in the crit. and retrograde regions of complex hydrocarbon mixtures. D. F. R.

Equilibrium of carbon dioxide and carbon monoxide in contact with nickel and nickel oxide or with nickel, γ-alumina, and nickel aluminate, and its modification by the physical state of the solid reactants. R. Fricke and W. Weitbrecht (*Z. Elektrochem.*, 1942, **48**, 389).—A correction (cf. A., 1942, I, 241). J. W. S.

Kinetics of formation of two-phase systems near the critical point. O. Todes and J. Zeldovitsch (*Acta Physicochim. U.R.S.S.*, 1942, **16**, 26—33).—Possible states of a system near the crit. point are (a) states such that small arbitrary changes lead eventually to phase separation, and (b) states which are stable with respect to small changes, but unstable with respect to a new phase. The characteristics of states of type (a) are considered. The rate of phase separation depends on the rate of heat exchange between the phases, the theory showing that c_p is negative for certain systems. Expressions are derived for the time of separation into phases. The existence of certain theoretically unattainable states is briefly considered. A. J. E. W.

Homeomorphous transformations of potassium chloride, bromide, and iodide in a homogeneous crystalline medium. A. G. Bergman (*Compt. rend. Acad. Sci. U.R.S.S.*, 1942, **35**, 274—277).—Examination of available data together with data obtained by the author confirms the existence of polymorphous transformations for KCl at 27° and for KBr at 22°, accompanied by no pronounced reconstruction of the cryst. lattice. Breaks in the solubility curves of KCl, KBr, and KI occur at 27°, 20°, and 11°, respectively. C. R. H.

Iodine monochloride. IV. System potassium chloride–iodine monochloride. J. Cornog and E. E. Bauer (*J. Amer. Chem. Soc.*, 1942, **64**, 2620—2624).—The v.p. of ICl between −15° and 50° has been measured by a dynamic method; the derived vals. of heats of fusion, vaporisation, and sublimation are: 1850, 9950, and 11,800 g.-cal. per mol. The v.p.–composition relations of the system KCl–ICl have been formulated. *KCl,2ICl* or *KCl$_3$I$_2$* has been prepared by direct union of KCl and ICl at <45°. The dissociation pressures of KCl,ICl and its monohydrate and of KCl,2ICl have been determined. Solubility curves for KCl,ICl and KCl,2ICl in ICl indicate a transition point at 45°. W. R. A.

Binary system CaSiO$_3$–diopside and the relations between CaSiO$_3$ and akermanite.—See A., 1943, I, 74.

System CaSiO$_3$–diopside–anorthite.—See A., 1943, I, 74.

The systems LiNO$_3$–NH$_4$NO$_3$ and LiNO$_3$–NH$_4$NO$_3$–H$_2$O. A. N. Campbell (*J. Amer. Chem. Soc.*, 1942, **64**, 2680—2684).—Thermal analysis of the system LiNO$_3$–NH$_4$NO$_3$ has confirmed and extended the results of Perman and Harrison (A., 1924, ii, 756). The system LiNO$_3$–NH$_4$NO$_3$–H$_2$O has been investigated at 25°, 31°, 60°, and 90° by solubility technique. No compound is formed; solid NH$_4$NO$_3$ and LiNO$_3$ are mutually insol. LiNO$_3$ exists in only one cryst. form; the existence of LiNO$_3$,0·5H$_2$O is doubted. W. R. A.

System sodium nitrate–dioxan–water at 25°. B. Selikson and J. E. Ricci (*J. Amer. Chem. Soc.*, 1942, **64**, 2474—2476).—Using the Karl Fischer reagent to determine the H$_2$O in equilibrium liquids, the solubility relationships in the system NaNO$_3$–dioxan–H$_2$O have been investigated at 25°. Exact vals. are given for the solubility of NaNO$_3$ at 25° in dioxan containing very small % of H$_2$O. W. R. A.

Heats of organic reactions. XIV. Digestion of β-lactoglobulin by pepsin. R. Haugaard and R. M. Roberts (*J. Amer. Chem. Soc.*, 1942, **64**, 2664—2671).—Native β-lactoglobulin (**I**) and (**I**) denatured by alkali were digested by pepsin at pH 1·5 and heat evolved, N precipitable by $CCl_3 \cdot CO_2H$, increase in NH_2-N, and dialysable N have been measured in the same digest as a function of the time of digestion. The apparently simultaneous scission of a no. of peptide linkings whenever a mol. of (**I**) is attacked suggests that the elimination of one such linking greatly decreases the stability of the others. Since the thermal effect is not ∝ the hydrolysis the digestion is probably accompanied by an exothermic non-hydrolytic process. W. R. A.

Apparent energy of the N–N linking as calculated from heats of combustion. C. M. Anderson and E. C. Gilbert (*J. Amer. Chem. Soc.*, 1942, **64**, 2369—2372).—Isothermal heats of combustion have been determined for NH_2Ph, NH_2Bz, $(NHBz)_2$ (**I**), $NHPh_2$, $NHPh \cdot NH_2$ (**II**), and N_2Ph_4 (**III**). Vals. for the energy of the N–N linking in (**I**), (**II**), (**III**), and $(NHPh)_2$ have been calc.; they depend on the nature of the substituent groups attached to N. W. R. A.

Thermochemistry of acid dissociation. Proton affinities of acid anions. G. Briegleb (*Naturwiss.*, 1942, **30**, 436—439).—The proton affinities (*P*) of the anions of H_2O, PhOH, AcOH, HCO_2H, $CH_2Cl \cdot CO_2H$, and the halogen acids have been evaluated. *P* for the halogen acids is 60—70 kg.-cal. < for the weak acids. For the latter *P* increases slightly with decreasing dissociation const., being 380 kg.-cal. for $CH_2Cl \cdot CO_2H$ and rising to 386 kg.-cal. for PhOH. For H_2O $P = 392$ kg.-cal. The data are discussed with reference to the thermochemistry of dissociation and hydration. C. R. H.

Calculation of free energies of formation from ternary phase diagrams. F. Halla (*Z. physikal. Chem.*, 1940, **A**, **185**, 426—434).—Theoretical. The author's method of calculating free energies of formation of the binary phase of two-component systems (cf. A., 1936, 290) has been extended to three-component systems and illustrated with data for eight metallic systems. C. R. H.

VII.—ELECTROCHEMISTRY.

Temperature coefficient of the conductance of potassium chloride solutions. A. R. Gordon (*J. Amer. Chem. Soc.*, 1942, **64**, 2517).—Li and Fang's data (A., 1942, I, 399) for 30° and 40° should for the present be treated with reserve. W. R. A.

Effect of centrifugal fields on the electromotive force of galvanic cells. D. A. MacInnes (*Ann. New York Acad. Sci.*, 1942, **43**, 243—251).—A mathematical treatment and a discussion of some experimental methods and results. N. M. B.

Oxidation–reduction potentials of the platinum compounds including organic amines and glycine. A. A. Grünberg and V. N. Lavrentiev (*Compt. rend. Acad. Sci. U.R.S.S.*. 1942, **35**, 203—205).—Oxidation–reduction potentials (*E*) at 25° of (*a*) $[Pt(NH_2R)_2Cl_2] + 2Cl' \rightleftharpoons [Pt(NH_2R)_2Cl_4] + 2e$ (*cis* and *trans*) (R = H, Et), (*b*) $[Pt(NH_2 \cdot CH_2)_2Cl_2] + 2Cl' \rightleftharpoons [Pt(NH_2 \cdot CH_2)_2Cl_4] + 2e$, and (*c*) $[Pt(NH_2 \cdot CH_2 \cdot CO_2H)_2] + 2Cl' \rightleftharpoons [Pt(NH_2 \cdot CH_2 \cdot CO_2H)_2Cl_2] + 2e$ (*cis* and *trans*) in N-NaCl are > in N-HCl (cf. A., 1940, I, 295), by 26 and 29 mv. for the *cis* and *trans* systems respectively, which is about the same as for $[PtCl_4]'' + 2Cl' \rightleftharpoons [PtCl_6] + 2e$. The vals. of *E* for (*a*) R = Et > for (*a*) R = H > for (*b*). Exceptionally (*c*) has lower vals. of *E* which for the *cis* is greater by 13 mv. than for the *trans* system. F. R. G.

Iron electrode potential in a magnetic field. A. L. Parson (*Nature*, 1942, **150**, 605—606).—A brief account of an experimental test of reported observations of p.d. between two Fe electrodes one of which is in a magnetic field and the other is not, *e.g.*, p.d. of 0·05 v. for 30,000 gauss, by Paillot and others. In the tests described p.d. of this order are observable but are built up so slowly and irregularly as to suggest that they have no significance in magnetic theory and are attributable to subsidiary causes, such as reaction between the Fe^{II} salt used and O_2. W. J.

Cathodic polarisation of zinc. O. Essin (*Acta Physicochim., U.R.S.S.*, 1942, **16**, 102—119).—Polarisation curves are given for discharge of Zn from 0·05—0·5M-$ZnSO_4$ in N-H_2SO_4, 0·04—0·08M-ZnO in 4N-KOH, and 0·66M-$Na_2Zn(CN)_4$ alone and with added NaCN or KOH, with a Hg jet cathode. Discharge is slow in all cases, and (except with $ZnSO_4$) is accompanied by polarisation due to slow dissociation of complex ions. This dissociation proceeds much more rapidly on a Zn cathode than on Hg. A. J. E. W.

Temperature correction equations for ionic concentration determinations. F. Lieneweg (*Z. tech. Physik*, 1942, **23**, 145—148).—The variation of the e.m.f. of cells when the electrodes are at different temp. is investigated, and expressions are obtained for the curves of e.m.f. against pH at different temp., and of e.m.f. against temp. for different pH vals. A. J. M.

Overvoltage. XIV. Hydrogen decomposition potentials under various conditions in acid solutions at platinised platinum electrodes. A. L. Ferguson and M. B. Towns (*Trans. Electrochem. Soc.*, 1942, **82**, *Preprint* 26, 301—317; cf. A., 1943, I, 18).—Using platinised Pt cathodes in 2N-H_2SO_4, a study has been made of the influence on cathode change curves of conditions which alter the H_2 concn. on the solution side of the electrode–electrolyte interface. The cathode potential, both above and below the so-called reversible val., can be appreciably altered for a given c.d. by conditions on the solution side of the interface which influence the rate of diffusion of H_2 towards or away from the interface. The changes produced support the theory of polarisation potential proposed previously (A., 1942, I, 241). C. E. H.

Reduction of unsaturated hydrocarbons at the dropping mercury electrode. II. Aromatic polynuclear hydrocarbons. S. Wawzonek and H. Laitinen (*J. Amer. Chem. Soc.*, 1942, **64**, 2365—2368; cf. A., 1942, I, 400).—Half-wave potentials (*P*) and diffusion current consts. (*c*) for 17 aromatic polynuclear hydrocarbons have been determined. *P* is independent of concn. but is characteristic of certain structures, whereas *c* ∝ concn. The polarographic method is useful in determining hydrocarbons and the arrangements of double bonds in their various rings. W. R. A.

Influence of colloids on electrode processes.—See B., 1943, I, 73.

VIII.—REACTIONS.

New kinetic effect. N. M. Emanuel (*Compt. rend. Acad. Sci. U.R.S.S.*, 1942, **35**, 250—254).—The effect of pretreatment of H_2S–O_2 mixtures on the flash within the region of ignition and on the kinetics near the region has been investigated. The flash operation replaces the indicator bulb as a means of investigating the kinetics of a slow reaction and is extended to the study of the kinetics of the intermediate products. It is shown that max. [SO] is attained at 260—280° and that [SO] is independent of initial pressure but ∝ pressure displacement as a result of pretreatment. C. R. H.

Exchange of the Cl of $H^{35}Cl$ with $AsCl_3$, PCl_3, $POCl_3$, CCl_4, $SiCl_4$, S_2Cl_2, and KCl. K. Clusius and H. Haimerl (*Z. physikal. Chem.*, 1942, **B**, **51**, 347—351).—The homogeneous gas exchange of the Cl of $H^{35}Cl$ (3% $H^{37}Cl$: 97% $H^{35}Cl$) is rapid for PCl_3 and $AsCl_3$, slower for $POCl_3$, very slow for $SiCl_4$ and S_2Cl_2, and negligible for CCl_4. By using fine and coarse powders of KCl, the exchange is shown to be limited to the surface layers. A mechanism involving additive compounds, *e.g.*, $HPCl_4$ and H_2SiCl_6, is postulated. W. R. A.

Reactions in solutions containing O_3, H_2O_2, $H^{\cdot}$, and Br'. Specific rate of the reaction between O_3 and Br'. H. Taube (*J. Amer. Chem. Soc.*, 1942, **64**, 2468—2474).—Variation of the rate of the reaction $H_2O_2 + O_3 = 2O_2 + H_2O$ (*A*) with $[O_3]$, $[H_2O_2]$, $[H^{\cdot}]$, and $[Br']$ has been investigated. (*A*) proceeds by three paths: (i) a non-chain path, involving oxidation of Br' by O_3 to OBr' (sp. rate 1600 ± 100) and reduction of OBr' by H_2O_2 (sp. rate 9×10^5); (ii) a chain reaction, initiated by $H_2O_2 + O_3 \rightarrow HO + HO_2 + O_2$, continued by $HO_2 + O_3 \rightarrow HO + 2O_2$, $HO + H^{\cdot} + Br' = H_2O + Br$, $Br + H_2O_2 \rightarrow H^{\cdot} + Br' + HO_2$, and broken by $HO_2 + Br \rightarrow H^{\cdot} + Br' + O_2$: (iii) a chain reaction, initiated by $Br_2 + O_3 + H_2O \rightarrow HO + Br + BrOH + O_2$ or $HO_2 + Br + Br' + H^{\cdot} + O_2$, and broken by $Br + Br \rightarrow Br_2$. The nature of the chain-breaking step depends on the ratio $[O_3] : [H_2O_2]$. No evidence for the oxidation of Br' by O_3 by a free radical process was found. W. R. A.

Study of mechanism of chemical reactions with oxygen isotopes. II. Mechanism of the Beckmann rearrangement. G. Mikluchin and A. Brodski (*Acta Physicochim. U.R.S.S.*, 1942, **16**, 63—70).—Experiments with H_2O enriched in ^{18}O show that no exchange occurs between H_2O and NHPhBz in an acid or neutral medium; no exchange occurs between H_2O and NHPhAc in a neutral medium, but in acid slow exchange is detected. Reaction of $CPh_2{:}N \cdot OH$ with H_2O and PCl_5 in the cold is accompanied by O exchange, showing that the Beckmann rearrangement occurs by an intermediate elimination of O as H_2O, and not by direct intramol. rearrangement. A. J. E. W.

Hydrolysis of aliphatic nitriles in concentrated hydrochloric acid solutions. B. S. Rabinovitch and C. A. Winkler (*Canad. J. Res.*, 1942, **20**, **B**, 221—230).—The rates of hydrolysis of HCN, MeCN, and $CN \cdot CH_2 \cdot CO_2H$ in 1—8·5N-HCl have been studied over various temp. ranges. The results indicate that the consecutive hydrolyses of the nitrile and of the amide are each unimol. reactions, the ratio of the velocity coeffs. of these reactions being the greater the greater is the [HCl]. In each case the energy of activation of the reaction decreases rapidly with increasing [HCl]. J. W. S.

Kinetics of the alkaline hydrolysis of propionitrile. B. S. Rabinovitsch and C. A. Winkler (*Canad. J. Res.*, 1942, **20**, **B**, 185—188).—The hydrolysis of EtCN in 0·3—4N-NaOH has been studied at 39·5° and 59·6°. Determinations of the $[EtCO \cdot NH_2]$ and $[NH_3]$ indicate that the initial reaction is bimol. and that the relative rates of hydrolysis of EtCN and $EtCO \cdot NH_2$ are ~1 : 10. The bimol. velocity coeff. is almost independent of the [NaOH]. In 0·65N-NaOH the energy of activation is ~20,300 g.-cal. per g.-mol. J. W. S.

Mechanism of chemiluminescent reactions of oxidation with hydrogen peroxide. B. J. Sveschnikov (*Compt. rend. Acad. Sci. U.R.S.S.*, 1942, **35**, 278—283).—The kinetics of chemiluminescence of 3-amino-, 3-acetamido-, and 3-hydroxy-phthalhydrazide, lucigenin, and pyrogallol when oxidised with H_2O_2 in an alkaline medium have been studied. The data support the view that the excited mol. is due to a series of subsequent transformations of a single mol. of the primary substance, and that the splitting of H_2O_2 by alkali proceeds via a chain reaction involving intermediate products. Lack of knowledge of the kinetics of splitting of H_2O_2 both in absence and in presence of luminescent substances hinders further elucidation of the kinetics of chemiluminescence. C. R. H.

Reactions of alkyl halides with hydrogen halides. H. P. Meissner and H. J. Schumacher (*Z. physikal. Chem.*, 1940, **A**, **185**, 435—446).—MeBr and MeCl react with HI above 350° and 325°, respectively, the reaction products being CH_4, I_2, HBr (HCl), and, additionally for MeBr, C and a residual gas. The reaction is heterogeneous. The halides do not react with HBr at temp. < their respective decomp. temp. The thermal decomp. of MeBr has also been investigated. The decomp. products are HBr, CH_4, H_2, C, and a liquid Br compound. This reaction, which is homogeneous, is slightly inhibited by HBr and CH_4 but unaffected by N_2. C. R. H.

Catalysts for peroxide decomposition. M. Bobtelsky and A. E. Simchen (*J. Amer. Chem. Soc.*, 1942, **64**, 2492—2498; cf. A., 1937, I, 523).—A mixture of $Co^{\cdot\cdot}$, citrate ions, and H_2O_2 (1 : 1 : 1) yields a pink peroxidised compound (**I**) which decomposes with liberation of all the disposable O into a green Co^{II} citrate complex (**II**). (**II**) can be obtained by peroxidising (**I**) with PbO_2 or MnO_2. (**II**) is an extremely active catalyst for the decomp. of H_2O_2 but does not decompose PbO_2 or MnO_2. The citrates are not attacked but when the corresponding tartrates are used, the tartrate ion is attacked. The properties of the complexes have been examined by gasometric, photometric, and conductometric methods. W. R. A.

Kinetics of amination of organic halides in liquid ammonia. G. S. Markova and A. I. Schatenstein (*Compt. rend. Acad. Sci. U.R.S.S.*, 1942, **35**, 68—70).—Unimol. velocity coeffs. (k) are recorded for reaction of liquid NH_3 at 25° with a no. of RCl, RBr, and RI at concn. 0·33 mol.-% RX, where R is an alkyl radical up to C_{12}. k is increased by the presence of salts in the order $Li^{\cdot} > Na^{\cdot}$, $Ca^{\cdot\cdot} > Sr^{\cdot\cdot} \gg Ba^{\cdot\cdot}$, $Br' > NO_3' \gg ClO_4'$. L. J. J.

Polyacrylic acid glasses. E. Jenckel and E. Braücker (*Z. physikal. Chem.*, 1940, **A**, **185**, 465—468).—The polymerisation of xylene solutions of $CH_2\colon CH\cdot CO_2H$ has been investigated over the range 80—250°. The increase in rate of polymerisation with temp. is rapid and above 130° the reaction is explosive. The mol. wts. of the polymerides are ~17,000—21,000 for polymerisation temp. 90—130°. The temp.-vol. curves show that the sol. and insol. forms are typical glasses. C. R. H.

Absolute rate of heterogeneous reactions. C. S. Bagdasarian (*J. Phys. Chem. Russ.*, 1941, **15**, 40—49).—Temkin's theory (cf. A., 1938, I, 396) is developed for reactions of the zero, the first, and the second order, and the final expressions are compared with experimental data. J. J. B.

Action of chlorine on anhydrous metallic oxides at room temperature. P. Pierron (*Compt. rend.*, 1941, **213**, 840—841).—The action of Cl_2 on Ag_2O and HgO is rapid. Na_2O, Li_2O, and CdO react slowly. The oxidising action of the products is < that of the O_2 absorbed. With Na_2O it is due to Na_2O_2, $NaClO_3$, and some NaOCl. With BaO it is due to BaO_2. Other oxides give no oxidising products. Cl_2O is observed in gaseous products from Cl_2 and HgO or CdO. O. D. S.

Heterogeneous process in the layer of solid particles used as a chemical reagent. B. V. Kantorovitsch (*Compt. rend. Acad. Sci. U.R.S.S.*, 1942, **35**, 167—171).—Formulæ relating the apparent velocity coeff. of a heterogeneous reaction, assuming infinite true velocity coeff., with hydrodynamic boundary-layer factors are developed. L. J. J.

Decomposition of diethyl ether induced by chlorine. H. P. Meissner and H. J. Schumacher (*Z. physikal. Chem.*, 1940, **A**, **185**, 447—464).—Cl_2 reacts with Et_2O at temp. > 350° with the momentary formation of MeCHO, EtCl, and HCl. This reaction is followed by a more complicated catalytic reaction in which, in addition to the excess of Et_2O, MeCHO and EtCl decompose. The catalyst is not Cl_2 but is probably a substance, gaseous at −110°, which is formed by the interaction of Cl_2 and MeCHO. C. R. H.

Influence of temperature on the slow and induced oxidation of glucose in the dark. N. R. Dhar (*J. Indian Chem. Soc.*, 1942, **19**, 331—332).—The rate of oxidation of glucose solution by air in the dark increases with rise of temp. to a max. between 30° and 40° and then decreases, both in the absence of an inductor and in presence of $Fe(OH)_2$. With $Ce(OH)_3$ as inductor the rate is much higher, and increases continuously with rise of temp. between 10° and 50°. F. L. U.

Active contact catalysts, their formation and nature. I. Nature of the active surface. S. Z. Roginski (*J. Phys. Chem. Russ.*, 1941, **15**, 1—30).—The activity of solid catalysts cannot be due to physical irregularities (lattice distortions etc.) as these rapidly disappear at temp. < the working temp. of the catalyst. Chemical impurities including gases are not easily eliminated by heat and determine the activity; all catalysts contain promoters. Degassing of metals (Pt, Pd, Ni, W) lowers their activity > does heat. If to degassed metal a gas (H_2, O_2, N_2, but not A) is added, the activity towards the hydrogenation of C_2H_2 shows a sharp max. when 1 atom of the gas is present for 100—1000 atoms of metal, O_2 being a better promoter than N_2 and H_2. The thermionic work function of W shows a min. at nearly the same ratio $O_2 : W = 1 : 400$ as that at which the activity is a max. The sp. surface areas of inactive (without O_2) and active Ni (with O_2) are identical, as shown by adsorption of A; the adsorption of H_2 and of C_2H_2 by active Ni is much larger. The activation consists in lowering the activation energy E of the reaction. Mechanisms to account for the min. of E at the best ratio $O_2 : W$ are discussed. Promoters and poisons are the same substances applied in different concns. J. J. B.

Combustion of carbon monoxide on Hopcalite and on its components. G. M. Schwab and G. Drikos (*Z. physikal. Chem.*, 1940, **A**, **185**, 405—425).—The reduction of CuO, MnO_2, and Hopcalite (**I**) begins at 140°, 30°, and 70°, respectively; reoxidation by O_2 begins at room temp., 100°, and room temp. respectively. For CO–O_2 mixtures the reaction velocity (k) ∝ [CO]. In reducing mixtures the initial high k decreases with increasing reduction attaining a const. val. ∝ $[O_2]$ for MnO_2 and (**I**), but decreasing continuously for CuO. k ∝ gas stream velocity. The abs. k at a given temp. is approx. equal for MnO_2 and (**I**), but in the case of CuO this val. of abs. k is attained only at a temp. 100° higher. For CuO and (**I**) catalytic reduction is the step which determines the val. of k. C. R. H.

Kinetics of catalytic combustion of carbon monoxide on copper oxide. Absolute calculation of catalytic reaction velocity. G. M. Schwab and G. Drikos (*Z. physikal. Chem.*, 1942, **B**, **52**, 234—252).—The rate of the catalytic combustion of CO on CuO at pressures between 0·3 and 150 mm. and between 300° and 430° ∝ [CO], but is independent of $[CO_2]$ and $[O_2]$. The heat of activation is 18 kg.-cal. per mol. The calculation of adsorption coeffs. and of velocity coeffs. is discussed. W. R. A.

Carbon deposition in the decomposition of ethylbenzene on metal surfaces and the study of this process by means of a photoelement. A. A. Balandin and V. V. Patrikeev (*Compt. rend. Acad. Sci. U.R.S.S.* 1942, **34**, 88—92).—C deposition occurring in high-temp. catalytic processes is studied by following the decrease in the amount of light reflected on to a photo-electric cell from a highly polished metal surface held in the reaction chamber. The method has been applied to the study of the catalytic decomp. of PhEt in presence and in absence of unsaturated hydrocarbons. The reaction has an induction period which decreases with rise of temp. from 450° to 650°; the rate of C formation also increases with temp. J. L. E.

Electrodeposition of iron–tungsten alloys from an acid plating bath.—See B., 1943, I, 72.

Diffusion theory of the co-deposition of gold and copper.—See B., 1943, I, 75.

Theory of the industrial electrolytic production of aluminium.—See B., 1943, I, 76.

Mercury-photosensitised reactions of ethylene at high temperatures. D. J. LeRoy and E. W. R. Steacie (*J. Chem. Physics*, 1942, **10**, 676—682).—Data for the Hg ($^3P_1$)-photosensitised reactions of C_2H_4, which have been obtained over the range 25—350°, show that in addition to the reactions Hg ($^3P_1$) + $C_2H_4 \rightarrow C_2H_4^*$; $C_2H_4^* + C_2H_4 \rightarrow 2C_2H_4$; and $C_2H_4 \rightarrow C_2H_2 + H_2$ there occurs Hg ($^3P_1$) + $C_2H_4 \rightarrow C_2H_3$ + H + Hg ($^1S_0$), the fourth reaction occurring only to a small extent at 25°. The increased quantum yield at high temp. is due either to the using up of the increased no. of Hg ($^3P_1$) atoms in the fourth reaction or, more probably, to higher quantum yield of the H atom- and vinyl radical-sensitised polymerisation of C_2H_4. The data are compared with similar data for other sensitisers. C. R. H.

Cadmium ($^3P_1$)-photosensitised reactions of the lower olefines. D. J. LeRoy and E. W. R. Steacie (*J. Chem. Physics*, 1942, **10**, 683—685).—The Cd ($^3P_1$)-sensitisation of C_2H_4, C_3H_6, Δ^{α}- and Δ^{β}-C_4H_8 has been investigated. The reaction rates for the last three olefines are ≪ for C_2H_4. The low rates are attributed to the influence of the C⁚C linking on the quenching process rather than to the strength of the C·H linking. C. R. H.

Photochemical studies. XXXV. Photochemical decomposition of methyl *n*-butyl ketone. W. Davis, jun., and W. A. Noyes, jun. (*J. Amer. Chem. Soc.*, 1942, **64**, 2676—2678).—For unfiltered Hg radiation and for 3130 A. the chief decomp. products of $COMeBu^{\alpha}$ at room temp. and 5—13 mm. are compounds with empirical formulæ C_3H_6 and C_3H_6O. Small amounts of CO are found but it is uncertain whether CO is a primary product of decomp. W. R. A.

Oxidation of ascorbic acid and ultra-violet irradiation of water. R. Guillemet (*Compt. rend.*, 1942, **214**, 540—542).—There is evidence that, in presence of O_2 which is readily activated by radiation, H_2O is oxidised to H_2O_2 and this in turn effects the oxidation of the ascorbic acid. In absence of free O_2 the H_2O is oxidised less readily, with elimination of H_2, to H_2O_2 which then effects oxidation. N. M. B.

Action of gases on the photogenic reaction accompanying the electrolysis of sodium azide and azoimide. E. T. Verdier (*Compt. rend.*, 1942, **214**, 617—619).—The ultra-violet emission accompanying electrolysis of HN_3 and NaN_3 is increased 500—600 times in presence of N_2 or H_2 (bubbled through anodic electrolyte), whilst A and N_2O are without influence and O_2 inhibits the emission. A chain mechanism involving N_2^+, N, NH, and H is suggested. L. J. J.

Intensity relationships with the ultramicroscope. I. Blackening of photographic plates by electron beams. B. von Borries (*Physikal. Z.*, 1942, **43**, 190—204).—The relation between the photographic blackening effect and the density of impinging 12·8—220-kv. electrons has been studied with 16 commercial emulsions; the results are shown as blackening curves, which are compared with curves obtained with visible light. The "energy density" required to produce a given blackening varies with the electron energy (E), and has a min. val. (at E = 30—80 kv.) characteristic of the emulsion; the optimum E val. is approx. that at which the range of the electrons in the emulsion equals the emulsion thickness. X-Rays excited in the emulsion do not contribute appreciably to the blackening. At high E the blackening can be increased by superposing an unsensitised film (Al or Cellophane) of suitable thickness on the emulsion. A. J. E. W.

IX.—METHODS OF PREPARATION.

Chemical separation of isotpes of hydrogen by addition of metals and compounds of metals to water, acids, and bases. I. Relative efficiencies of specific reactions. Effects of factors other than temperature. H. L. Johnston and C. O. Davis (*J. Amer. Chem. Soc.*, 1942, **64**, 2613—2620).—The extent of isotopic separation occurring in the following reactions which liberate H_2 or gaseous hydrides has been determined: Li, Na, K, Ca, CaC_2, and Al_4C_3 with H_2O; Mg, Zn, Fe, Mn, Al, and FeS with aq. H_2SO_4; and Al with aq. NaOH. Runs were usually made at or near room temp. H_2 and hydrides were burned in a flame, with a slight excess of tank O_2, and H_2O of combustion was carefully purified and analysed by the free submerged float method for its H isotope proportions. Corrections were applied for the ^{18}O abnormality of the tank O_2, which was determined separately. For a given set of reagents, data were reproducible and confirm the applicability of the quant. relationship $d \log_e [H] = \alpha d \log_e [D]$ in which [H] and [D] are instantaneous vals. of the amounts of H and D, in the liquid phase, and α is the "isotope separation factor," different for each reaction. The form of this relationship is identical with that which pertains to the isotopic separations by electrolysis. The regularities in the results and their bearing on some phases of the reaction mechanism are discussed. W. R. A.

Products obtained by the reducing action of metals on salts in liquid ammonia solution. VIII. Reduction of complex cyanides. J. W. Eastes and W. M. Burgess (*J. Amer. Chem. Soc.*, 1042, **64**, 2715—2716).—The complex cyanides of Cd, Cu, Ag, and Zn, unlike Ni, are reduced to the free metal by alkali metals in liquid NH_3 solutions. Under the experimental conditions all the pptd. metals were pyrophoric except Zn. Alkali nickelocyanides are reduced by Ca in liquid NH_3 solution, giving the same type of products as those obtained by reduction with alkali metals. W. R. A.

Hydrolysis of cadmium acetate. (Mlle.) M. Quintin (*Compt. rend.*, 1942, **214**, 538—540).—Measurements show that the salt undergoes a type of hydrolysis intermediate between that of $CdCl_2$ and $CdSO_4$ on the one hand, and $(PhSO_3)_2Cd$ on the other hand. This explains the anomalies shown at high dilution. N. M. B.

Reduction by hydrogen of lead and silver oxides. J. M. Dunoyer (*Compt. rend.*, 1942, **214**, 556—557).—The pressure–temp. curves of H_2 during the reduction of the heated oxides are given. The reduction PbO_2 (175—200°) $\rightarrow$ PbO ($\sim$275°) $\rightarrow$ Pb shows evidence of the intermediate formation of Pb_2O at $\sim$340°; this is not shown in the direct reduction of litharge. The reduction of Ag_2O begins at 50°; the intermediate formation of Ag_4O, below 100°, converted at 125° into Ag, is clearly shown by the curve. N. M. B.

Magnetic study of the reaction $AsBr_3 + Br_2 \rightleftharpoons AsBr_5$. (Miss) K. Savithri (*Proc. Indian Acad. Sci.*, 1942, **16**, **A**, 196—206).—Determinations of χ by the Gouy method show that solutions of $AsBr_3$ in AcOH obey the additive law, but solutions of Br in AcOH exhibit small departures. Equal vols. of equimol. solutions of $AsBr_3$ in AcOH and Br in AcOH, on mixing, give vals. of ρ and χ < calc. vals., and this is attributed to formation of $AsBr_5$. The magnetic evidence for the possible presence of a slightly partial double bond between As and attached Br atoms is discussed. W. R. A.

Family of oxyhalides. L. G. Sillén (*Naturwiss.*, 1942, **30**, 318—324).—Crystallisation of Bi_2O_3 from LiCl gives a *compound* $LiBi_3O_4Cl_2$. This is typical of a no. of similar *substances, e.g.*, $SrBi_3O_8Cl_3$, $CdBiO_2Br$, $Cd_{11}Bi_{1 \cdot 6}O_2Cl_3$, which possess similar X-ray structures, but different formulæ. The structures of a large no. of these compounds have been investigated. They are tetragonal with $a \sim 3 \cdot 9$ A., but c varying from 7 to 50 A. The oxyhalides of the type $Cd_{2-3x}Bi_{1+2x}O_2Cl_3$ are to be regarded as phases rather than compounds or solid solutions. A. J. M.

Study of mechanism of alkali fusion reactions with the heavy oxygen isotope. I. Makolkin (*Acta Physicochim. U.R.S.S.*, 1942, **16**, 88—96).—Alkali fusions of $PhSO_3Na$, $C_{10}H_7 \cdot SO_3Na$, and Na alizarinsulphonate (**I**) have been carried out with NaOH enriched in ^{18}O. The exchange phenomena accompanying the reactions show that NaOH mols. are first attached to the aromatic nucleus; $NaHSO_3$ mols. are then eliminated, and react with more NaOH to give Na_2SO_3. With (**I**) oxidation of the second C atom occurs by attachment of ONa from the NaOH, and not by removal of O from the CO: group or from the atm. Complete O exchange occurs between H_2O and Na_2SO_3 in 20 hr. at 170°; measurable exchange also occurs between NaOH and the Na phenoxides. A. J. E. W.

Composition and structure of molybdenum-blue. F. B. Schirmer, jun., L. F. Audrieth, S. T. Gross, D. S. McClellan, and L. J. Seppi (*J. Amer. Chem. Soc.*, 1942, **64**, 2543—2545).—Mo-blue has been prepared by a no. of new methods and all samples have the empirical formula Mo_8O_{23},xH_2O and yield identical X-ray diffraction patterns. Electron photomicrographs confirm the colloidal nature of Mo-blue. W. R. A.

Mechanism of iron passivation in alkaline solutions of oxidisers. A. G. Samartzev (*Compt. rend. Acad. Sci. U.R.S.S.*, 1942, **35**, 206—209).—Fe rotated in a solution containing 800 g. of NaOH per l. with 5—25 g. of KNO_3 per l. is initially dissolved to give a solution of Na_2FeO_2 and $Na_2Fe_2O_4$ which deposits a film of Fe_3O_4. The thickness and structure of the film depend on the temp., velocity of stirring, and concn. of the solutions. The KNO_3 may be replaced by KNO_2. F. R. G.

Formation and stability of oxide films. E. A. Gulbransen (*Trans. Electrochem. Soc.*, 1942, **82**, *Preprint* 19, 209—221).—The existence, formation, and stability of oxide films on Fe, stainless steel, and Cr–Fe have been studied by a vac. micro-balance technique (B., 1942, I, 351). A low-temp. H_2 reduction method has been used to study the stability of films formed under various conditions. The air-formed film on pure Fe weighs 0·44 μg. per sq. cm., whilst the film formed in HNO_3 weighs 1·16 μg. per sq. cm. Clean degassed Fe reacts with O_2 at pressures as low as 10^{-6} atm. at room temp. and $3 \cdot 3 \times 10^{-7}$ atm. at 800°. Preliminary oxidation curves of the materials studied are given and discussed. The mechanism for Cr–Fe and stainless steel is similar to that for Fe. The H_2-reduction method was unsuccessful with stainless steel at 600° and 800°. H_2O is adsorbed on clean Fe at room temp., giving a film stable to low pressure but not to 600°. C. E. H.

New series of iridium sulphitochlorides. V. V. Lebedinski and M. M. Gurin (*Compt. rend. Acad. Sci. U.R.S.S.*, 1942, **36**, 22—25).—Na_3IrCl_6,H_2O with Na_2SO_3 yields, together with $Na_7Ir(SO_3)_4Cl_2,7H_2O$, a new salt, *$Na_5Ir(SO_3)_2Cl_4,7H_2O$*, which with RbCl gives *$NaRb_3Ir(SO_3)_2Cl_3,6H_2O$* (*pentahydrate*). The constitution of the complexes is discussed. F. R. G.

X.—ANALYSIS.

Qualitative analysis of microgram samples. General technique and confirmatory tests. A. A. Benedetti-Pichler and M. Cefola (*Ind. Eng. Chem.* [*Anal.*], 1942, **14**, 813—816).—The technique of working in a capillary cone (A., 1937, 635) has been extended to permit carrying out confirmatory tests after separation of the constituents of a group. Methods for identifying 0·001 μg. of the more common ions of group II are described. L. S. T.

Volumetric determination of chlorides by method of Votoček and Trtílek. E. Bohm and O. Sturz (*Chemie*, 1942, **55**, 319—320(.—In the titration of Cl′ with $Hg(NO_3)_2$, using diphenylcarbazone as indicator, the end-point is indistinct, but in presence of Et_2O is indicated sharply by a change in the colour of the Et_2O layer from yellow-brown to intense red, due to formation of a red Et_2O-sol. Hg–diphenylcarbazone complex in presence of excess of Hg˙˙. R. J. W. R.

Determination of available chlorine in solutions containing Textone. See B., 1943, I, 63.

Colorimetric photo-electric determination of fluorine. P. Urech (*Helv. Chim. Acta*, 1942, **25**, 1115—1125).—The sample is, if necessary, fused with NaOH, dissolved in H_2O (30 c.c.), and treated with conc. H_2SO_4 (35 c.c.) in a Claisen flask containing glass beads and ignited SiO_2 (0·5 g.). The solution is distilled until the temp. reaches 165°, when steam is blown in until 400 c.c. distil at a flask temp. of 165°. The distillate is treated with NaOH until alkaline to phenolphthalein, evaporated to 25 c.c., and steam-distilled again with $HClO_4$ (25 c.c.) at 135° until 400 c.c. of distillate are collected. This is diluted to 500 c.c. and an aliquot containing $\not>$ 4 mg. of F′ is treated with 5 c.c. of $FeCl_3$–ferron reagent (saturated aq. 7-iodo-8-hydroxyquinoline-5-sulphonic acid), 90 c.c., H_2O 100 c.c., and 0·1N-$FeCl_3$ in 2N-HCl 10 c.c.), diluted to 100 c.c., and its absorption compared photometrically with standards, using an RG2 filter. J. W. S.

Zirconium–alizarin method of determining fluorine in natural waters. N. V. Tageeva (*J. Appl. Chem. Russ.*, 1942, **15**, 56—60).—

De Boer's method (A., 1924, ii, 705) is applicable to solutions containing $\nless 0{\cdot}2$ mg. % of F'; the error is $\ngtr 5$—10%. Cl', SO_4'', HPO_4'', and AsO_4''' interfere, and directions for the preliminary elimination of these ions are given. Naphthenic acids present in bore-waters do not interfere. R. T.

Detection of traces of moisture or oxygen in purified hydrogen.—See B., 1943, I, 63.

Iodometric determination of nitrogen in milk.—See B., 1943, III, 37.

[Analytical] control of ammonia in electrodeposition of brass.—See B., 1943, I, 73.

Analysis and preparation of "glacial metaphosphoric acid." I. Brown (*J. Proc. Austral. Chem. Inst.*, 1942, **9**, 212—220).—Commercial "reagent metaphosphoric acid" contains PO_3' 30—55, P_2O_7'''' 25—40, PO_4''' 0—5, and Na ~13·5%, and is analysed by three-stage titration against NaOH (bromocresol-green, thymol-blue, addition of excess of $AgNO_3$, and Me-red). The commercial product was reproduced (PO_3' 55, Na 12%) by heating 89% H_3PO_4 with $Na_3PO_4,8{\cdot}4H_2O$ at 300—350° for 3 hr. in Au vessels. M. H. M. A.

Crude boron. Analysis and composition. E. H. Winslow and H. A. Liebhafsky (*J. Amer. Chem. Soc.*, 1942, **64**, 2725—2726).—Methods for the analysis of crude B by fusion and by rapid and slow chlorination are outlined. W. R. A.

Determination of carbon in low-carbon iron and steel.—See B., 1943, I, 72.

Separation of water-soluble salts by flotation. (Sodium, potassium, and ammonium salts.) A. Guyer and R. Perren (*Helv. Chim. Acta*, 1942, **25**, 1179—1187).—The separation of Na, K, and NH_4 salts, suspended in a saturated aq. solution of the components, by the flotation method has been studied, using oleic aicd (**I**) and Utinal V (decadecylsulphonic acid) (**II**) as flotation agents. In the separation of Na and K salts from NH_4 salts (**I**) causes passage of NH_4 into the foam whilst (**II**) leaves it in the residue. K is more readily separated from NH_4 than is Na. For separation of Na and K the best results are obtained with (**II**), which causes the Na to remain in the residue. Salts with common cations can also be separated by this method, the tendency to pass into the foam following the order $SO_4'' > NO_3' > Cl'$. The adsorption of (**I**) and (**II**) on NaCl and KCl has also been investigated. J. W. S.

Determination of calcium as oxalate.—See B., 1943, III, 40.

Determination of oxide copper [in ores].—See B., 1943, I, 63.

Detection of the mercuric ion in semimicro qualitative analysis. M. G. Burford and A. F. Wichrowski (*J. Chem. Educ.*, 1942, **19**, 333—336).—A modification of Artmann's test (A., 1921, ii, 350) is described. The pptd. HgS is dissolved in hot conc. HI, the solution is evaporated just to dryness, 3N-HNO_3 added, and the solution again evaporated. A pink to scarlet deposit indicates Hg. The test is made more sensitive by adding Cu_2I_2, which gives a pink to dark-red deposit of Cu_2HgI_4. The comparative efficiencies of $(NH_4)_2S_x$, NaOH–NH_4Cl, and Sneed's NaHS reagent for separating group II into its sub-groups has been investigated. The presence of As and Sb, like that of Sn, favours dissolution of some of the HgS in $(NH_4)_2S_x$. L. S. T.

End-point of micro-titrations with colour indicators. A. A. Benedetti-Pichler and S. Siggia (*Ind. Eng. Chem.* [*Anal.*], 1942, **14**, 828—832).—Solutions of concns. customary in macro-analysis are proposed for use in micro-titrations. The limitations resulting from the use of colour indicators in micro-titrations are discussed. In these titrations, light must travel approx. the same distance through the titrated solution as in macro-analysis if the concns. of indicator are identical. A sufficient thickness of layer (4 cm.) can be obtained in micro-procedures using vols. of ~0·1 ml. by observing the end-point in a capillary attachment to the vessel in which the titration is carried out. Recorded data show that in titrating NaOH with HCl (Me-red), and $FeSO_4$ with $KMnO_4$, the end-points are not recognised at the proper times when the titrations are carried out in centrifuge cones. Observation of colour changes occurring in a part of the titrated system is discussed for org. solvents used in determining the end-point in iodometric titrations. Details of procedure for using a droplet of $CHCl_3$ in iodometric titrations, and adsorption indicators in Ag titrations on a mg. scale, are given. L. S. T.

Morin as fluorescence indicator. E. A. Kocsis and G. Zádor (*Z. anal. Chem.*, 1942, **124**, 42—45).—4—5 drops of 0·2% solution of morin in 50% EtOH serve as a fluorescence indicator for titrating NaOH with HCl, H_2SO_4, or HNO_3. In titrating alkali with acid in filtered ultra-violet light the yellowish-green colour suddenly fades (pH 8·0—9·8); this is followed by a second sudden change to emerald-green on adding more acid (pH 3·1—4·4). In titrating acid with alkali the colourless solution changes sharply to emerald-green (pH "8·0—9·8"), and then sharply to greenish-yellow (pH "3·1—4·4"). These changes enable alkali carbonate to be determined in presence of NaOH. Comparative data using phenolphthalein and Me-orange are recorded. L. S. T.

Determination of aluminium in manganese and aluminium bronzes, using the mercury cathode cell.—See B., 1943, I, 73.

Colorimetric determination of the aluminium content of magnesium alloys.—See B., 1943, I, 75.

Gravimetric determination of aluminium in magnesium alloys. Benzoate–oxine method.—See B., 1943, I, 75.

Photometric determination of manganese in manganese bronze.—See B., 1943, I, 73.

New fluorescence indicators. E. A. Kocsis and E. Pettkó (*Z. anal. Chem.*, 1942, **124**, 45—47).—*o*-OMe·C_6H_4·CHO (**I**), *o*-$C_6H_4(NH_2)_2,2HCl$, and *p*-$C_6H_4(NH_2)_2$ in 0·2% aq. or EtOH solution can be used as fluorescent indicators for titrating NaOH with aq. HCl or aq. H_2SO_4, but not aq. HNO_3, in filtered ultra-violet light. The colour changes are green to colourless, orange-yellow to colourless, colourless to green, respectively. The reverse changes occur on titrating acid with alkali. The pH range is 3·1—4·4. The aq. solution of (**I**) showed no change after 5 months. Typical data are recorded. L. S. T.

Colorimetric determination of cobalt as the cobalt thiocyanate complex. B. Mader (*Chemie*, 1942, **55**, 206—207).—The sample containing 0·001—0·1 g. of Co is made slightly alkaline with NaOH, just acidified with H_2SO_4, and treated with 6—8 g. of $Na_4P_2O_7$. After adding NH_4CNS (6—8 g.) the solution is extracted with 7 c.c. of C_5H_{11}·OH–Et_2O (1 : 7). After addition of more NH_4CNS and further extraction with C_5H_{11}·OH–Et_2O the combined extracts are diluted to 25 c.c. and the colour intensity is measured in conjunction with an S61 filter. The error of the method is 1—2%. For higher [Co] (0·3—20%) the colour produced in $COMe_2$ solution can be used with advantage. For this purpose Fe, Cr, W, and Mo are pptd. by boiling the solution with ZnO. An aliquot portion of the filtered solution is made up to 20 c.c., treated with 50% HNO_3 (0·1 c.c.), 2% aq. NaF (2 drops), and 50% KCNS (5 c.c.), and diluted to 50 c.c. with $COMe_2$. The colour of the resulting solution is measured photometrically in conjunction with a red OG2 filter. J. W. S.

Determination of cobalt and manganese by photometric methods. L. Waldbauer and N. M. Ward (*Ind. Eng. Chem.* [*Anal.*], 1942, **14**, 727—728).—Co in presence of Mn ($\ngtr$99·4%) is determined photoelectrically (green filter) using a $CHCl_3$ extract of the compound with 1 : 2-NO·$C_{10}H_6$·OH. Mn is determined in presence of Co ($\ngtr$99·5%), by pptn. as $MnNH_4PO_4,H_2O$ and subsequent conversion into the Mn–CH_2:N·OH compound, which is evaluated photometrically. Procedure, standardisation curves, and test data are given. L. S. T.

Analysis of tin-base bearing metal. Permanganate and iodometric methods for antimony and copper.—See B., 1943, I, 74.

Colorimetric determination of titanium in chromium steels. Separation of titanium and chromium by perchloric acid.—See B., 1943, I, 72.

Colour reactions for thorium, uranium, and other elements. V. I. Kuznetzov (*Compt. rend. Acad. Sci. U.R.S.S.*, 1941, **31**, 898—900).—The effect of various groupings on the production of coloured compounds with sp. elements, thus providing colour tests for these elements, is discussed. The colours produced by some *o'*-arsonic acids of *o*-hydroxyazo-compounds with rare earths, Ti, Zr, Sn, Th, Nb, Ta, and U are given. By adjustment of pH it is possible to increase the specificity of the reaction. The presence of AsO_3H_2 *ortho* to the azo-group is essential for the production of colour. The sensitivity in the case of Th or U is sufficient to give a colour change with solutions of 1 p.p.m. A. J. M.

Determination of germanium in silicate rocks. A. G. Hybbinette and E. B. Sandell (*Ind. Eng. Chem.* [*Anal.*], 1942, **14**, 715—716).—The rock sample is decomposed by means of H_2SO_4–HNO_3–HF. HF is removed by evaporation, followed by dilution and distillation at 140° with a current of air passing through the solution to remove the last traces of HF. Ge is then distilled as $GeCl_4$, and determined colorimetrically in the distillate by means of the blue colour formed with $FeSO_4$ and NH_4 molybdate. Interference by As is not serious in samples for which the method is intended. 0·0001% Ge can be detected with certainty in a 1-g. sample. Details of procedure and typical data are given. L. S. T.

XI.—APPARATUS ETC.

Device for improving temperature regularity in laboratory tube furnaces. H. Florenz (*Aluminium*, 1940, **22**, 351—352).—By enclosing the working tube and heating element in a wide Fe tube with air insulation the temp. of an electric tube furnace can be held const. to ±1° over the middle 20 cm. and to ±5° over 34 cm. when the total length is 60 cm., *i.e.*, the range of uniform heating is about doubled. A. R. P.

X-Ray high-temperature camera. A. de Bretteville, jun. (*Rev. Sci. Instr.*, 1942, **13**, 481—483).—The camera, for use at >300°, includes a concentric heater, a small Fe–constantan thermocouple, and a cooled jacket to protect the film. The sample may be rotated at 1 r.p.m. A. A. E.

Turbidity measurement by optical means. E. G. Richardson (*Proc. Physical Soc.*, 1943, **55**, 48—63).—A lecture. N. M. B.

Crystal rotating device for use on a fibre spectrometer. F. Happey and A. W. Porter (*J. Sci. Instr.*, 1943, **20**, 15).—By means of a device whereby a spindle carrying the crystal is rotated stepwise by a stop-watch mechanism the unit of translation along the crystal axes of rotation can be estimated. A. A. E.

Improvement in design of the concave grating spectrograph. G. P. Brewington (*Rev. Sci. Instr.*, 1942, **13**, 501—502).—The housing is large; the central image can be observed on a screen on the circle and an adjustable shutter cuts off only that portion of the light which would reach the photographic plate. A. A. E.

Automatic timing device for spectrographic exposures. G. Balz (*Aluminium*, 1940, **22**, 344—345).—A divice for automatically regulating presparking periods and exposure times in routine spectrographic analysis is illustrated and briefly described; it consists of a series of relays operated by a synchronous motor at pre-arranged intervals, and signal lamps to indicate the progress of a cycle of operations. A. R. P.

New type of microphotometer. R. Fürth (*Proc. Physical Soc.*, 1943, **55**, 34—41).—The instrument described shows the blackening curve, corresponding with the distribution of blackening along a straight line on a photographic plate or film, instantaneously on the fluorescent screen of a cathode-ray oscillograph. The curve can be measured directly on the screen or photographed for later use. N. M. B.

Subjective homochromic solution to the problem of heterochromic photometry. P. Fleury (*Compt. rend.*, 1942, **214**, 706—707).—A method of obtaining more accurate results in the photometry of different coloured lights is outlined. A. J. M.

Measurement of the blackening of spectral lines with a logarithmic galvanometer scale. G. Balz (*Aluminium*, 1940, **22**, 343—344).—Blackening of spectral lines on the photographic plate is a logarithmic function of the current of a photo-cell which is $\propto$ the incident light; by using a logarithmic scale with the galvanometer (construction and calibration are described) the difference in blackening of two lines is simply the difference between two numerical vals. A. R. P.

Photo-electric polarimeter. G. Bruhat, A. Blanc-Lapierre, J. Schiltz, and G. Raoult (*Compt. rend.*, 1942, **214**, 615—617).—Modifications to increase the sensitivity of the Bruhat–Guinier amplifier are described. L. J. J.

Niobium foil as a filter for Mo $K\beta$ radiation. L. K. Frevel and H. W. Rinn (*Rev. Sci. Instr.*, 1942, **13**, 504).—Intensity reductions for Mo $K\alpha$ and $K\beta$ lines have been measured. White radiation on the long-λ side of the Nb K edge produced definite spectra from those crystal planes giving intense Mo $K\alpha$ reflexions. For crystal diffraction work Zr is superior to Nb as a filter for Mo $K\beta$ radiation. A. A. E.

Electronic method of measuring molecular lifetimes. R. D. Rawcliffe (*Rev. Sci. Instr.*, 1942, **13**, 413—418).—Apparatus (an electron multiplier tube and a cathode-ray oscilloscope) employed to follow changes in light intensity occurring in times $\sim$1 μsec. has been used to measure the decay of fluorescence of Ac_2 vapour and that of light from a N_2 discharge. The mean lifetime of the fluorescence of Ac_2 vapour is $1{\cdot}40 \times 10^{-3}$ sec. The blue N_2 system decays exponentially with mean lifetime $7{\cdot}7 \times 10^{-6}$ sec.; the decay of the red system can be resolved into 2 exponentials, with mean lifetimes 29×10^{-6} and $1{\cdot}5 \times 10^{-6}$ sec., respectively. A. A. E.

Application of guard electrodes in dielectric measurements. E. W. Greenfield (*Rev. Sci. Instr.*, 1942, **13**, 489—492).—A brief survey. A construction drawing of a cylindrical, guarded cell suitable for immersion is reproduced. A. A. E.

Modified calomel cell for pH measurements. A. D. E. Lauchlan and J. E. Page (*Nature*, 1943, **151**, 84).—For routine determinations in which the highest accuracy is not required, NaCl can replace KCl. The potential of the cell is 245·8 mv. at 20°. A. A. E.

Apparatus for measurement of scattering of low-velocity ions in gases at low pressure. J. H. Simons, H. T. Francis, C. M. Fontana, and S. R. Jackson (*Rev. Sci. Instr.*, 1942, **13**, 419—426).—By means of the apparatus consisting of an ion source, focussing devices, a magnet for selection, and a measuring chamber, ion neutralisation as well as elastic scattering can be determined as a function of velocity. A. A. E.

Inefficiency and other sources of error in cosmic ray measurements with self-quenching counters. K. Greisen and N. Nereson (*Physical Rev.*, 1942, [ii], **62**, 316—329).—Errors due to inherent inefficiency (A) and to inefficiency (B) arising from showers and scattering have been measured. A is due almost entirely to the dead time and is $\sim$0·2% for counters with a normal counting rate of 300 per min. Data for B under various conditions are given and discussed. N. M. B.

Electronic liquid level indicator. S. C. Coroniti (*Rev. Sci. Instr.*, 1942, **13**, 484—488).—The liquid, conducting or not, occupies the inner space of a coaxial cylindrical condenser. As the level varies, the change in capacitance detunes a resonance, resulting in a change of plate current through the oscillator tube. A. A. E.

Simple thyratron circuit. S. Golden (*Ind. Eng. Chem.* [*Anal.*], 1942, **14**, 812). L. S. T.

Polarographic technique. A. Dravnieks and M. Straumanis (*Z. anal. Chem.*, 1942, **124**, 31—34).—A new form of dropping cathode, a simple cathode mounting, and a small anode vessel are described. L. S. T.

Electron microscopy with electrostatic lenses. H. Mahl (*Z. tech. Physik*, 1942, **23**, 117—119).—An improved electron microscope is described. W. R. A.

Stereoscopic measurement of objects with the electron microscope. E. Gotthardt (*Z. Physik*, 1942, **118**, 714—717).—Formulæ are advanced for the determination of the space co-ordinates of points from electron-microscope images. A. J. M.

Effect of crystal lattice interferences on the image produced by the electron microscope. H. Boersch (*Z. Physik*, 1942, **118**, 706—713).—Shadow electron-microscope photographs show that the black lines observed in the bright-field photographs of thin crystals are due to weakening of the primary beam by lattice interferences and are independent of the orientation of the crystal. A. J. M.

Applications of mass spectrometric analysis to chemistry. D. Rittenberg (*J. Appl. Physics*, 1942, **13**, 561—569).—A review of the use of radioactive and stable N and O isotopes as tracers in biochemistry. L. J. J.

Ultracentrifuge. D. A. MacInnes (*Ann. New York Acad. Sci.*, 1942, **43**, 175—176).—Introduction to the Conference, Nov., 1941. The " Svedberg " ($S = 10^{-13}$ abs. units) is adopted as the practical unit for sedimentation consts. N. M. B.

Optical problems of the ultracentrifuge. W. B. Bridgman and J. W. Williams (*Ann. New York Acad. Sci.*, 1942, **43**, 195—210).—A discussion of the methods, based on changes in optical properties, for following the redistribution of components during sedimentation in an ultracentrifuge. N. M. B.

Integration of the differential equation of the ultracentrifuge. W. J. Archibald (*Ann. New York Acad. Sci.*, 1942, **43**, 211—227).—Mathematical. N. M. B.

Production and maintenance of high centrifugal fields for use in biology and medicine. J. W. Beams (*Ann. New York Acad. Sci.*, 1942, **43**, 177—193).—The following types of ultracentrifuges are described and discussed: the Svedberg oil-driven type, the gas-driven type, the air-driven vac. type, and the electrically-driven magnetically supported vac. type. N. M. B.

Ultracentrifuge cell. E. G. Pickels (*Rev. Sci. Instr.*, 1942, **13**, 426—434).—Improvements include the strengthening of parts, the use of a duralumin centrepiece, provision for alignment, and an arrangement for orienting the windows. A. A. E.

Micro-scale extractions by organic solvents. P. F. Holt and H. J. Callow (*J.S.C.I.*, 1943, **62**, 32).—An apparatus for the extraction with immiscible org. solvents of small quantities (8 to 100 c.c.) of aq. solutions which easily emulsify on shaking is described.

Viscosity tonometer. New method of measuring tension in liquids. R. S. Vincent (*Proc. Physical Soc.*, 1943, **55**, 41—48).—The gas-free liquid is enclosed in a glass bulb to which is connected a fine capillary tube. By controlled cooling of the bulb, tension is created and pulls the column of liquid down the capillary tube. The highest rate of flow which does not cause a break in the liquid is observed and the corresponding tension calc. Illustrative results are given. N. M. B.

Recording viscosimeter for paint-consistency measurements.—See B., 1943, II, 57.

Simple rotary viscometer for the study of anomalous viscous properties. J. N. Mukherjee and N. C. S. Gupta (*Indian J. Physics*, 1942, **16**, 66—70).—Apparatus is described. O. D. S.

Velocity gradient method for measurement of viscous properties of non-Newtonian liquids. J. N. Mukherjee and N. C. S. Gupta (*Indian J. Physics*, 1942, **16**, 49—53).—The velocity gradient in a flowing liquid is determined directly by microscopic observation of the motion of suspended particles at different depths in the liquid. Curves for sugar solution (Newtonian liquid), gelatin sols, and a bentonite suspension are discussed. O. D. S.

Methods of measuring yield value, viscosity, and thixotropy. J. N. Mukherjee, N. C. S. Gupta, and K. C. Sen (*Indian J. Physics*, 1942, **16**, 54—65).—Although the capillary and rotary viscometers give similar viscosity– and yield val.–concn. curves for bentonite suspensions, the Bingham yield vals. and viscosity differ according to the method of measurement. Vals. obtained by the velocity gradient method (cf. preceding abstract) agree more closely with those obtained by the rotary viscometer. Variations in the lower yield val. and apparent viscosity of thixotropic suspensions with time have been observed. O. D. S.

Beryllium–copper and its applications. D. W. Crossley and E. M. Foster (*J. Sci. Instr.*, 1943, **20**, 7—9).—Be–Cu alloys are non-magnetic and show great freedom from sparking; they are especially suitable for springs, but should not be used in presence of S or halogens. Properties and manipulation are summarised. A. A. E.

Rigid stands for laboratory apparatus. L. J. Wheeler (*J. Sci. Instr.*, 1943, **20**, 15—16).—The use of electricians' conduit, preferably threaded for use with standard joints, is illustrated. A. A. E.

Short open-tube manometer for vacuum systems. S. C. Brown (*Rev. Sci. Instr.*, 1942, **13**, 503—504).—Fritted glass discs sealed in the U-tube permit the flow of gas but not Hg, which when in contact with the disc forms a vac. seal. A gas release may be provided by including a bulb to prevent sealing on the side remote from the vac. system. A. A. E.

Efficient column suitable for vacuum fractionation. Concentric tube type. S. A. Hall and S. Palkin (*Ind. Eng. Chem.* [*Anal.*], 1942, **14**, 807—811). L. S. T.

Constant-level device for hot water baths [using distilled water]. B. W. Pocock (*Ind. Eng. Chem.* [*Anal.*], 1942, **14**, 811—812). L. S. T.

Carbon dioxide generator [using dry-ice]. J. A. Johnston (*Ind. Eng. Chem.* [*Anal.*], 1942, **14**, 805). L. S. T.

Removal of adsorbents from chromatographic tubes. J. Turkevich (*Ind. Eng. Chem.* [*Anal.*], 1942, **14**, 792). L. S. T.

Enclosed laboratory apparatus for effecting repeated crystallisations from solvents. J. D. Piper, N. A. Kerstein, and A. G. Fleiger (*Ind. Eng. Chem.* [*Anal.*], 1942, **14**, 738—739). L. S. T.

Apparatus for crystallisation and filtration at low temperatures. F. W. Quackenbush and H. Steenbock (*Ind. Eng. Chem.* [*Anal.*], 1942, **14**, 736—737). L. S. T.

Flask design and high-speed stirring. A. A. Morton, B. Darling, and J. Davidson (*Ind. Eng. Chem.* [*Anal.*], 1942, **14**, 734—736; A., 1942, I, 75).—Improved apparatus for high-speed stirring is described. Results of a comparison of an ordinary flask, a creased flask, and the apparatus of Huber and Reid (B., 1926, 519), using the oxidation of p-$C_6H_4Me\cdot NO_2$ as a guide, are recorded. L. S. T.

XII.—LECTURE EXPERIMENTS AND HISTORICAL.

Henry Cavendish. M. Schofield (*Chem. and Ind.*, 1943, 41—42).

Newton's chemical philosophy. D. McKie (*Phil. Mag.*, 1942, [vii], **33**, 847—870).

Joseph Black (1728—1799). A. Kent (*Chem. and Ind.*, 1942, 530—531).

John Roebuck. K. R. Webb (*Chem. and Ind.*, 1942, 533—534).

Early history of strontium. J. R. Partington (*Ann. Sci.*, 1942, **5**, 157—166).

Origin of the thermometer. F. S. Taylor (*Ann. Sci.*, 1942, **5**, 129—156).

Bernardo Oddo (1882—1941). Q. Mingoia (*Gazzetta*, 1941, **71**, 737—752).—An obituary notice, with bibliography. E. W. W.

History of isotopes and measurement of their abundances. E. B. Jordan and L. B. Young (*J. Appl. Physics*, 1942, **13**, 526—538).—A survey of published work. L. J. J.

XIII.—GEOCHEMISTRY.

Fluorine and boron in natural waters, and their bearing on the occurrence of petroleum. N. A. Tageeva (*Compt. rend. Acad. Sci. U.R.S.S.*, 1942, **34**, 117—129).—F, B, and P (As) contents of various natural waters (Caucasian) are tabulated, and discussed in relation to the origin of the water and relationship to oil deposits. L. S. T.

Distribution of boron in the waters of Azerbaidjan oilfields and its correlational value. L. A. Guliaeva (*Compt. rend. Acad. Sci. U.R.S.S.*, 1942, **35**, 71—75).—B distribution in H_2O from Baku petroleum layers increases regularly with depth and accumulation of B is not associated with accumulation of Cl. High B content is associated with alkaline H_2O. [B]/[Cl] is a good correlative for the three sections of the productive layer; in mud-volcanoes it indicates the H_2O-bearing horizons pierced by the volcano. L. J. J.

Occurrence of copper in oil-field waters. E. S. Itkina (*Compt. rend. Acad. Sci. U.R.S.S.*, 1942, **35**, 149—152).—Cu is found in most samples of edge-H_2O from oil-fields and mud-volcanoes of Azerbaidjan, but not in those of the second Baku. A. J. M.

Occurrence of strontium and barium in oil-field waters of the Ural–Volga region. A. A. Varov and I. I. Romm (*Compt. rend. Acad. Sci. U.R.S.S.*, 1942, **35**, 114—117).—All oil-field waters in this area contain Sr, but only waters from the Devonian regions contain Ba. The content of Sr depends on the [SO_4''] of the H_2O, the chemical characteristics of the H_2O, and the degree of mineralisation. A. J. M.

Salt reserves of Lake Ebeitz. I. G. Drushinin (*Compt. rend. Acad. Sci. U.R.S.S.*, 1941, **31**, 901—902).—The salt deposited in Lake Ebeitz (Omsk region) when the lake is frozen consists chiefly of $Na_2SO_4,10H_2O$ (**I**). Salts deposited by sedimentation consist of (**I**) (92·89%), NaCl (1·32%), $MgSO_4$ (0·30%), and $Ca(HCO_3)_2$ (traces). In autumn and winter, the newly pptd. (**I**) covers the bottom of the lake to a depth of 25—30 cm. The bed of the lake consists chiefly of (**I**) (mirabilite). A. J. M.

Iron content of marine river-deposits. C. Francis-Bœuf (*Compt. rend.*, 1942, **214**, 279—282).—Data for three river estuaries are given, and the fine semi-colloidal deposits, which contain an important proportion of FeS or FeS_2, are discussed with reference to their function as a binding material for larger particles, colour, relation to org. matter, and variation with geographical conditions. N. M. B.

Segregation of secondary quartz in the lower Permian deposits of Tatana. L. M. Miropolski (*Compt. rend. Acad. Sci. U.R.S.S.*, 1942, **36**, 62—65).—Examination of these deposits shows the widespread presence of SiO_2 as individual grains or crystals, intergrowths, and aggregates and in cavities in other rocks. The mechanism by which this concn. of Si as SiO_2 has occurred is discussed. J. W. S.

Study of bent quartz crystals by means of a Cauchois spectrograph. E. Vainschtein (*Compt. rend. Acad. Sci. U.R.S.S.*, 1942, **34**, 107—109).—The general picture of deformation observed in mica is reproduced in its main features in crystals of quartz. The phenomenon described by Watson (A., 1938, I, 99) should be accounted for by the breaking of the crystal into separate pieces. L. S. T.

***X*-Ray spectrographic investigation of bent mica crystals with the aid of a Johann spectrograph.** E. Vainschtein (*Compt. rend. Acad. Sci. U.R.S.S.*, 1942, **35**, 233—235).—Spectrographic examination of bent mica crystals shows that in the action of bending the crystals are split into smaller crystals, the latter changing their orientation one to another without being individually distorted to any appreciable extent. C. R. H.

Fossilisation of diatoms in Tertiary flints of Oran. G. Deflandre (*Compt. rend.*, 1942, **214**, 319—322).—New features of diatom fossilisation are described. F. O. H.

New diagram for the determination of plagioclase twins. A. N. Zavaritsk (*Compt. rend. Acad. Sci. U.R.S.S.*, 1942, **36**, 14—16).—The anorthite and twinning law of a plagioclase can be determined using the five-axial universal stage by direct measurement, without graphical construction. F. R. G.

Binary system $CaSiO_3$–diopside and the relations between $CaSiO_3$ and akermanite. J. F. Schairer and N. L. Bowen (*Amer. J. Sci.*, 1942, **240**, 725—742).—Data from quenching experiments are recorded for these two systems, and results are represented diagrammatically. The bearing of these results on the chemical compositions of certain rock-forming minerals, and on their melting and stability relationships is discussed. L. S. T.

System $CaSiO_2$–diopside–anorthite. E. F. Osborn (*Amer. J. Sci.*, 1942, **240**, 751—788).—New data obtained by the quenching method are presented; the phase relationships are discussed by means of diagrams. A ternary reaction point occurs at 1245°, and the lowest temp. at which liquid exists in the system under equilibrium conditions is 1236°. The compound $5CaO,2MgO,6SiO_2$ does not appear in this system; data supporting the view that it does not exist are given. Additional data for the limiting systems $CaSiO_3$–anorthite (**I**) and diopside–(**I**) are recorded. L. S. T.

Macrofibrous anhydrite in the Chuvash Republic. L. M. Miropolski (*Compt. rend. Acad. Sci. U.R.S.S.*, 1942, **35**, 157—158).—An analysis of a macrofibrous anhydrite is given. A. J. M.

"Age" of terrestrial matter and the geochemical uranium : lead ratio. F. F. Koczy (*Nature*, 1943, **151**, 24).—Revised calculations give 5·33 × 10^9 years as the max. age of terrestrial matter and 5·6 for the geochemical Pb : U ratio. A. A. E.

Principal stages in the history of indium in the earth's crust. N. M. Prokopenko (*Compt. rend. Acad. Sci. U.R.S.S.*, 1941, **31**, 903—906).—The geochemical history of In may be reduced to the stages: magmatic, pegmatitic, pneumatolytic, contact, hydrothermal, and hypergene. In is not typical of the magmatic stage, and occurs largely disseminated. It occurs only in small concns. in pegmatites and pneumatolytic deposits. The skarn deposits (contact type) of the U.S.S.R. often contain reasonable concns. of In. It occurs in the largest concn. in hydrothermal deposits (*e.g.*, Sn and W minerals). It seldom accumulates in the hypergene stage in large amounts. A. J. M.

Migration of ionium under natural conditions. I. E. Starik and O. S. Melikova (*Compt. rend. Acad. Sci. U.R.S.S.*, 1941, **31**, 911—913.—The Io content of carnotite with an isomorphous admixture of tyuamunite has been determined. Although the migration of Ra from the mineral is considerable, the Io content is relatively near its equilibrium val. A. J. M.

Age of pyroxenite intrusions of Afrikanda and Ozernaja Varaca in the Kola Peninsula. E. K. Gerling and I. E. Starik (*Compt. rend. Acad. Sci. U.R.S.S.*, 1942, **35**, 153—154).—Two shorlomite specimens from the above intrusions were investigated, their content of He, Ra, and Th being determined. The two intrusions were formed simultaneously ~340 × 10^6 years ago. A. J. M.

"Friable" bauxites and the cretaceous crust of bauxite weathering in the Sokolov deposit of the Kamensk (Central Urals) region. B. P.

Krotov (*Compt. rend. Acad. Sci. U.R.S.S.*, 1942, **35**, 76—78).—Friable structure in the upper layers of bauxite beds is due to weathering in continental periods. Abnormal Si contents in friable bauxites are associated with the nature of overlying sedimentary rocks. L. J. J.

Development of Tartarian lower Permian red rocks of the "red bed" type and the causes of their colour. L. M. Miropolski (*Compt. rend. Acad. Sci. U.R.S.S.*, 1942, **35**, 210—213).—The green and red colouring of the interbeds of argillite, silstone, marl, and breccia in the Kungurian deposits along the Kama river (Tartar Republic) is attributed to oxides and hydrated oxides respectively of Mn and Fe. F. R. G.

Metamorphism and assimilation in the Wellington District, N.S.W. II. Dynamic and contact metamorphism of a group of ultrabasic rocks. E. M. Basnett (*J. Proc. Roy. Soc. New South Wales*, 1942, **76**, 55—81).—Petrological. Chemical analyses of 9 rocks are recorded. L. S. T.

Rock deformation and mineralisation at Mount Isa. R. Blanchard and G. Hall (*Proc. Austral. Inst. Min. Met.*, 1942, No. 125, 1—60).—The rock deformational and mineralisation processes responsible for ore deposition in the Mount Isa Ag–Pb–Zn deposit are described, and supported by data relating to (i) replacement by the mineral sulphides, (ii) mineralogical composition of the Ag–Pb–Zn ore bodies, and (iii) mineralogical composition of the central mineralised block at Mount Isa. Analyses of typical Mount Isa pyrite are given. L. S. T.

Spectral analysis of celestite from the Upper Permian deposits of Tataria. L. M. Miropolski and S. A. Borovik (*Compt. rend. Acad. Sci. U.R.S.S.*, 1942, **34**, 114—116).—Of the 37 elements sought in 6 samples only 11, viz., Mg, Al, Si, Ca, Ti, V, Fe, Cu, Y, Ba, and Sr, were found. The composition of crystals is essentially the same for different stratigraphical horizons, and no relation between chemical composition and variation in habit and shape of the crystals could be established. The Si, Ba, Ca, and Ti contents are high and variable. Mg, Fe, Al, V, Cu, and Y are present in traces only. Si and Fe appear to be part of the lattice of celestite, and Ti and Fe characterise its colour. L. S. T.

Subdivision of colloid-dispersed minerals of the montmorillonite group. I. D. Sedletzki (*Compt. rend. Acad. Sci. U.R.S.S.*, 1942, **34**, 130—133).—Examination of montmorillonite (**I**) clays shows that (**I**) is not an individual mineral, but consists of a group of closely-related minerals of different compositions; these are recorded. L. S. T.

Mineralogy of lower cretaceous deposits of Kislovodsk [Lower Caucasus]. S. G. Sarkisian (*Compt. rend. Acad. Sci. U.R.S.S.*, 1942, **35**, 284—287).—The results of a detailed mineralogical analysis of cretaceous deposits at Kislovodsk are described. The deposits are considered to be local in origin. C. R. H.

Morphology of idocrase. J. A. Tremblay (*J. Washington Acad. Sci.*, 1942, **32**, 327—337).—Analysis by Donnay's method assigns the space-group $C4/acn$ with $c : a = 0{\cdot}5372$ to idocrase. After turning through 45°, the space-group becomes $P4/nnc$ with $c : a = 0{\cdot}7597$. The data, which agree with those obtained by *X*-rays, are discussed with reference to Bravais' law and to Friedel's law of mean indices. C. R. H.

Nordite, a new mineral of the Lovozero tundras. V. I. Gerasimovski (*Compt. rend. Acad. Sci. U.R.S.S.*, 1941, **32**, 496—498).—*Nordite* occurs as light-brown lamellæ, $a : b : c = 0{\cdot}730 : 1 : 0{\cdot}527$. Cleavage is marked along (100); hardness 5—6, sp. gr. 3·430, n_g 1·642, n_m 1·630—1·640, n_p 1·619. *X*-Ray data show it to be rhombic. The empirical formula is $2Na_2O,3(Sr,Ca,Mn,Mg)O,0{\cdot}7(La,Di,Y)_2O_3,8SiO_2$. Of the individual rare earths, nordite contains La_2O_3 8·55%, Ce_2O_3 8·1%, Pr_2O_3 1·6%, Nd_2O_3 1·85%. It is found in pigmatites between sodalite grains. L. J. J.

Villiaumite from Lovozero tundras. V. I. Gerasimovski (*Compt. rend. Acad. Sci. U.R.S.S.*, 1941, **32**, 492—495).—Villiaumite (essentially NaF) occurs in interstices of lovozerite as carmine-red grains, n_{6200} 1·3253, n_{6000} 1·3258, n_{5600} 1·3268, n_{5200} 1·3272. The *X*-ray spectrum agrees with NaF. It is found associated with sodalite-syenite and luyavrite, and is probably widely distributed in the Lovozero and Chibiny massifs. L. J. J.

Method of colour-photomicrographs in the ultra-violet as applied to determination [detection] of silver in thin [mineral] sections. E. M. Brumberg and M. V. Schevtschenko (*Compt. rend. Acad. Sci. U.R.S.S.*, 1941, **32**, 486—488).—Micro-inclusions of Ag in mineral sections are photographed by reflected light with the Hg line 3130 A., isolated by the filters described, which corresponds with a reflexion min. of Ag. Reflexion microscopic objectives are used. L. J. J.

Colloid-dispersion mineralogy, its problems and methods. I. D. Sedletzki (*Compt. rend. Acad. Sci. U.R.S.S.*, 1942, **34**, 165—170).—From a review of the results of recent work on the genesis of highly dispersive formations, *e.g.*, soils, loesses, clays, muds, the following five laws of colloid-dispersion mineralogy are enunciated: (1) the composition of these minerals is governed solely by the character of the weathering process, (2) the composition of the minerals formed by weathering of different rocks represents paragenetic association of argillitites determined by the weathering conditions, (3) the paragenesis of elements forming such fractions depends on the paragenesis of colloid-dispersive minerals, (4) the genesis of the minerals is linked up with the conditions of the medium, *e.g.*, montmorillonite-type minerals are formed under neutral or alkaline conditions, and kaolin-type under acid conditions, (5) the weathering of rocks passes through a series of stages the duration of which is determined by physico-geographical and climatic conditions. A. R. P.

Dolomitisation of reefagenic formations in the oil-bearing region of Ishimbaevo. G. I. Theodorovitsch (*Compt. rend. Acad. Sci. U.R.S.S.*, 1942, **34**, 160—164).—Evidence is adduced to show that the dolomitisation of limestone by aq. $MgSO_4$ ceases when the solution becomes saturated with $CaSO_4$ and that saturated $MgSO_4$ solution is not necessary to complete the process. When the $CaSO_4$ is deposited in the dolomite and subsequently leached out a porous dolomitic limestone or dolomite remains; this is the case at Ishimbaevo, where petrographic examination of the rocks indicates that both dolomitisation and sulphatisation of the original limestone deposits took place under extreme conditions at the bottom of shallow bays or other H_2O reservoirs. Subsequently when the reefs were covered by the H_2O of the Kungurian basin all the free cavities were rapidly filled with fine-grained anhydrite. A. R. P.

Thermal characteristics of humic acids. I. D. Sedletzki and G. V. Schmakova (*Compt. rend. Acad. Sci. U.R.S.S.*, 1942, **35**, 255—257).—Thermographs of humic acids from peat and soil show similar characteristics, viz., endothermic interval 90—100° due to separation of hygroscopic H_2O, exothermic interval 200—400° possibly due to combustion of certain ingredients, endothermic interval 630—635° due to separation of H_2O as a result of transformation of CO_2H, OH, and OMe groups, exothermic interval 770—860° due partly to burning of bituminous substances, and a complex exothermic effect at 1100° when humic acids decompose. The data support those obtained by *X*-ray and electronographic methods. C. R. H.

Modern conceptions of the physical constitution of coal and related research in Great Britain. C. E. Marshall (*J. Geol.*, 1942, **50**, 385—405).—No essential differences exist between the normal coal types and constituents of American and British Carboniferous coals. The importance of petrographic analysis in the economic and efficient utilisation of coal, and of petrographic examination of the mineral matter in coal seams in solving problems of prep. and treatment, is emphasised. L. S. T.

Relation of the physical constitution of coal to its chemical characteristics. H. H. Lowry (*J. Geol.*, 1942, **50**, 357—384).—Mainly a review of published data on the chemical nature of the banded constituents of coal seams. L. S. T.

Physical constitution of coal as related to coal description and classification. E. C. Dapples (*J. Geol.*, 1942, **50**, 437—450).—A discussion of the interrelationship of primary coals shows that no sharp boundary exists between banded and non-banded varieties, and that all are part of the same series of composite coals. L. S. T.

Influence of physical constitution of coal on its chemical, hydrogenation, and carbonisation properties. G. C. Sprunk (*J. Geol.*, 1942, **50**, 411—436).—Correlation between microstructure and the chemical, carbonisation, and hydrogenation properties of coal shows that microstructure must be considered whenever differences in coal properties are to be explained. The type of coal and the kind of constituents have considerable effect on the ultimate and proximate analysis. Relationships established between the analysis of coals and the yields of carbonisation products are given. The O content of bright coals correlates satisfactorily with the agglutinating val. of the coal. L. S. T.

Optical reflexions from coal. C. G. Cannon and W. H. George (*Nature*, 1942, **150**, 690).—Max. variations in ash content, volatile matter, and sp. gr. exhibit overlap between coal constituents, but measurements of % specular reflexion at polished surfaces at 60° angle of incidence and reflexion are characteristic for durain (2—4) and vitrain (5·7—15·7). The spreading of the reflected beam is in the order fusain > durain > vitrain. A. A. E.

Distribution of nickel and copper in the caustobiolites of Tataria. L. M. Miropolski (*Compt. rend. Acad. Sci. U.R.S.S.*, 1942, **35**, 155—156).—Ni and Cu are always present in the ash of any kind of caustobiolites (coal, peat, oil, asphaltite, etc.) but the amounts in these substances in the Tataria district are very small. Coals appear to contain more Ni and Cu than other substances of this type. A. J. M.

Sulphur as an indicator in prospecting for oil, on the evidence obtained in the region of Sterlitamak-Ishimbaevo. G. I. Teodorovitsch (*Compt. rend. Acad. Sci. U.R.S.S.*, 1942, **34**, 121—125).—When accompanied by bitumens, gaseous, liquid, or solid, or their traces, native S indicates the presence of oil at lower horizons. L. S. T.

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MARCH, 1943.

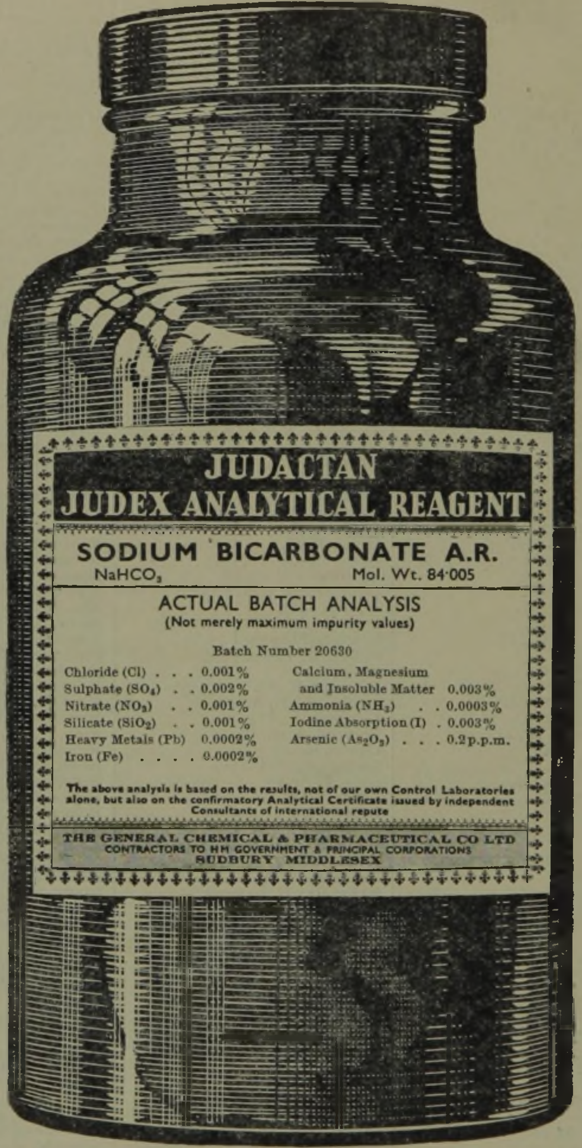
JUDACTAN

ANALYTICAL REAGENTS WITH ACTUAL BATCH ANALYSIS

ACTUAL

BATCH

ANALYSIS



JUDACTAN
JUDEX ANALYTICAL REAGENT

SODIUM BICARBONATE A.R.
$NaHCO_3$ Mol. Wt. 84·005

ACTUAL BATCH ANALYSIS
(Not merely maximum impurity values)

Batch Number 20630

Chloride (Cl) . . .	0.001%	Calcium, Magnesium and Insoluble Matter	0.003%
Sulphate (SO_4) . .	0.002%	Ammonia (NH_3) . .	0.0003%
Nitrate (NO_3) . .	0.001%	Iodine Absorption (I) .	0.003%
Silicate (SiO_2) . .	0.001%	Arsenic (As_2O_3) . . .	0.2 p.p.m.
Heavy Metals (Pb)	0.0002%		
Iron (Fe)	0.0002%		

The above analysis is based on the results, not of our own Control Laboratories alone, but also on the confirmatory Analytical Certificate issued by independent Consultants of international repute

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