BRITISH CHEMICAL ABSTRACTS

B.—APPLIED CHEMISTRY

AUGUST, 1937.

I.—GENERAL; PLANT; MACHINERY.

Plant construction and chemistry. O. Fuchs (Chem. Fabr., 1937, **10**, 213—216).—A plea is made for closer co-operation between the plant manufacturer and the chemist in Germany. C. I.

Wood as chemical raw material. G. Schneider (Chem.-Ztg., 1937, **61**, 473—476).—A review covering carbonisation, saccharification, production of cellulose, tanning materials, and resins, etc.

Designing soft copper gaskets for high-pressure equipment. W. L. Edwards (Chem. Met. Eng., 1937, **44**, 134—137).—A method for designing Cu gaskets and illustrations of their use with different types of joints are given. D. K. M.

Use of anhydrous ammonia for testing tightness of equipment. L. H. Brandt (Chem. Met. Eng., 1937, **44**, 157—158).—The leakages in equipment may be detected by connecting it internally with a source of anhyd. NH_3 and moving a burning S taper (made by dipping cotton wick into molten S) around the outside; white fumes will indicate leakages. When this method is used for plant made of Cu or its alloys, care should be taken that H_2O is absent; with large systems, especially when there is danger of a spark or heating, it is important to avoid forming an explosive mixture of NH_3 and air (15—28 vol.-% of NH_3). D. K. M.

Thermal conductivity of insulating materials and methods of testing. E. Griffiths (J. Inst. Heat. Vent. Eng., 1937, **5**, 21—36).—Relevant work of the National Physical Laboratory is reviewed. R. B. C.

Vacuum [drying plant] in heat technology. A. Schacht (Wärme, 1937, **60**, 164—165).—The application of the above plant for concentrating solutions and extracting gases, *e.g.*, from cables before impregnation, is discussed. R. B. C.

Experimental film dryer for use with or without vacuum. Anon. (Chem. and Ind., 1937, 509).—An illustrated description is given of a variable-speed, two-drum film dryer with about 1·2 sq. ft. of heating surface, capable of evaporating about 5 lb. of H_2O per hr. The dryer is built into a horizontal, mild-steel cylinder suitably equipped for vac. operation and provided with windows for observation purposes. F. J. B.

Heat transfer and pressure drop in rectangular air passages. L. Washington and W. M. Marks (Ind. Eng. Chem., 1937, **29**, 337—345).—The friction and heat-transfer factors were determined for the flow of air through smooth Cu ducts, 5 in. wide and 48 in. long, with the sides spaced $\frac{1}{8}$, $\frac{1}{4}$, and $\frac{9}{16}$ in., for a wide range of velocities in each case. For isothermal flow the crit. velocity agrees well with that determined for circular sections. When the air is being heated, the flow is viscous up to much higher Reynolds nos.; the friction factor is higher while the flow is viscous, but substantially the same when the flow becomes turbulent. F. J. B.

Ammoniacal lithium nitrate as absorption liquid for refrigerating machines. K. Gensch (Z. ges. Kälte-Ind., 1937, **44**, 1—5, 24—29).—A pressure–temp.–concn. diagram for ammoniacal $LiNO_3$ (I) containing various % of NH_3, and curves showing sp. heat and heat evolution, are given. A refrigerating plant (Schering–Kahlbaum) employing (I), to produce 10,000 kg.-cal. per hr. at an evaporation temp. of −55°, is described. Operating data obtained over a period of 4000 hr. are discussed. (I) does not undergo change in use, and it is claimed that low temp. can be obtained more economically with it than with aq. NH_3. R. B. C.

Cooling effect of compressed air when freely expanded. W. S. Weeks (Amer. Inst. Min. Met. Eng., Tech. Publ. 793, Mar., 1937, 6 pp.).—The temp. attained by air when expanded to 1 atm. either from a tank held at const. pressure or from a closed tank, and when flowing into a tank from a pipe line held at const. pressure, are calc. R. B. C.

Significance of compact disperse materials in grinding. H. W. Kohlschütter (Z. Ver. deut. Ing., Beih. Verfahrenstech., 1937, No. 1, 5—6).—The energy required for grinding such substances as Fe_2O_3 and SiO_2 gel depends on their method of prep. R. B. C.

Theoretical foundations of grinding [brittle substances]. A. Smekal (Z. Ver. deut. Ing., Beih. Verfahrenstech., 1937, No. 1, 1—4).—A lecture. R. B. C.

Industrial significance of colloid-chemical research in Hungary. A. Buzágh (Tech. Kurir, 1937, **8**, 43—46).—A lecture. E. P.

Particle packing and particle shape. H. E. White and S. F. Walton (J. Amer. Ceram. Soc., 1937, **20**, 155—166).—The theoretical packing of spheres is exhaustively analysed, showing that, of the 5 possible methods, pyramidal and tetrahedral packing each give a min. void space of 25·95%, which can be reduced to 14·9% by the progressive packing of secondary, tertiary, quaternary, and quinary spheres in the spacings. A very fine filler in the remaining voids may reduce the voids to 3·9%. Cylindrical (but not ellipsoidal) particles if correctly packed give a lower porosity than is possible with spheres. The application of these theories to the production of dense refractories is discussed and illustrated. Investigation of exceptionally dense refractories indicates that advantage has been taken of the optimum packing of spherical particles. The possibility of crushing grogs to a spherical particle shape is discussed. J. A. S.

Particle shape and surface characteristics of aggregates. R. G. H. Clements (Chem. and Ind., 1937, 248—250).—A classification is suggested in which particle shape is subdivided into four groups, *e.g.*, rounded, irregular, angular, and flaky, and surface characteristics into six groups, *e.g.*, glassy, smooth, granular, cryst., pitted, and spongy and porous. Typical examples are given. T. W. P.

Influence of the solid [component] on the flow properties of dilute [mineral loading] suspensions. R. N. Traxler (Paper Trade J., 1937, **104**, TAPPI Sect., 123—126).—Various types of flow encountered in dispersed systems containing various concns. of solid are discussed, and a no. of instruments available for evaluating flow properties in such systems are mentioned. Methods of determining both primary properties (particle size, size distribution, and shape) and secondary properties (% of voids and average void size) of the compacted powder are described. A simple relation exists between vol. concn. of the solid present and the η of the suspension, which makes possible an accurate evaluation of the influence of a dispersed solid on the flow properties of slurries of which it is a part. Possible applications in the paper-making industry are indicated. H. A. H.

Extraction velocity of solids. I. Theory of [solvent] extraction of a slab. S. Hatta (J. Soc. Chem. Ind. Japan, 1936, **39**, 486—488B).—Mathematical. Only one end of the slab is exposed to the solvent, and it is assumed that the slab is previously impregnated with solvent, that the diffusion coeff., solution ratio, and vol. of residue are const., and that adsorption effects are negligible. C. R. H.

Influence of glues on cracking of wetted powders. II. A. V. Dumanski, N. N. Krjatschkov, and E. G. Leisle (Kolloid. Shurn., 1936, **2**, 391—398). —Cracking produced by drying or bending of pastes of starch, clays, soils, etc. was observed. The perimeters of the single fields, but not their areas, are almost const. for a given sample. Addition of gum arabic or gelatin to starch increases the fields. Dil. pastes at bending give larger fields than the conc. ones. The pastes do not crack at bending when the H_2O content is too high, *e.g.*, >5% for sand or 55% for starch + gelatin. J. J. B.

Modern filtration with bag filters in the chemical and allied industries. E. Ebbrecht (Chem.-Ztg., 1937, **61**, 375—377).—Bag filters as used in the sugar and foodstuffs industries are recommended for general use where the amount of solid matter to be removed is small. D. P.

Fluid quantity meter. H. Lohmann and E. Säuerländer (Siemens Z., 1937, **7**, 60—65).—An apparatus is described and its application in a sugar factory discussed. R. B. C.

Countercurrent liquid–liquid extraction in a packed tower. Solvent extractions of [lubricating] oil by nitrobenzene. J. H. Rushton (Ind. Eng. Chem., 1937, **29**, 309—318).—Variables entering into the design of suitable equipment are enumerated, and the process is applied to the separation of the naphthenic and paraffinic components of a lubricating oil by countercurrent extraction with $PhNO_2$; this was examined firstly by means of an equilibrium batch system and then in a packed tower with a variety of packings. Small packings appeared to give better extraction than large, but they limited the throughput; optimum conditions were obtained with a graded packing. The solvent ratio over a wide range has little effect on the efficiency of the process. F. J. B.

Conditions at liquid–liquid interface. L. C. Strang, T. G. Hunter, and A. W. Nash (Ind. Eng. Chem., 1937, **29**, 278—282).—Information has been sought which will enable mass transfer from fluid to fluid to be treated mathematically along similar lines to Prandtl's treatment of heat transfer. Experimentally the simplest case was investigated, *i.e.*, that in which an annulus of H_2O flowed down between a glass wall and a stationary core of immiscible liquid. Wide ranges of rates of flow and η of core liquid were examined. The results appear to show that the crit. velocity as determined by a modified Reynolds curve and checked by visual observation is dependent on the physical properties of the core liquid, and occurs at a lower val. of Reynolds no. than it does in a corresponding full circular or annular pipe. F. J. B.

Mechanism of gas–liquid reaction. Batch absorption of carbon dioxide by stirred alkaline solutions. L. B. Hitchcock (Ind. Eng. Chem., 1937, **29**, 302—308).—The factors controlling the rate of absorption are limited to the properties of the liquid phase. Mathematical analysis of the initial (steady-state) rate of absorption as determined previously (A., 1934, 41), and of the results of new determinations, show that the rate of absorption is inversely $\propto$ the η of the liquid phase, and also that the initial rate of absorption increases with increasing solute concn. up to a max. and then decreases, that the solute-concn. term should include the interfacial val. of the solubility of the pure gas in the solvent, and that the instantaneous rate of absorption of a batch is given by the sum of the initial rates of dissolution of corresponding hydroxide and carbonate concns. Changing temp. produces a change in the exponent of the "driving force" or concn. term of the expression evolved. F. J. B.

Desorption of carbon dioxide from water in a packed tower. T. K. Sherwood, F. C. Draemel, and N. E. Ruckman (Ind. Eng. Chem., 1937, **29**, 282—285).—Data for the desorption of CO_2 from H_2O by air in a tower packed with 1-in. C Raschig rings have been obtained with a view of making a general analysis of overall coeffs. of mass transfer. A specialised modification of an Orsat apparatus was developed to deal with the accurate analysis of very dil. CO_2–air mixtures involved. Gas rate had no effect on K_La over the range 57—314 lb./hr./sq. ft., whilst the effect of the H_2O rate is indicated by the empirical relation $K_La = 0{\cdot}021L^{0{\cdot}88}$ over the range 770—9120 lb./sq. ft./hr. F. J. B.

[Rotary] pressure filter. W. Schöne (Chem. Fabr., 1937, **10**, 216—218).—The filter consists of a rotating drum contained in a pressure-tight housing. The liquid to be filtered is pumped into the intermediate space at 2—15 atm. There is an overflow for surplus feed, a compressed-air connexion at the filtering pressure to assist drying, and a conveyor device for cake removal without pressure loss. Another design, suitable for heavy ppts., consists of a travelling belt upon which the liquid is fed and which thus travels through a pressure chamber. This and the filtrate chamber form one pressure unit. The belt is cleaned as it returns. This type of filter has proved suitable for, *e.g.*, samples of Al_2O_3 difficult to filter. C. I.

Design and analysis of fractionating columns for complex mixtures. P. Docksey (J. Inst. Petroleum Tech., 1937, **23**, 316—349).—The calculation of the products which will be obtained when a given feed is fractionated under known conditions is discussed. Methods are evolved for making plate-to-plate calculations in both rectifying and stripping sections of a tower working on the continuous principle, in tabular form convenient for calculation. They are based on the conventions that perfect equilibrium is attained on each plate and that const. volatility ratios can be used without loss of accuracy. If the composition is known or assumed at one point in the tower the plate-to-plate calculation gives the composition at other points and this may be used in analysis to obtain a val. for plate efficiency, in design to correct the initial assumption and so finally arrive at the true composition of the products, or to calculate the theoretical no. of plates required to effect a given separation. These points are discussed, particularly the application of the method to design. C. C.

Evaporation of purified waters. L. Fassina (Chim. et Ind., 1937, **37**, 649—652).—The suitability for boilers of H_2O softened by addition of $Ca(OH)_2$ or Na_2CO_3 is discussed. The disadvantages of the resulting alkaline solution are stressed, particularly its power of dissolving Zn, Cu, and Fe at 100°, its tendency to convert $CaCO_3$ into $Ca(OH)_2$, which reacts with sol. sulphates to form an incrustation of $CaSO_4$, and the tendency of $Mg(OH)_2$ to react with sol. chlorides to form $MgCl_2$, which is hydrolysed at 100° with formation of HCl. It is emphasised that the H_2O should be alkali-free and that the amount of dissolved $Mg(OH)_2$ and $CaCO_3$ should be kept to a min. In the latter connexion the use of zeolites and of $NaAlO_2$ is discussed. C. R. H.

Specific enthalpy of low-pressure steam. C. H. Berry (Combustion, 1937, **8**, No. 10, 41—42).—Equations and charts for computing enthalpy with an accuracy of 2% for the temp. ranges −40° to 316°, 316—592°, and 592—872° are given. R. B. C.

Empirical expression for total heat of superheated steam. P. Tongas (Compt. rend., 1937, **204**, 1408—1410).—The total heat (H) of superheated steam is given by $H = (4{,}250{,}400 + 2513t)/(7114—t) - [10^{(0{\cdot}00324t + 0{\cdot}88350)} + 57]p/[10^{(0{\cdot}00410t + 1{\cdot}13085)} - p]$ kg.-cal., where t = temp. and p = pressure in kg./sq. cm. R. S. B.

Thermal quantity meter. A. Egli (Siemens Z., 1937, **17**, 57—60).—The instrument described records separately the vol. of H_2O flowing in a system, the temp. difference between the feed and the return, and the quantity of heat. R. B. C.

Absorption of gases in packed towers. T. H. Chilton, H. R. Duffey, and H. C. Vernon (Ind. Eng. Chem., 1937, **29**, 298—301).—Experiments were made to determine the comparative efficiencies of marbles and corresponding sizes of broken stone, in a range of tower sizes, when scrubbing NH_3 from an air–NH_3 mixture by means of H_2O. Little difference was found in efficiencies of the two types of packing, and for a given case the absorption coeff. appears to increase as some fractional power of the increase in surface. F. J. B.

Recovery of sulphur dioxide from waste gases. Design of scrubbers for large quantities of gases. H. F. Johnstone and A. D. Singh (Ind. Eng. Chem., 1937, **29**, 287—297).—The correlation between heat- and mass-transfer data, in cases where the resistance of the liquid film is negligible (cf. Chilton and Colburn, B., 1935, 577), has been examined experimentally and substantiated. Data for the evaporation of H_2O, as indicated by increasing R.H. of the air, the absorption of SO_2 by alkaline solutions and of NH_3 by acid solutions, together with the resistance to gas flow were obtained. The contact surfaces in the scrubbing towers consisted of a no. of arrangements of (*a*) vertical smooth plates, (*b*) vertical corrugated plates, (*c*) grids, and (*d*) random packings. Consideration of the data indicates that a grid packing best fulfils all the requirements of a scrubbing plant to remove SO_2 from large quantities of combustion gases. Optimum grid dimensions for economic design and operation have been calc. from the data, and it is indicated that the practical results from a tower so designed substantially agree with the anticipated figures. F. J. B.

Measurement of fluid flow. R. Witte (Arch. Wärmewirts., 1937, **18**, 89—93).—The measurement of the flow of H_2O, steam, and aq. NH_3 by means of diaphragms and nozzles inserted in the pipe-line, and the effects of temp. and pressure on the accuracy attainable, are described. R. B. C.

Preventing failure of boiler fusible plugs. E. I. Lloyd (Steam Eng., 1937, **6**, 229—230).—Analyses of various oxide deposits found on boiler safety plugs (bronze casing filled with Pb or Sn) which had failed in service showed that SnO_2 was the chief constituent. Factors controlling corrosion of the casing by feed-H_2O or furnace gases are discussed. R. B. C.

Measurement of air flow. E. Ower (Colliery Eng., 1937, **14**, 187—190).—A review. R. B. C.

Determination of moisture in industrial gases containing dust. F. Lieneweg (Z. Ver. deut. Ing., Beih. Verfahrenstech., 1937, No. 1, 10—13).—The various methods are reviewed. R. B. C.

Method and apparatus for determination of clouds, smoke, and dusts. A. Czernotzky (Chem. Fabr., 1937, **10**, 218—220).—Of 3 one-litre flasks (I), (II), and (III), (I) and (II) contain 300—400 c.c. of H_2O which is kept boiling briskly. The gas to be tested is drawn through (I) and (II), ascends through a bulb condenser, and then passes down through a worm condenser to (III), which contains 150 c.c. of cold H_2O. A meter and pressure regulator complete the apparatus. In the case of steam-volatile clouds, H_2O must be replaced by another suitable liquid. The substance to be tested for is found chiefly in (I) and (II), but also in (III) by entrainment. The apparatus was designed for determining $ZnCl_2$ clouds in HCl vapour. It is also suitable for P_2O_5 and SO_3. C. I.

Alinement chart for interpreting Orsat analyses of flue gas. W. K. Woods (Chem. Met. Eng., 1937, **44**, 157).—A chart for calculating excess air etc. used in combustion from flue-gas analyses is given. D. K. M.

Industrial heating appliances. Monel metal in oil industry.—See II. **Fractional extraction of mixtures.**—See III. **Dyestuff equipment.**—See IV. **Vortex beater for pulp. Filtration in pulps etc. industry.**—See V. **Particle-size air analyser. Insulating refractories.**—See VIII. **Inspecting boiler drums etc. [for cracks]. Steels at elevated temp. Steels for high-pressure vessels.**—See X. **Measuring diffusion consts.**—See XIII. **Crystallisation of sugar solutions. Raschig rings.**—See XVII. **Spray-drying milk.**—See XIX.

See also A., I, 374, **Determination of particle size. Dispersoid analysis.**

Patents.

Regenerative open-hearth furnace system. W. J. Tourville (U.S.P. 2,046,419, 7.7.36. Appl., 19.11.35).—A rotating or tilting furnace is worked reversibly. The regenerators at each end are moved as a whole to change their functions; *e.g.*, they may be in a raised position when carrying exhaust gases and lowered when preheating air. B. M. V.

(A) Operation of (A, B) regenerative furnaces. E. A. Vierow (U.S.P. 2,049,477—8, 4.8.36. Appl., 12.5.34).—(A) Each side of the furnace is provided with $\nless 3$ ports leading to regenerators (others may be placed in an end), and inlet and outlet occur always simultaneously in each group; there are always more outlets than inlets, the functions being changed in a regular cycle. (B) The middle port is always an outlet and leads to a waste-heat boiler or the like. B. M. V.

Gas-converting furnace. L. S. Gregory, Assr. to H. C. Price (U.S.P. 2,049,699, 4.8.36. Appl., 6.8.34).—The conduit conveying a fluid to be heated at an exactly const. temp. (θ) is surrounded by a tubular vessel containing a liquid of b.p. θ and communicating with a condenser for vapour. The vessel is surrounded by an electrical resistance heater, and that in turn by a protecting and insulating covering. B. M. V.

Converter. T. V. Fowler, jun., A.-M. Harkness, H. F. Merriam, and B. M. Carter, Assrs. to Gen. Chem. Co. (U.S.P. 2,046,816, 7.7.36. Appl., 29.4.30).—In a converter for exothermic catalytic reactions, means are described for causing the catalyst to descend through vertical tubes, the casing surrounding which is divided into two sections so that different fluids may be used to exchange heat with the catalyst, *e.g.*, ingoing reagents in the upper section and air in the lower. B. M. V.

Kiln retort structure. R. S. Kent (U.S.P. 2,046,687, 7.7.36. Appl., 9.11.34).—A setting of retorts comprising a large no. of vertical metallic tubes suitable for reactivation of used active C is described. B. M. V.

Sealing devices for rotary kilns, dryers, and the like. Vickers-Armstrongs, Ltd., and J. D. Sky (B.P. 465,382, 26.2.36).—The seal includes a flexible cylindrical band maintained in tension in the axial direction, that tension alone being relied on to maintain it in contact with the other element, a ring of T-iron or the like, which rubs on it. B. M. V.

Annealing apparatus. F. J. Winder and L. L. Swift, Assrs. to Surface Combustion Corp. (U.S.P. 2,048,644, 21.7.36. Appl., 25.3.36).—The furnace is heated by internally fired, radiant U-tubes. B. M. V.

Heat-treating apparatus. T. D. Williams, Assr. to Amer. Steel & Wire Co. of New Jersey (U.S.P. 2,050,029, 4.8.36. Appl., 14.8.34).—An electrically heated, closed annealing furnace of the lifting-bell type is described. A metallic cover for the hearth and the metallic inner bell dip into the same liquid seal outside the refractory walls. B. M. V.

Impregnators, disinfectors, autoclaves, and other heated tanks and vessels. A. G. Brown and I. C. Morgan (B.P. 465,404, 6.8.36).—The digester is provided with a jacket and/or an internal vessel containing oil; the coils or rows of heating/cooling pipes are in the oil. B. M. V.

Drying apparatus. J. F. Dornfeld (U.S.P. 2,049,199, 28.7.36. Appl., 28.11.33).—Spent grains or the like are charged axially of a cylindrical tower and are supported on a conical perforated baffle, the dried material being discharged around the base of the cone. The interior of the cone is swept by brushes to keep the apertures clear for the passage of an upward current of air. B. M. V.

Mercury column thermostat. W. M. Smith and D. W. Miller, Assrs. to Vapor Car Heating Co., Inc. (U.S.P. 2,046,416, 7.7.36. Appl., 26.1.35).—The electrical contacts are fixed and the vol. of the bulbs is const. A main bulb is exposed to the temp. to be controlled and an auxiliary bulb placed in an electrically heated chamber the heat supply to which is altered to adjust the operating temp. of the thermostat. B. M. V.

Cleaning of [locomotive] feed-water heaters. F. H. Graham and V. D. Washburn (U.S.P. 2,039,163, 28.4.36. Appl., 14.3.34).—Tarry residue deposited from exhaust steam is removed by immersing the heaters in paraffin oil (specifications given) at 65—150°. L. C. M.

Alkalising or deacidifying water by means of lime. R. Adler (B.P. 466,374, 14.4.36).—A by-pass flow of H_2O is taken from the outlet of the apparatus and pumped through $Ca(OH)_2$ (in piece or milk form) back into the inlet conduit, the main flow afterwards passing through a filter or other clarifier. B. M. V.

Prevention of corrosion in water containers. A. Besag (B.P. 466,558, 25.11.35).—For open or closed tanks in which the H_2O rises and falls and is covered with a layer of oil, outlet and overflow devices so arranged as to prevent loss of oil are described. B. M. V.

High-vacuum diffusion pumps. (a, b) J. L. McCowen, (b) E. W. Fawcett, and (a, b) Imperial Chem. Industries, Ltd. (B.P. 465,478 and 466,514, [a] 6.11.35, [b] 29.11.35).—(a) A baffle or the boiler mouth is in the form of an annular nozzle directing the vapour on to condensing surfaces, and the boiler is insulated from the cooler part of the pump by a vac. space. (b) Part of the working fluid is continuously removed after condensation, treated to remove volatile impurities, and returned to the boiler of the pump. The treatment may comprise distillation in a column or in a short-path, high-vac. still, and one purifier may serve several pumps. B. M. V.

Fluid-treating device. J. K. Rummel, Assr. to Babcock & Wilcox Co. (U.S.P. 2,046,583, 7.7.36. Appl., 14.7.31).—The solid content of steam is measured by condensing the steam with simultaneous removal of the CO_2, and measuring the electrical conductivity of the condensate and of the boiler-H_2O (or of the condensate + 1% of boiler-H_2O) and applying a correction for the CO_2 remaining in solution. B. M. V.

Vacuum steam-heating systems. J. Lavergne (B.P. 465,204, 1.10.35).—A thermostat in one of the rooms controls both the vac. pump and the main steam supply, the controls being interlinked to maintain a const. difference in pressure between the steam flow and return H_2O-pipes. B. M. V.

Casting of molten or liquid material. G. Pemetzrieder (B.P. 465,335, 16.11.36).—The metal or like is centrifugally spun before casting and is forced out of the centrifuge by another pneumatic or hydraulic fluid supplied under pressure. B. M. V.

Heat-insulation treating and binding compound. J. P. Doyle, Assr. to E. E. Westergreen (U.S.P. 2,050,089, 4.8.36. Appl., 5.7.33).—A composition for binding together layers of felt or the like comprises a 9 : 1 mixture of maize paste (starch) and acacia gum, H_2O being afterwards mixed in at 50° to *d* 1·106. B. M. V.

Manufacture of heat-insulating tubes. F. Rosengarth, Assr. to N. V. Maats. tot Beheer en Exploit. van Octrooien (U.S.P. 2,048,817, 28.7.36. Appl., 27.4.33. Ger., 17.5.32).—Glass silk or the like is applied to a rotating mandrel and the whole introduced into a cylindrical mould, preferably screw-threaded internally. A slot is formed in the mould through which a covering strip of paper or the like is wound on. B. M. V.

Heat-insulating and fireproof materials. R. van Rolleghem, Assr. to Comp. Internat. de Prod. Ignifuges et Calorifuges (C.I.P.I.C.) (U.S.P. 2,046,494, 7.7.36. Appl., 26.5.34. Belg., 26.5.33).—Asbestos is improved by all or any of the following treatments : soaking in a bath of $(NH_4)_2SO_4$, alum, H_3BO_3, and starch, drying, surface-coating with a solution of alkaline silicate having graphite and/or Fe_3O_4 in suspension. (Cf. B.P. 440,409; B., 1936, 274.) B. M. V.

Apparatus for utilisation of waste heat. G. Yates (U.S.P. 2,048,242, 21.7.36. Appl., 26.8.35).—An economiser includes two annular chambers for H_2O, the flue gas passing outside and through the axial space. One of the H_2O chambers is connected thermosiphonically to storage tanks for feed H_2O; the other carries the H_2O being pumped to the boiler. B. M. V.

Regenerator with chequer work for vertical flow of gaseous media. C. Otto (U.S.P. 2,049,272, 28.7.36. Appl., 5.10.35. Ger., 7.9.34).—The apertures through the bricks are formed so that the gas has direct vertical passage. The bricks of the top course are provided with upstanding fins so that the header space above them is divided into parallel passages. In the setting, replacement of one course without disturbing others is provided for. B. M. V.

Devices for establishing connexion between two sealed vessels. Gen. Electric Co., Ltd., R. L. Breadner, and H. G. Jenkins (B.P. 465,369, 17.1.36).—A frangible diaphragm separates the two vessels and is broken by a spring-operated plunger which is released by the electrical fusion of a detent. The device is applicable to the admission of Hg into an electric-discharge lamp after it has been degassed, filled with rare gas, and sealed. B. M. V.

Compositions for sealing and gasket purposes. Crown Cork & Seal Co., Inc. (B.P. 466,375, 16.4.36. U.S., 22.5.35).—A major part of finely-divided cushioning material (cork) is mixed with a vulcanised synthetic rubber (Duprene) and a modifier to control tackiness (cumar resin or polymerised tung oil). B. M. V.

(a) Production of cold-flow in substances. (b) Cold-working of materials. (c) Mechanical working of substances. C. H. Howland-Shearman (B.P. 465,196—8, [a—c] 27.7.35. U.S., [b, c] 27.7.34).—" Fracture-proofing " treatments which leave a smooth surface are described. (a) Material comprising crystals cemented by amorphous material, *e.g.*, steel, is subjected to an initial intense pressure, > the elastic limit, by a tool of which the pressure is gradually decreased and the velocity of movement increased throughout the length of the stroke, preferably in parabolic relation thereto. (b) Apparatus is described for effecting the treatment. (c) Materials of other structural form (grey cast Fe, cast steel, hard wood, cast bronze and brass, Al, porcelain, gutta-percha, lignum vitæ, fibre, "Insulite," and "Bakelite") are similarly treated. B. M. V.

Refrigeration. H. M. Williams, Assr. to Gen. Motors Corp. (U.S.P. 2,049,790, 4.8.36. Appl., 18.5.31).—Parts of apparatus exposed to a refrigerant containing F are coated with a mixture of vinyl acetate and chloride, heated to render it insol. in the refrigerant. B. M. V.

Percussion ore mill. E. L. Ball (U.S.P. 2,047,171, 14.7.36. Appl., 5.3.34).—The ore is dropped from an elevation on to an anvil so shaped as to project the broken pieces horizontally and radially, the casing being protected by a bank of broken ore. B. M. V.

Roller mills for pulverulent and like materials. H. W. Bird, and Coates Bros. & Co., Ltd. (B.P. 465,248, 16.9.36).—A mill for wet or dry work on paint, chocolate, etc. is described. The ground material is removed from a train of rollers by a scraper blade against one of them; immediately under the scraper is a small auxiliary roller for pressing back on to the roll any loosely adherent material which may get past the scraper. B. M. V.

Clinker grinders. Erith's Eng. Co., Ltd., and A. W. B. Ferguson (B.P. 465,235, 3.7.36).—The bottom of a clinker pit is composed of a pair of toothed rolls running outwards and co-operating with spring-mounted, swinging, crushing plates divided into sections over the length. B. M. V.

Pulverising plant. Brit. "Rema" Manufg. Co., Ltd., and P. Howden (B.P. 465,212, 19.11.35).—An air-swept ball or rod mill with classifier is described. B. M. V.

Manufacture of solid comminuted material. J. L. Stecher, M. G. Amick, and C. E. Daniels, Assrs. to E. I. Du Pont de Nemours & Co. (U.S.P. 2,047,391, 14.7.36. Appl., 17.11.33).—Pb–Na alloy is melted, applied to a cold surface, immediately removed therefrom, and broken up, *e.g.*, by a helical worm scraping the inside of a jacketed cylinder. B. M. V.

Production of finely-divided material. H. S. Booth (U.S.P. 2,047,354, 14.7.36. Appl., 22.7.32).—For the manufacture of pigments, insecticides, or the like, a H_2O-insol. crystalloid (I) is dissolved in a fused, inorg., H_2O-sol., inert compound (II) and passed in contact with an aq. pptg. agent (III) in which is dissolved a compound (IV) which will react with the surface of particles of (I) to form a non-isomorphous, cryst. solid insol. in the reacting mixture (I—IV), (IV) being small compared with (I). *E.g.*, (I) alkaline-earth sulphates and carbonates, (IV) a phosphate, fluoride, sulphate, or silicofluoride, but always a different negative ion from that in (I). B. M. V.

Muller-type mixer. A. G. J. Rapp and A. G. Granath (U.S.P. 2,049,866, 4.8.36. Appl., 9.12.32).—Mixing and discharging ploughs for an edge-runner mill of the stationary-pan type are described. B. M. V.

Continuous mixer. J. Apple (U.S.P. 2,048,913, 28.7.36. Appl., 15.9.32).—The dry constituents of concrete are continuously poured down a funnel. The H_2O is caused to flow down the outside of the neck of the funnel, forming a complete sleeve around the dry material and not mixing with it until they both enter the mixing device, which comprises a drum with paddles. B. M. V.

Separator [for cereals]. T. J. Kidd (U.S.P. 2,048,746, 28.7.36. Appl., 24.4.34).—For the separation of, *e.g.*, hulls from seeds the material is worked through a screen by a paddle feeder, falls vertically, and is directed nearly horizontally against impact plates, in front of which the light material is picked up by an ascending current of air. B. M. V.

Classifier. H. Hardinge and R. J. Russell, Assrs. to Hardinge Co., Inc. (U.S.P. 2,047,202, 14.7.36. Appl., 22.12.32. Renewed 19.6.35).—The Hardinge rotary drum classifier is fully described. Usually the drums are cylindrical and inclined, but single- and double-conical ones may be used; the inner drum has an upper closed end and merely distributes the feed steadily. (Cf. B.P. 463,503; B., 1937, 632.) B. M. V.

Heated drum apparatus for desiccating liquids and semi-liquids. W. Sasse and E. Schneider, Assrs. to Buell Combustion Co., Ltd. (U.S.P. 2,046,489, 7.7.36. Appl., 27.12.34. Ger., 8.1.34).—A drying drum and a no. (2) of feed rollers are positively rotated in the same direction, *i.e.*, oppositely at the nips, being maintained out of contact at adjustable distances to vary the amount of liquid picked up, and situated so that a trough of liquid is formed in each nip. B. M. V.

Heating of fluids. J. D. Seguy, Assr. to Universal Oil Products Co. (U.S.P. 2,049,473, 4.8.36. Appl., 17.3.33).—Hydrocarbon oils (*e.g.*) are heated to conversion temp. in tubes which are heated by radiation from both sides, the effect being modified by taking some of the used combustion gases and recirculating them in contact with the tubes in the radiant zone. B. M. V.

Continuous rotary filter. P. C. Keith, jun., H. O. Forrest, and L. V. Horn, Assrs. to Standard Oil Co. (U.S.P. 2,050,007, 4.8.36. Appl., 11.5.35).—A filter especially suitable for the dewaxing of oil, the diluent being, *e.g.*, liquid C_3H_8, comprises a rotary drum and doctor contained within a pressure-tight shell which forms also the prefilt container. The cake is brought out by a screw conveyor and the conveyor shaft may drive the drum so that there need be only one opening requiring special sealing means. The pressure is maintained by gas pumped in at the upper part. B. M. V.

Filtering device. C. J. Coberly and E. M. Wagner, Assrs. to RoKo Corp. (U.S.P. 2,046,770, 7.7.36. Appl., 31.1.33).—Automatic apparatus for cleaning a filter by back-wash is described; it is applicable, *e.g.*, to the filtration of oil from a well. B. M. V.

Centrifugal separators. Aktieb. Separator (B.P. 466,347, 30.3.37. Swed., 4.4.36).—A discharge device for two liquids is described. B. M. V.

Separation of slime and sand suspensions. J. M. Patek (U.S.P. 2,047,798, 14.7.36. Appl., 4.5.34).—In a hydro-separator, in addition to the usual peripheral overflow and rakes for underflow, there is a distributed draw-off at an intermediate level, suspended from the rake mechanism; the pulp drawn off is scrubbed with H_2O, the fine slime withdrawn, and the remainder returned to the tank. B. M. V.

[Dry] separator [for placer sand]. C. C. Baldwin (U.S.P. 2,046,442, 7.7.36. Appl., 8.4.33).—The sand is centrifugally thrown and slides down a conical surface into an expanding annular air stream, guided by a cone of reverse inclination, the small quantity of very heavy material being caught in suitably placed channels. The fan is on the same vertical shaft as the thrower. B. M. V.

[Froth-]flotation separation apparatus. L. L. Mayer and R. M. Hale, Assrs. to Minerals Separation North American Corp. (U.S.P. 2,047,643, 14.7.36. Appl., 15.12.34).—The cells are of the mechanically agitated, sub-aërated type, and several are arranged for series flow, the outlet for transfer of pulp being low down and at the same level as the agitator. B. M. V.

Operation for azeotropic distillation. J. J. Gordon, Assr. to Eastman Kodak Co. (U.S.P. 2,049,441, 4.8.36. Appl., 12.6.35).—The process is applicable to the separation of H_2O from lower aliphatic acids (I). An entraining agent (II) chosen to form with H_2O an azeotrope of b.p. $<100°$ is admitted to a still containing plates in a proportion which is insufficient to cause (II) to drop below the feed plate to which the H_2O–(I) azeotrope is admitted, and the bottom section of the still is heated to form a rectifying zone for H_2O. If (I) is AcOH then (II) may be a mixture of $Bu^{\beta}OAc$ and $Bu^{\beta}OH$. B. M. V.

Distillation and extraction. Le R. M. Dearing, Assr. to Antioch Industrial Res. Inst., Inc. (U.S.P. 2,038,546, 28.4.36. Appl., 31.12.31).—A reciprocating diaphragm pump with H_2O-cooled cylinder walls is employed, which receives vapour from the still and compresses it; the condensed liquid drains away before the next stroke. L. C. M.

One-piece sheet-metal evaporator. D. P. Heath (U.S.P. 2,046,740, 7.7.36. Appl., 12.6.31. Renewed 5.10.35).—A sheet is rolled over itself to form three turns closely adjacent, affording passages for two fluids, the inner layer being, if desired, formed with re-entrant parts to form shelves or the like; the edges are then welded together. The whole is suitable for a combined evaporator and food chamber in a refrigerator. B. M. V.

Vapour-condensing and liquid-cooling apparatus. N. H. Gay (U.S.P. 2,046,554, 7.7.36. Appl., 21.6.33).—A cooling means supplied with a refrigerated liquid is placed in the vapour space of a vessel containing the liquid to be cooled. The used refrigerant is separated into liquid and vapour and the former immediately repassed, the vapour being reliquefied elsewhere. B. M. V.

Mixing tank for fibrous material suspended in liquid. J. C. F. C. Richter (U.S.P. 2,047,595, 14.7.36. Appl., 11.9.34. Norw., 8.7.33).—From the impellers a no. of curved vanes extend to deliver the pulp to various levels; it then returns around the curved sides of the tank and back to the impellers. B. M. V.

Contacting of liquid and gas. D. A. Sillers (U.S.P. 2,048,145, 21.7.36. Appl., 21.1.32).—The gas is caused to impinge on the surface of a pool of liquid with such force as to raise a wave and then to turn upwards with the spray through an axial conduit into an upper chamber in which the liquid is separated and returned to the pool in the same or another similar scrubber. B. M. V.

Contact apparatus for liquid and gas. W. P. Chandler, jun., Assr. to Blaw-Knox Co. (U.S.P. 2,048,179, 21.7.36. Appl., 23.10.34).—The gas is blown over the surface of a pool closely under the ends of a nest of vertical tubes up which the gas and spray then pass. The spray drops out in a chamber above and returns down smaller tubes submerged in the pool. A no. of units are superposed in tower form. B. M. V.

Putting liquids in suspension in a gaseous medium. F. Gauchard (B.P. 465,357, 5.11.35. Fr., 19.2.35).—For producing a stable liquid mist, not vapour, the liquid is ejected through the atomiser while mixed with a compressed portion of the gas, and the spray further agitated by stationary or rotating baffles forming shock surfaces. B. M. V.

Fluid-mixing cocks. S. C. Messina and F. N. S. Fragoso (B.P. 465,222, 11.3.36).—A plug cock for mixing hot and cold H_2O is arranged so that the total area of hot + cold ports is const. after the first opening. B. M. V.

Pasteurising apparatus. Brit. Thomson-Houston Co., Ltd. (B.P. 465,232, 19.6.36. U.S., 22.6.35).—A mixing and holding chamber without dead spaces and with baffles to prevent local rapid flow due to bubbles is described. B. M. V.

Sterilisers. A. F. and O. H. Pieper, Assees. of C. R. Meitzler (B.P. 466,368, 11.3.36. U.S., 13.4.35).—A dry steriliser in which the internal atm. is circulated unchanged during the whole process of heating and cooling is described. Separate fans driven by a single motor are provided for circulating the internal atm. and the cooling medium (air). B. M. V.

Gas filter. A. A. Knecht (U.S.P. 2,048,871, 28.7.36. Appl., 26.6.35. Ger., 18.7.34).—Mats are woven from flat wires, those in one direction being twisted only through a multiple of 90° between every two untwisted wires. B. M. V.

Filter. E. F. Wemhoener (U.S.P. 2,048,718, 28.7.36. Appl., 17.5.34).—A disc filter especially for cleaning gases, itself cleaned by reverse flow and having rapid means for changing the discs, is described. B. M. V.

Filter and liquid and gas separator. R. T. Smith (U.S.P. 2,048,956, 28.7.36. Appl., 23.4.34).—H_2O and dirt are separated from compressed air as far as possible by deflexion and finally by an absorbent filter. B. M. V.

Separation of suspended particles from gases. M. A. Lissman, Assr. to Internat. Precipitation Co. (U.S.P. 2,047,568, 14.7.36. Appl., 8.7.35).—Forms of momentum apparatus without sharp corners are described. B. M. V.

Purification of air and gases. C. Wetherill, and Holman Bros., Ltd. (B.P. 465,488, 8.11.35).—A fog is formed of H_2O and an agent (castor oil) having a lower surface tension than that of H_2O, both liquids being forced by compressed air through mixing and atomising jets in various combinations. B. M. V.

Cleaning of air or other gases. Celluloid Corp. (B.P. 466,382, 16.7.36. U.S., 19.7.35).—The gases (air) are passed through a screen irrigated with an ester, preferably a phosphoric ester in the liquid state, *e.g.*, $(C_6H_4Me)_3PO_4$. B. M. V.

Centrifugal apparatus for cleaning and conditioning air. H. McCornack (U.S.P. 2,047,424, 14.7.36. Appl., 3.7.33).—Apparatus for removing or supplying H_2O from or to air for internal-combustion engines, according to the temp. of the H_2O used for scrubbing, is described. B. M. V.

Air- or gas-washing apparatus. O. Stott (B.P. 466,519, 9.12.35).—The air or gas is caused to pass between inclined impervious plates, the passages being baffled by a device (set level) comprising groups of sheets of expanded metal or the like which are irrigated. B. M. V.

Treatment of gases [with liquids]. B. M. Carter, Assr. to Gen. Chem. Co. (U.S.P. 2,046,500, 7.7.36. Appl., 11.8.30).—Interaction of a gas and liquid is effected by spraying the liquid into the gas at a point where the gas current is sharply expanding, and passing on the mixture over hurdles (or like fillings) which have a cross-section many times that of the restricted part of the gas entry. B. M. V.

Precipitation from a gaseous medium of oil or other substance suspended in a mist-like manner. F. G. Till (B.P. 465,438, 3.6.36. Switz., 3.6.35).—Baffles are arranged to cause the gas to impinge at high velocity on the upper surfaces and thereafter to leave freely upwards, the oil being allowed to creep along the lower surfaces to suitable collecting gutters, and the baffles being shaped as nozzles to direct the gas into the next chamber. B. M. V.

Dust-separating apparatus. A. J. Sackett, Assr. to A. J. Sackett & Sons Co. (U.S.P. 2,050,231, 4.8.36. Appl., 22.7.31).—An air separator for cleaning sandy material is described. B. M. V.

Gas-testing device. F. W. Dwyer and F. B. Gilbert (U.S.P. 2,047,407, 14.7.36. Appl., 22.12.33).—A closed tilting vessel is formed with a narrow neck adjacent the axis of the pivots; alkali (in the case of CO_2 determination) is placed in the lower part and the neck sealed with a little floating oil. After filling the upper part with the gas to be assayed the vessel is rocked and the CO_2 determined by reduction of pressure. B. M. V.

Automatically measuring traces of gases. M. D. Thomas, Assr. to Amer. Smelting & Refining Co. (U.S.P. 2,047,526—7, 14.7.36. Appl., [A] 6.7.32, [B] 25.2.33).—(A) Absorption apparatus in which a no. of absorptions are made to each change of reagent automatically by a motor is described. (B) The vol. of the aspirated gas is measured by a meter; two absorbers are used, one absorbing while the solution in the other is being tested, *e.g.*, by conductivity. B. M. V.

Apparatus for determination of moisture. C. W. Brabender (U.S.P. 2,047,765, 14.7.36. Appl., 1.11.35. Ger., 22.2.34).—The apparatus is suitable for foodstuffs, fatty materials, wood, and coal. The samples, placed on pans, are put over a series of holes in a circular table which rotates within an oven and above a steel yard for weighing each pan in an air chamber adjacent, without removal from the oven. B. M. V.

Volumetric [density-]testing device. C. O. Marshall, Assr. to Toledo Scale Manufg. Co. (U.S.P. 2,049,269, 28.7.36. Appl., 25.3.32).—A vessel of known vol. is placed on a weighing machine with indicating scale, the scales being calibrated in *d*, proportion of ice cream in a mixture, and/or other convenient figures. B. M. V.

[Optical] pyrometer. R. Hase (U.S.P. 2,049,260, 28.7.36. Appl., 15.11.34. Ger., 17.11.33).—The elements comprise (1) a source of comparison light, (2) the object, and (3) and (4) two wedges between (1) and (2). (3) is neutral in colour and graded in intensity, whilst (4) is graded as to colour; all are on the same axis. B. M. V.

Apparatus for testing the viscosity of liquids. C. S. Healy (U.S.P. 2,049,162, 28.7.36. Appl., 24.8.34).—The oil is placed between two surfaces of predetermined area which are pressed nearly together, one being provided with spacing studs of low height. They are then pulled apart by a known force and the time taken for the oil to yield is noted, this time being found to be a measure of η. B. M. V.

Viscosimeter. L. Ubbelohde (U.S.P. 2,048,305, 21.7.36. Appl., 27.7.33. Ger., 24.3.32).—In a capillary-tube type of viscosimeter the traction due to surface tension at the lower mouth of the capillary is avoided by suitably shaping the mouth and by permitting entry of air at the junction of the narrow and wide tubes so that the liquid flows along the wall of the latter only. B. M. V.

Refractometer. E. E. Jelley (U.S.P. 2,047,561, 14.7.36. Appl., 6.6.35).—A small sample of liquid is held in the ditch formed between a vertical, optically worked glass plate and the upper edge, truly at 45°, of another glass plate adhering thereto. The remainder of the apparatus comprises mainly an illuminated slit through, and refractometer scale on, an opaque plate remote from the bevelled glass plate. B. M. V.

Friction element. R. E. Spokes and H. H. Willard, Assrs. to Amer. Brakeblok Corp. (U.S.P. 2,049,522, 4.8.36. Appl., 17.3.34).—The asbestos or the like is impregnated with a metal formate which will decompose with friction heat and deposit metal on the rubbing surface. B. M. V.

Friction padding material. W. J. Slagle, Assr. to Dewey & Almy Chem. Co. (U.S.P. 2,048,475, 21.7.36. Appl., 10.10.30).—A mat for preventing slipping of light objects on polished surfaces comprises a fibrous base, one surface of which is coated with a friction material containing rubber, and the other with a modified rubber adhesive which will adhere more strongly to the base than to the object on which it is placed. B. M. V.

Fire-extinguishing compound. G. T. Oglanby (B.P. 466,294, 17.1.36).—A composition especially suitable for coal mines since it is also a timber preservative comprises gypsum powder 8 (by wt.), $Ca(OH)_2$ 8, NaCl or Na_2CO_3 4 pts., and cement or powdered mineral 1 pt. B. M. V.

Erratum.—On p. 513, col. 1, line 12, *for* B.P. 642,569 *read* B.P. 462,569.

Apparatus for producing foam, particularly for fire extinguishing. Concordia Elektrizitäts A.-G. (B.P. 466,574, 29.11.35. Ger., 8.12.34).

Separating gas mixtures.—See VII. **Temp. meter. Thermostat. Treating gases or liquids.** —See XI. **Mixing fertilisers.**—See XVI. **H_2O-purifying (etc.) apparatus.**—See XXIII.

II.—FUEL; GAS; TAR; MINERAL OILS.

Constitution of Italian fuels. II. I. Ubaldini and F. Magaldi (Annali Chim. Appl., 1937, **27**, 146—156; cf. B., 1932, 407).—The amount of carboxylic and phenolic acidity in certain Italian lignites and coals has been determined. O. J. W.

Kansas and Missouri coals. P. B. Place (Combustion, 1937, **8**, No. 10, 37—40).—Analyses are tabulated and their classification is discussed. R. B. C.

Examination of Austrian coals. I. Description of the coals and results of low-temperature carbonisation. W. J. Müller, E. Graf, R. Gruber, and H. Scheuch (Sparwirts., 1937, **15**, 9—12).—The physical characteristics, *e.g.*, colour, structure, and fracture, of brown and bituminous coals from various mines are described. Results of carbonisation tests in the Fischer–Schrader (brown coals) and Strache–Hiller (bituminous coals) assay apparatus are tabulated. R. B. C.

Brown coal from the Meldzere district of Courland. M. Priman (Latvij. Univ. Raksti, 1936, **3**, 229—313).—The coal is a lignitous one. Hard and soft samples were separated and studied separately. Full analytical data and distillation results are given for both types. Possible uses are discussed. J. W.

Tests on coal-flotation plant. M. R. Vieux (Rev. l'Ind. Min., 1937, 227—231).—The results of tests on two different types of plant with two French coals are detailed. C. E. H.

Influence of conveying and loading devices on coal degradation, and preventive measures therefor. H. Knaust (Glückauf, 1937, **73**, 257—264).—Data relating to the breakage sustained by various sizes of bituminous coal when falling from different heights on to concrete, wood, and coal are given. Large coal is degraded less when falling on to concrete than on to coal. The production of small coal increases suddenly when the height of fall is $>$2·5—3·5 ft., depending on the coal strength. R. B. C.

Screening and dewatering [of coal and coke]. H. O. H. Cerckel (Gas World, 1937, **106**, Coking Sect., 61—66).—The merits of various types of screen are discussed and different modes of construction described. Wedge-wire-stepped screens are recommended for dewatering. A. R. Pe.

New methods of assessing coal preparation. K. F. Tromp (Glückauf, 1937, **73**, 125—131, 151—156).—Methods for predicting the results obtained by cleaning coal on a jig washer, *e.g.*, that of Heidenreich, are critically discussed. The possibility of determining the separation error independently of the characteristics of the coal as expressed by the washing curve is examined. By introducing a "distribution factor," *i.e.*, the % of raw feed within a given range of *d* which goes into the sink product, a smooth distribution curve is obtained. Since this curve is independent of the *d* distribution in the unwashed coal, the performance of a given jig on coals of known composition can be predicted. A simple mathematical form is derived for the curve, enabling it to be plotted in any particular case from the results of 4 or 6 gravity-stage separations. R. B. C.

Fuel briquetting. R. A. Strong, E. Swartzman, and E. J. Burrough (Canada Dept. Mines, Mines and Geol. Branch, Rept. 755, 100 pp.).—The Canadian briquetting industry is described. Results of briquetting tests carried out at the Fuel Research Laboratory, Ottawa, are discussed and the patent literature is summarised. R. B. C.

Danger to coal silos from coal containing sulphur. R. Grün (Bauing., 1936, **17**, 520—521). —Damage to a concrete silo was traced to SO_4'' in the coal-washing H_2O. Commencement of disintegration was revealed by efflorescence and by white patches of $CaSO_4$ on the concrete surface. Protective measures are necessary if the SO_4'' content of the H_2O is $>$500 mg./litre. Application of $\not<$3 coatings of bituminous paint is usually sufficient. In the case of severe damage (described) 3 layers of bituminised paper covered by pumice concrete and rendering were applied. R. B. C.

Chemical composition of artificial coals. H. Bode (Braunkohle, 1937, **36**, 87—90).—Analyses of artificial coals prepared by the Gropp–Bode method (cf. A., 1932, 1230) are given. The products resulting from these artificial metamorphoses agree in chemical properties with the corresponding natural coals in the case of both brown and bituminous coals. The reason why artificial coals do not yield a swollen coke when subjected to the crucible test is not yet known. R. B. C.

[French] Interministerial Commission on Fuel Utilisation. Anon. (Ann. Min. Paris, 1936, [xiii], **10**, 21—68b).—The 15th report of the above gives the results of an investigation of coal-sampling procedure and describes a method of preparing samples for the laboratory from the gross sample. Methods

recommended for determining H_2O, ash, volatiles, and S in coal, and its calorific val., are given.
R. B. C.

Nomographic determination of calorific values [of coals]. R. McAdam (Colliery Eng., 1937, **14**, 166—168).—Graphical solutions of the Dulong, Grumell–Davies, and Goutal formulæ are given.
R. B. C.

Investigation of fuels. R. Walcher (Österr. Chem.-Ztg., 1937, **40**, 182—190).—Standard methods of analysis of solid, liquid, and gaseous fuels are summarised.
A. B. M.

Rapid determination of nitrogen in coal. R. D. Scheinman and A. Z. Jurovski (Chim. Tverd. Topl., 1934, **5**, 696—702).—The Kjeldahl-Whitaker method is modified by the use of $KMnO_4$ + CuO as the oxidising medium.
Ch. Abs. (*e*)

Rapid method for determining the moisture content of small coal. G. J. Greenfield and G. A. Dummett (Fuel, 1937, **16**, 183—188).—100 g. of the coal are stirred with 50 ml. of $2N$-H_2SO_4 for 2 min.; the mixture is filtered and the concn. of the filtrate determined by titration with N-NaOH. From the change in concn. of the acid the H_2O content of the coal is calc. The accuracy of a single determination is approx. 1 in 40. If the coal contains mineral matter which reacts with the acid the H_2O content may be calc. from the results of two determination using different concns. of acid, *e.g.*, $2N$ and $5N$, respectively.
A. B. M.

Determination of volatile substances in anthracites. M. P. Lonskaia (Chim. Tverd. Topl., 1934, **5**, 690—695).—A weighed amount of the air-dried sample is heated in a tared crucible under prescribed conditions with kerosene. The latter prevents undesirable decomp. reactions of the coal.
Ch. Abs. (*e*)

Hydrogenation of Taiwan coals. T. Ogawa, A. Matsui, and H. Senoo (J. Soc. Chem. Ind. Japan, 1937, **40**, 56B).—The results of hydrogenation of six coals are tabulated. The min. and max. degrees of liquefaction are, respectively, 70·0 and 79·9% on the ash- and moisture-free coal.
C. R. H.

Electricity and the coking industry. J. F. Vazson (Year-Book, Coke Oven Managers' Assoc., 1937, 115—130).—The manner of dealing with the electrification of new coking plants is discussed.
H. C. M.

Construction of modern coke ovens. Refractory materials and reinforcements. Control of expansion. Economy of working. C. Berthelot (Rev. Mét., 1937, **34**, 170—189).—The present-day position of coke ovens in France is discussed and compared with foreign practice. The most important dimension in ovens for producing metallurgical coke is the width. Considerable economy of construction can be obtained by the use of SiO_2, semi-SiO_2, and fireclay bricks since the expansion of SiO_2 bricks is now well understood and can be controlled.
W. P. R.

Low-temperature coke ovens. A. Thau (Glückauf, 1937, **73**, 264—268).—Diagrammatic descriptions are given of the Cellan–Jones, Lecocq, and Kemp coke ovens which are operated at low temp. for the production of lump domestic coke. The economics of the Cellan–Jones process are discussed.
R. B. C.

Low-temperature carbonisation of Cheliabinsk coals. II. I. B. Rapoport and Z. E. Kosolapov (Chim. Tverd. Topl., 1934, **5**, 702—710).—Carbonisation at 450—550° yielded 2·5—4% of primary tar and 62·4—63·2% of semi-coke. The *d* and the NH_3 and phenolic contents of the tar waters increased with rise of carbonisation temp.
Ch. Abs. (*e*)

Carbonising properties and petrographic composition of Millers Creek bed coal from Consolidation No. 155 mine, Johnson County, Ky., and the effect of blending Millers Creek coal with Pocahontas bed and Pittsburgh bed (Warden mine) coals. A. C. Fieldner, J. D. Davis, R. Thiessen, W. A. Selvig, D. A. Reynolds, G. C. Sprunk, and C. R. Holmes (U.S. Bur. Mines, 1937, Tech. Paper 572, 50 pp.).—Results of the chemical, physical, and petrographic examination of the coal are recorded. The coal [60·1% of fixed C (dry, mineral matter-free), and calorific val. 14,380 B.Th.U. per lb. (moist, mineral matter-free)] is classified as a high-volatile *A*-coal. The carbonising properties of the coal, and of blends of this coal with low-volatile Pocahontas No. 4 and high-volatile Pittsburgh bed coals, have been determined, using the A.G.A.–B.M. test procedure and the Fischer low-temp. assay. The coking quality of the coal was considerably improved by blending, the unblended coal yielding cokes of inferior quality.
H. C. M.

Foundry coke. W. E. Mordecai (Year-Book, Coke Oven Managers' Assoc., 1937, 107—112).—The physical and chemical properties desirable in foundry cokes are discussed.
H. C. M.

Practical calculations on burning wood. L. Kienberger (Keram. Runds., 1937, **45**, 240—242).—Curves are given connecting *d*, H_2O content, and calorific val. for beech, birch, oak, pine, fir, aspen, and willow.
G. H. C.

Improving the quality of coke from difficultly-fusible coals. W. Herrmann (Diss., Berlin Tech. Hochschule, 1936, 50 pp.).—Analyses are given of coals from the "U" mine (Ruhr). The causes of the poor quality of metallurgical coke obtained from these coals were investigated. Temp. measurements taken over the cross-section of the oven and examination of the softening limits of the coals showed that the rate of heating of the oven was too slow. Laboratory experiments in which this rate and the grain size, H_2O content, and bulk *d* of the charge were varied showed that it was possible to improve the coke quality. Carbonisation of suitable blends of coal from the mine yielded satisfactory cokes.
R. B. C.

Causes of the reactivity of coke. B. G. Šimek and F. Coufalík (Brennstoff-Chem., 1937, **18**, 213—220; cf. B., 1937, 312).—The reactivities towards CO_2 at 1000° have been determined by Kassler's method (B., 1933, 946) with the following results: (*a*) petroleum coke nil, (*b*) pitch coke 63·94, (*c*) coke from pitch to which 0·2% of Fe stearate and 0·1%

of Mn stearate had been added, 83·32, (*d*) Ceylon graphite 65·72, (*e*) Acheson graphite 21·25. The crystal structure of the cokes has also been determined by *X*-ray examination. (*a*) was highly disperse, (*b*) and (*c*) were less disperse, (*d*) was coarsely cryst., and (*e*) relatively finely cryst. There was no correlation between the reactivities and the estimated surface areas of the C crystals. It is concluded that the nature of the C surface, particularly of the radicals forming the external groups, has a considerable influence on the reactivities. The catalytic action of the ash constituents is also of importance; the Fe and Mn compounds added to (*c*) acted as contact catalysts, but had no influence on the mode of formation of the C crystals on carbonisation. A. B. M.

Utilisation of aqueous liquor from low-temperature carbonisation [of coal]. J. Széki and A. Romwalter (Roy. Hungarian Palatine-Joseph Univ. Tech. Econ. Sci., Publ. Dept. Min. Met., 1936, **8**, 116—126).—The liquor from a Bohemian coal intermediate in properties between brown and bituminous coal contained $2NH_4HCO_3,(NH_4)_2CO_3$, 59·9, NH_4HS 12·25, C_5H_5N 8·85, and phenols 0·55 g. per litre. In contact with air part of the NH_3 volatilised, NH_4HS was completely converted into $(NH_4)_2S_2O_3$, whilst some of the phenols were resinified. Treatment of the liquor with O_2 under pressure at room temp. showed that both O_2 and S were absorbed by the phenols, which acted as catalysts. When the phenols were treated with $FeCl_2$ and HCl a faintly yellow, almost invisible ink was obtained which, when applied to paper, turned black with age. Blackening took place immediately when the treated paper was exposed to NH_3 fumes. Attempts to prepare photographic developers from the phenols were unsuccessful. R. B. C.

Utilisation and disposal of ammonia liquor from coal-carbonisation plants. F. Stief (Gas- u. Wasserfach, 1937, **80**, 467).—The mixture of NH_3 and steam etc. leaving the still is passed through the incandescent coke bed in a gas generator. The heat absorbed in decomp. the NH_3 is only a fraction of the calorific val. of the H_2 produced, so that if waste steam is used for heating the still the process is economic. A. B. M.

Pyrogenation of carbon. L. Longchambon (Compt. rend., 1937, **204**, 1487—1489).—Dilatometric studies on various cokes and anthracites of different origin are discussed. W. R. A.

Carbon black. III. Channel process. Production from pyrolysis waste gases. L. M. Pidgeon (Canad. J. Res., 1937, **15**, **B**, 139—155).—The waste gases from the pyrolytic decomp. at 800—850° of 70 : 30 C_3H_8–C_4H_{10} mixtures were burned in the channel plant described previously (cf. B., 1936, 724). The yields of C black for various channel heights and draught conditions were determined. Conditions were obtained which enabled the yield to be increased from 4·9 lb. per 1000 cu. ft. for the untreated gas to 5·4 lb. per 1000 cu. ft. after pyrolysis, whilst 23—25 lb. of light oil per 1000 cu. ft. were recoverable during pyrolysis. An examination of synthetic mixtures showed that addition of H_2 and of olefines respectively decreased and increased the yield. An increase in the amount of aromatics formed during pyrolysis was accompanied by an increase in H_2 with a corresponding reduction in the yield of C black. The blacks obtained compared favourably with commercial blacks in their reinforcement of rubber. C. R. H.

Carbon black. IV. Channel process. Effect of draught control and channel height on rubber reinforcement, sorption, and volatile content. L. M. Pidgeon (Canad. J. Res., 1937, **15**, **B**, 187—207).—The effect of channel height, draught control, and gas composition on the properties of C produced in an experimental C black plant have been investigated. Channel height plays an important rôle; rubber reinforcement and yield vary with channel height in a similar way. Sorption increases almost logarithmically; volatile content is high with low channel height. The apparent *d* varies directly with the channel height. Draught control does not give definite correlation with the factors affected by channel height, and gas composition appears to be without influence on them. W. R. A.

Carbon gas black. G. L. Roberts (Paint, Oil, Chem. Rev., 1937, **99**, No. 8, 28—29).—A review of modern requirements for the paint, lacquer, and printing ink industries, and how these are met by manufacturers. D. R. D.

Preparation and porosity of active charcoals. M. Dubinin and E. Zaverina (J. Phys. Chem. Russ., 1937, **9**, 161—176).—Active wood-pulp charcoals were prepared by impregnating them with $ZnCl_2$ of different concns., after varying thermal pretreatments (160—400°). Products were tested for adsorption of I, phenols, and methylene-blue. Activity decreases with rising temp. of pretreatment and with decrease in $[ZnCl_2]$. The average pore size increases with increased $[ZnCl_2]$, as shown by relative sorption of homologous acids. E. R.

Activated carbon—its manufacture and storage. J. P. Harris and E. A. Sigworth (J. Amer. Water Works Assoc., 1937, **29**, 377—389).—Methods are outlined and recommendations given covering shipment, the ideal conditions of storage, and the general and particular precautions to be taken regarding electrical equipment and chemicals (*e.g.*, avoidance of contact with Cl_2, SO_2, petrol, oil, etc., and of mixing dry with hypochlorites etc.). O. M.

Determination of the density of powdered activated carbon. E. S. Hopkins (J. Amer. Water Works Assoc., 1937, **29**, 390—391).—Occluded air, interfering with ordinary pyknometer readings, is removed by immersion in non-solvent liquid or submergence in boiling H_2O for a definite time. The procedure is described. O. M.

Activation of charcoal by zinc chloride. I. Influence of concentration of zinc chloride on activity of charcoal. E. V. Alexeevski and T. G. Platschenov (J. Appl. Chem. Russ., 1937, **10**, 589—599).—Cellulose and lignin impregnated with aq. $ZnCl_2$ yield as active charcoals as does wood. Activation is ascribed to the catalytic influence of $ZnCl_2$ on tarry and resinous products formed during carbon-

isation, and leading to formation of a product with a very highly developed surface. Activation of the C is $\propto$ the [$ZnCl_2$] of the impregnating solution.
R. T.

Comparison of efficiencies of activated charcoal. B. P. Denisovitsch (Chim. Farm. Prom., 1935, No. 1, 47—49).—The charcoal is put in a burette through which standard I solution is run (1 litre/hr.).
Ch. Abs. (*e*)

Wood [suction-]gas engine. H. List (Österr. Chem.-Ztg., 1937, **40**, 173—177).—The relation between speed of combustion of gas–air mixtures in the cylinder of an engine and the composition of the gas is discussed. To obtain a high efficiency using suction-gas from wood it is necessary that the gas should have as high a calorific val. as possible, that a high compression ratio should be used in the engine, and that the cylinder head should be designed to give the max. turbulence to the charge. Other requirements are low temp. but not too low a pressure of the entering charge, and freedom of the gas from impurities, *e.g.*, tar, AcOH, and dust. There is need for a simple and efficient purifier having a low gas-resistance for use with suction-gas generators using wood. Data obtained with a simple type of generator, using beech wood with 22% of H_2O, and operating in conjunction with a stationary engine, are recorded. A. B. M.

Industrial heating appliances using turf (peat) as fuel. I. Lancashire boiler with turbine furnace. II. Loco-type boiler with Wollaston producer furnace. III. Waste wood burning furnace. IV. Magazine-type, central-heating boiler. Anon. (Ind. Res. Counc. Dublin Dept. Ind. and Comm., Bull. 1, 1937, 19 pp.).—Tests showed that peat is a satisfactory fuel for steam-raising or central-heating purposes. R. B. C.

Use of the gas producer in metallurgical processes. C. le Chatelier (Chim. et Ind., 1937, **37**, 835—852).—The development of the gas producer as applied in metallurgy is reviewed and its advantages and disadvantages in this field are critically discussed. Its use is at present declining; if it is to regain its former position attention must be directed to the following developments: complete heat recuperation, coking of the coal without loss of by-products, more efficient clinker removal, and utilisation of fines.
A. B. M.

Application of materials to gasworks construction. H. Johnston (Gas World, 1937, **106**, 429—433).—The properties of new or improved materials which have become available in recent years for structures, machinery, and appliances are reviewed and instances of their application given. A. R. Pe.

Experiments on a small coal panel at the Lisitschansk mine (on underground gasification). I. P. Kiritschenko (Pod. Gazif. Uglei, 1935, No. 7—8, 3—12).—Operations are described. The water-gas produced had a heating val. of 800—1200 g.-cal. per cu. m. Ch. Abs. (*e*)

Water-gas at Lisitschansk coal mine. I. P. Kiritschenko (Pod. Gazif. Uglei, 1935, No. 9, 34—35).—Tests on underground gasification are described.
Ch. Abs. (*e*)

Burning of anthracite plates for the study of water-gas production. A. I. Semenov, I. S. Galuinker, and V. V. Kondakov (Pod. Gazif. Uglei, 1935, No. 7—8, 23—30).—Tests are described. In an experimental plant a water-gas of heating val. 2460 g.-cal. per cu. m. was obtained. Ch. Abs. (*e*)

Activities of Water Gas Committee [American Gas Association]. K. B. Nagler (Proc. Amer. Gas Assoc., 1936, 794—807).—Work carried out since 1924 on the production of water-gas is summarised.
R. B. C.

Water-gas equilibrium and detoxification of town gas. F. Schuster (Gas- u. Wasserfach, 1937, **80**, 304—307).—Revised sp.-heat data for the range 0—1000° (cf. B., 1935, 898) are used to calculate the equation (A., 1929, 396) for the water-gas equilibrium const., the new vals. of which agree with results in the catalytic detoxification of gas by the reaction $CO + H_2O = CO_2 + H_2$. Consideration of the behaviour of the Fe oxide catalyst at various temp. showed that at a space velocity of 100 equilibrium is reached at 380—400°. A. R. Pe.

Reaction between methane and water vapour. K. Kafuka and T. Ogura (J. Chem. Soc. Japan, 1935, **56**, 1145—1159).—The best yields of H_2 and CO were obtained with a Ni catalyst at 1000° and a gas pressure of 5 mm. Use of Ni with Al_2O_3, MgO, or pumice was more effective. Ch. Abs. (*e*)

Sources and production of [town] gas in the United States. R. Mezger (Gas- u. Wasserfach, 1937, **80**, 314—320, 334—338).—Estimated reserves, output, and prices of raw materials for gas supply (coal, crude oil, oil-refinery gas, and natural gas) are surveyed. Manufactured gas, the output of which is small compared with that of natural gas, consists largely of carburetted water-gas. Developments in several items of gasworks plant and instruments are described. A. R. Pe.

Determination of the oil-fog content of [town's] gas. W. E. Russell (Proc. Amer. Gas Assoc., 1936, 688—689).—Various methods are summarised.
R. B. C.

Gas-purifying masses. V. Charrin (J. Usines Gaz, 1936, **60**, 563—565).—The types employed in France for removing H_2S from town's gas are described. R. B. C.

Detoxification of town's gas at Hameln [Germany]. F. Schuster (Z. Ver. deut. Ing., 1937, **81**, 143—146).—Detoxification is effected in one stage by catalytic conversion of CO in presence of steam: ($CO + H_2O = H_2 + CO_2$). A gas having the combustion properties of town's gas is directly obtained without washing out CO_2. A plant having a thermal efficiency of 65%, which was reconstructed early in 1936, is described, and operating data are tabulated. Future plants are expected to have a thermal efficiency of 80%. R. B. C.

Corrosion and [town] gas detoxification. D. Witt and F. Schuster (Gas- u. Wasserfach, 1937, **80**, 430—432).—The complete removal of O_2 and partial removal of HCN and org. S in detoxification greatly reduced the corrosive action of the gas on wet Fe and steel. A. R. Pe.

Recovery of sulphur from coke-oven gas. I. M. Secchi (Chim. e l'Ind., 1937, **19**, 187—191).—A survey of methods used during the last 25 years and of recent devlopments. O. J. W.

Removing sulphur dioxide from flue gases. B. G. Gaberman (Chim. Tverd. Topl., 1934, **5**, 736—740).—Up to 76·5% of the SO_2 in an artificial flue-gas mixture was absorbed in a flushing system containing MnO_2 suspended in an aq. Mn^{II} solution. 0·11 ton of H_2O was needed to absorb the SO_2 produced by burning 1 ton of peat (8·42% S). Ch. Abs. (*e*)

Content of free oxygen in a fuel gas and its explosiveness. A. S. Kuznetzov (Pod. Gazif. Uglei, 1935, No. 5, 22).—Fuel gas containing CO_2 1·5, O_2 1·6, CO 9·17, CH_4 0·37, and H_2 33·72%, when mixed with air, could be ignited by a hot Pt wire at an O_2 content $>$6·42%. Ch. Abs. (*e*)

Method of identifying explosive gases in small concentration. S. J. Modzikowski (Proc. Amer. Gas Assoc., 1936, 680—687).—The sample is measured in a Haldane or Bureau of Mines burette, CO_2 is absorbed, and the remaining gas burned. The ratio, contraction in vol./vol. of CO_2 obtained, when compared with similar ratios tabulated for known gases, *e.g.*, coke-oven and water-gas, enables the sample to be identified. In addition to the above test, complete analysis of the sample by the Bureau of Mines method and determination of CO therein by the I_2O_5 method are recommended in certain cases. R. B. C.

Use of copper pipe for [town's] gas services. H. L. Gaidry (Proc. Amer. Gas Assoc., 1936, 601—602).—Data obtained from various gas companies show that, in general, Cu pipe has a longer life than wrapped steel pipe. R. B. C.

Electrolytic corrosion of gas mains. H. C. Widlake (Gas World, 1937, **106**, 660—664).—Stray currents, which arise mainly from transport undertakings using uninsulated rails as return conductors, can be reduced but not entirely prevented by careful bonding and negative feeders to the rails. Further defensive measures for gas distribution systems subject to such currents are electrical drainage in persistently anodic areas and insulating coverings. Recent investigations on the latter are discussed (cf. B., 1935, 1146; 1936, 549, 650). A. R. Pe.

Cutler–Hammer thermeter. T. M. Gilbert (Proc. Univ. Gas Assoc., 1936, 816—821).—The design and operation of a recording gas calorimeter are diagrammatically described. R. B. C.

Small-scale gas calorimeter. J. H. Jones and J. M. Miller (Fuel, 1937, **16**, 177—183).—The gas to be tested is passed from a calibrated burette (350 c.c.) to the combustion chamber of the calorimeter wherein it is burned with O_2 at a specially designed jet. The gas is ignited by means of an electric spark; the products of combustion pass down the combustion chamber and thence up through spiral brass tubes immersed in the H_2O of the calorimeter. The dimensions of the latter are such that the rise in temp. of the H_2O is 3—4°. The calorimeter proper is surrounded by a water-jacket from which it is separated by an annular air space. The method of procedure is similar to that used for solid fuels in the bomb calorimeter. The average deviation from the mean for a series of determinations carried out with a gas of 500 B.Th.U./cu. ft. was $\pm$1·2 B.Th.U. A. B. M.

Gas-meter diaphragm research. W. V. Stockton (Proc. Amer. Gas Assoc., 1936, 708—710).—Strips of leather treated with various dressings, *e.g.*, castor oil, tallow, and diethylene glycol, were immersed in C_6H_6 and the % of dressing lost after given time intervals were measured. None of the dressings was completely satisfactory, but linseed and tung oils and beeswax gave the best results. Results of preliminary trials of a no. of leather substitutes, *e.g.*, Cellophane, Duprene, and Thiokol, are discussed. R. B. C.

Leather [gas-meter] diaphragm dressings. L. M. Van der Pyl (Proc. Amer. Gas Assoc., 1936, 706—707).—The types of oil commonly employed for gas meters are discussed. R. B. C.

Treatment of ammonia liquor in saturators. K. M. Nosalevitsch (Koks i Chim., 1937, **7**, No. 2, 52—56).—Corrosion of Pb lining by NH_3 liquor is due chiefly to the presence of NH_4CNS in the latter, and may be largely eliminated by raising the acidity to 20% in the saturator for 1—2 hr., when the NH_4CNS undergoes practically complete decomp. R. T.

Natural Peruvian asphalts. F. Kohn (Bol. Soc. Quím. Peru, 1936, **2**, 191—198).—Bituminous earth from Chumpi (Peru) loses 6—9 wt.-% by volatilisation in the course of 5—6 days. The further loss at 50° is small. The bitumen content (2—4%) is not affected by such volatilisation. Possible industrial uses of the earth are considered. F. R. G.

Humic acids. III. I. Ubaldini and C. Siniramed (Annali Chim. Appl., 1937, **27**, 94—102; cf. A., 1934, 1219).—The decomp. of the humic acids from an Italian lignite on heating in a current of N_2 from 105° to 350° has been studied. Decomp. commences appreciably at 125° and increases regularly with rise in temp., the products being almost exclusively CO_2 and H_2O. The vol. of CO_2 formed is $\propto$ the loss in CO_2H groups; a small proportion of the H_2O is derived from splitting off of phenolic OH, but most of it is from other O compounds. Anhydride formation does not occur. The residue after heating at 350° contains 7—8% of CO_2H (16% of which is esterifiable) and 3·7% of OH, compared with the original content of 21% of CO_2H (46% esterifiable) and 7% of OH. L. A. O'N.

Non-toxic road tar. W. G. Adam, F. M. Potter, and D. G. Murdoch (Chem. and Ind., 1937, 387—389).—An outline is given of the experimental studies leading to the production of road tar (cf. B., 1934, 615) which does not render H_2O flowing over it toxic to fresh-H_2O fish. A. R. Pe.

Determination of tar acids and bases by extraction methods. C. H. Fisher and A. Eisner (Ind. Eng. Chem. [Anal.], 1937, **9**, 213—218).—A survey and comparison of published extraction methods. F. N. W.

Continuous distillation of tar in tube stills. W. Fitz (Teer u. Bitumen, 1937, **35**, 107—109).—

Modifications to the plant which have increased the yield of oil and improved the quality of the pitch are described. R. B. C.

Distillation of coal tar in a stream of coal gas or air. G. B. Kagan (Koks i Chim., 1937, 7, No. 2, 56—62).—The yield of oily products is increased, and of cryst. products diminished, when distillation of the anthracene (I) fraction is conducted in a stream of air or gas. The (I) content of the cryst. fraction is $>$ in the case of ordinary distillation. R. T.

Hydrogenation of low-temperature tar by laboratory-scale continuous plants. II. S. Andô (J. Soc. Chem. Ind. Japan, 1937, 40, 124—125B; cf. B., 1937, 203).—The apparatus, catalyst, and tar used were those described previously (*loc. cit.*). Hydrogenation was carried out at 480°/200 atm. The oil obtained was fractionated and the gasoline and middle-oil fractions were separated into neutral and phenolic oils. The composition of the gasoline was determined. A higher rate of hydrogenation together with a catalyst supported on pumice instead of on asbestos fibre increased the oil yield and phenolic oils and increased the paraffin content of the gasoline at the expense of aromatics and naphthenes. (Cf. King and Shaw, B., 1936, 727.) J. W.

Catalytic hydrogenation of phenolic oil in low-temperature tar. IV. Effect of catalysts on composition of hydrocarbons formed. S. Andô (J. Soc. Chem. Ind. Japan, 1937, 40, 83—85B; cf. B., 1936, 132).—Hydrogenation of the oil at approx. 460°/210—260 atm. in presence of MoO_3, $MoO_3 + S$, $(NH_4)_2MoO_4 + S$, NiO, Fe_2O_3, Al_2O_3, I, or $SnCl_2$ as a catalyst shows that the most effective catalysts for the formation of low-boiling hydrocarbons are MoO_3 (alone or mixed with S) and $(NH_4)_2MoO_4 + S$; NiO and I are also very active. The gasoline fraction contains $<$0·7% of unsaturated, 40—66% of aromatic, and 32—57% of naphthene hydrocarbons (I). The consumption of H_2, the yield of gasoline fraction, and the % of (I) are increased by using $MoO_3 + S$ as catalyst. P. G. C.

Manufacture of blown asphalts. V, VI. Y. Ichikawa (J. Soc. Chem. Ind. Japan, 1937, 40, 77B; cf. B., 1937, 202).—Samples were prepared from (*a*) an asphaltic-base crude and (*b*) a mixed-base crude by blowing with an air temp. of 240°, the η at 100° for both oils being 509. Comparison of physical properties showed that the mol. vols., H/C ratio, and impact no. were higher for (*a*) than for (*b*), from which it is concluded that asphaltic-base hydrocarbons are polymerised to a greater extent than mixed-base hydrocarbons by air-blowing. H. C. R.

Manufacture of blown asphalts. VII. Properties of asphaltenes. VIII. Properties of petrolenes. Y. Ichikawa (J. Soc. Chem. Ind. Japan, 1937, 40, 128B; cf. preceding abstract).—Differences between (VII) asphaltenes, and (VIII) petrolenes, from straight and blown asphalts are reported. J. W.

Plasticity range of Rumanian bitumens. V. Cerchez, E. Arion, and V. Niculescu (Oel u. Kohle, 1937, 14, 321—324).—Determinations of the dropping point (Ubbelohde), the softening point (ring-and-ball and Kraemer–Sarnow methods), and the setting point (Höpfner–Metzger) on 22 bitumens from 5 different works confirmed the relationships suggested by Höpfner and Metzger for the correlation of these physical properties and showed that bitumens of Rumanian origin are equal to others in plasticity range measured as the difference between the dropping and setting points. This property is considered to be the most valuable criterion of the quality of a bitumen. It varies with the softening point, with the origin of a bitumen, and with its method of prep. H. C. R.

Bitumens and humic acids present in coals. G. L. Stadnikov and A. A. Falkovskaia (Chim. Tverd. Topl., 1934, 5, 683—689).—Data for various Russian coals are tabulated. Ch. Abs. (*e*)

Recovery of bitumen from mineral mixtures. O. Pfrengle (Asphalt u. Teer, 1936, 36, 861—865; Road Abs., 1937, 4, No. 67).—A method is described in which the bitumen is extracted in cold $CHCl_3$ (I). The (I) is removed by distillation in a current of CO_2 in a Cu vessel immersed in an oil-bath at const. temp. Correction factors are necessary owing to the action of (I) on the binder. T. W. P.

Change of physical properties of bitumens in preparation of sheet asphalt mixtures. E. Gehrlach (Teer u. Bitumen, 1936, 34, 381—383).—Data showing the influence of mixing temp. on the penetration and softening point, and on the ductility, of petroleum bitumen mixed with sand and limestone filler are given. R. B. C.

Failure of the standard method of determining the bituminous content when applied to a naturally impregnated limestone. A. A. Ashworth (J. Inst. Petroleum Tech., 1937, 23, 266—269).—Cold extraction with CS_2 fails to extract all the bitumen. A method involving extraction with boiling C_2HCl_3 is satisfactory and is described in detail. H. C. R.

Monel metal in the oil industry. R. Müller (Oel u. Kohle, 1937, 13, 325—329).—The advantages of using this alloy where resistance to H_2SO_4, HCl, $ZnCl_2$, PhOH, CCl_4, C_2HCl_3, and NaOH and high mechanical strength are required are pointed out. The mechanical and corrosion-resisting properties of this and other alloys containing Ni, Cu, Al, and Si are compared with those of steel, Cu, Pb, etc. in tables, and illustrations are given of valves, filter-presses, and centrifugal pumps made from these alloys. H. C. R.

Increasing oil- and gas-well production by acidising. Development of methods and equipment. P. E. Fitzgerald (Min. and Met., 1937, 18, 289—294).—The resistance offered to the flow of oil and gas through limestone oil-bearing formations is decreased and oil production increased by treatment with HCl (15 wt.-%). Substances containing N and S are added to the acid to act as corrosion inhibitors. The technique of applying acid and controlling its action on the formation is discussed and the Carr method of treating is described. C. C.

[Oil industry] drilling mud; its manufacture and testing. P. Evans and A. Reid (Trans. Min.

Geol. Inst. India, 1936, **32**, 263 pp.).—Mud fluid plays an important part in drilling oil wells and a survey is first given of methods of mixing and subsequent treatment and general reconditioning of muds. The significance of the methods of measuring the physical properties of drilling muds is discussed, including d, η, thixotropy, stability, salinity, etc. The flow of mud fluids is of the plastic-flow type, and η is expressed in terms of yield val. and mobility. As a result, special types of viscosimeter are used for measuring η. A no. of these are described in detail. The yield val. of muds from different types of clay varies greatly. With increasing wt. the yield val. increases according to an exponential law. Fine-grained suspensions are more viscous than coarse-grained ones of equal concn., and muds matured by agitation show increased η, due mainly to a change in yield val. Temp. effects are complex and the changes induced may be largely non-reversible. A preliminary examination has been made of the laws of flow for the circulating system of a well. The main object of η measurements is to assist in the production of a mud requiring the min. of pump pressure and having the least yield val. consistent with efficient service. Many muds exhibit a moderate degree of thixotropy, and this subject is discussed at length. Tests for the stability and salinity of the mud are briefly discussed. A relation exists between p_H and the stability of a suspension, many muds being very stable between p_H 11 and 12. p_H measurements are also closely associated with changes in η. Simple H_2 electrodes are convenient for determining the p_H of drilling muds. C. C.

Disposal of brines from oil-drilling and petroleum operations. E. Boyce (J. Amer. Water Works Assoc., 1937, **29**, 362—369).—Disposal of oil-field brines (conc. aq. solutions of mineral salts pumped to the surface with the oil) by dilution in streams, solar evaporation, evaporation under plant conditions (if sufficient rare salt is present), and return to the underground formation are discussed. O. M.

Chemical composition of Uchta heavy petroleum. J. K. Jubiev (Sci. Rep. Moscow State Univ., 1934, No. 3, 251—254).—The petroleum belongs to the naphthene–aromatic class, and is characterised by high asphaltene and S contents. R. T.

Naphthenic acids from crude oil. V. Biske (Refiner, 1937, **16**, No. 2, 72—77).—The production of naphthenic acids (I) from Peruvian crude oil at the Manchester refinery of Lobitos Oilfields, Ltd., is described. The oil is extracted with aq. NaOH, and Na naphthenates in the extract are converted by treatment with H_2SO_4 into (I), which are refined by steam-distillation. R. B. C.

Analysis of mineral oils with solvents. H. Steinbrecher and H. Kühne (Oel u. Kohle, 1937, **13**, 417—420; cf. B., 1937, 407).—The separation of oils into creosote, olefines, aromatics, *cyclo*olefines, naphthenes, and paraffins by successive extraction with solvents is described. It is accurate enough for technical purposes and far more so than are H_2SO_4 extractions. Creosote and olefines are first removed with diethylene glycol (I) and the creosote is separated from the recovered extract with 10% NaOH solution. Aromatics are removed from the residue by extraction with 3 vols. of (I) saturated with SO_2, and *cyclo*olefines by extraction with $\alpha\alpha$-dichlorohydrin. Naphthenes are separated from paraffins with $CH_2Ph{\cdot}OH$ (II), which is removed from the residue by washing with 35% AcOH. The reliability of these methods is proved by the results of check analyses on four oils using other reliable methods, the results showing good agreement. Volatile paraffins are somewhat dissolved with the naphthenes by (II). Crude oils can be analysed and evaluated by these methods without pretreatment, and the results used in formulating refining procedure. H. C. R.

Cold fractionation of mineral oils with solvents. H. Steinbrecher and H. Kühne (Oel u. Kohle, 1937, **13**, 481—483).—The authors' methods already recorded (B., 1937, 407) can be successfully adapted to the lighter distillates. Results obtained on a no. of such products are compared with those given by extractions with 94% and 98·3% H_2SO_4; they give satisfactory agreement. H. C. R.

Desulphurising Irak crude petroleum with finely-divided copper. C. Baron (Ann. Off. nat. Comb. liq., 1937, **12**, 25—28).—Distillation of petrol over comminuted electrolytic Cu yielded a gum-free product. The costs are given of a hypothetical process for desulphurising crude petroleum by means of Cu in which S is recovered as H_2SO_4 and $CuSO_4$. R. B. C.

Desulphurising paraffin and shale oils under atmospheric pressure. I. N. Titz (Sci. Rep. Moscow State Univ., 1934, No. 3, 165—171).—S is quantitatively removed as H_2S from org. S compounds by passing the products over Ni–Al_2O_3 or Pt–Al_2O_3, at 350°. R. T.

Relation between bleaching power and structure of filter-clays. R. Fussteig (Nat. Petrol. News, 1936, **28**, No. 50, 64—68).—The types of clay employed in the petroleum industry for decolorising oils are discussed. R. B. C.

High-temperature expansion of petroleum fractions. K. M. Watson, E. F. Nelson, and G. B. Murphy (Oil Gas J., 1936, **35**, No. 26, 85—87, 91).—A method for determining the sp. vols. of cracked and straight-run petroleum fractions at temp. up to the crit. is described. The sample is contained over Hg in a Pyrex-glass tube with a bulb at its upper end. The lower part of the tube is connected through a packing gland to a Hg-filled cylinder fitted with a piston operated by a screw and hand-wheel. Heating of the upper portion of the tube is effected by means of a removable electric furnace and changes in vol. of the sample are measured by means of a cathetometer sighted on the Hg meniscus. Readings were taken over the range 204—426° and from 0 to 1200 lb./sq. in., corrections being applied for glass expansion. Expansion data for a petroleum fraction of d (A.P.I. degrees) 37·0 are given. Methods for correlating expansion data with physical properties, *e.g.*, d, b.p., and crit. pressure, are discussed. R. B. C.

Destructive hydrogenation of petroleum products. P. V. Putschkov (Bull. Acad. Sci. U.R.S.S., 1937, 185—208).—The velocity of hydrogenation of paraffin is $>$ that of aromatic hydrocarbons, so that in hydrogenation in the liquid phase the content of the latter rises, owing to gasification of the former. R. T.

Hydrogenation of Ermelo oil shales and shale oils. A. J. Petrick (Brennstoff-Chem., 1937, **18**, 221—224; cf. B., 1937, 406). A. B. M.

Low-temperature berginisation. P. V. Putsohkov and A. F. Nikolaeva (Bull. Acad. Sci. U.R.S.S., 1937, 171—184).—At 420—440°, with low H_2 pressure and small amounts of MoS_3 catalyst, berginisation leads chiefly to breakdown of paraffin hydrocarbons, whilst aromatic hydrocarbons and sulphides are not attacked to any great extent. At 360—400° and with high H_2 pressures (100—250 atm.) sulphides are preferentially hydrogenated, then aromatic, and then naphthene hydrocarbons; paraffin hydrocarbons are practically unattacked. R. T.

Utilisation of Fushun shale oil. III, IV. Effect of catalysts and other factors on cracking [and] hydrogenation of the oil. Y. Kosaka, A. Yamanouchi, and K. Tanaka (J. Soc. Chem. Ind. Japan, 1937, **40**, 3—7B).—Higher temp. and longer reaction time increased the % of benzol in the oil, but decreased the total oil yield. The most favourable conditions for production of benzol were 1 hr. at 470°. The best catalysts were Fe_2O_3 (7·6% of H_2) and NH_4 molybdate (4·76% of H_2). CoO, MoO_3, Ni_2O_3, WO_3, and $ZnCl_2$ also had some effect. Catalyst deterioration may be prevented by addition of a little S between each run. The benzol obtained contained paraffins 50, naphthenes 25—30, and aromatic hydrocarbons 15—20%. J. W.

Utilisation of Fushun green shale and refining of Fushun shale oil. X—XII. K. Ishibashi (J. Soc. Chem. Ind. Japan, 1937, **40**, 7—8B, 8B, 8—9B; cf. B., 1936, 581).—X. Repeated redistillation (in steam) of Fushun shale oil increases the yield of distillate and decreases *d*, η, I val., Conradson C no., solidifying point, N, and S. Unsaturated substances are polymerised to pitch.

XI. Results are given for the use of the shale in refining the oil.

XII. Results are given for refining the oil by distillation with addition of the shale, which removes unsaturated substances by selective polymerisation and decomp. J. W.

Cracking of wash oil from the Neftegaz factory with anhydrous aluminium chloride. S. E. Michlina (Sci. Rep. Moscow State Univ., 1934, No. 3, 247—250).—The oil (containing 42% of solid products) remaining after separation of aromatic hydrocarbons from the product of pyrolysis of petroleum is distilled from $AlCl_3$, to yield liquid 60, gaseous 5, and solid (coke) products 35%. Analytical data are given for the liquid fraction. R. T.

Cracking of oils by condenser discharges. S. Roginski and A. Schechter (J. Appl. Chem. Russ., 1937, **10**, 473—486).—Heavy hydrocarbons (mazout, anthracene oil) are decomposed by impulse condenser discharges, with production of C_2H_2 and H_2. The yield of C_2H_2 is 125 litres per kw.-hr. R. T.

Catalytic polymerisation of cracked-gas components at atmospheric pressure. H. Otsuka (J. Soc. Chem. Ind. Japan, 1937, **40**, 21—23B).—A H_3PO_4 catalyst was used. C_2H_4 was not appreciably affected. Best results with C_4H_8 were obtained at 200—250° and with C_3H_6 at 250—300°. J. W.

Synthesis of benzine by the Bindley process. A. Thau (Oel u. Kohle, 1937, **13**, 350—353; cf. B., 1933, 774; 1935, 885; 1936, 581).—The S content of the initial gas is reduced to 0·002 g./cu. m. by first removing the H_2S over Fe oxide, hydrogenating the org. S compounds over a $CuO–PbCrO_4$ catalyst, and finally removing the H_2S so produced by means of Fe oxide, followed by washing with aq. $K_3Fe(CN)_6$. The synthesis itself is carried out at 200°/1 atm. in presence of a $Ni–Mn–Al_2O_3$–kieselguhr catalyst. The latter is agglomerated by mixing it with Et orthosilicate and exposing it to moist air before reduction. Ordinary water-gas (CO 42, H_2 48%) may be used as the initial gas. The process is preferably carried out in stages, the hydrocarbons formed being removed after each stage. The course of the reaction may be represented by $9CO + 18H_2 = (CH_2)_9 + 9H_2O$. A. B. M.

Analysis of cracking benzine. R. J. Levina (Sci. Rep. Moscow State Univ., 1934, No. 3, 241—245).—A procedure for analysis of mixtures containing heptylene, C_7H_{16}, PhMe, methyl*cyclo*-hexane and -hexene, and ethyl*cyclo*-pentane and -pentene is described. R. T.

Determination of lead tetraethyl in benzines. V. Prever and N. Foglino (Annali Chim. Appl., 1937, **27**, 142—146).—Three methods used in practice are compared and shown to give results in good agreement. O. J. W.

Chemical composition of Fergana benzine. A. M. Rubinstein (Sci. Rep. Moscow State Univ., 1934, No. 3, 255—257).—The benzine, b.p. 35—200°, is characterised by absence of S and of unsaturated hydrocarbons, and by its low content of aromatic and hydroaromatic hydrocarbons. R. T.

Drying oil from cracked gasoline. G. M. Woods (Petrol Eng., 1936, **8**, No. 1, 106—107).—When a vapour-phase cracked Mid-Continent naphtha distillate was heated with air for 6 hr. under 7 atm. pressure a product similar in properties to linseed oil was obtained. Tests with the oil in paints were made. In general, satisfactory results were obtained. Cracking of the film was observed after a year's exposure. By careful control of the process development on a commercial scale appears to be possible. Costs are discussed. R. B. C.

Extended vapour-pressure chart for hydrocarbons and petroleum products. E. S. L. Beale (J. Inst. Petroleum Tech., 1937, **23**, 311—315).—The b.-p. conversion chart described by Beale and Docksey (B., 1935, 51) has been extended, the pressure scale to 2600 lb./sq. in. and the temp. scale to cover the range —100° to 1000°. A modification of the same chart is given to show how it can be used for adjusting the b.p. of residues from crude oil for small pressure changes, as is required in the calculation of equilibrium temp. C. C.

Determining the aniline point of dark petroleum products. L. Donn (Ind. Eng. Chem. [Anal.], 1937, 9, 202—204).—Use is made of η–temp. curves to determine the NH_2Ph point of non-transparent oils. F. N. W.

Conditions for the test of evaporation loss and relations between loss and flash point of petroleum oils. III. Evaporation loss–flash point relationship. T. Kurosawa (J. Soc. Chem. Ind. Japan, 1937, 40, 15B; cf. B., 1937, 203).—The relation was $yz^n = k$ (y = loss after 3 hr. heating, z = flash point). J. W.

Physical and chemical constants of gas oils with different cetene numbers. D. J. W. Kreulen (J. Inst. Petroleum Tech., 1937, 23, 253—265).—Accurate determinations were made of the following properties of eleven gas oils (cetene no. 23·5—65): *d*, mol. wt., *n*, dispersion, sp. dispersion, NH_2Ph point, surface tension, parachor, sp. parachor, Diesel index, the C, H, and S contents, calorific val., acidity, Br val., flash and fire points, Conradson no., cloud and pour points, η, distillation, "Kennziffer," cetene no., and ring analysis (cf. B., 1935, 836, 934). The methods are specified and results tabulated. The cetene no., calc. from the sp. parachor, the Diesel index, and the ring analysis ($-0{\cdot}2A + 0{\cdot}1N + 0{\cdot}85P$, where A, N, and P are the % of aromatic, naphthenic, and paraffinic rings, respectively), are plotted against determined vals. A certain broad relation exists, but no definite function can be established. The best agreement is given by Diesel index and ring analysis. H. C. R.

Technical possibilities of fuel economy. W. Vogl (Österr. Chem.-Ztg., 1937, 40, 177—182).—In view of the possibility of the early exhaustion of mineral oil supplies, within 8—16 years according to some estimates, measures to ensure future supplies of liquid fuels are discussed. These include increased efficiency in the processes of working up the crude petroleum oils and in utilising the various products, and the production of liquid fuels from coal and other natural materials, *e.g.*, by hydrogenation, the Fischer–Tropsch process, etc. A. B. M.

Synthetic motor fuels F. Fischer (Österr. Chem.-Ztg., 1937, 40, 159—162).—A lecture. A. B. M.

Production of motor spirit from coal. M. Pirson (Rev. l'Ind. Min., 1937, 249—263).—The development of the process of coal hydrogenation is reviewed. The nett cost of motor spirit produced by this process, or by the Fischer–Tropsch process, is estimated as approx. 20 pf./litre. A. B. M.

Synthetic motor spirit. W. W. Myddleton (Chim. et Ind., 1937, 37, 863—864; cf. B., 1935, 885; 1936, 581).—In synthesising hydrocarbon motor spirits from mixtures of CO and H_2 the use of (i) a Co instead of a Ni catalyst, (ii) ordinary water-gas instead of a gas in which the CO : H_2 ratio has been adjusted to 1 : 2, and (iii) a 2- or 3-stage instead of a single-stage operation, leads to the production of a motor spirit of higher olefine content and therefore of better anti-knock val. (C_8H_{18} no. about 65), and is moreover more economic. A. B. M.

Production of motor spirit by polymerisation. R. Fussteig (Chim. et Ind., 1937, 37, 853—860).—A theory of polymerisation is outlined, based on the assumption of the intermediate formation of mols. of $\dot{:}CH_2$. By heating C_2H_4 at high temp. (950—1100°) and low pressures (30—35 atm.) in absence of a catalyst it was converted into CH_4, C, and $\dot{:}CH_2$. The last-mentioned group polymerised to C_3H_6, C_4H_8, C_5H_{10}, and aromatic hydrocarbons. In presence of a catalyst (I), consisting of $MnSO_4$, $Fe_2(SO_4)_3$, and a salt of H_3PO_4, and at lower temp. (250—450°) C_2H_4 was converted into liquid hydrocarbons consisting principally of unsaturated and aromatic compounds, the proportion of the latter being the higher the higher was the temp. CH_4 was converted largely into C_2H_4 and C_3H_6 by passing it first at 980°/12 atm. through a chamber containing a Ni–$Fe_2(SO_4)_3$ catalyst and then at 980°/40 atm. through a second chamber containing I. A 2-stage treatment of a cracking gas gave good yields of liquid hydrocarbons. The cracking of an oil poor in H is advantageously carried out in presence of CH_4 (natural gas). A. B. M.

Manufacture of liquid fuels by treating solid fuels with solvents. C. Berthelot (Génie Civil, 1937, 110, 266—268).—The Pott–Broche process is described. R. B. C.

Fuels for Diesel engines. H. N. Bassett (Chem. & Ind., 1937, 570—573).—Tests with hydrogenation coal products and coal-dust suspensions are referred to. Ignition quality (usually expressed as a cetene no.) can be judged indirectly from the NH_2Ph point. This method cannot be used with oil from coal or shale, or doped oil. $EtNO_3$ is the dope commonly used. Other properties in a suitable specification are discussed. C. I.

Production of Diesel and fuel oils from bituminous coal tar. E. Moehrle (Tech. Mitt. Krupp, 1937, 5, 38—39).—Processes involving solvent treatment of the tar with gas oil or Kogasin at >1 atm. in presence of catalysts are reviewed. R. B. C.

Machine for classifying liquid fuels according to their ignition advance under conditions of use in compression-ignition engines. P. Clerget (Compt. rend., 1937, 204, 658—660).—The fuel is burned under controlled temp. and compression conditions, and the incidence of ignition and rise in pressure automatically recorded. The relation between the ignition delay and cetene nos. of 9 fuels was not linear (cf. B., 1935, 615). A. J. E. W.

Classification of heavy [oil] fuels; relation between the cetene number and ignition delay. P. Dumanois and G. Desbrosse (Compt. rend., 1937, 204, 954—956; cf. preceding abstract).—The ignition delay of a fuel in a compression–ignition engine, α, is related to the cetene no., n, by $n(\alpha - \delta) = C$ (δ and C are consts.). For a 1 : 1 mixture of two fuels, $2/(\alpha - \delta) = 1/(\alpha_1 - \delta) + 1/(\alpha_2 - \delta)$, and $n = \frac{1}{2}(n_1 + n_2)$. A. J. E. W.

Desulphurising motor fuel by absorption. Dubrisay (Ann. Off. nat. Comb. liq., 1937, 12, 29—35).—Treatment of petroleum spirit with Al_2O_3 activated by heating to 800° showed that S compounds therein were catalytically oxidised to S.

Although deodorised the spirit was reactive to Cu. Kaolin or kieselguhr impregnated with aq. $Cu(NO_3)_2$ and subsequently calcined deodorised and completely desulphurised petrol. The earth could be reactivated by heat-treatment. R. B. C.

Possibility of using methyl alcohol in injection engines. G. Manzella (Energia Termica, 1936, 4, 62—69).—Comparative tests were made with petrol and aq. 94·5% MeOH in a single-cylinder, two-stroke engine (16 h.p.; 520 r.p.m.). When using MeOH it was found advantageous to preheat the induction air by means of the exhaust gases. Under the same conditions of running the max. efficiency of the engine was as high with MeOH as with petrol. R. B. C.

[Ethyl] alcohol motor fuels on the British market. A. R. Ogston (Petrol. Times, 1937, 37, 597—599, 645—647).—The manufacture and properties of Koolmotor and Cleveland Discol, both of which contain anhyd. EtOH 15, C_6H_6 15, and petrol 70%, are described. R. B. C.

Knock rating. V. Relationship between molecular structure and antiknock characteristics of paraffin hydrocarbons. R. Kobayasi (J. Soc. Chem. Ind. Japan, 1937, 40, 153—156B; cf. B., 1937, 109).—The calculation of the "instability product" is described and it is shown that for a considerable no. of paraffins this val. increases regularly with the C_8H_{18} no. There is thus a close relationship between mol. structure (represented by this product) and the antiknock characteristics. J. W.

Relative knocking characteristics of motor fuels in service. J. M. Campbell, W. G. Lovell, and T. A. Boyd (J. Soc. Auto. Eng., 1937, 40, 144—148T).—The principles affecting the knock were studied. Experiments indicate that the relative knock of certain cracked and straight-run petrols may be affected by spark-timing, engine speed, and mixture ratio. From the viewpoint of engine design the most advantageous combination of these variables in a given engine varies according to the nature of the fuel used. It is suggested that the anomalous characteristics of benzol blends are the result of vaporisation phenomena in the induction system, as also are certain depreciation effects observed in straight-run petrols containing $PbEt_4$. R. B. C.

Knocking in internal-combustion motors, and the detonation wave. A. Sokolik and A. Voinov (Bull. Acad. Sci. U.R.S.S., 1937, 123—142).—A detonation wave with a velocity of propagation of about 2000 m./sec. is associated with knocking. This is due to slow propagation of the flame, with presence of large amounts of peroxides in the unburnt gas. R. T.

Reaction kinetics of combustion processes. H. Mark (Österr. Chem.-Ztg., 1937, 40, 192—196).—Recent views on the reaction mechanism of the combustion of H_2 etc., and on the cause and prevention of knocking in the internal-combustion engine, are summarised. A. B. M.

Luminous flame. III. Properties of luminous flame and Kirchhoff's law. S. Yagi and S. Kawai (J. Soc. Chem. Ind. Japan, 1937, 40, 144—149B; cf. A., 1937, I, 279).—The effect of adding primary air on the emission and absorption spectra of the luminous flame was studied. Kirchhoff's law is applicable to such flames only at the shorter λλ, on account of soot effects as λ increases. The temp. of the flames (optical pyrometer) does not coincide with the effective temp. obtained by calculation. An explanation of this discrepancy is offered. J. W.

Propane and butane have specific value in production of luminous flames. W. Z. Friend and E. Q. Beckwith (Ind. Heating, 1937, 4, 187—191, 196).—The advantages of employing C_3H_8 and C_4H_{10} in forge, glass-melting, and annealing furnaces are discussed. R. B. C.

Hydrocarbon mixtures and physical properties. E. Prévost (Rev. Combust. liq., 1936, 14, 263—271).—The variations in physical properties, from those calc. from the law of mixtures, which occur when hydrocarbons of similar or dissimilar composition are mixed, are discussed. R. B. C.

Physical properties of olefine hydrocarbons. W. L. Nelson (Oil Gas J., 1937, 35, No. 34, 52; cf. B., 1937, 315).—Physical data, *e.g.*, *d*, m.p. b.p., crit. temp. and pressure, are tabulated for C_2—C_{20} olefines. R. B. C.

Hydrocarbon hydrates. R. W. Miller (Proc. Amer. Gas Assoc., 1936, 703—706).—The composition and properties of hydrates found in natural gas pipe-lines are described. R. B. C.

Setting point of mineral oils. A. Bondi (Petroleum, 1937, 33, No. 14, 1—5).—The bearing of the heat absorption accompanying the crystallisation of wax and of the velocity of crystallisation on the abnormal η changes of oils near their setting points is mathematically analysed. This throws light on the rate of formation of the new solid phase. It is possible to follow these changes of phase by η measurements if the mixture laws of the components are known. The cooling phenomena are delayed by the liberation of the latent heat of crystallisation, and the changes in the physical properties of the oil due to separation of paraffin wax are subjected to long delays. It is therefore necessary to keep the oil at a const. temp. for some time if comparable results are desired. H. C. R.

Paraffin wax in Fushun shale oil. I—IV. Y. Konaka (J. Soc. Chem. Ind. Japan, 1937, 40, 110—111B).—The oil is of high *d*, coeff. of expansion, sp. heat, and f.p. and of low η, being composed mainly of high-boiling distillates. The paraffin content is about 18%. The highest-boiling fraction consists of a red adhesive pitch containing much unsaturated material of high N content. Paraffin wax was determined in all fractions by selective dissolution in EtOH–C_6H_6 (8 : 2 to 9 : 1 by vol.). The mean m.p. of the total wax was 57·2°. The 370—380° fraction contained most wax (29%). 13 normal and 8 *iso*-hydrocarbons were isolated from the wax by fractional crystallisation from EtOH–C_6H_6. The m.p. of the *n*-hydrocarbons ranged from 28·2° to 80·6° and other physical consts. were very near those of Krafft's synthetic paraffins. The *iso*-hydrocarbons had m.p. 22·6—78·8° and higher mol. wt., *d*, and *n*, but lower m.p., than the *n*-hydrocarbons with the same no. of C atoms. The approx. ratio of *n*- to *iso*-paraffins in the wax is 4 : 1. H. C. R.

Lubricant hydrocarbons of petroleum. II. Action of chlorine and bromine on a medicinal vaseline. E. André and A. Maurel (Bull. Soc. chim., 1937, [v], **4**, 727—735; cf. B., 1936, 728).—Passage of Cl_2 (1·25 mols.) into a solution of liquid paraffin (I) (D.A.B. VI; mean composition $C_{28}H_{50}$) in $CHCl_3$ at 4° gives a product containing 8·4% Cl, equiv. to the replacement of 1 H per mol. The velocity of substitution (HCl evolution) can be controlled by the intensity of illumination. Contrary to Mabery's results with American oils (B., 1927, 577), (I) reacts very slowly and incompletely with Br even in presence of catalysts, the max. substitution giving a product which contained 10·96% Br (63% of the theoretical for mono-substitution). The hydrocarbons of lower mol. wt. undergo halogenation more readily. J. W. B.

Lubrication of journal bearings in oxidising conditions. C. Jakeman and A. Fogg (J. Inst. Petroleum Tech., 1937, **23**, 350—366).—Various commercial motor oils were tested on a N.P.L. journal-friction machine with Ni–Cr steel journal and bronze bush under a load of 1000 lb./sq. in. and at 1300 r.p.m. Prior to test the oil is circulated in contact with air at 160° for 24 hr. In the tests the temp. was gradually raised to that of min. friction (1 hr.) and held at this temp. for 5 hr., after which it was raised to seizure point (1½ hr.). Successive tests were carried out with new bushes. It is concluded that the rise in seizing temp. and decrease in min. friction produced by running a bearing periodically up to seizing temp. in oxidising conditions is not due to any great extent to a change in the oil, this being almost entirely accounted for by changes in the form and surface finish of the bush. When a bush has reached the run-in condition fluid-film lubrication appears to be maintained almost up to seizure point. The addition of "ethyl fluid" to castor oil causes an increase in the min. coeff. of friction, a fall in the seizing temp., and visible deterioration of the bush surface. C. C.

Fatty acid nitriles, amides, and ketones for extreme-pressure lubricants. A. W. Ralston, C. W. Christensen, E. J. Hoffman, W. W. Selby, and V. Conquest (Nat. Petrol News, 1936, **28**, No. 50, 59—62).—The prep. and lubricating properties of fatty acid nitriles, ketones, amides, and thioamides are discussed. The nitriles are stable, readily prepared, very sol. in lubricants, non-corrosive, and possess oiliness. Their polymerisation produces substances analogous to heavy mineral oils, whilst cracking under pressure at 550° gives lower nitriles and straight-chain hydrocarbons with pronounced penetrative properties. High-mol. aralkyl ketones are readily sol. in mineral oils and greases. Ketones containing the phenoxyphenyl radical, *e.g.*, the $C_{17}H_{35}$ ketone, when added to mineral oils produce gels which liquefy under slight pressure. Owing to their limited solubility the amides are of little interest. Certain thioamides with marked polar properties and fair solubility were examined. The Faville–Le Valley machine and the Stephens consistometer were used for assessing oiliness and load-carrying capacity. R. B. C.

Penetrating oils. Anon. (Oil and Col. Tr. J., 1937, **91**, 1806—1807).—The formulation of lubricants for loosening metal parts is discussed, with reference to the patent literature. D. R. D.

Regeneration of mineral aviation [lubricating] oils. N. I. Georgescu (Österr. Chem.-Ztg., 1937, **40**, 190—192).—Used oils were regenerated by treatment for 30 min. at 80—85° with 10% of a Rumanian active earth ("Sondafin"), followed by dilution with benzine, filtration, and removal of the benzine by distillation. As much as 97% of the oil was recovered. The regenerated oil was at least equal in quality to the original fresh oil; in some cases it was somewhat better, particularly in respect of η-index. A. B. M.

Oil-film thickness at transition from semi-fluid to viscous lubrication. G. B. Karelitz and J. N. Kenyon (Trans. Amer. Soc. Mech. Eng., 1937, **59**, 239—246).—A flat specimen of bearing metal was pressed against a rotating lubricated shaft and the gradual sinking of the specimen due to wear measured. A steady state was reached when a film of oil separated the rubbing surfaces. The usual formulæ for the load-carrying capacity of oil films between flat surfaces were applied to calculate the oil-film thickness, which was about 0·000047 in. for Sn-base babbitt, 0·000058 in. for Pb-base babbitt, 0·000035 in. for a bearing bronze, and 0·000052 in. for leaded Cu. Photomicrographs were taken of cross-sections of the bearing block near the rubbing surface. In the case of the bronze test-piece the height of the excresences was 0·000043 in., which compared favourably with the computed thickness of the oil film. R. B. C.

Viscosity conversion charts. R. Grosholtz (Nat. Petrol News, 1937, **29**, No. 2, 151—152).—The interconversion of η as determined in Saybolt, Engler, and Redwood instruments may be effected by means of the charts described. R. B. C.

Erratum.—On p. 407, col. 1, line 2, *for* Kuhne *read* Kühne.

Solvent extraction of lubricating oil. Fractionating columns. Interpreting flue-gas analyses.—See I. **Alcohols from water-gas.**—See III. **Catalytic oxidation of H_2S.**—See VII. **SiO_2 brick.**—See VIII. **Brown-coal ash for cement production. Adhesion of bitumen to stones. Tar–rock asphalt [road dressings]. Bituminous treatment of sandy soil roads. Recovering bitumen from mineral mixtures.**—See IX. **Corrosion of metals by non-electrolytes.**—See X. **Pyrogenic decomp. of cottonseed oil.**—See XII. **Asphaltum finishes. Pipe coatings.**—See XIII. **Swelling of rubber in lubricating oil.**—See XIV. **Tanning products from peat tar.**—See XV. **Fertilisers from peat. Oil sprays.**—See XVI. **Coal-mining explosives.**—See XXII.

See also A., I, 350, **Fatty acids in lubrication.** 366, **Self-inflammation of C_5H_{12}. Anti- and pro-knocks in combustion.** 313, **Determination of S and Cl in combustibles.**

PATENTS.

Scouring of coal. T. M. DODSON (U.S.P. 2,048,923, 28.7.36. Appl., 9.8.33).—Stain and rust are removed by scouring with a mixture of H_2O and coal (preferably anthracite) larger than dust but such as will just pass through round holes $\frac{3}{16}$ in. diameter. B. M. V.

Carbon remover and method of using the same. H. E. BUC and R. ROSEN, Assrs. to STANDARD OIL DEVELOPMENT CO. (U.S.P. 2,047,191, 14.7.36. Appl., 3.5.32).—Compounds of the "onium"-base type, having the typical formula $R_n{\cdot}X{\cdot}OH$, in which R_n are univalent org. radicals and X is an element in the right-hand column of groups IV—VI, are efficient C removers. Articles to be cleaned are kept in contact with a 10% solution of the base until the C is completely loosened. These compounds are substantially non-corrosive in their action on metal parts with which they make contact. Examples include $NEt_4{\cdot}OH$ and $SnPh_3{\cdot}OH$. H. C. M.

Recovery of organic products, in particular liquid products, from solid carbonaceous substances by pressure-extraction. G. W. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 466,336, 8.2.36).—Solid carbonaceous materials, *e.g.*, brown coal or peat, are extracted under pressure of 50 to >200 atm. (500 atm.) and at 200—500° (300—420°) with solvents, *e.g.*, middle or heavy oils, in presence of catalysts consisting of Fe, Co, Ni, either as metals or compounds, together with alkaline substances, *e.g.*, KOH, milk-of-CaO. D. M. M.

Apparatus for hydrogenation of carbonaceous materials. COMP. DE BETHUNE (B.P. 466,976, 12.3.36. Fr., 2.4.35).—Carbonaceous materials, *e.g.*, oils, are hydrogenated at elevated temp. and pressure, *e.g.*, 500—550°/200 kg. per sq. cm., in a no. of separate stages in series with intermediate cooling after having first pretreated the oil vapour–H_2 mixture in contact with the catalyst at a somewhat lower temp., *e.g.*, 400°, and in a special form of vaporiser. D. M. M.

Simple hydrogenation of unsaturated hydrocarbons and destructive hydrogenation of distillable carbonaceous materials. INTERNAT. HYDROGENATION PATENTS CO., LTD. (B.P. 467,147, 29.10.36. Addn. to B.P. 443,937; B., 1936, 533).—Unsaturated hydrocarbons and carbonaceous materials are hydrogenated in an apparatus subdivided into compartments containing catalyst and provided in the intermediate zones with a heat-exchange device and with devices suitable for thoroughly mixing the reactants after they have passed the heat exchanger. D. M. M.

Destructive hydrogenation of solid carbonaceous materials. H. E. POTTS. From INTERNAT. HYDROGENATION PATENTS CO., LTD. (B.P. 467,117, 21.1.36).—Solid carbonaceous materials, *e.g.*, coal, are impregnated before hydrogenation with a solution of Mo and/or W compounds obtained by treating with H_2SO_4 substances containing Mo and/or W in a form insol. in H_2O (*e.g.*, sulphides recovered from previous destructive hydrogenations). The solution may contain 50—120% of the amount of free acid required to neutralise the basic compounds in the solid carbonaceous materials and a wetting agent, *e.g.*, $C_{10}H_6Pr^{\beta}{\cdot}SO_3H$, may be employed. The hydrogenation is carried out at 380—500°/100—1000 atm. D. M. M.

Manufacture of heavy oils poor in, or free from, asphalt. G. W. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 466,524, 20.1.36).—Finely-divided solid carbonaceous materials are extracted or mildly hydrogenated under pressure of 300—450°/>50 atm., the non-fusible solid constituents are separated from the products, and the latter are extracted with light aliphatic hydrocarbons containing 4—9 C in the mol. The oily layer is separated from the asphaltic layer, and the solvent removed from the former, which is subsequently distilled to give a heavy oil and a lighter fraction; the last-named is used together with the asphaltic layer for pasting fresh material. D. M. M.

Furnace for pyrolytic treatment of hydrocarbon oils. C. O. MELBERG, Assr. to CONTINENTAL OIL CO. (U.S.P. 2,048,351, 21.7.36. Appl., 23.6.34).—The tubes of small bore carrying the oil are straight and arranged around the sides of a polygon, so that they may be easily cleaned. B. M. V.

Refining of hydrocarbon oils. EDELEANU GES.M.B.H., Assees. of E. TERRES, E. SAEGEBARTH, and J. MOOS (B.P. 466,977—80, 23.3.36. U.S., 22.3.35).—Hydrocarbon oils containing paraffinic and aromatic or unsaturated constituents, *e.g.*, mineral oils, low-temp. tar oil, and brown coal oil tar or their fractions, are refined by extraction with selective solvents comprising: (A) $CH_2Ac{\cdot}CO_2Et$, Et lactate, $Et_2C_2O_4$, etc., with or without the use of an auxiliary solvent miscible in any proportion with the selective solvent, *e.g.*, a representative of the aromatic, hydroaromatic, or non-selective aliphatic or aromatic halogen derivatives or low-boiling paraffin; (B) ketones, org. acids, org. anhydrides, org. oxides, alcohols, and ethers, *e.g.*, COPhMe or n-$C_6H_{13}{\cdot}OH$; (C) Br-derivatives of hydrocarbons, *e.g.*, s-$C_2H_3Br_3$, $C_2H_2Br_4$, $CH_2Br{\cdot}CO_2Me$, 1 : 2 : 4-$C_6H_3Br(NO_2)_2$; (D) org. N compounds, *e.g.*, amines, amides, nitriles, NO_2-compounds, etc., *i.e.*, alkylamines, o-nitroaniline, quinoline, etc. (B—D) An auxiliary solvent, as in (A), may be employed. D. M. M.

Treatment of hydrocarbons of low b.p. EDELEANU GES.M.B.H. (B.P. 467,048, 14.5.36. U.S., 15.5.35).—Light oils are extracted with SO_2 at <—18°, *e.g.*, —45° to —55°, to obtain a fraction rich in aromatic and unsaturated hydrocarbons, or, alternatively, the extraction is carried out at —7° to —10° and the extract then cooled to —45° to —55° with the production of two layers, the lower being extremely rich in aromatic and unsaturated constituents. D. M. M.

Natural-gas conversion. W. W. TRIGGS. From PHILLIPS PETROLEUM CO. (B.P. 466,483, 30.8.35).—A mixture of normally gaseous and normally liquid hydrocarbons is heated at 400°/500 lb. per sq. in. until the former are converted into the latter. The products are fractionated, whereby a motor-spirit fraction together with permanent gases and a normally gaseous hydrocarbon of intermediate boiling range are obtained. D. M. M.

Treatment of hydrocarbon gases. J. C. Morrell, Assr. to Universal Oil Products Co. (U.S.P. 2,039,440—1, 5.5.36. Appl., [a] 31.8.32, [b] 19.1.33). —Gaseous hydrocarbons rich in olefines and free from any substantial quantity of normally condensible hydrocarbon vapour are polymerised by treatment (a) with a metallic salt in aq. solution in presence of added HCl, elevated temp. and pressure being used if desired; (b) with conc. aq. $ZnCl_2$ at such temp. and pressure that the $ZnCl_2$ is in aq. solution during the reaction. D. M. M.

Production of hot reducing gases. C. G. Maier, Assr. to Mountain Copper Co., Ltd. (U.S.P. 2,039,603, 5.5.36. Appl., 7.5.32).—A hydrocarbon (I) is continuously converted into a $CO–H_2$ mixture substantially free from H_2O and CO_2 and unchanged (I) by mixing the (I) in the gaseous state with the theoretical quantity of air or gas containing O_2 at a temp., *e.g.*, 900—1000°, just sufficient to initiate the reaction, and the mixture is brought from the point of mixing into initial contact with a catalytic mass at a velocity high enough to prevent flame formation, the velocity being gradually reduced as the gas flows in contact with the catalyst, but is always maintained high enough to prevent flame. D. M. M.

Rendering commercially useful the gasol and ethylene contained in industrial gases. Ruhrchemie A.-G. (B.P. 467,032, 5.9.35. Ger., 5.9.34 and 4.9.35).—C_2H_4 and other readily volatile hydrocarbons and the higher hydrocarbons, *e.g.*, C_3H_6, C_3H_8, C_4H_8, C_4H_{10}, etc., are adsorbed together from coal gas, flushed off with steam, liquefied, and expanded, after which the higher-boiling constituents are again adsorbed from the vapours rich in readily volatile hydrocarbons. The final mixture, rich in C_2H_4, is suitable for org. reactions. D. M. M.

Motor fuel. H. E. Buc, Assr. to Standard Oil Development Co. (U.S.P. 2,046,243, 30.6.36. Appl., 21.12.32).—Addition of 5—50% (10—30%) of an ether, ROR′, where R, R′ are hydrocarbon radicals and at least one is a branched aliphatic radical, to motor fuel (gasoline) results in improved anti-knocking character which is still further improved by $PbEt_4$. Fuels containing Pr_2O, $MeOBu^{\gamma}$, and *tert.*-C_5H_{11}·OMe are claimed. A. H. C.

Treatment of hydrocarbon motor fuels. (a) G. W. Ayers, jun., (b) J. Hyman and G. W. Ayers, jun., Assrs. to Gasoline Antioxidant Co. (U.S.P. 2,039,576 and 2,039,595, 5.5.36. Appl., [a] 1.10.34, [b] 18.1.30).—(a) Gum formation is inhibited (a) in cracked gasoline, by allowing the gasoline to make contact with an adsorptive catalyst while still substantially in the vapour phase, and then adding 0·001—0·009% of an aminobenzene, *e.g.*, NH_2Ph; (b) in motor fuel from vapour-phase cracking processes, by treating it while still in the vapour phase with a selective polymerising catalyst and subsequently adding to it a small proportion of an aminophenol, *e.g.*, *p*-NH_2·C_6H_4·OH. D. M. M.

Preparation of stabilised petroleum hydrocarbons. Wingfoot Corp. (B.P. 467,056, 11.8.36. U.S., 6.9.35).—Gum formation in motor spirit is inhibited by the use of 0·001—1% of a *sec.* naphthylamine in which the $C_{10}H_7$ group is at least partly hydrogenated, *e.g.*, the phenyl- or tolyl-α- or β-naphthylamines. D. M. M.

Treatment of the exhaust gases from compression-ignition types of engines in underground workings. J. F. Alcock (B.P. 466,321, 4.9.36).—The exhaust gases are passed through a cooling chamber, then caused to impinge on the surface of an appreciable quantity of H_2O, and allowed to escape to atm. after passing through layers of coke, sawdust, or other fluid-permeable, H_2O-absorbing materials. D. M. M.

Hard-water-soluble oil. E. W. Adams and G. W. Flint, Assrs. to Standard Oil Co. (U.S.P. 2,039,377, 5.5.36. Appl., 20.5.33).—A sol. oil which readily emulsifies with hard H_2O and contains no alcohol is prepared by dissolving in a mineral oil (η 80—300 sec. Saybolt at 38°) 8—40% of purified mahogany soap containing $\ngtr 1\%$ of Na_2SO_4 or other salt, 1—6% of soda-rosin or other H_2O-sol. soap, and 2·5—0·5% of H_2O. D. M. M.

Removal of wax [from oils]. U. B. Bray and D. E. Carr, Assrs. to Union Oil Co. of California (U.S.P. 2,048,244, 21.7.36. Appl., 18.12.33).—The oil is diluted with a liquefied gas, the mixture chilled and filtered under pressure, and the pressure on the wax cake suddenly released and/or the cake is heated to $<$ the m.p. of the wax to cause evaporation of the diluent and leave the cake porous and friable. B. M. V.

Treatment of lubricating stocks containing amorphous wax. R. E. Burk, Assr. to Standard Oil Co. (U.S.P. 2,038,640, 28.4.36. Appl., 5.10.33).—PhOH 5—25 wt.-% is mixed with the oil at $>$40·5°, the mixture is cooled to −19°, and the magma containing PhOH and wax filtered off. L. C. M.

Dewaxing of oil. L. Dillon and C. E. Swift, Assrs. to Union Oil Co. of California (U.S.P. 2,039,636, 5.5.36. Appl., 24.7.33).—Wax is separated from mineral oil by dissolving the oil in a solvent, mixing finely-divided substances, *e.g.*, lampblack, with the oil solution, chilling to ppt. the wax, subjecting the chilled mixture to an electric field to separate the wax, and separating the wax from the oil/diluent solution with or without the aid of filtering. The oil is freed from the diluent by distillation. D. M. M.

Lubricant for free-wheeling. E. W. Adams and G. M. McNulty, Assrs. to Standard Oil Co. (U.S.P. 2,048,479, 21.7.36. Appl., 3.2.33).—Mixed-base oils (η etc. specified) are mixed with 10—15% of sulphurised cottonseed oil, the whole containing 0·5—3·0% S and having only slight change of η with temp. B. M. V.

Preparation of lubricant containing *pseudo*-pimaric acid. E. A. Brennan and W. Hull (U.S.P. 2,042,035, 26.5.36. Appl., 28.2.34).—Lubricants having improved temp.-η characteristics and increased chemical stability are obtained by compounding mineral or lubricating oils with $\nless 5$ wt.-%

of a salt or soap of *pseudo*pimaric acid (properties given) which has a grease-setting acid val. of 90—100%. H. C. M.

Mineral lubricating oil composition. L. Mellersh-Jackson. From Standard Oil Co. of California (B.P. 467,090, 5.12.35).—A mineral lubricating oil has dissolved in it a small quantity, *e.g.*, $\not>$2%, of a basic metal salt of petroleum naphthenic acids, *e.g.*, a basic naphthenate (I) of Zn, Mg, Co, or Al. A preferred composition contains 1% of Al dinaphthenate. An insol. suspension, *e.g.*, of finely-divided graphite, colloidal metals, etc., may be stabilised in suspension by the (I). D. M. M.

Manufacture of high-quality lubricating oils. I. G. Farbenind. A.-G. (B.P. 466,996, 17.8.36. Ger., 17.8.35).—Gaseous olefines, *e.g.*, C_2H_4 or mixtures containing it, are polymerised by means of $AlCl_3$ in presence of inert solvents to produce lubricating oils, the gases being entirely free from O_2 or S or their compounds and free Fe being excluded from the reaction; the anhyd. $AlCl_3$ used must contain <5% (<2·5%) of unsublimable residue. D. M. M.

Preparation of charges for internal-combustion engines or burners. F. A. Kane (B.P. 467,089, 5.12.35. U.S., 12.12.34).

Heating fluids. Rotary filter. Apparatus for determining moisture. Fire-extinguishing compound.—See I. **Mercaptan conversion.**—See III. **Bituminous road mixings. Paving materials.**—See IX. **Foundry-core oil. Inhibitors for steel pickling.**—See X. **Asphalt plastic. Phenolic condensation products.**—See XIII. **Utilising bagasse.**—See XVII. **Wax coating for fruit.**—See XIX.

III.—ORGANIC INTERMEDIATES.

Graphical design methods applied to the fractional extraction of the system methyl*cyclo*hexane–aniline–*n*-heptane. K. A. Varteressian and M. R. Fenske (Ind. Eng. Chem., 1937, **29**, 270—277; cf. B., 1936, 1071).—Fractional extraction with NH_2Ph as solvent is compared with fractional distillation for separating a mixture of n-C_7H_{16} (I) and methyl*cyclo*hexane (II). The saturation and equilibrium data for the system were determined and examined mathematically. This information has then been used in a graphical solution of the problem of solvent extraction, using the concept of reflux, and a method similar to that employed in the case of fractional distillation. From observations on a tower about 1 in. diameter it is concluded that for a sp. case of a separation of a 1 : 1 mixture into products containing 90% of (II) and 90% of (I), respectively, fractional extraction followed by simple distillation would require about $\frac{1}{7}$ of the heat and $\frac{1}{2}$ of the tower space necessary in the case of fractional distillation. F. J. B.

Synthesis of methyl alcohol and higher alcohols from water-gas. G. Natta (Österr. Chem.-Ztg., 1937, **40**, 162—170).—Kinetic experiments have shown that the reaction $CO + 2H_2 \rightarrow MeOH$ behaves approx. as a termol. reaction; diagrams are given showing vals. of the equilibrium const. and the equilibrium concns. as functions of the temp. and pressure. The catalysts are usually mixed oxides in which the function of the promoter (*e.g.*, Cr_2O_3) is only to prevent sintering of the active constituent (*e.g.*, ZnO). An active single-oxide catalyst has been prepared by heating natural $ZnCO_3$ (smithsonite). Addition of alkali to the catalyst brings about the synthesis of higher alcohols. The following mechanism for this synthesis is suggested: $R{\cdot}OH\,[+\,KOH] \rightarrow R{\cdot}OK\,[+CO] \rightarrow R{\cdot}CO_2K\,[+2H_2] \rightarrow R{\cdot}CH_2{\cdot}OH$, etc. This was confirmed by the production of higher alcohols on heating the K salts of fatty acids with H_2 at 400°/200—250 atm. (cf. A., 1932, 831). A ZnO–KOAc catalyst proved suitable for the production of higher alcohols in addition to MeOH; of the former, $Pr^{\alpha}OH$ and $Bu^{\beta}OH$ predominated in the product. The presence of higher alcohols had the advantage of increasing the miscibility of MeOH with benzine when blending them for use as motor spirit. Such blends behave well in the engine. MeOH has a high anti-knock val.; addition of only 10% of MeOH (as compared with 26% of EtOH or 60% of C_6H_6) was required to raise the C_8H_{18} no. of a benzine from 66 to 80. Gas for the synthesis may be produced from Italian brown coal either by gasification of the coke in steam and O_2, the latter being obtained, *e.g.*, from air by the Frank–Linde process (cf. B., 1932, 407), or by a modification of the water-gas process, *e.g.*, the V.I.A.G. process. Plant in Italy is briefly described. A. B. M.

Preparation of ethyl acetate from acetaldehyde by Tischtschenko's reaction. M. J. Kagan (J. Appl. Chem. Russ., 1937, **10**, 497—498).—Polemical, against Batalin *et al.* (A., 1937, II, 4). R. T.

Wetting, detergent, and toilet agents prepared from alkali sulphates of aliphatic higher alcohols. II, III. S. Ueno (J. Soc. Chem. Ind. Japan, 1937, **40**, 24B; cf. B., 1936, 137).—An account is given of the prep. and stability of alkali and NH_4 sulphates of oleyl and cetyl alcohols, and their industrial status in Japan. J. D. R.

Determination of formaldehyde and benzaldehyde by means of chloramine-*T*. B. Carli and R. Airoldi (Annali Chim. Appl., 1937, **27**, 56—59).—A dil. aq. solution of the aldehyde is treated with KI and chloramine-*T*, the whole made alkaline, set aside for 15 min., acidified, and the excess of I titrated with $Na_2S_2O_3$. L. A. O'N.

Fatty acids. M. J. Hausman (Soap, 1937, **13**, No. 6, 26—30, 73).—A review of methods for their production and their use in soap manufacture. L. D. G.

Simple benzene derivatives. W. L. Nelson (Oil Gas J., 1937, **35**, No. 38, 39; cf. B., 1937, 315).—The *d*, b.p., m.p., latent heat, and heat of combustion are tabulated for various C_6H_6 derivatives, *e.g.*, C_6Me_6. R. B. C.

Complex benzene hydrocarbons. W. L. Nelson (Oil Gas J., 1937, **35**, No. 40, 60).—The *d*, b.p., m.p., heat of combustion, η (Saybolt), and η-index are tabulated for C_6H_6 derivatives (C_{24}—C_{60}). R. B. C.

Multi-ring hydrocarbons. W. L. Nelson (Oil Gas J., 1937, **35**, No. 44, 46).—The *d*, b.p., m.p., heat of combustion, η (Saybolt), and η-index are tabulated for 21 $C_{10}H_8$ and anthracene derivatives. R. B. C.

Products of chlorination of phenol. S. T. Raschevskaja, G. V. Zilberman, and A. D. Tscherniavskaja (J. Appl. Chem. Russ., 1937, **10**, 499—506).—The f.p. of *o*-chlorophenol (I) is not significantly affected by admixture of PhOH. The product of chlorination of PhOH yields 3 fractions on distillation, viz., (I)–PhOH, b.p. <180°, (I)–PhOH–dichlorophenol (II), b.p. 180—200°, and PhOH–(II)–*p*-chlorophenol (III), b.p. 200—220°. The *d* of the system (I)–PhOH follows the additive rule, so that the PhOH content of the first fraction may be derived from its *d*. The mixtures (I)–PhOH and (I)–(II) may be analysed bromometrically. The second and third fractions are nitrated, when (II) and (III) undergo complete, and (I) partial, oxidation, whilst PhOH yields picric acid (IV). The feebly acid nitration product is steam-distilled, when chlorodinitrophenol distils over, leaving (IV), which is determined by Zacharev's method (A., 1934, 91); trustworthy results are not obtained for mixtures containing >20% of PhOH. The presence of 3 mols. of H_2O in the (IV)–$Cu(NH_3)_4$ complex described by Zacharev is not confirmed. R. T.

New raw material—naphthenic acids. A. Voigt (Allgem. Oel- u. Fett-Ztg., 1937, **34**, 157—160).—The chemical properties and possible applications of naphthenic acids are briefly reviewed. E. L.

Physical properties of olefines. Naphthenic acids from crude oil.—See II. **MeOH catalysts. H_2 from CH_4.**—See VII. **Determination of furfuraldehyde.**—See IX. **Steels for urea synthesis.**—See X. **Acid-proof diaphragms.**—See XI. **Glycol and its derivatives in paint etc.**—See XIII. **Determining $(CH_2)_6N_4$ in medicines. Determining I in hydroxyquinoline derivatives.**—See XX.

See also A., I, 365, **Reduction potential of $(NO_2)_2$-compounds.** 369, **Hydrogenation catalysts.** II, 270, **Prep. of aliphatic dihalogeno-compounds of high mol.-wt. Catalytic oxidation of alcohols.** 271, **Synthesis of EtOBu$^\beta$. Determination of ββ-dichlorodiethyl sulphide.** 291, **Electrolysis of aromatic acids.** 292, **Synthesis of benzylideneacetalazine.**

Patents.

Manufacture of hydrocarbons and their derivatives from mixtures of hydrogen and oxides of carbon. G. W. Johnson. From I. G. Farbenind. A.-G. (B.P. 465,668, 22.11.35).—CO–H_2 mixtures are converted into gaseous or liquid mixtures of hydrocarbons and their O-containing derivatives by passage over a catalyst consisting of reduced Fe_3O_4 at 400—850°/>50 atm., or at 150—500°/>50 atm. over reduced Fe_3O_4 containing Si, Ti, or their compounds, alone or mixed with U, Mn, W, Cr, Mo, Cu, Ag, Ni, Co, alkali or alkaline-earth metals, or derivatives of these. P. G. C.

Treatment of gases containing organic vapours. Celluloid Corp. (B.P. 466,910, 11.2.36. U.S., 11.2.35).—Org. compounds (solvents etc.) are recovered by passing the mixed gases containing them into a trialkyl or trialkylaryl phosphate, and distilling off the dissolved compounds. Apparatus is illustrated. P. G. C.

Manufacture of alkyl chlorides. E. I. Du Pont de Nemours & Co. (B.P. 466,134, 22.11.35. U.S., 22.11.34).—Olefines ($CH_2{:}CH_2$, $CHMe{:}CH_2$) are converted into alkyl chlorides by the action of HCl at 42—60°/1 atm., in presence of a suspending medium (*e.g.*, $CHCl_2{\cdot}CH_2Cl$, CCl_4) and a catalyst ($AlCl_3$, $FeCl_3$, $SbCl_5$). P. G. C.

Manufacture of fluorine compounds of aliphatic hydrocarbons. I. G. Farbenind. A.-G. (B.P. 466,509, 29.11.35. Ger., 29.11.34).—Aliphatic Cl-compounds ($\nless C_2$) containing the group CCl_2 or CCl_3 are converted into the corresponding F-compounds by heating with SbF_3 or anhyd. HF (autoclave); *e.g.*, $CMeCl_3$ is converted into $CMeCl_2F$, $CMeClF_2$, and $CMeF_3$, $CHMeCl_2$ into CHMeClF and $CHMeF_2$, at 150°. A. H. C.

Halogenation. C. F. Read, Assr. to C. L. Horn (U.S.P. 2,046,090, 30.6.36. Appl., 29.12.33).—SO_2–Cl_2 mixtures, when passed through molten hydrocarbons or solutions thereof, react as ClSO·OCl, giving substances, CHRR′·O·SOCl, which with more Cl_2 give CHRR′Cl or with H_2O, CHRR′·OH. Only 1 H on each C is replaced. The products vary with the conditions; thus at 50° C_6H_6 gives *p*-$C_6H_4Cl{\cdot}O{\cdot}SOCl$ and at 70° *p*-$C_6H_4Cl_2$. SO_2 and other halogens give similar compounds. Glycerides are similarly substituted in the acid radical. R. S. C.

Manufacture of olefines. G. W. Johnson. From I. G. Farbenind. A.-G. (B.P. 466,210, 24.10.35).—Saturated hydrocarbons yield olefines, H_2, and CO when heated at $\nless$800° with O_2. The production of C_2H_4 and C_3H_6 from C_2H_6 containing 30—40% of O_2, and from C_3H_8 containing 25—33% of O_2, respectively, is claimed. A. H. C.

Polymerisation of olefines. Standard Oil Development Co. (B.P. 466,066, 15.5.36. U.S., 26.10.35).—*iso*Olefines (I) are preferentially polymerised by passing olefine vapours over a catalyst (*e.g.*, oxides of Al, La, Zr, $AlCl_3$, H_3PO_4, on SiO_2 or diatomaceous earth) at 80—200°/1—7 atm., the reaction time being such that mainly (I) are polymerised. The unaffected gases may be separately polymerised. The examples are restricted to mixtures containing 10·7% of *iso*butene, and the product after contact times of 5—100 sec. contains 80% of the dimeride. Apparatus is figured. P. G. C.

Carrying out exothermic [organic] reactions. Distillers Co., Ltd., H. Langwell, C. B. Maddocks, and J. F. Short (B.P. 466,416, 22.11.35).—Olefines (C_2H_4) and O_2 or gases containing O_2 are converted into olefine oxides by passing the mixtures over a catalyst (Ag) contained as a layer in a tube or tubes of good thermal conductivity (Al, sherardised Fe), a const. reaction temp. being maintained by immersing the tubes in a cooling (*e.g.*, refluxing) liquid. Multitubular apparatus is described. A. H. C.

Hydration of higher olefines. Distillers Co., Ltd., H. M. Stanley, and J. E. Youell (B.P.

466,439, 25.2.36).—An aq. ($\ngtr$40%) inorg. polybasic acid (H_2SO_4) is treated with excess of an olefine which is maintained liquid by increased pressure at 50—150°, and alcohol formed is removed in the olefine layer. A continuous process is described and the hydration of C_3H_6 (30—40% H_2SO_4; 80°/40 atm.), C_4H_8 (20—40% H_2SO_4; 100°/15—20 atm.), and of $CMe_2{:}CHMe$ (15% H_2SO_4; 120°/10—15 atm.) is claimed. A. H. C.

Manufacture of alcohols. H. S. Davis and A. W. Francis, Assrs. to Socony–Vacuum Oil Co. (U.S.P. 2,047,194, 14.7.36. Appl., 9.3.34).—A mixture of alcohols is produced by hydrating an easily hydrated olefine with a mixture of H_2O and an alkyl sulphate obtained by absorbing a difficultly hydrated olefine in H_2SO_4. The production of $EtOH–Pr^{\beta}OH$ mixtures by absorbing C_2H_4 in H_2SO_4 and simultaneously hydrolysing the Et_2SO_4 and hydrating added C_3H_8 (50—150°/700—1000 lb.) is claimed. A. H. C.

Manufacture of glycols. F. A. Weihe, jun., Assr. to McAleer Manufg. Co. (U.S.P. 2,047,811, 14.7.36. Appl., 11.7.34).—Glycols are produced (yield 100%) by heating olefine chlorides, bromides, or chloro- or bromo-hydrins at $\ngtr$163°/400 lb. with H_2O in an atm. of excess CO_2 while slowly adding an alkali or alkaline-earth hydroxide. The production of $(CH_2{\cdot}OH)_2$ from derivatives of C_2H_4, using NaOH or $Ca(OH)_2$, is claimed. A. H. C.

Manufacture of ethylene oxide. Distillers Co., Ltd., H. Langwell, and H. M. Stanley (B.P. 466,417, 22.11.35).—$(CH_2)_2O$ is absorbed from gaseous mixtures obtained by oxidising C_2H_4, by activated C, formation of $(CH_2{\cdot}OH)_2$ being minimised by drying with hot air or an inert gas after each desorption (wet steam, C_6H_6, or CCl_4 vapour). A. H. C.

Absorption of ethers [dimethyl ether]. H. Klein, Assr. to I. G. Farbenind. A.-G. (U.S.P. 2,039,170, 28.4.36. Appl., 14.12.33. Ger., 16.12.32).—Me_2O is absorbed from gaseous mixtures (*e.g.*, of Me_2O, MeCl, and HCl) by scrubbing with aq. $ZnCl_2$ ($d > 1{\cdot}95$), and may be recovered by heating the solution at 60—65°. L. C. M.

Production of glycol derivatives [ethers]. Distillers Co., Ltd., H. M. Stanley, and J. E. Youell (B.P. 467,228, 3.12.35).—Glycol ethers are prepared by heating under pressure a mixture of a monohydric alcohol, an olefine oxide, and a *tert.* amine (as catalyst); the latter may be prepared *in situ*. *E.g.*, EtOH, $(CH_2)_2O$, and $N(C_5H_{11})_3$ heated at 110—120° and sufficient pressure (5—10 atm.) to keep the reactants in the liquid state afford $OH{\cdot}CH_2{\cdot}CH_2{\cdot}OEt$ and polyethylene glycol ethers. P. G. C.

Mercaptan conversion. P. K. Frolich and P. J. Wiezevich, Assrs. to Standard Oil Development Co. (U.S.P. 2,045,766, 30.6.36. Appl., 8.4.32).—By passage over catalysts at 200—500° (300—450°)/$\nless$10—200 atm., mercaptans are subjected to (*A*) "dehydrunsulphing" reactions, *e.g.*, $2EtSH \rightarrow BuSH + H_2S$, and $2EtSH \rightarrow Et_2S + H_2S$, and (*B*) dehydrogenation, *e.g.*, $EtSH \rightarrow MeCHS + H_2$, $2EtSH \rightarrow Et_2S_2 + H_2$, and $2EtSH \rightarrow MeCS{\cdot}SEt$. Metal sulphides catalyse reactions *A*; group VI metal oxides or sulphides catalyse reaction *B*. O-containing products are obtained by mixing the mercaptan vapour with O_2, H_2O, or alcohols. Admixture with H_2 or CO (with H_2S gives COS and H_2) favours reactions *A*. Admixture with H_2S suppresses reactions *A*. Admixture with olefines suppresses formation of olefines by loss of H_2S from 1 mol. of mercaptan. In examples the mercaptans, b.p. 30—50°, from sour-cracked petroleum with 1 : 1 : 1 CdS–ZnS–activated C at 350° give mainly thioethers, H_2, H_2S, and olefines. In other examples 1 : 1 FeS–MnS, 19 : 1 : 19 CdS–ZnS–Al_2O_3, and 1 : 1 : 1 ZnO–MnO–Cr_2O_3 are used. R. S. C.

Manufacture of alkylene sulphides. I. G. Farbenind. A.-G. (B.P. 465,662, 11.11.35. Ger., 10.11.34).—$(CH_2)_2O$ and its derivatives are treated with H_2O-sol. thiocyanates or $CS(NH_2)_2$ or its derivatives, preferably in presence of solvents or accelerators (*e.g.*, K_2CO_3). S and O are exchanged by the reactants. R. G.

Manufacture of sulphur-containing additive compounds of alkyl or aralkyl halides. W. W. Groves. From I. G. Farbenind. A.-G. (B.P. 465,603, 8.11.35).—Alkyl or aralkyl halides are treated with aliphatic thioethers $S(R{\cdot}OH)_2$ in which R is the residue of an aliphatic hydrocarbon or a corresponding residue substituted by OH or having the C chain interrupted by O, giving H_2O-sol. additive products of the type $(OH{\cdot}R)_2SClR'$ ($R'Cl$ = alkyl or aralkyl chloride). $S(C_2H_4{\cdot}OH)_2$ gives with CH_2PhCl a *compound*, m.p. 81°, with 3-nitro-4-methoxybenzyl chloride a *compound*, m.p. 115°, with 3-chloro-4-methoxybenzyl chloride a *compound*, m.p. 113°, and with 1-$C_{10}H_7{\cdot}CH_2Cl$ a *compound*, m.p. 112°. R. G.

Manufacture of acetic acid. W. O. Walker and U. Kopsch, Assrs. to A. O. Smith Corp. (U.S.P. 2,047,534, 14.7.36. Appl., 19.4.35).—MeCHO (2—75% in hydrocarbon mixtures) is oxidised by air or O_2 on passing at 50—80° through a solution containing $Co(OAc)_2$, AcOH, and about 1—10% of H_2O (prep. and activation by MeCHO and O_2 is described. Cf. U.S.P. 1,976,757; B., 1936, 233). A. H. C.

Production of maleic acid. Carbide & Carbon Chemicals Corp., Assees. of C. H. Walters (B.P. 465,848, 7.3.36. U.S., 9.4.35).—Butenes, $CH_2{:}CH{\cdot}CH{:}CH_2$, *n*- and *sec.*-BuOH are converted into $({:}CH{\cdot}CO_2H)_2$ in 19—30% yield by passing the vapours with air over a catalyst (a vanadate, or MoO_3 with or without TiO_2) at 250—400°. P. G. C.

Manufacture of esters of methacrylic acid. E. I. Du Pont de Nemours & Co., H. J. Barrett, and D. E. Strain (B.P. 465,789, 14.11.35).—Monomeric methacrylic esters are prepared by treating unsaturated alcohols with $CH_2{:}CMe{\cdot}CO_2H$, $(CH_2{:}CMe{\cdot}CO)_2O$, $CH_2{:}CMe{\cdot}COCl$, or $CH_2{:}CMe{\cdot}CO_2R$ (R = lower alkyl) in presence of esterification catalysts. β-*Methylallyl methacrylate* has b.p. 57—59°/15 mm. Monomerides are polymerised by the action of heat (60—100°), light, and/or polymerisation catalysts (*e.g.*, Bz_2O_2), if desired in presence of plasticisers or softening agents. Polymerisation may be carried out in a solvent for the monomeride only or in a common solvent, or the monomeride may be emulsified prior to polymerisation. Rigid or flexible backings may be coated with monomerides as such or in solution or emulsion form and polymerisation effected *in situ.* R. G.

Manufacture of poly[hydr]oxycarboxylic acids or their salts. A. G. Bloxam. From M. Finkelstein (B.P. 462,565, 30.11.35).—Trihexosan is oxidised in aq. solution, *e.g.*, with alkaline $KMnO_4$, NaOCl, H_2O_2, halogens, to give mono- and di-basic acids, the Mg, Ca, Ba, Cu, and Fe salts of which are H_2O-sol. (the " basic " Ba salt of the dibasic acid is only sparingly sol. and is used for isolation of the acid); the Ca salts are said to have therapeutic val. H. A. P.

Formation of esters. Continental Oil Co. (B.P. 465,983, 12.5.36. U.S., 27.5.35).—Esters (*e.g.*, Me stearate, $C_{18}H_{37}\cdot OAc$) are prepared by passing the superheated vapours of the more volatile reactant into the heated less volatile reactant in presence of a relatively non-volatile catalyst, *e.g.*, $NaHSO_4$. The reaction mixture is kept at such a temp. that the more volatile reactant and H_2O distil off; the latter is separated and the former returned to the reaction vessel. Apparatus is figured. [Stat. ref.] P. G. C.

Manufacture of salts of condensation products. I. G. Farbenind. A.-G. (B.P. 466,814, 6.12.35. Ger., 6.12.34. Addn. to B.P. 449,185; B., 1936, 872).—The products from the condensation, under normal pressure and conditions facilitating removal of H_2O, *e.g.*, by stirring or passing air or an indifferent gas through the mixture, of citric acid and a polyhydric alcohol of $\not<3$ OH, in which at least one CO_2H per mol. of acid remains unesterified, are converted into sol. palatable alkaline-earth or Mg salts. Examples are: citric acid (105 pts.) and mannitol (92 pts.), sorbitol (95 pts.), or glycerol (48 pts.) are heated and stirred at 120—130° until the required wt. of H_2O is lost (about 20 pts.); the product is dissolved in H_2O, neutralised with a salt of Ca, Ba, Sr, or Mg (the carbonate or oxide), and the salt pptd. by pouring the solution into MeOH. N. H. H.

Manufacture of acetaldehyde from gases containing acetylene. I. G. Farbenind. A.-G., and G. W. Johnson (B.P. 466,569, 28.11.35. Addn. to B.P. 460,145; B., 1937, 326).—Small proportions of C_2H_2 in gaseous mixtures are hydrated to MeCHO in presence of excess of aq. catalyst solutions containing H_2SO_4, $HgSO_4$, $FeSO_4$, and $Fe_2(SO_4)_3$, the ratio of the last two being maintained, by simultaneous addition of $Fe_2(SO_4)_3$ and withdrawal of spent solution, so that of the total Fe, $>20\%$ is present as $Fe^{\cdots}$. The gases and solution are passed concurrently through the reaction vessel at such a speed that 10—30 times the vol. of liquid present in the vessel is circulated per hr. Continuous plant is described. A. H. C.

Manufacture of β-keto-acetals. A. Carpmael. From I. G. Farbenind. A.-G. (B.P. 466,890, 7.12.35).—β-Chlorovinyl ketones are treated at low temp. with alcohols, particularly MeOH and EtOH, in alkaline media (NaOH, KOH); β-keto-acetals are obtained. The prep. of *acetylacetaldehyde Me₂*, b.p. 67—69°/20 mm., and *Bu₂ acetal*, b.p. 112°/18 mm., *benzoylacetaldehyde Et₂ acetal*, and β-*keto*iso*heptaldehyde Et₂ acetal*, b.p. 150(?)—120°/18 mm., is described. R. G.

Manufacture of chlorinated ethyl and vinyl ketones. A. Carpmael. From I. G. Farbenind. A.-G. (B.P. 466,891, 7.12.35).—Acid chlorides are treated with $CH_2{:}CHCl$, preferably in presence of a Friedel–Crafts type condensing agent ($AlCl_3$), with or without a solvent (CCl_4), to give αβ-dichloroketones, $R\cdot CO\cdot CHCl\cdot CH_2Cl$; HCl is eliminated by distillation under reduced pressure to give β-chlorovinyl ketones ($R\cdot CO\cdot CH{:}CHCl$). The prep. of Ph dichloroethyl ketone, m.p. 57—58°, Ph chlorovinyl ketone, b.p. 133—135°/18 mm., chlorovinyl Me ketone, b.p. 43—45°/18 mm., and *Bu^β β-chlorovinyl ketone*, b.p. 72—74°/18 mm., is described. R. G.

Preparation of [aliphatic] nitriles. Armour & Co. (B.P. 467,043—4, 31.1.36. U.S., [A] 6.3.35, [B] 15.3.35).—(A) Higher ($>C_{15}$) are converted into lower aliphatic nitriles by pyrolysis at 400—800°/250—500 lb. per sq. in. *E.g.*, $C_{17}H_{35}\cdot CN$ affords $C_nH_{2n+1}\cdot CN$ ($n = 5$—11) hydrocarbons, and some unsaturated nitriles. Apparatus is figured. (B) The above process is effected at atm. pressure in presence of contact materials (pumice, SiO_2) or a dehydrating catalyst (Al_2O_3); similar products are obtained. P. G. C.

***N*-Aminohydroxyalkyl-substituted alkylenediamines.** R. R. Bottoms, Assr. to Girdler Corp. (U.S.P. 2,046,720, 7.7.36. Appl., 9.6.33).—As adsorbents for acid gases are claimed substances, $NRR'\cdot X\cdot NR''R'''$, in which $X = \not<C_2$ alkylene or hydroxy- or amino-alkylene containing $\not<2$ CH_2, and at least one of the groups R, R′, R″, and R‴ = aminohydroxyalkyl. They are prepared by treating an alkylenediamine with $\not<1$ mol. of a halogeno-(chloro-)alkylene oxide at 0° and causing the product to react with 5—10 mols. of NH_3 and 1—1·3 mol. of alkali. Thus, $(CH_2\cdot NH_2)_2$ and $CH_2Cl\cdot CH{<}\genfrac{}{}{0pt}{}{O}{CH_2}$ give N-γ′-*chloro*- and thence N-γ′-*amino*-β′-*hydroxypropylethylenediamine*. Similarly are obtained NN-*dimethyl*-N′-γ′-*amino*-β′-*hydroxypropyl*-, NN′-*diethyl*-N-γ′-*amino*-β′-*hydroxypropyl*-, and N-γ′-*amino*-β′-*hydroxypropyl*-N′-δ″-*amino*-β″γ″-*dihydroxybutyl-ethylenediamine*, β-*hydroxy*-N-γ′-*amino*-β′-*hydroxypropyl*- and β-*hydroxy*-NN′-*di*-(γ′-*amino*-β′-*hydroxypropyl*)-*propylenediamine*, oils, cryst. at low temp. R. S. C.

Manufacture of capillary-active carboxylic acid amides. G. W. Johnson. From I. G. Farbenind. A.-G. (B.P. 466,853, 4.12.35).—Wetting agents are obtained by condensing amides ($\not<C_5$) having at least one H on the N with $(CH_2O)_x$ and H_2SO_3 at > room temp. in presence of a *tert.* base and, if desired, in a neutral solvent containing a mineral acid, basic (K_2CO_3), or neutral (H_2O_2) condensing agent. *E.g.*, SO_2 is passed into oleamide (40) and paraformaldehyde (I) (20) in C_5H_5N at 100°, palmitmethylamide (25) and (I) (10) in C_5H_5N (100) at 100°, or lauramide (100) with (I) (40) in NEt_3 (100) at 90° or with (I) (20) in C_5H_5N (200 pts.) at 100°. Amides from mixed fatty acids from natural sources may be used. R. S. C.

Manufacture of benzene derivatives containing halogenated methyl groups. W. W. Groves.

From I. G. FARBENIND. A.-G. (B.P. 465,885, 15.11.35).—Side-chain chlorination of *o*-xylene and its derivatives stops at the Cl_5-compound, which by interchange of F for Cl gives the F_5-compounds. These can be further chlorinated to compounds, *o*-$CF_3\cdot C_6H_4\cdot CClF_2$, which in turn yield the F_6-compounds. Thus are obtained o-*trichloromethylbenzylidene chloride*, m.p. 48°, o-*trifluoromethylbenzylidene fluoride*, b.p. 140—142°, o-*chlorodifluoromethylbenzotrifluoride*, b.p. 168—170°, and o-*bistrifluoromethylbenzene*, b.p. 140—142°. From 4-chloro-*o*-xylene 5-*chloro*-2-*trifluoromethylbenzylidene fluoride*, b.p. 164—167°, 5-*chloro*-2-*chlorodifluoromethylbenzotrifluoride*, b.p. 74—77°/18 mm., and 5-*chloro*-2-*bistrifluoromethylbenzene*, b.p. 160—164°, are obtained. Similarly *ψ*-cumene affords 2 : 5-*bistrichloromethylbenzylidene chloride*, m.p. 70°, 2 : 5-*bistrifluoromethylbenzylidene fluoride*, b.p. 140—143°, 2 : 5-*bistrifluoromethylchlorodifluoromethylbenzene*, b.p. 160—163°, and 1 : 2 : 4-*tristrifluoromethylbenzene*, b.p. 140—143°.
R. F. P.

Catalytic synthesis of amines. H. ADKINS and C. F. WINANS (U.S.P. 2,045,574, 30.6.36. Appl., 28.6.32).—Hydrogenation (Ni etc.) at 50—200°/50—150 atm. of mixtures or condensation products of CO-compounds and amines gives excellent yields of amines. Thus, *cyclo*hexanone and *cyclo*hexylamine (I) give 70% of di*cyclo*hexylamine, b.p. 115—120°/10 mm.; $Pr^{\alpha}CHO$ with (I), piperidine, or $CH_2Ph\cdot CH_2\cdot NH_2$ gives N-n-*butyl*-cyclo*hexylamine*, b.p. 200—204°, -*piperidine*, b.p 170—174°, and -β-*phenylethylamine*, b.p. 130—135°/10 mm. (36% with 11% of *di*-n-*butyl*-β-*phenylethylamine*, b.p. 162—168°/10 mm.); hydrobenzamide affords 94% of $CH_2Ph\cdot NH_2$ and 90% of $NH(CH_2Ph)_2$; hydrofuramide gives 92% each of 2-tetrahydrofurfurylamine and di-2-tetrahydrofurfurylamine, b.p. 103—106°/2 mm.; $CHPh\colon NPh$ gives 96% of $NHPh\cdot CH_2Ph$; $CHPh\colon CH\cdot CH\colon N\cdot OH$ gives 42% of $Ph\cdot[CH_2]_3\cdot NH_2$.
R. S. C.

Manufacture of alkyl derivatives of amidated aromatic hydrocarbons. U.S. INDUSTRIAL ALCOHOL Co. (B.P. 466,650, 22.10.36. U.S., 22.10.35 and 22.9.36).—*C*-Alkyl derivatives of aromatic amines (I) (p-$C_6H_4Bu^{\gamma}\cdot NHAc$) are prepared by interaction of an acylated aromatic amine, *e.g.*, NHPhAc, with an alkyl halide (chloride, bromide) or hydroxide, in presence of a Friedel–Crafts catalyst and an inert diluent (which gives a homogeneous reaction mixture), *e.g.*, $(CH_2Cl)_2$, $PhNO_2$, $CHCl_3$, CS_2, and at a temp. sufficiently low to control the speed of reaction. By deacylation, or nitration and deacylation of (I), the corresponding amines or NO_2-amines are obtained. Examples are: NHPhAc and $AlCl_3$ in $(CH_2Cl)_2$ give with (*a*) $Bu^{\gamma}Cl$ (in 94% yield), $Bu^{\gamma}OH$ (in 58·5% yield), or *iso*amyl chloride, p-*tert*.-butyl-, (*b*) *sec*.-BuCl, sec.-*butyl*-, m.p., 121—122°, and (*c*) $Pr^{\beta}Cl$ (1 equiv.), mono- and (3 equivs.) *tri*-, m.p. 140·5—141°, -iso*butylacetanilide*. Similarly, o-$C_6H_4Me\cdot NHAc$ with $Bu^{\gamma}Cl$ gives a mixture of isomeric *tert*.-butyl-*o*-acet-toluidides.
N. H. H.

Preparation of diaryldithiocarbamates. P. C. JONES, Assr. to B. F. GOODRICH Co. (U.S.P. 2,046,876, 7.7.36. Appl., 16.8.35).—Diarylamines dissolved in liquid NH_3 are treated with a metal of $E_h > 2$ volts (Na); an inert liquid of low f.p. (*e.g.*, PhMe) is added, NH_3 boils off, and CS_2 is added to the fine suspension of the metal compound (MNR_2). The resulting suspension of $NR_2\cdot CS\cdot SM$ is separated by filtration.
R. G.

Manufacture of alkylphenols. V. IPATIEFF, Assr. to UNIVERSAL OIL PRODUCTS Co. (U.S.P. 2,046,900, 7.7.36. Appl., 11.2.33).—Phenols are *C*-alkylated by treatment with olefines etc. in presence of P acids (H_3PO_4) as catalysts, under pressure if necessary. Gas mixtures containing olefines (*e.g.*, from cracking processes) and/or mixtures of phenols may be used. The examples describe the alkylation of PhOH and *m*-cresol, whereas the claims relate mainly to polyhydric phenols.
R. G.

Synthetic production of alcohols. E. T. THEIMER, Assr. to VAN AMERINGEN–HAEBLER, INC. (U.S.P. 2,047,396, 14.7.36. Appl., 29.8.33).—An olefine oxide (or compound producing this) in a hydrocarbon or other Friedel–Crafts reactant (I) is added at a low temp. to a suspension of an anhyd. metal halide in suspension in the same solvent so that the mol. ratio of (I) to olefine oxide is $\nless 10:1$. The production of $CH_2Ph\cdot CH_2\cdot OH$ from C_6H_6, $(CH_2)_2O$ (or $CH_2Cl\cdot CH_2\cdot OH$), and $AlCl_3$ at 6—10° (yield 40%) is claimed.
A. H. C.

Manufacture of *tert*.-alkylaryloxy-alkylols [-alkanols and their hydrogen sulphates: wetting agents etc.]. ROHM & HAAS Co. (B.P. 463,991, 8.11.35. U.S., 30.11.34).—*tert*.-Alkylphenols are condensed with an alkylene halohydrin or oxide, and the products are optionally esterified with H_2SO_4. *E.g.*, ααγγ-tetramethylbutylphenol (I) is condensed with $(CH_2)_2O$ in EtOH in presence of NaOH to give *ααγγ-tetramethylbutylphenyl* β-*hydroxyethyl ether*, b.p. 152—164°/1—2 mm., also obtained by use of $Cl\cdot[CH_2]_2\cdot OH$ and NaOH, the H sulphate of which (*Na* salt) is said to have good wetting properties. β-*Hydroxyethyl ethers* are similarly prepared from *tert*.-*iso*dodecyl- (b.p. 140—185°/4 mm.), *tert*.-*iso*hexadecyl- (b.p. 140—172°/3 mm.), chloro-ααγγ-tetramethylbutyl- (b.p. 194°/6 mm.), and *tert*.-*iso*octyl-phenol (b.p. 145—150°/2 mm.); the monoglyceryl, b.p. 215—220°/7 mm., *hydroxypropyl*, b.p. 143—145°/2 mm., and *hydroxybutyl*, b.p. 145°/1—2 mm., *ethers* of (I) are described.
H. A. P.

Manufacture of carboxylic acids containing free carboxyl and their salts [textile assistants]. I. G. FARBENIND. A.-G. (B.P. 463,828, 29.2.36. Ger., 1.3.35).—Primary and *sec*. arylamines *C*-substituted by a hydrocarbon radical of $\nless C_2$ (other than a purely aromatic or *cyclo*aliphatic-aromatic radical) are made to interact with polycarboxylic acids (C_{2-8}). *E.g.*, interaction of *C*-*iso*nonylaniline (I) with excess of $Et_2C_2O_4$ at the b.p., followed by hydrolysis (NaOH), gives a half-amide which is claimed to have wetting and washing properties. Other examples describe products from p-$C_{12}H_{25}\cdot C_6H_4\cdot NHMe$ and diglycollic anhydride, mixed *o*- and p-$NH_2\cdot C_6H_4\cdot C_8H_{17}$(*iso*) and maleic anhydride, 1 : 2 : 5-$NH_2\cdot C_6H_3(OMe)\cdot C_8H_{17}$(*iso*) and hexahydrophthalic anhydride, (I) and Me_2 thiodiglycollate, and p-$NH_2\cdot C_6H_4\cdot C_8H_{17}$(*iso*) and mixed amino-di- and -tri-acetic acids.
H. A. P.

Purification of phthalic anhydride. C. Conover, Assr. to Monsanto Chem. Co. (U.S.P. 2,046,368, 7.7.36. Appl., 17.10.29. Renewed 5.5.34).—$C_6H_4(CO)_2O$ is purified by melting in a closed vessel, and cooling in an undisturbed condition so that a large proportion of the material solidifies on the cooling coils; the liquid phase containing the impurities is then run off. A product of m.p. 131·35° is obtained. R. G.

[Preparation of] salts of [alkyl] esters of *p*-hydroxybenzoic acid. W. H. Engels and J. Weijlard, Assrs. to Merck & Co., Inc. (U.S.P. 2,046,324, 7.7.36. Appl., 17.6.33).—Alkaline-earth (Ca, Mg) salts of alkyl *p*-aminobenzoates are prepared by mixing aq. solutions of the Na salt and a H_2O-sol. salt of the metal. Non-hygroscopic powders sufficiently H_2O-sol. to be used as food preservatives and antiseptics are obtained. R. G.

Manufacture of benzaldehydes containing trifluoromethyl groups. W. W. Groves. From I. G. Farbenind. A.-G. (B.P. 466,007, 20.11.35).—Aromatic aldehydes containing one or more CF_3 are obtained by heating o-$CF_3{\cdot}C_6H_4{\cdot}CHF_2$ or its derivatives with 95% H_2SO_4 at 90—120°. Thus are obtained o-*trifluoromethyl-*, b.p. 70°/16 mm., *5-chloro-2-trifluoromethyl-*, b.p. 214—217°, and 2 : *5-bistrifluoromethylbenzaldehyde*, b.p. 69—72°/10 mm. R. S. C.

Manufacture of vanillin from waste sulphite pulp liquor and related substances containing ligninsulphonic acids. H. Hibbert and G. H. Tomlinson, jun. (B.P. 465,708, 18.9.36).—Sulphite liquor (*d* 1·05) is boiled with 24% of NaOH or heated with 12% of NaOH at 125—160°/>1 atm. and then treated with CO_2 (excess), and the vanillin extracted (C_6H_6, $C_2H_4Cl_2$). KOH or $Ba(OH)_2$ may also be used, and the liquor may be conc. R. F. P.

Ketone condensation products. H. R. Arnold, Assr. to E. I. Du Pont de Nemours & Co. (U.S.P. 2,046,145, 30.6.36. Appl., 30.6.34).—By passage over mixed dehydrogenating–dehydrating–hydrogenating catalysts *sec.*-methylcarbinols are converted successively into ketones COMeR, CMeR:CH·COR, and $CHMeR{\cdot}CH_2{\cdot}COR$, and higher condensation products. The proportions in which the products are obtained vary mainly with the time of contact. The unsaturated ketones are not isolated. The desired time of contact is given by $982{\cdot}2P/ST$ sec., *P* being the pressure (atm.) and *S* the gaseous space velocity × 10^{-3}. *T* should be 350—375° for chromite-type catalysts. In examples a Zn–Cu–Cd chromite or MgO–CuO catalyst is used. The reaction is detailed for $Pr^{\beta}OH$, CHMeEt·OH, and *cyclo*hexanol under various conditions. R. S. C.

Manufacture of carboxylic acid amides and nitrogenous condensation products. G. W. Johnson. From I. G. Farbenind. A.-G. (B.P. 461,883, 20.7.35).—Amides and/or their dehydration (cyclisation) products are obtained by heating carboxylamides with polynuclear amines and a H halide, SO_2, H_2SO_4, or an alkali or NH_4 H sulphite or H sulphate. *E.g.*, the interaction of NH_2Bz with 1-aminoanthraquinone (I) and HCl (on heating) gives 1-benzamidoanthraquinone; by heating (I) with $NH_2{\cdot}CO_2Et$ at 120—180° in a stream of HCl 1 : 9-anthrapyrimidone is formed, and 1-amino-2-hydroxyanthraquinone with $HCO{\cdot}NH_2$ and HCl at 130—135° gives 2-hydroxy-1 : 9-anthrapyrimidine, and with NH_2Ac, similarly, gives its *Py-C*-Me derivative. H. A. P.

Manufacture of condensation products of the anthraquinone series. A. Carpmael. From I. G. Farbenind. A.-G. (B.P. 462,386, 2.7.35).—The interaction of vattable primary amines with anthraquinone derivatives having a 5- or 6-membered heterocyclic ring in the 1 : 2 position in presence of alkalis results in condensation with loss of H_2 to give vat dyes or intermediates for dyes or pharmaceuticals. *E.g.*, interaction of 1-aminoanthraquinone (I) with anthraquinone-1 : 2(*N*)-thiazole (II) and KOH in C_5H_5N at 50° gives a violet-blue *K* salt, said to be of the μ-1-anthraquinonylamino-compound; with 1 : 2(*N*)-pyridinoanthraquinone (III) a similar condensation with (I) is said to occur in position 3. Other examples describe condensation *products* from (II) and 1-amino-5-benzamido- and -4-methoxyanthraquinone, 3-bromo-2-aminoanthraquinone, and the compound formed by alkaline condensation of 1 - amino - 5 - 1′ - benzanthronylaminoanthraquinone, anthraquinone-1 : 2(*N*) : 5 : 6(*N*)-anthraquinonedithiazole and (I), and (III) and 1-amino-4-benzamido- and 2-amino-anthraquinone. H. A. P.

Production of aldehydes. G. W. Johnson. From I. G. Farbenind. A.-G. (B.P. 466,723, 18.12.35).—When compounds, NArY·CHO or $\begin{matrix}\mathrm{Ar}\\|\\\mathrm{Y}\end{matrix}\!\!>\!\mathrm{N{\cdot}CHO}$ (Y = a saturated C_{2-3} chain; Ar has no substituent *p* to the N), are treated with acid Cl-containing condensing agents ($POCl_3$, $COCl_2$), best in a neutral solvent (C_6H_6, $CHCl_3$) at room temp., the CHO wanders into the Ar *p* to the N. The N·CHO compounds are obtained by boiling the amine with HCO_2H. Thus are obtained *2-methyl-*2 : *3-dihydroindole-5-aldehyde*, b.p. 169—170°/2·5 mm., 1 : 2 : 3 : *4-tetrahydroquinoline-6-aldehyde*, m.p. 95—96°, 1 : 2 : 3 : 4 : 10 : *11-hexahydrocarbazole-6-aldehyde*, b.p. 220—230°/1 mm., *4-aza-*1 : 2 : 3 : *4-tetrahydrophenanthrene-9-aldehyde*, m.p. 189°, *2-phenyl-*2 : *3-dihydroindole-5-aldehyde*, a resin [*phenylhydrazone*, m.p. 183—185° (decomp.)], *1-formyl-2-phenyl-*, b.p. 220°/12 mm., and *-2-methyl-*2 : *3-dihydroindole*, b.p. 145—147°/3 mm., *1-formyl-*1 : 2 : 3 : *4-tetrahydroquinoline*, b.p. 180—182°/25 mm., *9-formyl-*1 : 2 : 3 : 4 : 10 : *11-hexahydrocarbazole*, b.p. 174—176°/1 mm., and *4-formyl-4-aza-*1 : 2 : 3 : *4-tetrahydrophenanthrene*, m.p. 77—78°. R. S. C.

Manufacture of water-soluble derivatives of the indole series [wetting agents]. J. R. Geigy A.-G. (B.P. 466,635, 3.7.36. Switz., 14.4.36).—2 : 3-Dihydroindoles, containing in position 1 or 2 a > C_5 aliphatic or alicyclic substituent and further substituted, if desired, in the free 1, 2, or 3 positions by alkyl, aryl, or aralkyl, and in the Bz nucleus in any manner, are sulphonated without formation of coloured by-products to give acids, the salts of which are H_2O-sol. and capillary-active. Suitable dihydroindoles are obtained by known methods or by condensing by NaOEt o-$C_6H_4Me{\cdot}N(Acyl){\cdot}CHO$ (gives 1-alkylindoles), o-$C_6H_4Me{\cdot}NAc{\cdot}Acyl$ (gives 1-alkyl-2-methylindoles), etc., o-$C_6H_4Me{\cdot}NH{\cdot}Acyl$ (gives 2-alkylindoles), or *o*-$C_6H_4Me\cdot NAlk\cdot Acyl$ (gives 1 : 2-dialkylindoles), and hydrogenating the product; Acyl = pure or crude > C_5 acid radical. As example is given the condensation of the amide from *o*-$C_6H_4Me\cdot NH_2$ and palm-nut fatty acids by NaOEt at 290—320° to give a crude indole, b.p. 120—210°/0·4 mm., which by hydrogenation (Ni; 120—130°/150 atm.) affords crude 2-undecyl-2 : 3-dihydroindole; this (60) is added to (*a*) H_2SO_4,H_2O (60) at 10—20° and treated at 5° with oleum (26% SO_3) (120), (*b*) oleum (66% SO_3) (60) and H_2SO_4,H_2O (120), or (*c*) H_2SO_4,H_2O (300) and $ClSO_3H$ (300 pts.) at 10°. The sulphonation of 2-heptadecyl-2 : 3-dihydroindole and of the dihydroindole from the *o*-toluidide of cod-liver oil fatty acids is also detailed. R. S. C.

Manufacture of 2 : 4 : 6-triamino-1 : 3 : 5-triazine [melamine]. A. G. Bloxam. From Soc. Chem. Ind. in Basle (B.P. 466,957, 17.12.35).—$CN\cdot NH_2$ or dicyanodiamide is heated with NH_3 above 100° (120—200°) in presence of 0—20 wt.-% of H_2O (calc. on $CN\cdot NH_2$), preferably in presence of a solid (Fe powder) or liquid (MeOH) diluent. A high yield of $(CH_2N_2)_3$ is obtained. R. G.

Azeotropic distillation.—See I. **Dibenzanthrones.** See IV. **Polymerisation products.**—See XIII. **BuOH fermentation.**—See XVIII.

IV.—DYESTUFFS.

Versatility in dyestuff equipment. J. A. Lee (Chem. Met. Eng., 1937, **44**, 124—127).—A description is given, with illustrations, of the layout and equipment of the Linden plant of the General Aniline Works (U.S.A.). D. K. M.

Analysis of methylene-blue. K. D. Schtscherbatschev (Chim. Farm. Prom., 1935, No. 2, 117—118).—A small sample of the dye is treated with excess of standard $SnCl_2$, heated, and titrated in CO_2 with standard $K_2Cr_2O_7$. The appearance of a permanent blue colour indicates the end-point. Ch. Abs. (*e*)

Influence of position isomerism in azo dyes on their fastness to light and washing. M. E. Griffith (Ohio Agric. Exp. Sta. Bull., 1935, No. 548, 80—81).—Investigations with benzeneazo-α- or -β-naphthol dyes show that introduction of an SO_3H into the C_6H_6 nucleus increases fastness to washing; the position of the substituent has little effect, but fading is least with *ortho*-substitution. In general, the β-$C_{10}H_7\cdot OH$ dyes are better than those of the α-series and the *o*-sulphanilic dyes are most resistant to the combined effects of light and washing. Ch. Abs. (*r*)

Identification of Naphthol Yellow S and a suggested mechanism of its fading. H. H. Hodgson and E. W. Smith (J.C.S.I., 1937, **56**, 108T).—1 : 2 : 4 : 7-$OH\cdot C_{10}H_4(NO_2)_2\cdot SO_3H$ (I) (Naphthol Yellow S) is reduced ($SnCl_2$) to 2-*nitro*-4-*amino*-α-*naphthol*-7-*sulphonic acid* (II), red-brown from H_2O (cf. A., 1882, 63; 1909, i, 470). Aq. solutions of the salts (HCl, H_2SO_4, HNO_3) deepen in colour on heating and revert on cooling. Wool is dyed by (II) in red-brown shades unaffected by acids, HNO_2, and alkalis after soaping. (I) can be thus identified on the fibre as treatment with $SnCl_2$ affords a pale yellow, turning deep red-brown on washing and rendered fast by boiling. The substance produced on wool fibre by the fading of (I) had the same colour and behaved in the same way as (II), which had apparently been produced by photo-reduction. K. H. S.

Ultra-violet fluorescence lamp [for dyes etc.].—See XI. **Ponceau 2R.**—See XIX.

Patents.

Monoazo dyes. A. H. Knight, and Imperial Chem. Industries, Ltd. (B.P. 465,957, 18.11.35).—A diazotised monoamine, $NH_2\cdot Ar\cdot SO_2\cdot NXY$, where Ar and Y are radicals of the C_6H_6 series and X is an alkyl C_{10-20}, is coupled with a naphthol-di- or -tri-sulphonic acid, a 1-acylamino-8-naphtholdisulphonic acid, or a 1-sulphoarylpyrazolone, the coupling components being free from long-chain aliphatic radicals. Among examples (9) are *m*-$NH_2\cdot C_6H_4\cdot SO_2\cdot NPh\cdot C_{12}H_{25}$ → 1 : 8 : 3 : 6-$OH\cdot C_{10}H_4(NHAc)(SO_3H)_2$ (scarlet) and 6 : 3 : 1-$OEt\cdot C_6H_3(NH_2)\cdot SO_2\cdot NPh\cdot C_{12}H_{25}$ → 2 : 3 : 6-$OH\cdot C_{10}H_5(SO_3H)_2$ (reddish-orange). The shades on wool are characterised by a fastness to severe washing and milling which is superior to that of the dyes of B.P. 933 and 17,105 of 1910 (B., 1911, 204, 483), 312,582, and 325,229 (B., 1930, 1061, 454). K. H. S.

Manufacture of monoazo dyes. A. H. Knight, F. Lodge, and Imperial Chem. Industries, Ltd. (B.P. 466,127, 21.11.35).—Aminocarboxylic esters $NH_2\cdot Ar\cdot CO_2R$, where Ar is a residue of the C_6H_6 series and R is alkyl C_{10-20}, are diazotised and coupled with components devoid of such chains and having at least one SO_3H or CO_2H. Among examples (22) are the dyes *p*-$NH_2\cdot C_6H_4\cdot CO_2C_{12}H_{25}$ → 2 : 6 : 8-$OH\cdot C_{10}H_5(SO_3H)_2$ (orange), *m*-$NH_2\cdot C_6H_4\cdot CO_2C_{18}H_{37}$ → 1 : 8 : 3 : 6-$OH\cdot C_{10}H_4(NH_2)(SO_3H)_2$ (dull violet), *p*-$NH_2\cdot C_6H_4\cdot CO_2C_{10}H_{21}$ → 1 : 8 : 4 : 6-$OH\cdot C_{10}H_4(NHAc)(SO_3H)_2$ (red). The shades on wool are of excellent fastness to washing and milling. K. H. S.

Manufacture of monoazo dyes. A. H. Knight, and Imperial Chem. Industries, Ltd. (B.P. 466,799, 5.12.35).—Dyes sol. in H_2O, identical with those of B.P. 441,089 (B., 1936, 362), are made by coupling diazotised sulphuric ethers of hydroxyalkyl *p*-aminophenyl ethers (which may carry nuclear substituents other than CO_2H, NO_2, or SO_3H) with *p*-cresol. Diazo compounds in the examples are derived from *p*-$NH_2\cdot C_6H_4\cdot O\cdot C_2H_4\cdot SO_4H$, *p*-$NH_2\cdot C_6H_4\cdot O\cdot [CH_2]_3\cdot SO_4H$, 1 : 3 : 4-$NH_2\cdot C_6H_3Cl\cdot O\cdot C_2H_4\cdot SO_4H$, and 1 : 3 : 4-$NH_2\cdot C_6H_3Me\cdot O\cdot C_2H_4\cdot SO_4H$. Wool, natural and Sn-weighted silk, and cellulose acetate silk are dyed in greenish-yellow shades of good fastness to light and marking-off during steaming. K. H. S.

Manufacture of azo dyes. A. Carpmael. From I. G. Farbenind. A.-G. (B.P. 465,902, 27.12.35. Addn. to B.P. 443,163; B., 1936, 825).—Disazo dyes are made by combining a diazo compound with 5-aminoquinoline (I) or derivatives having position 8 free, rediazotising, and coupling again. Cu complexes of either the monoazo or disazo dyes are formed. In the example, the dye $1:2:4\text{-OMe}\cdot C_6H_3(NH_2)\cdot SO_3H \rightarrow (I) \rightarrow 5:2:7\text{-OH}\cdot C_{10}H_5(NH\cdot C_6H_4\cdot CO_2H\text{-}m)\cdot SO_3H$ (second coupling with addition of C_5H_5N) is boiled for 7 hr. with 1·1 mols. of $CuSO_4$; after purification, cotton is dyed bright greenish-blue shades of excellent fastness to light. K. H. S.

Manufacture of red azo dyes. Chem. Works formerly Sandoz (B.P. 465,955, 18.11.35. Switz., 21.11.34).—Diazotised aniline-*o*-sulphonamides are coupled with $8:2:6\text{-OH}\cdot C_{10}H_5(NH_2)\cdot SO_3H$ (I). At least one H of the $SO_2\cdot NH_2$ is substituted by an aromatic, hydroaromatic, or aliphatic radical or the N is part of the 5-ring of carbazole. In the examples, the substituents are NHPh, NPh_2, $NEt(2':5'\text{-OMe}\cdot C_6H_3Cl)$, $NH\cdot C_6H_{11}$, $N(C_6H_4Me\text{-}m)\cdot CH_2Ph$. Wool is dyed in clear red shades levelling better and of better fastness to light than the dyes of B.P. 312,582 (B., 1930, 1061). K. H. S.

Manufacture of azo dyes containing chromium. A. G. Bloxam. From Soc. Chem. Ind. in Basle (B.P. 466,189, 20.11.35).—An azo dye $R\cdot N\colon N\cdot R'(NH_2)(SO_3H)_n$, where R is a radical containing a chelating group, $n = 1, 2,$ or 3, and R′ is a $C_{10}H_8$ residue having NH_2 in position 1 and *ortho* to $\cdot N\colon N\cdot$, is heated with a salt of Cr until a complex is formed and NH_2 converted into OH. Among examples (16), the dye $1:4:2:5\text{-OH}\cdot C_6H_2Cl(NH_2)\cdot SO_3H \rightarrow 1:4:6\text{-NH}_2\cdot C_{10}H_5(SO_3H)_2$ (53·8) is heated for 12 hr. with an aq. solution of Cr_2O_3 (11·4) and H_2SO_4 (22·9 pts.). Wool is dyed violet of good fastness to fulling and light. The dye can also be used for nitrocellulose lacquer. K. H. S.

Manufacture of indigoid dyes. Soc. Chem. Ind. in Basle (B.P. 466,638, 10.7.36. Switz., 10.7. and 16.10.35).—Unsymmetrical indigoid dyes of the 2 : 2′ series are made by condensing an 8-halogeno-1 : 2-naphthothioindoxyl with a reactive 2′-derivative of a 2 : 1-naphthothioindoxyl (I), or *vice versa*. The 2′-derivatives used are halides, anils, ketones, carboxylic acids, or oximes. Among examples, 8-*bromo*-1 : 2-*naphthothioindoxyl*, m.p. 180—181° (279), is made by successive steps from 8-*bromonaphthalene*-1-*sulphonyl chloride*, m.p. 102—103°, 8-*bromo*-1-*thiolnaphthalene*, m.p. 109—110°, and 8-*bromonaphthalene*-1-*thioglycollic acid*, m.p. 158°, and condensed with the *p*-dimethylamino-2′-anil of (I) (332) in boiling PhCl (4000 pts.). The dye can be converted into its leuco-ester and affords dyeings and prints of a blackish-brown shade hitherto obtainable only from mixtures on animal and vegetable fibres. K. H. S.

Manufacture of anthraquinone dyes. G. W. Johnson. From I. G. Farbenind. A.-G. (B.P. 466,714, 30.11.35).—Anthraquinone derivatives containing halogen or SO_3H in position 6 or 7 and NHR at 1 and 4 (R being a radical of the C_6H_6 or $C_{10}H_8$ series, including partly hydrogenated $C_{10}H_8$ and *cyclo*alkylphenyl) are condensed with mercaptans and sulphonated, or *vice versa*. Among examples, 6-chloro-1 : 4-di-*p*-toluidinoanthraquinone (I) (811) is sulphonated and the sulphonic acid (50) boiled with NaOH (5), C_5H_5N (1000), H_2O (100), and $p\text{-}C_6H_4Me\cdot SH$ (II) (12 pts.) until the dye is free from Cl. Similarly 1 : 4 : 6-trichloroanthraquinone is condensed first with 5 : 6 : 7 : 8-tetrahydro-β-naphthylamine (2 mols.) and then with (II) and sulphonated, or (I) is condensed with $\beta\text{-}C_{10}H_7\cdot SH$ and sulphonated. In every case wool is dyed a very fast green shade from an acid bath. K. H. S.

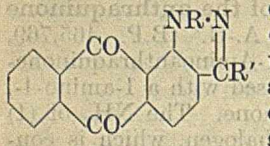
Manufacture of vat dyes of the anthraquinone series. I. G. Farbenind. A.-G. (B.P. 465,769, 19.10.36. Ger., 22.10.35).—1-Aminoanthraquinone-2-carboxylic acid (I) is condensed with a 1-amino-4-, -5-, or -8-arylaminoanthraquinone. The NH_2 of (I) may be replaced by NO_2 or halogen, which is converted into NH_2 after condensation. Compared with the dyes of B.P. 219,830 (B., 1924, 824) the new dyes afford on vegetable fibres red to currant shades of good fastness to light and Cl_2. Among examples (5), 1-amino-4-anilinoanthraquinone (31) in boiling $o\text{-}C_6H_4Cl_2$ (400) is condensed with the chloride of (I) (29 pts.); cotton is dyed currant shades from a dark brown vat. K. H. S.

Manufacture of acid wool dyes of the anthraquinone series. I. G. Farbenind. A.-G. (B.P. 465,889, 15.11.35. Ger., 16.11.34).—H_2O-sol. blue wool dyes of excellent fastness to light are obtained by interaction of an anthraquinone derivative substituted in positions 1 : 4 by groups replaceable by interaction with amines, *e.g.*, Cl, and in position 6 or 7 by $SO_2\cdot NHR$ (R = a group containing SO_3H), with a hydroarylamine, *e.g.*, hexahydroaniline (I). Examples are: 1 : 4-dichloroanthraquinone-6-sulphomethyltauride or -6-sulphonmethylanilidosulphonic acid (obtained from the sulphonyl chloride and methyltauride in NHPhMe and sulphonating in the latter case) with (I) in presence of $CuSO_4$ and aq. NaOH at the boil give 1 : 4-*dihexahydroanilinoanthraquinone*-6-*sulphomethyltauride* and -6-*sulphonmethylanilidosulphonic acid*, respectively. N. H. H.

Manufacture of (A) polyhydroxy-compounds of the dibenzanthrone series, (B) trihydroxydibenzanthrones and their quinones. G. W. Johnson. From I. G. Farbenind. A.-G. (B.P. 461,885 and 462,658, [A] 22.7.35, [B] 6.8.35).—(A) Amino-2 : 2′-dihydroxydibenzanthrones or the corresponding quinones are hydrolysed. *E.g.*, the 1-NH_2-compound or the derived quinone when heated with 10% H_2SO_4 at 220—230° gives 1 : 2 : 2′-trihydroxydibenzanthrone (I) and the 1-hydroxy-2 : 2′-quinone (II), respectively; the latter may be reduced to (I) by $NaHSO_3$. Other starting materials are 1 : 1′-diaminodibenzanthrone-2 : 2′-quinone (1 : 1′-diaminodibenzanthrene-2 : 7 : 2′ : 7′-diquinone) and its Br_2-derivative (the latter gives a dibromo-1 : 1′-dihydroxydibenzanthrone-2 : 2′-quinone). (B) Dibenzanthrone-2 : 2′-quinones free from NH_2 in positions 1 : 1′ and having H in 1 and/or 1′ are heated with (aq.) H_2SO_4 and an oxidising agent in amount insufficient of itself to introduce 1 OH. *E.g.*, dibenzanthrone-2 : 2′-quinone (10 pts.) is heated with NH_4 vanadate (0·4 pt.) in 39% H_2SO_4 (335 pts.); on cooling, a mixture of (I) and (II) separates. Other oxidising agents mentioned are NOCl, MnO_2, and Hg and Se compounds. H. A. P.

Manufacture of vat dyes. G. W. Johnson. From I. G. Farbenind. A.-G. (B.P. 466,184, 28.11.35).

—Vat dyes of very good fastness properties are obtained by partly or completely acylating (in an org. solvent, *e.g.*, $PhNO_2$) an aromatic NH_2-compound containing at least one cyclic :CO with (the acid chloride of) a 1(*N*) : 2-pyrazoloanthraquinonecarboxylic acid of the annexed formula (R = H, alkyl, or aryl; R′ = CO_2H or aryl containing CO_2H) and afterwards, if desired, when the amine contains an *o*-OH, -SH, or -NH_2, eliminating H_2O to give the azole, or acylating any free NH_2 groups with other acylating agents. In examples (18), the chloride of 1(*N*) : 2-pyrazoloanthraquinone-*Py*-*C*-carboxylic acid with the following -anthraquinones in $PhNO_2$ at 160° gives *dyes*: 1-amino- (greenish-yellow), 1-amino-5-benzamido- (yellow), 1 : 5-diamino- (yellow), 2-amino-3-hydroxy- (followed by treatment with H_2SO_4; brilliant yellow). Similarly, the chloride of 1(*N*) : 2-pyrazoloanthraquinone-*Py*-*C*-phenyl-4′-carboxylic acid with aminoanthraquinones gives other dyes. The new acylating agents are obtained, *e.g.*, by treating 1-chloro-2-acetylanthraquinone with N_2H_4,H_2O and oxidising the resulting methylpyrazoloanthraquinone with MnO_2 in H_2SO_4.



N. H. H.

Manufacture of polyamino-1 : 9-anthrapyrimidines [dyes]. I. G. FARBENIND. A.-G., and G. W. JOHNSON (B.P. 462,227, 29.7.35. Addn. to B.P. 407,363; B., 1934, 493).—The interaction of NH_3 and amines with amino-1 : 9-anthrapyrimidinesulphonic acids is claimed. *E.g.*, 5-amino-1 : 9-anthrapyrimidine-2-sulphonic acid (I) when heated with 25% aq. NH_3 at 190—200° gives the 2 : 5-$(NH_2)_2$-compound, m.p. 295°; similarly are prepared [from (I)] 5-*amino*-2-*methylamino*-, m.p. 289°, -2-*butylamino*-, m.p. 207—209°, -2-*dimethylamino*-, m.p. 258—260°, -2-*piperidino*-, -2-*ethylamino*-, m.p. 240°, -2-β-*hydroxyethylamino*-, -2-*anilino*-, -2-*methylanilino*-, -2-cyclo*hexylamino*-, and -2-*benzylamino*-, m.p. 253°, and (from the 4-NH_2-compound) 3 : 4-*diamino*-, m.p. 281—283°, and 4-*amino*-3-*methylamino*-1 : 9-*anthrapyrimidine*, m.p. 291—292°. The products are bluish-red to red-brown vat dyes. H. A. P.

Manufacture of iminopolymethine dyes. G. W. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 462,238 and 462,296, [A] 28.8.35, [B] 28.8. and 6.11.35).—(A) Yellow to red basic dyes, said to have good fastness to light, are prepared by condensation of "1 : 3 : 3-trimethyl-2-methyleneindoline-ω-aldehyde" (I) or its nuclear substitution products with primary or *sec.* arylamines (or aminoazo compounds or *p*-leucaniline). The products are converted by sulphonation into acid dyes. *E.g.*, (I) is heated in excess of aq. HCl with *p*-$C_6H_4(NH_2)_2$ at the b.p. to give an orange dye, or with $NH(C_6H_4Me\text{-}p)_2$ and $POCl_3$ in C_6H_6 to give a yellow dye. Numerous other examples derived from (I) and from its 5-OMe-derivative and a variety of arylamines are given. (B) Indolines having a reactive α-CH_2 are condensed (P halides or $COCl_2$) with *N*-acyl derivatives of heterocyclic *sec.* amines (having N as the sole hetero-atom). *E.g.*, 1 : 3 : 3-trimethyl-2-methyleneindoline (II) is added at 0—5° to a mixture of *N*-formyl-2-methyldihydroindole and $POCl_3$ with the production of a yellow basic *dye*. Similar *dyes* are produced from (II) and the *N*-CHO derivatives of tetrahydroquinoline (III) and hexahydrocarbazole, the Ac derivatives of dihydro-2-methylindole (IV) and (III), and the COEt derivative of (IV), and from the 5-OMe-derivative of (II) and the Ac derivative of (IV). H. A. P.

Manufacture of dyes. KODAK, LTD. From EASTMAN KODAK Co. (B.P. 466,097, 15.8.35).—Dyes are made by condensing an arylthiazoline or arylselenazoline having a μ-ketonic alkacyl group and an alkyl group attached to the N, with a compound having a reactive CH_2 directly attached to CO or CS and selected from the barbituric and thiobarbituric acids, aroylacetonitriles, rhodanines, or 2-thiooxazole-2 : 4-diones. Thus 1-acetylmethylene-2-ethylbenzthiazoline (I) with thiobarbituric acid (II) forms 2 : 4 : 6-*triketo*-2-*thio*-5-[(1-*benzthiazylidene*)-2-*ethyl*iso*propylidene*]*hexahydropyrimidine*, m.p. 332—334° (decomp.) (AgCl emulsion sensitised to 460 mμ; max. at 430 mμ); 2-acetylmethylene-1-ethyl-β-naphthathiazoline (III) and (II) afford 2 : 4 : 6-*triketo*-2-*thio*-5-[(2-β-*naphthathiazylidene*-1-*ethyl*)iso*propylidene*]*hexahydropyrimidine*, m.p. 301—302° (decomp.) (460 mμ; max. at 430 mμ); (III) and $CH_2Bz{\cdot}CN$ give 8-[(2-β-*naphthathiazylidene*-1-*ethyl*)iso*propylidene*]*benzoylacetonitrile*, m.p. 235—237° (decomp.) (555 mμ; max. at 510 mμ); (I) and 3-ethylrhodanine (IV) yield 5-[(1-*benzthiazylidene*-2-*ethyl*)iso*propylidene*]-3-*ethylrhodanine*, m.p. 216—218° (decomp.) (655 mμ; max. at 560 mμ); (I) and 3-phenylrhodanine (V) afford 3-*phenyl*-5-[(1-*benzthiazylidene*-2-*ethyl*)iso*propylidene*]*rhodanine*, m.p. 296—298° (decomp.) (640 mμ; max. at 520 and 580 mμ); (I) and 2-thio-3-ethyloxazole-2 : 4-dione (VI) give 2-*thio*-5-[(1-*benzthiazylidene*-2-*ethyl*)iso*propylidene*]-3-*ethyloxazole*-2 : 4-*dione*, m.p. 206—207° (decomp.) (620 mμ; max. at 540 mμ); (III) and rhodanine yield 5-[(2-β-*naphthathiazylidene*-1-*ethyl*)iso*propylidene*]*rhodanine*, m.p. 264—265° (decomp.) (640 mμ; max. at 600 mμ); (III) and (IV) afford 5-(2-β-*naphthathiazylidene*-1-*ethyl*)iso*propylidene*-3-*ethylrhodanine*, m.p. 251—253° (decomp.) (660 mμ; max. at 545 mμ and 645 mμ); (III) and (V) give 3-*phenyl*-5-[(2-β-*naphthathiazylidene*-1-*ethyl*)iso*propylidene*]*rhodanine*, m.p. 299—300° (decomp.) (540 mμ; max. at 535 mμ and 600 mμ); 1-ethyl-2-propionylmethylene-β-naphthathiazoline and (V) yield 3-*phenyl*-5-[(2-β-*naphthathiazylidene*-1-*ethyl*)-α-*ethylethylidene*]*rhodanine*, m.p. 266—268° (decomp.) (690 mμ; max. at 560 mμ and 610 mμ); (III) and (VI) afford 2-*thio*-5-[(2-β-*naphthathiazylidene*-1-*ethyl*)iso*propylidene*]-3-*ethyloxazole*-2 : 4-*dione*, m.p. 254—256° (decomp.) (AgBr sensitised to 640 mμ; max. at 560 mμ). K. H. S.

Manufacture of (A) dyes, (B, C) carbocyanine dyes. KODAK, LTD. From EASTMAN KODAK Co. (B.P. 466,244—6, 15.8.35. Cf. B.P. 466,097; preceding).—Dyes useful as sensitisers for silver halide emulsions and also as filter dyes or for dyeing cellulose acetate silk are prepared (A) by condensing a compound (heterocyclic, non-cyclic, or homocyclic) containing a reactive :CH_2 attached to :CO or :CS with the formylmethylene derivative of a heterocyclic base in presence of Ac_2O. The four examples are the condensation of 1-ethyl-2-formylmethylene-β-naphthathiazoline with 3-ethylrhodanine, 2-thio-3-ethyloxazole-2 : 4-dione, Et 2-quinolylpyruvate, and CH_2Ac_2, respectively. The sensitising max. of the products lie at 560 and 610, 660, 575, and 505 mμ, respectively. (B) Carbocyanines are prepared by condensing a cyclic NH_4 quaternary salt, having a reactive α- or γ-Me, with the formylmethylene derivative of a heterocyclic base. Three examples of unsymmetrical carbocyanines result by condensing, in Ac_2O, 1-ethyl-2-formylmethylene-β-naphthathiazoline with quinaldine ethiodide, lepidine ethiodide, and 1-methylbenzoxazole ethiodide, respectively, the sensitising max. of the dyes lying at 580 and 640, 710, and 570 mμ, respectively. The fourth example is the reaction of 1-methyl-2-formylmethylene-1 : 2-dihydroquinoline and 2-methyl-β-naphthathiazole ethiodide, to give a dye with sensitising max. at 580 and 640 mμ. (C) 8-Substituted unsymmetrical (or symmetrical) carbocyanines are prepared by condensing the quaternary salt of a thiazoline, or of an *N*-alkylbenz-(or -naphth-)oxazole, -thiazole, or -selenazole having a reactive α-Me, in the presence of Ac_2O or $(EtCO)_2O$, with a benz-(or naphtha-)thiazoline or -selenazoline, having a ketonic α-acylmethylene group. 28 such carbocyanines are formulated, and their prep. and sensitising properties are described. F. M. H.

Manufacture of dyes containing metal. A. Carpmael. From I. G. Farbenind. A.-G. (B.P. 465,738, 12.11.35).—New pigment dyes are made by acting on *o*-aminophenols in H_2O or org. solvents in presence of metal salts with *o*-hydroxycarbonyl compounds OH·R·CO·R′, where R is an aromatic residue and R′ is an org. radical or H. Among examples (10), $Zn(OAc)_2,3H_2O$ (9·17 g.) is heated to 80° in 50% aq. EtOH (150 c.c.) and *o*-$OH{\cdot}C_6H_4{\cdot}CHO$ (I) (6·1 g.) is added. A clear, pale yellow solution is formed from which a hot solution of *o*-$OH{\cdot}C_6H_4{\cdot}NH_2$ (II) (5·45 g.) in 50% aq. EtOH (100 c.c.) gives a greenish-yellow ppt., which is a lake dye of pure shade and good fastness to light. Similarly lakes are formed from Pb, Ti, Zr, Th, Cu, and Ni. (I) may be replaced by 1 : 2-$CHO{\cdot}C_{10}H_6{\cdot}OH$, 1 : 5 : 2-$CHO{\cdot}C_6H_3Cl{\cdot}OH$, or 1 : 2-$OH{\cdot}C_{10}H_6{\cdot}COPh$ and (II) may be replaced by 1 : 5 : 2-$OH{\cdot}C_6H_3{\cdot}Cl{\cdot}NH_2$, 1 : 2 : 5-$OH{\cdot}C_6H_3(NH_2){\cdot}NEt_2$, or 4 : 1 : 3-$OH{\cdot}C_6H_3Me{\cdot}NH_2$. K. H. S.

Manufacture of dyes. G. W. Johnson. From I. G. Farbenind. A.-G. (B.P. 466,194, 20.11.35).—Dyes are obtained by heating (at 200—250°) diamides or dinitriles of aromatic *o*-dicarboxylic acids, *e.g.*, $C_6H_4(CN)_2$, or mixtures giving these, *e.g.*, *o*-Cl_2- or chlorocyano-compounds with CuCN, and ketones, *e.g.*, benzanthrone (I), benzoin, isatin, benzoquinone, chloranil, Michler's ketone, in presence of condensing agents of the Friedel–Crafts type (in > mol. amount) and, if desired, a diluent, *e.g.*, NO_2- and halogeno-aromatic hydrocarbons, C_5H_5N, alkali halides. The products are useful as pigments, lakes (when sulphonated), and, in certain cases, as vat dyes. Examples are: (I) with *o*-$C_6H_4(CN)_2$ and $AlCl_3$, $FeCl_3$, or $ZnCl_2$ gives a green, olive-green, or bluish-green dye. N. H. H.

Condensation products of anthraquinone series.—See III. **Colouring acetate silk.**—See VI.

V.—FIBRES; TEXTILES; CELLULOSE; PAPER.

Rapid colorimetric determination of fat content of wool. E. K. Zilberkveit and L. A. Vasiliev (J. Appl. Chem. Russ., 1937, **10**, 570—577).—0·5 g. of wool is extracted with 5 ml. of boiling $CHCl_3$ or CH_2Cl_2 for 5 min., the solution filtered, the extraction repeated, and the extracts + washings are diluted to 25 ml. Then 1 ml. of Ac_2O and 10 drops of conc. H_2SO_4 are added to 5 ml. of solution, and the coloration developing after 3 min. is compared (blue filter) with that of a standard [4·5 g. of $K_2Cr_2O_7$ and 762 g. of $Cu(NO_3)_2,3H_2O$ in a litre of solution, the coloration of which corresponds with that given by 0·25% of lanoline in $CHCl_3$]. R. T.

Determination of sulphur in wool. P. Larose and A. S. Tweedie (Canad. J. Res., 1937, **15**, **B**, 65—74).—In the method described, a macro-modification of Pregl's micro-technique is used. The modifications embody a divided O_2 stream, part of which is utilised to prevent back-diffusion of explosive combustion products, and also a new form of H_2O_2 absorption flask. Various cleansing pretreatments of the wool with different org. solvents, and their effect on the S vals., are described. Pretreatment with dil. HCl is shown to be unnecessary, whilst drying in an oven at 105° for 2 hr., instead of conditioning, lowers the S val. by $<0{\cdot}04\%$. The importance of removing nitrates is stressed. Comparison of the S vals. obtained with those given by the Carius and Benedict–Denis methods revealed excellent agreement for a wide range of different wools. S. G. S.

Structure of keratin fibres. W. Harrison (J. Text. Inst., 1937, **28**, P 110—112).—It is suggested that the change from α- to β-keratin may be due to the distortion of a rectangular cell of dimensions 27 × 10·3 × 9·8 A. to a monoclinic cell of the same dimensions with an angle γ of about 42°. A hair may be regarded as a cylindrical tube of network structure filled with solid matter of fibrillar structure, and the properties of permanent set and of supercontraction may be due to changes in the hardness or vol. of the interior substance. A. G.

Structure and elastic properties of silk fibroin. I. Sakurada and Y. Matsushita (J. Soc. Chem. Ind. Japan, 1937, **40**, 58—59B).—Two new spots are reported in the *X*-ray diagram of silk fibroin. One agrees with a point previously found for sericin and the other indicates a period of 2·5*n* A.; it is suggested that this latter may be due to a folded polypeptide chain as it is near the val. 5·1 A. found for α-keratin. A. G.

***X*-Ray diagrams of regenerated silks.** I. Sakurada and Y. Matsushita (J. Soc. Chem. Ind. Japan, 1937, **40**, 59B).—Silk regenerated from solutions in various solvents has an unchanged *X*-ray diagram. A. G.

Gum formation in cotton: probable composition and nature of the causal factor. S. Kasi-

NATHAN (Proc. Soc. Biol. Chem. India, 1936, **1**, 9).—The gums appear to be of bacterial origin. W. O. K.

Present-day problems of the bast fibre-producing industry. M. LÜDTKE (Angew. Chem., 1937, **50**, 291—294).—During warm-H_2O retting of flax the p_H falls at first to 4·60—4·90; later a further fall occurs, corresponding with over-retting. Artificial drying at a relatively high temp. leaves the residual impurities sticky and difficult to remove, and impedes the subsequent straightening of the fibres. Loss of strength during artificial drying is due to loss of elasticity at the high temp. rather than to the action of org. acids. Other retting methods are also discussed. A. G.

Flax studies. W. F. GEDDES (Canad. Dept. Trade Comm. Grain Res. Lab., 8th Ann. Rept., 1934, 31—34).—The same figure for the I val. of the Et_2O extract of finely-ground flaxseed meal was obtained for various methods of drying the meal and of treating the extract. The refractometric method for determining the oil content of flaxseed may be correlated with the Et_2O-extraction method. The extraction of flaxseed pigments is described. The concn. of pigment was considerably reduced by ageing and storing. CH. ABS. (*e*)

Laboratory fractionation of cellulosic materials. T. T. POTTS and F. BRIDGE (Paper-Maker, 1937, **93**, TS 79—80, 91—94).—Chemical fractionation of flax-straw shive and of Spanish esparto by extension of standard methods is shown to yield pectin, lignin, hemicellulose, and cellulose products which are by no means pure. The residual "cellulose" fraction from flax straw, *e.g.*, still contains 13·96% of lignin (original 22·62%) and 5·5% of pentosans (10·81%), whilst that from esparto, although free from lignin (original 17·45%), still contains 7·95% of pentosans (24·06%). Commercially boiled esparto fibre contains about 1·9% of lignin and about 21% of pentosans. Esparto differs from flax-straw shive in not containing uronic groups (naphthoresorcinol test). The resistance of esparto papers to decomp. on ageing may be connected with the strong chemical linking between certain of its constituents. H. A. H.

Chemical composition of wood. W. G. VAN-BECKUM and G. J. RITTER (Paper Trade J., 1937, **104**, TAPPI Sect., 253—254).—A procedure for determining the holocellulose content (total carbohydrate fraction after freeing from extraneous materials) of wood has been devised, in which solvent-extracted sawdust is alternately treated with Cl_2 and a 3% EtOH solution of $NH_2(C_2H_4{\cdot}OH)$. The determination takes >3 hr. The end-point indicating complete lignin removal is sharp, and coincides closely with vals. for lignin obtained gravimetrically. H. A. H.

Analysis and composition of lignified vegetable tissues. Wood from angiosperms and gymnosperms. G. BERTRAND and G. BROOKS (Ann. Off. nat. Combust. liq., 1937, **12**, 8—23; cf. B., 1937, 124).—Tabulated analyses and results of extraction with H_2O, EtOH, and Et_2O are given for various species of angiosperms (*A*), *e.g.*, maple, oak, ash, and beech, and gymnosperms (*G*), *e.g.*, larch and pine. The trunks of *A* yield 15—34% of xylose and those of *G* 22·5—31% of mannose. In general, wood from the branches of both *A* and *G* contains less cellulose, but more ash and glucoside, than does wood from the tree trunks. R. B. C.

Pretreatment of wood with hot dilute acid. Effect on lignin values. W. E. COHEN and E. E. HARRIS (Ind. Eng. Chem. [Anal.], 1937, **9**, 234—235).—In the determination of lignin (I) content of maple wood, pretreatment with boiling 3% aq. H_2SO_4 (to a smaller extent, boiling H_2O) is to be avoided, as some (I) is dissolved. F. N. W.

Effect of pretreating wood in aq. salt solutions on subsequent delignification in sulphite liquor. J. M. CALHOUN and O. MAASS (Canad. J. Res., 1937, **15**, B, 80—83).—Previous work on the effect on delignification of pretreating spruce wood with buffer solutions of varying p_H (B., 1936, 103, 235) is extended to neutral salt solutions, the effect of varying both anions and cations being investigated. The retardation of delignification by any neutral salt depends on the position of the ions of the salt in the Traube lyotropic series, the observed order being the reverse of that for the hydration of the ions, but the same as that for the swelling of gelatin. This suggests that the swelling factor is important. Increase in concn. of the pretreating salt enhances the retarding effect of the salt on delignification. S. G. S.

Pretreatment of wood in aqueous solutions. A. J. COREY, J. M. CALHOUN, and O. MAASS (Canad. J. Res., 1937, **15**, B, 168—185; cf. preceding abstract).—Spruce wood meal was pretreated by heating in buffer solutions (p_H 3—7) for 6 hr. at 100—140°, and finally cooked for 3 hr. at 140° in bisulphite liquor. The pulp yield and the amount of residual lignin increased with rise in the pretreating temp. Pretreating at 140° for 36 hr. at p_H 3 completely delignified the wood, though at a reduced rate of pulping. The formation, during pretreatment, of a lignin-like substance was confirmed. Coagulation of the lignin and its effect on subsequent treatment with bisulphite liquor are discussed. Jack pine behaved similarly to spruce. C. R. H.

Thermodynamics of cellulose nitration. I. Chemical equilibrium of nitration. II. Law of mass action. I. KAGAWA (J. Soc. Chem. Ind. Japan, 1937, **40**, 151—153B, 153B).—I. It is shown theoretically that for all nitrating liquors in equilibrium with a cellulose nitrate (I) of given composition the ratio of the partial v.p. of HNO_3 and H_2O should be the same; data are given to show that this is approx. true.

II. There is a linear relation between the ratio of the partial v.p. of HNO_3 and H_2O in the nitrating mixture and the mol. ratio of $\cdot NO_3$ to $\cdot OH$ in the resulting (I), and therefore (I) can be regarded thermodynamically as an ideal solution of $\cdot NO_3$, $\cdot OH$, and a cellulose residue. It is deduced that the *d* and heat of formation of the (I) should be linearly related to % N, and this is experimentally true. A. G.

Lyophilic properties of cellulose and its derivatives. VIII, IX. Swelling and ζ-potential of cellulose nitrate in organic liquids. K. KANAmaru and S. Ueno. **X—XII. Electrokinetic phenomena at the surface between sols of cellulose derivatives of varying concentration and (X) their dispersion media, (XI, XII) solvent mixtures of varying composition.** K. Kanamaru and T. Kohno (J. Soc. Chem. Ind. Japan, 1937, **40**, 91—102B, 102—110B, 128—137B; cf. B., 1937, 124).—VIII, IX. Measurements are recorded of the ζ-potential and the swelling of cellulose nitrate (13·5% N) in EtOH, Et_2O, C_6H_6, EtOAc, and mixtures of these. In general, the greater is the swelling the greater is ζ, and the parallelism is improved by taking the val., ζ_0, of ζ immediately after immersing the cellulose nitrate. The val. of ζ at first falls rapidly, the more rapidly the higher is its initial val., then rises to a max., and falls asymptotically to its final val., ζ_∞. The fall $(\zeta_0-\zeta_\infty)/\zeta_0$ is probably a measure of the swelling power of the liquid.

X. A measure of the potential at the interface between sols of cellulose nitrate or acetate in $COMe_2$ and pure $COMe_2$ was obtained by allowing a thin stream of the sol to flow through the solvent in an electrical field and measuring the deflexion. The potentials fell with increasing concn. of the sols, and passed through zero at concns. which (for the nitrates) were the higher the lower was the η of the nitrate. Measurements of η showed that at these concns. the whole of the solvent was immobilised by the solute. Sols of nitrate were negative and those of acetate positive.

XI, XII. Measurements are recorded of the charges on the surface of streaming solutions of cellulose derivatives (cellulose nitrate and benzylcellulose) falling through solvent mixtures, and of the solvent powers of these mixtures as determined by the vol. of light petroleum which produces a permanent cloudiness when added to a 3% solution of the cellulose derivative in the solvent mixture. When the concn. of the cellulose derivative in the streaming solution is > that at which recharging of the sol begins, then the charge on the surface and the solvent power of the solvent mixture are symbatic. At lower concns. of the cellulose derivative the relation is more complex. A. G.

Yellowing of celluloid in light. P. Trevy (Rev. gén. mat. plast., 1937, **13**, 60—63, 131—133).—Yellowing of celluloid films on exposure to light is associated with changes in physical and chemical properties, such as permeability to H_2O, and varies according to the λ of the light, being most intense at 3000—3500 A. The phenomenon is entirely superficial. The influence of impurities in the nitrating mixture, the nitrocellulose, and the plasticisers, and of the purity of the cellulose and H_2O, the temp. of nitration, etc. is examined. F. McK.

Effect of temperature and amount of acetic anhydride on rate of acetylation of cellulose as fibrous material. I. Sakurada and Y. Tokuno (J. Soc. Chem. Ind. Japan, 1937, **40**, 77—79B).—The rate of acetylation at 15°, 25°, and 40° is expressed by $x = kz^m$, where x is the equiv. of combined AcOH per $C_6H_{10}O_5$, z the time, and k and m are consts. k increases rapidly with rising temp., but m (0·26—0·31) only slightly. The heat of activation is about 15 kg.-cal. and is independent of the degree of acetylation. The rate is unaffected by the amount of Ac_2O, but is greatly affected by that of H_2SO_4; it is therefore probably controlled by the amount of the compound of these two substances. A. G.

Influence of external form and of pretreatment of the fibre on rate of acetylation of fibrous material. I. Sakurada and Y. Tokuno (J. Soc. Chem. Ind. Japan, 1937, **40**, 79—80B).—Cotton paper, loose cotton, and linters in the form of pasteboard acetylate at about the same rate, though the last reacts slowly at first. Ramie reacts more rapidly after mercerisation, but not after chemicking. Undried, mercerised cellulose reacts much more rapidly than normally mercerised or unmercerised cellulose. The activity of rayon increases greatly with decreasing filament denier. A. G.

Fibrous, acetone-soluble acetylcellulose. I. *X*-Ray diagram and mechanical properties of the film. I. Sakurada and I. Watanabe (J. Soc. Chem. Ind. Japan, 1937, **40**, 60—61B).—Fibrous, $COMe_2$-sol. acetylcellulose contains 58·5±1·5% of AcOH and gives the *X*-ray diagram of triacetylcellulose; in spite of its high content of AcOH it yields films of a strength and extensibility = that of Cellite. A. G.

***X*-Ray study of the action of acetone and acetic acid on acetylcellulose.** I. Sakurada and Y. Matsushita (J. Soc. Chem. Ind. Japan, 1937, **40**, 61—63B).—When fibrous triacetylcellulose (I) and fibrous, $COMe_2$-sol. acetylcellulose (II) are swollen with $COMe_2$ liquid or vapour the *X*-ray diagram of swollen (I) is obtained, showing that in neither case is the structure easily destroyed. After swelling with AcOH, only the interference of this is obtained. Films from the fibrous (II) give much sharper diagrams than those from the commercial product. A. G.

Cellulose ethers: availability and use in time of national emergency. J. Craik (Chem. and Ind., 1937, 565—566).—Benzylcellulose can be used for the manufacture of acid- and alkali-resistant lacquers, of moulding powders, of H_2O-resistant films, and of bookcloth. In time of emergency it could replace cellulose nitrate for some purposes, but the PhMe required for its manufacture might not be available. Ethylcellulose is more sol. and less H_2O-resistant, but the raw materials for its manufacture should be available; it could be used for celluloid, for lacquers, and for insulating materials. A. G.

Viscosity of ethylcellulose. N. Legrain (Rev. gén. mat. plast., 1937, **13**, 123, 125—129).—The influence of acids, bases, and H_2O on the lowering of η of ethylcellulose has been examined. The best results were obtained in an acid medium. F. McK.

Benzylcellulose. I. H. Saegusa and Y. Nakayama (J. Soc. Chem. Ind. Japan, 1937, **40**, 63—64B).—Increasing the concn. of aq. NaOH used for steeping cotton linters prior to benzylating resulted in a lower η, but the properties of the product were always good. Raising the benzylating temp. increased the η, the best temp. being 100—110°. The amount of CH_2PhCl should be >10 times the wt. of cellulose; addition of

C_5H_5N, NH_2Ph, CCl_4, NH_4SCN, $CH_2Ph{\cdot}OH$, or Ag_2O resulted in no marked improvement. A. G.

Viscose. LXXI, LXXII. Spinning experiments with viscose from alkali-cellulose prepared with caustic soda containing sodium sulphide. S. Suehiro, S. Kobinata, M. Yamaguchi, and H. Ishikawa (J. Soc. Chem. Ind. Japan, 1937, **40**, 43—44B, 44B).—LXXI. Addition of Na_2S shortens the ageing time and improves the quality of the fibre, especially when spinning into 60% H_2SO_4.

LXXII. When spinning into a bath containing H_2SO_4, Na_2SO_4 and $ZnSO_4$, the use of 4% Na_2S resulted in inferior fibre, but smaller amounts were sometimes beneficial. A. G.

Microscopical detection of viscose silk mixed with cotton and other textile fibres. Anon. (Boll. Staz. sperim. Ind. Carta Fibre Tess., 1937, **32**, 89—90).—The fibre, after immersion in 6% NaOH for 1 min., is treated with a solution of a direct dye and observed under the microscope. Viscose silk is swollen and evenly dyed with marked longitudinal striations. Cotton, even if mercerised, is almost unattacked. Hemp may be dyed, but always unevenly. Cuprammonium silk is dyed like viscose, but is less swollen and lacks the striations. Approx. determination of the viscose content of mixed textiles is possible. The method is not applicable to textiles which have received an anti-crease treatment, owing to the impermeability of the resin, but provides a means of controlling this process. L. A. O'N.

Determination of cellulose wool in spun or woven mixtures. O. Viertel (Mitt. Materialprüf., 1937, **21**, 333).—Cellulose acetate, in mixtures with cotton or wool in yarn or fabrics, may be determined by straightforward dissolution in $COMe_2$. Viscose or cuprammonium cellulose, mixed with cotton, wool, or natural silk, is best dissolved by steaming at 70° with $Ca(CNS)_2$ solution (d 1·35). For mixtures of these with wool only, careful treatment with 2% NaOH for 10 min. gives fairly accurate results, only small quantities of the cellulose constituents being dissolved. Alternatively, carbonisation with $AlCl_3$ is a satisfactory method. D. A. C.

Mulberry tree as a paper material. R. Sansone (Paper Ind., 1937, **19**, 64—66).—Mechanical methods of separating fibrous material from twigs and bark of the mulberry tree are described. Boiling with Na_2CO_3 and then with NaOH, followed by bleaching with NaOCl, produces white pulp of very satisfactory strength. H. A. H.

Lignin from different tree species. E. Wedekind (Papier-Fabr., 1937, **35**, 141—142).—The different tree species may be divided into two lignin-producing groups, viz., spruce, pine, and aspen, the lignin from which has 14—16% OMe and 64·5—65·5% C, and beech, ash, oak, larch, and service tree (*Sorbus terminalis*), the lignin from which contains 19—21% OMe and 61·0—62·5% C. Although similarity in chemical behaviour has not been confirmed between the individual species in the second group, both beech and *Sorbus* yield a substance which produces a violet coloration by addition of MeOH–HCl, and has 28% OMe; its mol. wt. in molten camphor is 1100—1160, and it has been identified with aglucone, which forms a violet dye by warming with MeOH–HCl. D. A. C.

Extraction of ligninsulphonic acid from sulphite-cellulose by means of methyl alcohol. C. Kullgren (Svensk Kem. Tidskr., 1937, **49**, 65—75).—Extraction with HCl–MeOH of varying concn. shows that ligninsulphuric acid (I) is approx. 0·5N in the fibre phase (cf. Du Rietz, B., 1937, 534). The rate of extraction is given by $dx/dt = K(A - x)^3$, in agreement with theory. If Na-sulphite-cellulose is extracted, no dissolution takes place. Methylation of (I) takes place only at the moment of dissolution, and it is concluded that (I) is glucosidically linked in the original lignin. M. H. M. A.

Effect of wood quality on sulphite pulp. V. P. Edwardes (Paper Trade J., 1937, **104**, TAPPI Sect., 98—99).—Sulphite pulp quality is affected much more by the quality of the wood used than by any other single variable which occurs during the commercial cooking process. H. A. H.

Artificial stones for different kinds of groundwood pulp. R. I. Wynne-Roberts (Paper Mill, 1937, **60**, May 22, 17—18, 20).—The influence of different types of stone texture and burr design, of variation in stone hardness, and of power consumption on the freeness and strength properties of mechanical pulp made from different kinds of pulp wood is discussed. In particular, special conditions necessary for satisfactorily grinding Southern pine are outlined. H. A. H.

Technical control in a groundwood [pulp] mill. R. D. Moynihan (Paper Ind., 1937, **18**, 1061—1063).—Various grinding, screening, and other factors are discussed. H. A. H.

Running of [paper mill] beaters. A. B. Green (Paper Ind., 1937, **18**, 930—936; **19**, 52—58).—Charts are given to show the different strength, freeness, and other characteristics of beaten pulp at different beater-roll settings. Practical examples of the val. of automatic beater control are given. H. A. H.

Later mill practice in dewatering and drying of [wood] pulps. R. D. Kehoe (Paper Trade J., 1937, **104**, 24 June, 32, 34, 36, 39).—Current practice in producing dry chemical pulp, involving the use of smooth feltless Kamyr presses and the Flakt hot-air drying process, is described. H. A. H.

Factors influencing drainage through Fourdrinier [paper-machine] wires. H. Specht (Paper Trade J., 1937, **104**, TAPPI Sect., 92—95).—From drainage tests with the Schopper–Riegler wetness apparatus, using 27 kinds of paper-machine wire mesh and a wide variety of paper-pulp furnishes, it is concluded that drainage rate is at a max. at about p_H 5·3, higher p_H vals. in particular slowing down the rate. In general, drainage rate is affected by temp. according to changes in η of H_2O alone. Variations in the rate with different kinds of wire mesh are also indicated. H. A. H.

Vortex beater [for paper pulp]. D. B. Wicker (Paper Trade J., 1937, **104**, TAPPI Sect., 305—311).—The equipment is described, and its practical advantages as a compact, enclosed, and efficient integral unit are pointed out. Large-scale beating tests comparing the action of the Vortex beater (with both steel and stone fillings) with that of a hollander (steel knives and granite bedplate) are presented. Comparative strength, freeness, hydration rate, and power-consumption figures are given. H. A. H.

Continuous causticising system at Crossett [pulp and] paper mills. F. J. Lammers (Paper Trade J., 1937, **104**, TAPPI Sect., 293—296).—The various processes and plant for the continuous manufacture of cooking liquor for kraft pulp are described. Unusual features are stressed. H. A. H.

Utilisation of kraft lime mud for preparation of bisulphite cooking liquor [for wood pulp manufacture]. O. Kress and E. H. Williams (Paper Trade J., 1937, **104**, TAPPI Sect., 276—277).—$Ca(HSO_3)_2$ prepared by absorption of SO_2 by the CaO-mud residue from kraft pulp manufacture produces sulphite pulp comparable in strength, bleachability, chemical properties (α-cellulose, lignin, and 1% NaOH solubility), and dye absorption with that produced from normal cooking liquor. Estimated savings in pulp production costs are given. H. A. H.

Simplified method for analysis of bisulphite [pulp] cooking liquor. D. T. Jackson and J. L. Parsons (Paper Trade J., 1937, **104**, TAPPI Sect., 99—100).—$NaClO_2$ is a satisfactory reagent for the volumetric analysis of bisulphite cooking liquor. Good agreement with the iodate method of Palmrose (B., 1935, 490) is claimed, and other advantages are discussed. H. A. H.

Pectins in sulphite pulp. O. Wurtz (Papier-Fabr., 1937, **35**, 185—187).—The intensity of stain produced on sulphite pulp with Ru-red and malachite-green is partly dependent on the cooking degree of the pulp; in the case of Ru-red this is attributed to accompanying variations in the pectin content of the pulp, since neither lignin nor EtOH–C_6H_6 extracts are coloured. The influence of pectins in imparting parchmentising properties to pulp on beating is indicated by the absence of these properties in bleached pectin-free cotton pulp, which gave very little coloration with Ru-red. Pectinous substances were removed from easy-beating bleached sulphite pulp by prolonged digestion in 2% HCl at room temp. and subsequent extraction with H_2O, simultaneously with the Ru-red staining power. D. A. C.

Concentration and filtration in the pulp and paper industry. R. J. Venn (Paper Maker, 1937, Internat. No., 50, 52, 54, 56, 58, 60, 82).—The rotary vac. filter is discussed in relation to its use for removing traces of cooking liquor from chemical wood pulp and from esparto, for washing bleached pulp, for thickening all classes of pulp, for removing fibre from recoverable backwater, and for filtration of CaO mud. Sedimentation methods of thickening and clarifying pulp stock and effluents are also referred to. H. A. H.

Rapid determination of the viscosity of cuprammonium solutions of pulps. F. Schütz, W. Klauditz, and P. Winterfeld (Papier-Fabr., 1937, **35**, 117—121).—A cuprammonium solution containing 8 g. of Cu per litre in 15% aq. NH_3 is used. 0·4 g. (bone-dry equiv.) of pulp is weighed out into a special flask, which is then filled completely with the solution so as to exclude all air. The flask is of such capacity that a 1% pulp solution is obtained. Dissolution is effected in 15 min. by rotating the flask, mounted in a sheath to exclude light, on a motor-driven disc, and the liquid is stirred by steel pebbles placed in the flask. The η is then determined at 20° with an Ost–Ostwald viscosimeter from which light is also excluded by placing in a thermostat filled with a red dye solution. The overall accuracy of the method is stated to be ±2% provided the prescribed manipulative details are accurately adhered to; a determination occupies 35 min. Addition of 0·05% of $Na_2S_2O_3$ to the Cu–NH_3 solution will give results comparable with those obtained by working under N_2. D. A. C.

Viscosity of cuprammonium solutions. F. Barber and J. E. Minor (Paper Ind., 1937, **19**, 60—62).—Erratic duplication of η determinations with hard unbleached rag stock by the capillary method is due to the difficulty of effecting complete dissolution of the cellulose at 1% concn. From tests correlating η at ½% and 1% concn., it is proposed that tests with such pulps should be carried out at ½%, the results then being computed in terms of 1% concn., so as to be in line with tests on more normal pulps. Advantages of this method over the TAPPI method advocating a restricted capillary length for solutions of high η are indicated. H. A. H.

Standard method for determining pulp strength. Memo. No. 101, Strength Testing Commee. [of the Verein der Zellstoff- u. Papier-Chemiker u. -Ingenieure (Papier-Fabr., 1937, **35**, 109—115, 121—124, 129—131).—A historical review of the development of the German standard method of pulp evaluation, using the Jokro beater and the Rapid-Köthen sheet machine. For the unbeaten test, the British standard disintegrator is adopted. It is suggested, as a contribution to international standardisation, that sheets made with the British or Swedish sheet machines should be couched on cardboard and dried in the Rapid-Köthen dryer. Results obtained thus showed satisfactory agreement with the German method. D. A. C.

Interpretation of [wood] pulp [evaluation] tests. J. d'A. Clark (Paper Trade J., 1937, **104**, TAPPI Sect., 118—120).—The importance of the very fine fibre fraction, which is lost during the usual methods of pulp evaluation for freeness and strength, and its marked effect on both these properties, are discussed. The satisfactory correlation of various types of freeness tester is on this account considered impossible. The sp. vol. of paper test-sheets is held to be an important feature and one which leads to a better understanding of true pulp qualities than many of the usually recorded pulp-evaluation criteria. H. A. H.

Development of pulp-strength testing. G. Jayme (Papier-Fabr., 1937, **35**, 193—197).—A historical review of the development of methods of pulp evaluation. The main features of the more widely used methods are tabulated, and typical curves showing the change in physical properties on beating various types of pulps are given. D. A. C.

Significance of water [in the pulp and paper industry]. H. J. Skinner (Paper Trade J., 1937, **104**, TAPPI Sect., 179—184).—Numerous factors affecting the suitability of H_2O for the various pulp- and paper-making operations are discussed. H. A. H.

Water purification to meet paper-mill requirements. A. S. Behrman (Paper Trade J., 1937, **104**, TAPPI Sect., 114—118).—Methods of removing various impurities from H_2O required for paper-making are discussed. H. A. H.

Defects in papermaking felts. H. Mendrzyk (Papier-Fabr., 1937, **35**, 125—128).—Defects commonly encountered in woollen paper machine felts, arising both from defects inherent in the fibres as well as from damaging conditions of manufacture and use, are described. The extent of alkali damage may be estimated by Allwörden's Cl_2–H_2O reaction, producing blisters on sound fibres only, or by $ZnCl_2$, which colours the damaged portions brown. The extent of acid attack is shown by the formation of bubbles on the fibres after treatment for 1·5—3 min. with ammoniacal KOH. D. A. C.

Automatic control of paper drying. J. Strachan (Paper-Maker, 1937, **93**, TS 65—67).—The deleterious effects of over-drying are enumerated and factors affecting variation in moisture content briefly reviewed. The Dirks apparatus for automatically controlling moisture content, which depends for its operation on the variation of static electricity with % of moisture in the paper, is discussed. H. A. H.

Influence of air on [machine] drying [of paper]. A. E. Montgomery (Paper Trade J., 1937, **104**, 3 June, 30—31).—The influence of air on evenness of drying, on drying rate, and on steam economy is discussed in relation to paper-machine operating conditions. H. A. H.

Use of sodium silicate as sizing agent and improver in papermaking. F. Freeth (Paper-Maker, 1937, **93**, TS 63—64, TS 69—70).—Factors affecting the efficiency of Na silicate when used in conjunction with size and alum for sizing paper pulp are discussed, and numerous advantages are claimed. The applications of Na metasilicate as a cleansing agent in paper mills are also referred to. H. A. H.

Use of enzymes in the preparation of paper coatings. R. A. Diehm (Paper Trade J., 1937, **104**, TAPPI Sect., 213—214).—The partial hydrolysis of starch and of casein by means of enzymes is discussed in relation to the adhesive strength and binding power of paper coating materials. A mixture of 90% of unhydrolysed and 10% of completely hydrolysed casein shows a very high adhesive strength, in spite of the low adhesive power of the hydrolysed portion. This is attributed to the more complete envelopment of the clay or other loading particles by the NH_2-acids and peptones produced, and the consequent closer binding of loading and casein. H. A. H.

Test for tearing-resistance [of paper]. M. Winterbottom and J. E. Minor (Paper Ind., 1937, **18**, 928—930).—The TAPPI method is criticised on the grounds of permitting too wide tolerance in the no. of sheets to be torn at one time so as to obtain instrument readings of 20—40 units. It is suggested that all tests should be made on single sheets except in those cases where such vals. are too low to be accurately recorded. Bond papers increase in strength by 10% when the R.H. is increased from 50 to 65%, and tag and index papers are even more sensitive. H. A. H.

Optical characteristics of paper. III. Opacifying power of fibres and fillers. F. A. Steele (Paper Trade J., 1937, **104**, TAPPI Sect., 129—130; cf. B., 1935, 1136).—Previous adaptations of the Kubelka–Munk equations (B., 1935, 490) can be used to determine the individual contribution of the components of paper to its opacity. The relative opacifying powers of various fibres and fillers are presented. H. A. H.

Alkali-staining property of paper. Anon. (Paper Trade J., 1937, **104**, TAPPI Sect., 254).—Details are given of the TAPPI tentative standard method of comparing the colour formed on adding NaOH to an aq. extract of the paper with those of a range of standards produced by mixing $K_2Cr_2O_7$ and Congo-red. Vals. are reported as the "alkali-staining no." of the paper. H. A. H.

Improved methods for the examination of paper. H. N. Lee (Tech. Studies Field Fine Arts, 1935, **4**, 93—106).—Colour reactions of various types of fibre with a mixture of saturated aq. $CaCl_2$ (5), H_2O (10), and 2% aq. KI saturated with I (4 vols.) are described. A solution of 10 g. of KI and 10 g. of I in 5 c.c. of H_2O also serves to differentiate various fibres. A method of sectioning is described. Tests are given for rosin, starch, loading materials, glue, casein, and formogelatin. Ch. Abs. (e)

New optical instruments for paper testing and fibre examination. O. Neese (Papier-Fabr., 1937, **35**, 177—178).—Some recent Zeiss instruments are described. D. A. C.

Instrumentation studies. XIII. Adaptability of the G[eneral] E[lectric] reflexion meter as a colour analyser [for paper]. XIV. Comparison of the Smith–Taber and the Gurley stiffness testers [for paper]. XV. Comparison of the Carter and Gurley stiffness testers. XVI. Correlation between degree of sizing [of paper] as determined by the Valley, TAPPI, and Currier methods. Inst. Paper Chem. (Paper Trade J., 1937, **104**, TAPPI Sect., 245—251, 255—267, 271—275, 287—291, 297—299, 303—304; cf. B., 1937, 657).—XIII. By substituting colour filters for the standard brightness filter, the accuracy, sensitivity, range, reproducibility, and applicability of the "G.E." reflexion meter as a colour analysing instrument have been determined on a range of papers having wide variations of colour and surface characteristics, as well as on coloured glasses and cellulose films. The resulting colour curves are compared with those obtained by the Hardy colour analyser. Correlation of the unmodified instruments is unsatisfactory, but the introduction of a special auxiliary heat filter into the reflexion meter decreases the discrepancies so that agreement to within about 5% is attained, except in the case of deep red papers. The causes of the various discrepancies are discussed. They are shown to be due in part to a new kind of infra-red fluorescence radiation excited in the "G.E." instrument by visible light passing the ordinary heat filter installed. The theory and measurement of this infra-red fluorescence are described. The reflexion meter affords a good objective means for the standardisation of colour in the paper industry, but for complete colour analysis a spectrophotometer of the Hardy type is necessary.

XIV. The design, accuracy, sensitivity, and reproducibility of the two instruments are compared. Interconversion of stiffness readings is possible.

XV. The design, accuracy, sensitivity, and reproducibility of the two instruments are compared. Satisfactory calibration curves have been constructed from data obtained on a variety of papers tested in both the machine and cross directions.

XVI. Fairly good correlation between the TAPPI and Currier methods of measuring resistance to H_2O penetration was obtained on a variety of papers, but lack of agreement between these two methods and the Valley method, and even more with the ink-flotation method, was observed. The need for more completely studying the measurement of aq. penetration of paper is emphasised. H. A. H.

Photo-electric measurement of opacity and brightness [of paper]. T. H. Farebrother (Paper-Maker, 1937, **94**, ts 104—112).—Ten instruments for measuring the opacity and brightness of paper are briefly reviewed, and practical considerations with a few of them are discussed. These include, in particular, accuracy of repetition with both one and two observers when measuring contrast ratio with the Bausch and Lomb opacimeter. The concept of "sp. opacity" is developed as a means of measuring opacity at, or correcting it to, a specified wt. and for fixed R.H. conditions. H. A. H.

Charging of paper with electricity. W. Brecht, F. Schmid, and R. Vieweg (Papier-Fabr., 1937, **35**, 133—140, 142—148, 149—159).—Factors producing a static charge (V) on paper were investigated by rubbing it under controlled conditions (apparatus described) with "Chevreaux" leather, V being measured by means of an electrometer. The R.H. of the surrounding atm. is the main factor governing both the induction and retention of V on paper, the cause being ascribed to the surface absorption of H_2O forming a conducting "skin." The H_2O content of the paper, when it has free access to the atm., is relatively unimportant in producing V, but the retention of V in reeled or stacked paper is governed entirely by its H_2O content since it is this factor which controls the R.H. of the immediately surrounding atm. On a fast "news" paper machine, V was absent from the dryers, but appeared first at the "sweat cylinders," which is ascribed to the low R.H. (45%) at this point. Max. V was noted after the machine calender, but was considerably reduced both before and after the pope reel. The abs. H_2O content of the air has little effect on V, which, however, can be reduced if H_2O mist is present. No V was produced by the process of H_2O evaporation during drying. Filler content, sizing degree, thickness and finish of the paper, and the nature and wetness of the half-stuff govern the production of V mainly to the extent to which they affect the equilibrium H_2O content of the paper; in themselves, however, they are relatively unimportant factors. Addition of 2·8% of NaCl to the paper reduced V to zero; this was due to its high degree of dissociation and not to its hygroscopic nature. D. A. C.

Detection of tannin in dyed or printed papers. F. Burgstaller (Papier-Fabr., 1937, **35**, 128—129).—5—10 g. of the paper are extracted with hot EtOH, filtered, and the filtrate conc. to about 10 c.c. It is then treated on the water-bath with an equal vol. of aq. 0·5% $TiCl_3$ when an orange ppt. of the tannate is formed. If the paper is sized the resin pptd. with the tannate on addition of the $TiCl_3$ is removed with 70% EtOH. The results are unaffected by the presence of either carbohydrates or dyestuffs which are not easily reduced. D. A. C.

Manufacture of packing sheet [containing rubber]. W. Esch (Gummi-Ztg., 1937, **51**, 547—548).—A description is given of the method of production and the composition of asbestos-filled unvulcanised packing sheet for high-pressure use and of vulcanised material to resist H_2O, oils, acids, etc. D. F. T.

Preservation of records. A. E. Kimberly and B. W. Scribner (U.S. Bur. Stand. Misc. Publ. M154, Mar., 1937, 28 pp.).—Storage conditions in variously situated libraries, the effects on paper of light and SO_2 pollution of the air, and damage arising from the presence of dust and excess of H_2O in the air due to inadequate ventilation are surveyed. In a study of old papers, those having the highest α-cellulose contents, whether rag or wood, were the most permanent, and excess of both alum and resin seemed to be followed by marked deterioration; writing ink containing HCl, $FeSO_4$, gallic and tannic acids accelerated the ageing of paper, and a harmless ink prepared from NH_4 "oxyferrigallate" is recommended. Motion-picture reproduction of records on cellulose acetate films is satisfactory if they are used and stored properly; in addition, the coating of records with cellulose acetate foil shows promise both as regards permanency and because it does not appreciably increase storage space. Recommended practices are recapitulated, the optimum atm. conditions for storage being given as 45—55% R.H. and 21—27°. D. A. C.

Wood. Flow of dil. suspensions.—See I. **Textiles from glass.**—See VIII. **Sampling wood for analysis.**—See IX. **Fibre-cored colliery ropes.**—See X. **Ultra-violet fluorescence lamp for textiles etc.**—See XI. **Sulphite waste lye powder in detergents etc.**—See XII. **Dissolution of cellulose derivatives. Measuring diffusion consts. Printing ink.**—See XIII. **Sulphite-cellulose extracts for tanning. Soya-bean meal as adhesive.**—See XV. **Wool from merino sheep. Flax.**—See XVI. **Utilising bagasse.**—See XVII.

See also A., II, 277, **White oak cellulose.** 278, **Decomp. of cellulose esters and ethers with Na. Nitration of cellulose. Cellulose acetates and celluloses. η of solutions of cellite in AcOH. Prep. of cellulose acetates.** 296—7, **Lignin and related compounds.**

PATENTS.

Fibre liberation and fibrilised products thereof. A. C. WHITFORD, Assr. to J. W. ALLEN, E. E. KENT, and H. W. PACKER (U.S.P. 2,048,719, 28.7.36. Appl., 29.6.32. Renewed 21.8.35).—Plant fibres containing ligneous lamellæ around the ultimate cells are boiled to split the fibre bundles, in the open air, in liquor containing dispersed hydrophilic neutral soap 0·2—0·5, Na_2CO_3 0·5, and Na_2SO_3 0·5%. B. M. V.

Thread and/or fabric [from rayon]. J. I. TAYLOR, Assr. to NORTH AMERICAN RAYON CORP. (U.S.P. 2,042,437, 26.5.36. Appl., 26.2.35).—Rayon filaments emerging from the spinnerets are twisted into threads which are roughened to break some of the filaments, several of these threads are twisted together by applying a twist in the opposite direction to that first applied, and the resulting thicker threads are passed through dil. aq. NaOH, then through a 2·5% aq. suspension of stearic acid or a sulphonated fatty alcohol, and finally through a rubber emulsion. After drying, the rubberised threads are vulcanised in the usual way. A. R. P.

Manufacture of artificial silk and by-product recovery therefrom. A. J. L. MORITZ and J. J. SCHILTHUIS, Assrs. to AMER. ENKA CORP. (U.S.P. 2,042,016, 26.5.36. Appl., 26.12.34).—Freshly spun packages of viscose artificial silk are washed with an aq. solution to eliminate impurities and CS_2; the charged solution is removed and freed under vac. from CS_2, which is purified for re-use. F. R. E.

Manufacture of films, foils, ribbons, and like products. BRIT. CELANESE, LTD., J. H. ROONEY, and P. R. HAWTIN (B.P. 463,567, 3.10.35).—A solution of an ester or ether of cellulose in a volatile solvent is extruded on to an endless band while a liquid compatible with the cellulose derivative, *e.g.*, a solution of a plasticiser in this solvent, is continuously applied, *e.g.*, by a pad, at a point before the film–band junction in order to prevent air being drawn in at the angle of contact. F. R. E.

Manufacture of saturated fibrous products. I. J. NOVAK, Assr. to RAYBESTOS–MANHATTAN, INC. (U.S.P. 2,049,469, 4.8.36. Appl., 16.8.33).—Wet aq. pulp in the form of a web from a papermaking machine is treated with the desired saturant (I) (a waterproofing agent or the like) on both sides until the fibres are distended, but the web as a whole is preserved by sandwiching between two wire screens or the like. A predetermined quantity of H_2O and (I) is gently pressed out by a roller taking the place of one of the screens, and immediately afterwards the web is passed into a pool of (I) and the swelling and pressing are repeated. B. M. V.

[Gummed] label [for application to hydrophobes]. J. E. SNYDER, Assr. to DU PONT CELLOPHANE CO., INC. (U.S.P. 2,046,492, 7.7.36. Appl., 3.2.32).—To the aq. adhesive of a label intended for application to Cellophane (I) or the like is added a solvent (*A*) for (I) which is also a softener (*B*) for the adhesive; if desired, the *A* and *B* functions may be effected by separate substances. Examples claimed are, for *A*, di- or tri-ethylene glycol, glycerol monochlorohydrin, diacetin; for *B*, $2\text{-}C_{10}H_7\cdot SO_3Na$, *p*-$C_6H_4Me\cdot SO_2\cdot NH_2$, guanidine thiocyanate, triphenylguanidine, *m*-$C_6H_3Me(NH_2)_2$, $Na_2C_2O_4$, Na_2S_2. B. M. V.

Production of joined fibrous-bodied article. E. C. SLOAN, Assr. to J. B. HAWLEY (U.S.P. 2,041,974, 26.5.36. Appl., 19.5.34. Cf. U.S.P. 2,013,865 and 7; B., 1936, 928).—Fibrous sheets are coated with a vinyl resin, either as a solid or as a solution in, *e.g.*, $COMe_2$ (in which case the solvent is removed), and after assembling to a required shape are fixed by heat and pressure. Veneers and decorative effects also coated with the resin may be applied and cemented on the article during heat-pressing. The resin coating may be pigmented. R. J. W. R.

Pressure-inversion process of making hard board products. W. H. MASON and C. H. WESTPHALEN, Assrs. to MASONITE CORP. (U.S.P. 2,046,750, 7.7.36. Appl., 12.4.34).—Lignocellulose fibres containing enough non-cellulosic material to produce thorough bonding and $\not<25\%$ ($>50\%$) of H_2O are hot-pressed (with wire-mesh between the fibre and the platen) at a very high pressure (400—500 lb./sq. in.) initially, which is reduced as the drying progresses but never drops below 60 lb. per sq. in. The temp. of the press is $>220°$ (230—275°). B. M. V.

Formation and use of staple products from continuous filaments. BRIT. CELANESE, LTD., and H. DREYFUS (B.P. 463,485, 30.9.35. Addn. to B.P. 424,830).

Mixing fibrous material with liquid. Producing cold-flow.—See I. **Vanillin.**—See III. **Improving textiles.**—See VI. **Cellulose derivative compositions.**—See XIII. **Butadiene derivatives.**—See XIV.

VI.—BLEACHING; DYEING; PRINTING; FINISHING.

Co-operation between the textile and laundry industries. F. C. HARWOOD (J. Text. Inst., 1937, 28, P124—129).—An account of the work of the British Launderers' Research Association and of recommended laundering processes. A. G.

Wetting agents in textile processing. I. D. R. DHINGRA, I. S. UPPAL, and K. VENKATARAMAN (J. Soc. Dyers & Col., 1937, 53, 91—100).—*Na oleanilide*-p-, *Na oleo-α-naphthylamide*-4-, *Na oleomethylanilide*-p-, *Na ricinoleanilide*-p-, *Na ricinoleo-α-naphthylamide*-4-, and *Na ricinoleomethylanilide*-p-*sulphonate* are prepared and determinations made of their interfacial tension (kerosene–H_2O at 33°), wetting power, protective action towards colloidal Au, resistance to hard H_2O, application in kier-boiling, and effect on absorption of substantive dyes. A. W. B.

Mordanting silk with chromium salts. VII, VIII. K. HISHIYAMA (J. Soc. Chem. Ind. Japan, 1937, **40**, 86—89B; cf. B., 1936, 638).—The amounts of $CrCl_3$ and $Cr_2Cl_5(OH)$ absorbed by silk are increased by addition of Na_2SO_4, but solutions of $Cr_2Cl_4(OH)_2$ and $Cr_2Cl_3(OH)_3$ become turbid and no absorption occurs; the absorption of normal or basic sulphates increases to a max., but diminishes with further addition of Na_2SO_4. NaCl increases the absorption of the chlorides, but diminishes that of the sulphates. A. G.

Micellar structure of rayon in relation to dyeing. Newly developed theories in scouring and dyeing. H. H. Mosher (Rayon Text. Month., 1937, **18**, 305—306, 385—388).—The most even results are obtained in the dyeing of rayon by using the highest temp. and the greatest alkalinity that are practicable. Some modern dyeing assistants are substantive to the fibre and help to impart a desirable flexibility and softness. A. G.

Colour deviation in piece-dyed rayon fabrics. I. J. Saxl (Rayon Text. Month., 1937, **18**, 325—326, 383—384).—Such colour variations are frequently due to over-stretching of the rayon yarns. A. G.

Finishing of woollen hosiery material. H. James (Rayon Text. Month., 1937, **18**, 235—236, 287, 388—389).—Most woollen hosiery material is finished by some form of hot-pressing, and when this is carried out on dry fabric the H_2O regain of the wool is lowered; this results in wool being sold in place of the less expensive H_2O. A. G.

Permanent sizing with alkali-soluble cellulose ethers. W. P. Cohoe (Chem. and Ind., 1937, 381—387).—Cotton cloth may be sized on ordinary padding machinery with solutions of alkali-sol. cellulose ethers in aq. NaOH. Up to 200% of talc or 400% of china clay may be added to the ether, and this may also be applied as a froth made by heating with the addition of soap. The size may be fixed with acid or salt solutions, or by drying and then washing out the NaOH. When applied as a froth a high concn. of ether may be used without imparting a stiff or boardy handle. The finishes thus obtained are equal to those provided by regenerated celluloses. The cloth has a smooth and lustrous appearance, an improved handle, and increased strength and resistance to abrasion. The finish is permanent to laundering and wear and does not yellow. A. G.

Effect of regain on rate of adsorption of stannic chloride by silk fibroin. G. V. Jansen and E. H. Smith (Canad. J. Res., 1937, **15**, **B**, 53—64).—The uptake in a given time of $SnCl_4$ (I) by fibroin varies with the moisture content of the silk. Saturated silk ($>$ 30% of moisture) attains max. adsorption at a greater rate than dry silk, whilst between these two extremes a min. rate of adsorption exists at of 10—23% of moisture. The appearance of this min. is explained as being due to a catalytic effect of the H_2O on the adsorption of (I) mols. which are deposited in the outer pore spaces and resist inward diffusion until the silk has reached its max. swelling. The higher rate of adsorption of weighting material by H_2O-saturated fibroin, over dry silk, is explained in terms of the higher rate of inter-micellar swelling of the former; *e.g.*, silk gut is shown to increase in diameter by 20% in 6 hr. when placed in H_2O at room temp., whereas in (I) solution the same degree of swelling requires 72 hr. The average diameter of the pore spaces in fibroin is < 6 A., whilst that of (I) calc. from its parachor is $\sim 6{\cdot}5$ A. Hence the rate of swelling profoundly affects the rate of adsorption of (I) mols. The final weighting of silk is caused by Sn complexes resulting from hydrolysis of the adsorbed (I); the effects of temp. and of additions of inorg. Cl' and SO_4'' to the weighting bath are investigated. S. G. S.

Determination of copper and manganese in textiles. Anon. (Chem.-Ztg., 1937, **61**, 389).—The general method of incinerating sized textiles has been altered (details given) so that the ash can easily be dissolved. This renders treatment with fusion mixture unnecessary. T. G. G.

Wetting etc. agents.—See III. **Ultra-violet fluorescence lamp** [**for textiles**].—See XI. **Detergent action and wetting etc.**—See XII. **Permeability of resins to H_2.**—See XIII. **Leather substitutes.**—See XV.

Patents.

Washing fibrous materials. Electric Smelting & Aluminum Co. (B.P. 463,407, 23.8.35. U.S., 16.7.35).—Colloidal protein (I) substances are removed by an initial treatment in a solution ($p_H > 10{\cdot}5$) containing an alkali and a material which inhibits coagulation of the (I). The treatment is carried out at $>38°$, but at $<$ the b.p. of the solution. The material consists of pine oil fatty acid, a hydrogenated or sulphonated naphtha, or a salt of a sulphonated high-mol. alcohol, or mixtures of these. Highly dispersed inorg. colloidal substances, *e.g.*, alkali-metal Al silicates (cf. B., 1922, 599; 1930, 662), may also be added to the solution. R. J. W. R.

Lubrication and/or tinting of textile materials. Brit. Celanese, Ltd., E. Stanley, H. C. Olpin, and R. H. J. Riley (B.P. 463,548, 24.9.35).—Threads of, *e.g.*, cellulose acetate are lubricated with clear liquids prepared from a mineral oil (*e.g.*, saturated aliphatic oils of b.p. 200—350°), an oil-in-H_2O emulsifying agent (I), a H_2O-in-oil emulsifying agent (II), and H_2O. (I) may be an alkylolamine soap, *e.g.*, triethanolamine oleate (III), an alkylsulphonic acid of $> C_{12}$, or sulphuric ester of, *e.g.*, stearyl alcohol. (II) may be a fatty acid or alcohol $\nless C_{12}$, *e.g.*, oleic acid. Where tinting is required, an acid dye is dissolved in the mixture, and tinting and lubrication can be carried out simultaneously. The lubricants and dyes are readily removed on scouring. *E.g.*, the lubricating mixture may be mineral oil (80), oleic acid (20), (III) (20), and H_2O ($>$5 pts.). R. J. W. R.

Dyeing medium for live hair. F. Stroher A.-G. (B.P. 463,481, 30.9.35. Ger., 3.10.34).—To the liquid hair dye is added a neutral thickening medium consisting of a high-mol. ($> C_8$) aliphatic alcohol (I), *e.g.*, cetyl alcohol, a high-mol. ester of (I), *e.g.*, cetyl palmitate, or a mono-ester of an aliphatic acid ($> C_8$) and a polyhydric alcohol, *e.g.*, glyceryl monostearate. R. J. W. R.

Dyeing of cellulosic fibrous materials. W. W. Groves. From I. G. Farbenind. A.-G. (B.P. 466,099, 18.9.35).—Cellulose textile fibres are rendered capable of being dyed with acid wool dyestuffs or acid sulphuric esters of leuco-vat dyestuffs by treatment, prior to or during the dyeing operation, with quaternary NH_4 compounds of type $X{\vdots}N(Hal)R{\cdot}CO{\cdot}R'$, where $X{\vdots}N$ = aliphatic *tert.* amine, R = aliphatic hydrocarbon residue $\ngtr C_7$, $R' = OR''$ or $NR'''R''''$, where R'' = aliphatic hydrocarbon radical, R''' and R'''' = H or org. radical; at least one of radicals R'', R''', R'''', or one attached to N^V, has a chain $\nless C_8$. The quaternary NH_4 compound may be added to the solution from which the fibres are spun prior to dyeing. Examples describe the use of $NMe_3Cl{\cdot}CH_2{\cdot}CO{\cdot}NMe{\cdot}C_{18}H_{37}$, $C_{18}H_{37}{\cdot}NMe_2Cl{\cdot}CH_2{\cdot}CO{\cdot}NH_2$, etc. R. G.

Dyeing of cellulosic fibrous material. W. W. Groves. From I. G. Farbenind. A.-G. (B.P. 466,157, 18.9.35. Addn. to B.P. 466,099; preceding).—The fastness to H_2O and washing of dyeings on cellulose fibres, *e.g.*, viscose rayon, of acid wool or acid sulphuric esters of leuco-vat dyes which have been applied to the fibre as described in the chief patent, is considerably improved by after-treatment with a bath (1 g./litre) of a suitable org. compound of high mol. wt. containing N^V, *e.g.*, octadecylpyridinium bromide. $SO_4Me{\cdot}NMe_3{\cdot}[C_6H_4{\cdot}NH{\cdot}CO]_4{\cdot}C_6H_4{\cdot}NMe_3{\cdot}SO_4Me$, or peralkylated polyethylenediamine. Examples illustrate the use of these products in improving the fastness of dyeings on viscose rayon of Acid Violet 6B with $R{\cdot}NMe_2Cl{\cdot}CH_2{\cdot}CO{\cdot}NH{\cdot}C_{12}H_{25}$ (I) (R = aliphatic radical C_8—C_{14}), Wool Fast Blue BL with $NMe_3Cl{\cdot}CH_2{\cdot}CO{\cdot}NH{\cdot}C_{18}H_{35}$, and Acid Anthracene Red 3B with (I). N. H. H.

Dyeings. W. W. Groves. From I. G. Farbenind. A.-G. (B.P. 466,772, 31.10.35).—Dyeings produced on textiles with substantive dyes sol. in H_2O are improved by after-treatment with compounds $NXX'X''Hal.{\cdot}R{\cdot}CO{\cdot}Y$, where X, X', X'' are aliphatic radicals, R is an aliphatic residue $\ngtr C_5$, and Y is OR' or $NR''R'''$, where R' is an aliphatic hydrocarbon radical of $\ngtr C_9$ and R'' and R''' are H or an org. radical; at least one of the radicals X, X', X'' has $> C_6$. Among examples, cotton dyed with Diamine Fast Red 8BL (I) is treated for 15 min. in a cold bath containing 1 g. of $C_{18}H_{37}{\cdot}NH{\cdot}CO{\cdot}CH_2{\cdot}NMe_2Cl{\cdot}CH_2{\cdot}CO_2Me$ per litre, or cotton dyed with Cotton Yellow CH is treated with $NMe_3Cl{\cdot}CH_2{\cdot}CO{\cdot}NH{\cdot}C_{18}H_{35}$, or viscose dyed with (I) is treated with 2 g. of $C_{18}H_{35}{\cdot}NMe_2Cl{\cdot}CH_2{\cdot}CO_2Me$ per litre. The treated dyeings have better fastness to H_2O than similar dyeings which are untreated. K. H. S.

Dyeing of cellulose esters with azo dyes. A. Carpmael. From I. G. Farbenind. A.-G. (B.P. 462,335, 10.9.35).—An arylamine or arylaminoazo compound is diazotised on the fibre and coupled with a OH- or hydroxy-carboxy-derivative of a compound $\begin{matrix}C_6H_4\\C_6H_4\end{matrix}{>}x$ in which x is O, S, SO, SO_2, S_2, CH_2, CO, or CH:CH; the shades produced are brown to black and are dischargeable. Examples of the coupling components are: 2- and 3-hydroxyfluorenone, 3-hydroxydiphenylene oxide-2-carboxylic acid, 3-hydroxyphenanthrene-2-carboxylic acid, 3-hydroxydiphenylene sulphide-2-carboxylic acid, and 3 : 6-dihydroxydiphenylene sulphide. H. A. P.

Colouring of acetate artificial silk. C. Shaw, P. G. Carter, R. H. Sennett, and Imperial Chem. Industries, Ltd. (B.P. 466,601, 30.10.35 and 2.10.36. Addn. to B.P. 447,134; B., 1936, 787).—Yellow shades which are non-phototropic are produced on cellulose acetate by *Bz*-1-alkoxybenzanthrones in which the alkoxy has 2—5 C and may carry substituents (excluding CO_2H and SO_3H). Bz-1-β-*Chloroethoxy*-, m.p. 147·5—153° (bright greenish-yellow), -iso*propoxy*- (greenish-yellow), -n-*butoxy*-, m.p. 120—122° (yellow to reddish-yellow), -n-*amyloxy*-, m.p. 133—135° (bright yellow), -β-*methoxyethoxy*-, m.p. 139·5—142° (bright yellow), and -β-*ethoxyethoxybenzanthrone*, m.p. 132·5—133·5° (bright yellow), are described. K. H. S.

Production of dyeings and printings. I. G. Farbenind. A.-G. (B.P. 466,846, 29.11.35. Ger., 29.11.34).—Wool, natural or Sn-weighted silk, or artificial silk is padded with an acid or an acid-producing substance before dyeing or printing with azo dyes of the Rapidogen type, which are then developed on the fibre by the action of steam. Vat and mordant dyes can be used alongside the azo dyes. Among acids are mentioned H_2SO_4, H_3PO_4, lactic or tartaric acid, $OH{\cdot}CH_2{\cdot}CO_2H$, $H_2C_2O_4$; substances yielding acid by hydrolytic or thermal dissociation are $NaHSO_4$, $MgSO_4$, $ZnSO_4$, esters, and amides, *e.g.*, Et_2 tartrate (I), $CH_2(CO{\cdot}NH_2)_2$, $CH_2Br{\cdot}CO_2H$, $OAc{\cdot}CH_2{\cdot}CH_2{\cdot}SO_3Na$. Among examples (8), unloaded natural silk is treated with H_2SO_4 (12 c.c., *d* 1·55, per litre), dried, and printed with a composition containing the diazoamino-compound 1 : 4 : 2-$C_6H_3MeCl{\cdot}NH_2$ → 1 : 2 : 4-$CO_2H{\cdot}C_6H_3(NH_2){\cdot}SO_3H$ together with 2 : 3-hydroxynaphthoic *o*-toluidide; steaming produces a yellowish-red. Further, a viscose fabric is prepared with (I) (35 c.c. per litre) and dried; it is printed with the diazoimino-compound 2 : 5 : 1 : 4-$(OMe)_2C_6H_2(NH_2){\cdot}CO{\cdot}NHPh \rightarrow NHMe{\cdot}CH_2{\cdot}CH_2{\cdot}SO_3H$ together with 2 : 3-$OH{\cdot}C_{10}H_6{\cdot}CO{\cdot}NHPh$ and on adjacent parts with the dye Galloviridine and Cr acetate; on steaming a blue and green print is obtained. K. H. S.

Manufacture of dyed artificial masses from regenerated cellulose. I. G. Farbenind. A.-G. (B.P. 465,606, 8.11.35. Ger., 9.11.34).—A pigment of a reduced dye which is insol. or sparingly sol. in cold alkali and fairly stable to oxidation is added to a cellulose solution before regeneration, together with wetting or dispersing agents. Among examples, Indanthrene Brilliant Pink R (200) is reduced in H_2O (1500) and 25% aq. NH_3 (1200) at 92° with $Na_2S_2O_4$ (200 pts.). The reduced dye as 13% aq. paste, mixed with the condensation product of oleyl alcohol and $(CH_2)_2O$ (80 pts.), is added to cuprammonium cellulose solution (23% on the wt. of cellulose). On spinning the thread is coloured deep bright pink, the colour yield being better than in the process in which the leuco-compound oxidises easily to form coarse dye particles. K. H. S.

Treatment of textiles. I. G. Farbenind. A.-G., Assees. of A. Chwala and E. Waldmann (B.P. 466,734, 8.6.36. Austr., 6.6.35).—Disulphonium compounds $R(SAR'_2)_2$ (I), where $R =$ an aliphatic radical of $\not< C_{10}$, $R' =$ Me, Et, or C_6H_4Me, and $A =$ an acid anion (Cl', NO_3', OAc, etc.) prepared, *e.g.*, by interaction of alkyl dithiols with Me_2SO_4, BzCl, CH_2AcCl, are useful in aq. solutions for treating textiles, *e.g.*, as wetting, emulsifying, or dispersing agents, for increasing the fastness to H_2O, perspiration, washing, and light of substantive dyes on cellulose, and to alkaline fulling of acid dyes on wool, and also as reserving agents in artificial silk or wool dyeing. Suitable examples of (I) are prepared from dibromooctadecane (from $C_{18}H_{35}\cdot OH$ and HBr) or trichloro-hard paraffin by reaction with a hydrosulphide or Na_2S, and treating the resulting dithiol with Me_2SO_4.
N. H. H.

Improving textile materials. A. G. Bloxam. From Soc. Chem. Ind. in Basle (B.P. 466,015, 8.10.35).—Textile materials are treated with a condensation product of an aldehyde or its equiv. (CH_2O) and an aminotriazine or derivative thereof containing at least one replaceable H (2 : 4 : 6-triamino-1 : 3 : 5-triazine), or, *e.g.*, 2 : 4-diamino-, 2-chloro-4 : 6-diamino-, 4 : 6-diamino-, 2-(4′-hydroxyphenyl)-, or 4-amino-6-hydroxy-2-phenyl-1 : 3 : 5-triazine, which is hardened by heating at, *e.g.*, 120—150°, either before or after application. In the former case, a matt appearance is produced, and in the latter, a resistance to creasing. Other dressing agents, *e.g.*, starch, or softening agents may be included.
N. H. H.

Improvement of cellulosic materials. G. W. Johnson. From I. G. Farbenind. A.-G. (B.P. 462,290, 25.7.35).—Improvement in the dyeing properties, appearance, and handle of cotton, viscose, etc. is claimed to result from treatment in H_2O with "practically colourless" compounds having at least one substantive group containing at least one aromatic nucleus and at least one radical (other than purely aromatic) of $\not< C_7$ directly attached to one another, and at least one quaternary PH_4 or NH_4 or ternary SH_3. *E.g.*, viscose cut fibre is treated at the b.p. with a 0·1% solution of the diquaternary salt from bischloroacetbenzidide and dimethyl-dodecyl- or -hexadecyl-amine [the salts using $SMe\cdot C_{12}H_{25}$ and $P(CH_2Ph)_3$ are also mentioned] and is then capable of being dyed with acid wool dyes. In other examples similar compounds are claimed to impart (to viscose) softness, H_2O-repellency, level-dyeing properties with vat dyes, and H_2O- and washing-fastness when dyed with substantive dyes. H. A. P.

Treatment of cellulose ester threads, ribbons, films, fabrics, and like materials. Brit. Celanese, Ltd., R. W. Moncrieff, and C. W. North (B.P. 463,955, 5.10.35).—Selected portions of the fabric, *e.g.*, of cellulose acetate, are reserved against hydrolysis by coating with a material resistant towards the hydrolysing agent, but rendered removable by it, *e.g.*, paraffin wax (5—15) and stearic acid (85—95%); the fabric is then treated with a hydrolysing agent, *e.g.*, aq. NaOH, and the reserving agent (now Na stearate + wax) is removed by washing. H. A. P.

Treatment of cellulosic material. R. J. W. Reynolds, E. E. Walker, C. S. Woolvin, and Imperial Chem. Industries, Ltd. (B.P. 466,817, 6.12.35).—Natural or regenerated cellulosic (woven) materials are rendered permanently H_2O-repellent and of soft handle by impregnating (at $<40°$) with an aq. (0·1—2%) solution of a quaternary salt, $R\cdot O\cdot CH_2\cdot NR'R''R'''Hal$ [$R =$ an aliphatic hydrocarbon of $> C_{12}$, $NR'R''R''' =$ a heterocyclic (*e.g.*, C_5H_5N) or aliphatic (*e.g.*, NMe_3, NBu_3) *tert.* amine], drying at a relatively low temp., and heating to 90—100° to decompose the quaternary salt. Examples illustrate the use of octadecyl-, cetyl-, and oleyl-oxymethylpyridinium chloride in treating cotton, wool–cotton union, cotton woven fibre dyed with Chloroazol Blue BS or Fast Red FS, unsized paper, regenerated viscose, sisal rope, and viscose taffeta dyed with Chlorazol Fast Red KS. N. H. H.

Imparting hydrophobic properties to cellulose fibres. W. W. Groves. From I. G. Farbenind. A.-G. (B.P. 463,472, 21.6.35. Cf. B.P. 463,300; B., 1937, 539).—H_2O-repellent effects resistant to laundering are obtained by treatment with a phenol (I) containing at least one aliphatic or *cyclo*aliphatic residue of $>C_6$ [*e.g.*, *iso*dodecyl- (II) or di*iso*hexylphenol] and an aliphatic aldehyde or dialdehyde (*e.g.*, CH_2O, as vapour or $\not> 5\%$ solution, or glyoxal). The reaction products from (I) and aldehydes (III), *e.g.*, methylol compounds, may also be used, in which case heating only is necessary and the CH_2O after-treatment may be omitted. In an example, viscose is immersed in a 5—10% solution of (II) in C_5H_5N, dried, immersed in 3% aq. CH_2O, dried, and heated at 100° for 16 hr. Exposure to CH_2O vapour at 110° for ½ hr. may also be employed. (I) and (III) may be incorporated with artificial fibres by introduction into the spinning bath. R. J. W. R.

Finishing [crease-proofing] of textile fabrics. A. E. Roberts and W. Watkins (B.P. 465,875, 17.8. and 26.10.35, 21.3. and 15.8.36).—The fabric is treated with vegetable or animal substances (*e.g.*, casein) which can be hardened by CH_2O, or with synthetic resins, and is then mechanically treated to unstick the fibres, by passing it under and over breaker bars and through a cold nip on a mangle several times or by hand crumpling or some such device which prevents adhesion between the fibres. The fabric is then heat-treated, if necessary in presence of CH_2O (or substances yielding CH_2O) and, if desired, under pressure, to harden the reinforcing substances.
R. G.

Crease-resistant treatment of textile yarns. A. E. Roberts and W. Watkins (B.P. 465,939, 17.8. and 26.10.35, 21.3. and 15.8.36).—Yarns are rendered crease-resistant by coating and/or impregnating the individual yarns with a 3—5% solution or dispersion of, *e.g.*, casein, albumin, glues, gelatins, or synthetic resin-forming substances in H_2O, using no alkali except with casein, so that approx. 70 wt.-% is taken up and, after thoroughly drying (at 110°), treating the yarn mechanically to separate the individual fibres, and finally treating with CH_2O or its equiv. (at 130°/pressure). N. H. H.

Treatment of absorbent fibrous material. BRIT. UNITED SHOE MACHINERY CO., LTD., Assees. of Q. L. QUINLIVAN (B.P. 463,633, 1.10.35. U.S., 3.11.34).—Stiffened materials from fabrics, felt, paper, etc. are prepared by impregnation with a hot solution of cellulose acetate (I) (Ac val. 48—54½) which ppts. (I) in a discontinuous form on cooling. The solution contains about 10—20% of (I) and the solvent may be, *e.g.*, EtOH + 25—55% of H_2O in which (I) is sol. at the b.p. The materials are useful as stiffeners in shoe manufacture. R. J. W. R.

Impervious [oiled] fabric. J. K. HUNT, Assr. to E. I. DU PONT DE NEMOURS & CO. (U.S.P. 2,041,836, 26.5.36. Appl., 1.8.33).—Oil-impregnated materials of improved flexibility, especially at low temp. and after ageing, and particularly suitable for oil-pump diaphragms, are prepared by treating fabric with a drying oil (*e.g.*, linseed, oiticica, tung) containing 0·25—2·0% of α-$C_{10}H_7{\cdot}NHPh$, p-$C_6H_4Ph{\cdot}OH$, pyrocatechol, α-$C_{10}H_7{\cdot}OH$, creosol, or a polyarylguanidine (*e.g.*, diphenylguanidine). The oils are generally bodied, the reagent is incorporated in the hot oil, and driers are added. The fabric is given 2—3 impregnations, with intermediate drying of the coats, and for the first coating treatment the oil is generally thinned (with raw oil or solvent) before use. R. J. W. R.

Improvement [prevention of thread displacement] of textiles. G. W. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 466,171, 19.11.35).—Displacement of threads of artificial silk or mixed fabrics when subjected to mechanical strain is prevented by treatment with solutions or emulsions of resin alcohols or corresponding amines or ethers, polyglycol ethers or esters of such compounds, or with quaternary NH_4 compounds of resin amines, or with ester- or amide-like condensation products of dicarboxylic acids with such alcohols or amines. 8 examples of the use of abietinylamine, the diabietinol ester of maleic acid, etc. are given. R. G.

Production of ornamental effects on materials containing organic derivatives of cellulose. BRIT. CELANESE, LTD., H. C. OLPIN, and G. H. ELLIS (B.P. 466,803, 5.12.35).—The fastness of patterned effects on fibres, foils, films, etc. containing org. derivatives of cellulose produced by the process of B.P. 387,343 (B., 1933, 303) is improved by treatment, under regulated conditions, with dry steam (2—5 min. at 99—105°). Only the parts of the material containing both effect material, *i.e.*, dyestuff, pigment, etc., and swelling agent are thus fixed, the remaining effect material being subsequently removed. In addition, when the material is originally non-lustrous, the areas containing swelling agent are rendered lustrous. N. H. H.

Starch solutions for dressing or finishing textile fabrics. W. SECK (B.P. 467,098, 7.12.35. Ger., 10.12.34).—The η of starch solutions is reduced, without addition of dispersing agents, by passing it through a rotary beater machine having a circumferential velocity of $\nless$47 m./sec. A. H. C.

Textile assistants. Wetting etc. agents. Carboxylic amides.—See III. **Rubberised thread.**—See V. **Washing means.**—See XII. **White-tipped skins.**—See XV.

VII.—ACIDS; ALKALIS; SALTS; NON-METALLIC ELEMENTS.

Chamber [sulphuric acid] process. XXV. Continuous-reading device for the nitrosity of "nitrose" in the sulphuric acid industry. M. MATSUI, K. ODA, and J. FUJINO (J. Soc. Chem. Ind. Japan, 1937, 40, 56—58B; cf. B., 1932, 840).—The nitrous vitriol from the Gay Lussac tower is diluted with air-free H_2O; the N oxides are removed by air and reabsorbed in distilled H_2O. The electrical conductivity of this solution is $\propto$ the concn. of the N acids. C. R. H.

Mechanism of the lead-chamber reaction. II. Reaction between sulphurous and nitrous acids under various conditions. E. ABEL and J. PROISL (Monatsh., 1937, **70**, 201—212; cf. B., 1935, 848).—Over the $[H_2SO_4]$ range 0·01—14N the course of the reaction between H_2SO_3 and HNO_2 is similar to that found previously, but increasing $[H^{\cdot}]$ favours the production of NO. At lower acidities the ratio of NO : N_2O produced is affected by the proportions of H_2SO_3 and HNO_2 present, but is almost independent of temp. The [NO] in the system appears to have no effect on the reaction. The results confirm the theory advanced previously. J. W. S.

Contact sulphuric acid manufacture. V. Promoters. M. MATSUI, K. ODA, T. NAKA, and T. KOJIMA (J. Soc. Chem. Ind. Japan, 1936, **39**, 471B; cf. B., 1935, 492).—The promoting action of Na and K on the activity of V_2O_5 in oxidising SO_2 in a mixture of SO_2 7% and air 93% is > that of Ag, Ba, Al, Pb, Sn, or Mn. Even at 600° the activities of Na–V and K–V catalysts are not reduced. Pb and Mn are poor promoters. C. R. H.

Contact sulphuric acid manufacture. VI. Dispersion degree of vanadium oxide on the carrier. VII. Size of the carrier. M. MATSUI and R. KIYOURA (J. Soc. Chem. Ind. Japan, 1937, **40**, 80—81B, 81—83B).—A comparison of conversions with catalysts having varying % of V_2O_5 promoted with Na or K on diatomaceous earth, suggests that there is an optimum proportion of V_2O_5 to carrier. Comparison between two types of carrier shows that the surface area of the latter affects conversion efficiency and optimum temp. Comparisons are also made between catalysts prepared from pptd. V_2O_5 (having the latter dispersed through the carrier) and from V salts (in which the V is conc. at the surface by capillary action). C. I.

Dependence of performance of vanadium catalyst in the sulphuric acid contact process on gaseous impurities and activators. H. SIEGERT (Angew. Chem., 1937, **50**, 319—320).—The poisoning action of CO is due, not to its action on the catalyst, but to its reducing action on SO_2. It may accordingly be decreased by raising the temp. of the catalyst in order to oxidise CO more completely to CO_2. As reacts with, and accumulates in, the catalyst as As_2O_5, the V_2O_4–V_2O_5 equilibrium on which the catalytic action depends being thereby displaced. The poisoning action is greatest with catalysts low in alkali, and is decreased by raising the temp. KVO_3 and $AgVO_3$ are converted during catalysis into sulphates, with simultaneous increase in the activity of the catalyst. The promoter action of metals on V_2O_5 catalysts is attributed to the catalytic action of metallic sulphates on the oxidation and reduction of V_2O_5, and may be brought about also by direct admixture of Na_2SO_4 or Ag_2SO_4 with V_2O_5. J. S. A.

Ammonia and methanol [methyl alcohol] catalysts. A. T. Larson (Trans. Electrochem. Soc., 1937, **71**, Preprint 19, 215—221).—A historical summary. S is a strong poison for Fe catalysts used in NH_3 synthesis, but has no effect on $ZnO–Cr_2O_3$ catalysts used in synthesising MeOH. The relationship between the catalysts used in the two syntheses is discussed. J. G. A. G.

Reduction of iron catalysts for ammonia synthesis. II. Influence of conditions of reduction of catalysts on their activity. S. S. Latschinov and A. A. Vedenski (J. Appl. Chem. Russ., 1937, **10**, 435—456).—The activity of magnetite catalysts prepared by reduction in a stream of $N_2–H_2$ mixture falls with rising temp. and increasing pressure, and rises with increasing velocity of flow; the most active catalysts are obtained by raising the temp. gradually from 375° to 500°, with a rate of flow of 15,000—30,000 vols. per vol. of catalyst, and at 100 atm. R. T.

Determination of potassium in ammonia synthesis catalysts. G. K. Distanov (J. Gen. Chem. Russ., 1937, **7**, 681—683).—1 g. of catalyst is dissolved in H_2O containing 15 ml. of conc. HCl, 6—7 drops of HNO_3 are added, and the solution is evaporated almost to dryness. 8 drops of HNO_3 and 25 ml. of H_2O are added to the residue, and Fe is pptd. by aq. NH_3. The filtrate is evaporated to dryness, and the residue ignited, dissolved, and K determined by the usual methods. R. T.

Separation of halite from sylvine minerals by flotation. S. A. Kuzin (J. Appl. Chem. Russ., 1937, **10**, 457—469).—Practically quant. separation of NaCl from KCl is achieved by flotation, using 1 kg. of oleic acid (I) or Acidol, 5 kg. of $Pb(NO_3)_2$ (II), and 2 kg. of Na silicate (III) per ton of sylvine mineral present in the saturated solution. On a technical scale 80—85% KCl is obtained in 90% yield by repeated flotation, adding fresh (I) and (III), but not (II), at each operation. R. T.

Flotative properties of gypsum. W. E. Keck and P. Jasberg (Min. Tech., 1937, **1**; Amer. Inst. Min. Met. Eng., Tech. Publ. 762, 17 pp.).—Laboratory experiments, using a pure natural gypsum, show that it is non-floatable with xanthates prepared from monohydric saturated alcohols with 2—12 C. Good results were obtained with Na oleate (I) and palmitate, and, in conjunction with the former, terpineol, n-C_5H_{11}·OH, and n-C_7H_{15}·OH increased the amount floated. Na_2CO_3 and CaO both depressed flotation with (I) and both gelatin and tannic acid acted as strong depressors. W. P. R.

Metaphosphate investigation aims at cheaper fertilisers. H. A. Curtis, R. L. Copson, and A. J. Abrams (Chem. Met. Eng., 1937, **44**, 140—142).—The development of a semi-large-scale furnace with a tower in which $Ca(PO_3)_2$ is prepared by the action of P_2O_5 passing through a bed of phosphate rock ($P_2O_5 : CaO = 1 : 3$) at 1200° is described. F is largely eliminated from the rock by the process. P_2O_5 in the product shows 97—100% "availability" by the NH_4 citrate method. A $P_2O_5 : CaO$ ratio of 1·56 may also be obtained, but this product is hygroscopic. $CaSO_4$, $Al_2(SO_4)_3$ with evolution of SO_2 and SO_3, and NaCl with evolution of P chlorides yield metaphosphates when similarly treated; if P is burned in sufficient moist air to yield HPO_3 then this, by a similar operation on NaCl, yields $NaPO_3$ and HCl. D. K. M.

Flotative properties of hæmatite. W. E. Keck, G. C. Eggleston, and W. W. Lowry (Min. Tech., 1937, **1**; Amer. Inst. Min. Met. Eng., Tech. Publ. 763, 24 pp.).—The principal sources of Fe in Michigan are massive and specular hæmatite (I) deposits. Among the fatty acid soaps Na oleate was the strongest collector, but NH_4 palmitoleate, linoleate, and laurate gave good results. Specular (I) was slightly more floatable than massive (I), and comparison of the flotation of solid with that of spongy (I) showed the former to be the more floatable in the fine and the latter in the coarse sizes. Massive (I) was most floatable at −200- to +325-mesh and unfloatable at −35- to +48-mesh. Small quantities of cresylic acid, terpineol, or n-C_7H_{15}·OH greatly increased flotation with Na oleate. Na_2CO_3 and CaO both depressed the flotation of massive (I). The effects of many other additions are also described. W. P. R.

Industrial removal of iron from aluminium sulphate solutions by means of manganous acid. I. Fazzioli (Chim. et Ind., 1937, **37**, 861—862).—Fe is pptd. as $Fe(HMnO_3)_3$ from a neutral or slightly acid solution at 70—80° by agitation with a slight excess of H_2MnO_3, obtained by treating the ppt. from a previous batch with H_2SO_4 and washing free of $FeSO_4$, or produced in the solution by interaction of $KMnO_4$ (2 mols.) and $MnSO_4$ (3 mols.). Sufficient $KMnO_4$ is also added to oxidise Fe^{II}, and to ppt. the $MnSO_4$ thus produced. Wooden or Pb-lined apparatus should be used. An analogous method is used for the purification of $CuSO_4$ solutions. I. C. R.

Nepheline syenite. R. B. Ladoo (Glass Ind., 1937, 204—206).—Nepheline syenite is a rock of high Al_2O_3 content mixed with K and Na felspars containing sufficient Na and K to be readily fusible without addition of other ingredients. It contains Al_2O_3 24, fluxing oxides 15, SiO_2 59%. Fe occurs in the rock as magnetite and is removed by magnetic separation. The final product contains 0·06% Fe_2O_3. Its application to glass-making and advantages involved are discussed. C. L. M.

Utilisation of methane for production of hydrogen. G. Natta and R. Piontelli (Chim. e l'Ind., 1937, **19**, 177—182).—The incomplete combustion of CH_4 in presence of CO_2 and of H_2O has been studied for the range 800—1400°. Diagrams are given showing the final equilibrium composition in the systems CH_4–H_2O–O_2 and CH_4–CO_2–O_2 as a function of the initial composition. The conditions under which it is possible to obtain a $H_2 : CO$ ratio of 2 in the final gas have been determined for the two ternary systems as well as for the quaternary system CH_4–CO_2–H_2O–O_2 at 1000°. O. J. W.

Catalytic oxidation of hydrogen sulphide in presence of active charcoal. F. Krczil (Chem.-Ztg., 1937, **61**, 247—249, 267—270).—The removal of H_2S from coal gas by catalytic oxidation to S, the promoter action of H_2O vapour, pretreatment of the gas, and activation of the C are reviewed. Current technical methods of operating the contact process, of extracting S from the catalyst, especially with aq. $(NH_4)_2S$, and of regenerating the catalyst are discussed. Oxidation of H_2S with SO_2 is less practicable. J. S. A.

Rapid determination of sulphur in pyrites cinder. M. Matsui (J. Soc. Chem. Ind. Japan, 1937, **40**, 142—143b).—The sample is heated to 1000° in a stream of air, and the S collected in aq. Na_2O_2. The residual alkali is titrated with standard acid. G. H. C.

Contact activity of chromium oxide in oxidation of sulphur dioxide to sulphur trioxide. I. E. Adadurov (J. Appl. Chem. Russ., 1937, **10**, 470—472).—Polemical, against Postnikov *et al.* (B., 1937, 133). R. T.

Determination of sulphur dioxide and sulphur trioxide in sulphur burner gases. L. Sokkola (Finnish Paper Timber J., 1935, 1022).—The gases are aspirated through 20 c.c. of $0{\cdot}1N$-NaOH + $0{\cdot}001M$-$SnCl_2$. The $SnCl_2$ prevents oxidation of SO_3'' to SO_4''. The H_2SO_4 formed from the SO_3 is pptd. with benzidine hydrochloride, filtered off, and the filtrate titrated with $0{\cdot}1N$-NaOH. Ch. Abs. (*e*)

Determination of iodine in extracts from brine. I. Orlov and T. Kaganova (Chim. Farm. Prom., 1935, No. 1, 44—46).—I liberated with nitrite from the acidified brine is extracted with activated C, ground, extracted with Na_2SO_3, filtered, made up to a definite vol., and titrated (eosin) with $AgNO_3$ in presence of $(NH_4)_2CO_3$. I is determined in waste liquors by oxidising to IO_3' with Br, removing the excess of Br with PhOH, and titrating I liberated from added KI with $0{\cdot}001N$-$Na_2S_2O_3$. Cl is determined by boiling with HNO_3 and titrating by the Volhard method. The acids in the crude I are extracted with light petroleum, shaken with standard alcoholic NaOH, and the excess of alkali is titrated. Ch. Abs. (*e*)

Desorption of CO_2 from H_2O. Gas–liquid reactions. Pressure filter. Absorption of gases. Scrubbers for gases. Determining clouds etc.—See I. **S from coke-oven gas. Disposal of brines.**—See II. **Testing building CaO.**—See IX. **Ba and Sr minerals.**—See X. **Acid-proof diaphragms.**—See XI. **Pigments. Red Sb sulphides.**—See XIII. **CaO–S spray. Paris Green. S for insecticides.**—See XVI. **Microtitration of free H_2SO_3.**—See XVIII. **Detecting H_2S.**—See XXIII.

See also A., I, 365, **Decomp. potentials of fused electrolytes.** 369, **Hydrogenation catalysts. Electrolytic prep. of Cu oxide and salts.** 370, **Synthesis of NO.** 373, **Separation of O isotopes. Phosphoceruleomolybdic acid. Purification of chlorates. Prep. of const.-boiling HBr.** 374, **Determination of F, and of N_2O_4–NO.** 375, **Determination of CO_2 in carbonates.**

Patents.

Manufacture of sulphuric acid. H. F. Merriam, Assr. to Gen. Chem. Co. (U.S.P. 2,042,675, 2.6.36. Appl., 23.7.32).—Spent acid sludge is heated to oxidise org. impurities, yielding SO_2, O_2, and org. vapours; the gases are cooled to remove H_2O, then passed through a V catalyst to oxidise the org. compounds and part of the SO_2 to SO_3, and finally through a Pt catalyst to complete the SO_2 oxidation. A. R. P.

Manufacture of hydrocyanic acid. R. W. Millar, Assr. to Shell Development Co. (U.S.P. 2,043,930, 9.6.36. Appl., 24.6.33).—NH_3 is catalytically oxidised with sufficient air to give a $3{\cdot}5 : 1$ NO–N_2 mixture, which is dehydrated, mixed with 3·5 vols. of natural gas, and passed at 1200° through a sillimanite catalyst. A. R. P.

Recovery of hydrocyanic acid. Rohm & Haas Co. (B.P. 461,130, 5.7.35. U.S., 9.3.35).—Gases containing HCN are scrubbed with H_2O to produce dil. aq. HCN, which is neutralised to p_H 6·8—8·2 and treated with a sol. Zn, Cd, or Ni salt; the resulting ppt. is collected and distilled with H_2SO_4, the vapours being scrubbed with a $Zn(CN)_2$ slurry to remove H_2S before condensation. A. R. P.

Synthesis of compounds [*e.g.*, ammonia]. J. J. O'Leary, Assr. to Atmospheric Nitrogen Corp. (U.S.P. 2,046,478, 7.7.36. Appl., 2.12.31).—A mixture of N_2 and H_2 (and accumulating inerts) is circulated in a no. of steps of synthesis, each including a pump, a catalyst, and means for removing NH_3. Bleeding is effected from one or more primary circulations into a secondary circulation embodying a catalyst of higher activity, the final bleed thus being caused to contain a high proportion of inerts. Preferably make-up of N_2 and H_2 is supplied to all stages. B. M. V.

Preparation of a mixture of oxygen and ammonia gases. E. W. Harvey, Assr. to Barrett Co. (U.S.P. 2,038,562, 28.4.36. Appl., 21.6.33).—Aq. NH_3 (I) containing urea, CO_2, or $NaNO_3$ (added to lower its v.p. during transport) together with a stream of H_2O is sprayed down a tower up which passes hot air. NH_3–air mixture suitable for the prep. of HNO_3 is drawn off at the top of the tower, and dil. aq. NH_3 containing $NaNO_3$ etc. at the foot of it. L. C. M.

(a) Process for producing solutions of alkali sulphites. (b) Apparatus for producing solutions. G. Haglund, Assr. to Patentaktieb. Gröndal–Ramén (U.S.P. 2,047,627—8, 14.7.36. Appl., [a] 12.1.33, [b] 20.10.33. Swed., [a, b] 12.3.32).—A series of closed chambers is connected, as regards gas flow, from the top of one to the bottom of the next, and the chambers may be superposed or on the same level. Liquid is circulated from collecting sumps below to sprays above the same chamber, and consequently absorption is by countercurrent flow, but a smaller concurrent flow of liquid from sump to sump is permitted. (A) SO_2 gas and a milk of a Ca compound are made to interact. B. M. V.

Removal of water from [sodium] cyanide. E. J. Pranke, Assr. to E. I. Du Pont de Nemours & Co., Inc. (U.S.P. 2,042,549, 2.6.36. Appl., 18.12.34).—Flake NaCN ($>$96% purity) is prepared by allowing 40% aq. NaCN to flow in a thin stream on a rotary drum heated at 150—180°; the rapid expulsion of H_2O prevents hydrolysis of the salt. A. R. P.

Manufacture of crystalline substances [*e.g.*, sodium silicate]. N. V. Chem. Fabr. "Gembo" (B.P. 460,857, 8.8.35. Holl., 8.8.34).—A hot solution of Na_2SiO_3 is added to a cold solution containing (*a*) NaOH 20 or (*b*) NaOH 5 and NaCl 15, whereby $Na_2SiO_3,9H_2O$ separates on cooling to 22°. Mixtures of Na_2CO_3 and NaOH solutions afford crystals of $Na_2CO_3,7H_2O$. A. R. P.

Purification of asbestos. E. Schürmann and W. Esch (U.S.P. 2,046,971, 7.7.36. Appl., 9.5.35. Ger., 23.5.34).—Asbestos is treated with compressed air (or O_2) and steam at elevated temp. and pressure (165°/12 atm.) to oxidise pyritic matter. B. M. V.

Separation of zinc and cadmium in sulphate solution. R. Teats, Assr. to Amer. Smelting & Refining Co. (U.S.P. 2,038,969, 28.4.36. Appl., 1.2.34).—Aq. $CdSO_4$ 200—400 g. per litre containing Zn is treated with sufficient aq. $K_4Fe(CN)_6$; the ppt. of $Zn_2Fe(CN)_6$ is collected in a filter-press and CdS pptd. from the filtrate. L. C. M.

Alumina production [from alum]. F. C. Frary, Assr. to Aluminum Co. of America (U.S.P. 2,043,743, 9.6.36. Appl., 8.9.34).—Alum crystals are dried first at 80—90°, then at 150°, and finally at 600—650° to expel crystal H_2O in stages without melting the crystals, and the anhyd. salts are heated at 700—1000° until SO_3 ceases to be evolved. The product is leached with H_2O to remove K_2SO_4 and the Al_2O_3 residue calcined. A. R. P.

Preparation of aluminium oxide. H. Löfquist (B.P. 461,059, 2.6.36).—Bauxite is melted with PbO to form $2PbO,(Ti,Si)O_2$ with the SiO_2 and TiO_2 impurities and the melt is slowly cooled from 800—900°, whereby the Al_2O_3 crystallises out. The crushed melt is treated with AcOH and the resulting $Pb(OAc)_2$ melted at 75°, whereby the Al_2O_3 settles to the bottom while the SiO_2 and TiO_2 float. A. R. P.

Manufacture of barium and calcium sulphates. J. McCallum, Assr. to Titanium Pigment Co., Inc. (U.S.P. 2,039,432, 5.5.36. Appl., 27.10.34).—Pure, white, and finely-divided $CaSO_4$ and $BaSO_4$ are prepared by melting a mixture of the crude sulphate, a solvent salt of an alkali or alkaline-earth metal, preferably NaCl, $CaCl_2$, or Na_2SO_4, and a reducing agent, preferably petroleum coke, and maintaining the melt at temp., *e.g.*, 1050—1150°, to produce a free-flowing, low-melting slag, a flux (acid or basic) being added if required. The slag contains the impurities from the crude sulphate and, having a higher *d*, separates easily by gravity. D. M. M.

Manufacture of calcium cyanamide. A.-G. f. Stickstoffdünger (B.P. 461,274, 14.8.35. Ger., 14.8.34. Addn. to B.P. 393,128; B., 1933, 625).—Mixtures of CaC_2 with granulated $CaCN_2$, CaO, or MgO are passed through a rotary furnace at 850—970° against a slow current of N_2. A. R. P.

(A) Manufacture, (C) purification, of titanium compounds. [B] Treatment of titanium-bearing minerals. S. S. Svendsen, Assr. to Burgess Titanium Co. (U.S.P. 2,042,434—6, 26.5.36. Appl., [A] 27.5.32, [B] 27.9.34, [C] 4.6.35. Norw., [A] 9.6.31).—(A) Ground ilmenite containing SiO_2 is heated with a mixture of NH_4F and NH_4HF_2 first at 230—280° to expel the SiO_2 as $SiF_4,2NH_3$ (I), then at 290° to volatilise the TiO_2 as $TiF_4,2NH_3$ (II). Both sublimates are treated separately with the NH_3 expelled in the first stages of heating to ppt. $Si(OH)_4$ and $Ti(OH)_4$, respectively, and to regenerate NH_4F for re-use. The FeF_2 residue is heated with $(NH_4)_2SO_4$ to convert it into $FeSO_4$ and NH_4F, and the $FeSO_4$ is heated in air and steam to recover H_2SO_4 and obtain Fe_2O_3 for use as a pigment. (B) Ground ilmenite is heated slowly to 180° with a NH_4F–NH_4HF_2 mixture in an atm. of NH_3 and the product leached to obtain a solution of (I) and (II) and a residue of $(NH_4)_3FeF_6$, which is heated in steam and air at 500° to obtain Fe_2O_3 and sublime NH_4HF_2 for re-use. The solution of (I) and (II) is neutralised with NH_3 (p_H 6·8) and treated with $(NH_4)_2S$ to ppt. FeS and the filtrate boiled with an excess of NH_3 to ppt. a mixture of Ti and Si hydroxides which is calcined. (C) The NH_3–$(NH_4)_2S$ treatment for removing Fe and heavy metals from solutions of Ti fluorides is claimed. A. R. P.

Production of metal halides. Deuts. Gold- u. Silber-Scheideanstalt vorm. Roessler (B.P. 466,705, 29.1.37. Ger., 13.2.36).—Anhyd. metal halides of, *e.g.*, Be, Cr, Zr, Th, Ti, W, and Mo are obtained by interaction of an intimate mixture (in granulated or briquetted form) of C and suitable derivatives of the metals, *e.g.*, the oxides, silicates, or salts containing no O, with a halogen (Cl_2) or its equiv., *e.g.*, $COCl_2$, at temp. sufficient to volatilise the halide, and, if necessary, separating the products by fractional condensation. The required heat is supplied by electrical resistance heating, *e.g.*, in a shaft furnace having a C lining as one electrode, and a central C shaft as the other. The prep. of $BeCl_2$ is described in detail. N. H. H.

Burning of limestone with recovery of carbon dioxide. E. P. Gillette, Assr. to Gillette Res. Corp. (U.S.P. 2,047,064, 7.7.36. Appl., 3.4.33).—The $CaCO_3$ is preheated to remove impurities, but not to evolve CO_2, and is then decomposed in continuous vertical retorts of which the walls may be composed of SiC. B. M. V.

Obtaining carbon dioxide. F. B. Hunt and R. L. Turner, Assrs. to Liquid Carbonic Corp. (U.S.P. 2,048,656, 21.7.36. Appl., 18.11.31).—Flue gases at $\ngtr$ atm. pressure are scrubbed with EtOH, MeOH, COMe$_2$, Et$_2$O, EtOAc, or MeOAc, preferably in refrigerated state. The CO$_2$ may be removed by boiling with steam or (partly) by allowing the solution to rise to room temp. B. M. V.

Freezing of liquid carbon dioxide. J. C. Goosmann, Assr. to Adico Development Corp. (U.S.P. 2,047,099, 7.7.36. Appl., 24.10.28).—Apparatus in which liquid CO$_2$ is cooled by evaporation of part of itself is described. B. M. V.

Separation of low-boiling gas mixtures. R. Linde (U.S.P. 2,048,076, 21.7.36. Appl., 31.1.34. Ger., 16.2.33).—The process includes: periodically reversed regenerators for heat exchange between the bulk of ingoing air and outgoing N$_2$ and O$_2$; two stages of rectification, in one of which N$_2$ is condensed by boiling O$_2$; and cancellation of cold losses by highly compressing a minor proportion of air, precooling it, further cooling it in heat exchange with uncondensed N$_2$, and then expanding the air itself through a throttle. B. M. V.

Sulphur condenser. G. H. Gleason and A. C. Loonam, Assrs. to Guggenheim Bros. (U.S.P. 2,049,160, 28.7.36. Appl., 6.9.34).—Condensers for collecting S which has been formed in the gases by reduction of SO$_2$ comprise: (1) a packed tower of good conducting material having a pool of S at the bottom, on which the inlet gas impinges; (2) a chamber with baffles, alternately hanging and upstanding, retaining pools of S through which the gas must bubble as it passes below the baffles. The chamber and baffles are constructed of good conducting material and are preferably hollow with cooling medium blown through the spaces. The floor rises towards the outlet so that the condensed S continually renews the seals. (Cf. B.P. 419,787—8; B., 1935, 306.) B. M. V.

Treatment of refinery sludges containing selenium and tellurium. O. C. Martin and C. W. Clark (U.S.P. 2,039,256, 28.4.36. Appl., 17.2.34).—Tank-house sludges, anode slimes, etc., containing Se and Te together with Pt, Ag, Au, Cu, etc., are given a sulphating roast at 650—700°; Se and SeO$_2$ are recovered from the fume. The calcine is leached with H$_2$O and Te recovered from the residue by oxidation with dil. HNO$_3$, extraction with aq. NaOH, and pptn. with SO$_2$. Ag is recovered from the aq. leach and the remaining vals. are pptd. from the residual slime. L. C. M.

Production of chlorine dioxide. G. L. Cunningham and B. J. Losch, Assrs. to Mathieson Alkali Works, Inc. (U.S.P. 2,043,284, 9.6.36. Appl., 8.11.34).—Cl$_2$ diluted with air or N$_2$ is passed at 20—25° through 45% aq. NaClO$_2$. A. R. P.

Separating phosphorus. H. A. Curtis, Assr. to Tennessee Valley Authority (U.S.P. 2,039,297, 5.5.36. Appl., 14.5.35).—Hot reaction gases from a P-reduction furnace are continuously treated with lime-water (I) and the fixed gases separated therefrom, any small quantities of P carried forward being recovered by adsorption. The condensed P, sludge, and (I) are allowed to stratify and separated, the (I) being recycled after being brought up to concn., whilst the sludge is dried and incorporated with fresh charging stock for the furnace. D. M. M.

[CO$_2$] gas-testing device.—See I. **Reducing gases.**—See II. **Au from sea-H$_2$O.**—See X. **Decomposing H$_2$O etc. Electrolysis of ZnSO$_4$.**—See XI. **ZnS pigments.**—See XIII. **Fertilisers.**—See XVI.

VIII.—GLASS; CERAMICS.

Heat balance of annular kilns. C. Schmidt (Tonind.-Ztg., 1937, **61**, 479—481).—A very large part of the heat is used in driving off CO$_2$ and H$_2$O. By attending to small losses and recovery of heat from waste gases (as, *e.g.*, for heating ingoing air) appreciable savings can be effected. G. H. C.

Thermal investigation of the fusion of glass. Y. Miyazaki (J. Fuel Soc. Japan, 1937, **16**, 45—46).—A thermal balance for a producer gas-fired regenerative glass furnace is given. The cold thermal efficiency of the producer is 72·9%, and the overall thermal efficiency of glass fusion 12·6%. Of the total heat supplied to the producer, 52·5% is lost from the hearth by radiation, conduction, and convection. H. C. M.

Fining of soda–lime–magnesia glasses. A. E. Badger (Glass Ind., 1935, **16**, 369).—Substitution of CaO for part of the dolomite produced a marked improvement in the fining of the glass melted in closed pots of 2000 lb. capacity. Ch. Abs. (*e*)

Use of [sodium] sulphate in glass making. Anon. (Keram. Runds., 1937, **45**, 226—228).—In a simple lime–soda glass, the progressive replacement of the Na$_2$CO$_3$ (I) by its equiv. of Na$_2$SO$_4$ (II) shortened the time for fusion; the time for clearing was increased by 50% when 25% of the (I) was replaced, but further increase of the (II) had little effect. The resultant glass contained about 0·5% of SO$_3$, irrespective of the amount of (II) used, and did not attack the pot lining. The gases above the melt contained notable amounts of S compounds and are mainly responsible for the corrosion observed when (II) is used. G. H. C.

Glasses coloured by sulphurous matters. I. K. Fuwa (J. Soc. Chem. Ind. Japan, 1937, **40**, 15B).—The effects of adding 0·1—1·0% of S, together with oxidising and reducing agents, to two series of glasses ($1{\cdot}3R'O,R''O,6SiO_2$ and $1{\cdot}3R'O,B_2O_3,6SiO_2$) were examined. The use of K$_2$O produced darker colours than did Na$_2$O, whilst the darkening effect with reducing agents was $>$ that of oxidising agents. Glasses containing PbO were not coloured. T. W. P.

Ruby glass containing copper. I. Sawai and I. Kubo (J. Soc. Chem. Ind. Japan, 1937, **40**, 89—90B).—A rod of Na–Ca glass containing 0·37% CuO was heated in an electric furnace in a current of air. Relations between time of heating and temp. necessary to obtain the required colour are given, and it is shown that the colour is produced at temp $<$ that at which the glass begins to flow, at which point the colour begins to diminish. Results are affected by atm. conditions. C. I.

Art of decorating glass. V. H. Remington (Glass Ind., 1937, 149—152, 195—198).—The spraying process is described. The most suitable vehicles for glass enamels consisting of Pb borosilicate glasses, the spraying apparatus and technique, etc. are discussed. Defects such as blistering, crazing, etc. are described together with the necessary precautions to be taken. The silk-screen process for decoration of ceramic ware is described. Equipment, the prep. of the silk screens, and the optimum procedures are defined. C. L. M.

Determination of the alkalinity imparted to water by ampoule glass. R. K. Snyder and E. N. Gathercoal (J. Amer. Pharm. Assoc., 1937, **26**, 321—328).—The difference in p_H of freshly boiled distilled H_2O before and after autoclaving in the ampoules for 30 min. at 15 lb. pressure should be <0.5; also, the titration val. of 10 g. of the powdered (40—60-mesh) glass should be <0.5 c.c. of $0.02N$-HCl. The phenolphthalein test of the N.F. VI is unsatisfactory. F. O. H.

Physical characteristics and properties of textile materials made from glass. J. H. Thomas (Glass Ind., 1937, 201).—The use of glass fibres for production of yarn and cloth is reviewed. The application to insulation purposes, filtration of acids, etc. is mentioned, together with the possibilities connected with cloths exhibiting fire-resistance, chemical stability, etc. Glass fibres 0·0002 in. in diameter are now produced. C. L. M.

Detection of small amounts of boric acid in glass. H. Gravestein and A. W. F. Middelberg (Mikrochem., Molisch Festschr., 1936, 154—163).—The finely-powdered material (10—20 mg.) is fused with 60 mg. of Na_2CO_3. The melt is dissolved in 3 drops of H_2O, and acidified strongly with HCl, which must be free from NH_4 salts. 1 drop of the solution is evaporated at 70—90° in a crucible covered with a watch glass, on to which H_3BO_3, if present, sublimes in characteristic crystals. The method is suitable for samples with 0·01—1 mg. of H_3BO_3. J. S. A.

Relation between the transformation temperature and the variation in the [refractive] index for several glasses. (Mme.) N. Winter-Klein (Compt. rend., 1937, **204**, 1470—1472).—The higher is the transformation temp., the greater is the max. variation in n. W. R. A.

Mechanical drying in vitreous enamelling. J. H. Hollows (Foundry Trade J., 1937, **56**, 199—200, 202).—The requirements of an efficient dryer and the relative costs of steam, gas, and oil are discussed. R. B. C.

Formulation of enamels. R. Aldinger (Keram. Runds., 1937, **45**, 237—239).—The qualities required in ground- and top-enamels are discussed and exemplified in formulæ for enamelling cooking pots; different top enamels are given for the interior and exterior of the pot, to meet the different conditions which have to be withstood. G. H. C.

Coloured glazes. Anon. (Keram. Runds., 1937, **45**, 250—252).—Formulæ for preparing a wide variety of colours are given. G. H. C.

Size distribution of ceramic powders as determined by a particle-size air analyser. P. S. Roller (J. Amer. Ceram. Soc., 1937, **20**, 167—174).—An effective air separator for particles $<20\ \mu$ consists of a vertical U-tube which is oscillated by impact so that the powder moves in the direction opposite to that of the air jet, which enters at one limb of the tube. The deflocculated particles are blown clear of the main body of powder and do not tend to reflocculate. The baffling of the air jet by the shape of the tube eliminates residual high-speed air currents. The provision of a tapper on the collecting cone (the angle of which is $>$ the angle of repose of the finest powder) greatly accelerates the collection of the powder in the paper weighing-thimbles. The air supply (1·0—1·5 in. Hg) is filtered, and dried for the finest fractions. The importance of controlling the 0—5 μ fraction in ceramic grinding is stressed. Data for the fractionation of flint felspar, pyrophyllite, china clays, talc, and mixtures are recorded. J. A. S.

Talc in whiteware. R. F. Geller and A. S. Creamer (J. Amer. Ceram. Soc., 1937, **20**, 137—147).—Three talcs (CaO 0·3, 1·6, 16·9%) were used in a range of bodies from porous earthenware to vitrified porcelain, fired at 1145—1255°. Extensive physical data (including H_2O-adsorption and moisture-expansion) for bodies containing 14—40% of talc were obtained for comparison with a standard wall-tile body, ball clay 25, kaolin 30, flint 37, felspar 8%. Talc increases the resistance to moisture-expansion and thermal shock, lowers the maturing temp., and decreases the firing range and thermal expansion. Glazes of low thermal expansion would be required. Laboratory and plant-scale tests by pressing and jiggering indicate that these bodies will need a closer control of raw materials, processing, and kilning. J. A. S.

Effect of small additions of bentonite and ball clay to a whiteware mixture. J. W. Whittemore (J. Amer. Ceram. Soc., 1937, **20**, 153—154).—Use of small amounts of bentonite with the ball clay in a body composed of clay 50, quartz 30, felspar 20% increased the plasticity and workability, the dry and fired strengths, the drying and firing shrinkage, and vitrification. The colour of the ware was not adversely affected. J. A. S.

Effects of soluble salts in clay products. B. Butterworth (Trans. Ceram. Soc., 1937, **36**, 233—242).—Finished clay products may contain 0·1—4% of sol. salts (I), *i.e.*, alkali sulphates (usually in small amounts), $MgSO_4$ [responsible for most of the failures due to crystallisation of (I)], and $CaSO_4$ (the most common). "Rusty" staining of mortar joints is caused by decomp. of $FeSO_4$ derived from bricks. Typical failures caused by crystallisation of $MgSO_4$ are described; $CaSO_4$ is less harmful in this respect and is liable to cause failure only in very damp conditions, but its solution may attack Portland cement products, forming (with considerable expansion) Ca sulphoaluminates. This reaction is the cause of failures of cement pipes buried in soil rich in gypsum, and, in certain cases, of the decay of cement mortar and rendering. Remedies for the effects discussed are considered; hard burning of the products reduces the content of (I). A. L. R.

Use of syenites in semi-vitreous ware. II. Plant trials. C. J. Koenig (J. Amer. Ceram. Soc., 1937, **20**, 148—152; cf. B., 1936, 1153).—5-in. plates were produced with the standard china body in which the felspar was replaced by each of two syenites. The greater fluxing power of the syenites was accommodated by (1) replacing the felspar by syenite + an additional 1·5% at the expense of the flint and firing at a lower temp. (cone 4 biscuit + glost), and (2) replacing the felspar by a mixture of syenite 95 + flint 5% or by syenite 65 + flint 35 (in the case of the mineral of higher nepheline content) and firing at the normal temp. (biscuit cone 9, glost cone 5). The plates passed the chipping, impact, heat-shock, and autoclave tests, and ultimate failure was by dunting and not crazing. The warping of the cone 9 bodies was $<$ that of the standard felspar body. The syenite bodies had a higher thermal expansion than the felspar body, but the moduli of rupture and elasticity of both types of body (with the same adsorption, *i.e.*, degree of vitrification) were similar. Photomicrographs illustrate that the mullite development takes place in the nepheline and felspar grains. J. A. S.

Blistering in ceramics. W. Schuen (Tonind.-Ztg., 1937, **61**, 490—491, 504—505).—The causes are: entrainment of air in excessively fatty or harsh clay, reaction of Fe oxide with carbonaceous matter or decomp. of Fe oxide at high temp., formation or liberation of H_2O at high temp., or overburning. G. H. C.

Errors in working up fireclay. R. Rasch (Tonind.-Ztg., 1937, **61**, 511—512, 526—527).—Many failures are due to inadequate ageing and too rapid working, and an incorrect proportion of fine material in the clay. G. H. C.

Drying of bricks. F. Schünhoff (Tonind.-Ztg., 1937, **61**, 512—513).—Advantages of using efficient drying plant are pointed out. G. H. C.

Firing of refractory bricks. R. Klesper (Feuerungstech., 1936, **24**, 174—179; 1937, **25**, 79—83).—The operation and control of gas-fired annular kilns, descriptions of which are given, are discussed. Various types of intermittent furnace for firing SiO_2 bricks are described. The arrangement of the bricks in, and the heating up, control, and coal requirements of, the furnace are discussed. R. B. C.

Manufacture of vitrified bricks in ordinary brickworks. A. Möser (Tonind.-Ztg., 1937, **61**, 465—467).—Since the burning has to be conducted within the range between sintering and fusion, the blending of raw materials and the technique of burning are distinctly different from those usual in brickworks practice and require still closer control; such processes cannot be safely undertaken without a preliminary careful study of local conditions. An annular kiln can be used with careful regulation, but better results are obtained if it is converted into some form of chamber kiln. G. H. C.

Fuel problem of the firebrick industry. S. Fujita (J. Fuel Soc. Japan, 1937, **16**, 46—48).—The thermal efficiencies of the ring, downdraught, and tunnel kilns are compared. It is considered that tunnel kilns, despite their high initial cost, will be increasingly employed owing to their superior efficiency (60—65%). The possibility of using cheaper low-grade coals or coke breeze in place of the lump high-grade coals at present required is discussed. H. C. M.

Refractories for the steel industry. L. J. Trostel (Iron Steel Eng., 1937, **14**, No. 3, 24—35, 46).—A review. R. B. C.

Refractories for iron blast frunaces. R. A. Lindgren (Min. Tech., 1937, **1**; Amer. Inst. Min. Met. Eng., Tech. Publ. 752, 16 pp.).—The problem of disintegration of the refractory bricks forming the shaft of a blast furnace is discussed. Disintegration is caused by interaction of the constituents of the refractory with CO with deposition of C. The amount of Fe and the degree of its oxidation in the brick are important factors determining the life of the lining. If present as Fe_3O_4 little C deposition occurs, but Fe_2O_3 acts as a catalyst for the reaction $2CO \rightarrow CO_2 + C$. W. P. R.

Semi-acid refractory materials. S. A. Tschicharevitsch and G. L. Kogan (Sotz. Rekons. Nauk., 1935, No. 5, 164—165).—Brick for lining open-hearth furnaces made from a mixture of cryst. gravels and plastic refractory clays of low bonding power could be used for more fusions than could the usual refractory brick. Ch. Abs. (*e*)

Suspended, unfired, reinforced roofs for open-hearth and electric furnaces. I. S. Kainarski, B. J. Pines, and S. J. Kozlov (Ogneuporui, 1935, **3**, 661—666).—Roofs of metal-cased magnesite chromite blocks, after a run of 62 hr., were in satisfactory condition. Ch. Abs. (*e*)

Service of silica brick in open-hearth furnaces of the Petrovski plant at Dnepropetrovsk. V. Trubenkov (Ogneuporui, 1935, **3**, 492—498).—The behaviour of roof bricks under operating conditions is described. Ch. Abs. (*e*)

Relationship between structure and life of silica bricks in the roof of an open-hearth steel furnace. V. L. Bosazza (J. Chem. Met. Soc. S. Africa, 1937, **37**, 526—532).—SiO_2 bricks may be classified as (*a*) coarse-grained, with a large proportion of angular particles $>0·5$ cm. in diameter, and $>1\%$ of TiO_2; (*b*) intermediate type, with sub-angular particles and $<1\%$ of TiO_2; and (*c*) fine-grained, with much more rounded particles and $\not>$ a trace of TiO_2. The life is longest with (*a*)-type bricks, in which tridymite twin crystals are found and slag penetration is a min. Thus careful choice of both materials and method of manufacture is necessary. Photographs and diagrams of structures are included. S. J. K.

Silica brick and salt attack. G. E. Foxwell (Gas J., 1937, **218**, 803—804).—No alkali was found to have combined with the material of a brick (containing 93% of SiO_2) which had withstood coke-oven gases for 2 years, whereas bricks containing only 80% of SiO_2 failed in 7 months. Kaolin, quartz, tridymite, and cristobalite were rapidly attacked by fused NaCl. G. H. C.

Properties of moulding sands of Nippon and Manchoukuo. K. Matuzuka (Mem. Ryojun Coll. Eng., 1936, **9**, 223—303).—The properties of various moulding sands as determined by laboratory tests for strength, permeability, bonding, and refractoriness, and by actual casting experiments with cast Fe and steel, are described. W. P. R.

Thermal conductivity of silicon carbide refractory bricks. F. Holler (Wärme, 1937, **60**, 245—251).—The Salmang–Frank, hollow-cylinder method for determining the thermal conductivity (*C*) of refractories is described. The temp. rise is measured of a known quantity of H_2O flowing through a tube lying along the axis of a hollow cylinder of the refractory, heated by external electrical wiring and protected by circumferential and end lagging. Results of tests on various types of SiC brick are discussed. *C* increased with the purity, decreased with excessive burning temp. (due to decomp.) and with increasing porosity, and was higher with caustic magnesite bond than with clay bond. R. B. C.

Savings with insulating refractories. J. G. Coutant (Chem. Met. Eng., 1937, **44**, 137—138).—The properties of Insuline, an insulating refractory made by expanding fireclay so that it contains a large no. of microscopic unconnected cells, are discussed and the fuel economies resulting from its use, particularly in intermittently operated furnaces, are indicated. D. K. M.

Particle packing and shape.—See I. **Coke-oven refractories. Luminous flames** [**in glass-melting**].—See II. **Nepheline syenite.**—See VII. **Galvannealed sheet. Analysis of chromite refractories.**—See X.

See also A., I, 356, η of system $K_2B_4O_7$–B_2O_3 in fused state.

Patents.

Device for stopping melted glass at the outlet of a tank furnace, and installations provided therewith. Comp. Réunies des Glaces et Verres Spéciaux du Nord de la France (B.P. 466,437, 10.2.36. Fr., 28.3.35).—A "register" (guillotine) is cooled by internal H_2O and lowered down inclined guides in its own plane, but it can be displaced slightly out of that plane to permit it being jarred away from frozen glass on the outside. B. M. V.

Tempering of glass. H. Perry and A. W. Grotefeld (B.P. 463,678, 30.9.35 and 7.5.36. Cf. B.P. 449,602; B., 1936, 933).—A continuous sheet-glass heating and chilling device is described. J. A. S.

Manufacture of decorative glass panel. Oxvar, Ltd. From Oxford Varnish Co. (B.P. 463,588, 10.3.36).—A decorative open-colour transfer (*e.g.*, vitreous enamel) is applied to the surface, over which is applied a further contrasting enamel or plastic layer which also serves to bind the panel rigidly, back to back, with another similar panel. An additional laminating layer (decorated, if desired) may be inserted between the plates. J. A. S.

Manufacture of indium-containing glass. W. S. Murray (U.S.P. 2,042,117, 26.5.36. Appl., 26.11.34).—A transparent yellow glass is obtained by fusing a mixture of sand 558, Na_2CO_3 28, Na_2SO_4 212, $CaCO_3$ 202 pts., and In_2O_3 0·5 pt. A. R. P.

Manufacture of clay-puzzuolana. H. Wagner (B.P. 463,453, 21.11.35. Ger., 4.12.34).—The quality of a puzzuolana is improved by burning the clay material (at 550—800°) in an atm. free from S or its compounds, and preferably in an oxidising atm. J. A. S.

Treating and filtering clay slip. D. F. McCormick, Assr. to Kaolin Processes, Inc. (U.S.P. 2,049,071, 28.7.36. Appl., 14.9.33).—The slip is cascaded, applied to a rotary filter, and the cake removed by a doctor and conveyor, all processes being effected in countercurrent contact with a stream of heated air. B. M. V.

Manufacture of composite [**furnace**] **brick.** A. M. Kohler, Assr. to Babcock & Wilcox Co. (U.S.P. 2,050,225, 4.8.36. Appl., 21.5.32. Renewed 21.6.34).—For the production of a combined super-refractory and insulating brick, a single, very refractory slip is mixed with org. particles, aërated, moulded, and dried in aërated condition. The articles are then fired with more intense heat on one face than on the others, that face being rendered very refractory while the rest of the brick still contains voids due both to the air and to the combustion of the org. matter. B. M. V.

Manufacture of refractory articles. A. P. Thurston. From Babcock & Wilcox Co. (B.P. 463,516, 15.5.36).—An aluminosilicate material is mixed with a glass of low m.p. (*e.g.*, 800—1000°) and fired at a relatively low temp. (*e.g.*, 1235°), whereby the glass dissolves one or more of the components and progressively raises its m.p., producing a highly refractory body. J. A. S.

Manufacture of preformed abrasive article. E. S. Merriam (U.S.P. 2,050,112, 4.8.36. Appl., 17.9.35).—Articles formed of abrasive grains, the constituents of a vitreous bond, and combustible material are placed in a retort separated by a supporter of combustion. The internally-generated heat is alone sufficient to vitrify the bond. B. M. V.

Production of a garnet abrasive. R. H. Rizor, Assr. to Mid-West Abrasive Co. (U.S.P. 2,050,212, 4.8.36. Appl., 22.4.35).—Garnet grains are treated with $\not<2$ alkali halides in presence of O_2 at an initial temp. just $<$ the m.p. of the halide mixture and at a final temp. 200° lower (or at 550—850°). Cooling is completed in absence of air. B. M. V.

Presses for manufacture of multi-layer non-splintering glass. A. Kämpfer (B.P. 463,342, 22.1.36. Ger., 21.9.35).

Producing cold-flow.—See I. **Metal–glass seal.**—See X.

IX.—BUILDING MATERIALS.

New developments in firing [**of cement kilns**] **with solid, liquid, and powdered fuels.** H. Jordan (Zement, 1937, **26**, 357—361, 375—378).—A review of recent patents is given. G. H. C.

Tschernoretschenski Portland cement plant. I. E. Baschmatschnikov and J. G. Sokolov (Tzement, 1935, **3**, No. 8, 25—32).—The plant is described. Ch. Abs. (*e*)

Stability of the lining of the Leningrad cement plant. J. S. Lurie and S. I. Vorotuintzev (Tzement, 1935, 3, No. 8, 37—38).—High-grade cement is produced from CaO tuff, clay, and roasted pyrites. The grog brick lining of one kiln was replaced by a clinker–concrete packed lining in the drying and sintering zones. The kiln continued to operate normally after 3 months. Ch. Abs. (e)

Ash from powdered brown coal as a raw material for the production of cement. V. V. Surovtzev and A. S. Rasorenov (Stroit. Mat., 1935, No. 7, 63—71).—The finely-divided ash together with CaO can be used for producing puzzuolanic cements. The mechanical properties are improved by adding 2% of dil. aq. $CaCl_2$ or NaCl. Ch. Abs. (e)

Calculation of the raw materials for cement. V. N. Jung (Tzement, 1935, 3, No. 8, 4—18).—A formula for the saturation of clinker with CaO in ordinary Portland cement is suggested. Ch. Abs. (e)

Calculation of the mixture of raw materials for production of Portland cement clinker. V. A. Kind (Tzement, 1935, 3, No. 8, 19—24).—A crit. review. Ch. Abs. (e)

Constitution of Portland cement clinker. B. Tavasci (Tonind.-Ztg., 1937, 61, 487—490, 502—504).—From the parallelism of their behaviour towards etching agents, alite is considered to be identical with $3CaO,SiO_2$ and belite with $2CaO,SiO_2$ (in α- and β-forms), whilst celite is a mixture of $3CaO,Al_2O_3$ and $4CaO,Al_2O_3,Fe_2O_3$. G. H. C.

Fused cement. II. Mineral constitution of aluminous cement. K. Akiyama (J. Soc. Chem. Ind. Japan, 1937, 40, 139—142B).—In absence of Fe_2O_3, CaO,Al_2O_3 and $2CaO,SiO_2$ were detected in sections of clinker. When Fe_2O_3 is present it forms $4CaO,Fe_2O_3,Al_2O_3$; $2CaO,SiO_2$ cannot be seen. Cements of lower strength appear to contain $2CaO,Al_2O_3,SiO_2$. (Cf. B., 1934, 719, 884.) G. H. C.

Fine-grinding of cement. V. Impact test of clinker. Y. Sanada (J. Soc. Chem. Ind. Japan, 1936, 39, 465B; cf. B., 1936, 372).—The impact crushing strength of common cement clinker is (40—170) $\times 10^5$ dynes, depending on composition, burning conditions, and rate of cooling. G. H. C.

Low-heat Portland cement. M. Fujii (2nd Congr. on Large Dams, Washington, Sept., 1936, Preprint D9, 9 pp.).—The properties, *e.g.*, heat of hydration, alkali-resistance, etc., of a Japanese Portland cement (composition given) are compared with those of standard and rapid-hardening Portland cements. R. B. C.

Magnesian Portland cement. I. L. Lefand and V. V. Serov (Tzement, 1935, 3, No. 7, 7—18).—Conditions for obtaining a const.-vol. magnesian Portland cement are reviewed. Ch. Abs. (e)

Magnesia content of Portland cement. II. Effect of magnesia on preparation of $2CaO,Fe_2O_3$. Y. Sanada and G. Nishi (J. Soc. Chem. Ind. Japan, 1937, 40, 16—17B; cf. B., 1936, 498).—$2CaO,Fe_2O_3$ (I) and MgO,Fe_2O_3 (II) are insol. and free MgO is sol. in a 5% solution of AcOH in MeOH. On heating mixed CaO, Fe_2O_3, and MgO, (I) and (II) begin to form at 800°, but when excess of CaO is present, the (II) decomposes at 1200° into MgO. T. W. P.

Special Portland cements. VI. Burning temperature of manganese–chromium Portland cement. K. Akiyama (J. Soc. Chem. Ind. Japan, 1937, 40, 137—139B; cf. B., 1936, 695).—Cements containing 1·4% of Cr_2O_3 and 1·1% of Mn_2O_3 have good strength when burned for a short time at 1450—1500°, but poor when burned for a longer time or at a temp. $>$1550°. G. H. C.

Action of magnesium salts on puzzuolanic Portland cements. V. V. Kind (Tzement, 1935, 3, No. 7, 42—53).—The cements are sufficiently resistant to aq. Mg salts at concns. $<$1%. Mg salts decompose Ca silicates and aluminates. Free $H^{\cdot}$, formed by hydrolysis, can also enter into the reaction. The slow deterioration of Portland cement is due to the presence of free CaO, which forms $Mg(OH)_2$ with $MgSO_4$ and $MgCl_2$. This also occurs with small puzzuolanic additions. Ch. Abs. (e)

Stability towards mineral salts of puzzuolanic Portand cement with additions of burnt clay. V. V. Kind (Tzement, 1935, 3, No. 8, 42—47).—The stability increases with the addition of burnt clay (20—50%). The product with 40—50% of clay is considerably more stable than pure Portland cement, but less so than the product formed by adding Bryansk diatomite rock. The low stability is probably due to formation of Ca sulphoaluminate. Ch. Abs. (e)

Puzzuolanic cements and their control. Q. Sestini (Annali Chim. Appl., 1937, 27, 105—141).—A survey of methods used in their manufacture and control. O. J. W.

Theory of hardening of lime–puzzuolana cements. V. N. Jung (Stroit. Mat., 1935, No. 8, 3—18).—These cements harden very slowly owing to the formation of adsorption systems of indefinite composition, which are converted into amorphous, gelatinous, hydrated silicates. In air-drying, the strength begins to fall on carbonation. In CaO–sand brick, subjected to steam under pressure, concretions of cryst. hydrated silicates are formed, which, on carbonation, form cryst. calcite concretions without decrease of strength. The hardening of CaO–basic slag cement is followed by a colloidation of slag under the influence of aq. $Ca(OH)_2$. CaO–slag cements are much less subject to carbonation than those containing CaO–puzzuolana, on account of the density of colloidal formations. Ch. Abs. (e)

Report of Working Committee [American Society for Testing Materials] on volume change and soundness of Portland cement. H. F. Gonnerman (Proc. Amer. Soc. Test. Mat., 1936, 36, [I], 225—251).—The expansions of neat cement bars, one day after removal from the mould, were measured when stored in air, in H_2O at 21—24°, in steam over boiling H_2O, and in steam at 175° (autoclave). Free CaO appears to be the principal cause of expansion; only relatively slight increases were due to MgO and $Ca_3(PO_4)_2$. R. B. C.

Special cement. W. T. Halcrow and F. M. Lea (2nd Congr. on Large Dams, Washington, Sept., 1936, Preprint D11, 19 pp.).—Practical experience on the use of low-heat cements in Great Britain is not available. Tests on heat evolution carried out on concrete, using two forms of adiabatic calorimeter, and on neat cement, by the heat-of-dissolution method, are described. A simple adiabatic calorimeter has been developed and found satisfactory. Tests on the solubility of cements carried out by the Swedish extraction method (*A*) with ground set neat cement, by percolation methods with lean mortar plaques, and by Rengade's method, in which mortar specimens are subjected to the action of a H_2O jet, showed that *A* was simple in operation and gave good reproducibility. R. B. C.

Special cement. O. Kallauner (2nd Congr. on Large Dams, Washington, Sept., 1936, Preprint D42, 7 pp.).—The chemical analyses, heat of hydration, and properties of various Portland and special cements manufactured in Czechoslovakia for H_2O-retaining structures are given. R. B. C.

Special cements for hydraulic structures. W. A. Kind (2nd Congr. on Large Dams, Washington, Sept., 1936, Preprint D23, 23 pp.).—Portland blast-furnace cement or puzzuolanic Portland cement with acid hydraulic admixtures is superior to normal Portland cement for this purpose. R. B. C.

Special cements for hydraulic works and large dams. O. Hoffmann and C. Semenza (2nd Congr. on Large Dams, Washington, Sept., 1936, Preprint D61, 11 pp.).—Italian types are described. R. B. C.

Special-cement tests. F. Vogt and J. Rutle (2nd Congr. on Large Dams, Washington, Sept., 1936, Preprint D28, 16 pp.).—Notes on the determination of the bending strength, shrinkage, and creep of cements are given. R. B. C.

Methods of testing cement in regard to heat of hydration, action on cement by water percolating through concrete, shrinkage, permeability, and workability. Internat. Sub-Commee. on Special Cements for Large Dams (2nd Congr. on Large Dams, Washington, Sept., 1936, Preprint D43, 102 pp.).—Experimental work is described and tentative specifications based thereon are given. R. B. C.

Influence of temperature of drying of blast-furnace slag on the hydraulic properties of slag cement. V. J. Eremenko (Tzement, 1935, **3**, No. 6, 36—40).—In slag containing 46—47% of CaO, drying temp. of 600—1000° decrease the mechanical strength of the cement, but the rate of decrease falls with rising temp. The decrease is limited to the early hardening period. The setting time decreases only slightly. A drying temp. of 800° is recommended. Ch. Abs. (*e*)

Fifty years' experience of concrete in Norwegian dams. K. Baalsrud and K. Friis (2nd Congr. on Large Dams, Washington, Sept., 1936, Preprint D27, 9 pp.).—The effects of pure or acid H_2O under pressure and frost on Portland cement concrete are discussed. R. B. C.

Effect of internal temperature of gravity dams on the strength of concrete. E. Ishii (2nd Congr. on Large Dams, Washington, Sept., 1936, Preprint D1, 16 pp.).—An investigation was made of the strength developed in mortar and concrete cured at 20—70° for 1 year. Samples cured at 40—50° had the highest strength at early stages. This difference decreased with time, all samples having approx. the same strength after 90 days. R. B. C.

Temperature effects in mass concrete. N. Davey (2nd Congr. on Large Dams, Washington, Sept., 1936, Preprint D10, 19 pp.).—Factors determining temp. rise in a mass of setting concrete are discussed. The temp. rise and strength developed in hardened concrete is higher at the centre than at the edges except in the case of high-alumina cement, where the strength is lower at the centre. R. B. C.

Internal stresses in concrete. A. Pogány (Zement, 1937, **26**, 396—397).—The spatial development of the set was followed by Vicat needles applied simultaneously at various points of cement–sand models representing various sections commonly used in concrete construction which had been cut through at various intervals after pouring. Setting usually proceeded outwards from within, and the form of the set core depended little on the form of section, but considerably on the composition of the cement and the mix, and was considerably disturbed at points where the section changed abruptly. G. H. C.

Determination of tensile strength from the bursting pressures of hollow concrete cylinders. A. Pogány (Zement, 1937, **26**, 397—398).—The stress distribution is simpler than for the conventional H-shaped test-piece. If $P =$ bursting pressure (kg./sq. cm.), and b and $c =$ the external and internal radii (cm.), then tensile strength $= 2Pc^2/(b^2 - c^2)$. An apparatus for measuring P is described. G. H. C.

Influence of addition of powdered stone to the cement on the qualities of concrete. J. Bolomey (Sci. et Ind., 1936, **20**, 385—389; Road Abs., 1937, **4**, No. 126).—The strength of concrete containing stone dust is reduced in proportion to the reduction of cement content. The strength of 1 : 3 cement–standard sand mortars is not reduced to the same extent, probably because of the porous, inhomogeneous nature of the mortar. Admixture of stone dust to neat cement mixes increases the shrinkage; this effect is smaller in concretes. The effect of frost action on concrete containing stone dust is $>$ that on ordinary concrete. T. W. P.

Effect of calcium and sodium chlorides on concrete when used for ice removal. H. F. Gonnerman, A. G. Timms, and T. G. Taylor (Proc. Amer. Concrete Inst. J., 1936, **8**, 107—122; Road Abs., 1937, **4**, No. 78).—Concrete of normal composition, aged up to 35 days, scales badly when ice is repeatedly removed by means of NaCl or $CaCl_2$. Repeated application of these solutions produces scaling even in absence of freezing. A protective measure is described in which the surface of the dry concrete is brushed and treated with boiled linseed oil thinned with turpentine, followed after 24 hr. by an application of near boiled linseed oil. T. W. P.

Crystalline masses from Tschardzhui loesses for production of paving blocks. P. S. Kuten (Stroit. Mat., 1935, No. 7, 43—45).—Loess (SiO_2 49·26, Al_2O_3 11·25, TiO_2 0·53, Fe_2O_3 6·62, Mn_3O_4 0·36, CaO 12·75, MgO 3·34, SO_3 0·19, K_2O 2·07, Na_2O 1·27, ignition losses 12·95%, m.p. 1140°) was heated at 1350—1400° and cast mechanically into metal moulds. To obtain a cryst. structure the blocks were annealed at 500—1000° for 10·5—12·5 hr. They had a crushing strength of 5400 kg. per sq. cm. and other good mechanical properties. Ch. Abs. (e)

Crushing experiments on cement mortar and [clay] bricks. F. Hönig (Z. Ver. deut. Ing. Beih. Verfahrenstech., 1937, No. 1, 21—26).—The results of static and dynamic crushing tests carried out on cubes of the above are tabulated. The materials were found to obey Rittinger's law. R. B. C.

Chemical investigation of building materials. H. Wagner (Chem.-Ztg., 1937, **61**, 265—267).—The analytical control of material used in cements, concrete, etc., and the investigation of the corrosive action of soils, natural H_2O, etc. on building materials, are reviewed. J. S. A.

Carbon dioxide in testing [building] lime. H. Hecht, M. Pulfrich, and W. Hornke (Tonind.-Ztg., 1937, **61**, 477—479).—Reproducible compressive strengths were obtained with cylinders (35 mm. × 37 mm. diameter) made of 1 : 5 (pts. by wt. of CaO and standard sand) mortar gauged with 8% of H_2O and kept for 24 hr. in air and 4 hr. in an atm. consisting of 2 vols. of air and 1 vol. of CO_2, saturated with H_2O. The grading of the sand and the H_2O content are important, and these conclusions apply only to white, and not to hydraulic, limes. G. H. C.

Concrete roads. G. Brusch (Chem.-Ztg., 1937, **61**, 513—515).—A review.

Experimental bituminous treatment of sandy-soil roads. P. F. Critz and H. F. Sligh (Publ. Roads, 1937, **17**, 249—278; Road Abs., 1937, **4**, No. 57).—A detailed account is given of tests of a method for the stabilising of sand, silt, or sand–clay soils by tar or bituminous products. Subsequent observations on the treated surfaces are given, the following conclusions being reached. The durability of the surface depends largely on the character and drainage of the subgrade. With loose, poorly graded or unstable soil, the strength must be derived from the binder. The time required for loss of volatile matters from cut-back asphalts and low-η tars was > was expected, probably due to the formation of a viscous sealing layer on the surface. Slow-curing oils which retain fluidity over long periods do not possess sufficient stabilising power to compensate for weakness of the aggregate, but mixtures containing them retain plasticity under traffic. Medium-η tars behaved in a similar way to cut-back asphalts, but stabilisation was more uniform. The surface treatment of a non-stabilised base which had received a priming coat gave satisfactory results except for the development of surface roughness. T. W. P.

Surface treatment with mixtures of tar and rock asphalt. A. di Renzo (Strade, 1937, **19**, 104—107; Road Abs., 1937, **4**, No. 81).—A detailed description is given of experimental road dressings. T. W. P.

Adhesion of cut-back bitumens to stones. W. Geissler and H. Kleinert (Asphalt u. Teer, 1936, **36**, 481—483, 500—503, 533—538; Road Abs., 1937, **4**, No. 118).—The commercial cut-backs were mainly fluxed with bituminous coal-tar oils. The evaporation of the fluxing oils from surfacing mixes ceased after about 35 days, leaving about half of these oils in the mixes. Adhesion was not affected by evaporation of the oils or by dry-air storage. T. W. P.

Boiling test for adhesion [of bituminous binders to stones] according to Riedel and Weber, and practice. J. Oberbach (Teer u. Bitumen, 1936, **34**, 271—274, 287—291; Road Abs., 1937, **4**, No. 119).—The test and theory are discussed. It is concluded that the behaviour of stones towards such binders in presence of H_2O depends more on mechanical, cryst., and other properties of the former, rather than on their chemical character. For studying the stone–binder relations, the H_2O test (immersion in H_2O at room temp. of stone covered with a thin film of binder) should be used. T. W. P.

Suggestions on new experimental uses for roof coatings. H. A. Gardner (Sci. Sect. Nat. Paint, Var. Assoc., Inc., May, 1937, Circ. 533, 171—176).—Powdered metals (Al, Cu, Zn, etc.) and exfoliated jeffersite are sprinkled on bituminous paints before they are quite dry. Resistance to "bleeding" is obtained with a coating of an alkyd emulsion paint. S. M.

Wood–water relationships. III. Molecular sorption of water by Sitka spruce wood. W. W. Barkas (Proc. Physical Soc., 1937, **49**, 237—242; cf. B., 1936, 837).—The apparent mol. sorption of H_2O by Sitka spruce flour is const. at about 23% of the dry wt. of the wood, over a period of 83 days, when a sucrose solution is used as indicator, but with NaCl solutions there is a gradual fall of apparent sorption to 5% after 14 days. This fall is attributed to slow sorption of the NaCl and not to a low mol. sorption val. The low val. deduced by Stamm (cf. B., 1935, 408) is discussed. N. M. B.

Structure, occurrence, and properties of compression wood. M. Y. Pillow and R. F. Luxford (U.S. Dept. Agric. Tech. Bull., 1937, No. 546, 32 pp.).—The lignin content of compression wood is slightly >, and the cellulose content <, that of normal wood. A. G. P.

Sampling of wood for analysis, with particular reference to the Australian eucalypts. W. G. Campbell and S. A. Bryant (Biochem. J., 1937, **31**, 748—754).—The "kino" of the living jarrah tree differs from the product normally present in seasoned timber and, on grinding and screening, tends to concentrate in the fraction of smallest particle size. Under certain conditions this fact is shown to have little significance in sampling of wood for analysis. Any grinding operation tends to detract from the accuracy of cellulose and lignin determinations, the effects being most marked in particles of smallest size. Grinding should be regulated so as to produce a min. of fine dust, and this should be discarded. Selection of the 80—100- or 60—80-mesh fraction of wood flour for analysis probably cannot be improved on. P. W. C.

Determination of pentosans in the analysis of woods. I. Gravimetric determination of furfuraldehyde. W. G. Campbell and L. H. Smith (Biochem. J., 1937, **31**, 535—544).—The gravimetric determination of furfuraldehyde (I) by means of thiobarbituric acid (II) is critically examined and compared with that by phloroglucinol (III). The high results obtained in determinations by (II) are probably due to adsorption of (II) by the condensation product and to the slight solubility of the latter in 12% HCl. Distillation of certain hardwoods and of one softwood with 12% HCl gave rise to little or no hydroxymethylfurfuraldehyde (IV), so that substitution of (II) for (III) had no special advantage. Certain softwoods do yield appreciable amounts of (IV) and the condensation product with (II) is then granular and readily peptised by washing and cannot be collected quantitatively. (II) is therefore regarded as unsuitable as a general precipitant for (I) and the substitution of diphenylthiobarbituric acid is suggested. P. W. C.

Wood preservatives. N. A. Richardson (Dept. Sci. Ind. Res., 1937, Forest Prods. Res. Rec. 17, Ser. 3, 13 pp.).—The composition, properties, and uses of preservatives are discussed under the three types: oil (creosotes), H_2O-sol. (inorg. compounds), and solvent (toxic org. compounds dissolved in volatile oils). Factors affecting the choice of preservative are briefly discussed. E. A. R.

Characteristics of aggregates.—See I. **Materials for gasworks construction. Non-toxic road tar. Bituminous limestone. Asphalt mixtures.**—See II. **Pretreatment of wood.**—See V. **Effects of sol. salts in clay products.**—See VIII. **Phenolated pilchard oil.**—See XII. **Soya-bean meal as adhesive.**—See XV.

See also A., I, 371, **Hydration of Ca aluminates and cements.**

Patents.

Cement-handling plant. H. E. McCrery, Assr. to Blaw-Knox Co. (U.S.P. 2,048,877, 28.7.36. Appl., 12.9.33).—Apparatus for storing and measuring cement and aggregate is described. B. M. V.

Manufacture of slag cement. G. Witty (U.S.P. 2,049,881, 4.8.36. Appl., 26.9.35).—A cement equal in quality to Portland cement is formed by mixing dry, without further calcination, granulated blast-furnace slag 100 pts. by wt., CaO 20, calcined bauxite 10, felspar 5, $CaCl_2$ 3, $MgSO_4$ 2. B. M. V.

Cement improver. C. R. Rex (U.S.P. 2,048,967, 28.7.36. Appl., 21.3.32).—The additions have lubricating properties and help to eliminate voids when admixed with cement concrete, or they can be used alone as cement. Limestone or dolomite is burned (at 900—1000°) to leave 5—7% of carbonate and is then slaked in an aq. solution of a chloride of a less powerful base than Ca (*e.g.*, $MgCl_2$), H_2O being in excess to prevent the temp. rising above 105°; the presence of a borate is advantageous. The final dry powder should comprise MgO 22, $Ca(OH)_2$ 40, $CaCO_3$ 6, $Mg(OH)_2$ 1·5 pts.; $MgCl_2$ and oxychlorides should be absent. B. M. V.

Coating for concrete. A. Hartvedt (U.S.P. 2,048,932, 28.7.36. Appl., 7.9.35).—A rendering for concrete blocks or walls comprises Portland cement 100, Na_2HPO_2 4, $CaCl_2$ 6 lb., and H_2O to make fluid enough for application by gun or brush. B. M. V.

Composition for colouring and waterproofing concrete and the like. F. E. Miller (U.S.P. 2,047,426, 14.7.36. Appl., 1.4.35).—A composition for application to the surface of concrete comprises a dye dissolved in EtOH, an aromatic hydrocarbon (toluol), and a bituminous material (coal tar or asphalt) rendered dispersible by means of a heavy-metal soap. B. M. V.

Building tile. G. Witty (U.S.P. 2,049,882, 4.8.36. Appl., 30.9.35).—High-MgO lime 40, $CaSO_4$ 10, ground blast-furnace slag 70, quartz 24, pigment 5 pts., and calcined Na_2SO_4 1 pt. are mixed with H_2O to a moulding consistency, in a concrete mixer. B. M. V.

Acoustic material. J. Dean, Assr. to D. Campbell (U.S.P. 2,049,832, 4.8.36. Appl., 10.4.34).—The composition comprises granulated naval cork 8, granulated pumice 4, powdered "magnesia" asbestos 1 lb., and 7% rubber solution 1 gal. (U.S.). B. M. V.

Alkali silicate heat- and sound-insulating composition. N. M. Elias (U.S.P. 2,047,016, 7.7.36. Appl., 26.9.30).—The composition comprises microcellular, insol. alkali borosilicate, either anhyd. or with 10—30% of combined H_2O formed by mixing solutions of the two salts and heating the resulting solid in block form until the desired H_2O content is attained; the blocks are used as such or after breaking into granules, which may be united by cement. B. M. V.

Fire-resistant, porous insulating material. H. L. Becher, Assr. to Agasote Millboard Co. (U.S.P. 2,047,187, 14.7.36. Appl., 19.11.34).—94% of exfoliated vermiculite is mixed with viscose solution to form 6% of gelatinised cellulose. B. M. V.

Manufacture of moistureproofed moulded article. R. G. Lemmerman, Assr. to Ferro Eng. Co. (U.S.P. 2,039,172, 28.4.36. Appl., 27.2.34).—Absorption of H_2O and consequent crumbling of artificial stone articles bound with Na silicate is prevented by addition of Fe^{II}, Al, Zn, or Cu sulphate to the mixture containing, *e.g.*, aggregate 80—94, aq. Na silicate (35—40) 6—20, and $FeSO_4$ $\not>$0·7%. L. C. M.

Production of bituminous road mixtures. L. Kirschbraun, Assr. to Patent & Licensing Corp. (U.S.P. 2,046,902, 7.7.36. Appl., 22.8.31).—Mineral aggregate and soap-stabilised asphalt emulsion are mixed with agitation until the aggregate is uniformly coated, and a destabilising agent (weak acids or their

NH_4 salts; amphoteric oxides, *e.g.*, ZnO) is added with continued agitation to such an extent as to produce delayed breakdown of the emulsion.
B. M. V.

Manufacture of bituminous paving materials. D. M. Hepburn and S. S. Sadtler, Assrs. to Hepburnite Corp. (U.S.P. 2,049,772, 4.8.36. Appl., 25.11.31).—Mineral aggregate is mixed, in succession, with a mixture of highly penetrative bitumen and a slowly volatile solvent, a small quantity of partly neutralised fatty acid, and a small quantity of solid bitumen powder which is also sol. in the same solvent. All operations including laying the paving and evaporation of solvent take place at room temp., it being intended that the former be effected before the latter is complete.
B. M. V.

Manufacture of plywood. J. V. Nevin (B.P. 466,485, 7.8.36. U.S., 12.8.35).—The core ply or plies is/are coated with a no. of coats of an aq. solution of a partly condensed resin (*e.g.*, cresylic acid and an aldehyde), each coat being dried to $\ngtr 4\%$ of H_2O; the final coat is then humidified to 15—40% of H_2O and the veneer applied with heat and pressure. Finally the whole may be humidified to 8—12% of H_2O.
B. M. V.

Production of concrete road surfaces. A. Holter (B.P. 467,457, 29.6.36. Norw., 24.10.35).

Waterproofing and lining tunnels and other structures. W. Briggs & Sons, Ltd., and G. A. March (B.P. 466,223, 13.12.35).

Producing cold-flow. Determining moisture.—See I. **Hard boards.**—See V. **Asphalt plastic.**—See XIII.

X.—METALS; METALLURGY, INCLUDING ELECTROMETALLURGY.

Magnetic dressing of Lower Silesian bog-iron ore. W. Luyken and L. Kraeber (Mitt. Kaiser-Wilh. Inst. Eisenforsch., 1936, **18**, 35—41).—Procedure for concn. by magnetic separation is described.
E. S. H.

Complete analysis of chrome-iron ore and chromite refractories. W. Erber (Angew. Chem., 1937, **50**, 382—383).—Fusion with $Na_2S_2O_7$ is recommended. Attack is rapid and leads to complete separation and insolubilisation of SiO_2 with one fusion.
J. S. A.

Morphology of the inclusions in siderurgical products. IV. Titanium, zirconium, and vanadium steels and alloys. V. General conclusions. A. M. Portevin and R. Castro (Iron and Steel Inst., Apr., 1937. Advance copy No. 12, 22 pp.; cf. B., 1936, 1098).—IV. In presence of O_2 Ti gives rise to TiO_2 inclusions which occur as small globules. At steel-working temp. they are non-plastic and are not drawn out in rolled steel. In presence of S small additions of Ti affect the distribution (but not the appearance) of MnS. For larger additions of Ti the sulphide appears as hard small particles which are not sol. in 5% H_2SO_4. Ti has a strong affinity for N and C and both Ti_2N_2 and $Ti_2(CN)_2$ can be distinguished in steels. ZrO_2 is seldom seen in steels as the Zr is usually added in the form of a Si-Zr alloy to act as a deoxidant and the inclusions formed are of SiO_2–ZrO_2. Zr sulphides have similar characteristics to MnS, but they are not attacked by HCl. ZrN and ZrC are sometimes classified as inclusions, but strictly speaking they should be considered more as phases similar to intermetallic compounds.
W. P. R.

Open-hearth furnace operation—four million B.Th.U. per ton. E. H. Schwartz and G. E. Rose (Iron Steel Eng., 1936, **13**, 1—8).—A review.
Ch. Abs. (*e*)

Cupola operation. H. H. Shepherd (Foundry Tr. J., 1937, **56**, 113—115, 139—140).—The cupola lining, the height of the coke bed, and C and S pick-up etc. are discussed.
R. B. C.

Behaviour of manganese in the cupola. M. T. Davis (Trans. Amer. Foundrymen's Assoc., 1936, **49**, 592—605).—Loss of Mn from the cupola during treatment of high-test cast Fe was investigated. Loss varied from 25 to 40% and was greatest at high temp. Addition of Mn to the charge to allow for loss is not recommended.
R. B. C.

Five years of progress in southern blast-furnace practice. F. H. Crockard (Amer. Inst. Min. Met. Eng., 1935, Tech. Publ. 653, 20 pp.).—A review.
Ch. Abs. (*e*)

Basic open-hearth slag an important by-product at the Ensley Works. R. L. Bowron (Min. & Met., 1937, **18**, 198—199).—The Fe produced in the blast furnaces at these works contains Si 0·8—1·3, P 0·8—0·85, and Mn 0·44—0·55%. Practically all the Si, C, and Mn are removed in bessemerising with an acid slag; this slag is removed and replaced by CaO for the P blow. The basic slag from this operation contains Fe 20·9, Fe_2O_3 7·3, Si 6·5, Al_2O_3 1·8, CaO 46·2, MgO 1·9, Mn 6·2, and P_2O_5 14·4% (citrate-sol. 11·5%). About 97% of the P is recovered in 10 tons of slag from 110 tons of Fe treated; the slag is ground with a low-P_2O_5 slag to give a product (80% through 100-mesh) containing 8—12% P_2O_5.
A. R. P.

Rhythmic crystallisation in slags. F. Roll (Kolloid-Z., 1937, **79**, 221—222).—Examples of banded crystallisation in slags from a cupola furnace are given. The cryst. portions contain less Fe than the vitreous.
F. L. U.

Use of sound and supersonic waves in metallurgy. Experiments in clearing fume, fog, and smoke. V. H. Gottschalk and H. W. St. Clair (Min. & Met., 1937, **18**, 244—247).—The coagulating effect of supersonic waves on aërosols is explained with reference to recent work.
A. R. P.

Application of *X*-rays to metallurgy. R. Michaud (Rev. Mét., 1937, **34**, 195—203).—The determination of the degree of orientation and of crystal size by means of *X*-ray spectrographs does not suffice to indicate the magnetic properties of 3—4% Si-steel transformer sheets. The optimum annealing temp. and time of Al rolled sheets are quickly determined by means of *X*-rays.
W. P. R.

Sponge-iron experiments at Mococo. C. G. Maier (U.S. Bur. Mines, 1936, Bull. 396, 81 pp.).—

The experimental production of sponge Fe from leached pyrite cinder (52% Fe) is described. With natural gas in view, C_4H_{10} was used as fuel; this, mixed with air preheated to 700°, was passed through alundum granules containing Ni, which converted it into a suitable reducing gas, viz., H_2 30·5, CO 21·8, N_2 44·4, CH_4 0·5, CO_2 0·8%, having a temp. of 1000—1050°. Reduction was carried out in a rotary kiln provided with a lining and central fire-tube of alloy steel. A 90% reduction was readily obtained; addition of 5% of CaO was made in order to prevent sticking. Removal of Zn was nearly complete. Pre-roasting of the pyrite cinder is necessary, to remove S''. Magnetic concn. of the product lowered the insol. content to 2%. A trial open-hearth heat for production of low-C rimmed steel from the sponge Fe proved very satisfactory. The ladle analysis of the steel was: C 0·07, Mn 0·33, P 0·009, S 0·037, Cu 0·39%, Sn trace, Zn nil. The ingots made were quite normal, and when rolled into sheet and drawn into wire gave products as good as those from commercial stock. S. J. K.

Equilibria in the carburising of iron by gases. O. Madono (Bull. Inst. Phys. Chem. Res. Japan, 1937, **16**, 258—264).—Reactions involved in the carburising of Fe by CO are discussed. It is shown that the C content of Fe during carburisation cannot exceed that corresponding to a saturated solid solution of Fe_3C. C. R. H.

Physical and mechanical properties of pure iron as as a function of cold-working. W. Broniewski and I. S. Glotz (Compt. rend., 1937, **204**, 1473—1475).—Variations in physical properties occur mostly in the initial phase of cold-working and in the last (third) phase. The intermediate phase behaves as a mixture of the two other phases. Mechanical and magnetic properties show the greatest changes on cold-working. Other properties, although not sensibly altered, do show the greatest variation in the third phase of cold-working. W. R. A.

Heat-treatment of cast iron. J. E. Hurst (Iron Steel Ind., 1937, **10**, 285—288, 325—327).—N_2- and surface-hardening are discussed. R. B. C.

Heat-treatment of cast iron. E. Piwowarsky and E. Söhnchen (Giesserei, 1937, **24**, 97—106).—Results of experiments on various types of cast Fe are discussed. By oil-quenching and tempering the strength could be raised to 60 kg./sq. mm. Samples containing the lowest % of C + Si responded best. The composition ranges in which the properties of chill-castings were superior to those of sand-castings were investigated. Addition of Ni, Cr, and Mo improved the mechanical properties, especially in the cast and annealed condition. The wear-resistance of grey cast Fe was raised by quenching. R. B. C.

Hardening of cast iron by heat-treatment. J. S. Vanick (Met. Progr., 1936, **29**, No. 1, 40—43).—The treatment of typical cast irons is described. Ch. Abs. (*e*)

Influence of silicon, phosphorus, and manganese on nitrogen-hardening cast iron. J. E. Hurst (Iron and Steel Inst., Apr., 1937. Advance copy No. 8, 10 pp.).—Cast Fe containing Al and Cr can be hardened by the nitriding process. A variation of the Si content up to 5% has no effect on the max. surface hardness, but depth of penetration decreases with increase of Si $>$ 0·20%. P results in a lower surface hardness, but the total depth of the hardening effect is not altered. Mn does not appear to affect either the hardness or penetration. N_2-hardening at 500°, 550°, and 600° of the Si specimens showed that the highest and most uniform hardness results were obtained at 550°, and that the penetration increased with rise of temp. Growth also increased with rise of temp., but was independent of the Si and Cr contents. At 600° the nitrided case was hard and brittle. W. P. R.

Spatial form of graphite [in cast iron]. F. Roll (Giesserei, 1937, **24**, 206—208).—Investigation by means of dye impregnation or the chemical dissolution of the Fe is difficult, and the latter method does not preserve the shape of the individual graphite flakes. The solid form of the flakes is well shown by preparing transparencies of micrographs of parallel sections and binding these together in register. C. E. H.

Hydrogen-permeability of cast iron and its decarburisation by hydrogen. W. Baukloh and F. Springorum (Metallwirts., 1937, **16**, 446—449; cf. B., 1936, 105, 236, 500; 1937, 558).—The H_2-permeability (P) of cast Fe is $\gg$ that of 0·85% C steel, and is increased by raising the temp. and Si content. P depends largely on the form of the graphite flakes, which is also influenced by Si. At 600°, P increases with time up to a const. val. depending on H_2 pressure. Decarburisation is affected by the above factors in the same way as P. Attack by H_2 is reduced by an Al–Fe alloy coating, and is less on white than on grey Fe. C. E. H.

Cast iron and its applications in engineering. A. Campion (Trans. Inst. Eng. and Shipbuilders, Scotland, 1937, **80**, 156—195).—The production of special types of cast Fe, *e.g.*, Mechanite, and examples of their application in place of cast steel are described. R. B. C.

High-duty alloy cast iron. A. B. Everest (Foundry Trade J., 1937, **56**, 265—267, 273).—The production, heat-treatment, and properties of special cast Fe, *e.g.*, Ni-Tensyl and Ni-Hard, are discussed. R. B. C.

Wire ropes for mines. M. A. Hogan (Bull. Inst. Min. Met., 1937, No. 391, 35 pp.).—The manufacture and the properties of ropes in relation to working conditions are discussed. R. B. C.

Effect of fibre cores on internal corrosion in colliery winding ropes. J. E. O. Mayne (Safety in Mines Res. Bd., 1937, Paper 97, 38 pp.).—Internal corrosion can take place without penetration of the rope by H_2O containing salts or acids, and it is shown that Manila and other fibres used for cores are liable to develop HCO_2H and AcOH as a result of bacterial action, which can corrode wire ropes in presence of H_2O, even in absence of O_2. Pressure between wire and core accelerates attack since it tends to remove the protective batching and impregnating oils used in core manufacture. Most of the harmful acid can be removed from the raw Manila fibre by cold-H_2O

treatment, and it is suggested that subsequent bacterial action might be prevented by treating the washed fibre with an antiseptic which would not corrode steel. The practicability of these preventive measures has not yet been demonstrated. A. J. K.

Grain size and its influence on the manufacture of steel wire. B. L. McCarthy (Iron Age, 1935, **136**, No. 15, 14—19; No. 16, 23—27, 80—82).—A review. Data for grain size of different carburising temp., after various additions of Al, are recorded. Ch. Abs. (*e*)

Grain size [in steel]. C. H. Herty, D. L. McBride, and E. H. Hollenback (Trans. Amer. Soc. Met., 1937, **25**, 297—314).—The grain size (*G*) which determines hardenability is that present in steel at the moment of quenching. For a given analysis hardness penetration is directly ∝ the grain surface area per unit vol. of steel at the quenching temp. The surface area is a function of *G*. Surface hardness is independent of *G* provided the crit. cooling rate is exceeded. This rate is higher for fine- than for coarse-grained steels. If the rate is decreased below the crit. val. soft spots occur. R. B. C.

Control of steel production on the basis of grain size. P. P. Tschitschkanov and K. K. Vinogradov (Zavod. Lab., 1937, **6**, 74—76).—The size of austenite grains formed during tempering varies according to the conditions under which the alloy was formed. R. T.

Three-dimensional diagram connecting grain size, temperature, and carbon content of steels. I. S. Gaev and B. S. Gendler (Zavod. Lab., 1937, **6**, 71—73).—A diagram connecting grain size of γ-Fe with temp. and C content is given. R. T.

Galvanised and galvannealed sheets. J. L. Schueler (Met. Progr., 1937, **31**, 499—503).—Galvannealing differs from galvanising in that the Fe sheet leaving the Zn pot is passed into a heat-treating furnace at >650° without cooling. Galvannealed sheet requires no etching treatment before enamelling or painting and is more resistant to corrosion than galvanised sheet. R. B. C.

Various conditions of ordinary steels, annealed, quenched, hyperquenched, and intermediate states, according to dilatometric cooling curves. J. Seigle (Génie Civil, 1937, **110**, 11—14).—The effects of various cooling and quenching methods on the properties of steels are discussed. R. B. C.

Strength of steel at blue-heat temperatures. W. Enders (Arch. Wärmewirts., 1937, **18**, 83—85).—The strength of steel in the range 100—300° is discussed. Significant alterations in strength are caused by small differences in chemical composition. R. B. C.

Influence on steel of hydrogen absorbed by the melt. P. Bardenheuer and E. H. Keller (Mitt. Kaiser-Wilh. Inst. Eisenforsch., 1936, **18**, 227—237).—When H_2 is passed through molten steel the content of C, S, or P is not influenced, but reaction with O occurs. Excess of H_2 in the steel is removed only slowly. The embrittling of C- and Ni–Cr-steel by absorption of H_2 is described. E. S. H.

Rôle of gas in metals. A. Portevin, G. Chaudron, and L. Moreau (Compt. rend., 1937, **204**, 1252—1254; cf. A., 1935, 905).—The variations in hardness, conductivity, and crystal parameters of Fe, deposited electrolytically, have been studied on changing the content of H_2 in the metal. The removal of H_2 by degassing does not alter the properties, but annealing reduces hardness without a notable loss of gas. On charging with H_2, the electrical resistance (*R*) increases and the ductility decreases. A similar variation in *R* occurs with Al. R. S. B.

Ageing of steel. E. S. Davenport and E. C. Bain (Trans. Amer. Soc. Met., 1935, **23**, 1047—1093).—C ageing is caused by random pptn. of Fe carbide from ferrite supersaturated with C. Strain ageing is caused by the rejection of an Fe–O compound from ferrite which is apparently supersaturated with O_2, in the slip bands of cold-worked grains. Ch. Abs. (*e*)

Overstressing and understressing [of steels] in fatigue. J. B. Kommers (Engineering, 1937, **143**, 620—622, 676—678).—Two steels were studied containing 0·27 and 0·62% C, respectively. The endurance limit is not a fixed quantity; this val. and the subsequent life at a lower stress are, compared with those of the virgin material, usually decreased after a period of overstressing. In the rare cases of overstress increasing the endurance limit, the subsequent life at lower stresses may be increased. A period of understress raises the endurance limit. The amount of damage by overstressing depends on the % overstress and the cycle ratio, *i.e.*, the no. of cycles used in overstressing/no. of cycles possible at that stress. The damage by overstressing may be repaired, and in some cases more than repaired, even after large cycle ratios of overstress, by careful subsequent understressing. The damage by cyclic overstress is a gradual process. No evidence of cracking is found even for large cycle ratios. S. J. K.

Fatigue-strength diagrams of steels at various tensions, with special reference to the form of the test-piece. A. Pomp and M. Hempel (Mitt. Kaiser-Wilh. Inst. Eisenforsch., 1936, **18**, 1—14). E. S. H.

Dependence of fatigue strength of steel on frequency of loading. F. Körber and M. Hempel (Mitt. Kaiser-Wilh. Inst. Eisenforsch., 1936, **18**, 15—19).—For 7 steels (compositions tabulated) the fatigue strength is 8—13% higher at a frequency of 450 per sec. than at 450 per min. E. S. H.

Primary dendritic and non-dendritic textures in ordinary mild steels. J. Seigle (Chim. et Ind., 1937, **37**, 629—635).—The steels examined had ≯0·1% C. Both textures could be observed together, the dendritic texture being in that portion of the steel where cooling had been slow. Anodic attack and attack by the Stead–Le Chatelier reagent on the steels after varying heat-treatments were studied. C. R. H.

Factors influencing segregation and solidification in steel ingots. L. H. Nelson (Amer. Inst. Min. Met. Eng., Tech. Publ. 802, Apr., 1937, 7 pp.).—Data showing the effect of pouring temp., hot-top vol., ingot taper, and pouring rate on C segregation in killed, hot-topped steel ingots are given. The degree of segregation of Mn, P, S, and Si, and the effect on soundness of moving the ingot before complete solidification, are discussed. R. B. C.

Plain carbon steel. A. L. Boegehold (Metal Progress, 1937, **31**, 147—152).—The limitations of heat-treated C steel for use in automobiles are discussed. R. B. C.

Influence of carbon content on high-temperature properties of steels. A. E. White, C. L. Clark, and R. L. Wilson (Trans. Amer. Soc. Met., 1935, **23**, 995—1015).—Tensile, creep, and impact tests at 30—760°, with supplementary microscopical examination, show that the behaviour of steel at elevated temp. may be independent of the C content, and determined by the addition of alloying elements or the initial heat-treatment. Ch. Abs. (*e*)

Steels at elevated temperatures. R. T. Rolfe (Iron Steel Ind., 1937, **10**, 143—147, 187—191).—The effects of combined stress and temp. on steels employed in steam power plant are discussed. R. B. C.

Influence of degree of rolling, rolling temperature, and thickness relations on the rolling process and the mechanical properties of the rolled material in the hot-rolling of medium-hard carbon steels. A. Pomp and W. Lueg (Mitt. Kaiser-Wilh. Inst. Eisenforsch., 1936, **18**, 183—204).—The influence of the various factors on rolling at 700—1200° is described. E. S. H.

Interpretation of torsion impact properties of carbon tool steel. G. V. Luerssen and O. V. Greene (Trans. Amer. Soc. Met., 1935, **23**, 861—877).—The 3 stages in the impact curve coincide with the 3 recognised structural changes traversed in tempering. Ch. Abs. (*e*)

Effect of phosphorus on the mechanical and corrosion-resisting properties of low-carbon and low-alloy structural steels. J. A. Jones (Iron and Steel Inst., Apr., 1937. Advance copy No. 9, 26 pp.).—The demand for structural steels (37—43 tons/sq. in.) has led to attempts being made to use P as an alloying element, and the results of adding P to 0·1% C steels and low-alloy steels with Mn, Cr, and Cu additions are given. In absence of Mn, Cr, or Cu the tensile strength of low-C steels cannot be raised to over 34 tons/sq. in. without danger of serious notch-brittleness. Any marked improvements to atm. corrosion were accounted for by the presence of alloying elements other than P, and the use of the latter for raising the strength of low-C or low-alloy steels should be regarded as permissible rather than as preferable. W. P. R.

Alloy steels. A. L. Boegehold (Met. Progress, 1937, **31**, 265—269).—Their application in automobile construction is discussed. R. B. C.

Practical trial of roofing sheets of copper steels and other materials. (Sir) R. Hadfield and S. A. Main (Iron and Steel Inst., Apr., 1937. Advance copy No. 7, 5 pp.).—Three materials: (*a*) Cu steels, (*b*) ingot Fe, (*c*) plain C steel painted and unpainted, were used for roofing materials at the works of Messrs. Hadfields, Ltd., Sheffield. Their behaviour for the past 9¾ years has been observed, but only the unpainted sheets have so far given useful information. The Cu-bearing steel is proving superior to ordinary steel, and ingot Fe is inferior to the plain C steel. W. P. R.

Nickel–iron alloys of high permeability, with special reference to mumetal. W. F. Randall (J. Inst. Elect. Eng., 1937, **80**, 647—667).—The development of high-permeability alloys is summarised. The correct methods of application to ensure complete utilisation of the magnetic properties of these alloys are stressed, and the need for heat-treatment is emphasised. Possible mechanisms of the heat-treatment process are suggested. Data as to magnetic and electrical properties, and testing methods employed in the control of mumetal, are given, together with practical applications of high-permeability materials. P. G. McC.

Properties of materials for cast crank shafts. H. J. Gough and H. V. Pollard (J. Inst. Auto. Eng., 1937, **5**, 96—166).—Results of static tensile, static torsion, notched-bar impact, indentation hardness, and fatigue tests carried out on specimens machined from cast bars of inoculated Fe, alloy steel, and Fe–Cu–Cr, Fe–Cr–W, and Fe–Ni–Cr are discussed. R. B. C.

Modern materials [steels] for high-pressure vessels. L. P. McAllister (Welding Eng., 1935, **20**, No. 5, 30—32).—The properties of Ni steels, Mn–V steels, and Chromansil steels are tabulated. Ch. Abs. (*e*)

Improved fabrication of 18 : 8-chromium steels. D. R. Pratt (Welding J., 1935, **14**, No. 12, 16—19).—A review of applications of Ti and Nb. Ch. Abs. (*e*)

Chromium steels of high nitrogen content. R. Franks (Trans. Amer. Soc. Met., 1935, **23**, 968—987).—Grain refinement is due to Cr nitride promoting austenite formation. N_2 will not correct the harmful effect of C in high-Cr steels. Ch. Abs. (*e*)

New heat-resistant alloy. S. L. Hoyt and M. A. Schell (Trans. Amer. Soc. Met., 1935, **23**, 1022—1038).—The alloy contains Fe with 37·5% Cr and 7·5% Al, is malleable both hot and cold, and is suitable for operations at 1260—1315°. Ch. Abs. (*e*)

Transformations of austenite in a chromium–silicon steel. S. Steinberg, V. Susin, and I. Goldin (Rev. Mét., 1937, **34**, 190—194).—By means of magnetometric, hardness, and microscopical tests the behaviour of a steel containing C 0·35, Cr 8·92, and Si 3·13% was studied. The influence of the initial temp. and duration of heating on the martensitic change point (Ar2), the isothermal transformation of austenite, and the effect of partial transformation are given in the form of tables and graphs. W. P. R.

Transformation kinetics of austenite. V. Comparison of magnetisation and resistance isotherms of an age-hardening steel. F. Wever and K. Hild (Mitt. Kaiser-Wilh. Inst. Eisenforsch., 1936, **18**, 43—49; cf. B., 1935, 593).—The transformation has been studied between 610° and 200°

by magnetic and resistance measurements. At each temp. the change in resistance precedes the magnetic change. E. S. H.

Improvement of pearlitic manganese steel by titanium. G. F. Comstock (Met. & Alloys, 1937, **8**, 148).—Steels with 0·28—0·35% C and 1·2—1·6% Mn, if deoxidised with Fe–C–Ti (5 lb./ton), give high tensile strength with good ductility and impact-resistance, when normalised at 815—955°. S. J. K.

Properties of commercial steel sheets containing additions of copper, manganese, chromium, and phosphorus. S. C. Britton (Iron and Steel Inst., Apr., 1937. Advance copy No. 3, 13 pp.).—Mild steel, Cu–Cr–high-P, Cu–Mn, and Cu–Cr steels were examined for their corrosion-resisting and strain-ageing properties. Beneficial effects of addition of Cu and P on the resistance to atm. corrosion were indicated, but the effects were not strongly marked. Although all the steels showed strain-ageing effects there was not a strong tendency for ageing after cold-work to produce embrittlement. W. P. R.

Contributory effects of furnace atmospheres on the grain size of molybdenum high-speed steel. A. Phillips and M. J. Weldon (Trans. Amer. Soc. Met., 1935, **23**, 886—904).—A steel (Mo 7·05, Cr 3·93, V 2·05, C 0·77%) was heated in oxidising, reducing, and neutral atm. and the effect on grain size, temp. of incipient melting, and extent of decarburisation determined. Oxidising atm., especially those containing H_2O vapour, produced the biggest structural changes. Ch. Abs. (*e*)

Alloy and fine-grained steels for locomotive coupling rods. H. O'Neill (Iron and Steel Inst., Apr., 1937. Advance copy, No. 11, 22 pp.).—Ni–Cr–Mo and Mn–Mo steels have proved satisfactory in service as coupling rods, but are subject to the banding of the structure and variable behaviour under impact. Plain C steels of inherent fine grain size give vals. in mechanical tests equiv. to low-alloy steels and their notched-bar ductility is notably high. Various methods for ascertaining the inherent grain size are described and a temp.-gradient, Cl_2-etching test is stated to give rapid and reliable results. Contrary to results of previous workers, no evidence of differences in carburising, decarburising, flame-cutting, machining, and cold-working properties of coarse- and fine-grained steels was found. Actual physical grain size *per se* is not considered to be the prime cause for high Izod vals. of the fine-grained steels. W. P. R.

Special steels for urea synthesis apparatus. F. F. Chimuschin, G. I. Sharov, and P. D. Arlievski (Chim. Maschinostr., 1937, **6**, 27—33).—Of a no. of steels, one containing C 0·09, Si 0·87, Mn 0·83, Cr 8·2, Ni 17·1, Mo 3·82, Cu 4·10, and Ti 0·75% was the most suitable. R. T.

Underground corrosion [of ferrous materials]. K. H. Logan (Trans. Amer. Soc. Civil Eng., 1936, **101**, 811—833).—The characteristics and causes of underground corrosion of Fe pipes are discussed. Corrosion is due mainly to non-uniform distribution of O_2 and H_2O along the pipe surface. The use of Cu and Cu alloys and of protective coatings is advocated. R. B. C.

Method for testing the resistance of stainless steels to local corrosive attack. S. Brennert (Iron and Steel Inst., Apr., 1937. Advance copy No. 2, 1 p.).—The anodic potential which can be applied to a metal surface without any "break through" occurring is determined. The potential is measured against that of a saturated calomel electrode. The practicability and defects of the method are discussed and some results for stainless steel given. W. P. R.

Effect of protective coatings on the corrosion-fatigue resistance of steel. D. G. Sopwith and H. J. Gough (Iron and Steel Inst., Apr., 1937. Advance copy No. 13, 25 pp.).—The fatigue-resistance in air and in salt spray of 0·5% cold-drawn C steel protected by (1) galvanising, sherardising, and electrodeposited Zn, (2) electrodeposited Cd with and without enamel and boiled linseed oil, (3) sprayed Al, with and without enamel, (4) phosphates + enamel, (5) enamel only, are reported. Increased resistance is given by galvanising, sherardising, and sprayed Al + enamel. Zn- and Cd-plating and sprayed Al alone gave only fair protection. Phosphate treatment + enamel did not give as good results as metallic coatings, and enamel and oil reduced the degree of protection afforded by Cd-plating. W. P. R.

Steeloscopic grading of alloy steels. L. M. Ivantzov and S. L. Mandelschtam (Zavod. Lab., 1937, **6**, 66—70).—A scheme for spectral analysis of alloy steels is described. R. T.

Determination of granular structure of steel. A. P. Guljaev and A. P. Belova (Zavod. Lab., 1936, **5**, 1329—1334).—Guljaev's method (B., 1937, 445) is applicable to low-C tool steels. R. T.

Multiparametric analysis [of steels]. N. S. Akulov and M. A. Grabovski (Zavod. Lab., 1936, **5**, 963—971).—The magnetic properties of steels are evaluated on the basis of measurements of the higher harmonics obtained in magnetic fields. R. T.

Dissolution of ferrophosphorus. F. A. Henglein and K. Stoeckhert (Angew. Chem., 1937, **50**, 380—382).—Oxidation of Fe_2P to $Fe_2O_3 + P_2O_5$ by means of air or H_2O vapour at 1200—1300° has little technical significance. Wet treatment with $HCl + KClO_3$ or, better, Cl_2 at 400—450° effects conversion into $FeCl_3 + PCl_3$, as does $COCl_2$ at 400°. Attack by conc. H_2SO_4 above 100° is quant., $FeSO_4$ and H_3PO_4 being produced, with simultaneous formation of $S + SO_2$. Aq. KOH under pressure at 300°, or at 300° in presence of O_2 (300 atm.), leads to the formation of hydrated Fe_3O_4 or Fe_2O_3, respectively. Oxidative fusion with NaCl at $>1000°$ produces $FeCl_3$ + cryst. Fe_2O_3. Treatments with H_2SO_4, Cl_2, or KOH are economically practicable processes. J. S. A.

Use of the polarograph in ironworks laboratories for determination of copper, nickel, and cobalt in presence of one another in steels. G. Maassen (Angew. Chem., 1937, **50**, 375—380).—The steel is dissolved in 50% HCl and evaporated down with a little HNO_3. The residue is dissolved in H_2O

and treated with $2N$-aq. NH_3, containing NH_4Cl, to ppt. the Fe. The solution is freed from dissolved O_2 by treatment with a stream of pure N_2, and is examined polarographically. Cu is determined from the (equal) current increments at $-0{\cdot}34$ and $-0{\cdot}54$ volt, Ni from that at $-1{\cdot}1$ volts. Small amounts of Ni may be so determined in presence of Co (deposition at $-1{\cdot}3$ volts). For the determination of Co, Fe is separated by pptn. with 20% NH_4Cl + a suspension of $BaCO_3$, to avoid co-pptn. of Co. The concn. of acid and other electrolytes in the solution must be maintained const. in all cases. Using large samples (10—20 g. of Fe), with or without subsequent extraction of the bulk of the $FeCl_3$ by means of Et_2O, the method may be used for the detection and determination of traces of Cu and Ni in Fe. J. S. A.

Possible applications of perchloric acid in ironworks laboratories. A. RAAB (Angew. Chem., 1937, **50**, 327).—Si, Mn, and P in cast Fe and unalloyed steels are determined by dissolving the Fe in $HClO_4$. SiO_2 is at once insolubilised; P in solution is pptd. as NH_4 phosphomolybdate, which is subsequently dissolved in $0{\cdot}2N$-NaOH. The excess of NaOH is titrated back with H_2SO_4. Mn is oxidised with $(NH_4)_2S_2O_8$ in presence of $AgNO_3$ to MnO_4', which is determined by titration with As_2O_3. Alloy steels and cast Fe may similarly be dissolved in $HClO_4$. Cr is thereby dissolved as CrO_4'', which is determined by reduction with standard $FeSO_4$. High-speed steels are first dissolved in HCl. SiO_2 and WO_3, which remain undissolved, are freed from V and Mo by treatment with H_2O_2. The solution is evaporated down, taken up in HCl, and Mo then pptd. as MoS_2. Cr and V are oxidised completely by evaporating the resulting solution with $HClO_4$. CrO_4'' and VO_3' are titrated with $FeSO_4$, and V is finally titrated with $KMnO_4$ after buffering the free $HClO_4$ by means of NaOAc. J. S. A.

Rapid determination of cobalt in steel. E. JABOULAY (Rev. Mét., 1937, **34**, 166—169).—The method is based on the conversion of Co into $Co_2(CN)_{12}Co_3,12NaCN$, which has an intense yellow colour. It is formed by addition of NaCN to an acid solution of Co followed by NaOH. Excess of NaCN is determined by titration with standard $AgNO_3$. Details of the method are given. W. P. R.

Laboratory tests of new pipe coatings. S. EWING (Proc. Amer. Gas Assoc., 1936, 648—657).—Results of experiments to determine the suitability of a no. of coatings, *e.g.*, tornesite paint, porcelain enamel, Thiokol plastic, and Vinyloid lacquer, for protecting steel pipe from soil corrosion are discussed. Shielded or reinforced waterproof bitumens gave the most promising results. R. B. C.

Phosphate rust protection. O. HAEHNEL (Z. Ver. deut. Ing., 1937, **81**, 488).—Methods of protection against rust by means of phosphate coatings are discussed. R. B. C.

Flotation and its possibilities in the Norwegian mining industry. F. P. EGEBERG (Tids. Kjemi, 1937, **17**, 37—41, 61—65).—The theory and technique of modern flotation processes are described. M. H. M. A.

Metallurgical stoppers and nozzles. A. M. TRACHTENBERG and I. A. TATARSKI (Ogneuporui, 1935, **3**, 648—654).—Nozzles with magnesite inserts must be used for casting boiling metal. Details of firing conditions and composition are given. CH. ABS. (*e*)

Improvements in sheet[-metal] annealing furnaces. C. HEURTEY (Rev. Mét., 1937, **34**, 161—165).—A gas-fired annealing furnace which is heated by means of radiant tubes is described. W. P. R.

Disturbances caused in the dilatometric diagram by cold-working of metals. M. BONZEL (Compt. rend., 1937, **204**, 583—585; cf. B., 1935, 997).—Cold-working results in anisotropic expansion on heating, especially in temp. regions corresponding with lattice changes. The effect is pronounced in alloys, but small in pure metals; in plain C steels it varies with the degree of division of the cementite. The effect reaches a max. at a certain degree of cold-working. A. J. E. W.

Slow bend and impact tests of notched [metal] bars. H. F. MOORE, H. B. WISHART, and S. W. LYON (Proc. Amer. Soc. Test Mat., 1936, **36**, II, 110—117).—Data are recorded for steels, Cu, brass, and duralumin in the range —40° to 20°. R. B. C.

Relations between stress and reduction in area for tensile tests of metals. C. W. MACGREGOR (Amer. Inst. Min. Met. Eng., Tech. Publ. 805, April, 1937, 19 pp.).—Methods of plotting stress–strain and stress–reduction in area curves for metals cold-worked in tension are critically discussed. A new method of representing these relationships is described and results of tensile tests on various steels and non-ferrous metals plotted according to the proposed method are discussed. R. B. C.

High-velocity tension–impact tests [on metals]. H. C. MANN (Proc. Amer. Soc. Test. Mat., 1936, **36**, II, 85—109).—Data are recorded for Si- and Mn-bronzes and steels. R. B. C.

Detection of elastic strains in metals by *X*-ray methods. G. AXENOV (Tech. Physics U.S.S.R., 1935, **2**, 17—20).—The theory of the effect of elastic strains in metals on the lattice consts. is developed. Elastic strains deform the Debye rings, and examination of the structure of these rings gives the magnitude, sign, and direction of the principal strain. A. J. M.

Comparison of heat-resisting materials at high temperatures. F. KÖRBER and A. POMP (Mitt. Kaiser-Wilh. Inst. Eisenforsch., 1936, **18**, 247—251).—Tensile strengths and hardness of 9 steels (compositions tabulated) and a high-Ni alloy (Ni 60·3%) containing Cr, Mo, and Mn have been determined at 600—900°. E. S. H.

Metals and alloys in the printing industry. IV. B. W. GONSER and S. EPSTEIN (Met. & Alloys, 1937, **8**, 117—121; cf. B., 1937, 573).—The composition and prep. of plates for photoengraving, lithographic, gravure, and steel-engraving work are described. The degree of precision required in printing is stated and methods used to attain it are outlined. S. J. K.

Recovering and interpreting diamond-core-drill samples. R. D. LONGYEAR (Min. & Met., 1937, **18**, 239—243).—Methods of taking correct representative samples of core and sludge are discussed. A. R. P.

Cavitation-erosion of metals. W. C. Schumb, H. Peters, and L. H. Milligan (Met. & Alloys, 1937, **8**, 126—132).—A new, small-scale method of study is described. Data are given for cavitation-erosion of brass, Al, Cu, Tobin bronze, and cold-rolled steel, and the influence of the properties of the fluid on such erosion. Comparison is made between cavitation of metals and their sand-blast penetration vals. P. G. McC.

Corrosion of metals and phenomena of passivity. L. Colombier (Rev. l'Ind. Min., 1937, 232—247).—General principles are reviewed. C. E. H.

Corrosion of metals by non-electrolytes. Influence of light hydrocarbon fuel on metals and alloys. III—V. Action of cracked petrol on (III) magnesium, aluminium, and aluminium alloys, (IV) steels, and (V) copper and brass. L. G. Gindin and R. S. Ambarzumjan (J. Phys. Chem. Russ., 1937, **9**, 91—99, 213—221, 222—230; cf. B., 1936, 698; 1937, 144).—III. The corrosion of Mg, Al, and Al alloys in 600 days by petrol made by cracking Grozni oil has been investigated. Mg is strongly affected, but Al and its alloys are stable. The corrosion of Mg is due to autoxidation of the petrol.

IV. C steel (0·2% C) is strongly corroded by cracked petrol in 500—700 days at room temp. Corrosion is coupled with autoxidation of the petrol. Stainless (Cr–Ni) steel remains unattacked after 400 days.

V. Cu is strongly corroded by cracked petrol in 600 days at room temp.; the losses in wt. are up to 2·5 g. per 100 g. Corrosion is due to autoxidation of the petrol. No autoxidation or corrosion occurs in presence of α- or β-pinene (50 drops per litre). Brass is strongly corroded by petrol from Baku, but only slightly by that from Grozny. The corrosion of brass is associated with a dezincifiation. E. R.

Spark-spectrum study of the corrosion of alloys. H. Triché (Compt. rend., 1937, **204**, 966—968; cf. A., 1936, 559).—Changes in the chemical nature of the surface can be investigated by observing high-frequency spark spectra obtained when using a moving surface of the alloy as one sparking electrode. A. J. E. W.

Influence of the mean stress of the cycle on the resistance of metals to corrosion-fatigue. H. J. Gough and D. G. Sopwith (Iron and Steel Inst., Apr., 1937. Advance copy No. 6, 21 pp.).—Six materials, including non-corroding steels, duralumin, and a Mg alloy, were tested for their resistance to fatigue under the combined influence of fluctuating tensile stress and salt spray. There was no evidence of a corrosion-fatigue limit for any of the materials tested, and the influence of the mean stress on the endurance range in a salt spray was similar to that on the fatigue range in air. W. P. R.

Maintenance with the metallising process. R. A. Axline (Paper Trade J., 1937, **104**, TAPPI Sect., 127—129).—The process is described, and recent advances in its application are discussed. H. A. H.

How to weld twenty-nine metals. C. H. Jennings (Iron Age, 1936, **138**, No. 26, 30—45; No. 27, 30—35; 1937, **139**, No. 2, 27—31; No. 3, 32—33, 101—102; No. 5, 60—63; No. 6, 44—47).—The electric arc-welding of special steels, Fe, Al, Cu, Ni, brass, and bronze is described. R. B. C.

Resistance welding improved by thyratron control. W. C. Hutchins (Gen. Elect. Rev., 1937, **40**, 116—124).—A discussion. R. B. C.

Magnaflux inspection of pressure-vessel welds. J. W. Yant (Mech. Eng., 1937, **59**, 145—146).—The technique adopted for detecting the presence of cracks at the weld by means of the Magnaflux test is described. Finely-divided Fe powder with the particles insulated is applied to the specimen after local magnetisation. R. B. C.

Detection of fatigue cracks [in machine parts] by the Magnaflux method. T. C. Rathbone (Mech. Eng., 1937, **59**, 147—152).—The procedure is described. R. B. C.

Magnaflux inspection of boiler drums and unfired pressure vessels. R. F. Cavanagh (Mech. Eng., 1937, **59**, 153—155).—The procedure for detecting cracks by the Magnaflux method is described. R. B. C.

A.F.A. [American Foundrymen's Association] grain-distribution numbers for foundry sand. Anon. (Trans. Amer. Foundrymen's Assoc., 1936, **44**, 545—551).—The method is described. R. B. C.

Copper and copper alloys. M. Cook (Metal Ind. Lond., 1937, **50**, 511—515, 534—536, 557—559).—Developments in the metallurgy of Cu and Zn and in the production of bronze, brass, and Cu–Sn alloys from the earliest times are reviewed. R. B. C.

New alloying method for bronzes. R. Ozlberger (Giesserei, 1937, **24**, 251—254).—An alloy containing Cu 92·44, Sn 7·31, and Ni 0·25% is entirely homogeneous, is readily hot-forged, and can be considerably strengthened by cold-work. The composition is crit., small variations causing lack of uniformity and difficulty in working. A similar but somewhat harder alloy is obtained by replacing part of the Ni by Ag. The alloys are suitable for cannon and for bearings, and have good resistance to corrosion. C. E. H.

Corrosion of [copper–]beryllium bronzes. H. N. Terem (Compt. rend., 1937, **204**, 1426—1428).—The corrosion of Cu–Be alloys (0·5—10% Be) has been studied at 20° in HCl, H_2SO_4, HNO_3, AcOH, NaOH, and aq. NH_3, in concn. 1—10%, and in sea-H_2O. HCl and AcOH have least attack, and for these increase in % of Be does not influence the rate. The attack by H_2SO_4 forms a red oxide, but high content of Be stifles attack. The resistance to HNO_3 is of the same order as that of Cu for 2% Be, but decreases greatly for 5% Be. The resistance to NaOH is = that to H_2SO_4, and oxidation also occurs. The attack by NH_3 decreases with increasing % of Be. The alloys are resistant to sea-H_2O, except those with the highest % of Be, with which pitting occurs. R. S. B.

Hardness and [electrical] conductivity of heat-treated copper castings alloyed with zirconium and beryllium. G. F. Comstock and R. E. Bannor (Met. & Alloys, 1937, 8, 106—109).—Alloys containing Zr (up to 3·24%) give relatively high conductivity (κ) combined with hardness when quenched from approx. 480° and tempered at 235°. Zr (up to 3·52%) in conjunction with Be (up to 1·92%) does not improve κ, but diminishes the degree of softening on over-ageing, compared with the use of Be alone. S. J. K.

Equipment for routine creep tests on zinc and zinc-base alloys, and an example of its application. J. Ruzicka (Amer. Inst. Min. Met. Eng., Tech. Publ. 806, April, 1937, 15 pp.).—The equipment is described and data obtained on rolled Zn-base alloys are given. R. B. C.

Spectral analysis of ores for nickel and tin. V. V. Nedler (Zavod. Lab., 1936, 5, 1469—1474).—Spectrographic determination of Ni and Sn is described. R. T.

Strength of nickel alloys at low temperatures. R. Hanel (Z. Ver. deut. Ing., 1937, 81, 410—414).—A crit. review. R. B. C.

Nickel-alloy gear materials and their heat-treatments. J. W. Sands and F. J. Walls (Product Eng., 1935, 6, 370—373).—Data for gears made of Ni alloys, heat-treated steel, cast Fe, and bronze alloys are compared. Ch. Abs. (e)

Determination of copper in metallic nickel. J. J. Lurie and M. I. Troitzkaja (Zavod. Lab., 1937, 6, 33—35).—1—5 g. of Ni are dissolved in 10—20 ml. of 60% HNO_3, the solution is neutralised with aq. NH_3, and 5 ml. of 80% AcOH and H_2O to 250 ml. are added. Pt gauze in contact with a strip of Pb is immersed in the solution at 80—90° for 40 min., washed, and weighed; the increase in wt. gives the Cu content of the sample. 0·5—1 g. of Na tartrate should be added to the solution when Fe is present. R. T.

Colorimetric determination of cobalt in metallic nickel. J. J. Lurie and M. I. Troitzkaja (Mikrochem., 1937, 22, 101—108).—Co is determined, without prior separation, as $(NH_4)_2Co(CNS)_4$. The metal is dissolved in HNO_3 and evaporated down with HCl. Cu in an aliquot part is removed as CuCNS by treatment with $NH_4CNS + Na_2SO_3$. $Na_4P_2O_7$ is added and the solution neutralised with aq. NH_3 (phenolphthalein). NH_4CNS is added, + a little aq. NH_3, and then $COMe_2$. The upper H_2O-$COMe_2$ layer is separated and its colour matched against standards. Alternatively, Co may first be separated with 2 : 1-OH·$C_{10}H_6$·NO at 80°, 0·05 g. of Fe being added as a carrier. The ppt. is ashed and dissolved in HCl. Co is then determined in the solution as above. J. S. A.

Age-hardening of some cobalt–tungsten–iron alloys. H. Cornelius, E. Osswald, and F. Bollenrath (Metallwirts., 1937, 16, 393—399).—Three alloys containing 69·4, 55·83, and 38·9% Co and 20·4, 25·24, and 40·7% W, respectively, were investigated. At room temp. they have an undercooled, face-centred cubic structure which decomposes with pptn. on heating at temp. up to 650—750°, the hardness simultaneously increasing. The max. hardness and max. rate of hardening occur in this temp. range, little or no pptn. and hardening being found on annealing at 800—1000°. At the lower temp. a hexagonal lattice is produced, but at the higher temp. the original lattice remains. Data are obtained regarding the transformations of Co, and the existence of an intermediate ε-phase in the Co–W system, confirming previous work, and these are used to explain the changes observed. C. E. H.

Analysis of refined lead. S. J. Fainberg (Zavod. Lab., 1937, 6, 36—40).—100 g. of Pb are added to a fused mixture of 4 g. of KOH and 6 g. of NaOH, the mass is stirred for 10 min. at 350°, the melt dissolved in H_2O, the stirrer, crucible, and residual Pb are washed with N-NaOH, and the solution + washings diluted with N-NaOH to 100 ml. 5—10 ml. of the solution are boiled with 20 ml. of 50% H_2SO_4 and 1 ml. of 2% Na_2SO_3 for 2 min., cooled, filtered from $PbSO_4$, and Sb is determined colorimetrically in the filtrate. R. T.

Continuous extrusion of lead cables. P. Dunsheath (J. Inst. Elect. Eng., 1937, 80, 353—377).—The construction and operation of the continuous Pb-extrusion machine, and the physical and metallurgical properties of the sheath obtained, are described. R. B. C.

Fluxes for soft soldering. C. C. Miller (Metal Ind. Lond., 1937, 50, 503—505).—The types employed are summarised. R. B. C.

Photo-nephelometric determination of calcium, and its application to analysis of slags. N. M. Miloslavski and E. G. Vavilova (Zavod. Lab., 1937, 6, 28—33).—0·02—0·04 g. of slag is brought into solution, SiO_2, Fe, and Al are removed by the usual methods, Ca is pptd. as CaC_2O_4, and the ppt. calcined to give $CaCO_3$. This is dissolved in dil. HNO_3, the solution evaporated to dryness, the residue dissolved in H_2O, and the solution diluted to 50—100 ml., of which a vol. containing 0·02—0·6 mg. of Ca is taken, diluted to 10 ml., and 40 ml. of reagent [made by dissolving 4 g. of stearic acid and 0·5 ml. of oleic acid in 425 ml. of 95% EtOH, adding 20 g. of $(NH_4)_2CO_3$ in 100 ml. of H_2O, followed by 425 ml. of EtOH, 50 ml. of H_2O, and 20 ml. of conc. aq. NH_3, and filtering the solution] are added. The turbidity obtained is compared with that given by standard Ca solution. R. T.

Barium minerals. J. Simpson (Repts. on Mineral Ind. Imp. Inst., 2nd ed., 1937, 84 pp.).—The occurrence, winning, and treatment of Ba minerals and the uses of Ba and its compounds are reviewed. R. B. C.

Strontium minerals. E. H. Beard (Repts. on Mineral Ind., Imp. Inst., 2nd ed., 1937, 33 pp.).—The occurrence, winning, and treatment of Sr minerals and the uses of Sr and its compounds are reviewed. R. B. C.

High-chromium alloys—centrifugal castings and tubes. R. J. Wilcox (Met. Progr., 1936, 29, No. 1, 44—48).—Operating conditions are described for alloys with Ni 3—65 and Cr 9—29%, with or without additions of Mo. Ch. Abs. (*e*)

New [tungsten] alloy of high density. P. Bergsøe (Nature, 1937, **139**, 886).—The method used for producing W alloys (cf. Smithells, B., 1937, 573) resembles that used by the Pre-columbian Indians to produce coherent Pt by heating and working with a small amount of Au. L. S. T.

Pressed and cast hard alloys with a tungsten base. I. M. Griaznov (Neft. Choz., 1935, **29**, No. 10, 47—57).—A review. Ch. Abs. (*e*)

The Achotla chloridising mill [for silver ores]. H. P. Allen (Min. Tech., 1937, **1**; Amer. Inst. Min. Met. Eng., Tech. Publ. 773, 13 pp.).—The ore treated in the mill consists of both oxide and sulphide from which neither Ag nor Au can be extracted by a simple cyanide process. Details of ore treatment prior to roasting with NaCl are given. Consumption of reagents averages NaCl 112, CaO 10·6, and NaCN 1·0 kg. per metric ton of dry ore; the metal recovery is Au 90 and Ag 83%. The ore assays 4—8 g. of Au and 390—470 g. of Ag per metric ton. W. P. R.

New mineral formations on silver coins of XV century. L. Chrobak (Bull. Acad. Polonaise, 1937, A, 93—95).—A Cu vessel containing coins of XV century, found in Cracow during 1936, was encrusted with azurite and malachite, and small crystals of Cu. The coins were also coated with limonite and cerussite. Analysis of the washing liquid and sludge showed Cu, Pb, and Ag, and of the coins: Ternare: Cu, Ag, Pb, Bi, Fe, Au, Ni, Zn, As; Denare: Cu, Ag, Sb, Sn, Fe, Pb, As, Mn, Ni, Ti; Half-groschen: Cu, Ag, Pb, Fe, Au, Mn, Bi, Sb, Ni. F. J. L.

Reduction of free-milling gold ores and the Pinder stamp. A. B. Foote (Min. & Met., 1937, **18**, 197—198).—Since direct ball-milling of Au ores results in the pounding of the free Au into thin flakes often coated with talc and a consequent difficulty in recovering the metal by amalgamation or flotation, it is suggested that crushing from $\frac{1}{4}$ in. to 30-mesh should be carried out in Pinder stamps with inside amalgamation, the slurry from the stamps passing over amalgamated tables and then through a classifier, only the underflow from which is passed through a ball mill in a closed circuit with the classifier, the overflow passing directly to the flotation cells. Economy in space and operating costs is thus effected and a better recovery of Au obtained. A. R. P.

Platinum and allied metals. C. Johnson and R. H. Atkinson (Inst. Chem. Eng., May, 1937. Advance proof, 12 pp.).—The method and apparatus used in refining the Pt concentrates obtained in the treatment of Canadian Cu–Ni ores are described and an account is given of the uses of the Pt metals in the rayon industry, dentistry, jewellery, the chemical and electrical industries, and as catalysts. A. R. P.

Mirrors of aluminium film obtained by thermal vaporisation of the metal in a vacuum. H. Dambier (Rev. Aluminium, 1937, **14**, 665—668).—A review of the production of Al mirrors and their applications. E. S. H.

Welds in thick aluminium sheet. H. Buchholz (Z. Ver. deut. Ing., 1937, **81**, 433—437).—Welds in annealed Al sheet (25 mm. thick) produced by gas and arc welding were investigated by microscopical and *X*-ray examination and by tensile, bending, hardness, and corrosion tests. The strength of the weld was uninfluenced by the method of welding and was approx. = that of the sheet. R. B. C.

Spot- and seam-welding of aluminium alloys. G. O. Hoglund (J. Soc. Auto. Eng., 1937, **40**, 57—64T).—The equipment and procedure employed are described. R. B. C.

Soldering aluminium. Anon. (Auto. Eng., 1937, **27**, 42).—The characteristics of Alunize, an alloy of high tensile strength suitable for joining Al and Mg alloys, are described. R. B. C.

Furnaces for aluminium alloys. G. C. Castle (Metal Ind. Lond., 1937, **50**, 527—531).—The various types employed for melting and heat-treatment are described. R. B. C.

Aluminium die-casting alloys. E. E. Thum (Proc. Amer. Soc. Test. Mat., 1936, **36**, I, 182—192). Al–Si alloys containing 5% and 12% of Si were sprayed with aq. 3—5% NaCl. Corrosion data are tabulated and discussed. R. B. C.

Aluminium free-cutting alloys. R. Sterner-Rainer (Aluminium, 1937, **19**, 253—254; cf. B., 1937, 687).—Good machining qualities are obtained by adding 5% of Si to remelted Duralumin, or 2·5% of Si or 3% of Si + 1·5% of Fe to an alloy containing Cu 3·5 + Zn 10% made from scrap. These additions do not reduce the scrap val. of the alloy as do Bi and Pb, nor interfere with Eloxal treatment. When 0·05% of Li is present in the second alloy, Pb, Bi, and additional Mg are needed to give fine turnings on machining. C. E. H.

Recrystallisation of aluminium–magnesium alloys. R. Michaud and E. Segol (Compt. rend., 1937, **204**, 980—983).—When tempered alloys of low Mg content are heated, recrystallisation does not occur until the β-phase is completely pptd. A. J. E. W.

New alloys of the invar type susceptible to structural hardening. P. Chevenard, L. Huguenin, X. Waché, and A. Villachon (Compt. rend., 1937, **204**, 1231—1233).—The structure of invar alloys has been studied by thermomagnetic analysis, and mechanical and thermal characteristics have been determined. Alloys suitable for chronometers may be prepared by pptn.-hardening of carbide in alloys of the type of Guillaume's invar (cf. A., 1920, ii, 494) containing additions of V, Mo, Ti, etc., and by incorporating an Al–Ti alloy. R. S. B.

New metal mallet. K. Wissemann (Aluminium, 1935, **17**, 644).—An Al–Zn alloy (Zn 7—15%) is a suitable substitute for Pb. It keeps its shape longer and is sufficiently deformable not to damage the metal parts. Ch. Abs. (*e*)

Hardenable light-metal alloys. L. Tronstad (Tids. Kjemi, 1937, **17**, 57—60, 75—80).—A lecture. M. H. M. A.

Machinability of light metals, particularly alloys for automatic machines. H. Opitz (Aluminium, 1937, **19**, 150—157).—The mechanical factors influencing the machining of Al alloys are investigated and discussed. C. E. H.

Methods of testing the machinability of light metals. H. Schallbroch (Aluminium, 1937, **19**, 157—163).—Existing methods are discussed and effects of various factors on the results are described. C. E. H.

Protection of light alloys. E. C. J. Marsh and E. Mills (Aircraft Eng., 1937, **9**, 97—102).—Results of salt-spray corrosion tests carried out on a no. of Al alloys in the unprotected condition, after anodising, and after treatment with various org. finishes or with H_2O containing Na_2CO_3 5 and $Na_2C_2O_4$ 1·5% (M.B.V. treatment), and corrosion data for various Mg-base castings protected with org. finishes, are tabulated. R. B. C.

Surface protection of light metals. A. Koppenhöfer (Metallwirts., 1937, **16**, 417—419).—Oxide films, lacquers, and coatings produced by rolling composite sheets are briefly discussed. C. E. H.

Dissolution potentials of aluminium and light alloys. P. Lacombe and G. Chaudron (Rev. Mét., 1936, **33**, 697—704).—Potential data are recorded and a general account of the electrochemical behaviour of the alloys is given. W. P. R.

Determination of aluminium in presence of iron by means of hydroxyquinoline; application of the method to slags and ores. S. J. Fainberg and E. M. Tal (Zavod. Lab., 1936, **5**, 1307—1310).—The M_2O_3 ppt. obtained in the routine analysis of the minerals is dissolved in 100 ml. of dil. HCl, and 20 ml. of 25% tartaric acid (made alkaline with aq. NH_3) and 12 ml. of 25% Na_2SO_3 are added. 28 ml. of 25% KCN are gradually added to the solution at 70°, followed by 2 ml. of 10% Na_2S at 100°. The ppt. is washed and excess of 1·5% hydroxyquinoline is added to the filtrate + washings, at 100°. The ppt. is washed with hot H_2O and dissolved in dil. HCl at 70°, and the solution cooled and titrated with 0·1—0·2*N*-$KBrO_3$–KBr. R. T.

General directions for designating raw, half-finished, finished, and scrap materials and for collecting and sorting non-ferrous base-metal scrap. Ausschuss für wirtschaftliche Fertigung, and W. Claus (Metallwirts., 1937, **16**, 439—445).—A code is recommended for designating the nature and composition of non-ferrous metal products. A comprehensive table gives rapid tests for identifying the various types of scrap Al alloys, and indicates the main sources of such scrap, the principal detrimental impurities, and the alloys with which it may be mixed for remelting. C. E. H.

Thermal and electrical conductivities of aluminium alloys. L. W. Kempf, C. S. Smith, and C. S. Taylor (Amer. Inst. Min. Met. Eng., Tech. Publ. 783, Preprint, Jan., 1937, 12 pp.).—The above properties were determined for a no. of commercial Al alloys. The relation between the conductivities is best defined by the equation $K = (5{\cdot}02\lambda T \times 10^{-9}) + 0{\cdot}03$, where *K* and λ are the thermal and electrical conductivities, respectively, and *T* is the abs. temp. The λ of Al–Si alloys falls rapidly with increasing [Si]. R. B. C.

Electrochemical protection of iron from corrosion by alkalis. V. V. Stender, B. P. Artamonov, and K. J. Bogojavlenskaja (J. Appl. Chem. Russ., 1937, **10**, 414—434).—The rate of corrosion of Fe by aq. NaOH at 100° is expressed by $K = 0{\cdot}43 + 0{\cdot}047(N - 5)$, where *K* is the no. of g. of Fe dissolved per sq. m. per hr., and *N* the [NaOH]. *K* rises rapidly with temp. from 25° to 100°, and falls with rising [$NaClO_4$] from 0 to 4%. Cathodic polarisation (c.d. 0·5—3·0 amp./sq. m.) not only prevents corrosion, but also leads to elimination of Fe from the solutions. The c.d. necessary for prevention of corrosion is $\propto$ the *K* of the given Fe. R. T.

Ductile zinc coating deposited on [steel] wire by electrolysis. E. E. Thum (Met. Prog., 1937, **31**, 524—528, 544).—The process developed by the Bethlehem Steel Co. is described. The wire is cleaned electrolytically in a bath of fused NaOH and then electrogalvanised. The coating is much thicker than that obtained by the hot-dip process. R. B. C.

Alkaline plating baths containing organic amines. I. Copper plating from solutions containing diethylenetriamine. C. J. Brockman (Trans. Electrochem. Soc., 1937, **71**, Preprint 22, 245—248).—Good bright deposits of Cu can be obtained from $CuSO_4$ solutions containing just sufficient $NH(C_2H_4{\cdot}NH_2)_2$ (I) to produce a blue coloration, operated at c.d. 0·03—0·25 amp. per sq. dm. A large excess of (I) leads to a reduction in cathode current efficiency. J. W. C.

Alkaline plating baths containing the ethanolamines. V. Copper plating from diethanolamine solutions. C. J. Brockman and J. B. Whitley (Trans. Electrochem. Soc., 1937, **71**, Preprint 21, 241—244; cf. B., 1936, 551).—Bright deposits of Cu can be obtained from baths containing 3 pts. of $CuSO_4$ to 1 pt. of $Na_2C_2O_4$ with addition of $NH(C_2H_4{\cdot}OH)_2$, the cathode current efficiency approaching 100%. The concn. of the bath may be varied over fairly wide limits. J. W. C.

Lead–silver anodes for chromium plating. I, II. T. Ishida (J. Soc. Chem. Ind. Japan, 1936, **39**, 484—485B, 485B).—I. Pb–Ag anodes are less corroded than Pb or other anodes, corrosion decreasing and subsequently increasing with increase in Ag content; min. corrosion occurs with approx. 5% of Ag. Rate of corrosion and quantity of ppt. are little affected by changes in conditions of electrolysis.

II. In intermittent plating, Pb–Ag anodes are better than the others, but corrosion is > in continuous plating. Accumulation of Cr^{III} is slightly > with Pb, but much < with Fe anodes. C. R. H.

Hardness of electrolytic chromium. M. Cymboliste (Compt. rend., 1937, **204**, 1069—1071; cf. B., 1932, 1122).—The hardness (*H*) is decreased by SO_4'', Cl′, Br′, or F′ in the plating bath, and increased by metallic cations. *H* decreases with increasing

[CrO_3]. For bath temp. $< 55°$, increasing c.d. decreases H; at $> 55°$ it increases H. H is max., for all c.d. vals. observed, for a bath temp. of 50°.

A. J. E. W.

Six years of observation of chromium [plate] in a job shop. W. A. Vignos (Platers' Guide, 1936, **32**, 11—14).—The Ni sub-coat should be controlled as regards Cl, acidity, metal content, temp., and c.d. The coating produced during the first few sec. determines the character of the final Cr plate. Other factors are reviewed. Ch. Abs. (*e*)

Theory of chromium plating. E. Müller (Z. Elektrochem., 1937, **43**, 361—376).—Müller's theory is summarised, discussed in the light of recent experiments, and compared with that of Weiner (B., 1936, 997, 1044). E. S. H.

Rhodium surfaces for metal reflectors. B. Bart (Product Eng., 1935, **6**, 308—309).—Electrodeposited Rh has a high specular reflexion over a wide colour range. It is harder than Ag, non-oxidising, resistant to heat, chemically resistant, and requires no polishing. It is not colour-selective.

Ch. Abs. (*e*)

Electrodeposition of manganese from aqueous solutions. I. Chloride electrolytes. H. H. Oaks and W. E. Bradt (Trans. Electrochem. Soc., 1936, **69**, 567—584). **II. Sulphate electrolytes.** W. E. Bradt and H. H. Oaks (*Ibid.*, 1937, **71**, Preprint 1, 1—7).—I. Using a bath containing $MnCl_2$ 300—400 g. and NH_4Cl 30 g. per litre operated at 26° and c.d. 20 amp. per sq. dm., smooth silvery-white deposits of pure Mn having a hardness of 5·5—6·0 on Mohs' scale and capable of taking a high polish can be obtained on buffed Cu cathodes. Anodes are of commercial (96%) Mn and a diaphragm are preferably used, with agitation of the catholyte. Owing to the gradual increase in the [Mn] of the bath and tendency towards pptn. of $Mn(OH)_2$, continuous operation becomes impossible.

II. Smooth deposits of pure Mn $>0·4$ mm. thick can be obtained from an agitated solution containing $MnSO_4$ 100, $(NH_4)_2SO_4$ 75, and NH_4CNS 60 g. per litre operated at 25° with c.d. 25 amp. per sq. dm. and p_H 4—5·5. The Mn content and p_H of the bath are controlled by using a combination of commercial (96%) Mn and Acheson graphite anodes and distributing the anode current in the ratio Mn : graphite = 1 : 8. Muslin-cloth diaphragms are used. The cathode efficiency is 60—75%. J. W. C.

Metals co-deposited with tungsten from the alkaline tungsten plating bath. M. L. Holt (Trans. Electrochem. Soc., 1937, **71**, Preprint 30, 365—373).—Compounds of Co, Sn, Cd, Fe [excluding $K_3Fe(CN)_6$ and $K_4Fe(CN)_6$], and other metals added to the Fink–Jones alkaline W-plating bath (cf. B., 1931, 930) function as cathode depolarisers, the added metal co-depositing with the W. Of the additions investigated, Fe is the most and Zn the least effective, the relative depolarising properties depending on the respective positions of the added metals in the electrochemical series. J. W. C.

Blister pits in electrodeposits. M. Cymboliste and J. Salauze (Trans. Electrochem. Soc., 1937, **71**, Preprint 16, 171—183).—The formation of minute blister pits in deposits of Cu, Ni, and other metals is attributed to the presence of flocculated basic material adhering to small gas bubbles attached to the surface of the cathode. The mode of formation of the basic material affects the characteristics of the resulting pits. J. W. C.

Erratum.—On p. 574, col. 2, line 12, *for* with *read* without.

Failure of boiler fusible plugs. Cu gaskets.—See I. **Materials for gasworks construction. Use of gas producers in metallurgy. Cu pipe-lines. Gas-main corrosion. Monel metal in oil industry.**—See II. **Open-hearth furnaces. Refractories for steel industry. Moulding sands.** —See VIII. **Radiography and metals and alloys.** —See XI. **Pipe coatings. Painting light metals.** —See XIII. **Al [containers] for fruit products. Corrosion of tinned cans. Sugar as corrosion-inhibitor.**—See XIX. **Cr-plating works effluent.** —See XXIII.

See also A., I, 352, **Resistance of hardened Pt.** 356, **Systems Cu–Zn and Ni–Al. Mn amalgams. Fe–Ni alloys.** 357, **α-Transformation in Fe–Ni alloys. Eutectoid diagram Fe–Fe_3C. Identification of Fe–Pd. Pt–Ru. Phase boundaries in binary alloys.** 367, **Corrosion of metals.** 377, **Determination of V in steel.**

Patents.

[Flotation reagent for] ore concentration. R. L. Perkins, Assr. to Nat. Aniline & Chem. Co., Inc. (U.S.P. 2,049,470, 4.8.36. Appl., 9.1.30).—C_6H_6 (350 pts.) is treated at 10° with SCl_2 (50) in presence of anhyd. $AlCl_3$ (50) and the condensation product is heated with S ($<25\%$) under reflux; the oily compound formed can be used in the flotation of sulphide ores. B. M. V.

Metal separation. W. E. Beatty (U.S.P. 2,048,316, 21.7.36. Appl., 27.12.32).—A comminuted mineral containing metallic (conducting) and non-metallic particles is suspended in a volatile liquid (H_2O) and subjected to an arc field of such intensity that the heat due to eddy currents will cause a bubble of vapour to form on each metallic particle.

B. M. V.

[Ore-]roasting apparatus. H. H. Stout and J. M. Samuel (U.S.P. 2,046,753, 7.7.36. Appl., 29.5.28. Renewed 7.5.32).—A roaster with $\nless 8$ superposed hearths is provided with large ports and flues so that gas flowing at a rate $>24,000$ lb./hr. has a max. velocity in the ports of 7 ft./sec. Gas containing SO_2 is withdrawn from the upper portion and returned to a lower portion together with a supply, from an external source, of SO_2 gases or air. Sulphide Cu ores are treated at 340 tons per day, the roast being self-sustaining, the exit gas at 400° and containing 8% of SO_2, and the calcines being at 650° and suitable for reverberatory smelting. B. M. V.

Reduction of ores by metallic calcium. P. P. Alexander, Assr. to Ventures, Ltd. (U.S.P. 2,043,363, 9.6.36. Appl., 7.7.34).—Ca ingots are heated in the reduction vessel in an atm. of H_2 at a dull red heat until no more H_2 is absorbed, then cooled, and pulverised in the vessel; the refractory oxide to be reduced is then added and well mixed with the CaH_2 powder, and the mixture is heated in vac. to expel H_2 and then more strongly to effect the reduction. A. R. P.

Combination furnace [for metals or ores]. H. Pontzen, Assr. to Amer. Lurgi Corp. (U.S.P. 2,042,626, 2.6.36. Appl., 27.9.34. Ger., 30.9.33).—Claim is made for a series of ellipsoid rotary furnaces mounted on a rotatable platform and provided with automatic charging and casting devices. A. R. P.

Melting and refining of metals. A. B. Kinzel, Assr. to Union Carbide & Carbon Corp. (U.S.P. 2,039,087, 28.4.36. Appl., 25.4.34).—Claim is made for a construction of oil-fired, open-hearth furnaces; the oil jets, which are fed with air enriched with O_2, are directed downwards so that a quiet zone at a comparatively low temp. lies under the roof, and the hot gases leave by ports just above the level of the molten metal. L. C. M.

Furnaces for annealing stainless-steel and other metal strip. Birmingham Electric Furnaces, Ltd., and A. G. E. Robiette (B.P. 466,560, 26.11.35).—The strip is passed (continuously) in contact with a heated hearth composed of soft-annealed Ni or of soft-annealed Fe or steel ($<0{\cdot}15\%$ C), the Brinell hardness in each case being 60—125. B. M. V.

Forming of metals. [Manufacture of tough, fine-grained cast iron.] S. R. McBride, Assr. to H. L. Fuog (U.S.P. 2,043,387, 9.6.36. Appl., 5.11.34).—Cr–Ni cast Fe is melted with 1% of a U ore free from carbonaceous shale. A. R. P.

Production of [ferrous-alloy] castings. C. O. Burgess, Assr. to Union Carbide & Carbon Corp. (U.S.P. 2,038,639, 28.4.36. Appl., 26.7.33).—In the casting of Fe alloys containing Cr 0·1—35 (0·1—2), Si 1—4, C 1—4, Mn 0·15—1, S $\not>0{\cdot}5$, and P $\not>0{\cdot}3\%$, the carbide-forming action of the Cr is lessened, with the production of ductile castings, by addition of part of the Si (in the form of Fe–Cr–Si) as graphitising agent just prior to pouring. L. C. M.

[Foundry] core and oil therefor. R. Stahl, Assr. to Aristo Corp. (U.S.P. 2,047,297, 14.7.36. Appl., 5.12.30).—An oil mixture for prep. of sand cores comprises polymerised olefines (I) and unpolymerised vegetable oil, with resin if desired, (I) being produced from cracked petroleum distillates by contact with solid absorbents. B. M. V.

Production of wrought iron. F. Johannsen, Assr. to F. Krupp Grusonwerk A.-G. (U.S.P. 2,047,562, 14.7.36. Appl., 7.11.35. Ger., 25.8.34).—Ore and carbonaceous fuel travel along an inclined rotary kiln (similar to a cement kiln), passing in turn through the stages in which preheating and the formation of sponge Fe, lumped Fe, and fused slag rich in Fe occur, the last mixture falling out at the lower end of the kiln. Steam and/or comminuted oxidising agents are injected with the primary at the burner end. B. M. V.

Welding electrode. R. K. Hopkins, Assr. to M. W. Kellogg Co. (U.S.P. 2,039,167, 28.4.36. Appl., 17.11.33).—Weld-rod sections are joined by short lengths of threaded rod of high-conductivity metal (*e.g.*, Cu, Ag, Al, or brass). L. C. M.

Welding and fusing [stainless-steel] metal. R. M. Rooke and F. C. Saacke, Assrs. to Air Reduction Co., Inc. (U.S.P. 2,043,811, 9.6.36. Appl., 12.11.34).—The gas used for the welding torch consists of a mixture of C_2H_2 with the necessary O_2 added as a 60 : 40 N_2–O_2 mixture. A. R. P.

[Steel] welding electrode. E. W. Kronbach, Assr. to Una Welding, Inc. (U.S.P. 2,043,927, 9.6.36. Appl., 16.5.32).—The steel rod is coated first with a 6% suspension of lampblack in 50% aq. Na silicate, then with a paste of 52% of a mixture of talc 73·2, 25% Ti–Fe 24·3, and $CaCO_3$ 2·5% with 48% of 30% aq. Na silicate. A. R. P.

Electric welding [of steel]. L. T. Jones, H. E. Kennedy, and M. A. Rotermund, Assrs. to Union Carbide & Carbon Corp. (U.S.P. 2,043,960, 9.6.36. Appl., 9.10.35).—The metal to be welded is covered with a flux containing CaO 27—38, MgO 9—16, SiO_2 60, Al_2O_3 4—6, and CaF_2 6%, and this is melted by passage of a current between an electrode and the work without forming an arc. The welding rod is then immersed in the fused slag and the temp. maintained by the resistance of this slag to the passage of the current. A. R. P.

[Ferrous] metal–glass seal. H. Scott, Assr. to Westinghouse Electric & Manufg. Co. (U.S.P. 2,043,307, 9.6.36. Appl., 14.6.34).—The C in the surface layers of steel is removed by heating in H_2 at 950° for 5—20 hr. and the surface is then oxidised by heating in air; the resulting film readily gives a good joint when fused into glass. A. R. P.

Preparation of inhibitors [for steel pickling]. J. D. Ruys and R. L. Kittle, Assrs. to Shell Development Co. (U.S.P. 2,042,412, 26.5.36. Appl., 3.4.35).—Acid sludge from petroleum refining is neutralised with NH_3 and the resulting aq. $(NH_4)_2SO_4$ removed. The recovered oil is extracted first with aq. NH_3, then with H_2SO_4, and the two extracts are mixed, the solution of N bases is removed, and the pptd. oily product is extracted with H_2O to yield an aq. inhibitor suitable for addition to dil. H_2SO_4 pickling baths. A. R. P.

Inhibiting corrosion [of the radiators of internal-combustion engines]. L. M. Burghart, Assr. to U.S. Industrial Alcohol Co. (U.S.P. 2,038,988, 28.4.36. Appl., 12.7.34).—Claim is made for the use of EtOH containing alkali nitrite, soap, and film-forming oil; *e.g.*, a mixture of aq. 40% $NaNO_2$ 6·25, kerosene 30 c.c., and soap 0·9 g. per litre may be used. L. C. M.

Cleaning [of steel]. P. McDorman, Assr. to Gen. Motors Corp. (U.S.P. 2,043,300, 9.6.36. Appl., 27.1.32).—Economies in working or forming Fe or steel are effected by using hydrocarbon lubricants; these can readily be removed by passing the metal twice through an atm. of moist Cl_2 with an intermediate H_2O rinse. A. R. P.

Manufacture of hot-galvanised articles. F. C. Elder (U.S.P. 2,049,834, 4.8.36. Appl., 9.12.35).—

Thin Fe sheets are coated with Zn in any of the known ways and, after cooling if a hot process is used, are then rapidly dipped at least once in molten Zn to produce an extra thick coat without completely melting the first coat. B. M. V.

Manufacture of coated insulated wire. Zaidan Hojin Rikagaku Kenkyujo (B.P. 463,290, 11.3.36. Jap., 12.3.35).—The wire is cleaned by means of rotating bands moving transversely to the direction of travel of the wire. A. R. P.

Coating of ferrous strip material [with carbon]. A. J. Marino, Assr. to Gilby Wire Co. (U.S.P. 2,043,549, 9.6.36. Appl., 17.3.33).—Soft Fe or steel strip is passed continuously in succession through an oxidising furnace at 650° (4 min.), over cooling rolls (4 min.), through a furnace filled with natural gas or producer gas (8 min.), and then into a quenching bath. The product is used for making valve anodes with a high heat-radiating capacity. A. R. P.

Manufacture of alloy steels [for nitriding]. W. M. Burden, R. Genders, and R. Harrison (B.P. 460,956, 30.4.35).—Ta or Nb in an amount 10% $>$ that required to combine with all the C is added, together with 1% of Al, to steel which is required to be N-case-hardened. (Cf. B.P. 457,760; B., 1937, 456.) A. R. P.

Nitriding [of steel]. J. P. Larkin (U.S.P. 2,041,769, 26.5.36. Appl., 13.1.32).—Steel containing C 0·2—0·4, Al 0·75—1·25, Cr 1—2, and Mo $\sim$ 0·3% is immersed in a bath of fused KNO_3–$NaNO_3$ or NaCl–KCl–$CaCl_2$–Na_2CO_3 at 460—625° (550°) and NH_3 is slowly bubbled through the bath. A. R. P.

Nitriding [of steel]. D. A. Holt, Assr. to E. I. Du Pont de Nemours & Co., Inc. (U.S.P. 2,042,527, 2.6.36. Appl., 30.11.32).—The steel is immersed for 2—15 hr. in a fused bath (530°) of LiCl 37·6, KCl 46·9, and NaCl 15·5% containing 1—40 (10)% of Na_2CN_2 and covered with flake graphite. A. R. P.

Hardening of cobalt steel. R. H. Harrington, Assr. to Gen. Electric Co. (U.S.P. 2,043,533, 9.6.36. Appl., 29.10.31).—Steel containing Co 5—60 (36), Mo 1—10 (8), and C 0·5—2 (1)% is quenched in oil from 950° and reheated at 450—550°. A. R. P.

Chromium–aluminium steel for articles exposed to high temperatures. E. Scheil, Assr. to Verein. Stahlwerke A.-G. (U.S.P. 2,043,631, 9.6.36. Appl., 12.11.31. Ger., 29.11.30).—The steel contains Cr 1—6, Al 11—5 (Cr + Al 10—12), and C $\ngtr$0·1%. A. R. P.

Recovery of metal values [copper]. J. A. Murphy, jun. (U.S.P. 2,038,850, 28.4.36. Appl., 29.9.34).—Roasted CuS ore, or CuO or $CuCO_3$ ore, is leached with acidified H_2O previously deoxidised by treatment with scrap Fe; Cu is pptd. from the liquor by a slight deficiency of Al or Zn powder in a closed vessel, and the fine cement-Cu, after washing with deoxidised H_2O, is suitable for use as a bronze pigment. L. C. M.

Apparatus for separating metals and metal alloys [white metal from bronze or steel]. K. A. Lindner, Assr. to Amer. Smelting & Refining Co. (U.S.P. 2,041,844, 26.5.36. Appl., 10.3.34).—The apparatus comprises a reverberatory furnace containing a series of perforated hearth trays so mounted as to form an oscillating chute down which the metal mixture is passed; the white metal melts and is shaken through the perforations to the hearth of the furnace, from which it is withdrawn from time to time. A. R. P.

Refining of copper alloys. J. O. Betterton and A. J. Phillips, Assrs. to Amer. Smelting & Refining Co. (U.S.P. 2,042,291—2, 26.5.36. Appl., [a] 18.5.34, [b] 31.5.34).—(a) The alloy is melted in a reverberatory, then poured into a converter and blown under a Na_2CO_3–SiO_2 flux until all the Zn is volatilised as ZnO fume, and finally blown in two stages with two new flux charges to produce first a Sn-rich and then a Sn-poor slag which is used as the flux for a new charge in the first Sn blow. The Sn-rich slag is smelted to recover the Sn as metal. (b) The process is conducted as in (a), but all the Sn is removed in one blow and the slag smelted to recover a Sn–Cu–Pb alloy which is roasted and leached to remove Cu as $CuSO_4$; the residue from leaching is reduced to produce a Sn–Pb solder. A. R. P.

Production of [copper–]lead alloys. F. B. Peterman, Assr. to Internat. Lead Refining Co. (U.S.P. 2,042,625, 2.6.36. Appl., 28.10.33).—Molten Pb is covered with a flux of NaCl containing the required amount of Cu as $CuSO_4$; agitation of the mixture at 525° effects rapid reduction of the Cu into the Pb. A. R. P.

Manufacture of bearings. Glacier Metal Co., Ltd., and J. Bate (B.P. 466,273 and 466,332, 25.11.35).—Methods of forming flat blanks of Fe, brass, or the like faced with white metal are described. B. M. V.

Cadmium–cobalt bearing alloy. W. E. McCullough, Assr. to Bohn Aluminum & Brass Corp. (U.S.P. 2,043,588, 9.6.36. Appl., 1.4.35).—The alloy consists of Cd with 1·5—10% Co. A. R. P.

(a) Recovery of tin [from bearing metals]. (b) Treatment of metals [*e.g.*, solder]. (c) Detinning of lead alloys. (a, b) J. O. Betterton, (a) C. N. Waterman, (b) A. J. Phillips, (c) T. D. Jones and J. C. Reinhardt, Assrs. to Amer. Smelting & Refining Co. (U.S.P. 2,043,573—5, 9.6.36. Appl., [a] 26.5.34, [b] 19.7.34, [c] 21.5.35).—(a) The alloy is melted under a $PbCl_2$–NaCl eutectic flux into which PbO is introduced to oxidise the Sn to SnO_2, which dissolves in the slag. Any Sb present remains with the Pb. The slag is crushed and leached with brine to obtain a residue of SnO_2 and recover the $PbCl_2$ for re-use. (b) The flux used is the $CaCl_2$–NaCl eutectic, PbO being introduced into it at 550°. (c) In the process claimed in (a), CaO is added to the flux to produce the PbO necessary for oxidising the Sn. A. R. P.

Extraction of gold from saline solutions [sea-water]. H. C. Parker, Assr. to J. W. Chard (U.S.P. 2,042,121, 26.5.36. Appl., 4.8.34).—The sea-H_2O is passed continuously through a closed container containing Ni granules kept in agitation by a rotating helical screw. A. R. P.

[Air-hardening gold] alloy [for pen nibs]. R. H. Leach, Assr. to Handy & Harman (U.S.P. 2,042,155, 26.5.36. Appl., 2.4.36).—The alloy contains Au 33—50 (41·7), Ag 10—18 (14), Cu 30—40 (35), Ni 1—5 (2), and Zn 5—10 (7·3)%; it air-hardens on cooling from 760°. A. R. P.

Sintered hard [tungsten] carbide composition. Brit. Thomson-Houston Co., Ltd. (B.P. 463,239, 28.9.36. U.S., 28.9.35).—Claim is made for a sintered alloy of WC 99—95 and TaC, NbC, TiC, or MoC 1—5% (NbC 1%). Sintering is effected at 2200—2300° in a reducing atm. The product has H_B 1600—1800 and a tensile strength of 100,000 lb./sq. in. A. R. P.

Multiple [magnesium-base] alloys. G. Schichtel, Assr. to Amer. Magnesium Metals Corp. (U.S.P. 2,041,865—7, 26.5.36. Appl., [A] 18.11.32, [B] 4.6.35, [C] 14.2.33. Austr., [A—C] 19.2.32).—Claim is made for Mg alloys containing (A) Al 1—18 (3) and Bi or Sb 0·05—2·0 (Sb 0·5)%, (B) Al 1·1—17 (2—4), Zn 1—8·4 (1), and Bi or Sb 0·05—2·0 (Sb 0·5)%, or (C) Al 1—16 (8), Mn 0·12—2·0 (0·2), and Bi or Sb 0·05—2·0 (Sb 0·5)%. A. R. P.

Treatment of aluminium or aluminium alloy. K. Hayakawa (U.S.P. 2,039,165, 28.4.36. Appl., 17.1.35).—The metal is heated at $>$900°/vac. in an Fe vessel for $\frac{1}{2}$—1 hr.; the temp. is then lowered to 500—700° and an atm. of hydrocarbon gas introduced, the metal being then rapidly cooled. An improved structure is claimed to result. L. C. M.

Aluminium welding rod. F. Keller, Assr. to Aluminum Co. of America (U.S.P. 2,043,855, 9.6.36. Appl., 31.1.35).—The rod consists of an alloy of Al of the same composition as the metal to be welded but containing in addition 0·01—0·75% of one or more grain-refining elements of the group Ti, Zr, Cr, Mo, W, U, *e.g.*, Cr 0·25, Ti 0·1, or Zr 0·2%. A. R. P.

Control of chromium-plating solutions. H. S. Lukens, Assr. to United Chromium, Inc. (U.S.P. 2,042,611, 2.6.36. Appl., 3.2.32).—The solution is maintained in contact with solid $SrSO_4$, the solubility of which in aq. CrO_3 is just sufficient to supply the SO_4'' necessary for accurate control of the plating. A. R. P.

Producing cold-flow. Casting molten material.—See I. **Treating refinery sludges.**—See VII. **Anode for electrolysis. Cu electrode.**—See XI. **Adherent finishes for metal.**—See XIII.

XI.—ELECTROTECHNICS.

Application of *X*-ray methods to problems of cold-work, preferred orientation, and recrystallisation [in metals]. J. T. Norton (Amer. Soc. Test. Mat., Symp. on Radiography and *X*-Ray Diffraction Methods, 1936, 302—323).—A review. R. B. C.

[*X*-Ray study of] constitution of alloys. K. R. Van Horn (Amer. Soc. Test. Mat., Symp. on Radiography and *X*-Ray Diffraction Methods, 1936, 230—283).—The application of *X*-rays for studying the structure of alloys is discussed. R. B. C.

Radiographic inspection [of metals]. H. H. Lester (Amer. Soc. Test. Mat., Symp. on Radiography and *X*-Ray Diffraction Methods, 1936, 156—190).—A discussion. R. B. C.

Radiography in the welding shop. J. C. Hodge (Amer. Soc. Test. Mat., Symp. on Radiography and *X*-Ray Diffraction Methods, 1936, 53—91).—The technique and equipment employed for the *X*-ray examination of welds are discussed. R. B. C.

Foundry applications of radiography. E. Cook (Amer. Soc. Test. Mat., Symp. on Radiography and *X*-Ray Diffraction Methods, 1936, 25—32).—The metallurgical control and inspection of metal castings by means of *X*-rays is discussed. R. B. C.

Applications of radiography and fluoroscopy. H. E. Seeman (Amer. Soc. Test. Mat., Symp. on Radiography and *X*-Ray Diffraction Methods, 1936, 92—115).—A review. R. B. C.

Principles of the radiographic process. J. T. Norton (Amer. Soc. Test. Mat., Symp. on Radiography and *X*-Ray Diffraction Methods, 1936, 3—24). Factors determining the successful production of a radiograph are discussed. R. B. C.

Effecting sterilisation by radiation. A. R. Dennington (Canad. Dairy and Ice Cream J., 1937, **16**, No. 6, 32—34).—The use of short-λ (λ 2500) radiations in the sterilisation of food, air, and H_2O is discussed. Milk at 2° irradiated as a thin film flowing over an inclined plane (40 sec. exposure) is claimed to reach 98% sterility. W. L. D.

Portable ultra-violet fluorescence lamp for examination of textile and other materials. D. A. Derrett-Smith (J. Text. Inst., 1937, **28**, T 145—160).—The ultra-violet light is supplied by a Vi-tan burner and is filtered through Chance's ultra-violet filter glass No. 14. Lists are given of the fluorescent effects observed with oils, fats, waxes, dyes, soaps, moulds, and bacteria, as well as with cellulose tendered by chemicking or acid treatment. A. G.

Photographic detection of thorium oxide in [tungsten lamp] filaments. J. A. M. van Liempt and J. H. M. van Uden (Rec. trav. chim., 1937, **56**, 607—612).—Details are given for detecting 1—3% of ThO_2 in W filaments by the blackening of a photographic plate caused by the radioactivity of the ThO_2. Only Schumann plates or others of the highest sensitivity can be used. Drawn filaments give the strongest blackening, and those consisting of single crystals the weakest, for a given % of the ThO_2. The effect is greater in moist than in dry air. F. L. U.

Thermionic vacuum-tube electrode materials. F. P. Peters (Trans. Electrochem. Soc., 1937, **71**, Preprint 29, 339—363).—Cathodes are fabricated either from pure Ni or Ni alloyed with Co, Si, Al, etc., and coated with an activated layer of alkaline-earth oxide, or, in high-voltage tubes, from pure or "thoriated" W. Anode materials include carburised Ni, Mo, Fe, Cu, and graphite. For grids Mo is being replaced by cheaper materials, viz., Ni–Cr, Ni–Mn,

and Ni–Fe–Mo alloys. New data are appended on the high-temp. mechanical and electrical properties of the Ni alloys employed in vac.-tube construction.
J. W. C.

Storage battery life tests. I. Laboratory life testing. II. Service life testing. J. E. HATFIELD and H. R. HARNER (Trans. Electrochem. Soc., 1937, 71, Preprint 31, 375—388; 32, 389—395).—I. The results of two series of laboratory life tests on Pb storage cells having similar negative plates but dense and bulky positive-plate pastes, respectively, are discussed.

II. The results of laboratory and service life tests on automobile Pb storage cells are compared.
J. W. C.

Silver oxide positive of the alkaline accumulator. I. K. KINOSHITA (Bull. Chem. Soc. Japan, 1937, 12, 164—172; cf. B., 1936, 1103).—Charge and discharge curves of the positive Ag oxide plates in the cell Ag oxide|aq. KOH|Fe have been studied. Discharge occurs in two steps, corresponding with $Ag_2O_2 \rightarrow Ag_2O$ and $Ag_2O \rightarrow Ag$. The coeff. of utility of the Ag oxide is $\gg$ that of the PbO_2 in the Pb–acid storage cell.
F. L. U.

Acid-proof diaphragms. W. W. STENDER, J. G. JORNITSKY, and B. G. SABO (Trans. Electrochem. Soc., 1937, 71, Preprint 11, 97—114).—Ordinary asbestos paper diaphragms are satisfactory in cells for the electrolysis of acid aq. salts and for the electrochemical purification of H_2O. Diaphragms of silicated asbestos paper are recommended for use in the electro-synthesis of org. compounds. Chlorinated rubber diaphragms are resistant to mineral acids, alkalis, and Cl_2, have a high permeability, and are generally useful at temp. $\not>$80—90°. Microporous ebonite diaphragms resist HCl, H_2SO_4, and alkalis, but not Cl_2, and are widely used for the separators in Pb storage cells.
J. W. C.

Dielectric properties of anodic layers in aluminium electrolytic condensers. J. E. LILIENFELD, L. CHANDLER, jun., and S. GOLDMAN (Physics, 1935, 6, 416—425; cf. B., 1932, 348).
CH. ABS. (e)

Thermal conductivity of insulating materials. J. A. WEH (Gen. Elect. Rev., 1937, 40, 138—140).—An electrical method of measuring the thermal conductivity of solid dielectrics is described. Data for typical insulating materials, *e.g.*, rubber, are given.
R. B. C.

Simultaneous determination of the specific heat and thermal conductivity of insulators. Signal method. P. VERNOTTE (Compt. rend., 1937, 204, 563—565).—Heat is supplied at a const. rate to one face of a plate of the material, and the time taken for the temp. disturbance to reach the other face is measured; c and κ can then be calc. For ebonite (d 1·20), $c = 0·34$ and $\kappa = 0·00041$.
A. J. E. W.

Dielectric measurements on varnished tapes. A. L. BROWNLEE, F. J. POHNAN, and J. P. GALASSINI (Elect. J., 1937, 34, 51—54).—Factors influencing power-factor measurements of varnished tapes, *e.g.*, temp., humidity, and test voltage, were investigated. A standardised method for testing tapes is given.
R. B. C.

Electricity in the coking industry. Activated C. Gas-main corrosion. Cracking of oils.—See II. **Measuring paper smoothness and opacity.**—See V. **Electric furnaces. Talc porcelain.**—See VIII. **Supersonic waves and *X*-rays in metallurgy. Mumetal. Resistance isotherms of age-hardening steel. Testing corrosion-resistance of stainless steels. Detecting strains in metals. Corrosion of alloys. Resistance welding. Pb cables. Protecting Fe from corrosion. Zn-coated steel wire. Cu-, Cr-, Mn-, and W-plate. Electrodeposits.**—See X. **Action of radiations on plants.**—See XVI. **Photo-electric densitometer.**—See XXI. **Cr-plating works effluent.**—See XXIII.

See also A., I, 352, **Resistance of hardened Pt.** 356, **Magnetic Mn amalgams.** 357, **Identification of Fe–Pd alloys.** 365, **Reduction potential of $(NO_2)_2$-compounds. Decomp. potentials of fused electrolytes.** 369, **Electrolytic prep. of Cu oxide and salts.** 370, **Synthesis of NO.** 374, ***X*-Ray determination of particle size. Dispersoid analysis.** II, 291, **Electrolysis of aromatic acids.**

PATENTS.

Electrical thermostat. W. D. HARPER (U.S.P. 2,049,562, 4.8.36. Appl., 3.1.36).—Hg is contained in a bulb and stem and at least the latter is of insulating material. Electrodes are inserted into the bulb and also at a variable distance down the stem, and its longitudinal movement is converted into the rotation of a pointer over a dial by means of a helical flat spring.
B. M. V.

[Electrical] temperature meter. P. S. BAUER, Assr. to NORTH SHORE NEWS CO. (U.S.P. 2,049,285, 28.7.36. Appl., 7.8.31).—For measuring small variations in temp. an a.-c. (1000 ~) Wheatstone bridge is used. This comprises 3 arms of pure resistance, the fourth containing an electrolytic cell the capacity of which is neutralised by a variable inductance in series so that that arm also becomes a resistance which is very sensitive to temp. changes, the change being neutralised by adjusting one of the other arms, which is calibrated.
B. M. V.

Colorimeter apparatus. M. L. KUDER (U.S.P. 2,048,554, 21.7.36. Appl., 21.8.34).—A generating type of photoelectric cell is compensated for fatigue by a variable shunt which is adjusted and re-adjusted when one of the standard colour slides is in use.
B. M. V.

Photoelectric colorimeter. R. H. MÜLLER (U.S.P. 2,043,589, 9.6.36. Appl., 31.5.33).—An optical system comprising a series of lenses and condensers and a photoelectric cell is claimed.
A. R. P.

Electric lamps comprising luminescent materials. GEN. ELECTRIC CO., LTD., and J. T. RANDALL (B.P. 466,503, 28.11.35).—The luminescent material (for use in conjunction with Hg vapour and usually a rare gas for starting) comprises chiefly a Cd silicate containing Mn as activating impurity. This compound is prepared by mixing SiO_2 derived from $SiCl_4$ and H_2O with pure CdO, adding $MnCl_2$

to give 0·5% Mn, and heating the whole in vac. slowly up to 1000° during 2 hr. and then at that temp. for 1 hr. B. M. V.

Cuprous oxide photoelectric cell. W. ROSETT (U.S.P. 2,049,472, 4.8.36. Appl., 25.2.32).—A Cu (or Ag) sheet is slotted, heated in an inert atm. at 1000°, O_2 (S, Se, or Te) is admitted, and heating continued for 1 hr.; the grid is then cooled uniformly in a reducing medium (I), to form a surface film of metal, and the reduced metal is removed from one face only. For (I), tung, lard, or fish oil, or petroleum jelly is suitable. B. M. V.

Electric-discharge devices. BRIT. THOMSON-HOUSTON CO., LTD. (B.P. 466,254, 2.11.36. U.S., 1.11.35).—In an arc-discharge type of lamp, the starting electrode dipping into a pool of Hg is formed of 600-mesh carborundum dispersed in a ceramic material (≮10% of the whole) and fired at 900—1100°. B. M. V.

Gaseous electric-discharge device. G. GAIDIES, Assr. to GEN. ELECTRIC CO. (U.S.P. 2,046,941, 7.7.36. Appl., 15.10.35. Ger., 26.10.34).—In a discharge lamp for commercial voltages, filled with Ne and A, each electrode comprises a metal (W) filament, only one end of which is brought out through the seal, wrapped around a rod of alkaline-earth metal (Ba or Ba–Sr), and a tube of alkaline-earth oxide (BaO) surrounds those. B. M. V.

Electron emitter. [Coated filament.] J. R. WILSON, J. T. ACKER, and C. D. HARTMAN, Assrs. to BELL TELEPHONE LABS., INC. (U.S.P. 2,041,802, 26.5.36. Appl., 30.6.33).—A Ni, Pt, or Ni–Pt alloy filament is coated with a mixture of $BaCO_3$ 255, $SrCO_3$ 300, $Ba(NO_3)_2$ 50, $Sr(NO_3)_2$ 100, and $NiCO_3$ 40 pts. made into a thick paste with a solution of cellulose nitrate in $C_5H_{11}{\cdot}OAc$; the coated filament is then heated to bright redness in CO until the $NiCO_3$ is reduced to metallic Ni. A. R. P.

Electrical treatment of gases or liquids. G. GRAVE, Assr. to INTERNAT. PRECIPITATION CO. (U.S.P. 2,049,561, 4.8.36. Appl., 1.6.34. Ger., 7.6.33).—Gases are treated in order to ppt. suspended dust, or liquids to break down emulsions, by high-tension current of two or more different kinds applied to the electrodes in rotation, one kind of current comprising peaky impulses of steep wave front. B. M. V.

Electrical devices for detecting a gas in a gaseous mixture and for determining the amount thereof. KABUSHIKI KAISHA HOKUSHIN DENKI SEISAKUSHO (B.P. 466,390 and Addn. B.P. 466,391, 29.8.36. Jap., [A, B] 3.9.35).—(A) Combustion of the sample (with added O_2 if necessary) is completed in contact with a Pt wire, the Pt forming both the heater and an arm of the bridge of an electrical-resistance thermometer, but not being relied on as catalyst for it is enclosed in a porous ceramic tube impregnated with a catalyst. (B) There being two like Pt wires in the Wheatstone bridge, in this case each wire is enclosed in a porous catalytic tube adapted to act on a different gas, respectively; at the same time each wire acts as standard for the other in turn, when in a stagnant atm. B. M. V.

Primary cell. M. L. MARTUS and E. H. BECKER (U.S.P. 2,048,347, 21.7.36. Appl., 20.3.35).—The cell comprises (1) a Zn anode, (2) a depolariser, (3) an alkaline electrolyte. (2) and (3) are separated and preserved from mutual contamination by a pervious layer of (4) metal sprayed on (5) a fabric base, (4) being in contact with (2) and not forming a couple therewith. *E.g.*, the cell may contain (2) CuO, (5) cheese cloth shrunk in NaOH, and (4) Fe or Cu. B. M. V.

Apparatus for electrolytically decomposing water or other liquids under pressure. H. OLSEN (B.P. 466,563, 27.11.35. Ger., 28.11.34).—The collecting spaces for O_2 are formed by plates bent to a ∩ with the arms very close together and one side being finely perforated, covered with asbestos or the like, and placed adjacent to a perforated plate on which H_2 is evolved. A no. of these units are placed together and bent to form concentric cylinders. H_2 is led away upwards and O_2 downwards, provision being made for the fact that the latter at 700 atm. or more is heavier than the electrolyte. B. M. V.

[Anode for] electrolysis [of zinc sulphate solutions from ore leaching]. H. M. DORAN and H. D. HOUGHTON, Assrs. to ANACONDA COPPER MINING CO. (U.S.P. 2,042,591, 2.6.36. Appl., 15.11.34).—The insol. anode consists of an alloy of Pb with Cd ≯0·5 (0·2—0·4)%. A. R. P.

Production of electrode [copper starting sheet]. J. P. DYER, Assr. to NICHOLS COPPER CO. (U.S.P. 2,048,854, 28.7.36. Appl., 15.12.33).—For the electrodeposition of Cu from $CuSO_4$ solutions, a Cu starting sheet is coated with Sn and further coated with Pb on at least the area adjacent to the surface of the bath. B. M. V.

Electrolytic condenser. H. EMMENS, W. C. VAN GEEL, and A. F. P. J. CLAASEN, Assrs. to N. V. PHILIPS GLOEILAMPENFABR. (U.S.P. 2,039,154, 28.4.36. Appl., 8.6.33. Ger., 10.6.32).—Electrolytes, p_H 2—4, consisting of EtOH or glycerin with org. acid, alkali phosphate, and alkali or NH_3 are claimed; *e.g.*, glycerin containing KH_2PO_4 40 g., citric acid 40 g., and 0·9*N*-aq. NH_3 117 c.c. per litre may be used. L. C. M.

Electrolytic devices such as capacitors. BRIT. THOMSON-HOUSTON CO., LTD. (B.P. 465,299, 3.2.36. U.S. 22.2.35).—A cryohydric electrolyte for a condenser or the like is composed essentially of NH_4 acetate and borates. B. M. V.

Dielectric material. A. MEISSNER (U.S.P. 2,046,476, 7.7.36. Appl., 8.11.29. Renewed 18.9.33. Ger., 13.11.28).—The resin in a mixture of artificial resin and a filler is melted and oriented by an electric field, the whole being chilled while in the field. B. M. V.

Electrical insulation [for copper wires]. R. H. MÜLLER, Assr. to GEN. ELECTRIC CO. (U.S.P. 2,047,029, 7.7.36. Appl., 6.1.33. Ger., 12.1.32).—A Cu conductor is insulated to resist a temp. of 200—300° by means of a fused coating of Cu halide and a mineral silicate. B. M. V.

Electric-resistance elements or refractory supports therefor. Walsall Conduits, Ltd., W. Whalley, and A. E. Read (B.P. 466,361, 13.12.35).

Production of electrodes [grooved pasted plates] of electric accumulators. Chloride Electrical Storage Co., Ltd. (B.P. 466,702, 12.1.37. Ger., 12.2.36).

Separators for electric storage batteries. J. Lucas, Ltd., and G. D. Spencer (B.P. 466,355, 26.11.35).

Hg thermostat. Connecting sealed vessels. Producing cold-flow. Fluid-treating device.—See I. **Metal separation. Coated wires. C-coated ferrous strip. Welding.**—See X. **Determining oxidising agent in H_2O.**—See XXIII.

XII.—FATS; OILS; WAXES.

Chemistry of fats in the fight against food spoilage. K. Täufel (Fette u. Seifen, 1937, **44**, 179—187).—The different types of rancidification in fats are reviewed and methods for recognising them and preventing such changes are discussed.

E. L.

Correlation of the constants of butter fat. A. Azadian and A. B. Attia (Ann. Falsif., 1937, **30**, 32—34).—The constancy of the val. (Reichert–Meissl + Polenske + I vals.)/refractometer degrees for cow's and buffalo's milk fat has been studied. The val. varies for the cow according to whether it is pasture- (1·51) or stall-fed (1·36). 68 samples of buffalo milk fat showed a val. of 1·50 (range 1·34—1·68).

W. L. D.

Variation in the butyric index of butter fat. M. Teply (Ann. Falsif., 1937, **30**, 23—31).—The $PrCO_2H$ index varies directly with the Reichert–Meissl (R.–M.) and the Polenske vals. both with season of the year and stage of lactation. The index is at a max. (22) in February and a min. (16) in August, with an annual mean of 19. Development of acid rancidity on storage lowers the index slightly. The $PrCO_2H$ index of goat's-milk fat averages 12·1 and the R.–M. val. 20·7. The index for various mixtures of butter fat and coconut oil is given. W. L. D.

Variations of certain chemical and physical properties of butter fat as revealed by melting time. W. D. Gallup, A. H. Kuhlman, and R. M. Waldby (Oil and Soap, 1937, **14**, 124—126).—Determinations of the melting time, m.p., hardness index, and I val. of 61 samples of butter fat were made. It was found that melting time is $\propto$ hardness index and m.p., and, less definitely, is $\propto 1/\text{I}$ val.

T. G. G.

Dependence of the viscosity and density of fats and fatty acids on their iodine values. G. B. Ravitsch (Acta Physicochim. U.R.S.S., 1937, **6**, 205—212).—The η vals. of pure linoleic, oleic, and stearic acids have been determined at 20—90° with an Ubbelohde viscosimeter. η decreases linearly with increase in degree of unsaturation as given by the I val. During hydrogenation of a mixture of cottonseed and linseed oils, η increases and d decreases, the change in η being almost linear with the change in I val. Viscosimetric and dilatometric methods can be used to study especially the initial stage of hydrogenation of cottonseed oil, whereas the formation of eutectic mixtures of fatty acid salts complicates the usual methods, *e.g.*, m.p. of the samples and of their acids. J. W. S.

Simplification of the determination of the saponification value. J. Hübscher (Seifens.-Ztg., 1937, **64**, 315—316).—The following method, which avoids the use of standardised alcoholic KOH or an analytical balance, is proposed for technical use: 8—10 g. of melted fat or fatty acids (soap stock) are weighed into a flask on a rough balance, and an excess (about 8 g.) of aq. KOH (d 1·38) is weighed in. 40—50 c.c. of 96% EtOH and alcoholic phenolphthalein are added, and the mixture is heated as usual under an air condenser for 40—50 min. The excess of alkali is titrated with 0·5N-HC lor -H_2SO_4 and the sap. val. calc. E. L.

Determination of the hexabromide value. Deuts. Ges. f. Fettforschung (Fette u. Seifen, 1937, **44**, 113—114).—Margaillan's method differs but slightly from the Fritz method (cf. B., 1937, 365). Precautions should be taken to avoid emulsification during extraction of fatty acids with Et_2O. 10 ml. of dried ethereal solution are placed in a centrifuge tube, 1 ml. of glacial AcOH is added, the vessel stoppered and placed in melting ice for 10 min., and then 25 ml. of freshly prepared Br solution are added all at once. If the hexabromide val. is to be expressed as the wt. of brominated acids obtained from 100 g. of fat, the only precaution necessary during the prep. of the fatty acids is prevention of oxidation.

F. C. B. M.

Refractometric determination of fatty acids in Turkey-red oil. W. Leithe and H. Lamel (Fette u. Seifen, 1937, **44**, 111—113).—Except that the oil is first heated with HCl (2 vols. of conc. HCl, d 1·19 with 1 vol. of H_2O), the procedure is identical with that already described (B., 1936, 798). F. C. B. M.

Twitchell reagents. XIX. Octadecylbenzenesulphonic acid. K. Nishizawa and S. Tokuriki. **XX. Dipropylnaphthalenesulphonic acids.** K. Nishizawa, S. Hiraoka, and S. Hibino (J. Soc. Chem. Ind. Japan, 1936, **39**, 488—489B, 489—490B; cf. B., 1937, 151).—XIX. H_2SO_4 (up to 2N) greatly increases the fat-splitting power of *octadecylbenzenesulphonic acid* (I) (*Ba* salt) (prep. from PhI and $C_{18}H_{37}I$, followed by treatment with oleum). This acid is more effective in the hydrolysis of olive oil than the original Twitchell reagents.

XX. *n*- and *iso*-Dipropylnaphthalenesulphonic acids (cf. *loc. cit.*), now purified through their *Ba* salts (+ $4H_2O$), are similar in cryst. form (detailed) and in their high fat-splitting properties in presence of H_2SO_4 (up to 2N). R. F. P.

Antioxygens and fat stabilisers. F. Wittka (Chem.-Ztg., 1937, **61**, 386—389).—A review. The constitutions of natural antioxygens are unknown although active concentrates have been prepared. Many compounds have been suggested as artificial antioxygens, but it is doubtful whether all of them are efficacious. Direct measurement of O_2 absorption is the best method of testing. The action of these compounds has not been satisfactorily explained. An extensive patent list is given. T. G. G.

Thermodynamics of fat hydrolysis. H. P. Kaufmann and M. C. Keller (Fette u. Seifen, 1937, **44**, 105—107; cf. B., 1937, 462).—Hydrolysis of fats is not accompanied by measurable heat of reaction. F. C. B. M.

Extraction of fatty residues. I. Taussky (Petroleum, 1937, **33**, No. 14, 6—7).—The most advantageous methods of solvent extraction for reducing the fat content of these residues to a negligible amount are described. H. C. R.

Purification of glycerin waters [contd.]. H. Dorner (Seifens.-Ztg., 1937, **64**, 317—319; cf. B., 1937, 696).—The solubilities of the lower fatty acids (C_4—C_{12}) and of their heavy-metal salts are summarised (data from Beilstein); comparison of the solubilities of the Ca, Ba, and Zn salts of the C_6-, C_8- and C_{12}-acids show that the usual $Al_2(SO_4)_3$–$BaCO_3$–$Ba(OH)_2$–$(NH_4)_2SO_4$ process of purification is not the most suitable for autoclave crude lyes derived from the splitting of the nut oils. E. L.

Practical soap-making. I. Hard soap. H. Manneck (Fette u. Seifen, 1937, **44**, 202—205).—The effect of NaCl on the η of the soap solution in the pan, proper conditions for salting-out, and the bleaching of soap are especially considered. E. L.

Sulphite[-cellulose] waste lye powder as raw material for soaps and detergents. R. Krings (Allgem. Öel- u. Fett-Ztg., 1937, **34**, 192—196).—"Zewa powder" (technically pure Na ligninsulphonate, obtained by evaporation of waste sulphite lyes) has detergent and H_2O-softening properties and can be usefully incorporated in soap powders, toilet soap, etc. without causing discoloration, provided the admixed soap is substantially dry and the product packed in moisture-proof containers. E. L.

Use of alginic acid for soaps. Anon. (Maslob. Shir. Delo, 1934, No. 3, 28).—Na alginate possesses no detergent properties. Ch. Abs. (*p*)

Coconut oil soaps prepared by saponification with carbonate. Anon. (Allgem. Öel- u. Fett-Ztg., 1937, **34**, 138—144).—The prep. (on a small scale) of satisfactory soaps from coconut oil fatty acids, alone, or admixed with other acids, by neutralising with Na_2CO_3, and only finishing off with NaOH (KOH), is described. E. L.

Soap from coriander seed. F. Nevolin and A. Koliv (Maslob. Shir. Delo, 1934, No. 6, 23—25).—The seeds contain 11—20% of a fatty oil which gives soft Na and K soaps of pleasant odour. Ch. Abs. (*p*)

Preparation of solvent-containing soaps. E. Pyhälä (Öle, Fette, Wachse, 1937, No. 4, 1—6).—The prep. of soaps containing solvent (mineral oil, aromatic hydrocarbons), which shall give clear solutions in H_2O, are described. The analysis of two commercial products (one containing Al Ca naphthenate and sulphonated acids) is detailed. (Cf., *e.g.*, G.P. 309,574 and 365,160; B., 1919, 295A; 1923, 318A.) E. L.

The perfect toilet soap. K. L. Weber (Öle, Fette, Wachse, 1937, No. 5, 1—7).—The selection of the fats (olive, arachis, castor, palm oil, slightly hardened oils) and the most suitable method of manufacture and drying for the especially mild soaps intended for nurturing the skin (as distinct from mere washing, *e.g.*, for foam-massage) are detailed. E. L.

Effect of glycerin on equilibria of hydrated soap systems. R. H. Ferguson (Oil and Soap, 1937, **14**, 115—118).—Addition of glycerin (I) to a soap lye or nigre does not cause any separation of neat soap. When (I) is present the soap is more difficult to salt out although the effect is small when $< 9\%$ of (I) is present. T. G. G.

Effect of fat solvents and heavy hydrocarbons on detergent properties of soap. M. Nikiforov and K. Tschernak (Maslob. Shir. Delo, 1934, No. 6, 23—25).—Light and medium solvents (200—225°), especially those of homogeneous type, turpentine, decalin, and tetralin improve, and heavy solvents (250—275°) lower, the detergent power of soap. Addition of 10% of solvent to a hard soap softens the latter to an extent equiv. to a titre of 2—3. Ch. Abs. (*p*)

Double decomposition of triethanolamine soaps and sodium chloride. A. Tettamanzi (Annali Chim. Appl., 1937, **27**, 53—56).—Three successive treatments of the stearate with hot 20% NaCl solution gave 95% yields of Na soap. L. A. O'N.

Sand and pumice soaps from fatty acids. Anon. (Allgem. Öel- u. Fett-Ztg., 1937, **34**, 196—199).—Recipes and manufacturing hints are given. E. L.

Shaving creams. J. Kalish (Drug & Cosmetic Ind., 1937, **40**, 658—659, 665).—The appearance of the soaps obtained by neutralising coconut, olive, and palm oils, tallow fatty acids, and oleic, myristic, and stearic acids with KOH, NaOH, and $N(C_2H_4{\cdot}OH)_3$, (I) are described: all the (I) soaps, except the stearate, were red-brown in colour. E. L.

Alkali-free detergents. J. Hetzer (Öle, Fette, Wachse, 1937, No. 4, 9).—Ethanolamine soaps are strictly "alkali-free" and the term may be applied by extension to the alkali-metal salts of sulpho-acids (or like strong acids) since they do not yield alkali by hydrolysis in aq. solution. E. L.

Detergent action and its relation to wetting and emulsification. N. K. Adam (J. Soc. Dyers and Col., 1937, **53**, 121—128).—The several factors contributing to detergent action are discussed. Emphasis is laid on the importance of adhesion between the cleansing agent and the fabric, and the displacement of soil from single wool fibres by solutions of Na cetyl sulphate is illustrated by photomicrographs. F. L. U.

Analytical constants of Algerian olive oil. Sabatié (Ann. Falsif., 1937, **30**, 18—22).—Variations in the analytical consts. of North African olive oil (1934—5 produce) are given. Most samples had an I val. of 80—86. All oils showed a yellow and brick-red fluorescence with Wood's light. Adulteration with cereal oils gives a blue-violet fluorescence. W. L. D.

Oil from immature olives. G. Lucente and M. Barnaba (Annali Chim. Appl., 1937, **27**, 102—104).—The oil gives negative Villavecchia, Heidenreich, Hauchecorne, and Kreis tests, and has normal Zeiss and Fortelli indices. In the Bellier reaction, however, a faint reddish-violet coloration, characteristic of rapeseed oil, is produced. Sanza oil is not present. L. A. O'N.

New processes for treating linseed oil. A. V. Blom (Fette u. Seifen, 1937, **44**, 107—111).—The good drying properties of "Bisöl," obtained by air-blowing linseed oil at high temp. and then chilling it, are ascribed to the presence of bimol. glycerides containing isocyclic rings produced by diene synthesis and heterocyclic rings arising from peroxides. The durability of pigmented coatings is said to depend on the wetting properties of the medium. Badly wetted pigment particles may be compared with pores in the film, and slight strain may cause cracking to occur perpendicular to the force. "Bisöl" has excellent wetting properties. F. C. B. M.

Oxidised and polymerised oils. I. Viscosities of dilute solutions. M. Tatimori (J. Soc. Chem. Ind. Japan, 1936, **39**, 473—475b).—The η vals. of linseed oil, stand oil, oxidised linseed oil, and solid paraffin in C_6H_6 at 30° are reported. Einstein's η formula is inadequate for the viscous oxidised oils; straight-line relations are, however, given by two equations: (i) $\eta = K_0C + K_2C^2$ (where K_0 and K_2 are consts., and C is the no. of g. of solute in 100 c.c. of solution); (ii) $C/\eta = (100/\alpha\varphi) - C/\alpha$ (where α is a const. showing the mol. shape and φ is the vol. of 1 g. of solute in the solution). R. F. P.

Polymerisation of methyl esters of higher unsaturated acids. XX. Lower-boiling fraction obtained by heating the methyl esters of linseed oil fatty acids. K. Kino (Sci. Papers Inst. Phys. Chem. Res., Tokyo, 1937, **31**, 244—246; cf. A., 1937, II, 47).—The Me esters of linseed fatty acids at 290—300° in H_2 afford a low-boiling fraction, which when saponified and fractionated by means of the Pb salts affords evidence (acid val. and mol. wt.) of the presence of C_9- and C_{10}-acids. The acid obtained from the sol. Pb salt with O_3 affords succinic acid. J. L. D.

Refractive index of a solid film of linseed oil: rise in refractive index with age. A. P. Laurie (Proc. Roy. Soc., 1937, **A**, **159**, 123—133).—The n of a linseed oil film increases uniformly with its age, a fact which can be used in dating pictures and in detecting repaints. G. D. P.

Colour scales for oils and varnishes. D. L. Tilleard (J. Oil Colour Chem. Assoc., 1937, **20**, 124—148).—From trichromatic colour measurements with the Guild colorimeter of varnishes and oils contained in glass cells it has been possible to produce linear scales which closely match the materials in colour and brightness. The scales may equally well be obtained from measurements on different thicknesses of the same oil. The varnish scale contains ten grades with ten intermediate steps; the oil scale is similar, but over the medium and dark ranges provides for a band of colour, the limits of which are given in the reddish and greenish scales. For industrial use the scales are matched by Lovibond Tintometer glasses. A close match in both colour and brightness necessitates the use of blue glass in front of the sample to correct for excessive brightness. It is particularly in this brightness correction that the present scales mark an advance on earlier scales. They have the added advantage of being permanent and reproducible. F. C. B. M.

Proposed method for cold test on refined oils. Anon. (Oil & Soap, 1937, **14**, 104—105).—Perfectly dry 4-oz. sample bottles are half-filled with oil, tightly corked and sealed with paraffin wax, and then immersed in cracked ice: "winter oils" should be perfectly clear after 5½ hr. undisturbed immersion. E. L.

Seed oil of the common field poppy. W. Awe (Naturwiss., 1937, **25**, 366).—Seeds of *Papaver rhoeas* yield 22% of a non-toxic oil which resembles poppyseed oil from *P. somniferum* in its characters (no vals. given), but differs in that only a pale brown colour (instead of brownish-red) develops on treatment of the oil with HNO_2. E. L.

Mechanism of pyrogenic decomposition of cottonseed oil. T. S. Lo and L. S. Ts'ai (J. Chinese Chem. Soc., 1937, **5**, 44—50).—In the pressure distillation of cottonseed oil at const. temp. (390°), successive fractions were examined for d, sap. val., acid val., I val., and loss by H_2SO_4, and the gaseous fractions analysed for CO_2, CO, C_2H_4, and O_2. The results indicate roughly the reaction mechanism. A. Li.

Adsorption of oil by hulls of sunflower seeds. I. Krasitzki (Maslob. Shir. Delo, 1934, No. 3, 9—10).—The hulls absorb 24·51% of oil at 400 atm. Ch. Abs. (*p*)

Determination of moisture in whole and ground sunflower seeds, press cake, and hulls in Trinkler's apparatus. G. V. Vuigovski and M. L. Ginzburg (Maslob. Shir. Delo, 1934, No. 3, 21—22).—Concordant results are obtained in the apparatus at 130° by drying the whole seeds for 40, ground seeds for 25, press cake for 25—30, and hulls for 25 min., respectively. Ch. Abs. (*p*)

Determination of oil content of seeds by the refractometer. A. Rasterniaev (Maslob. Shir. Delo, 1934, No. 3, 10—11).—2 g. of ground seed are covered with 15 c.c. of $CHCl_3$ for 12 hr. The oil content is calc. from the n of the solution. Ch. Abs. (*p*)

Determination of oil content of seeds: new extraction apparatus. II. P. Zaitschenko (Maslob. Shir. Delo, 1934, No. 5, 18—19).—The extraction tube is arranged so that the seeds are exposed to the hot vapour of the solvent. Ch. Abs. (*p*)

Flash points of vegetable oils. A. S. Slaschtschev (Maslob. Shir. Delo, 1934, No. 3, 18—19).—Benzine (0·01—0·03%) lowers the flash point of vegetable oils by 40°. Vals. are affected by the conditions of the crop and storage. Ch. Abs. (*p*)

Indian vegetable oils. IV. Absorption of air. G. N. Bhattacharyya (Indian J. Physics, 1937, **11**, 65—72; cf. B., 1937, 464).—The Bunsen absorption coeff. for groundnut, olive, sesamé, chaulmoogra, rape, and kapok oils have been measured manometrically at room temp.; the vals. found are of the same order of magnitude as those of the mineral oils. W. R. A.

Characteristics of kapok oil. V. C. Mehlenbacher (Oil and Soap, 1937, **14**, 118—119; cf. B., 1936, 1106).—Physical and chemical consts. are given. During refining a long agitation period at a high temp. is essential. T. G. G.

Changes in phosphatide content of crude soya-bean oil during storage. G. E. Halliday (Oil & Soap, 1937, **14**, 103—104).—15 tank-car loads of filtered crude oil, which had been kept for 3—112 days, were sampled at 3 levels. After about 25 days, the phosphatide content (I) of the bottom layers began to increase, from 1·5% (for the original oil) to, *e.g.*, 5—10% or even 20—22% (100—90 days) in some cases, whilst the (I) of the upper half of the oil [the (I) of surface and middle layers of the oil was approx. uniform] fell to vals. < that for the original crude oil. The presence of H_2O appears to accelerate the separation of the (hydrated) phosphatides, and may account for the exceptional amount of sludge found in some cases. E. L.

Effect on the oil of drying castor beans. M. Shan-Puschkin and M. Sokolova (Maslob. Shir. Delo, 1934, No. 6, 15—17).—Drying the beans at 156—178° for 1—10 min. decreases the acid val. of the oil and causes polymerisation of free acids and of the oil. Ch. Abs. (*p*)

Effect of varying conditions in the catalytic hydrogenation of fatty oils on the nature of the reaction product. IV. H. I. Waterman and C. van Vlodrop (Rec. trav. chim., 1937, **56**, 521—525; cf. A., 1936, 1487).—Magnetic separation and mol. distillation fail to separate the highly active colloidal Ni catalyst (A., 1936, 1487) used to hydrogenate a 1 : 3 mixture of soya-bean and cod-liver oils unless the activity has been reduced by aggregation, but the catalyst is absorbed on active C (Carboraffin) with retention of 50% of its activity and can still be used to hydrogenate fatty oils at 60°/1 atm. Vitamin-*A* activity (Carr–Price) is maintained after hydrogenation with Ni at 60° to low I vals. and after magnetic separation of the catalyst, any previously observed decrease being due to absorption by the catalyst support (kieselguhr etc.). Soya-bean oil is hardened to a fat, m.p. 60°, in 1·75 hr. at 60°/1 atm., using the colloidal Ni catalyst. J. W. B.

Barbadoes nut in Cape Verde Islands. J. C. de Silveira (Anais inst. super. agron. Univ. tech. Lisboa, 1935, **6**, No. 1, 116—126).—The H_2O-free shelled nuts contain 56—66% of oil suitable for soap-making. Ch. Abs. (*p*)

Oils from *Althæa officinalis* and *Malva arborea*. H. J. Tropp (Farm. Shur., 1934, No. 4, 134—138).—Analyses are recorded. The oils have high contents of unsaturated acids of the linoleic type, show good drying qualities (especially that from *Althæa*), and can be substituted for linseed oil. Ch. Abs. (*p*)

Identification of oils of Cruciferæ in food oils. J. Grossfeld (Z. Unters. Lebensm., 1937, **73**, 409—426).—The oils are identified by separation of erucic acid (I). A sample of oil is saponified in presence of lauric acid and the Pb soaps are allowed to crystallise for several days at 20°. The I uptake of the ppt., expressed as c.c. of $0{\cdot}1N$-$Na_2S_2O_3$ per 0·5 g. of oil, is termed the "(I) val." of the oil. The actual (I) content may be calc. from the equation $y = 52{\cdot}1x - 0{\cdot}9x^2 - 217{\cdot}2$, where $y =$ mg. of (I) and $x =$ c.c. of $0{\cdot}1N$-I, and is accurate to within $\pm 2{\cdot}2\%$. Eight samples of commercial food oils had (I) vals. of 3·8—4·9. (I) vals. $\not> 5$ are, therefore, not attributable to oils of Cruciferæ. The (I) val. of rapeseed oil is approx. 12. E. C. S.

Fat-soluble vitamins of tropical food oils. J. L. Rosedale and C. J. Oliveiro (Trans. 9th Congr. Far East Assoc. Trop. Med., 1934, **1**, 327—336).—Malayan vegetable oils are deficient in vitamin-*A*. The -*D* content is sufficient if persons have adequate access to sunlight. Ch. Abs. (*p*)

Oil from *Peganum harmala*. H. J. Tropp (Farm. Shur., 1935, No. 2/3, 72—76).—The oil has d^{15} 0·924, n 1·4787, acid val. 6·6, sap. val. 177·85, Hehner val. 93·85, I val. 131, ester val. (before) 171·25 and (after acetylation) 196·8, Reichert–Meissl val. 1·5, Polenske val. 2·9, unsaponifiable matter 3·15%, CNS val. 79·6, hexabromide val. 0; it contains 55% of linoleic acid and is suitable for soap-making. Ch. Abs. (*p*)

Vitamin content of marine oils. O. Notevarp (Tids. Kjemi, 1937, **17**, 49—52).—A review and bibliography. M. H. M. A.

Variations in vitamin-*A* content of grayfish (*Squalus sucklii*) liver oil. L. I. Pugsley (Biol. Bd. Canada, 1937, Prog. Rept. 31, 3—5).—Vitamin-*A* content is much higher in livers of fish caught in February than in those obtained in November or December. Dark-spotted livers have a higher -*A* content than light livers. F. C. B. M.

Unsaponifiable matter of the liver and body oils of sea fish. S. Ueno and S. Nakaguchi (J. Soc. Chem. Ind. Japan, 1937, **40**, 85—86B).—In 9 species of fish examined the vitamin-*A* (I) and cholesterol (II) contents were greater for the liver oil than for the body oil, whereas the reverse holds for other unsaponifiable matters. It is suggested tentatively that the ratio of the sum of (I) and (II) to the total unsaponifiable fraction of the liver oil falls within a fairly narrow range. P. G. C.

Phenolated pilchard oil. W. A. Riddell (Biol. Bd. Canada, 1937, Prog. Rept. 31, 14—15).—Combination of phenol with the unsaturated centres of the fish oil acids yields first OPh-derivatives and secondly, on rearrangement, $C_6H_4{\cdot}OH$ derivatives of fatty glycerides. Painting of cedar, spruce, and fir blocks with this phenolated oil containing 3% of Co driers, and immersing the blocks in Prince Rupert Harbour H_2O during the breeding season of *Bankia*, in October, showed that the oil was highly efficient in resisting the attack of these organisms (which include pile worms, ship worms, etc.). F. C. B. M.

High-pressure hardening of oils by mixed catalysts with a high copper content. R. Koyama (J. Soc. Chem. Ind. Japan, 1937, **40**, 25—29B).—Experimental data on the hydrogenation of soya-bean, sardine, and herring oils at 180°/30 atm., with catalysts of Cu–Ni, $CuCO_3$, and Co–Cu, are given. With soya-bean oil, Cu–Ni is most active when not pretreated with H_2, and when the ratio $Cu : Ni = 70 : 30$, but pretreatment increases the efficiency with herring and sardine oils; from the latter, large yields of *iso*oleic acid are obtained with a $CuCO_3$ catalyst. J. D. R.

Influence of (A) Japanese acidic earth and activated acidic earth-refinings, (B) active charcoal refining, on the rancidity exhibited thereafter by the refined oils and fats during storage. S. Ueno and Y. Hayasi (J. Soc. Chem. Ind. Japan, 1937, **40**, 66—70B, 70—73B).—(A) Refining of oils and fats (some 17 different specimens) with Japanese acid clay and activated clay, without subsequent washing, tended to increase the rate of development of rancidity (Kreis test) and of free fatty acids (I). (B) Treatment with active C had a similar effect, but the increase of the (I) was not so great. The drying oils and fish oils showed the greatest tendency to rancidification, which was $\ll$ in the case of hydrogenated fish oils. E. L.

Bleaching of Japan wax. IX. I. Sakuma, I. Momose, and J. Shomura (J. Soc. Chem. Ind. Japan, 1937, **40**, 48—50B; cf. B., 1937, 153).—Decolorisation of the crude wax by extraction with 95% EtOH facilitates bleaching by exposure to sunlight. The Hilger blancometer, Hess–Ives tint-photometer, and König–Martens spectrophotometer gave concordant results when measuring the progress of the bleaching. E. L.

Drying oil from gasoline.—See II. **Fatty acids [for soaps]. Wetting etc. agents.**—See III. **Determining fat in wool. Flax[-seed oil].**—See V. **Ultra-violet fluorescence lamp [for soaps etc.].**—See XI. **Oil media. Train oils. Varnish oils.**—See XIII. **Swelling of rubber in fatty oils.**—See XIV. **Palm oil. Flax[-seed oil]. Oil cake as fertiliser. Oil sprays.**—See XVI. **Determining fat in cheese. Detecting food adulteration.**—See XIX. **Detergents.**—See XXIII.

See also A., I, 350, **Fatty acids in lubrication.** 369, **Polymerisation of drying oils.** II, 272—3, **Diene vals. of fats.** 274, **Vitamin-*C*.** 288, **Synthesis of vitamin-*A*.** III, 252, **Casein fat.** 280—3, **Vitamins.**

Patents.

Degreasing apparatus. N. R. Hood, W. E. Booth, and Imperial Chem. Industries, Ltd. (B.P. 466,207, 16.10.35).—After degreasing in the usual way, non-absorbent articles are placed in a drying compartment heated in the lower part by steam coils which are shielded from drip from the goods, the compartment being cooled in the upper part by coils and the upper atm. being in communication with the upper atm. of the cleaning compartments. B. M. V.

Washing means. Kalle & Co. A.-G. (B.P. 465,688, 4.5.36. Ger., 2.5.35).—A detergent is prepared by mixing a H_2O-sol. ether of cellulose, starch, lichenin, or xylan with a wetting agent, *i.e.*, the Na salts of $C_{10}H_7{\cdot}SO_3H$, $C_{10}H_5Me_2{\cdot}SO_3H$, or other arylnaphthalenesulphonic acid. The prep. and use of these detergents is claimed. P. G. C.

[Surface-recessed] soap tablets. R. M. Watt (B.P. 466,343, 16.2.37).

Determining moisture.—See I. **Sol. oil. Lubricants.**—See II.

XIII.—PLASTICS; RESINS; PAINTS; COATING COMPOSITIONS.

Cellulose ester plastics. V. E. Yarsley. **Phenolic and cresylic types of plastics.** G. Dring (Chem. & Ind., 1937, 591—593, 593—596).—Brief reviews.

Surface technique in pheno- and aminoplasts. K. Brandenburger (Plast. Massen, 1937, **7**, 112, 114, 150—152, 185—186).—A detailed review is given of processes suitable for the production of decorative effects on phenolic and urea resins, by the use of metallic powders, metal inlays, engraved moulds, etc. F. McK.

Use of pigments, lakes, and other colouring matters in plastics. J. H. Clewell and H. W. Paine (Amer. Paint J., 1937, **21**, No. 28, 18, 54).—A review, with special reference to cellulose nitrate plastics. D. R. D.

Injection of thermo-hardening plastics. K. Brandenburger (Plast. Massen, 1937, **7**, 172—174).—Factors to be considered in the injection moulding of thermo-hardening synthetic resins are reviewed. A special machine for such work is described. F. McK.

Shellac, the parent of modern plastic resins. W. H. Gardner (Amer. Paint J., 1937, **21**, No. 28, 16—18).—A historical review of the development of the applications of shellac. D. R. D.

Wood rosin and turpentine. Use of wood naval stores in paint and varnish. P. J. Boot (Oil and Col. Tr. J., 1937, **91**, 1797—1803).—A review. D. R. D.

Resins. XXVIII. Resin from *Symphonia globulifera*, L. E. Stock (Farben-Ztg., 1937, **42**, 459—460; cf. B., 1937, 466).—This Brazilian resin (of elemi type) had: acid val. 52·5, 51·5; sap. val. 129·5, 122·5; m.p. 230—240° (decomp.); ash 1·129% (Mg, Al, SiO_2, Fe); Storch–Morawski reaction red-brown; $Cu(OAc)_2$ reaction negative. Solubility, fluorescence, and capillary analytical data are given. The resin is unsuitable for varnish manufacture as it carbonises before melting and does not cook into linseed oil. S. S. W.

Refractive indices of natural resins. A. E. Alexander (Amer. Min., 1936, **21**, 199).—The vals. given for 18 resins vary from 1·528 for gutta-percha to 1·546 for CW kauri. L. S. T.

Synthetic resins from mixed phenols. L. E. Stout, S. Feldman, and J. Ellis (Mod. Plastics, 1937, **14**, No. 6, 38—39, 71—73).—Results of moulding tests and time of cure on a series of mixed phenol–CH_2O–cresol resins are discussed. Resins containing $>70\%$ of cresol were incapable of producing moulding powders. In general, *m*-cresol gave satisfactory resins, but *o*- and *p*-cresol were less satisfactory. F. McK.

Phenol–formaldehyde resins. III. Emulsification time of the phenol–formaldehyde–ammonia system. S. Tsuruta (J. Soc. Chem. Ind. Japan, 1937, **40**, 125—127b).—The results of earlier workers on the relation of the velocity of reaction between PhOH and aq. CH_2O and the emulsification time (*i.e.*, the time from initial heating to emulsification) are criticised. Emulsification depends on both quantity and solubility of resin produced, and is only inversely $\propto$ the reaction velocity when const. conditions (viz., of temp. and composition of the reaction mixture) obtain. Experimental results are given for PhOH–CH_2O reactions catalysed with NH_3, and the mathematical aspect is discussed. J. W. Cr.

Differentiation between phenol–formaldehyde resins produced by acidic and basic condensation. J. Scheiber and F. Seebach (Angew. Chem., 1937, **50**, 278—279).—Phenol–CH_2O resins formed in presence of HCl etc. contain 4 : 4′- (I) and 2 : 4′-dihydroxydiphenylmethane (II), both of which may be distilled off in vac. and the mixture separated by fractional crystallisation from hot H_2O. The components may alternatively be extracted with NaOH (details given) and are identified by their m.p. After fusion with $(CH_2)_6N_4$ only (I) is found. On the other hand, resins formed in presence of bases contain only (II). (Cf. Megson and Drummond, B., 1930, 600.) S. M.

Permeability of organic polysulphide resins to hydrogen. T. P. Sager (Amer. Paint J., 1937, **21**, No. 28, 56—58).—Varnishes made from these resins are recommended for coating fabric for airships etc., in place of the rubber usually employed, since the rate of loss of gas is thereby reduced to one seventieth, whilst the material is equally flexible and is less susceptible to damage by oil. D. R. D.

Manufacture of pigments by grinding instead of precipitation. W. Lambrecht (Farben-Chem., 1937, **8**, 189—190).—Pb-chromes can be produced by grinding Cr alum (156 pts.), PbO (94), and bleaching powder (78) in cold H_2O; a ball mill is suggested from which the liberated Cl_2 can be conveniently conducted. $Al(OH)_3$ is formed by grinding $Al_2(SO_4)_3$ and Na_2CO_3 in a small quantity of H_2O; the ppt. settles rapidly and can be washed without difficulty. S. M.

Manufacture of blanc fixe. E. S. Greigov (Peint., Pig., Ver., 1937, **14**, 68—69).—Crude barytes is dissolved in fused rock-salt, in which SiO_2 and other impurities are insol., and the product is added to H_2O. The pptd. $BaSO_4$ possesses extraordinary fineness and covering power. The process is cheaper than chemical treatment of barytes and cruder varieties may be used. S. M.

Zinc pigments. H. A. Nelson (Paint, Oil, Chem. Rev., 1937, **99**, No. 8, 16—18, 47).—The merits of the different Zn pigments are reviewed. D. R. D.

Progress in lead pigments. C. H. Rose (Paint, Oil, Chem. Rev., 1937, **99**, No. 8, 20—22).—A review, dealing particularly with basic Pb sulphate, Pb_3O_4, and basic Pb carbonate. D. R. D.

Modern trends in zinc and lead pigments. Eagle–Picher Lead Co. (Paint, Oil, Chem. Rev., 1937, **99**, No. 8, 36—39).—A review. D. R. D.

Tungsten and molybdenum compounds in pigment manufacture. W. Lamprecht (Farbe u. Lack, 1937, 245—246).—An account is given of the history of their development. S. M.

Red antimony sulphides. III. Primary materials. J. Garach (Caoutchouc et Gutta-Percha, 1937, **34**, 135—136, 165—166; cf. B., 1936, 1166).—An indication is given of the sources and character of the Sb compounds and thiosulphates used in the manufacture of red Sb sulphide for rubber-compounding. D. F. T.

Coloured pigments of organic origin. Anon. (Paint, Oil, Chem. Rev., 1937, **99**, No. 8, 24—27).—A review. D. R. D.

Flushed colours. K. M. Sprinkel (Paint, Oil, Chem. Rev., 1937, **99**, No. 8, 40—41).—The flushing process, in which pastes of pigment in oil etc. are prepared by direct displacement of H_2O from the H_2O-wet ppt. by grinding with the oily medium, in certain cases with the addition of wetting agents and the application of heat and reduced pressure, is described. D. R. D.

Dry and dispersed colours. M. B. Doty (Paint, Oil, Chem. Rev., 1937, **99**, No. 8, 10—14).—The resistance to light (for pure and dil. pigment), heat, acids, and alkalis, bleeding in various media, *d*, bulking val., oil absorption, fineness, and covering power have been determined for >60 org. and inorg. pigments. D. R. D.

Scattering in the near infra-red as a measure of particle size and size distribution. D. L. Gamble and C. E. Barnett (Amer. Paint J., 1937, **21**, No. 28, 58—60).—The particle size of a powder may be deduced from the spectral composition of the light transmitted by a dil. suspension of the powder, using Rayleigh's equation. Observations in the infra-red (up to $\lambda\ 4\ \mu$) are necessary for particles such as paint pigments. No details are given. D. R. D.

Colorimetry of pigments. Methods of testing. D. L. Tilleard (J. Oil Colour Chem. Assoc., 1937, **20**, 149—163).—Methods and conditions of colour measurement are outlined, particular reference being made to trichromatic colorimetry. Measurement of colour qualities of pigments and pigment mixtures in dry condition and dispersed in various media are described. The results may be used to detect cumulative and unobserved "drift" in industrial working standards of colour. For white pigments a special method, based on the magnification of slight colour differences by multiple reflexion within a cube lined with the white, is employed.

Fastness tests and dilution-val. tests, based on trichromatic measurements, are also recorded. F. C. B. M.

Physical aspects of [printing] ink manipulation. R. F. Bowles (Amer. Ink Maker, 1937, **15**, No. 4, 25—27).—The principles to be observed when making small additions (of thinner etc.) to printing inks in order to modify their properties (ease of working, penetration into paper, etc.) are discussed. D. R. D.

Printing ink driers. C. A. Knauss (Amer. Ink Maker, 1937, **15**, No. 4, 16—18, 39).—The factors affecting their efficiency are discussed. D. R. D.

Printing ink as a dynamic system. R. F. Bowles (Paper-Maker, 1937, **93**, TS 70—79).—The physico-colloidal properties of printing inks, and their behaviour during manufacture, storage, and application, are described. In particular, the various effects of ink-η, solid–liquid phase relations, and rate of oxidation, and of paper composition, absorbency, d, and opacity during the periods of impression, initial set, penetration, drying, and usage, are discussed. Photomicrographs illustrating the penetration of letterpress print into various types of paper are given. H. A. H.

World developments in pigments, paints, and varnishes. R. Bluma (Rev. gén. mat. plast., 1937, **13**, 130—131s).—A review, with particular reference to luminous paints, anticorrosive compositions, containing chlorinated rubber and Al, and synthetic resin varnishes. F. McK.

Colloid-chemical aspects of paint manufacture. A. Venkatasubban (Proc. Soc. Biol. Chem. India, 1936, **1**, 26).—A general review. W. O. K.

Improved oil media [for paints]. A. Foulon (Farbe u. Lack, 1937, 283—284).—To remove S and Cl (which produce early destruction of exposed films) from sulphurised linseed oil, the gelatinised material is washed with alkaline H_2O, pressed, and dried at 50°. Stabilisation of the mols. is also thus effected. The prepared paints are H_2O-resistant, excellent rust inhibitors, do not thicken or produce sediments even with heavy pigments, and are recommended for ships' bottoms and as primers for wood and stone. For resistance to acids and alkalis incorporation of rubber is suggested. S. M.

Train [whale, fish] oils and paints etc. containing them. Ohl (Allgem. Oel- u. Fett-Ztg., 1937, **34**, 183—189).—Experiments indicate that the presence of train oil stand oils in varnishes tends to produce slower drying and higher H_2O-transmissibility and to reduce the resistance to weathering and chemicals, except towards dil. acids (in which case the presence of stand oil may be advantageous); nevertheless, stand oils can be used to some extent to replace linseed oil etc. in varnishes. E. L.

Modern [paint] vehicles and zinc-white. A. Foulon (Allgem. Oel- u. Fett-Ztg., 1937, **34**, 131—135).—Alternatives to linseed oil, *e.g.*, nitrocellulose, silicates, " E.L.-Firnis," fish oils, which are compatible with Zn-white as a pigment are briefly discussed. E. L.

Glycol and its derivatives in the paint and varnish industry. R. Strauss (Farben-Chem., 1937, **8**, 190—192).—A review is given of methods for the prep. of glycol, its ethers and esters, and their properties and applications. S. M.

Polymerisation of hydrocarbons of synthetic rubber manufacture into a paint vehicle on a plant scale. L. V. Lopatin and B. J. Soldatov (Sintet. Kautschuk, 1935, No. 6, 22—29).—The hydrocarbons of different fractions (25—45°, 45—60°, 60—100°) obtained during synthetic rubber manufacture were washed with H_2O and polymerised in an autoclave with 20% of catalyst (Glukhovskaja clay, preheated at 420°) for 30 hr. at 100°. The product was vac.-distilled. Paint prepared from 100 pts. of the product per 100 pts. of ZnO dried in 12—22 hr., adhered well, and was waterproof. Ch. Abs. (*e*)

Use of chlorinated caoutchouc for protective painting of light metals. R. Strauss (Paint Var. Prod. Man., 1937, **16**, No. 5, 7—8).—A review. The formulation and properties of chlorinated rubber paints are discussed. D. R. D.

Paint consistency, with particular reference to formulation with lithopone. I. L. A. Melsheimer (Amer. Paint J., 1937, **21**, No. 33, 54—62).—The η, plasticity, and thixotropy of paints, factors influencing these properties, and methods of measurement are discussed. D. R. D.

Painting ship surfaces. H. C. Skeens (Paint Manuf., 1937, **7**, No. 5, 137—139).—The method of application is described and the formulation of suitable paints discussed. D. R. D.

Exterior and interior [paint] finishes. F. Kolke (Farben-Ztg., 1937, **42**, 560).—The restriction of finishes to either exterior or interior use is recommended on grounds of oil economy, correct usage, etc. Typical interior finishing materials are detailed and discussed from this viewpoint. S. S. W.

Yellowing of paints. C. S. Farmer (Paint Manuf., 1935, **5**, 282—283).—A review. Ch. Abs. (*e*)

Injury to paintings by *X*-rays. F. Müller-Skjold (Angew. Chem., 1937, **50**, 321—323; cf. B., 1936, 380).—Pigments other than white-Pb show no discoloration after prolonged irradiation with *X*-rays, white-Pb being but temporarily discoloured after 100,000 *r* units of exposure. Varnish, medium, etc. are similarly unaffected, both in the new and the aged (300 years) condition. *X*-Ray examination cannot damage pictures under the conditions used technically. J. S. A.

Chemical investigation of paint materials. H. Wagner (Chem.-Ztg., 1937, **61**, 485—487).—Methods of testing pigments, media, emulsions, and coatings are reviewed. The polarisation microscope is regarded as indispensable for determining grain size, shape, and structure. Sedimentation methods, the microscope, *X*-rays, infra-red photography, accelerated weathering tests, and chemical tests are necessary. Rust inhibitors to replace red-Pb, and oil-substitute media, are also discussed. I. C. R.

Sun-spray rapid test-rack. New development in [accelerated] exposure tests [for paints and enamels]. H. A. Gardner (Sci. Sect. Nat. Paint Var. Assoc., Inc., June, 1937, Circ. 534, 177—193).—The rack is moved with the sun by means of a water-wheel so that the painted panels are perpendicular to the sun's rays at all periods of the day; automatic spraying every ½ hr. is added. Rapid chalking and fading are produced. S. M.

Photomicrographical "evidence" for the "soap-formation theory." C. P. van Hoek (Farben-Ztg., 1937, 42, 283—284, 309—310, 335—336).—The literature on the formation of soaps in paint films by interaction between basic pigments and the paint vehicle is critically surveyed. The photomicrographical evidence for the existence of such soaps (mainly adduced by Blom, Ragg, and Droste) is considered inadmissible since (*a*) it is based on interactions that are not paralleled in actual paint films, and that themselves are not sufficiently clearly explained, (*b*) basic pigments in normal paint films do not give rise to anisotropic formations and, in any case, it is questionable whether the metal soaps studied are actually anisotropic, and (*c*) photomicrography can throw no light on the supposed soap formation. S. S. W.

Dissolution of cellulose derivatives. M. Taniguchi and I. Sakurada (J. Soc. Chem. Ind. Japan, 1937, 40, 119—120b).—The solubilities of cellulose dextrin acetate (I), of cellulose triacetate (II), and of a mixture of equal wts. of the two, have been measured in $CHCl_3$–C_6H_6 mixtures. (I) is completely sol. in all the mixtures used, but the solubility of (II) increases from 0% in 50% $CHCl_3$ to 100% in 100% $CHCl_3$. In the lower concns. of $CHCl_3$ the solubility of the (I) + (II) mixture is $<$ that calc. from the mixture rule, but at higher concns. it is greater. This agrees with the view that when the solvent power is low an insol. substance hinders the dissolution of a sol. material, but that when it is greater the dissolution of the sol. substance disperses the insol. material to form a more or less stable solution. The solubility of pure (II) is increased by addition of (I) to the solvent, but this effect is not great. Primary cellulose acetate is sol. in $CHCl_3$ and in $C_2H_2Cl_4$ and the secondary acetate in $COMe_2$ and in MeOAc, but a suitable mixture of the two is completely sol. in each of the four solvents. A. G.

Diffusion and viscosity of cellulose nitrate in various solvents. M. Taniguchi and I. Sakurada (J. Soc. Chem. Ind. Japan, 1937, 40, 121—122b).—In a series of liquids, as the solvent power increases, the particle radius (calc. from the diffusion const.) and the sp. vol. (calc. from the η) decrease; increasing solvent power results therefore in increased dispersion. A. G.

Three-layer method of [measuring] diffusion [constants]. M. Taniguchi and I. Sakurada (J. Soc. Chem. Ind. Japan, 1937, 40, 120—121b).—This method allows the use of shorter times than does the four-layer method. A. G.

Old and new nitro[cellulose] combination lacquers. F. Zimmer (Farben-Ztg., 1937, 42, 311—312).—A general historical review of the development of nitrocellulose lacquers is given, the gradual introduction of natural and later synthetic resins being traced. Modern combination lacquers containing oils, and their functions, are also outlined. S. S. W.

Leather finishes. A. Jones (Paint Manuf., 1937, 7, No. 5, 147—148).—Formulæ are given for various cellulose nitrate lacquers. D. R. D.

[Pigment] binders containing nitrocellulose [emulsions]. A. Kraus (Farbe u. Lack, 1937, 269).—For conversion into aq. emulsions the lacquers should be prepared from low-η ("Wasag" No. 6 or 5) nitrocellulose and the min. quantity of H_2O-sol. solvents and thinners; the usual plasticisers, *e.g.*, $(C_6H_4Me)_3PO_4$, and either synthetic (*e.g.*, ester gum, Albertols) or natural (*e.g.*, shellac, dammar) resins may be used. To avoid grittiness and poor spreading the pigment and filler are first ground into a 2% aq. solution of the emulsifying agent, *e.g.*, "Glutolin," and the lacquer is then incorporated. If properly formulated the products are H_2O- and weather-resistant. S. M.

Hygrometry in the use of nitrocellulose lacquers. F. Zimmer (Farben-Ztg., 1937, 42, 590—591).—The various factors influencing the "blushing" of cellulose lacquers are discussed, and the need, in this connexion, for greater attention being paid to R.H. observation in workshops is stressed. S. S. W.

Evaporation of lacquers. H. T. Mayer (Farben-Chem., 1937, 8, 120—122).—Factors which affect the choice of lacquer solvents and their rate of evaporation from the prepared lacquer are discussed. S. M.

Film tests with the Erichsen machine. R. Haug (Farben-Chem., 1937, 8, 197—200).—Fe panels were covered with 1 or 2 coats of Fe oxide oil paints and nitrocellulose lacquers and the depths of the impressions necessary to produce cracking of 10-day-old films were measured in an Erichsen hardness tester. The data (tabulated) give a measure of the elasticity of the films; they usually decreased with further (25 days) exposure, but were unaffected by the thickness of the panel. De-rusted surfaces gave higher vals. A comparative estimate of the adhesion is obtained by increasing the impression to an arbitrary val. and comparing the extent and orientation of the cracks and fissures (typical photographs are reproduced). S. M.

Evaluation of the properties of ethylcellulose films by the use of load–elongation curves. T. A. Kauppi and S. L. Bass (Amer. Paint J., 1937, 21, No. 28, 16).—Under low stresses, ethylcellulose (I) films are highly elastic. Beyond a certain load, the films yield suddenly, but at still higher loads they frequently become elastic again. No figures are given. (I) has higher flexibility and toughness but much lower hardness than cellulose acetate and nitrate. D. R. D.

Oil varnish analysis. C. P. A. Kappelmeier (Farben-Ztg., 1937, 42, 509—510, 535—536, 561—563).—An assembly of heating flask, condenser, and tapped U-tube, described and illustrated, is an improvement on known reflux arrangements for separating H_2O-immiscible solvents and H_2O from paints etc. by distillation with H_2O and CCl_4 (preferred to xylol), respectively. Subsequent treatment of the non-volatile residue is discussed with special reference to determination of oil and resin by selective saponification. Refluxing with KOH–BuOH gives sap. vals. for resin components in 6 hr. that are not attained in <30 hr. with the usual KOH–EtOH. Use is made of this to evolve a method for which more reliable results than those obtained by the recent Wolff–Zeidler "rate of reaction" method are claimed. Methods for the detection of phenolic resins in oil varnishes are detailed, and experimental precautions to be taken in the determination of o-$C_6H_4(CO_2H)_2$ as the K salt are indicated. S. S. W.

Heat-treatment of varnish oils. II. H. W. Chatfield (Paint Manuf., 1937, 7, No. 5, 144—145; cf. B., 1937, 586).—The commercial production and the advantages and disadvantages of stand oils are discussed. D. R. D.

Amber—a historic German varnish raw material. E. Stock (Farben-Ztg., 1937, **42**, 589—590).—The possibilities of producing pale varnishes from amber, esterified with glycerol, have been investigated. The properties of a series of oil varnishes of this type are tabulated (colour, acid val., hardness, resistance to H_2O, acid, and alkali), promising results being shown by an esterified amber–oiticica oil varnish. S. S. W.

From pearl essence to artificial pearls. R. Germain (Bull. Soc. d'Encour., 1937, **136**, 51—57).—Old and modern methods of extraction of pearl essence, the structure of the fish scales, and prep. of artificial pearls are described. S. M.

Air-drying asphaltum finishes. E. Assheton (Paint Manuf., 1935, 5, 371—373).—A review. The blackness of a sample of asphaltum can be evaluated by fusing 10 g. of the pitch with 40 g. of rosin, cooling to 149°, and adding turpentine until the bulk is 100 c.c. 10 c.c. of the solution are diluted to 1 litre with turpentine and the colour is matched against standards. Ch. Abs. (*e*)

Field tests of pipe coatings. S. Ewing (Proc. Amer. Gas Assoc., 1936, 627—647).—Results of corrosion tests on steel pipe treated with 42 different types of pitch and asphalt and buried in the soil in different locations for 5½ years are discussed. No coating entirely prevented corrosion in all test sites. Coal-tar-base materials are more stable and waterproof, but have a greater tendency to flow when warm and to crack when cold, than asphalt-base materials. The choice between these materials depends on relative costs. Hand coatings are less effective than machine coatings. Reinforcement of the coating, *e.g.*, by felt and burlap, should, in general, be avoided. A thin, closely woven fabric, *e.g.*, cotton, deeply embedded in the coating is preferable if reinforcement is adopted. Protection from corrosion in poorly drained soils presents the greatest difficulty. R. B. C.

Report of Sub-Committee, VII [American Society for Testing Materials] on accelerated tests for protective coatings. H. A. Nelson (Proc. Amer. Soc. Test. Mat., 1936, **36**, [1], 366—382).—Results of accelerated weathering tests and exterior exposure on varnish finishes are discussed. The primers used under the varnishes influenced the results of both tests. Caution is necessary in interpreting the results of the accelerated tests, which appear to offer little advantage over tests, *e.g.*, the Kauri reduction test, at present in use. R. B. C.

Erratum.—On p. 589, col. 1, line 15, *for* 7 *read* 1.

Wood.—See I. **C black. Liquor from low-temp. carbonisation.**—See II. **Cellulose ethers. Paper coatings.**—See V. **Roof coatings.**—See IX. **Metals in the printing industry. Surface protecting metals.**—See X. **Linseed oil. Phenolated pilchard oil.**—See XII. **Chlorinated caoutchouc.**—See XIV. **Pb-poisoning.**—See XXIII.

See also A., I, 363, **Rinmann's green.** 373, **Mo-blues.** II, 297, **Manila elemi resin.**

Patents.

[Asphalt] plastic composition. R. I. Colmar, Assr. to Texas Co. (U.S.P. 2,042,038, 26.5.36. Appl., 10.8.33).—To a stabilised asphalt emulsion is added a small proportion (*e.g.*, 0·39%) of a H_2O-sol. fluoride, *e.g.*, NaF, and aggregate, *e.g.*, stone, asbestos, cement; or the aggregate may be moistened with aq. NaF before addition of the emulsion. I. C. R.

Manufacture of [plastic] polymerisation products [of halogenovinyl compounds]. I. G. Farbenind. A.-G. (B.P. 465,520, 3.10.35. Ger., 6.10.34).—Vinyl compounds containing F and at least one other halogen are polymerised by heat at pressure > atm., and in presence or absence of a polymerisation catalyst; *e.g.*, $CF_2\colon CFCl$ or $CF_2\colon CHCl$ is heated under pressure at 40—45° for 24 hr. and then at 60—65° for 24 hr. The products are insol. in org. solvents, thermoplastic, and evolve incombustible gases on decomp. by heat. P. G. C.

Plastic packing composition. E. G. Howland and F. E. Payne, Assrs. to Crane Packing Co. (U.S.P. 2,041,835, 26.5.36. Appl., 27.4.35).—Packing for preventing leakage of gases etc., under conditions of vibration and moderate heat and pressure, consists of shredded cork and granulated cork (11), graphite (16), high-m.p. grease (mineral oil with >30% of Na soap) (16), and mineral oil (2½ pts. by wt.). Metallic granules, *e.g.*, Pb, inert fillers, *e.g.*, mica, Pb carbonate, and a (Ca) soap may be used. I. C. R.

Manufacturing luminous [plastic] substances. Soc. Franç. Helita (B.P. 463,372, 20.7.36. Fr., 18.7.35).—Contrasting effects can be obtained in luminous plastics by removing the polish from part of the surface (*e.g.*, by grinding etc.), by inlaying contrasting elements, by combining phosphorescent and fluorescent elements and using an intermittent source of light, or by incorporating elements or grains of contrasting materials. I. C. R.

Phonograph records and methods of making moudable material for production thereof and for other purposes. E. Wasey & Co., Ltd. From Durium Products Corp. (B.P. 463,338, 21.10.35).—

Resorcinol and CH_2O are heated in presence of a salt of sulphanilic acid, a nitroaniline, an ester of $NH_2\cdot C_6H_4\cdot CO_2H$, $NO_2\cdot C_6H_3Me\cdot NH_2$, or urea. [Stat. ref.] S. M.

Synthetic resin products [containing natural resins]. C. S. Farmer (B.P. 463,688, 30.9.35).—The condensation product of a natural resin, *e.g.*, colophony, cresylic acid containing $\nless$50% of *m*-cresol (10—15 wt.-%), and an anhyd. polymeride of CH_2O, *e.g.*, paraformaldehyde ($>$2 mols. of CH_2O : 1 mol. of cresylic acid), is heated with a polyhydric alcohol, *e.g.*, glycerol (9%), and a catalyst, *e.g.*, CaO (0·2%), excess of glycerol being removed by vac.-distillation, to produce a hard, high-m.p., light-stable resin. I. C. R.

Manufacture of [urea–formaldehyde] artificial resins [containing sulphur]. Imperial Chem. Industries, Ltd. (B.P. 463,433, 27.9.35. Italy, 29.9.34).—Urea is condensed (in two stages) with CH_2O in presence of free S, the mol. ratio CH_2O : urea being $>$2 : 1 in the first stage and 1·5 : 1 in the second. The condensation syrup may be absorbed on inert materials, dried in vac., and ground, preferably with an accelerator, *e.g.*, $NaHSO_4$ (with pigments and plasticisers), to produce a moulding powder. The product is similar in properties to thiourea resin. I. C. R.

Artificial [phenol–formaldehyde] resinous products. Beck, Koller & Co. (England), Ltd., Assees. of H. Hönel (B.P. 467,081, 9.10.35. Ger., 10.10.34).—A mixture of phenols (*e.g.*, *p*-*tert*.-amylphenol + PhOH) containing as main constituents those having only two reaction-favourable positions (*o*-, *o*- and *p*- to OH) unoccupied, the remainder consisting of $<$ about 10% of phenols having $>$2 reaction-favourable positions unoccupied, is treated with aq. CH_2O (formalin) in excess of mol. proportion in presence of strong alkali-condensing agents. The neutralised products are heated with and improve the properties of substantially neutral, natural or artificial waxes (giving greater hardness, chemical resistance, and elasticity and higher m.p.) and fatty oils (accelerating drying). J. W. Cr.

Manufacture of phenolic condensation products. J. H. James, Assr. to C. P. Byrnes (U.S.P. 2,042,313, 26.5.36. Appl., 25.9.24).—A phenol is caused to react with oxidation products of petroleum hydrocarbons instead of with CH_2O etc. S. M.

Production of [xylenol–aldehyde] oil-soluble resins. Bakelite, Ltd. (B.P. 467,234, 10.12.35. U.S., 11.12.34).—Crude xylenol mixtures are distilled into fractions the components of which have substantially uniform reactivity with aldehydes, the fractions are separately treated with aldehydes under appropriate conditions, and the products blended. Alternatively, the various fractions are caused to react successively in the order of increasing reactivity in the same mixture. J. W. Cr.

Manufacture of (A) zinc sulphide, (B) zinc sulphide pigments. T. A. Mitchell and R. L. Sessions, Assrs. to Hughes–Mitchell Processes, Inc. (U.S.P. 2,038,589—90, 28.4.36. Appl., [A] 11.6.31, [B] 5.8.31).—(A) ZnS free from traces of Cl is produced by pptn. from aq. $ZnCl_2$ with aq. BaS or Na_2S; after filtration, the ppt. is repulped, and heated at 650—750° in an inert atm. with $(NH_4)_2CO_3 + (NH_4)_2SO_4$; the ZnS is then treated with dil. aq. $Ti(SO_4)_2$ or $Al(SO_4)_3$, and finally with aq. 5% soap. The product does not deteriorate in colour and is easily wetted by paint oils. (B) Pptd. ZnS is treated with aq. $Ba(OH)_2$ containing $Al(OH)_3$, muffled, and treated with dil. aq. NaOH or Na_2CO_3 to improve its dispersion in paints. L. C. M.

Manufacture of [ink-]printing element. W. C. Huebner (U.S.P. 2,042,003, 26.5.36. Appl., 12.7.32).—A design is applied to the sensitised surface of a press-plate which is exposed to light and the image areas are removed; the plate is intaglio-etched, oxidised, and an ink-receptive mixture bonded thereon in described manner. S. M.

Cellulose derivative compositions. J. K. Hunt and G. H. Latham, Assrs. to E. I. Du Pont de Nemours & Co. (U.S.P. 2,046,165, 30.6.36. Appl., 15.7.33).—The keeping and H_2O-resisting properties of mixtures of cellulose derivatives (nitrates, ethers, and esters) with non- or semi-drying oils of I val. $<$ 135 ($<$120), as used for coating artificial leather etc., are improved by addition of 0·25—5·0% (on wt. of oil) of arylboric acids or substances, $OH\cdot Ar\cdot X\cdot Ar'\cdot OH$. X must be *o*- or *p*- to the OH and may be CHR, CRR′, or O; either or both aryl residues may be further substituted. Examples are $BPh(OH)_2$, p-$C_6H_4Me\cdot B(OH)_2$, $(p\text{-}OH\cdot C_6H_4)_2CMe_2$, $(p\text{-}OH\cdot C_6H_4)_2CHMe$, $(4:3\text{-}OH\cdot C_6H_3Me)_2CMe_2$, *o*- and p-$OH\cdot C_6H_4\cdot OPh$, condensation products of $(p\text{-}OH\cdot C_6H_4)_2CMe_2$ with CH_2O and of PhOH with dipentene. R. F. P.

Cellulose acetate compositions. P. La F. Magill, Assr. to E. I. Du Pont de Nemours & Co. (U.S.P. 2,047,919, 14.7.36. Appl., 16.11.34).—$HCO\cdot NH_2$ (I) alone or with other materials is employed as solvent for cellulose acetate–casein compositions, which can then be modified with other (I)-sol. materials, *e.g.*, starch, dyes, glue, gelatin, dextrin, and albumin. J. W. Cr.

Securing adherence of finishes to metal and other materials. W. W. Werring and T. S. Huxham, Assrs. to Bell Telephone Labs., Inc. (U.S.P. 2,047,758, 14.7.36. Appl., 31.1.34).—A composite priming coat is prepared by applying a thermosetting composition (I) initially sol. in $COMe_2$, coating with a solution of cellulose derivative (II), and heating to render (I) insol. Films (I) and (II) are firmly adherent and subsequent coats of cellulose derivative can be satisfactorily applied to (II). J. W. Cr.

[Oleoresinous] varnish. H. S. Rothrock, Assr. to E. I. Du Pont de Nemours & Co. (U.S.P. 2,047,597, 14.7.36. Appl., 16.10.34).—An alcohol obtained by hydrogenation of a natural acidic resin (*e.g.*, abietyl or hydroabietyl alcohol) is combined with drying oil to give a varnish characterised by pale colour, low η, and better drying and film properties than have rosin varnishes. J. W. Cr.

Manufacture of transparent coloured varnishes and the like. G. Dingwall and J. Oberhauser (U.S.P. 2,047,674, 14.7.36. Appl., 20.11.33).—A coloured mixture for colouring separately-prepared varnishes is made by mixing solutions of a mordant and a varnish base, adding NaOAc, eliminating solvents and pptd. solids, dissolving in varnish solvent, and stirring-in a basic org. dye. J. W. Cr.

(A) Imparting [lustrous] decorative finishes to articles. (B, C) Decorating the surfaces of articles. Oxvar, Ltd. From Oxford Varnish Corp. (B.P. [A] 463,589, [B, C] 463,590 and 463,614, [A] 12.3.36, [B, C] 13.3.36).—(A) To simulate wood grain etc. a coloured ground-coat is covered with a film containing lusterising material (cryst. HgCl suspended in a nitrocellulose lacquer to which a transparent dye may be added), the grain or other design applied, and the whole finished with a transparent varnish so as to maintain substantially the colour of the ground-coat. (B, C) Window frames, tubes, etc. are offset-printed by rotation about a flexible band which carries the design over a roll distorted to conform to the article. Suitable machinery is described. S. M.

Obtaining a decorating surface [resembling wood grain]. L. V. Casto, Assr. to Oxford Varnish Corp. (U.S.P. 2,047,670, 14.7.36. Appl., 1.11.33).—A simulated wood-grain surface is prepared by applying over a ground coating a grain pattern embodying an ink having a metallic (*e.g.*, bronze, Al, etc.) powder possessing greater light-reflecting properties than the ground coating, and finally a protective coating, *e.g.*, transparent varnish. J. W. Cr.

Moulding of articles from [a plate of] thermoplastic materials. A. Heilberg (B.P. 466,322, 4.9.36).

Manufacture of [irregularly shaped] articles from plastic substances. P. and H. Krägeloh (T. Krägeloh & Co.) (B.P. 466,239, 7.8.36. Ger., 29.1.36).

[Press-]moulding of [box-like] articles from thermoplastic and thermosetting compounds. J. Shaw & Sons (Salford), Ltd., and J. B. Shaw (B.P. 466,529, 10.3.36).

Method of and apparatus for coating articles [*e.g.*, shaped can ends]. J. O. Farrer. From Continental Can Co., Inc. (B.P. 463,695, 3.10.35).

Finely-divided material [pigments]. Producing cold-flow.—See I. **Esters of methacrylic acid.**—See III. **[Pigment] dyes.**—See IV. **Joined fibrous articles.**—See V. **Oiled fabric.**—See VI. **$BaSO_4 + CaSO_4$. Ti compounds.**—See VII. **Plywood.**—See IX. **Metal vals. [Cu, as bronze pigment].**—See X. **Dielectric.**—See XI. **Butadiene derivatives.**—See XIV.

XIV.—INDIA-RUBBER; GUTTA-PERCHA.

Rubber production from *Castilla* and *Hevea*. O. F. Cook (Science, 1937, 85, 406—407).—A discussion. L. S. T.

Natural and synthetic rubber. XVII. Separation of sol and gel rubber. T. Midgley, jun., and A. L. Henne (J. Amer. Chem. Soc., 1937, 59, 706—707; cf. A., 1936, 1497).—Sol rubber, prepared by a single pptn. from C_6H_6–EtOH, diffuses completely in Et_2O. However, when prepared by diffusion in Et_2O, it is separable into two N-free fractions, differing widely in O content and η. Pptn. is thus superior to diffusion as a method of prep. R. S. C.

Rubber in compression. J. Morrison (Trans. Inst. Rubber Ind., 1937, 12, 426—439).—Using a small cylinder of vulcanised rubber attached to the surface of two flat-headed screws, it is shown that the transition from tension to compression is smooth, no discontinuity occurring in the stress–strain curves at the zero point. In compression tests on small cylinders 1·95 in. diameter and 1·645 in. long, the degree of slippage between rubber and the compressing surfaces is a serious complicating feature. Increase in the proportion of C black in the rubber has an effect on the compression curve similar to that on the extension curve. An additional correction is introduced into the calculation of the increase in resilient energy contributed by the presence of the C black (cf. Lunn, B., 1929, 445). D. F. T.

Elasticity of rubber and its connexion with the structural model. E. Guth and H. Mark (Naturwiss., 1937, 25, 353—359).—A review of the elastic properties of rubber and their connexion with the chain-like structure of the mol. A. J. M.

Swelling of rubber. VIII. Swelling of vulcanised rubber in fatty oils and mineral lubricating oil. J. R. Scott (J. Rubber Res., 1937, 6, 47—51; cf. B., 1936, 1168).—Specimens of a mixture of rubber (95) and S (5 pts.), vulcanised to a coeff. of 4·54, were subjected in the standard manner in the dark to rape, linseed (raw and boiled), castor, and a purified mineral lubricating oil. Castor oil had an almost negligible swelling capacity, doubtless due to the OH groups, which also render glycerol void of swelling action on rubber. The effect of the other oils fell in the order rape $<$ linseed $<$ mineral oil. Boiled linseed oil, however, was characterised by a marked solvent and possibly oxidative effect, the sharp edges of the sample disc becoming rounded and the surface becoming sticky. D. F. T.

Absorption and diffusion of water in rubber. H. A. Daynes (Trans. Faraday Soc., 1937, 33, 531—544; cf. B., 1932, 1043).—The absorption of H_2O vapour by rubber does not take place in accordance with the simple gas-diffusion theory. A modified differential equation (at present unsolved) is proposed, and a no. of predictions from it as to differences between the absorption of a gas and of H_2O vapour are confirmed. The times required for absorption and desorption are the greater, the higher are the hygroscopicity of the rubber and the R.H. Except for very small ranges of humidity, the absorption- and desorption-time curves are of different shape, and desorption is much more rapid than absorption. These observations are consistent with the view that the rate of diffusion of H_2O in rubber is determined, not by the concn. gradient, but by the osmotic pressure gradient of H_2O-sol. constituents dissolved in the absorbed H_2O. F. L. U.

Determination of total selenium in rubber. J. G. Mackay and C. H. Avons (Trans. Inst.

Rubber Ind., 1937, **12**, 471—474).—The procedure recommended is to oxidise 1—1·5 g. of thinly sheeted soft rubber or 0·4—0·5 g. of rasped vulcanite cautiously with a mixture of 10 c.c. of HNO_3 (*d* 1·52), 5 c.c. of $HClO_4$ (*d* 1·12), and 5 c.c. of H_2O in a 250-c.c. flask with a ground-in reflux condenser, then evaporate the liquor to a small bulk, add 50 c.c. of HCl (*d* 1·19) and 25 c.c. of H_2O, and to boil strongly under reflux until evolution of nitrous fumes ceases. The solution is then saturated hot with SO_2 (10—15 min.) and boiled for 15—20 min.; the pptd. Se is filtered off next day, washed with hot H_2O and then with EtOH, dried, and weighed. D. F. T.

Determination of mineral substances in vulcanised rubbers by adding an organic accelerator to the solvent. K. Maruyama (J. Soc. Rubber Ind. Japan, 1935, **8**, 525—533).—Mercaptobenzthiazole (I) or its K salt (II) increases the solubility of rubber in petroleum solvents. The sample (1 g.) is mixed with 0·04 g. of (II) and 10 g. of paraffin and heated at 180°. When the mixture has melted, 0·02 g. of (I) is added. After shaking and when mineral matter has settled, light petroleum is added and the mineral matter separated by centrifuging. Ch. Abs. (*p*)

Combined use of two accelerators [for rubber vulcanisation]. VI. Diphenylguanidine and di-*o*-tolylguanidine. I. Aoe (J. Soc. Rubber Ind. Japan, 1935, **8**, 593—602).—The two accelerators do not form a eutectic mixture. Stearic acid in rubber neutralised the accelerators and retarded vulcanisation. Ch. Abs. (*p*)

Comparison between channel gas black and "soft" blacks [for rubber mixes]. W. Esch (Kautschuk, 1937, **13**, 92).—Comparative results are given for the plasticity (before vulcanisation) and the modulus, tensile strength, hardness, and permanent set, after optimum vulcanisation, of rubber mixtures containing three different proportions of channel black and four proprietary grades of "soft" black. D. F. T.

Hard-rubber reactions. IV, V. S. Numaziri (J. Soc. Chem. Ind. Japan, 1937, **40**, 111—113B, 113—114B; cf. B., 1936, 1008).—IV. The total and free S in rubber–S mixtures on progressive vulcanisation were measured and the corresponding coeffs. of vulcanisation calc. assuming 93% of caoutchouc in the natural rubber. The plotted results show a rapid increase in the rate of fixation of S after 90 min. at 141° for mixtures containing $>20\%$ of S. With high vals. for % S the vulcanisation coeffs. greatly exceeded that calc. for a composition C_5H_8S.

V. After max. fixation of S has been attained, further "vulcanisation" leads to gradual loss of combined S; the total S shows an even earlier decrease, viz., after approx. 90 min. at 141°. The loss is greatest for mixtures containing 70—80% of S (rubber 100), these incidentally giving max. tensile strength after 90 min. vulcanisation. D. F. T.

Semi-ebonite. II. P. A. Gibbons and F. H. Cotton (Trans. Inst. Rubber Ind., 1935, **11**, 354—376; cf. B., 1936, 32).—During ageing of semi-ebonite at 70°, H_2O, SO_2, CO_2, and H_2S are evolved and non-volatile oxidation products formed. Effects of external conditions, of vulcanisation, and of antioxidants on the deterioration of semi-ebonite are examined. Ch. Abs. (*p*)

"Oil-rubber" or factice as restricted substitute [for rubber] in rubber goods. W. Obst (Allgem. Oel- u. Fett-Ind., 1937, **34**, 175—177).—A brief discussion of its applications, and prep. (cf. Auer, B., 1929, 611). E. L.

Production, properties, and uses of chlorinated caoutchouc. R. Strauss (Paint and Var. Prod. Man., 1937, **16**, No. 4, 7—12).—A review. D. R. D.

C black.—See II. **Rubberised packing sheet.**—See V. **Acid-proof diaphragms.**—See XI. ***n* of natural resins [gutta-percha]. Red Sb sulphides. Synthetic rubber in paint. Chlorinated caoutchouc.**—See XIII.

Patents.

Preservation of [rubber] latex. United States Rubber Products, Inc., Assees. of J. McGavack (B.P. 463,934, 28.11.36. U.S., 21.4.36).—Latex is preserved against coagulation and putrefaction by the joint addition of NH_3 (≯0·6%) and NH_2OH (≯0·25%) or one of its salts. D. F. T.

Mixtures of natural rubber latex and aqueous dispersions of reclaimed rubber. A. E. Barnard and W. E. Messer, Assrs. to United States Rubber Co. (U.S.P. 2,044,046, 16.6.36. Appl., 16.2.34).—Stable mixtures of natural latex and an aq. soap dispersion of reclaimed rubber are obtained by arranging for the osmotic pressure of the two dispersions to be equal. D. F. T.

Manufacture of rubber compositions [from latex]. Internat. Latex Processes, Ltd., Assees. of Soc. Ital. Pirelli (B.P. 463,780, 31.10.36. Ital., 3.12.35).—Aq. dispersions of rubber (containing 5—10% of rubber) are compounded by addition of the insol. ppt. formed by interaction of a sol. zincate (possibly pretreated with CO_2) and $Mg(HCO_3)_2$; the ppt. may be introduced as a 5% aq. paste and the proportion may be such as to flocculate the rubber. D. F. T.

Compounding of rubber. W. S. Calcott and W. A. Douglass, Assrs. to E. I. Du Pont de Nemours & Co. (U.S.P. 2,044,059, 16.6.36. Appl., 3.8.29).—An alkoxy-substituted diarylamine [p-EtO·C_6H_4·NHPh, p-NH(C_6H_4·OEt)$_2$, or p-α-$C_{10}H_7$·NH·C_6H_4·OEt] is used as antioxidant. D. F. T.

Manufacture of abrasion-resistant rubber articles. Res. Assoc. of Brit. Rubber Manufrs., and J. R. Scott (B.P. 464,655, 24.12.35).—Articles such as soles, tyres, etc. are made with the wearing surface inclined at a considerable angle, preferably a right-angle, to the grain of the rubber; the grain may be accentuated by incorporation of anisotropic fillers. D. F. T.

Vulcanisation accelerators [for rubber]. W. Baird, G. E. Nettleship, and Imperial Chem. Industries, Ltd. (B.P. 464,026, 6.9.35 and 30.1.36).—Normal salts of piperidine or pipecoline with dicarboxylic acids (oxalic, adipic, phthalic, fumaric, etc.) when used in admixture with dibenzthiazyl disulphide give vulcanisates with high tensile strength and abrasion-resistance and better resilience than that obtained with mixtures of mercaptobenzthiazole and org. salts of diphenylguanidine. D. F. T.

Manufacture of chlorinated rubber. T. N. Montgomery, A. P. Lowes, and Imperial Chem. Industries, Ltd. (B.P. 463,969, 8.10.35).—Gaseous impurities are removed from chlorinated rubber solutions by (countercurrent) treatment with the (superheated) vapour of the solvent itself under conditions avoiding deposition of solid chlorinated rubber (but permitting concn. of the solution). D. F. T.

Stabilised butadiene derivatives. H. A. Winkelmann, Assr. to Marbo Products Corp. (U.S.P. 2,046,986, 7.7.36. Appl., 18.3.35).—Moulded or flexible masses, particularly transparent wrapping papers, are obtained from halogenated rubber, particularly the amorphous *as*-hydrochloride (I), by milling at $<95^\circ$ for $\ngtr 3$ min. with a basic stabiliser, particularly MgO, an ageing-retarder, and a plasticiser; little or no vulcanisation occurs. By adding also rosin (to prevent initial crumbling) and a little S and milling at, *e.g.*, 150° for 40 min., a vulcanised product is obtained. Wrapping paper up to 0·875 in. thick (0·0009—0·0012 in. preferred) is obtained by milling at 170° (I) 100, MgO 3, $(CH_2)_6N_4$ 2, Bu stearate 5 pts., paraffin 0·5, and Petrol Blue 0·005 pt., and then rolling under pressure. The % MgO may be 2—20% and other alkalis (best litharge) may be used. Fillers may be added and composite paper–rubber sheets can be obtained. Various mixes are detailed. R. S. C.

Manufacture of elastic threads [from rubber latex]. W. M. Spencer (B.P. 464,958, 17.4.36. U.S., 20.4.35).

Making decorative surfaces [on rubber articles, *e.g.*, bathing caps]. Internat. Latex Processes, Ltd. (B.P. 463,933, 28.11.36. U.S., 4.3.36).

Manufacture of rubber articles [from latex]. Internat. Latex Processes, Ltd. (B.P. 464,576, 28.11.36. U.S., 4.3.36).

Manufacture of deposited rubber articles [from latex by dipping]. A. N. Spanel (B.P. 464,019, 2.8.35).

Producing cold-flow.—See I. **Rubberised thread.**—See V. **Adhesive.**—See XV.

XV.—LEATHER ; GLUE.

Processing New Zealand [dewooled sheep] pelts. D. J. Lloyd and P. White (J. Fed. Curriers & Light Leather Tanners, 1935, **16**, 234).—Elimination of mottling and " leopard grain " is facilitated by use of min. $[Na_2S]$ in dewooling, by washing with old CaO liquor instead of with H_2O after pulling, by liming for 24 hr., with intermittent stirring using $\ngtr$0·26 g. of Na_2S and $\nless$4 g. of CaO per 100 c.c., by stacking limed pelts for $\ngtr$5 ($\ngtr$2) days, and by deliming with NH_4Cl and pickling with H_2SO_4 + NaCl. Ch. Abs. (*p*)

Effect of different salt solutions on swelling of pelt. P. Chambard and R. Garnot (J. Soc. Leather Trades Chem., 1937, **21**, 138—149).—The p_H for min. swelling is diminished progressively with [NaCl], $[Na_2SO_4]$, or [NaOAc]. The effect of these salts is less marked on alkaline than on acid swelling of pelt. The repression caused by the anion diminishes in the order of the Hofmeister series. Pickling is a function of dehydration, which $\propto p_H$ and the salt concn. in pickles of the same, but not of different, constitution. The same pickling effect is obtained by a NaOAc–AcOH pickle at p_H 4·5 and NaCl–HCl at p_H 2·0. D. W.

Theory of swelling measurements with hide powder and gelatin. V. Kubelka (Collegium, 1937, 231—240).—Errors in swelling determinations by the modified Claflin method are investigated. The H_2O taken up by hide powder consists of H_2O of swelling and that absorbed between the capillary spaces. Only the former is taken up by gelatin, and the amounts of each are approx. equal for hide powder. Thus swelling determinations made on gelatin are not applicable to hide powder, and *vice versa*. The rate of dissolution of gelatin in acid solutions varies with different acids and acid concn. The rate for hide powder under similar conditions is much smaller and depends only on the acidity of the solution. Swelling measurements on gelatin in acid solution are largely inaccurate owing to the amount of gelatin dissolved. D. P.

Sarcoptic mange in goat skins. Correlation of disease in the living animal with faults in the finished leather. (Miss) M. Dempsey and (Miss) M. E. Robertson (J. Soc. Leather Trades Chem., 1937, **21**, 196—208).—Irregularities in the grain surface, fibrosis of the grain tissue with marked obliteration of the hair follicles, and poor quality of the fibre structure of the corium are caused by infection of the skins of the living animal with sarcoptic mange mite. Leather produced from badly infected skins is of little val., but that from skins infected for a short time only is saleable. D. W.

Influence of temperature on liming of ox hides and goat skins. II. Liming of sun-dried hides in presence of sodium chloride. (Miss) W. B. Pleass (J. Soc. Leather Trades Chem., 1937, **21**, 208—232; cf. B., 1937, 474).—Sun-dried China hide was limed in aq. $Ca(OH)_2$ alone and with 0·1*M*-, 0·5*M*-, and 2*M*-NaCl liquors, respectively, and curves were derived to show the effect of temp. on H_2O-absorption and loss of N by the hide. The microscopical structure of the hide was examined after different periods. The swelling and opening-up of the fibres of the hide and the loss of N by the hide increased as the temp. was raised from 0° to 25°. At $>25^\circ$, the wt. of the hide after treatment was diminished owing to excessive opening-up and to loss of N. Max. H_2O-absorption was shown at 0° in presence of 0·5*M*-NaCl and at higher temp. in 0·1*M*-NaCl liquors. Increased swelling and slightly increased loss of N were caused by adding 0·1*M*-NaCl to $Ca(OH)_2$ liquors, but the fibres of the hide were opened up better. $Ca(OH)_2$ + 0·1*M*-NaCl is recommended for liming dried China hides; the optimum temp. is 18—21°. D. W.

Lipins of steer hide. II. Post-mortem changes. III. Effect of cure and storage. R. M. Koppenhoeffer (J. Amer. Leather Chem. Assoc., 1937, **32**, 142—151, 152—166; cf. B., 1935, 114).—II. The effect of a 24-hr. post-mortem period at 30° on the lipin content of fresh steer hide has been examined. Corium triglycerides remain unchanged, but corium and epidermal phospholipins appear to undergo some decomp. at the double linkings and also into free fatty acids. The cholesterol (I) remains unchanged.

III. The effect of a 30-day wet-salted cure, a 6 months' cure, and storage on the lipin content of steer hide has been studied. The phospholipin content of both corium and epidermis after 30 days' storage is considerably reduced; after 6 months it has almost disappeared. 15% of the corium glycerides are hydrolysed after a short cure, 67% after a long cure, to produce free fatty acids. The (I) is unaffected. 20—25% of epidermal lipins are removed by the brine. A little oxidative rancidity is found after 6 months. D. P.

Characteristics of vegetable tannins. XII. Tanning properties of sulphite-cellulose waste tanning extracts. F. Stather and O. Endish (Collegium, 1937, 193—216; cf. B., 1936, 1058).—A low tans/non-tans ratio, high mineral ash, low p_H, slightly smaller particle size, smaller diffusion coeff., and a reduced leather-wt. yield are found for sulphite-cellulose waste extracts as compared with vegetable tanning extracts. A smaller diffusion coeff., different particle size, and greater leather-wt. yield are found when sulphite-cellulose extract is used than with synthetic tannins. Less insol. matter is present and the speed of penetration is reduced when the two types of extract are used. An increase in amount of material fixed by hide powder is found when sulphite-cellulose extract is added to quebracho and chestnut extracts, and a decrease when added to oakwood and mimosa extracts. The amounts of material absorbed and irreversibly combined by hide powder from solutions of sulphite extract increase with increasing time of tanning and concn. and with decreasing p_H vals. Good leather is not made by sulphite-cellulose extract alone, but can be made by addition of this to vegetable tannin extracts. D. P.

Tanning with [sulphite-]cellulose [waste] extracts. W. Vogel (Collegium, 1937, 217—227).—Imitation box calf tanned with CH_2O and sulphite-cellulose waste extracts is not satisfactory, either with or without stuffing, owing to the high H_2O-absorption and -penetration figures of the product. Satisfactory slipper leather is made from goatskin and sheepskin by tanning with sulphite-cellulose extract and retanning with alum and salt. Ox hides tanned with these extracts alone or subsequently impregnated with either linseed oil or S are not suitable for sole leather. 20—30% of the extract can be used in the early stages of sole-leather tanning, but not in the final stages. D. P.

[Tanning] experiments with so-called ash-free sulphite-cellulose waste extracts. J. S. Aabye and O. V. Rasmussen (Collegium, 1937, 227—231).—Pieces of ox hide were given a preliminary tannage with crude quebracho extract, sulphite-cellulose waste extract [$(NH_4)HSO_3$ process], and Tannigan in different proportions, respectively, the tannage was completed with mimosa and chestnut extracts, and the products were analysed. The results indicate that a considerable proportion of the vegetable tannin extract can be replaced by the sulphite-cellulose extract. D. P.

Chrome[-tanning] liquors. VI. Properties of chrome-tanning extracts. E. R. Theis, E. J. Serfass, and C. L. Weidner (J. Amer. Leather Chem. Assoc., 1937, **32**, 166—180; cf. B., 1936, 162).—Degree of olation, particle size, free acid, and distribution of ionic and complex bound sulphate in solutions of a 33% basic, solid glucose-reduced Cr extract when dissolved at different temp., freshly made, and aged, have been evaluated. Olation and free acid increase with rise of temp. of dissolution and, when dissolved cold, with ageing. The Cr absorbed by pickled hide powder treated therewith, the particle size, and complex sulphate in the Cr liquor decrease with rising temp. of dissolution and with ageing. Dissolution at $>$80° causes a slight increase in particle size and complex sulphate content. D. P.

Phenol–furfuraldehyde synthetic tanning products from peat tar. XIII. F. Osipenko and E. Lipkina (J. Appl. Chem. Russ., 1937, **10**, 507—514).—The optimum conditions for prep. of synthetic tanning materials are as follows: the phenol fraction, b.p. 240—280°, of peat tar (5 pts.) is heated for 3 hr. at 200° with 1 pt. of furfuraldehyde, in presence of 0·5% of $(NH_4)_2CO_3$, and 1 pt. of the product is treated with 1·5 pts. of 2—3% oleum at 50—60°. The final product has good penetrating, filling, and tanning properties at p_H 4·5—6·5. (Cf. B., 1935, 819.) R. T.

Filtration of non-tannin solutions for analytical purposes [in tannin analysis]. J. G. Parker (J. Soc. Leather Trades Chem., 1937, **21**, 159—161).—Any filter-paper of sufficiently tight texture and free from sol. matter can be used for the filtration of non-tans. Its pleating or non-pleating is immaterial. Comparative results are quoted in support. D. W.

Precipitation of albumin by tannin and the tanning process. W. Hauser (Kolloid-Z., 1937, **79**, 213—215; cf. A., 1937, III, 48).—A theoretical discussion. F. L. U.

Quality of vegetable-tanned sole leather. IV. Effect of composition. Relation between quality and the composition of the leathers. II. (Miss) D. J. Lloyd and E. W. Merry (J. Soc. Leather Trades Chem., 1937, **21**, 178—196; cf. B., 1937, 476).—No relationship was found between the Thuau wear-resistance vals., the air-permeability, or the tendency of the grain to crack and the analytical vals. of the different layers of the leather, but there was some connexion between these properties and the cryst. structure of the fibres as shown by X-ray photographs. Weak-fibred leather was usually associated with $<0·7\%$ of grease in the middle layer of the leather. This % of grease was increased by reshedding the leather. The H_2O-absorption capacity of the leather was increased by increasing its content of H_2O-sol. matter, but it was most affected by the fibre weave. Air-permeability is controlled by the rolling operation. Leathers containing a high % of H_2O-sol. matter and a high % in the grain layer show high loss in wt. on soaking. These % vals. are largely controlled by the bleaching, drying, and rolling operations. D. W.

Determination of the acidity of vegetable-tanned leather. III. Report of the British Section Committee [of the Society of Leather Trades' Chemists]. D. Burton (J. Soc. Leather Trades Chem., 1937, **21**, 155—159; B., 1935, 1008).—The "buffer capacity" figure, *i.e.*, (no. of c.c. 0·1N-H_2SO_4 required to bring 2·45 g. of the leather to p_H 3·0)/5, has been determined by the members for different leathers. The "buffer capacity" includes the buffering effect of insol. as well as sol. compounds and is thus superior to the Innes $COMe_2$ and Atkin full titration methods. D. W.

Determination of "degree of stability" of [vegetable-tanned] sole leather. V. Casaburi and C. Corradini (Boll. Staz. Sperim. Ind. Pelli, 1936, **14**, 345—356; J. Soc. Leather Trades Chem., 1937, **21**, 81).—The shrinkage temp., T_G, of the leather is determined on the sample originally and after each of four successive soakings in H_2O. T_G is not altered after the first soaking of satisfactory leathers containing little H_2O-sol. matter, is increased with successive washings of medium-quality leathers, and is variable with unsatisfactory leathers. D. W.

Deterioration of vegetable-tanned leathers. I. Effect of tanning material on durability of the leather as judged by the Innes peroxide and Atkin–Thompson buffer-capacity methods. II. Mechanism of protection. D. Burton and J. M. Harrison (J. Soc. Leather Trades Chem., 1937, **21**, 161—166, 232—235).—I. Protection against deterioration is required by all tannages except sumac. Pyrogallol tannages are not superior to pyrocatechol. No correlation has been found between the peroxide and buffer-capacity tests. The buffer-capacity figures varied only from 0·7 to 1·3.

II. Sumac-tanned, pyrocatechol-tanned leathers which have been treated with 5% NaCl or Na_2SO_4, and pyrogallol-tanned leathers which have been treated with 5% Na_2SO_4 or Na_3 citrate (I) can show a p_H of 0·9—1·6 and yet not be deteriorated by H_2O_2. The protective effect of (I) is partly due to the formation of Na_2SO_4 with free H_2SO_4 in the leather. A leather tanned in presence of NaCl at p_H 1·0 and allowed to remain for 10 years still possesses good strength. D. W.

Metallic soaps in glacé-kid, sealskin, and gloving leathers. R. F. Innes (J. Soc. Leather Trades Chem., 1937, **21**, 149—154).—Cr and Fe soaps have been extracted with petroleum spirit from the pink-stained patches on two-bath chrome-tanned goatskins. The Fe had its origin in the commercial HCl used and in the feed-pipes in the tanning drums. Only 0·2 g. of Ca soap per litre has been found in a goatskin CaO liquor. The "killing" of the grease by 3 weeks' liming of a sealskin was shown to remove surface grease only. The grease from some New Zealand pickled pelts was viscous, due to the presence therein of Ca soaps; the grease from English fellmongered pelts practically free from Ca soap was clear and soft. Cr soaps were present in larger quantity in the spewed areas of a gloving leather than in the clear areas; the cause is traced to the formation of free fatty acids during damp storage conditions. Al soaps have been extracted from the greasy portions of alum-retanned, vegetable-tanned sheepskins. D. W.

Examination and evaluation of artificial leather and leather substitutes. F. Stather (Chem.-Ztg., 1937, **61**, 445—447).—Leather substitutes consist either of textile fibres covered with a nitrocellulose film or of leather scrap cemented together by means of rubber latex etc. The products are evaluated by physical tests such as determinations of tensile strength, stretch, wear-resistance, H_2O absorption, and air-permeability. D. P.

Fluorine content of gelatin from calf skins cured with salt and fluorides. L. S. Stuart, D. Dahle, and R. W. Frey (J. Amer. Leather Chem. Assoc., 1937, **32**, 205—210).—F is determined in the distillate after a single distillation of gelatin with H_2SO_4 by the peroxidised Ti method (A., 1934, 45). This method is shown to be accurate to $\pm10\%$. Commercial gelatin contains 4—10 p.p.m. of F. Gelatin made from calf skin cured with NaCl and Na_2SiF_6 contained 64—72 p.p.m. of F. More thorough washing of limed calf skin reduced the F content to that of normal commercial gelatin. Impurities in commercial salt capable of forming difficultly-sol. fluorides result in an increased F content in the final product. D. P.

Use of soya-bean meal for adhesive purposes. A. Bowden (Oil and Soap, 1937, **14**, 114).—Soya-bean meal (I) mixed with animal glue or casein finds use as a sizing medium in the paper industry. α-Protein [(I) treated with 0·2% NaOH and coagulated with 0·5% H_2SO_4] is a stronger adhesive than γ-protein [untreated (I)] for wood veneers, although it is not as strong as casein. T. G. G.

Water-soluble adhesives without flour. K. Micksch (Chem.-Ztg., 1937, **61**, 373—375, 396—397).—The use of powdered adhesives made from potato starch to replace prohibited rye-flour size and the prep. of adhesives from cellulose is described. The use of sulphite-cellulose lye cements in the laying of linoleum is discussed. D. P.

Wood.—See I. **Gas-meter diaphragms.**—See II. **Leather finishes.**—See XIII.

Patents.

Production of white-tipped skins or furs. I. G. Farbenind. A.-G. (B.P. 464,034, 9.10.35. Ger., 15.12.34).—The pelts are mordanted with alkali dichromate, then tipped with aq. alkali carbonate or bisulphite (thickened if desired), subsequently washed, and dyed as usual with oxidation dyestuffs. D. W.

Adhesive. D. S. Morse (U.S.P. 2,047,880, 14.7.36. Appl., 4.3.36).—Vulcanised rubber compounds are joined to metals, glass, moulded phenolic condensation products, hard rubber, etc. by inserting and vulcanising between the surfaces a sheet of rubber compound including a vulcanising agent, ZnO (or equiv. compounding material), and glue or paracoumarone–indene resin, one side (for adhesion to metal etc.) having been exposed to actinic radiation until the tackiness first formed is reduced. J. W. Cr.

Adhesive sheet material. W. Vorwerk (B.P. 463,344, 12.2.36. Ger., 12.2.35).

Gummed label.—See V.

XVI.—AGRICULTURE.

Origin of black soils in the Madras Presidency. P. V. Ramiah and C. Raghavendrachar (Proc. Soc. Biol. Chem. India, 1936, **1**, 9—10).—The black soils contain only a small quantity of org. matter, insufficient to account for the colour. They are probably formed from rock containing Ca and Ca–Na felspars, whilst the adjacent red soils are derived from rocks containing K felspar. The Fe in the black soils occurs as Fe^{III} silicate or in the Fe^{II} form, oxidation being prevented by the presence of Ca and Mg and excess of SiO_2. W. O. K.

Are the Indian soils becoming less productive? N. R. Dhar and S. K. Mukherji (Proc. Soc. Biol. Chem. India, 1936, **1**, 36).—The N deficiency exhibited by most Indian soils is reduced by application of manures containing carbohydrate, the fermentation of which is associated with N fixation. W. O. K.

Chemical composition of a heather-peat profile. S. A. Waksman (J. Ecol., 1937, **25**, 113—115).—Analyses of the org. matter of the peat at various depths are more characteristic of low- than of high-moor types. A. G. P.

Rôle of manganese in soil fertility. C. R. H. Iyer and R. Rajagopalan (Proc. Soc. Biol. Chem. India, 1936, **1**, 12).—Sol. Mn salts such as $MnSO_4$, applied to soil, are converted into finely-dispersed MnO_2 and so exercise a markedly beneficial effect. W. O. K.

Fertility of marsh soils. M. Popp (Superphosphat, 1935, **11**, 103—105).—Available nutrients in marsh soils are determined. In general, the nutrient vals. vary with the clay content. The P content decreases as the age of the soil increases, and is greater in heavy than in light types. Ch. Abs. (*p*)

Soil conditions and two East African vegetation types. G. Milne (J. Ecol., 1937, **25**, 254—258).—The distribution of certain plant species is examined in relation to soil characteristics, notably p_H and $CaCO_3$ content. A. G. P.

Nitrogen transformations in the soil. N. R. Dhar (Proc. Soc. Biol. Chem. India, 1936, **1**, 29).—Molasses applied to soils poor in N, 2—3 months before sowing results in a marked increase in N content as the results of N fixation, and also increases the humus content. The application of molasses is especially beneficial in rice cultivation and is also highly effective in the reclamation of alkali soils. W. O. K.

Mechanism of non-symbiotic nitrogen fixation in soil. T. R. Bhaskaran (Proc. Soc. Biol. Chem. India, 1936, **1**, 14—16).—The mixed bacterial flora of the soil rapidly decompose sugar without appreciable fixation of atm. N_2. The residue, which consists essentially of the Ca salts of org. acids, is used up more slowly, and during this stage the organisms actively fix atm. N_2. The ratio of N_2 fixed to C utilised, when the organisms are decomp. these Ca salts, is >3 times that obtained when carbohydrate is applied directly to the soil. The practical significance of these results is indicated. W. O. K.

Device for measuring the absorption rates of soils. C. K. Pearse (Science, 1937, **85**, 459—460). L. S. T.

Determination of ammonia volatilised from soils. V. Subrahmanyan (Nature, 1937, **139**, 884).—A piece of filter-paper moistened with standard acid is pasted on the inside of a glass or enamelled dish which just covers the vessel containing the soil. Unused acid in the paper is back-titrated with alkali. Most soils treated with ammoniacal fertilisers lose NH_3, especially under tropical conditions. Soils treated with org. manures with narrow C : N ratios also lose much N as NH_3. L. S. T.

Determination of cellulose in the soil. C. N. Acharya (Proc. Soc. Biol. Chem. India, 1936, **1**, 8).—Lignin is removed from the soil sample by treatment with HOCl and Na_2SO_3 until no red or brown coloration is produced on treatment by the latter. The residual soil is analysed for C and furfuraldehyde yield, from which the cellulose and xylan are calc. W. O. K.

Soils and fertilisers. (Sir) E. J. Russell (J. Roy. Agric. Soc., 1936, **97**, 327—379).—A review. W. L. D.

Movement of fertiliser salts in soils by capillarity. G. M. McClure (Ohio Agric. Exp. Sta. 53rd Ann. Rept., 1935, No. 548, 18—19).—The relative rates of upward movement of $(NH_4)_2HPO_4$, $NH_4H_2PO_4$, Na phosphates, K phosphates, and rock phosphate in soil decreased in the order named. The movement of treble superphosphate was $>$ that of 20% superphosphate but $<$ that of K phosphates. $(NH_4)_2SO_4$ (I), $NaNO_3$ (II), and NaCl in soil did not affect the movement of the phosphates. N supplied as NH_4 phosphates moved less readily than that as (I) or (II). Ch. Abs. (*p*)

Plot experiments at Lieusaint. H. Richard (Compt. rend. Acad. Agric. France, 1936, **22**, 1093—1099).—Fertiliser trials are recorded and discussed. A. W. M.

Agronomic studies on flint–clay soils in Eure-et-Loir [North France]. J. Garola (Compt. rend. Acad. Agric. France, 1936, **22**, 700—709).—The effect of fertiliser treatment on the crops grown is reviewed. A. W. M.

Possibility of separate measurement of the nutritive and ameliorative effects of a fertiliser

application at any period of crop growth. H. Lagatu and L. Maume (Compt. rend., 1937, **204**, 535—538).—A development of the authors' technique of leaf diagnosis is discussed. A. G. P.

Agricultural significance of the difference between the nutritive and ameliorating effects of manure. H. Lagatu and L. Maume (Compt. rend., 1937, **204**, 939—941; cf. preceding abstract).—The vine, manured with a heavy dose of KCl, benefits but slowly in health and yield. The N, P, and K equilibria of the plant are affected simultaneously. When $NaNO_3$ and Na_2HPO_4 are used, the deleterious effect persists for several years. The effect of $(NH_4)_2SO_4$ on potatoes depends largely on the weather, and may or may not affect adversely the N, P, and K balance. J. L. D.

Determination of the phosphoric acid requirement of chalky soils. G. Joret and H. Malterre (Compt. rend. Acad. Agric. France, 1936, **22**, 695—699).—Depth of soil and content of stones must be taken into account when determining the assimilable P_2O_5 in calcareous soils. Requirements of the soil are based on these corr. figures. A. W. M.

Influence of irrigation on the nitrate content of soils. P. Boischot and G. Drouineau (Compt. rend. Acad. Agric. France, 1936, **22**, 1090—1093).—Irrigation (in South France) increases the NO_3' content of soils treated with org. N fertilisers, compared with that of non-irrigated soils. The NO_3' formed is not leached out by the H_2O. A. W. M.

Mineral nitrogen in the nutrition of cultivated plants. P. Dopter and T. Frémont (Compt. rend. Acad. Agric. France, 1936, **22**, 473—478).—In clay soils, nitrate-N is assimilated by maize better than is ammoniacal N. The reverse is true of sandy soils, which have a smaller absorbing power. A. W. M.

Rôle of potassium and phosphorus in the utilisation of nitrate- and ammoniacal nitrogen by plants. F. V. Turtschin (Rep. Sci. Inst. Fertilisers Insectofung. Leningrad, 3rd Internat. Congr. Soil Sci., 1935, 33—49).—Plants grown with deficiency of K are unable efficiently to utilise $NH_4^{\cdot}$, which accumulates in toxic amounts in leaves. When N is supplied as NO_3' K deficiency is less serious, but lack of P becomes more important since it is necessary for the utilisation of NO_3'. P supplied in fertilisers increases the reducing power of plant tissues associated with utilisation of NO_3', whereas K increases the oxidising power necessary for conversion of NH_4 into amides. The optimum oxidation–reduction potential of plant tissue depends on the nature of the N source and is maintained by a suitable supply of K and P. Ch. Abs. (*p*)

Agricultural chemical characteristic of potassium chloride–ammonium nitrate. F. V. Turtschin (Min. Udobr. Insektofung., 1935, **1**, No. 4, 68—72).—For soils requiring N and K an NH_4NO_3–KCl mixture is recommended. The presence of 22—23% of Cl in the mixture has no detrimental effect on the plants. Ch. Abs. (*p*)

Effect of organic and inorganic fertilisers prepared from peat. Z. V. Logvinova (Min. Udobr. Insektofung., 1935, **1**, No. 5, 65—81).—Fertilisers prepared by treating peat or coal with NH_3 and H_3PO_4 are superior to $(NH_4)_2SO_4$ and are as effective as humic NH_4 phosphates and NH_4NO_3. Ch. Abs. (*p*)

Kotka phosphate. C. Krügel and C. Dreyspring (Superphosphate, 1935, **8**, 201—206).—Kotka phosphate, prepared by treating rock phosphate with $<$ the theoretical proportion of H_2SO_4, contains 55% of H_2O-sol. and 63% of NH_4 citrate-sol. PO_4'''. It is slightly less active than superphosphate (I) in stimulating the early growth of cereals on light soils, but produces substantially the same final yields. As a top-dressing the fertiliser is superior to basic slag but inferior to (I). Ch. Abs. (*p*)

Treating ordinary and acid superphosphates with ammoniacal solutions of ammonium nitrate. L. Berlin, L. Goritzkaja, and A. Zasedateleva (Min. Udobr. Insektofung., 1935, **1**, No. 4, 21—37).—Production of fertilisers containing various $N : PO_4'''$ ratios is described. Ch. Abs. (*p*)

Technology of humic phosphate fertilisers. K. K. Apuschkin and E. A. Kurotschkina (Min. Udobr. Insektofung., 1935, **1**, No. 4, 96).—Humic phosphates containing up to 40% of H_3PO_4 are prepared by repeated treatment of peat with H_3PO_4. In the process peat is partly hydrolysed to sugars which can reduce Fe^{III} and form complex compounds therewith. These compounds inhibit pptn. of Fe phosphates. Humic complexes containing $NH_4^{\cdot}$, NO_3', and PO_4''' are obtained by treating humic phosphates with liquid NH_3 or K NH_4 nitrate. Such complexes can also be prepared from long-flame coals. Ch. Abs. (*p*)

Oil cakes and press mud fertilise alkali fields. N. R. Dhar, S. K. Mukherji, E. V. Seshacharyulu, and N. N. Biswas (Proc. Soc. Biol. Chem. India, 1936, **1**, 36—37).—Instances are given of the reclamation of alkali soils in India by the application of oil-cake, press mud from sugar factories, or molasses. W. O. K.

Carbon dioxide content of Finnish cowstalls. G. Kronholm and Y. Välkkilä (Suomen Kem., 1937, **10**, **B**, 9—10).—CO_2 is absorbed in HCO_3' solution and determined calorimetrically, using p_H indicators. Data are given. A. G. P.

Conservation of liquid and stable manures with superphosphate. W. Dix (Superphosphat, 1935, **11**, 105—107).—Addition of superphosphate to urine or to stable manure restricts the loss of N. Ch. Abs. (*p*)

Iron mobilisation and plant growth in waterlogged soils. B. A. S. Iyengar (Proc. Soc. Biol. Chem. India, 1936, **1**, 32—33).—During the fermentation of org. manures, such as molasses, in soils, Fe^{III} is dissolved by the org. acids and reduced to Fe^{II}. Subsequently the Fe is repptd. as oxide, carbonate, phosphate, and sulphide. It is desirable that the soil phosphates removed in the pptn. of the Fe be replenished by the application of phosphatic fertilisers. W. O. K.

Crops and plant breeding. G. D. H. Bell (J. Roy. Agric. Soc., 1936, **97**, 151—185).—A review. W. L. D.

Lysimetric studies under various crops in Tunis. F. Boeuf and V. Novikoff (Compt. rend. Acad. Agric. France, 1936, **22**, 463—473).—A year or more of fallow conserves the H_2O in the soil, but more nutrients appear in the drainage H_2O of fallow plots than those under wheat or fodder. A. W. M.

Lysimeter experiments. IV. T. L. Lyon and J. A. Bizzell (Cornell Univ. Agric. Exp. Sta. Mem., 1936, No. 194, 59 pp.).—Seasonal variations over 12 years in the composition of drainage H_2O from differently manured and differently cropped soils are recorded. Liming did not increase the rate of percolation of H_2O through the soils. The N of percolates was almost entirely in the form of NO_3'. In fallow soils the N lost in drainage was increased by liming. The effect of CaO on losses of Ca and Mg varied in different soils. Cropping conserved soil-Ca probably by limiting the accumulation of NO_3'. In all cases losses of Ca, K, and Mg were in the (decreasing) order named. K was not conserved by cropping or rendered more sol. by liming. Loss of S in drainage H_2O was $>$ that in crops and was not appreciably affected by CaO. Intake of P by crops was somewhat higher on limed soils. A. G. P.

Nitrate-nitrogen in soil as influenced by the crop and soil treatments. W. A. Albrecht (Missouri Agric. Exp. Sta. Res. Bull., 1937, No. 250, 27 pp.).—Seasonal changes in the NO_3' content of soils under various cropping conditions are recorded. The decrease in NO_3' level in an individual soil due to cropping was very similar for all crops examined. Fertilisers did not greatly affect the level to which soil-NO_3' was exhausted by cropping. Increased [NO_3'] due to tillage was most marked after turning the soil with a mouldboard plough. Straw mulching diminished the NO_3' content of fallow soils; the effect was not counteracted by ploughing-in sweet clover. The growth of maize in mulched soils was similar to that in unmulched soils in which considerable NO_3' had accumulated. The NO_3' level in soil bearing a particular crop was substantially the same whatever the nature of the rotation adopted. A. G. P.

Action of heat, light, and radiations on plants. P. Chouard (Compt. rend. Acad. Agric. France, 1936, **22**, 133—140).—When planted between heated panels, delicate plants can be grown in the open without fear of frost. Hertzian, γ-, and X-rays are injurious, but infra-red and ultra-violet rays (when $>$2900 A.) are beneficial in small doses. The rays emitted by the visible spectrum are the most useful. A combination of $\frac{1}{2}$-watt lamps of low power and suitably filtered Hg-vapour lamps is satisfactory in prolonging daylight, whilst Ne lamps at night force young plants. A. W. M.

Importance of soil type and mechanical composition for sensitivity of plants to chlorine. A. V. Sokolov (Rept. Sci. Inst. Fertilisers Insectofung. Leningrad 3rd Internat. Congr. Soil Sci., 1935, 23—32).—Cl′ in fertilisers is more harmful to cereals, flax, hemp, and buckwheat on podsols than on chernozems, larger amounts of Cl being absorbed on the former type. Liming is not always an effective remedy. Potatoes and fibre plants grown on light soils are more sensitive to Cl than when grown on more compact soils. Ch. Abs. (*p*)

Micro-elements [in plant nutrition]. A. A. Chalizev and M. V. Kataluimov (Rept. Sci. Inst. Fertilisers, Insektofung. Leningrad, 3rd Internat. Congr. Soil Sci., 1935, 51—65).—In presence of a sufficiency of micro-elements (B, Mn, Zn, Cu, I, F) NO_3' produced better growth of mustard than did $NH_4^{\cdot}$. Yields of oats (especially of grain) were greater when grown in more conc. culture solutions containing the micro-elements. Without the latter, the more dil. culture media gave better results. Depressed yields caused by overliming on a podsol, a red earth, and a peat were due to depression of the availability of B. When B was added the same dressings of CaO increased yields. Mn increased the yield of oats on an overlimed peat and that of wheat on an alkali soil treated with $CaSO_4$. Plants on B- and Cu-deficient soils often contain abnormally large N and ash contents. Ch. Abs. (*p*)

Technique of modern field experiments. E. M. Crowther (J. Roy. Agric. Soc., 1936, **97**, 54—81).—A review, discussing yield trials, the application of statistical methods, factorial and multiple experiments, and crop sampling and forecasting. W. L. D.

Nitrogen fertilisers and nitrogen content of [wheat] grain. A. Demolon (Compt. rend. Acad. Agric. France, 1936, **22**, 304—305).—The influence of N fertilisers on the N content of wheat grain is more marked in early-maturing varieties. A. W. M.

Effect of nitrogen, thickness of sowing, and climatic conditions on wheat culture. J. Garola (Compt. rend. Acad. Agric. France, 1936, **22**, 296—303).—In the fertile silt soil of Northern France the most economical yields are obtained by sowing about 1 cwt. of wheat per acre with a moderate dressing of N fertiliser, application of which appears to increase the N content of the grain. Rainfall and thickness of sowing have a greater influence on K than on the other mineral nutrients. A. W. M.

Tensile strength, extensibility, and other characteristics of wheat roots in relation to winter injury. C. A. Lamb (Ohio Agric. Exp. Sta. Bull., 1936, No. 568, 44 pp.).—The nature and strength of the root system are examined in relation to the "heaving" of soil during severe frost. The influence thereon of the nutrient status of the soil and of climatic conditions is discussed. A. G. P.

New trials on take-all of wheat during 1934–5. E. Foex (Compt. rend. Acad. Agric. France, 1936, **22**, 140—147).—Grain infected with *Cercosporella herpotrichoides* or *Ophiobolus graminis* was treated with various fungicides before sowing, but without much success. Spraying with H_2SO_4 proved beneficial only when done in May. A. W. M.

Whiteheads or take-all in wheat. G. Samuel (J. Min. Agric., 1937, **44**, 231—241).—Factors influencing infection are discussed. Recommendations for control include suitable cultural practice, use of appropriate rotations, and preferential application of physiologically acid fertilisers. A. G. P.

Histological and cytological study of ethyl mercury phosphate poisoning in maize seedlings. J. E. Sass (Phytopath., 1937, 27, 95—99). A. G. P.

Influence of ammonium sulphate on stubble-sown oat crops in Victoria. D. Wark (Proc. Roy. Soc. Victoria, 1934, 47, I, 78—95).—Effects of dressings of $(NH_4)_2SO_4$, applied at sowing, on the NH_3 and NO_3' content of soil and the total N of the crop are recorded. The increased amount of N removed in crops was $<\frac{2}{3}$ of that applied in fertilisers. Ch. Abs. (*p*)

Manganese deficiency of oats and its relation to soil bacteria. F. C. Gerretsen (Ann. Bot., 1937, 1, 207—230).—Grey speck disease of oats is associated, not only with Mn deficiency, but also with a bacterial attack on the roots. Under sterile conditions plants may remain healthy though small with small supplies of Mn, but in presence of bacteria the roots become infected. Disinfection of diseased soils with CH_2O or of Mn-deficient H_2O cultures with Germisan permits the growth of healthy plants. Mn-deficient plants contain $\gg$ normal proportions of NH_3. This is produced partly by micro-organisms which attack the roots and partly by protoplasmic proteolysis resulting from diminished formation of carbohydrates by photosynthesis. Transport of the alkaline products to leaves causes the typical spotting of leaves of diseased plants. Certain soil organisms induce pptn. of oxides of Mn within the p_H range 6·5—7·8. In this range of soil reaction grey speck disease is most prevalent. Resistance of oats to invasion by bacteria is largely determined by the Mn content of the plant. A. G. P.

Concentrations of mineral nutrients in maize as affected by fertiliser treatment. J. D. Sayre and V. H. Morris (53rd Ann. Rept. Ohio Agric. Exp. Sta. Bull., 1935, No. 548, 25—26).—The inorg. P content of the expressed sap of maize was not consistently increased by manurial treatment. The N content of the sap was increased by use of N fertilisers. Ch. Abs. (*p*)

Effect of potassium fertilisers on grain cultures. V. N. Prokochev and E. M. Ustiushanina (Min. Udobr. Insektofung., 1935, 1, No. 5, 59—69).—The relative effects of KCl, sylvinite, and carnallite, and mixtures of these, depend on soil and weather conditions, on the nature of the crop, and on that of the rotation. Ch. Abs. (*p*)

Control of cereal rusts by means of chemicals. G. Gassner and K. Hassebrauk (Phytopath. Z., 1936, 9, 427—454).—The efficiency of numerous org. substances in preventing rust infection when applied to soil is determined. Vapours of certain substances, *e.g.*, α-$C_{10}H_7{\cdot}OH$, prevent the germination of fungus spores on host plants. In other cases, notably that of picric acid, substances may enter the plant *via* the roots and exert a chemotherapeutic action. A. G. P.

Phenolic oils from coal tar for destroying weeds in cereals. C. Chabrolin (Compt. rend. Acad. Agric. France, 1936, 22, 770—773).—A 7% emulsion of the oils was slightly more effective than 12% H_2SO_4 in destroying weeds in wheat when applied in mid-winter. A. W. M.

[Eradication of] field bindweed. C. J. Franzke and A. N. Hume (S. Dakota Agric. Exp. Sta. Bull., 1936, No. 305, 51 pp.).—Methods of control involving cultural operations, modification of crop rotation, and application of chemicals are examined. A. G. P.

Antagonistic action between potassium and alkaline earths for plant growth. K. Shibuya and T. Torii (J. Sci. Soil Manure, Japan, 1935, 9, 411—424).—In the growth of rice under Neubauer test conditions the antagonistic effects between K and Ca or Mg depended on the nature of the anions and cations present in the order, $K^{\cdot}$–$Ca^{\cdot\cdot} > K^{\cdot}$–$Mg^{\cdot\cdot}$, $SO_4'' > Cl' > NO_3'$. The action was greatest between salt solutions having the same degree of dissociation. The antagonism affected plant growth less when K was present in excess than when in amounts < normal requirement. Ch. Abs. (*p*)

Soil and plant response to certain methods of potato cultivation. G. C. Moore (Cornell Univ. Agric. Exp. Sta. Bull., 1937, No. 662, 48 pp.).—The influence of methods of planting and cultivation, of placement of fertilisers, and of the H_2O and NO_3' contents of soil on the extent of the root system and the yield and quality of the crop is examined. A. G. P.

Composition of the mineral matter in scab-infected potato tubers. A. Němec (Phytopath. Z., 1936, 9, 417—425).—The most uniform difference between mineral constituents of normal and infected potatoes is the lower Mg of the latter. The Ca content is unchanged or slightly increased by scab. Use of Mg-containing fertilisers increases the Mg content of the tubers, but does not prevent the appearance of scab. A. G. P.

Blooming of potatoes as influenced by pyrethrum dust. E. O. Mader and E. C. Udey (Phytopath., 1937, 27, 112—113).—Pyrethrum increases the no. of flower clusters appearing on potato plants, and when applied to plants which also receive Cu fungicides probably stimulates general growth. A. G. P.

Harvesting, curing, marketing, and feeding sweet potatoes. C. F. Clark (Mississippi Agric. Exp. Sta. Bull., 1936, No. 315, 42 pp.).—Effects of fertiliser treatment and of the use of fungicides on storage qualities are examined. Production costs and the results of feeding trials are recorded. A. G. P.

Control of sweet potato weevil. K. L. Cockerham (U.S. Dept. Agric. Leaflet, 1937, No. 121, 6 pp.).—Methods of fumigation with p-$C_6H_4Cl_2$ are described. A. G. P.

Precautions to avoid injury to potato haulm during arsenical spraying against Colorado beetle. Langenbuch (Z. Pflanzenkr. Pflanzenschutz, 1937, 17, 98—101).—Methods of application are discussed. A. G. P.

Arsenical dusting of cabbage in relation to poison residues. C. E. Smith, W. J. Reid, jun., P. K. Harrison, and C. O. Bare (U.S. Dept. Agric.

Circ., 1937, No. 411, 8 pp.).—Spraying within 30 days of cutting involves risk of retention of amounts of As > the legal tolerance. Residues occur chiefly on the outer loose leaves. A. G. P.

Control of onion smut. H. Bremer (Phytopath. Z., 1936, 9, 53—67).—Various methods of seed disinfection with CH_2O preps. are examined. A. G. P.

Utilisation of sunlight in the growth of green plants under natural conditions. W. Noddack and J. Komor (Angew. Chem., 1937, **50**, 271—277).—0·4—0·8% of incident light energy is stored by plants as chemical energy. The heat of combustion of the org. matter of plants averages 4·17 kg.-cal. per g. Experimental technique is described. A. G. P.

Maturity test of peas. S. L. Jodidi (J. Franklin Inst., 1935, **223**, 593—607).—The method is based on the determination of the vol. of 500 g. of peas by immersion in H_2O. Results agree with those based on determination of the starch/sugar ratio. A. G. P.

Influence of calcium carbonate on growth of radish. R. Échevin (Compt. rend., 1937, **204**, 1129—1132).—In solid synthetic media $CaCO_3$ lowered the yield of leaves and stems but increased that of roots, decreased the H_2O, increased the Ca content of whole plants, and increased the Mg content of leaves while lowering that of roots. A. G. P.

German soya[-bean] cultivation. G. Sessous (Fette u. Seifen, 1937, **44**, 175—178).—Soya is easily grown in medium soils for several successive years in the same plot; seed yields in relation to the results of breeding experiments, and the use of soya meal for human food, are discussed. Extracted, oil-free meal keeps less well than the entire soya meal. E. L.

Biology of *Thielavia basicola* (B. et Br.), Zopf. F. Sattler (Phytopath. Z., 1936, 9, 1—52).—Injury to beans, lupins, and tobacco by *T. basicola* increases with soil-H_2O content and with such conditions of temp., lighting, and atm. $[CO_2]$ as tend to weaken the growth of the plants. Greatest injury to beans occurs when these are grown with excessive K or N, or with a deficiency of N. Lupins were most affected when the K supply was excessive. In all cases the root-rot fungus was more active in soils of higher org. matter content. A. G. P.

Factors affecting the value of soil as a source of inoculation for leguminous crops. H. W. Batchelor (Ohio Agric. Exp. Sta. 53rd Ann. Rept. Bull., 1935, No. 548, 20).—The efficiency of soils as carriers of N-fixing bacteria decreased with p_H from 8 to 6, and was increased by addition of PO_4'''. Ch. Abs. (*p*)

Ammonia and nitrate-nitrogen for cotton. III. Influence of the nitrogen concentration in the nutrient medium. IV. Influence of the boron concentration. K. T. Holley and T. G. Dulin (Georgia Agric. Exp. Sta. Bull., 1937, No. 197, 24 pp.; cf. B., 1934, 1113).—III. In nutrients containing N as NO_3' plants grew better and produced more bolls than when similar levels of N (high or low) were given as $NH_4^{\cdot}$. $NH_4^{\cdot}$-fed plants showed a tendency toward better fruiting in the early stages. The $[NO_3']$ of the nutrient had no appreciable effect on the N content of the sap, the % total N of the tissues in the early growth stages, or on the total N of the seed. Media with high $[NH_4^{\cdot}]$ produced high sap-N, high total N in the plant in the early stages, and high seed-N. The increase in N content of saps of high-$NH_4^{\cdot}$ plants was most evident in the amide and asparagine fractions. The ash, Ca, Mg, and oil contents of the seed and the I val. of the oil were not appreciably affected by the level of N supply.

IV. Addition of 10 p.p.m. of B (as H_3BO_3) to NO_3' media improved the growth of cotton plants in spring, but had no effect on summer cultures in $NH_4^{\cdot} + NO_3'$ media when compared with controls in which the B content was very much smaller. Increased [B] in nutrients did not increase the B content of leaves in proportion to the amount supplied. The utilisation of B by plants was unrelated to that of Ca or Mg. In early growth B had no influence on the N partition of saps of plants grown with NO_3' or $NH_4^{\cdot}$. The acid/base ratio of saps was approx. the same for NO_3'- and $NH_4^{\cdot}$-plants, although the ash of the latter was the more acid. A. G. P.

Cotton fertilisers for Georgia soils. R. P. Bledsoe, S. V. Stacy, and J. J. Skinner (Georgia Agric. Exp. Sta. Bull., 1937, No. 196, 20 pp.).—Results of fertiliser trials are recorded. A. G. P.

Control of cotton root rot in the irrigated southwest. (U.S. Dept. Agric. Circ., 1937, No. 425, 9 pp.).—Liberal amounts of org. manure are placed in deep furrows and, after irrigation, cotton is planted immediately over the furrows. The activity of the root-rot fungus is diminished by the much increased microbiological population of the decomp. manure. A. G. P.

Flax. J. G. Hutton and C. Strickland (S. Dakota Agric. Exp. Sta. Ann. Rept., 1934, 20).—Application of P fertilisers trebled the yield of seed and of oil, increased the wt. per seed, and accelerated vegetative growth and seed production. Ch. Abs. (*p*)

Soil moisture. I. Water utilisation by apple trees in cultivated and grass orchard, compared with fallow land. W. S. Rogers. **II. Moisture variation in a pear orchard.** W. S. Rogers and D. N. Srivastava (East Malling Res. Sta., Ann. Rept. [1936], 1937, 105—109, 110—113).—I. Seasonal variations in the suction force (porous pot) at different depths in orchard soils are recorded. At 30-in. depth absorption by plant roots, and not evaporation, controls the H_2O context.

II. The "June drop," but not the flowering period, of pears is associated with a marked decrease in soil-H_2O content. A. G. P.

Apple trees in water culture. H. L. Pearse (East Malling Res. Sta., Ann. Rept. [1936], 1937, 131—136).—Aëration of the nutrient solution was most satisfactorily ensured by periodically spraying the solution on to the tree roots. The availability of Fe (supplied as citrate) to roots was higher when roots were sprayed with the solution than when they were immersed in it, even when the solution was artificially aërated and circulated. A. G. P.

Hardiness [of apple trees] in relation to fertiliser application. F. S. Browne (Pomological and Fruit-Growing Soc. Quebec, 41st Ann. Rept., 1934, 22—24).—Fertiliser treatments affected resistance to winter injury in the order : complete fertiliser $>$ N + P $>$ no fertiliser $>$ $NaNO_3$.

Ch. Abs. (*p*)

Impregnation of tree-banding materials. III. Apple-blossom weevil and codling-moth experiments in 1936. A. M. Massee, R. M. Greenslade, and J. H. Brair (East Malling Res. Sta., Ann. Rept. [1936], 1937, 232—239; cf. B., 1936, 899).—Bands impregnated with various chlorinated hydrocarbon preps. were less attractive to the insects than were untreated bands. A no. of new preps. caused injury to bark.

A. G. P.

Spraying fruit trees. B. Husz (Bull. Éc. hong. Hort., 1935, 1, 8—22).—Red spot in plum was controlled by 4 applications of 0·5—1·0% Bordeaux mixture, and of CaO–S alone and combined with Ca arsenate (I). Apple diseases and pests are best controlled by a combination of CaO–S with Pb arsenate for early, or with (I) for later, treatments.

Ch. Abs. (*p*)

(A) Injection of single interveinal areas of leaves for diagnosis of mineral deficiency. (B) Iron "shortage" chlorosis in apple trees grown in water culture. (C) Leaf-stalk injection for diagnosis of mineral deficiency. W. A. Roach. **(D) Iron-shortage chlorosis in the plantation.** W. A. Roach and B. F. G. Levy. **(E) Injection of individual branches of a tree independently of each other.** W. A. Roach. **(F) Injection of individual branches of a spur-pruned pear tree.** D. N. Srivastava and W. A. Roach. **(G) Injection of individual branches of a tree which had not been spur-pruned.** P. K. Sen. **(H) Injection of whole trees.** W. A. Roach. **(I) Functional disorders of apples on the tree.** H. Hill. **(J) Injection experiments on bitter-pit in apples.** B. F. G. Levy and W. A. Roach. **(K) Injection experiment on keeping qualities of apples.** A. C. Hulme, B. F. G. Levy, and W. A. Roach (East Malling Res. Sta., Ann. Rept. [1936], 1937, 142—145, 146—149, 150—152, 153—159, 160—166, 167—170, 171—173, 174—179, 180—182, 183—184, 185—186).—(A) The technique of injection is described. Fe deficiency is diagnosed within 3 days by the greener colour appearing in interveinal areas of leaves following injection of Fe citrate (I).

(B) Chlorosis in apple trees grown in culture media containing 10 p.p.m. of (I) is shown by injection methods to result from faulty Fe metabolism. Healthy leaves were maintained by feeding with Fe at 14-day intervals.

(C) Liquid (*e.g.*, aq. acid fuchsin) absorbed by a leafy apple twig through the stump of a cut leaf-stalk penetrated into definite areas of neighbouring leaves. The leaf area affected decreased as the angular distance from the injected stalk increased. Rapid diagnosis of Fe deficiency is obtained in this way.

(D) Fe chlorosis leading to faulty orchard performance is examined. Preliminary reports of curative treatments are given. An incipient Fe chlorosis, externally indistinguishable from N deficiency, is detected by injection methods.

(E) Individual branches of the same tree may be differently treated. Technique is described.

(F) Physiological effects of injection of solutions into suitably chosen branches are confined to those branches.

(G) In all but one case in 54 examined, solutions injected into spur-pruned branches remained in those branches. Injection of urea increased shoot growth in "off"-year trees; urea + K salts produced smaller increase in "off"- and "on"-year trees. Glucose decreased shoot growth. Toxic effects of "urea phosphate" (urea neutralised with H_3PO_4) in branches of "on"-year were $>$ in those of "off"-year trees.

(H) Technique is described.

(I) Internal cork, drought spot, H_2O-core, and bitter-pit are discussed.

(J) Injection of H_3BO_3, with or without nutrients, did not affect the severity of bitter-pit.

(K) Preliminary trials indicate an increased N content and higher respiration rate in apples from trees injected with urea. Injection of Na_2HPO_4 alone did not affect respiration, but in conjunction with urea depressed respiration rates to $<$ that of controls.

A. G. P.

Colour of apples as affected by weather and cultural conditions. C. O. Rawlings (New Hampshire Hort. Soc. 24th Ann. Rept., 1934, 29—34).—Defoliation of apple trees by spraying with 5% aq. $Ca(NO_3)_2$ or $NaNO_3$ (I), 2 weeks prior to harvest, improved the colour of apples without injury. Injection of H_3BO_3, HCl, sugar, or (I) into branches, although in some cases causing defoliation, was less successful. Ringing the trees caused some increase in colour. Application to soil of sugar, 3 weeks before harvest, improved the colour of the fruit and accelerated ripening by 2 weeks : S, CaO, citric acid, $Fe_2(SO_4)_3$, MnO_2, KCl, or superphosphate had no effect. In general, late applications of (I) did not adversely affect colouring.

Ch. Abs. (*p*)

Sooty-blotch disease of apples and plums. H. Wormald (East Malling Res. Sta., Ann. Rept. [1936], 1937, 194—197, 295—296).—Treatment with aq. NaOCl or $CaOCl_2$ gave promising results.

A. G. P.

Spray-residue investigations. I. Determinations of arsenic on pears and apples and of copper on loganberries. H. Shaw (East Malling Res. Sta., Ann. Rept. [1936], 1937, 240—245).—Pears and apples may be sprayed with Pb arsenate until 6 weeks prior to harvesting, or up to mid-July for late varieties. Application of Cu sprays to loganberries 15 days prior to picking produced only an insignificant Cu residue.

A. G. P.

Irrigation water and cultivation of citrus. A. Reifenberg (Hadar, 1935, 8, 231—233).—Analyses of irrigation waters (p_H 7·3—8·6) in Palestine are recorded. Trees were damaged by H_2O containing $>$ 350 mg. of Cl′ per litre, but complete infertility or death of trees occurred only with much greater concns.

A. G. P.

Zinc sulphate treatment for mottle leaf of citrus trees in the Sundays River valley. I. Matthews (Citrus Grower, 1935, No. 41, 30—32).—Beneficial effects were produced in 3—4 months by spraying with $ZnSO_4$ 10, $Ca(OH)_2$ 5, and spreader 0·5 lb. per 100 gals. of H_2O. Ch. Abs. (*p*)

Effects of arsenical sprays on grapefruit, oranges, tangerines, Temple oranges, limes, and lemons. L. Longfield-Smith (Florida Dept. Agric. Chem. Div. Rept. Winter Haven Chem. Lab. [1933—4], 1935, 3—70).—In all sprayed fruit As was detected in rind, rag, and juice. Translocation of As from sprayed to unsprayed areas of trees was very small. Although the amount of As in juice was small, acidity and sol. solids were appreciably diminished and maturation was accelerated. Adverse effects on orange were > those on grapefruit. Ch. Abs. (*p*)

Effects of spray applications of "triple phosphate of lime" to grapefruit and orange trees. L. Longfield-Smith (Florida Dept. Agric. Chem. Div. Rept. Winter Haven Chem. Lab. [1933—4], 1935, 71—84).—With phosphate solutions containing 20 lb. per 100 gals. a single application reduced acidity and slightly increased the sugar content of the fruit. Ch. Abs. (*p*)

Soil-management systems in a young Bartlett pear Orchard. F. S. Howlett (Ohio Agric. Exp. Sta. Bull., 1936, No. 578, 38 pp.).—Effects of cultivation of covercrops, of permanent bluegrass cover with supplements of N manures, of permanent lucerne cover, and of mulching with grass and straw on tree growth and fruit yield are examined. A. G. P.

Chlorosis control of peach trees. P. H. Joessel and A. Lidoyne (Compt. rend. Acad. Agric. France, 1936, **22**, 306—311, 315—320).—Doses of various Fe salts, containing 1 g. of Fe, were injected into infected peach trees during the spring. The different effects of the salts is reported. Conc. solutions of Fe salts were applied in the winter to deep cuts on peach trees with chlorosis. Fe K tartrate is the most effective. Some improvement was noticed by spraying with Fe NH_4 sulphate during late spring. A. W. M.

Bacterial canker in plum and cherry trees. H. Wormald (East Malling Res. Sta., Ann. Rept. [1936], 1937, 297—301).—The organism is described and preliminary trials of control measures are reported. A. G. P.

Stationary equipment for orchard spraying and the manufacture of home-made liquid lime-sulphur. F. H. Ballou (Ohio Agric. Exp. Sta. Bull., 1936, No. 572, 26 pp.).—Appropriate equipment and its operation are described. A. G. P.

Control of strawberry mildew (*Sphaerotheca humuli*). M. H. Moore (East Malling Res. Sta., Ann. Rept. [1936], 1937, 276—279).—CaO–S and S dusts controlled the mildew. The last-named preps. require the more frequent application. A. G. P.

Calcium applications to vines. H. Lagatu and L. Maume (Compt. rend. Acad. Agric. France, 1936, **22**, 478—494).—Addition of Ca fertilisers to vines on non-calcareous soils produces no beneficial results. A. W. M.

Influence of basic slag on the vine. H. Lagatu and L. Maume (Compt. rend. Acad. Agric. France, 1936, **22**, 1132—1138).—Basic slag and superphosphate have the same nutritional val. for vines, as determined by leaf-diagnosis. A. W. M.

How can variations in the Mediterranean climate affect the physiological ratio and quantities of absorbed nitrogen, phosphoric acid, and potash in the vine? H. Lagatu and L. Maume (Compt. rend. Acad. Agric. France, 1936, **22**, 363—382).—By means of leaf-diagnosis the amounts and ratio of N, P, and K in a vine receiving a complete fertiliser have been determined. The differences in the annual yields are due to the climatic variations, which are considered to influence fertiliser intake. There appears to be no cumulative effect of fertiliser over 6 years. A. W. M.

Influence of aluminium sulphate on *Cyperus malaccensis*. K. Yamamoto (J. Sci. Soil Manure, Japan, 1935, **9**, 365—376).—Growth of *C. malaccensis* and the yield and quality of its fibre are improved by treatment of soil with $Al_2(SO_4)_3$. H_2SO_4 may produce similar results, but its action is indirect. Addition of acid substances increased the NH_3 content of soil, but did not always increase the N content of the plants. A. G. P.

Influence of sodium salts on crops of sugar beet in presence of nitrogen derived from different sources. P. Nikichkina (Min. Udobr. Insektofung., 1935, **1**, No. 5, 98).—NaCl and Na_2SO_4 improved the yield of sugar beet only when N and P or complete fertilisers were applied. Ch. Abs. (*p*)

Coffee leaf-fall (*Hemileia vastatrix*, B. and Br.). E. Castellani (Agric. colon., 1937, **31**, 66—72).—A review of the use of several Cu sprays. A. W. M.

Requirements in water and fertilisers for the accumulation of nicotine in some types of *Nicotiana rustica* cultivated in the irrigated fields in the lower Volga region. A. Y. Tolstoplet (Tabachn. Prom., 1935, No. 3, 20—22).—The yield of nicotine was not uniformly influenced by irrigation or by fertiliser treatment. Ch. Abs. (*p*)

Determination of nutrient needs of shade trees with special reference to phosphorus. H. L. Mitchell (Black Rock Forest Papers, 1935, **1**, 1—4).—A close relationship exists between the amount of P applied to soil and the P content of leaves of oaks, chestnut, and maple. The K and N contents of leaves of deciduous trees are probably also related to the level of supply of these elements in the soil. Ground phosphate rock is an effective source of P for coniferous and deciduous trees. Ch. Abs. (*p*)

[Fungal] disease of elms. H. Lafosse and G. Fron (Compt. rend. Acad. Agric. France, 1936, **22**, 1078—1089).—Injection of 0·005% aq. quinoline sulphate into elms infected with *Graphium ulmi* proved successful in combatting the disease. A. W. M.

Relative feeding power of oaks and maples for soil-phosphorus. H. L. Mitchell and R. F. Finn (Black Rock Forest Papers, 1935, **1**, 6—9).—Red maple leaves contained approx. twice as much P as did those of red and white oaks and chestnut grown on the same soil and with the same fertiliser treatment. P absorption varies between genera but not between species. Ch. Abs. (*p*)

Recent improvement of African oil palms and palm oil production in Belgian Congo. E. Le Plae (Bull. Imp. Inst., 1937, **35**, 174—180).

Magnesium sulphate—a new insecticide. H. W. Frings and M. S. Frings (Science, 1937, **85**, 428).—A bran and molasses bait containing 20—25% of $MgSO_4$ is as effective as a 5% As bait in controlling grass-hoppers. L. S. T.

Production of Paris Green. Lotorev, Ermakov, Artamanov, and Egorov (Technika, 1935, No. 56).—Aq. $CuSO_4$ is mixed with AcOH, and meta-arsenite is added. The ppt. is collected and washed. Ch. Abs. (*p*)

Toxicity of certain insecticides to the chinch bug. C. H. Richardson, C. C. Deonier, and W. A. Simanton (J. Agric. Res., 1937, **54**, 59—78).—In laboratory trials with sprays the median lethal concn. against adult *Blissus leucopterus* was approx. 0·9—1·5% for soaps (a Na-base laundry soap being the best of those tested), 0·08% for nicotine in aq. solution, and 0·0025% for pyrethrins in $COMe_2$ solution. Field trials were in accord with the above. Other sprays and dusts tested were relatively ineffective. L. D. G.

Preparation of field-made winter petroleum oil sprays. H. Shaw and W. Steer (East Malling Res. Sta., Ann. Rept. [1936], 1937, 246—249).—Proprietary emulsifying agents are compared. In the oleic acid (I)–NaOH "two-solution" method of emulsification, the amount of (I) was lowered to 0·15% and that of NaOH to 0·0375% (allowing for natural hardness of H_2O) with success. A. G. P.

Combined fungicide–insecticide sprays in 1936. M. H. Moore and H. B. S. Montgomery (East Malling Res. Sta., Ann. Rept. [1936], 1937, 267—275).—Use of spreaders with CaO–S did not improve scab control. Bordeaux mixture (2 : 10 : 100) caused leaf burn, defoliation, and russetting. Nicotine added to petal-fall sprays satisfactorily controlled sawfly. A. G. P.

Fungicidal and phytocidal properties of certain new chemical preparations. I. Fungicidal properties. M. H. Moore and H. B. S. Montgomery. **II. Phytocidal properties.** H. Shaw (East Malling Res. Sta., Ann. Rept. [1936], 1937, 259—264, 264—266).—(I) CaO–S was more effective than were colloidal S preps. A colloidal Cu prep. caused more leaf burn and fruit russetting than did Bordeaux mixture (3 : 9 : 100).

II. Preliminary trials of a no. of Cu and other preps. are recorded. A. G. P.

New source of sulphur for combating insects and agricultural diseases. E. A. Pokrovski (Min. Udobr. Insektofung., 1935, **1**, No. 5, 89—94).—CaO–S is prepared by boiling with CaO the tailings obtained in flotation of S ores. Ch. Abs. (*p*)

"Ultra" sulphur. V. P. Mantschev (Min. Udobr. Insektofung., 1935, **1**, No. 4, 86—94).—"Ultra" S is prepared by spraying a heat-treated clay (passing 200-mesh) with liquid S containing small amounts of I and β-$C_{10}H_7$·OH (to lower η) at 140°. The product contains 12—13% S. Field trials with the prep. are recorded. Ch. Abs. (*p*)

Influence of various factors on the growth and quality of fine wool as obtained from merino sheep. D. S. Bell, D. A. Spencer, and J. I. Hardy (Ohio Agric. Exp. Sta. Bull., 1936, No. 571, 56 pp.).—The rate of growth of wool fibre at any season of the year may be increased by highly nutritious pasturage, but is reduced slightly by the commencement of the milk flow. Age, sex, and pregnancy had no influence. A high proportion of grease did not protect the growing fibre against weathering. Length of staple and density of fibre were the principal protective factors. Laboratory tests of wool quality are described. A. G. P.

Sheep blowfly investigations. W. M. Davies and R. P. Hobson (J. Min. Agric., 1937, **44**, 222—230).—Attraction of the flies to sheep depends on the presence of products of putrefaction [*e.g.*, $(NH_4)_2CO_3$ or indole placed on the sheep] and a "sheep factor" possibly related to the wool grease. Treatments promoting dry conditions near the skin restrict attack by flies. Common sheep dips have no repellent effect. Samples of wool treated with S, derris, or pyrethrum dips remained toxic to newly hatched larvæ for $\ngtr 1$ week, that with PhOH dip for $\ngtr 2$ weeks, and that with As dips for 3—6 weeks. A paraffin–phenolic dressing for maggots gave promising results. A. G. P.

Control of sheep ticks. W. L. Stewart (J. Roy. Agric. Soc., 1936, **97**, 81—95).—A mixed sheep dip containing As_2O_3 (0·17%), PhOH, and wool fat prevents infestation. W. L. D.

Is water containing sodium chloride suitable for watering cattle? A. Massé (Compt. rend. Acad. Agric. France, 1936, **22**, 602—607).—In Morocco drinking-H_2O containing about 0·1% of NaCl has no effects on the health of cattle. A. W. M.

Controlling cattle grubs on dairy cows. H. A. Herman and G. D. Jones (Montana Agric. Exp. Sta. Ann. Rept. Bull. [1933], 1934, 45).—Satisfactory control was obtained with an ointment containing 9·5% of derris in a fatty base. Ch. Abs. (*p*)

Effect of method and rate of grazing on beef production and plant population of pastures at Beltsville, Maryland. M. A. Hein and A. C. Cook (U.S. Dept. Agric. Tech. Bull., 1937, No. 538, 34 pp.).—The influence of the grazing system on the botanical and chemical composition of herbage and on the live-wt. increases of steers is examined. A. G. P.

Diseases of animals; prevention and treatment. F. C. Minett (J. Roy. Agric. Soc., 1936, **97**, 186—209).—A review. W. L. D.

Destruction of field mice. W. Lang (Z. Pflanzenkr. Pflanzenschutz, 1937, **47**, 72—75).—Modern methods are discussed. A. G. P.

Codling moth control experiments, Blackwood, 1934—5. R. Fowler (J. Dept. Agric. S. Australia, 1936, **39**, 458—467).—White oil emulsions showed substantially the same efficiency as did Pb arsenate. Molasses was a more effective attractant than apple vinegar for bait traps. α-$C_{10}H_7\cdot NH_2$ bandages readily trapped larvæ. A. G. P.

Observations on codling moth (*Cydia pomonella*, L.) in 1936. W. Steer (East Malling Res. Sta., Ann. Rept. [1936], 1937, 250—258, 302).—The timing of larval attack is examined. The first cover-wash of Pb arsenate should be applied late in June. A spray programme is recommended. A. G. P.

Walnut maggot [control]. L. Fulmek and K. Enser (Z. Pflanzenkr. Pflanzenschutz, 1937, **17**, 140—142).—Best results were obtained by spraying with 1% Pb arsenate. Slight leaf injury occurred. A. G. P.

Poison bait for slugs. C. T. Gimingham and H. C. F. Newton (J. Min. Agric., 1937, **44**, 242—246).—Successful use of a mixture of bran (1·5—2 pints) with metaldehyde ("Meta" fuel; 4 g.) is described. A. G. P.

Metaphosphate and fertilisers.—See VII. **[Effect of soils on] building materials.**—See IX. **Basic slag.**—See X. **Sugar cane.**—See XVII. **Rotenone in *Derris* etc.**—See XX.

See also A., III, 276, **"Y" potato virus. Bunchy-top disease of tomato. Prep. of virus-proteins by ultracentrifuging.** 284—7, **Plant growth.**

Patents.

Production of fertiliser material [ammoniated superphosphate]. E. W. Harvey and H. A. Beekhuis, jun., Assrs. to Barrett Co. (U.S.P. 2,038,788, 28.4.36. Appl., 27.6.30).—A dry, granular product is obtained by treating phosphate rock (68—70% of $Ca_3P_2O_8$) 1 wt.-% with H_2SO_4 (*d* 1·66) containing $(NH_4)_2SO_4$ 18 wt.-% in a den for 24 hr. L. C. M.

(A) **Fertiliser preparation.** (B) **Mixing apparatus [for fertiliser].** H. B. Siems, Assr. to Swift & Co. Fertilizer Works (U.S.P. 2,047,393—4, 14.7.36. Appl., 10.1.34).—(A) Acid is partly neutralised with anhyd. NH_3 and injected into a chamber in which additional preheated anhyd. NH_3 is injected in the reverse direction. Comminuted solid fertiliser is also allowed to enter the same chamber, the resulting mixture being dry, granular, and convenient to handle. (B) Apparatus for the process described in (A) is claimed; the main supply of NH_3 is preheated by the reaction of the first, partial, neutralisation. B. M. V.

Forcing flowering and fruit formation in plants. K. R. Kerns (U.S.P. 2,047,874, 14.7.36. Appl., 18.6.35).—Flowering and fruiting (*e.g.*, of *Bilbergia* or pineapple) is hastened by several treatments on alternate days with C_2H_2 (or C_2H_4) applied either in the atm. (0·5—2·0%) or in aq. solution. A. H. C.

Insecticide and fungicide. T. P. Remy, Assr. to Texas Co. (U.S.P. 2,046,181, 30.6.36. Appl., 19.11.32).—The kerosene or similar oil extract of ground *Verbascum* flowers (principally common mullein) is claimed as an insecticide and fungicide. It is used emulsified in H_2O (5% of extract), absorbed on fuller's earth, charcoal, etc., or, as a fly-spray, diluted to 0·1% by kerosene. R. F. P.

Finely-divided materials [insecticides].—See I. **Treating decomposable org. matter.**—See XXIII.

XVII.—SUGARS; STARCHES; GUMS.

"Teatini" process. O. Spengler, S. Böttger, and F. Tödt (Deut. Zuckerind., 1937, **62**, 347—348).—Replying to Callingham (*ibid.*, No. 14), the authors maintain that the Teatini process is neither new nor of much val. In the first descriptions of the process the liming treatment was not clearly defined. After the publication of preliming studies by other workers certain improvements were made, but optimum conditions were not sufficiently defined for the needs of practice, and certain important factors, such as the injurious effect of prolonged heating after cold preliming, were ignored. Teatini's use of SO_2 is much less effective than thin juice sulphitation with the same amount of SO_2. J. H. L.

Decomposition of glucose in solution containing an excess of calcium hydroxide. K. Suzuki (J. Soc. Chem. Ind. Japan, 1937, **40**, 64B).—Data were obtained at 50—80°, at the saturated v.p. of the solution, and at 80—100°/1 atm. C. R. H.

Influence of starch or sucrose on decomposition of glucose in solution containing an excess of calcium hydroxide at 80°. K. Suzuki (J. Soc. Chem. Ind. Japan, 1937, **40**, 64B).—Small amounts of starch accelerate, and large amounts retard, the decomp. The accelerating action of sucrose is greatest for small amounts of sucrose. C. R. H.

Barium chloride method for determining the end-point of second saturation [of sugar-beet juices]. Brukner (Deut. Zuckerind., 1937, **62**, 388).—In reply to suggestions by Spengler and Böttger (B., 1937, 716) the author contends that the effect of vigorous stirring cannot be due to absorption of atm. CO_2, and that it is unreasonable to assume that his results were due to abnormal composition of the juices analysed. J. H. L.

Return of waters from diffusion batteries and pulp presses to working [in beet-sugar factories]. W. Reischauer (Deut. Zuckerind., 1937, **62**, 439—440).—A description is given, with diagram, of the plant used at the Osterwieck sugar factory. A pulp pump raises the discharge from the diffusers to a large H_2O separator consisting of a sloping screen of 1 mm. slot width traversed by scrapers. The pulp from the separator is conveyed to presses, and the H_2O passes to a reservoir from the bottom of which deposited matters are drawn off. Pulp catchers are unnecessary. J. H. L.

Cane syrup. J. O. Carrero (Puerto Rico Agric. Exp. Sta. Rept. [1934], 1935, 9—12).—Determinations of sucrose, reducing sugars, P, K, and colouring matter in juices from 10 varieties, at 15-day intervals, are recorded. Supplementing CaO with H_3PO_4 hastened filtration of the juice. CaO darkened the juice, but the colour was restored by acid. Effects of various stages of boiling practice on the quality of syrups were examined. Reduction in colour was obtained with activated C or by increasing the acidity of the juice with tartaric acid. Use of activated C caused loss of flavour. Partial inversion of sucrose by controlled fermentation prevented crystallisation. CH. ABS. (*p*)

Sugar-cane gum. H. Colin and H. Belval (Compt. rend., 1937, **204**, 1010—1012).—The gum contains 20—25% of reducing sugar (mostly glucose), 3% of sucrose, $<1\%$ of nitrogenous material, 10% of ash, a wax, and a sugar which is dextrorotatory, non-fermentable, and hydrolysed (acid) to glucose (cf. B., 1929, 411). J. L. D.

Physicochemical studies on sugar-cane jaggery. T. Varahalu (Madras Agric. J., 1935, **23**, 389—393).—Apart from purity (% sucrose) non-sugar org. matter is the principal factor affecting crystallisation of sucrose in jaggery. Juice from cane manured with castor cake contains min. amounts of harmful non-sugar org. matter; the reverse was true of that manured with $(NH_4)_2SO_4$. Growth of cane under dry conditions, on saline soils, or in areas irrigated with brackish H_2O tended to increase the harmful org. matter content of juice. CH. ABS. (*p*)

Method and plant for continuous crystallisation of sugar solutions. J. A. Platte and G. H. de Vries (Chem. Weekblad, 1937, **34**, 363—367).—The theoretical studies described previously (B., 1936, 1226) have been tested experimentally in a laboratory apparatus with a view of designing a large-scale, semi-automatic, triple-effect evaporator in conjunction with a series of trough crystallisers. S. C.

Raschig rings in the sugar industry. Kuhn (Deut. Zuckerind., 1937, **62**, 349—353).—An irregularly packed layer of Raschig rings held between wire gauze of wide mesh has been used with success for holding back spray in juice evaporators, and also for removing traces of oil from exhaust steam. An assemblage of the rings moistened with oil makes an effective air filter for removing dust, or if sugar dust is to be removed the rings may be moistened with H_2O. CO_2 scrubbers packed with Raschig rings have been found more effective than cascade scrubbers. Other purposes for which the rings have been used are for degassing boiler feed-H_2O by exposing the heated H_2O in a film to steam, for cooling superheated steam, and as a medium in air-conditioning plant. J. H. L.

Mineral content of syrups, molasses, and soft sugars. O. Sheets and R. W. Pearson [with S. D. Summerford and J. F. Weeks] (Mississippi Agric. Exp. Sta. Tech. Bull., 1936, No. 22, 12 pp.).—Analyses are recorded. Sorghum syrup has high Ca and Fe contents. The mineral content of molasses is high, of brown sugar considerable, and of refined table syrups low. Evaporation of sorghum and sugar-cane syrups in Fe or Cu pans increased their Fe or Cu contents. A. G. P.

Turbidity in sugar products. V. Colour and turbidity of hand-refined sugars. F. W. Zerban and L. Sattler (Ind. Eng. Chem. [Anal.], 1937, **9**, 229—232; cf. B., 1936, 808).—The previous investigations (*loc. cit.*) on raw cane sugars have been extended to hand-refined sugars. F. N. W.

Utilisation of bagasse. K. S. Subramaniam and B. S. Rao (Proc. Soc. Biol. Chem. India, 1936, **1**, 5).—On digestion, bagasse yields 10—12% of furfuraldehyde. The dried residual material may be utilised as fuel or for cardboard manufacture. W. O. K.

Saccharification of wood and alcoholic fermentation of sugar. A. Kamazuka and B. Rokusho (J. Soc. Chem. Ind. Japan, 1937, **40**, 143—144B).—The effects of temp., time of reaction, quantity and concn. of acid on the saccharification of wood are tabulated. For fermentation of the product the yeast Rasse II is found best. E. M. W.

Determination of starch in frozen potatoes. W. Kröner and G. Steinhoff (Z. Spiritusind., 1937, **60**, 143).—Using the balance of Reimann or of Parow for such determination, the Saare–Parow rule (subtraction of 1% from the starch val. obtained after careful thawing) yields correct results only under special circumstances which cannot necessarily be attained in practice. The difficulties involved include incomplete thawing or temp. differences between H_2O and the tubers, uncontrollable vol. changes, and diffusion changes between H_2O and potatoes. I. A. P.

Determining the gelatinisation temperature of starches. Photoelectric method. D. H. Cook and J. H. Axtmayer (Ind. Eng. Chem. [Anal.], 1937, **9**, 226—228).—A method depending on the measured change in the light transmission of starch suspensions at the gelation temp. is described and is applied to 20 types of starch. F. N. W.

Fractionation of starch. B. N. Sastri and A. Krishnamurthi (Proc. Soc. Biol. Chem. India, 1936, **1**, 6).—Fractional pptn. by means of EtOH of starch dissolved in aq. $CaCl_2$ affords two fractions which differ in their rates of digestibility and diffusion. W. O. K.

Starch syrup in the liqueur industry. C. Luckow (Z. Spiritusind., 1937, **60**, 157).—The properties of starch syrups and their use for addition to liqueurs, to increase η without undesirable increase in sweetness, are discussed. I. A. P.

Wood. Fluid quantity meter. Bag filters.—See I. **N transformations in soil. Sugar beet. [Sugar-factory] press mud as fertiliser.**—See XVI. **N determination [in molasses].**—See XVIII. **Sugar as corrosion-inhibitor. Spoilage organisms in sugar and starch. Fodder yeast.**—See XIX.

See also A., II, 275, **α- and β-Aldoses and Br-oxidation products.** 313, **Colour development in sugar analysis.** III, 271, **Prep. of hexose monophosphate from yeast extract. Fermentative determination of sugar.**

PATENTS.

Starch solution.—See VI.

XVIII.—FERMENTATION INDUSTRIES.

Relation of the two sugar-forming diastases to the Lintner number. G. L. Teller (Cereal Chem., 1937, 14, 331—335).—Wheat and other cereals contain two types of diastase, conc., respectively, in the bran and the endosperm. Over a considerable range of p_H and temp., the activities of these types change in opposite directions. To minimise the consequent inaccuracy in the Lintner determination of diastase, this should be carried out near the average optimum temp. and p_H for the two types (50° and 5·0). E. A. F.

Temperature effects in preparation of wheat amylases. M. J. Blish, R. M. Sandstedt, and D. K. Mecham (Cereal Chem., 1937, 14, 328—330).—Wheat amylase in contact with the EtOH from which it is pptd. loses activity slowly at low room temp., but rapidly at 40°. In absence of EtOH, amylase, in dispersion or pptd. by $(NH_4)_2SO_4$, is stable for many hr. E. A. F.

Determination of yeast with the Lange colorimeter. C. Enders and K. Kärnbach (Woch. Brau., 1937, 54, 185—186).—Yeast centrifuged from cultures is suspended in distilled H_2O or in 0·15*M* buffer solution for investigation in the Lange colorimeter. Proportionality between % of absorption and yeast dry wt. holds up to approx. 40% absorption, allowing dry-wt. determinations to be made in this region with an error limit of 5%. For a given wt. of yeast, the absorption increases with age, so that yeasts which it is desired to compare should not differ widely in age. Sedimentation has no effect on the result during the time necessary for readings to be made. The effects of p_H on sedimentation in aq. buffer solutions and in gelatin solution have been observed. I. A. P.

Rapid Kjeldahl method for nitrogen determination. B. Drews (Z. Spiritusind., 1937, 60, 175—176).—Use of the reaction mixture containing Na_2SO_4, $CuSO_4$, and Se gives results in excellent agreement with the original Kjeldahl method, but in a much reduced time, when applied to yeast (fresh or dried) or molasses (cf. Lindemann, B., 1937, 718). Details of the procedure are quoted. Addition of $Hg^{\cdot\cdot}$ to the reaction mixture gives unsatisfactory results with these materials. I. A. P.

Aspects of malting. A. Krishnamurthi (Proc. Soc. Biol. Chem. India, 1936, 1, 30).—Ragi and cholam are possible substrates for barley in the manufacture of malt. A method is described for the prep. of ragi malt. W. O. K.

Barley and malt studies. II. Experimental malting of barleys grown in 1935. J. G. Dickson, H. L. Shands, A. D. Dickson, and B. A. Burkhart (Cereal Chem., 1937, 14, 316—327; cf. B., 1936, 213).—The method of experimental malting has been improved and gives better agreement with commercial malting. Comparison of barley varieties shows that these require different treatment for the best results. Barley was better than in 1934, being lower in total protein but higher in diastatic power. Tables are given showing the effects of regional conditions on different varieties. E. A. F.

Starch conversion in brewery mashing. I. A. Preece (J. Incorp. Brewers Guild, 1935, 21, 247—255).—A review. Ch. Abs. (*p*)

Correct calculation of evaporation in brewers' coppers. E. Rausch (Woch. Brau., 1937, 54, 187).—The importance is stressed of knowing whether a stated % of evaporation is calc. on the original wort, the cast wort, or the copper capacity. A clear interpretation is possible only when the initial wort vol. is stated. I. A. P.

Vaporisation of alcohol during the fermentation of molasses mashes. H. Pohl (Z. Spiritusind., 1937, 60, 148, 150—152; cf. B., 1937, 384).—EtOH volatilisation during fermentation has been studied, the results being critically discussed. I. A. P.

Practical results with the laminated vapour condenser. R. Wenzl (Woch. Brau., 1937, 54, 217—222).—The employment and efficiency of the condenser in connexion with the drying of brewers' spent grains and with the copper vapours, and the utilisation of the hot condensates, are discussed (cf. B., 1936, 565). I. A. P.

Foam [on beer]. J. Blom (J. Inst. Brew., 1937, 43, 251—260; cf. B., 1936, 214, 248).—The nature and properties of foam are discussed and a method is described for measuring head retention in beer. Foam stability is expressed by the no. of sec. required for one half of the foam present at any time to change into beer. The influence of malting and brewing conditions and of substances added to beer on foam stability is considered. This property is favoured by high malt-kilning temp., short (decoction) mashing, use of fresh hops and employment of the min. of yeast in secondary fermentation, optimal storage, and avoidance of unnecessary frothing of beer during manufacture, of too perfect filtration, and of too prolonged pasteurisation at high temp. Foam stability is lowered by fats and soaps and by pepsin, papain, and α-amylases. I. A. P.

Measurement of [beer] foam. K. Schuster and W. Mischke (Woch. Brau., 1937, 54, 177—179).—Glass powder (5 g., particle size 0·253—0·547 mm.) or specially purified quartz sand is allowed to fall from a height of 30 cm. into approx. 150 c.c. of beer (temp. 8—12°) contained in a measuring cylinder of 38 mm. diameter, and the foam vol. is read at 1, 2, 4, 6, 8, and 10 min. A "foam no." characteristic of the beer is given by $3075a^2/bv(10{\cdot}5 + t)$, where a and b are the foam vols. at 1 and 10 min., respectively, and v and t are the actual vol. and temp. of the beer. The method cannot be used for comparing filtered and unfiltered beers, the latter giving low vals., probably owing to adsorption of yeast etc. I. A. P.

Turbidity in wort and beer. III. Chill-haze. C. Enders (Woch. Brau., 1937, 54, 161—166, 169—174, 179—182, 188—191; cf. B., 1937, 485).—Chill-haze in beer and cooling-turbidity (*T*) in wort appear to be due to substances which are chemically identical. *T* has been measured photo-electrically (cf. B., 1936, 901), the temp. at which it first appears during cooling and a measure of the total *T* (5°) both being noted. The amount of *T* increases with decreasing modification of the malt, with increasing intensity of the mash process and increasing mash concn., and with decreasing duration of boil. Hop-boiling increases the sensitivity of wort to cooling. Substances responsible for *T* are present both in husk and in husk-freed grain, though barleys show varietal differences; hop tannins also contribute to *T*, whilst pectins may be not without influence. The suggestion that protein–tannin compounds are responsible for *T* is supported, and the production of these is dependent on the concn. of protein and tannin in the wort. p_H changes are without significance, but *T* is increased by O_2. Suggestions that hordein may play an important part in producing *T* are not supported. I. A. P.

Brilliancy of bottled beers. A. E. Berry (J. Incorp. Brewers Guild, 1935, **21**, 278—284).—Use of $CaSO_4$, preheated to 110°, for filtering is described. The prepared $CaSO_4$ is positively charged, thus facilitating removal of negative colloids.

Ch. Abs. (*p*)

Modern methods of cider making. H. L. Lantz (Trans. Iowa Hort. Soc., 1934, **69**, 28—33).

Ch. Abs. (*p*)

Extraction and preliminary examination of coloured compounds in red wines. A. Dangoumau and G. Debordes (Bull. Soc. chim., 1937, [v], **4**, 910—911).—Continuous extraction of red wines with Et_2O appears to remove colouring matters from them solely by virtue of their solubility in other materials simultaneously removed. Long preservation of the extract causes separation of it into two layers of which the ethereal portion is yellow. Light petroleum removes a yellow material from large but not from small quantities of red wine. H. W.

Extraction, separation, and determination of the esters of wines. A. Dangoumau and G. Debordes (Bull. Soc. chim., 1937, [v], **4**, 911—918).—Espil's method (B., 1937, 719) is adversely criticised for the following reasons. Different normal esters commonly present in wines (EtOAc, Et_3 citrate, Et lactate, Et_2 malate, Et_2 succinate, Et_2 tartrate) are very unequally sol. in light petroleum (I) and their coeffs. of distribution between (I) and 10% EtOH–H_2O are very different. Their complete removal cannot be effected rapidly (10 hr.) and a single correction factor cannot be applied in case of abbreviated extraction. At the p_H recommended by Espil certain esters suffer marked hydrolysis previous to determination. Other substances such as aldehyde H sulphites and compounds of H esters are partly removed during the extraction. Control experiments, effected by addition of known amounts of a normal ester to a wine, show extraction to be very incomplete.

H. W.

Determinations of esters in fermented liquors. L. Espil and E. Peynaud (Bull. Soc. chim., 1937, [v], **4**, 904—906).—Continuous extraction with light petroleum for 10 hr. in a Hagen apparatus suffices for the complete removal of esters from wines.

H. W.

Determination of total sulphur dioxide in wines. J. Dubaquié (Ann. Falsif., 1937, **30**, 6—8).—A rapid method consists of distillation under reduced pressure (30—40 mm. Hg) of the SO_2 from 50 ml. of wine after adding H_3PO_4, absorption in NaOH, and titration with I after acidifying.

W. L. D.

Micro-titration of free sulphurous acid, applicable to wines. C. Sumuleanu, M. Botezatu, and T. Nicolau (Ann. Sci. Univ. Jassy, 1937, **23**, 265—278).—The wine is distilled with H_3PO_4 in a current of CO_2. SO_2 is absorbed in neutral 3% H_2O_2. The H_2SO_4 formed is titrated with $0{\cdot}02N$-NaOH.

J. S. A.

Colorimetric micro-determination of chlorides, sulphates, and phosphates in wines. C. Sumuleanu and G. Ghimicescu (Ann. Sci. Univ. Jassy, 1937, **23**, 1—14).—For the determination of total PO_4''', the wine is neutralised with a 1 : 1 mixture of Na_2CO_3 and KNO_3 and evaporated to dryness. The ignited residue is dissolved in H_2O, and PO_4''' in an aliquot portion pptd. by adding $UO_2(OAc)_2$. The ppt. is separated centrifugally and redissolved in H_2SO_4. $UO_2^{\cdot\cdot}$ in the solution is determined colorimetrically with $K_4Fe(CN)_6$. Mineral PO_4''' is determined similarly by pptn. from the neutralised wine. For total SO_4'', the wine is evaporated down with HCl. The residue is neutralised with NaOH, Fe and Mg being eliminated as hydroxides. Ca is best separated first as CaC_2O_4. The solution is evaporated, the residue ashed, and SO_4'' in an aq. extract pptd. with benzidine (I) from a solution acidified with HCl (indicator, 2 : 4-dinitrophenol). The (I)–H_2SO_4 ppt. is filtered off and titrated with $0{\cdot}02N$-NaOH. Mineral SO_4'' is determined similarly by treating the wine with animal charcoal (II), evaporating it to a small bulk, and neutralising it with NaOH. Cl′ is determined by titration with $HgCl_2$ in HNO_3 solution, with $Na_2[Fe(CN)_5NO]$ as indicator, after treating the wine with (II).

J. S. A.

Blending of wines. G. Halphen (Ann. Falsif., 1937, **30**, 9).—The val. (non-volatile acids + 0·7)/% EtOH for two Hérault wines of 7·1 and 12·5% EtOH content and of a 1 : 1 mixture of these wines upholds the author's rule for blending. W. L. D.

Composition of Moroccan wines. L. Chauveau and A. Vasseur (Ann. Falsif., 1937, **30**, 85—91; cf. B., 1934, 376).—Characteristics of red, rose, and white wines of 1933—5 are recorded. E. C. S.

Fixing the date of vintage. Depardon and Buron (Compt. rend. Acad. Agric. France, 1936, **22**, 719—725).—By determining the ratio of tartaric acid to total org. acids in grapes for a given variety and district the optimum time for gathering can be assessed. A. W. M.

Improvement of sweet wines. W. V. Cruess and L. Hohl (Fruit Products J., 1937, **16**, 261—262).—Grape concentrate is added to the partly-fermented liquor and further fermentation allowed to proceed, before fortifying with high-proof brandy.

E. B. H.

Differentiation of vinegars. Identification and characterisation of Rumanian vinegars. A.

Schmidt (Z. Unters. Lebensm., 1937, **73**, 441—447).—The % of AcOH, CHAcMe·OH (I), extract, glycerol, and esters (as EtOAc), and the O and I vals. of a no. of fermentation vinegars and of mixtures of these with distillation vinegar are tabulated. The O and I vals. and the % of (I) are the most trustworthy indices for the differentiation of the two types of vinegar.
E. C. S.

Chemical changes which accompany the ageing of brandy. E. M. Bellet (Bull. Soc. chim., 1937, [v], **4**, 713—715).—Periodic determinations from 1913 to 1934 of the proportions of esters (total ester content approx. const.), higher alcohols, and aldehydes in four b.p. fractions of ageing brandy show that the ester index in the most volatile portion increases from 16 to 46. Hence the main factor responsible for ageing is the conversion of esters of higher alcohols into Et esters with liberation of the higher alcohols, oxidation of which to aldehydes is a purely secondary process. J. W. B.

Preparation of alcohol from currants. F. Wendel (Z. Spiritusind., 1937, **60**, 147—148).—A satisfactory fermentation of currant mash is possible only in presence of added nutrients, *e.g.*, NH_4 phosphate. Further, for max. EtOH yields and min. time of fermentation, the currants must either be minced before hot extraction with H_2O, or pretreated with steam under slight pressure, then yielding 37·5 c.c. of EtOH per 100 g. of currants with a fermentation time of 72 hr., all fermentable sugar being removed. The spent wash is rich in fat though relatively poor in protein, but its val. for feed purposes is lowered by its high acid content. The possibility of the prep. of tartar from the spent wash under distillery conditions is discussed. I. A. P.

Difference between apparent and true strength of alcoholic beverages. (Mlle.) J. Moroy (Ann. Falsif., 1937, **30**, 160—162).—A table is given in which the true strength (in degrees) of rum of varying extract content is calc. by means of Blarez' formula from the apparent strength. E. C. S.

Comparison of process economies in the alcohol industry. G. T. Reich (Chem. Met. Eng., 1937, **44**, 131—133).—EtOH and conc. slop production from molasses by the usual process, and that in which the beer is conc. in triple-effect evaporators and the condensed vapour from the first effect is passed into a rectifying column from which EtOH is obtained, are compared and the economies in first cost, labour, and fuel in the latter process are indicated.
D. K. M.

Paper coatings.—See V. **Fermentation of sugar. Starch syrup in liqueurs.**—See XVII. **Barley and malt.**—See XIX.

See also A., III, 268, **Cryst. catalase.** 269, **Prep. of trypsin-free aminopolypeptidase.** 271, **Prep. of hexose monophosphate from yeast extract. Fermentative determination of sugar.**

Patents.

Production of butyl alcohol and other products by fermentation. W. A. Burton. From Commercial Solvents Corp. (B.P. 463,718, 4.7.35).—In carrying out BuOH fermentations with organisms, *e.g.*, *Clostridium propyl butylicum*, the activity of which is favoured by $[H^{\cdot}] <$ that normally produced by the fermentation, Ca salts of AcOH or $PrCO_2H$ are added to the mash in concn. sufficient to secure the desired final $[H^{\cdot}]$. The yield of solvents is increased as compared with similar fermentations in presence of $CaCO_3$, but the ratios of individual solvents formed are somewhat modified. I. A. P.

Controlling hydrogen-ion concentration of fermentation mashes. W. A. Burton. From Commercial Solvents Corp. (B.P. 463,719—20, 4.7.35).—(A) In BuOH fermentations with organisms the activity of which is favoured by $[H^{\cdot}] <$ that normally produced by the fermentation, and on such scale that the ratio of height and/or vol. of mash to area of settled carbonate is substantially $>$ that in laboratory Erlenmeyer-flask fermentations, the neutralising agent is added in the form of freshly pptd. carbonate of Ca, Ba, or Fe, or as natural material ground to similar fineness, in place of the usual 200-mesh ground calcite. The particle size selected should be correlated with the "space-factor" of the vessel, particle size decreasing when this factor is increased. (B) Such BuOH fermentations may be carried out in presence of a slight excess of the neutralising agent (*e.g.*, 5—7% of the sugar concn.), this being at least as finely divided and having an available surface $\not<$ that of 200-mesh calcite. In general, the particle and aggregate size should be smaller for the less active fermentations, the agent in a particular fermentation being chosen as a result of settling tests or after measurement of particle or aggregate size, and the rapidity of fermentation determined by noting the rapidity of gas evolution or by prep. of an acidity curve. I. A. P.

Potato wash.—See XIX.

XIX.—FOODS.

Relative macaroni-making quality of durum wheat varieties. D. S. Binnington and W. F. Geddes (Cereal Chem., 1937, **14**, 293—304).—34 samples of durum wheats and the semolinas milled therefrom were analysed for protein and carotene (I) content. The macaroni produced from these wheats was subjected to colour analyses, which indicated little or no relation between colour and the (I) content of the wheat. E. A. F.

Grain quality of couch grass and wheat–couch grass hybrids. P. N. Shibaev (Cereal Chem., 1937, **14**, 437—439).—Gluten has been found in seven Gramineæ genera besides wheat. Couch-grass grain contains more gluten than wheat and makes good bread; crossing with it can be used to improve wheat quality. The gluten content of cereals throws light on their genetic relationships. E. A. F.

Conservation of wheat stocks. G. Bertrand and Briolay (Compt. rend. Acad. Agric. France, 1936, **22**, 522—530).—Wheat cannot be stored in silos if it contains $>$14% of H_2O, unless frequently turned over. With $\not>$16% of H_2O wheat can be stored in sacks in warehouses if passages are left between the rows and if the temp. is kept const. Chloropicrin has been successfully used against insects and rodents, and has no ill effects on the properties of the gluten or on the germination of the grain. A. W. M.

Storage of wheaten flour. II. Absorption of oxygen by flour when stored under various conditions. P. Halton and E. A. Fisher (Cereal Chem., 1937, **14**, 267—292).—Measurements of the rate of O_2 absorption by flour stored in O_2 and in air show the absorption to be due to mites (below 60° and above 12% H_2O content), bacteria, and fungi (above 12% of H_2O) and autoxidation of fats and of carotene (which is increased by drying). Flour in which biological activity has been suppressed by heat-treatment, drying, or $CHCl_3$ does not deteriorate in baking quality on prolonged storage. E. A. F.

Storage of rice in concrete silos. M. Kondô and T. Okamura (Proc. Imp. Acad. Tokyo, 1937, **13**, 117—120).—The aneurin content and nutritive val. of dried rice are unchanged by storing for 5 years in airtight silos. A. Li.

Stability of vitamin-*C* in sweet maize to shipping, freezing, and canning. C. F. Dunker, C. R. Fellers, and G. A. Fitzgerald (Food Res., 1937, **2**, 41—50).—Raw, fresh-cooked, frozen, and whole-grain canned sweet maize contain 40—60 international units of -*C* per oz., and cream-styled canned maize slightly less. Little loss of -*C* occurs after picking and keeping in the husk for a few days, after freezing and defrosting, or, in the case of canned maize, after opening and keeping for several hr. in the refrigerator. E. C. S.

Amino-acids in staple foods. II. Effect of milling wheat on distribution of amino-acids. F. A. Csonka (Cereal Chem., 1937, **14**, 397—399; cf. B., 1937, 721).—Patent and whole-wheat flours, and shorts and bran from the same wheat, were analysed for NH_2-acids. Cystine and tryptophan were higher in patent flour; tyrosine and dibasic acids were higher in whole-wheat flour. E. A. F.

Influence of individual milling technique on flour and loaf characteristics. M. C. Markley and A. E. Treloar (Cereal Chem., 1937, **14**, 305—315).—Milling of wheat in three different laboratories caused significant differences in the protein, ash, and diastatic activity of the flour, but not in loaf vol. or grain of crumb. E. A. F.

Effect of fermentation, certain dough ingredients, and proteases on physical properties of flour doughs. L. J. Bohn and C. H. Bailey (Cereal Chem., 1937, **14**, 335—348).—Fermented dough, remixed in the farinograph, showed decreased yield point and elasticity and increased mobility. Stress readings were increased by NaCl, decreased by shortening, milk solids-not-fat (especially those of low quality), large additions of papain (I), and malt. Small additions of (I) did not affect stress readings, and appear to act as a coagulant. E. A. F.

Colloidal behaviour of flour doughs. Thixotropic nature of starch–water systems. M. C. Markley (Cereal Chem., 1937, **14**, 434—436).—A starch–H_2O mixture showed in the farinograph a very high initial η which quickly fell on kneading but was restored by a rest period. This indicates a thixotropic system. Starch in dough is not negligible in comparison with the gluten. E. A. F.

Fundamental mechanical properties of flour dough. R. K. Schofield and G. W. S. Blair (Kolloid-Z., 1937, **79**, 148—154; cf. B., 1936, 712, 1175).—Previous work on the η and elasticity of dough is reviewed. Experiments are described illustrating the effect of ageing and of H_2O content on the extension under small loads. F. L. U.

Factors which influence results in wheat-meal time-fermentation test. C. O. Swanson (Cereal Chem., 1937, **14**, 419—433).—The time for disintegration of the dough ball depends on other factors besides wheat quality, including fineness of grinding, amount of mixing, temp., time of storage, presence of bran, shorts, or germ, and the CO_2 content of the H_2O. The occurrence of different types of distintegration necessitates careful and experienced observation. E. A. F.

Test baking. I. Technique and some factors affecting fermentation. II. Determination and significance of loaf volume. E. A. Fisher and P. Halton. **III. Human factor in test baking.** D. Katz (Cereal Chem., 1937, **14**, 349—372, 373—382, 382—396).—I. The fermentation time required decreases logarithmically with increasing quantity of yeast. Acceleration of fermentation with temp. decreases with increasing quantity of yeast, being 0 with 8% of yeast. Fermentation rate is affected by the size of the dough batch. Milling control demands a single baking test under rigidly const. conditions; flour research requires a series of tests to determine the most suitable conditions. The authors recommend a series in which only fermentation time is varied.

II. Improvements in the measurement of loaf vol. by means of rape seed give reproducible results. Section area and the sum of the perimeters are both closely correlated with loaf vol. Loaf vol. is not a good measure of baking quality, but the height of the loaf does indicate oven spring and the horizontal diameter stability.

III. The terms used by bakers to describe dough, and the sense impressions on which judgments are based, are analysed. Subjective impressions are of low sensitivity and reliability. E. A. F.

Development of "standard" A.A.C.C. standard baking test. G. Landis and C. N. Frey (Cereal Chem., 1937, **14**, 440—441).—Standardisation by prescription of certain equipment and procedure is undesirable at the present stage; research should be continued. E. A. F.

Standardised test baking. C. W. Herd (Food, 1937, **6**, 343—344).—The importance of evaluating a flour by a baking test plus physical measurements on the dough is stressed. W. L. D.

Characterisation and differentiation of Ponceau 2R in mixtures of pigments for pastries etc. C. Courtois (Ann. Falsif., 1937, **30**, 70—75).—Ponceau 2R is differentiated from 3R by its absorption in the Toussaint photocolorimeter. E. C. S.

Determination of water in confectionery by distillation with a mixture of mineral oil and amyl alcohol. P. Glassmann and J. Kantorer (Z. Unters. Lebensm., 1937, 73, 426—431).—The method is based on Kubierschki's for the determination of H_2O in lignite (cf. Z. anal. Chem., 1932, 91, 72). E. C. S.

The Nation's milk supply. Hygienic production and control. B. Davies (Lait, 1937, 17, 449—463, 591—605).—A review. W. L. D.

Freeing dairy plant from insect pests. W. P. Flint (Milk Plant Month., 1937, 26, No. 5, 50).—Ants are destroyed by fumigation of nests with CS_2 or $C_{10}H_7Cl$. Mite infestation is fly-borne and is overcome by fine oil sprays or HCN fumigation. The mites are previously exposed to a temp. of 30—32°, which makes them more active. Where possible, heating a room to 52—56° will destroy all insect life. W. L. D.

Air-conditioning of milk plant. G. O. Wedell (Milk Plant Month., 1937, 26, No. 5, 46—48).—Milk storage at 4°, and office and laboratory at 27° and 50% R.H., are recommended. W. L. D.

Milk pasteurisation. J. A. Tobey (Milk Dealer, 1937, 26, 52—58).—A historical review. W. L. D.

Vitamin-*C*, copper, and oxidised flavour of milk. P. F. Sharp, G. M. Trout, and E. S. Guthrie (Milk Plant Month., 1937, 26, No. 5, 32—34).—High pasteurisation temp. retards the development of oxidised flavour and destruction of ascorbic acid (I) because of the destruction of an enzyme which survives pasteurisation at 63°. The above reactions are accelerated by Cu in presence of the enzyme. Addition to milk of 100 mg. of (I) per litre retards the development of oxidised flavour. There is no destruction of (I) at 63°/30 min. if Cu is absent. Al containing Cu does not affect milk. W. L. D.

Seasonal variation of vitamin-*D* in milk. H. E. Bechtel and C. A. Hoppert (J. Nutrition, 1936, 11, 537—549).—An EtOH extraction method for concentrating the antirachitic factor in milk is described. Seasonal variations in the antirachitic potency of milk are considerable and are closely related to the amount of sunshine to which the animals are exposed. Under ordinary dairy conditions cows have little or no chance of storing vitamin-*D* during lactation. A. G. P.

Rapid determination of total nitrogenous material in milk for use of milk inspectors. A. Massé and A. M. Leroy (Comp. rend. Acad. Agric. France, 1936, 22, 608—612).—10-c.c. samples of milk are neutralised to phenolphthalein, 1 c.c. of CH_2O is added, and then definite amounts of dil. aq. NaOH. The depths of the red colorations developed are compared with standards. A. W. M.

Determination of small amounts of lead in milk. J. Gangl and E. Liedl (Mikrochem., Molisch Festschr., 1936, 147—153).—The fat-free constituents of 100 c.c. of milk are dissolved by heating with HNO_3, and org. matter in the solution is oxidised destructively by evaporation with HNO_3 + H_2SO_4. The insol. residue from the H_2SO_4 evaporation, containing $PbSO_4$ and $CaSO_4$, is washed with EtOH, and $PbSO_4$ extracted with NH_4OAc. The extract is treated with 3—5 c.c. of diphenylthiocarbazone (I) in CCl_4 (6 mg. per 100 c.c.), and then with 1% aq. KCN. Excess of (I) is removed by washing with aq. NH_3, and the Pb–(I) compound determined photometrically. J. S. A.

Method for calculation in standardising cream and milk. H. Edel (Milk Dealer, 1937, 26, No. 8, 40—41).—Nomograms for determining the amounts of milk and cream of known fat % to mix to give a product of desired fat % are given. W. L. D.

Homogenisation [of milk] as a preventive of oxidised flavour. H. E. Ross (Milk Plant Month., 1937, 26, No. 5, 40—44).—A homogenisation pressure of 1500 lb./sq. in. prevents the development of oxidised flavour even when Cu is added to milk after homogenisation. Pressures of 500—1000 lb./sq. in. are not dependable. W. L. D.

Composition and purity of milk in the Paris region. D. Florentin (Ann. Falsif., 1937, 30, 156—160).—The % of solids, fat, ash, and Na of a no. of samples of mixed and special milks are tabulated. E. C. S.

Is electrical deacidification of milk fraudulent? J. Pien (Ann. Falsif., 1937, 30, 146—155; cf. B., 1936, 296).—The mechanism of deacidification previously suggested is confirmed. No decomp. of lactic acid takes place during the electrolysis. The practice is condemned on principle. E. C. S.

Detection and determination of addition of fresh to pasteurised milk by the Orla-Jensen method. F. Stoppel (Z. Unters. Lebensm., 1937, 73, 327—329).—The method is modified by increasing sixfold the vol. of the sample and diluting fourfold. The apparatus is suitably modified and the time allowed for the cream to rise is increased from 2 to 20 hr. The factor c for pasteurised milk varies from 2 to 4, and increases regularly with addition of fresh milk, 30% addition giving $c = 47 - 64$. E. C. S.

Comparison of media and incubation temperatures for making bacterial counts of spray-process dry skim milk. L. R. Curtis and J. L. Hileman (Food Res., 1937, 2, 73—80).—The counts on tryptone agar were $>$ those on standard agar, and those at 32° $>$ those at 37°. E. C. S.

New spray-drying method for milk. A. Kufferath (Milch. Zentr., 1937, 66, 135—137).—A plant in which milk atomised with a spray nozzle is dried by a current of hot air entering close to the nozzle and incorporating new ideas for reducing entrainment losses is described. Economies in power and space are claimed. W. L. D.

Body and texture of butter. S. T. Coulter and W. B. Combs (Univ. Minnesota Agric. Exp. Sta., Tech. Bull. No. 115, 1936, 39 pp.; Nat. Butter and Cheese J., 1937, 28, No. 10, 16).—Sticky or sticky-crumbly texture depends partly on the composition of the butter fat and on the temp. of the trier and the temp. and age of the butter. Proper manufacturing procedure improves the hardness, slicing time, and standing up properties. Excessive cooling of cream should be avoided; cream should not be churned at a temp. $<$ that necessary to secure exhaustive churning. The wash-H_2O should be between 4·5° and 10°. Factors influencing the hardness of butter are enumerated. W. L. D.

Average vitamin-*A* and -*D* potency of butter. R. S. Morgan and H. Pritchard (Analyst, 1937, **62**, 354—362).—The respective average vitamin-*A* and -*D* potencies (by biological assay) of butter samples were 22·5 and 0·36 units per g. The respective min. vals. were 10—14 and 0·1—0·3 (during winter feeding), the max. (June—July) 30—40 and 0·4—1·0 units per g. of butter fat; average summer vals. were 27·2 and 0·49, and winter vals. (Nov.—April) 15·4 and 0·16. J. G.

Effect of preservatives on natural properties of butter. M. Fouassier (Ann. Falsif., 1937, **30**, 94—99).—The desirable reddening of butter at 160° is due to the charring of finely-suspended proteins other than casein. These are absent from non-acid butters such as those preserved with H_3BO_3–borax. Other disadvantages of preservatives are discussed. E. C. S.

Tendency of butter to brown when rapidly heated. M. Fouassier (Compt. rend. Acad. Agric. France, 1936, **22**, 1073—1077).—The browning of butter is due to the decomp. of sol. proteins at 160°, when the p_H is about 4. In presence of B preservatives or at p_H 7 this does not occur. A. W. M.

Modified test for salt in butter. L. R. Bryant (Canad. Dairy and Ice Cream J., 1937, **16**, No. 6, 19—20).—Three rapid methods for the determination are given. (1) 25 ml. of the aq. solution derived from shaking 10 g. of butter with 250 ml. of H_2O are titrated to K_2CrO_4 end-point with $AgNO_3$ solution (2·906 g./litre; 10 ml. of $AgNO_3$ solution ≡ 1·0% NaCl). (2) 17·6 ml. (Babcock pipette) of the same solution are titrated with $AgNO_3$ (K_2CrO_4) of such a concn. that 1 ml. ≡ 1·0% NaCl. (3) 25 ml. are titrated with $AgNO_3$ (5·812 g./litre) to dichlorofluorescein until the AgCl ppt. turns pink (10 ml. of $AgNO_3$ ≡ 2·0% NaCl). W. L. D.

Ice-cream regulations and standards. F. W. Fabian (Canad. Dairy and Ice Cream J., 1937, **16**, No. 5, 21—24).—Hygienic quality of raw materials, efficiency of the pasteurisation of the mix, indices of proper pasteurisation, dating and grading of mixes and ice cream, control of overrun, and bacteriological standards are discussed. W. L. D.

Examination of ice cream. W. Stoldt (Z. Unters. Lebensm., 1937, **73**, 329—337).—Bacterial counts and testing for *B. coli* are of little val. as indicators of clean handling. Artificial pigment is rapidly detected by treating with EtOH and conc. aq. HCl, a change of colour being a positive indication. A procedure for the determination of fat is outlined. The egg content is calc. from the % of P. E. C. S.

High-solids ice cream. P. Young (Proc. 8th Ann. State Coll. Washington Inst. Dairying, 1935, 35—45).—Methods of preventing crystallisation of lactose in high-solids mixtures are discussed. Reduction in lactose content by treatment of milk with lactose, addition of edible caseinates, and removal of lactose by centrifuging in mixtures containing added sucrose are considered. Ch. Abs. (*p*)

Composition of gorgonzola cheese as related to quality. E. Caserio and I. Erba (Quad. Nutrizione, 1936, **3**, 472—479).—The variations in taste and composition in cheeses made from the same curd and matured in the same environment are insignificant, and due entirely to the regularity or otherwise of the piercing (" greening "). Cheeses obtained by different techniques from milk produced in the same district and at the same season of the year show more marked differences in composition and quality. The best cheeses are those with high acidity, a high content of fatty acids, albumins, and peptones, and a low amide-N and NaCl content. Nutr. Abs. (*m*)

Sugaring of curd in manufacture of Cheddar cheese. J. C. Marquardt (Nat. Butter and Cheese J., 1937, **28**, No. 10, 14).—Addition of 0·75% of sucrose to cheese curd just before salting gives a cheese of slightly lower moisture content and improved flavour. W. L. D.

Secondary fermentations causing stinking odours and decay in Gruyère and Emmenthal cheese. W. Dorner and M. Thoeni (Lait, 1937, **17**, 561—569).—The faults are due to *Bact. proteolyticum*, n.sp., in small nos. The organism ferments xylose, arabinose, fructose, mannose, and galactose, but not maltose; it does not produce gas nor ferment lactates. It is completely destroyed at 63·5°/10 min. and 98% so at 55°/10 min. in milk. The faults in cheese can be overcome by pasteurisation of milk at 55—57°. W. L. D.

Commercial methods for determining fat in cheese. J. Pien (Lait, 1937, **17**, 569—576).—Two rapid methods are suggested: (*a*) Et_2O extraction of 5 g. of the cheese ground up finely with >100 g. of sand, and (*b*) a modified Gerber method using a milk butyrometer, 2·27 g. of cheese, and 15 ml. of a solution containing 43 g. of $SnCl_2$ and 700 ml. of HCl (*d* 1·19) per litre, dissolving at 65°, and centrifuging. Method (*a*) takes longer, but is the more accurate. W. L. D.

Comparison of three methods for determining fat in cheese. E. Pijanowski (Rocz. Nauk roln., 1936, **37**, 437—456).—The results of determinations of fat in Edam cheese by the methods of Schmidt, Bondzyński and Ratzlaff, Allemann, and Tholstrup and Pedersen (butyrometric method) are in agreement. Sources of error in the butyrometric method are discussed. Nutr. Abs. (*m*)

Cheese mites and their control. G. G. Dunstan (Canad. Dairy and Ice Cream J., 1937, **16**, No. 6, 26—30).—Mites do little damage at 0—3°, and increase slowly at 3—6° but rapidly at $>10°$. Fumigation is the most efficient method of control at $>6°$. $MeBr–CO_2$ and $(CH_2)_2O–CO_2$ mixtures are satisfactory fumigants for airtight chambers. Simple sanitary precautions help to prevent or lessen the degree of infestation. W. L. D.

World production of casein. G. Génin (Lait, 1937, **17**, 605—608).—A review. W. L. D.

Relation between surface area and form of hens' eggs. Breaking strength of eggs and its relation to the degree of mineralisation of the shells, as measured by the weight of ash per

unit surface. H. Edin, T. Helleday, and A. Andersson (Z. Unters. Lebensm., 1937, **73**, 313—326).—The areas of eggs of various dimensions, calc. from the Grossfeld–Seiwert formulæ (B., 1934, 523), are tabulated. Apparatus and procedure for the determination of the breaking strength by loading the whole egg are described, and the relation between the vals. obtained and size, shape, and ash content of the shell is discussed. E. C. S.

Effect of freezing on the swelling of viands. I. A. Smorodincev and S. P. Bistrov (Compt. rend. Acad. Sci. U.R.S.S., 1937, **14**, 369—372).—Freezing at −25° did not affect the swelling capacity of foods in various solutions. Swelling is influenced by p_H (min. p_H 4·2), the min. val. being unaltered by storage in the frozen condition for 2 months, but increasing after 4—6 months as a result of protein denaturation. After prolonged storage the swelling capacity increases in media more acid and decreases in those more alkaline than p_H 6·0—6·6. A. G. P.

Valuation of "Häckerle" [Silesian flesh paste]. G. Prange (Pharm. Zentr., 1937, **78**, 329—331).—The composition and analysis of 12 samples are given. E. H. S.

Determination of chlorides in meat products. S. S. Drozdov and S. P. Bistrov (Ukrain. Biochem. J., 1937, **10**, 107—114).—Determination of the Cl′ in extracts of the charred product is recommended. W. O. K.

Lead contamination of tinned sardines. H. Cheftel and M. L. Pigeaud (Ann. Falsif., 1937, **30**, 10—18).—Fresh sardines contain traces of Pb. Various stages of processing contribute slight amounts; the oil and tin, especially when Pb-soldered, produce the greatest amount of contamination. The Pb present in the tin contents (sardine + oil) may rise to 5 p.p.m. It is suggested that this val. should not be exceeded. W. L. D.

Effect of soil reaction on growth, yield, and market quality of potatoes. O. Smith (Cornell Univ. Agric. Exp. Sta. Bull., 1937, No. 664, 21 pp.).—Soil-p_H $<4·8$ or $>7·1$ diminished the yield of potatoes. The % of scabby potatoes was least in acid soils and increased with the soil-p_H to limits which differed from season to season. With very high p_H scabbiness again decreased. A. G. P.

Vitamin-*C* content of potatoes prepared for table use by various methods of cooking. J. E. Richardson, R. Davis, and H. L. Mayfield (Food Res., 1937, **2**, 85—95).—Boiling, steaming, and baking caused no loss, autoclaving a slight loss, and frying a definite loss of -*C*. E. C. S.

Vitamin-*C* content of raw and cooked potatoes. A. I. Virtanen and E. R. Sevelius (Suomen Kem., 1937, **10**, **B**, 12).—A small loss of vitamin-*C* occurs during cooking of potatoes. Reports to the contrary are explained by insufficient grinding of the raw material prior to titration. A. G. P.

Effect of cooking on the stability of vitamin-*C* in vegetables. II. N. A. Izmailova (Problems of Nutrition, Moscow, 1936, **5**, No. 6, 55—68).—Potatoes boiled in their skins retain their vitamin-*C* activity for 24 hr. after cooking, whilst in potatoes as soup the activity is destroyed in 6 hr. Destruction of the activity is more rapid after frying or boiling without skins. In cabbage soup the activity appears to be destroyed very rapidly, the rate of destruction depending on the material of the cooking vessel. Porcelain- or Cu-lined pots are preferable to enamelled ones. Nutr. Abs. (*m*)

Undesirable colour change in frozen peas stored at insufficiently low temperatures. H. Campbell (Food Res., 1937, **2**, 55—57).—Phæophytin is formed from chlorophyll in peas kept at −6·7°, but not in those kept at −20·6°. E. C. S.

Corrosion of tinned cans by spinach and other preserves treated with copper compounds. G. Heuser and E. Krapohl (Z. Unters. Lebensm., 1937, **73**, 338—346).—Corrosion is greater in presence of Cu salts (I), as much as 0·115% Sn being found in spinach preserves so treated. Tinfoil is corroded more rapidly by tartaric acid than by AcOH, Sn remaining in solution. In presence of (I) Sn is pptd. It is recommended that the cans be suitably lacquered. E. C. S.

Five years' storage research on New Hampshire apples. E. J. Ramussen (New Hampshire Hort. Soc. 24th Ann. Rept., 1934, 84—99; Massachusetts Fruit Growers Assoc. Rept., 41st Ann. Meet., 1935, 153—163).—By keeping apples at 15·5—18·3° for 5 days prior to storage the tendency towards brown core is diminished, and apples soften and become less acid and yellower without reduction of storage life. Storage quality of Baldwin apples is not definitely influenced by manurial treatment of the trees. Ch. Abs. (*p*)

Recent results of apple-storage investigations. H. H. Plagge (Trans. Iowa Hort. Soc., 1934, **69**, 21—27).—Respiratory activity of Grimes Golden apples is highest at 15·5° and decreases with temp. to 2·2°. Four stages of activity are distinguished: (i) a short period of increase, (ii) a short period of rapid decrease, (iii) a longer period of gradual increase, and (iv) a period of slight increase. Breakdown begins in (iv). Sorting apples while respiration is high accentuates soggy breakdown. Storage in a stage of diminished respiration obviates this. Ch. Abs. (*p*)

Pink coloration of pears in the course of preservation. N. V. Saburov, M. I. Kalebin, and M. V. Antonov (Konservn. Prom., 1935, No. 6, 10—13).—The colour produced in pears on boiling increases on slow cooling and is intensified by the presence of Sn. The colour is attributed to condensation of tannin substances, with which Sn combines. Boiling in presence of Fe causes darkening of the surface of pears. Ch. Abs. (*p*)

Relative penetrability of various tissues of the orange and banana to ethylene. D. A. Herbert and L. J. Lynch (Proc. Roy. Soc. Queensland, 1935, **46**, 72—79).—C_2H_4 diffuses readily through epicarp and endocarp. The mesocarp is more resistant. Differences in the ripening of bananas and oranges in an atm. containing C_2H_4 are not due to any barrier against the penetration of C_2H_4 into the pulp. Ch. Abs. (*p*)

Brown markings on S. African citrus fruits. R. G. Tomkins and D. J. Dreyer (Citrus Grower, 1935, No. 41, 1—4, 33—35, 37—38, 40—42, 44, 46—48).—In some cases pitting of fruit during low-temp. storage is diminished by colouring with C_2H_4; button browning and stem-end rot are increased by this treatment. Injury caused by liberation of oil from oil glands is most frequent on immature fruits and those picked after cold wet weather, and is commoner on artificially than on naturally ripened fruit. Brown markings are frequent after treatment with $NaHCO_3$. Ch. Abs. (*p*)

Acidity [of citrus fruits] as determined by titration and hydrogen-ion concentration. L. Longfield-Smith (Florida Dept. Agric. Chem. Div. Rept. Winter Haven Chem. Lab. [1933—4], 1935, 85—90).—The p_H of grapefruit juice varied from 3·0 to 3·4 with titratable acidity of 1·1—3·3%. Colorimetric determinations of p_H were 0·1—0·2 unit > those by the conductivity method. A general correlation exists between p_H and maturity, but it is not sufficiently uniform for field work. In oranges p_H and titratable acidity are more closely related. The min. p_H for mature oranges is 3·65. Ch. Abs. (*p*)

Vitamin content of canned pineapple juice. N. B. Guerrant, R. A. Dutcher, F. S. Tabor, and R. Rasmussen (J. Nutrition, 1936, **11**, 383—390).—Biological assay showed the juice to contain vitamin-*A* 30, -B_1 20, -B_2 2·5 Sherman units, and -*C* 40 International units per oz. A. G. P.

Vitamin-*C* content of paprika fruit. I. Szanyi (Termész. Közl., 1935, **67**, 527).—Only traces of -*C* occur in veins, stems, and seeds of Hungarian paprika. Green fruit contained 400, brown 800—2000, and fully ripe 1040—2100 mg. of -*C* per kg. Vals. for flesh or juice were still higher. Ch. Abs. (*p*).

Cold-storing plums. A. C. Painter (East Malling Res. Sta., Ann. Rept. [1936], 1937, 288—294).—The effect of stage of maturity and subsequent handling on storage life are examined. A. G. P.

Brown rot of plums in cold storage. H. Wormald and A. C. Painter (East Malling Res. Sta., Ann. Rept. [1936], 1937, 198—200).—Storage losses are largely due to *Sclerotinia fructigena* and *S. laxa*. Appropriate sanitary measures are indicated. A. G. P.

Ripeness of table grapes. E. Hugues and E. Bouffard (Ann. Falsif., 1937, **30**, 91—94; cf. B., 1936, 810, 1066).—The harvest of 1936 confirms the findings of previous years, but the sudden rise in sweetness was absent. E. C. S.

Poisonous deposits on fruit. Raucourt (Ann. Falsif., 1937, **30**, 94).—Fruit trees may be treated with $Pb_3(AsO_4)_2$ as late as the end of August so long as the wash is not too adhesive or too conc., but the fruit should be washed with dil. aq. HCl before marketing. E. C. S.

Behaviour of aluminium towards fruit products. G. Reif and H. J. Steinbeck (Z. Unters. Lebensm., 1937, **73**, 431—440).—The degree of corrosion of strips of Al by acid foods ∝ the H_2O content. 99·8% Al is attacked < Al of 99·5% purity, and metal heated to 380° or 550° < the cold-hammered metal. The most resistant is that with an electrolytic oxide film (Eloxal process), but this is closely approached by the chemically oxidised metal (MBV process). Al alloys are the least resistant. E. C. S.

Preparation of fruit and berry extracts. S. V. Tzerevitinov (Konservn. Prom., 1935, No. 6, 22—24).—Pectin is pptd. from fruit juices (*e.g.*, cranberry) by addition of juices rich in pectose [? pectase] (I) (*e.g.*, from clover leaves, lucerne, peas, or potatoes), heating for 5—10 hr. at 50—55° and then at 80° to check the action of (I) and to coagulate proteins, filtration, and evaporation. Moderate decolorisation of the (I) solution with C removes undesirable flavours. Ch. Abs. (*p*)

Bacteriological examination of tinned foods. E. Sacquépée and A. Jude (Ann. Falsif., 1937, **30**, 162—164).—Heating the outside of the container may destroy organisms present in the contents. 10% aq. $KMnO_4$ is recommended as a disinfectant, remaining in contact for 30 min. at 37°. E. C. S.

Sugar as an inhibitor of corrosion in canning. H. C. S. de Whalley (Chem. & Ind., 1937, 569—570).—Very highly refined sugars, whether beet or cane sugar, have only a slight inhibiting effect in the corrosion of Fe. Crude beet sugars have a strong inhibiting action, crude cane sugars a rather less one. Presumably, inhibition is due to some impurity, and in this connexion analyses of raw beet sugars show 3—6 p.p.m. each of Cu, Pb, and Mn against 0·1 p.p.m. or less in white sugar. C. I.

Thermophilic canned-food spoilage organisms in sugar and starch. F. M. Clark and F. W. Tanner (Food Res., 1937, **2**, 27—39).—Flat-sour spoilage organisms were most prevalent in the samples of sugar examined, thermophilic anaërobes in those of starch, all three groups of thermophilic spoilage organisms being present in each case. In examining starch, a suspension is made in cold H_2O and added to the hot medium, which is then carefully heated. Longer heating is necessary to destroy spores of non-spoilage organisms in starch than in sugar. E. C. S.

Factors affecting growth of food-poisoning micrococci. G. J. Hucker and W. C. Haynes (Amer. J. Publ. Health, 1937, **27**, 590—594).—Stone's gelatin containing 2% of beef extract showed liquefaction on plates by toxin-producing micrococci in a shorter time than did standard gelatin media. In foods or media containing >35% of sucrose, >6% of NaCl, and/or >0·05% of AcOH, these micrococci were either killed or greatly inhibited. W. L. D.

Manufacture of mayonnaise. Anon. (Allgem. Oel- u. Fett-Ztg., 1937, **34**, 127—131).—Notes on mayonnaise manufacture include a review of Russian memoirs describing American practice and original work on the selection of emulsifiers, with typical recipes for mayonnaises. E. L.

Absorption of atmospheric moisture by roasted coffee. B. Romani (Ann. Falsif., 1937, **30**, 75—83).—Roasted coffee cannot be kept satisfactorily in containers of paraffin-waxed paper, or of Cellophane

and parchment. Containers of glass, Fe, or similar material, fitted with airtight covers, are necessary. The flavour is unaffected by uptake of $\ngtr 6\%$ of H_2O. Roasted coffee in equilibrium with air of 75—85% R.H. takes up 12—15% of H_2O; of 60—75% R.H., 8—10%; of 50—60% R.H., 6—8%; of 40—50% R.H., 4—6%; and of 30—40% R.H., 3—4%.
E. C. S.

Staling of coffee. S. C. Prescott, R. L. Emerson, and L. V. Peakes, jun. (Food Res., 1937, **2**, 1—20).—The progress of rancidification and loss of flavour was followed in light petroleum extracts of coffee exposed to light and air. A close parallelism was not observed. Furfuryl alcohol was identified in the volatile oils extracted with Et_2O and was shown to decompose when exposed to moist air, especially in presence of acid, with production of a bitter substance. Other volatile fractions similarly decompose. It is possible that staling is associated with changes in these fractions. E. C. S.

Determination of caffeine in coffee and caffeine-free coffee. D. Florentin (Ann. Falsif., 1937, **30**, 83—85).—Gobert's method (B., 1936, 1125) is compared favourably with a "foreign" method involving clarification of the aq. extract with Al_2O_3 and $CuSO_4$, followed by extraction with CCl_4.
E. C. S.

Flavours and flavouring. Anon. (Canad. Dairy and Ice Cream J., 1937, **16**, No. 5, 32—34).—The judging and blending of flavours are discussed. Flavour-judging panels are advisable in factories.
W. L. D.

Microstatistical detection of falsification of powdery substances, illustrated by adulteration of ground black pepper with peppercorn husks. E. Grünsteidl and T. Stobiecki (Mikrochem., Molisch Festschr., 1936, 164—190).—0·1—0·2 mg. of material, ground and sieved to standard grain-size distribution, is subjected to a microscopical count, the tissues characteristic of substance and adulterant being differentiated by their fluorescence colours. Interpretation and evaluation of the data are discussed.
J. S. A.

Biological determination of heavy metals in food products. A. A. Ruckelman and E. I. Guberman (Ukrain. Biochem. J., 1937, **10**, 125—126).—The sensitivity of enzymes and bacteria to heavy metals affords a delicate method for the detection and determination of the latter in food products. W. O. K.

New methods for detection of adulteration in foodstuffs. K. V. Giri and P. N. Bhargava (Proc. Soc. Biol. Chem. India, 1937, **1**, 44—45).—(1) A sample of butter fat (I) is impregnated in an agar medium, hydrolysed by a lipase prep., and then flooded with a solution containing $CuSO_4$ and I. Pure (I) produces a dirty yellow-coloured zone at the centre of the agar plate; coconut oil gives a green and sesamé, groundnut, and safflower oils give a bluish-green zone. The presence of 20% or more of these oils in (I) is readily detected by the increase in the bluish-green tint of the centre zone.

(2) A cereal flour extract is impregnated in an agar plate and flooded with I after hydrolysis with salivary amylase. Wheat flour extract gives a blue and rice flour extract a violet zone. The adulteration of wheat by 20% or more of rice flour is detectable by this method. W. O. K.

Apparatus and appliances of the food industry. A. Beythien (Chem.-Ztg., 1937, **61**, 333—335).—The composition of utensils, wrapping materials, etc. is discussed from the legal viewpoint. E. C. S.

Food value of oat hulls. E. J. Sheehy (J. Saorst. Eir. Dept. Agric., 1935, **33**, 167—172).—Substitution of the hulls for hay (11 lb. for 8 lb.) gave good results for cattle. Hulls contain H_2O 10·5, protein 3·94, fat 1·48, sol. carbohydrate 52·2, fibre 28·3, ash 3·63%. Ch. Abs. (*p*)

Nutritive value of meadow hay. S. J. Watson and W. S. Ferguson (J. Min. Agric., 1937, **44**, 247—260).—Analytical data and digestibility trials with hays from different parts of Great Britain are recorded. Crude protein contents varied from 4·81 to 12·90% of the dry matter. Of all the nutrient constituents the crude and true protein showed the lowest digestibility coeffs. (30—50%). Quality-grading based on analysis and on practical users' estimates are compared. Methods of calculating the starch and protein equivs. are established.
A. G. P.

Utilisation of vitamin-*A* by dairy cows. G. S. Fraps, O. C. Copeland, R. Treichler, and A. R. Kemmerer (Texas Agric. Exp. Sta. Bull., 1937, No. 536, 26 pp.).—The vitamin-*A* potency of butter is closely related to that of the ration and to the period during which the ration has been fed. The average efficiency of utilisation of -*A* was 2·38—2·67%. $(0{\cdot}75—1{\cdot}4) \times 10^6$ Sherman–Munsell units of -*A* per cow are required daily to produce butter containing 65—95 units per g. A. G. P.

Influence of stage of maturity on chemical composition and vitamin-B_1 and -B_2 content of hays. C. H. Hunt, P. R. Record, and R. M. Bethke (Ohio Agric. Exp. Sta. Bull., 1936, No. 576, 18 pp.).—Lucerne, clover, and timothy hays contain more vitamin-B_1 than -B_2 (rat tests). Exposure in the field, without rain, for 96 hr. did not affect the -B_2 content of lucerne; rain caused a 50% reduction. The protein and -B_2 contents of bluegrass, rye, and wheat compare favourably with those of lucerne and clover when cut at similar stages of maturity. Assay of -B_2 by observations of growth and leg paralysis in chicks gave results similar to those of rat tests.
A. G. P.

Grass drying. H. E. Woodman (Fertiliser, Feeding Stuffs, and Farm Supplies J., 1937, **22**, 221—228).—The drying process and the utilisation of the product in the feeding of various farm animals are discussed. A. G. P.

Recent developments in grass drying. G. P. Pollitt (J. Soc. Arts, 1937, **85**, 733—750).—A lecture.

Extraction of the nitrogenous materials from dried grass. H. L. Wilkins (Science, 1937, **85**, 526—527).—Extraction of air-dry grass with 90%

HCO_2H in a Soxhlet apparatus brings most of the sample into a solution that contains all the N.
L. S. T.

Dairy farming and dairy work. J. Mackintosh (J. Roy. Agric. Soc., 1936, **97**, 258—286).—A review.
W. L. D.

Methods of milk control in the selection of early sheep varieties. A. M. Leroy (Compt. rend. Acad. Agric. France, 1936, **22**, 733—744).—The composition of ewes' milk in its relation to rearing single or twin lambs is reported.
A. W. M.

Feeding of livestock. C. Crowther (J. Roy. Agric. Soc., 1936, **97**, 287—326).—A review.
W. L. D.

Pica in Schleswig-Holstein cattle: cause and prevention. H. Traulsen (Landw. Versuchs-Stat., 1937, **128**, 89—125).—Pica was prevented by use of a supplement of fishmeal–molasses–$CaCO_3$–salt (or Cu-salt lick) to a linseed cake–oat chaff ration. The disease is associated in some areas with K deficiency in soil and with K and Na deficiency in hay. Cu was not a contributory factor. In Black Forest areas the K content of hay in pica-inducing was $>$ that in healthy zones. The Na and Cu contents were small in pica areas. In the curative heather and ling the Cu and Mn contents were $>$ in hay and the K : Na ratio was 1 : 1.
A. G. P.

Improvement of hill grazings. Cahn Hill experiments. M. Griffith (J. Roy. Agric. Soc., 1936, **97**, 33—53).—The grazing val. of dry hill slopes up to an altitude of 1400 ft. can be improved by drastic cultivation (harrowing, ploughing, or rotary tilling), manuring with 6 cwt. of basic slag (32%) or 1 cwt. of nitrochalk per acre (or their equiv. in N and P), the sowing of suitable seeds mixtures containing wild white clover, and the proper management of grazing by sheep. Such pastures can support 4 ewes and 4 lambs per acre in summer and 2 ewes per acre in winter. Crops of rapes or turnips capable of fattening 12—15 lambs per acre (95 lb. total live-wt. increase per acre) can be grown up to 1350 ft. A sequence of rest and hard-grazing periods is essential in order to maintain the quality of the pastures.
W. L. D.

Feeding cottonseed products to beef cattle. C. F. Clark (Mississippi Agric. Exp. Sta. Bull., 1936, No. 317, 88 pp.).—Results of numerous feeding trials with cottonseed meal and hulls in comparison with other feeding-stuffs are recorded.
A. G. P.

Factors which may affect the hardness of cottonseed cake. G. S. Fraps and C. D. Marrs (Texas Agric. Exp. Sta. Bull., 1936, No. 534, 27 pp.).—No relation was apparent between the composition of the cake and the crushing load. The temp. and H_2O content of the material when pressed had some influence on the hardness of the resulting cake.
A. G. P.

[Preparation of fodder yeast from wood-sugar solution.] H. Fink, J. Krebs, and R. Lechner (Biochem. Z., 1937, **290**, 447).—A correction (cf. B., 1937, 616).
P. W. C.

Storage and valuation of potato[-distillery] wash. R. Deplanque and R. Buse (Z. Spiritusind., 1937, **60**, 135—137).—Where it is necessary to store wash for cattle food overnight, it must be maintained at a sufficiently high temp. to obviate bacterial fermentation, preferably by keeping the wash in wooden vessels or in Fe vessels insulated against heat loss. The cleansing of such vessels and the efficiency of other storage methods are discussed. The yields of washes from different types of distillation process are indicated, and the val. of wash analysis for determining the efficiency of distillery operations and the suitability of the wash for cattle food is discussed, comparison being made between washes and the corresponding ripe mashes.
I. A. P.

Determination of crude fibre and cellulose in foods and fodder. Y. C. Tang, W. H. Yen, and H. C. Hsü (Z. Unters. Lebensm., 1937, **73**, 346—353; cf. B., 1936, 586).—The authors' method is compared with the Kürschner–Hanak procedure, and is shown to involve less destruction of pentosans. Modifications are described which enable the determinations to be carried out in a single vessel.
E. C. S.

Distillation method of determining acetic and butyric acids in silage. W. Lepper (Landw. Versuchs-Stat., 1937, **128**, 127—132).—The method described previously (B., 1934, 74) is further simplified. In the distillation of the silage extract with H_2SO_4 two distillate fractions suffice for the calculation of the proportions of the two acids present.
A. G. P.

Soya-bean phosphatides and their uses. G. A. Wiesehahn (Oil and Soap, 1937, **14**, 119—122).—A review in which a survey of the industrial applications of soya-bean lecithin is made.
T. G. G.

Soya-bean phosphatides. R. S. McKinney, S. G. Jamieson, and W. B. Holton (Oil and Soap, 1937, **14**, 126—129; cf. B., 1935, 559).—Treatment of the meal with 95% EtOH gives an extract containing, in addition to lecithin (I) and kephalin, monoaminodiphosphatides and diaminomonophosphatides. It is suggested that the (I) is present as a β-glucoside which is also combined with a dihydroxy-dibasic acid.
T. G. G.

Nutrient values of proteins of different origins. R. Gouin (Compt. rend. Acad. Agric. France, 1936, **22**, 386—392).—The N retained and excreted by pigs on special diets was determined, and from this the digestibility, retention and utilisation coeffs. were calc. Barley is the best cereal, whilst soya bean, pea, and groundnut meals are the best legumes.
A. W. M.

Bag filters.—See I. **Sterilisation.**—See XI. **Butter fat. Food oils. Vitamins in marine oils. Fats and food spoilage.**—See XII. **Sweet potatoes.**—See XVI. **Determining starch in frozen potatoes.**—See XVII.

See also A., II, 274, **Vitamin-*C*.** 288, **Synthesis of vitamin-*A*.** III, 252, **Casein fat.** 262, **Acid-base val. of honey.** 280—3, **Vitamins.**

PATENTS.

Manufacture of cereal products. C. Hoffman, Assr. to Ward Baking Co. (U.S.P. 2,041,129, 19.5.36. Appl., 12.11.32).—A dry powder containing $\nless 20\%$ of wheat germ, and rich in vitamin-*B*, -*E*, and -*G*, is prepared by mixing germ, flour, rice hulls, malt extract, yeast, etc. to a dough, fermenting, baking, and drying the product, and finally grinding to a powder. The powder may be incorporated in breakfast foods etc. to increase their vitamin content and improve their flavour. E. B. H.

Manufacture of casein. F. H. Clickner, Assr. to Kraft–Phenix Cheese Corp. (U.S.P. 2,044,282, 16.6.36. Appl., 28.9.33).—High-grade casein is prepared from unpasteurised separated milk heated by counterflow to $\ngtr 43°$, which is then treated with two continuous streams of mineral acid, the finely-divided curd produced bathed in its whey for 10—20 min. and then separated, washed, and dried to a H_2O content of $\ngtr 6\%$. E. B. H.

Preparation of [wax] product for coating fruit. A. R. Thompson, Assr. to Food Machinery Corp. (U.S.P. 2,046,537, 7.7.36. Appl., 5.7.32).—Wax are melted in H_2O and the mixture homogenised without emulsifying agents or chemical change, the homogeniser being of the fine-aperture type. B. M. V.

Coating of articles of food. G. Gören, Assr. to C. Cahn (U.S.P. 2,050,004, 4.8.36. Appl., 1.9.33. Fr., 30.3.33).—Disintegrated waste animal matter (*e.g.*, skins) is emulsified in brine at 50° to which are added 2·5% each of castor oil and glycerin (premixed). Unsmoked articles of food are rapidly dipped and dried, and afterwards smoked, the smoking powder containing CH_2O. B. M. V.

Apparatus for manufacture of prepared feeds. F. D. Snyder (U.S.P. 2,047,599, 14.7.36. Appl., 18.9.33).—The apparatus comprises, in one frame, a feeder, corn sheller, grinder, centrifugal pneumatic separator and blower, together with the necessary elevators to accept and deliver material at about ground level. B. M. V.

Separator for cereals. Volumetric *d*-testing device [for ice cream etc.]. Determining moisture.—See I. **Salts of *p*-hydroxybenzoic esters.**—See III.

XX.—MEDICINAL SUBSTANCES; ESSENTIAL OILS.

Determination of magnesium in medicines. D. S. Belenitzka (Farm. Shur., 1935, No. 2/3, 76—78).—Mg is best determined by direct alkali–acid titration, or by pptn. with hydroxyquinoline, followed by bromination and titration of the excess of Br iodometrically. Ch. Abs. (*p*)

Determination of hexamethylenetetramine in medicines. D. B. Jochelson (Farm. Shur., 1935, No. 5, 172—175).—The sample is treated with H_2SO_4, to produce $(NH_4)_2SO_4$ which is determined acidimetrically after addition of excess of CH_2O. Ch. Abs. (*p*)

Preparation of saligenin. I. M. Rotbart and D. H. Kolesnikov (Farm. Shur., 1935, No. 1, 27—28).—A mixture of PhOH 1, CH_2O 1, CaO 0·5 pt., and EtOH 2·5 pts. is allowed to react until the odour of CH_2O has disappeared. The product is acidified with AcOH, extracted with Et_2O, and, after removal of the solvent, the saligenin is finally recryst. from H_2O. Ch. Abs. (*p*)

Preparation of tripansin. A. M. Lvov (Chim. Farm. Prom., 1935, No. 2, 110—113).—Tripansin (Na tetrazo-*o*-tolidine-1 : 8-aminonaphthol-3 : 6-disulphonate) is prepared by coupling tetrazotised *o*-tolidine hydrochloride with H-acid in alkaline solution at low temp. Purification with EtOH eliminates NaCl. Ch. Abs. (*p*)

Plasmocid. I. T. Strukov (Chim. Farm. Prom., 1934, No. 6, 14—15).—1 mol. of 6-methoxy-8-(γ-diethylaminopropyl)aminoquinoline in HCl is treated with 2 mols. of methylenedisalicylic acid in sufficient aq. NH_3 to neutralise the acid. Ch. Abs. (*p*)

Determination of iodine in meditrene, iodohydroxyquinolinesulphonic acid, and chloroiodohydroxyquinoline. J. C. de Jong (Pharm. Weekblad, 1937, **74**, 608—612).—HIO_4 is reduced by $KMnO_4$ in tartaric acid solution, hence the method for its determination described in the Dutch Pharm. V, Suppl. 1, is not accurate. In the preferred method, meditrene (250 mg.) is boiled for 5 min. with 50 c.c. of $KMnO_4$ solution (1 : 25), 25 c.c. of H_2O, and 25 c.c. of dil. H_2SO_4, and the mixture cooled and treated with $NaHSO_3$ until decolorised. The solution is then treated with 10 c.c. of $0{\cdot}1N$-$AgNO_3$ and 25 c.c. of HNO_3, boiled, and the excess of $AgNO_3$ determined titrimetrically with $0{\cdot}05N$-NH_4CNS. In the analysis of chloroiodohydroxyquinoline, I is determined as described above, except that the acid solution is boiled for a longer time until all Cl is evolved, and $I + Cl_2$ are determined as follows: 120 mg. are oxidised with 5 c.c. of NaOH solution, 50 c.c. of H_2O, and 50 c.c. of $KMnO_4$ at the boil. The solution is cooled, decolorised with $NaHSO_3$, acidified, and the halogens are pptd. with 10 c.c. of $0{\cdot}1N$-$AgNO_3$ the excess of which is determined titrimetrically with $0{\cdot}05N$-NH_4CNS. S. C.

Analysis of ichthyol. S. M. Bolotnikov (Farm. Shur., 1935, No. 1, 21—23).—Samples should be sol. in H_2O (2), EtOH (4), or Et_2O–EtOH 8 pts., and should be free from cresols, PhOH derivatives, and foreign sulphonic acids. Total S should be >11, sulphate-S $\ngtr 2{\cdot}8$, thiophen fraction >12, and dry matter $>55\%$. Ch. Abs. (*p*)

Characteristic reactions [of medicinal substances]. T. Lassandro-Pepe (Boll. Chim.-farm., 1937, **76**, 269—270, 273—274).—The prep., properties, and reactions of antipyrine, pyramidone, and LiOBz are described. F. O. H.

Drug extraction. XIII. Extraction of *Ipomœa*. W. J. Husa and P. Fehder (J. Amer. Pharm. Assoc., 1937, **26**, 319—321; cf. B., 1937, 728).—The yield of resin obtained by extraction of jalap with 90 vol.-% EtOH is $>$ that by abs. EtOH, but the product is less pure. F. O. H.

Digitalis preparations, especially those in the [Danish] Pharmacopœia. K. O. Møller (Dansk Tidsskr. Farm., 1937, **11**, 81—95).—Preparative methods are discussed. The accuracy and stability of preps. have been investigated. M. H. M. A.

Properties of digitalis preparations. S. I. Ordinski (Chim. Farm. Prom., 1935, No. 1, 49—55).—The digitoxin (I) content varies from 0·240 to 0·643%.

No const. ratio exists between the (I) content and the biological activity. 70% EtOH produces the most effective tinctures. Ch. Abs. (*p*)

Comparison of tinctures made with 70 and 45% alcohol. J. Petrovski, K. Schulshenko, and H. Biloschita (Farm. Shur., 1935, No. 2/3, 71—72).—Tinctures of *Digitalis purpurea* and *Adonis vernalis* are richer in glucosides and more active biologically if made with 45% EtOH. Ch. Abs. (*p*)

Determination of halogens in [medicinal] extracts. I. Orlov and T. Ksenofontova (Chim. Farm. Prom., 1934, No. 6, 22).—After decolorisation with C, Volhard's method is applied to determination of total halogen, of halogens after removal of I, and of Cl after treatment of $KMnO_4$ to remove Br and I. Ch. Abs. (*p*)

Lu-jung, the Chinese drug. II. History in Japan. T. Mineshita (Folia Pharmacol. Japon., 1935, **21**, 223—235). Ch. Abs. (*p*)

Composition of ashes of drugs. II. L. Rosenthaler and G. Beck (Mikrochem., Molisch Festschr., 1936, 366—372).—Metallic and anionic constituents found in the ashes of quillaia bark and kalmus rhizomes are listed. J. S. A.

Colorimetric evaluation of derris root. A. Goudswaard and J. C. Timmers (Pharm. Weekblad, 1937, **74**, 630—634).—A permanent reddish-violet colour reaction suitable for the determination of rotenone is obtained when a $CHCl_3$ extract is treated with ordinary H_2SO_4. The colour, which reaches a max. depth (stable for 24 hr.) after 1 hr., is due to traces of $NO–NO_2$ and is not obtained with N-free H_2SO_4. Addition of traces of HNO_2 does not increase the sensitivity of the test. Conversely, the test may be used for detecting the presence of nitrous gases in H_2SO_4. It is more sensitive than the $NHPh_2$ reaction and is not interfered with by peroxides or $Fe^{\cdots}$. S. C.

Determination of rotenone in *Derris* and cubé. Crystallisation from extracts. H. A. Jones (Ind. Eng. Chem. [Anal.], 1937, **9**, 206—210).—The original method (B., 1933, 249) has been improved in certain details to give an accuracy of ±0·05% in the range of most accurate results. F. N. W.

Commercial-scale fermentation [of tobacco]. P. G. Asmaev (Tabachn. Prom., 1935, No. 3, 17—19).—To ensure proper fermentation an R.H. of 70—75% must be maintained. Ch. Abs. (*p*)

Forced fermentation of tobacco. Vodopianov and Antoniadi (Tabachn. Prom., 1935, No. 4, 25—26).—Forced fermentation, *e.g.*, at 50°, yields the same quality of tobacco as does the normal process, provided the raw material is suitable. Ch. Abs. (*p*)

Quality of tobacco goods. G. Dikker (Tabachn. Prom., 1935, No. 3, 30—34).—The quality of tobacco depends on the H_2O, ash, nicotine, and NH_3 contents (low N indicates inferiority), and the amount of reducing substances (increasing with better quality). High ratios of reducing substances : N and high "Schmuk no." (carbohydrate : protein ratio) indicate high quality.

Determination of the moisture content of tobacco. R. M. Cone and L. H. Davis (Ind. Eng. Chem. [Anal.], 1937, **9**, 219—221).—The moisture content of two samples is determined by six different methods and the results are compared. F. N. W.

Liquid used in the manometric determination of the oxygen index characterising the degree of fermentation of yellow types of tobacco. A. I. Smirnov (Tabachn. Prom., 1935, No. 3, 4—5).—The index is determined by measuring the decrease in pressure produced by samples of tobacco in special glass containers. A paraffin fraction (250—260°) is a suitable manometric liquid. Ch. Abs. (*p*)

Denicotinised cigarettes. A. Koperina and S. Kahbab (Tabachn. Prom., 1935, No. 3, 34—35).—Cotton wool (0·06 g. per cigarette) absorbs 93% of the nicotine (I) in tobacco smoke. C is not very efficient. Impregnation of cotton wool with picric acid did not improve absorption of (I). Ch. Abs. (*p*)

Nicotine of cigarette smoke. C. Pyriki (Pharm. Zentr., 1937, **78**, 313—318; cf. B., 1936, 298).—The distribution and significance of the constituents of the smoke in relation to the method of smoking are discussed. E. H. S.

Pfyl's [analytical] smoking method. W. Preiss (Pharm. Zentr., 1937, **78**, 331—333; cf. B., 1937, 187).—A reply to Wenusch (B., 1937, 619). Pfyl's method approximates more to the natural method than does Wenusch's. E. H. S.

(A) Ukrainian St. John's bread, and (B) conditions affecting its toxicity during preservation. H. J. Tropp (Farm. Shur., 1934, No. 6, 222—223, 223—227).—(A) Samples contained alkaloids 0·10—0·23, fatty oils (acid val. 2—3) 18—24, H_2O 5—8, ash 3—4%.

(B) For preservation, the material should be defatted and dried. 40% of the alkaloids are destroyed by heating at 100° for 1 hr. Ch. Abs. (*p*)

Colorimetric determination of adrenaline. M. I. Shapiro (Farm. Shur., 1934, No. 4, 131—134).—The reaction with $NaNO_2$ or phosphotungstic acid may be utilised for determining adrenaline in presence of $ZnSO_4$, B_2O_3, antipyrine, procaine, or cocaine. With ointments or in presence of protargol, results are only approx. Ch. Abs. (*p*)

Semi-micro-method for determination of morphine in opium according to D.A.B. VI. K. H. Bauer and H. Hildebrandt (Pharm. Zentr., 1937, **78**, 341—343).—With slight modifications, the D.A.B. VI method gives accurate results, using only 0·5—0·7 g. of opium. E. H. S.

Determination of morphine in simple tincture of opium. W. Biel (Pharm. Ztg., 1937, **82**, 477).—Morphine determinations in 17 tinctures by the D.A.B. IV and Mannich (isolation of the 2 : 4-dinitrophenyl ether) methods gave average contents of 0·985 and 1·206%, respectively. E. H. S.

Colour of morphine sulphate. J. M. Ort and W. G. Christiansen (J. Amer. Pharm. Assoc., 1937, **26**, 329—332).—The whiteness of morphine sulphate preps. is not a criterion of chemical purity. The causes of slight variations in appearance are discussed. F. O. H.

Sterilisation of coniine hydrobromide solutions. A. T. Dalsgaard and C. J. T. Madsen (Dansk Tidsskr. Farm., 1937, **11**, 118—125).—Coniine (I) is determined by extraction with $Pr^{\beta}OH$–$CHCl_3$ (1 : 3), addition of excess of HCl, and back-titration, or by pptn. as the silicotungstate. Aq. (I) hydrobromide is stable for 20 min. at 120°, but at $p_H < 7{\cdot}4$ care must be taken to avoid volatilisation of (I). M. H. M. A.

Stability of tropacocaine solutions towards heat-sterilisation and storage in ampoules. H. L. Hansen (Dansk Tidsskr. Farm., 1937, **11**, 109—117).—Tropacocaine hydrochloride aq. is stable for $>$20 min. at 120° at p_H 3·3—5·6, but at p_H 8·0 is 5% hydrolysed after 5 hr. at 120°. Specimens stored in ampoules for 10 months showed no decomp. The amount of hydrolysis is determined by extracting the BzOH formed with Et_2O and then determining it gravimetrically or volumetrically. M. H. M. A.

Assay of theophylline, theophylline monoethanolamine, and theophylline with ethylenediamine, U.S.P. A. N. Stevens and D. T. Wilson (J. Amer. Pharm. Assoc., 1937, **26**, 314—317).—The drug (0·2 g.) is dissolved in dil. aq. NH_3, treated with 20 c.c. of 0·1N-$AgNO_3$, and the mixture filtered, the ppt. being washed with H_2O. The combined filtrates are acidified with HNO_3 and excess of $AgNO_3$ is titrated with 0·1N-KCNS. The method is more accurate than that of the U.S.P. XI. F. O. H.

Stability of ergot. L. W. Rowe (J. Amer. Pharm. Assoc., 1937, **26**, 312—314).—The U.S.P. XI requirements (airtight and waterproof containers) are unnecessary, preps. of the crude drug being stable when stored in a dry place. F. O. H.

Two forms of salvarsan base. I. D. Vagenberg (J. Gen. Chem. Russ., 1937, **7**, 808—814).—3 : 3′-Diamino-4 : 4′-dihydroxyarsenobenzene sulphate yields salvarsan-B with aq. NaOAc, converted into isomeric -A by dissolving in 20% NaOH, heating at 90°, and pptg. with AcOH. -A differs from -B in colour, and in being sol. in org. solvents. Neosalvarsan prepared from -A by the action of rongalite is toxic, whilst that from -B is non-toxic. Conversion of -A into -B takes place when it is dissolved in HCl and pptd. with NaOAc. R. T.

Menthol content of oil of Japanese mint [*Mentha arvensis*, var. *piperascens*, Malinvaud] grown in one locality [of U.S.A.]. A. F. Sievers and M. S. Lowman (J. Amer. Pharm. Assoc., 1937, **26**, 286—288).—The menthol content (free 67—76, total 77—86%) is $<$ that of the oil of the mint grown in Japan. F. O. H.

Examination of essential oils by measurement of the ultra-violet absorption. D. Van Os and K. Dykstra (J. Pharm. Chim., 1937, [viii], **25**, 437—454, 485—501).—The extinction coeffs. of the main absorption bands are used to determine the amount of anethole in anise oil, carvone in caraway oil, eugenol in clove oil, cymene in chenopodium oil (I), $CHPh{:}CH{\cdot}CHO$ in cinnamon oil, citral in lemon oil, o-$NH_2{\cdot}C_6H_4{\cdot}CO_2Me$ in neroli oil, anethole in fennel oil, coumarin, linalool, and geraniol in lavender oil, myristicin in nutmeg oil, menthol in peppermint oil, and thymol in thyme oil; orange, bergamot, and lemon oils show the characteristic bands of their undefined high-boiling constituents. Other ingredients, *e.g.*, ascaridole in (I), are not detectable by this means. Adulterants, *e.g.*, aromatic compounds, can often be detected by characteristic bands or a deficiency of an absorbing ingredient. Cajuput, citronella, eucalyptus, rose, rosemary, sandalwood, and turpentine oils show no characteristic absorption. R. S. C.

Medicinal vaseline.—See II. **Ampoule glass.**—See VIII. **Vitamins in food oils.**—See XII. ***Nicotiana rustica.***—See XVI.

See also A., II, 274, **Vitamin-*C*.** 286, **Carbamide derivatives in the alkanolamine series.** 288, **Synthesis of vitamin-*A*.** 289, **Ether-sol. constituents of sarsaparilla root.** 290, **I val. of cinnamic acid derivatives.** 294, **Synthesis in the sterol and sexual hormone group, and of testosterone.** 296, **Diene val. of essential oils. Lucænol from *Lucæna glauca* seeds.** 297, **Prep. of quassin and neoquassin.** 302, **Derivatives of *p*-aminobenzenesulphonamide.** 306, **Medicinal products from acridine compounds.** 310—2, **Alkaloids.** 313, **Destruction of org. Hg compounds.** 314, **Determination of 8-hydroxyquinoline in pharmaceutical preps. Differentiation of alkaloids. Micro-tests of anabasine and related compounds.** III, 250, **Analysis of dysentery toxin.** 267, **Determination of strychnine. Ergot alkaloids.** 280—3, **Vitamins.**

Patents.

Preparation of composition for treatment of anæmia. A. E. Meyer, Assr. to Chappel Bros., Inc. (U.S.P. 2,038,586, 28.4.36. Appl., 21.12.31).—Aq. $FeCl_2$ (500 g. per litre; 100 c.c.) is filtered into glycerin (650 c.c.) and aq. 10% NaOH added until p_H 6·8 is reached; a protective colloid, *e.g.*, blood-serum, egg-albumin, or gum tragacanth, is then added to prevent pptn. of $Fe(OH)_2$ on keeping. L. C. M.

Manufacture of *l*-ascorbic acid (vitamin-*C*). T. Reichstein (B.P. 466,548, 3.11.36. Switz., 26.11.35. Addn. to B.P. 428,815; B., 1935, 701).—*l*-Ascorbic acid is obtained by heating 2-keto-*l*-gulonic acid or its acid-labile derivatives with acid in a solvent in which the vitamin is sparingly sol. *E.g.*, di*iso*propylidene-2-keto-*l*-gulonic acid hydrate is boiled in HCl–EtOH–dioxan or HCl–aq. dioxan, or Me 2-keto-*l*-gulonate is boiled in HCl–$CHCl_3$–EtOH. R. S. C.

Manufacture of di- and tri-iodo-derivatives of acylamino-acids and their salts. W. P. Williams. From Schering–Kahlbaum A.-G. (B.P. 465,994, 29.8.36).—Di- and tri-iodoaroylamido-acids, particularly hippuric acid derivatives, are claimed as internal and external disinfectants. The following are prepared from the appropriate acid chloride and NH_2-acid: 3 : 5-, m.p. 213°, and 2 : 4-*di*-, m.p. 209°, and 3 : 4 : 5-*tri-iodohippuric acid*, m.p. 241°, α-3 : 5-*di-*, m.p. 239°, and α-3 : 4 : 5-*tri-iodobenzamidobutyric acid*, m.p. 235°, 3 : 5-*di-iodobenzoyl-β-alanine*, m.p. 199°, and 3 : 4 : 5-*tri-iodobenzoylsarcosine*, m.p. 117°. R. S. C.

Preparation of [sulphonamide] compounds of therapeutic value. L. S. E. Ellis. From Soc. Usines Chim. Rhône-Poulenc (B.P. 465,914, 18.2.36).—*p*-Aralkylaminobenzenesulphonamides, which are bactericides, are prepared by treating *p*-$NH_2·C_6H_4·SO_2·NH_2$ with an aralkyl halide or an aromatic aldehyde, followed in the latter case by hydrogenation of the Schiff's base formed. p-*Benzyl-*, m.p. 175°, p-o′-, m.p. 183°, and p-p′-*hydroxybenzyl-*, m.p. 206°, p-β-*phenylethyl-*, m.p. 114—116°, and p-γ-*phenylpropyl-aminobenzenesulphonamide*, m.p. 144—146°, are described. R. F. P.

Process of stabilising epinephrine-type compounds. M. S. Kharasch, Assr. to E. Lilly & Co. (U.S.P. 2,047,144, 7.7.36. Appl., 26.3.34).—Epinephrine (adrenaline) and similar compounds are stabilised to O_2 and heat by addition of SH compounds or compounds which contain SH in a tautomeric form. Org. thio-acids may be added to the base (best about 3 mols. to 1 mol. of base to give p_H 3), or mercaptans or substances such as thio-carbamides and -semicarbazide (in examples 100—200%) may be added to the salt. Among examples are p-$SH·C_6H_4·SO_3H$, thiolactic acid, EtSH, PhSH, $NH_2·CS·NH·CH_2·CH{:}CH_2$, and $NH_2·CS·NH·NH_2$. R. S. C.

[Manufacture of] alkaline-earth metal double salts of organic acids. Seydel Chem. Co. (B.P. 467,080, 4.10.35. U.S., 11.10.34).—Oxides of Ca, Sr, or Mg are treated with a monoester of a dibasic aliphatic acid [particularly of $(CH_2·CO_2H)_2$] and BzOH (may be nuclear-substituted) to give therapeutically valuable products of the type $R'·CO_2·M(CO_2R)·CO_2R''$, where M = Ca, Sr, Mg; R = bivalent aliphatic radical; R′ = Ph or substituted Ph; R″ = alkyl, aralkyl, or substituted aralkyl. R. G.

Therapeutically active substance. A. Coulthard, and Imperial Chem. Industries, Ltd. (B.P. 465,886, 15.11.35).—Passage of $COCl_2$ into a solution of N-*p*-*p*′-aminobenzamidobenz-3-carboxy-2-naphthalide-6 : 8-disulphonic acid in aq. Na_2CO_3 at 60—65° gives the s-*carbamide*, which is toxic to blood parasites but not to the host. R. S. C.

Manufacture of ketones of polycyclic hydroaromatic compounds. W. W. Groves. From I. G. Farbenind. A.-G. (B.P. 465,960, 18.11.35).—3-Acetoxybisnorcholenic acid is transformed by the Curtius reaction ($SOCl_2$, NaN_3) into 3-*acetoxyternorcholenylcarbimide*, m.p. 103° (sinters 98°); this can be hydrolysed either by $AcOH–Ac_2O$, giving the *Ac* derivative, m.p. 243°, of 3-*acetoxyternorcholenylamine* (I), or by H_2SO_4, followed by liberation of the base with NaOH and subsequent conversion into the *amine hydrochloride*, m.p. 348°. With HNO_2 (I) gives both a *substance*, $C_{21}H_{30}O$, m.p. 120°, and an *alcohol*, $C_{21}H_{34}O_2$ (II), m.p. 179°, b.p. 170—220°/0·02 mm. Oxidation of brominated (II) by CrO_3 and subsequent debromination affords progesterone (III). With HOCl (I) gives the *hypochlorite*, which with Na–EtOH yields *pregnen-3-ol-20-one* (IV), m.p. 187—190°, b.p. 180—210°/0·001 mm., and this with CrO_3 affords pregnenedione, from which (III) is obtained by H_2SO_4. 3-*Hydroxyternorcholenylamine*, m.p 245—247°, after bromination, is oxidised by CrO_3 and then debrominated, giving 3-*ketoternorcholenylamine*, which after conversion into the *hypochlorite* is refluxed with C_5H_5N, affording (III). R. F. P.

Manufacture of unsaturated ketones containing a sterol nucleus. A. G. Bloxam. From Soc. Chem. Ind. in Basle (B.P. 466,707, 30.10.35).—3-Keto-sterol 5 : 6-dibromides lose HBr to *tert.* bases or alkali salts of org. acids, yielding 6-bromo-$\Delta^{4:5}$-ketones. Thus, $\Delta^{5:6}$-cholestenone dibromide and hot aq. KOAc or $C_5H_5N–C_6H_6$ give 6-*bromo*-$\Delta^{4:5}$-*cholestenone*, m.p. 126—127° (corr.). Androstenedione dibromide with hot aq. KOAc or NaOAc–EtOH gives 6-*bromo*-$\Delta^{4:5}$-*androstene*-3 : 17-*dione*, m.p. 170—171° (decomp.; corr.). Testosterone benzoate dibromide and NaOAc–EtOH give 6-*bromotestosterone benzoate*, m.p. 176—177° (corr.). R. S. C.

Manufacture of substituted pyridine-*o*-dicarboxylic amides. Soc. Chem. Ind. in Basle (B.P. 466,185, 28.11.35. Switz., 5.12.34 and 2.11.35).—Aliphatic diamides of pyridine-2 : 3- and -3 : 4- (not -2 : 5-)dicarboxylic acids are claimed as having a favourable effect on the circulation and respiration. The prep. of the following by various standard methods is described: *pyridine*-2 : 3-*dicarboxylbis-diethyl-*, m.p. 56—57°, b.p. 191—194°/7 mm., -*ethyl-*, m.p. 99—101°, -*di*-n-*butyl-*, m.p. 49—51°, b.p. 203—203·5°/2 mm., and -*dimethyl-amide*, m.p. 96—98°, -*dipiperidide*, m.p. 94—96°, b.p. 221—225°/2 mm., *pyridine*-3-*carboxyldiethylamide*-2-*carboxyldi*-n-*propylamide*, b.p. 170—172°/0·4 mm., *pyridine*-3 : 4-*dicarboxylbisdi-ethyl-*, m.p. 61—63°, b.p. 143—146°/0·3 mm., and -n-*propyl-amide*, b.p. 180°/0·3 mm. R. F. P.

Manufacture of acridine derivatives. A. Carpmael. From I. G. Farbenind. A.-G. (B.P. 466,505, 28.11.35).—5-Aminoalkylaminoacridinesulphonamides, substituted or not in the $SO_2·NH_2$, are claimed as efficacious against staphylo- and gono-cocci. The basic 5-substituent may be introduced before or after the $SO_2·NR_2$. 1 : 2 : 5-$CO_2H·C_6H_3Cl·SO_2·NMe_2$, p-$OMe·C_6H_4·NH_2$, K_2CO_3, and Cu afford 4-*sulphondimethylamido*-4′-*methoxydiphenylamine*-2-*carboxylic acid*, m.p. 173—174°, which with an excess of $POCl_3$ gives 5-*chloro*-7-*sulphondimethylamido*-3-*methoxyacridine*, m.p. 209—210°; this with $NH_2·CHMe·[CH_2]_3·NEt_2$ in PhOH at 90—100° yields 5-ε-*diethylamino*-sec.-*amylamino*-7-*sulphondimethylamido*-3-*methoxyacridine dihydrochloride*, decomp. 239°, and with other appropriate amines gives 5-γ-*diethylamino*-β-*hydroxypropylamino*- (*dihydrochloride*, decomp. 231°) and 5-β-γ′-*diethylamino*-β′-*hydroxypropylaminoethylamino*-7-*sulphondimethylamido*-3-*methoxyacridine*, m.p. 156—157° [(? *tri*)*hydrochloride*, decomp. 245—247°]. Similarly are obtained 4-*sulphondiethylamido*-4′-*methoxydiphenylamine*-2-*carboxylic acid* (I), m.p. 171°, 5-*chloro*-7-*sulphondiethylamido*-3-*methoxyacridine*, m.p. 188—190°, 5-γ-*diethylamino*-β-*hydroxypropylamino*-7-*sulphondiethylamido*-3-*methoxyacridine dihydrochloride*, decomp. 241°, 4-*sulphondimethylamido-4′-*, m.p. 187°, and -3′-*methyldiphenylamine-2-carboxylic acid*, m.p. 158—159°, 5-*chloro-3-sulphondimethylamido-7-*, m.p. 208—209°, and -8-*methylacridine*, m.p. 182—183°, 5-γ-*diethylamino*-β-*hydroxypropylamino*-3-*sulphondimethylamino-7-*, m.p. 123° (*dihydrochloride*, decomp. 232—233°; *methylenebis-2-hydroxy-3-naphthoate*), and -8-*methylacridine* (*dihydrochloride*, decomp. 236°), 3-*sulphondimethylamido-5-*p-*tolylthiol-*, m.p. 190—191°, and -5-*methoxy-7-methylacridine*, m.p. 160—161°. 1 : 2 : 4-$C_6H_3MeCl{\cdot}SO_2Cl$ and $NHMe_2$ give 2-*chlorotoluene-4-sulphondimethylamide*, m.p. 103—104°, oxidised by $KMnO_4$ to 2-*chloro-4-sulphondimethylamidobenzoic acid*, m.p. 182°, which with *p*-$OMe{\cdot}C_6H_4{\cdot}NH_2$, K_2CO_3, and Cu yields 5-*sulphondimethylamido-4′-methoxydiphenylamine-2-carboxylic acid*, m.p. 202—203°, and thence 5-*chloro-*, m.p. 189—190°, 5-ε-*diethylamino*-sec.-*amylamino-* (*dihydrochloride*, decomp. 218—220°), and 5-β-γ′-*diethylamino*-β′-*hydroxypropylaminoethylamino-8-sulphondimethylamido-3-methoxyacridine* [(? *tri*)*hydrochloride*]. PCl_5 converts (I) into the acid *chloride*, m.p. 115°, which affords the oily 3-*carboxy*-β-*diethylaminoethylamide*, converted by $POCl_3$ at 100° into 5-β-*diethylaminoethylamino-7-sulphondiethylamido-3-methoxyacridine*, m.p. 123°. p-*Aminophenyl* β-*hydroxyethyl ether*, b.p. 179—180°/7 mm. (obtained by treating *p*-$NO_2{\cdot}C_6H_4{\cdot}OK$ with $CH_2Cl{\cdot}CH_2{\cdot}OH$ and reducing the product with Fe–AcOH), and 3-*sulphondimethylamido-5-phenoxy-7-methylacridine* (II), m.p. 221—222° (obtained from the 5-Cl-compound by PhOH), in PhOH at 100° give 5-p-β-*hydroxyethoxyanilino-3-sulphondimethylamido-7-methylacridine*, m.p. 199—200°, which with $SOCl_2$, followed by $NHMe_2$, affords the 5-p-β-*diethylaminoethoxyanilino*-derivative (*dihydrochloride*, decomp. 259—260°). *p*-$NH_2{\cdot}C_6H_4{\cdot}CH_2{\cdot}NHAc$ and (II) in PhOH give 5-p-β-*acetamido-*, m.p. 129°, hydrolysed to 5-p-β-*amino-ethylanilino-3-sulphondimethylamido-7-methylacridine* (*dihydrochloride*, decomp. 240—242°). 5-*Bromo-3-sulphondimethylamido-7-methylacridine*, m.p. 215—216° (obtained from the acridone by PBr_5), with $NH_2{\cdot}[CH_2]_3{\cdot}S{\cdot}[CH_2]_2{\cdot}NEt_2$ or 1-β-aminoethylpiperidine gives 5-γ-β′-*diethylaminoethylthiolpropylamino-* (*dihydrochloride*, decomp. 105°) and 5-β-1′-*piperidinoethylamino-3-sulphondimethylamido-7-methylacridine*, m.p. 156—157°. 5-Chloroacridine and $NH_2{\cdot}C_2H_4{\cdot}NEt_2$ in PhOH afford 5-β-*diethylaminoethylaminoacridine dihydrochloride*, decomp. 253—254°, which with $ClSO_3H$ at 110° gives the sulphonyl chloride, converted by NH_3 or NH_2Me into 5-β-*diethylaminoethylaminoacridine*-x-*sulphon-amide*, decomp. 192°, and -*methylamide*, decomp. 123°, respectively; sulphonation at higher temp. gives polysulpho-products. R. S. C.

Preparation of 1-phenyl-2 : 3-dimethylpyrazol-5-on-4-yl *iso*pentyl [α-ethyl-*n*-propyl] ketone. H. P. Kaufmann (B.P. 465,982, 17.4.36. Ger., 7.5.35).—1-Phenyl-2 : 3-dimethylpyrazol-5-one and $CHEt_2{\cdot}COCl$ with $AlCl_3$ at 100° or in hot CS_2 or with $ZnCl_2$ at 145° give 4-α-*ethyl*-n-*butyryl-1-phenyl-2 : 3-dimethylpyrazol-5-one*, m.p. 132°, a potent antipyretic. R. S. C.

Manufacture of amide derivatives of *iso*oxazolecarboxylic acids. F. Hoffmann–La Roche & Co. A.-G. (B.P. 466,555, 15.1.37. Switz., 20.3.36. Addn. to B.P. 451,913; B., 1936, 1084).—*iso*Oxazolecarboxyl chlorides and *sec.* amines, other than dialkylamines, in C_5H_5N or a neutral solvent containing a base give amides having analeptic properties. 3 : 5-*Dimethyl*iso*oxazole-4-carboxyl-methylanilide*, b.p. 198°/11 mm., m.p. 42—43°, -*methylbenzylamide*, m.p. 51—52°, b.p. 216—217°/11 mm., -N-*benzyl*-p-*dimethylaminoanilide*, m.p. 76° (*hydrochloride*, m.p. 198—199°), -*vinyldiacetonamide*, m.p. 116—117°, -2′-*methyl-*, m.p. 40—41°, b.p. 189—191°/11 mm., and -2′ : 6′-*dimethylpiperidide*, b.p. 192—195°/11 mm., 3 : 5-*dimethyl-4-*iso*oxazolyl-*N-*ethylurethane*, m.p. 117—118°, and 5-*methyl*iso*oxazole-3-carboxylmethylanilide*, m.p. 76—77°, are thus obtained. R. S. C.

Admixture of sodium morrhuate and quinine solutions. F. R. Greenbaum (U.S.P. 2,046,116, 30.6.36. Appl., 18.4.35).—Quinine (20 g.) in $CH_2Ph{\cdot}OH$ (20 c.c.) is stirred into 5% aq. Na morrhuate (1 litre) and heated until a clear solution is obtained. Alternatively, quinine is dissolved in morrhuic acid, $CH_2Ph{\cdot}OH$ is added as preservative, and the mixture is poured into H_2O and the p_H adjusted to 8—10. Other fatty acids may be used. R. F. P.

Manufacture of organic mercury compounds. E. I. Du Pont de Nemours & Co. (B.P. 466,183, 22.11.35. U.S., 23.11.34. Addn. to B.P. 423,506; B., 1935, 333).—Oil solutions of unsubstituted alkyl- and aryl-mercuri-fatty acid salts are obtained by adding the fatty acid (oleic acid) to a suspension of the alkyl- or aryl-mercuriacetate in a paraffin oil of b.p. >120° and heating (at 130°), until the AcOH volatilises. R. F. P.

Manufacture of organic mercury–silicon compounds. I. G. Farbenind. A.-G. (B.P. 466,813, 6.12.35. Ger., 6.12.34).—Hg–Si compounds are obtained by treating sol. Hg salts [or HgO, $Hg(OH)_2$, or basic salts] with an unsaturated compound, phenol, or amine, and SiO_2 (gel or sol), sol. silicates, or Si derivatives such as $Si(OAc)_4$ and $SiCl_4$. Reaction is preferably effected in a (hydroxylic) solvent. To HgO (44) in MeOH (400) and AcOH (30) is added with stirring technical water-glass (I) (80) in H_2O (200), and C_2H_4 is passed in at room temp. until the HgO has disappeared; the insol. product is sol. in NaOH without pptn. of HgO and only slowly gives HgS with $(NH_4)_2S$, but HCl evolves C_2H_4. C_2H_4 is passed into $Hg(OAc)_2$ (32) in H_2O (200), to which technical K water-glass (40) in H_2O (100) and then EtOH (500) have been added. Solutions of $Hg(OAc)_2$ (48) in H_2O (300) and of (I) (60) in H_2O (300) are mixed with EtOH (300), treated with PhOH (20) in EtOH (30 pts.), and then stirred at 100° for 6 hr. R. S. C.

Polyhydroxycarboxylic acids. Salts of condensation products. Salts of *p*-hydroxybenzoic esters.—See III.

XXI.—PHOTOGRAPHIC MATERIALS AND PROCESSES.

Silver bromide films free from protective colloid. Lüppo-Cramer (Kolloid-Z., 1937, 79, 215—220; cf. B., 1937, 500).—A backing layer of rubber used to promote adhesion of colloid-free AgBr diminishes the sensitivity of the latter. Unlike gelatin emulsions, colloid-free AgBr becomes less sensitive with increasing grain size. It also yields, when developed with weakly alkaline metol, Ag of a lighter colour and lower dispersity than when protected. If a layer of colloid-free AgBr is subsequently embedded in peptone, albumin, or gelatin, the darkening produced on development is considerably increased. This effect is observed equally whether the colloid is added before exposure to light or between exposure and development. The properties of colloid-free AgBr are discussed with reference to its use in photography of the extreme ultra-violet region. F. L. U.

[Residual image after] removal of photographic emulsions. A. Reychler (Bull. Soc. chim. Belg., 1937, **46**, 1—4).—If the image on a plate is situated near the glass, has been subjected to the action of Cr oxides in some form, and has aged for some time, then on removal of the emulsion with boiling dil. NaOH a residual image remains on the glass, formed by partial opacification of the surface. The image may suitably be formed by impregnating a AgBr emulsion with dichromate, drying, exposing, and " developing " with $Na_2S_2O_3$; after redeveloping in the light with, *e.g.*, metol–quinol, a diapositive is formed, with the image near the glass. This image is then " reddened " with KBr and CrO_3 and reduced with metol–quinol; other suitable treatments are described. The plate is then aged by keeping for some time, after which the emulsion may be dissolved off. After six months' ageing, a faint image remains; after one or two years' ageing, a brilliant residual image is obtainable. J. L.

Modern [photographic] development papers. Wandelt (Phot. Ind., 1934, **32**, 1350—1352).—Data for Agfa " Lupex " glossy gaslight paper are recorded. Neither the gradation nor the γ val. alone characterises a paper. Ch. Abs. (*e*)

Preserving developers with acid. J. Southworth (Brit. J. Phot., 1937, **84**, 341—343).—The keeping properties of two-solution metol–quinol developers can be greatly increased by acidification of the developer–sulphite solution with glacial AcOH or, better, with H_2SO_4 or $NaHSO_3$; the metol oxidises slowly, however, and loss of SO_2 also occurs. The solutions, though little discoloured, are inferior to similar acid solutions of pyrogallol developers. Details are given of tests with several single- and two-solution developers. J. L.

Factors in the design of a photo-electric densitometer requiring no empirical calibration. E. W. H. Selwyn and F. H. G. Pitt (Phot. J., 1937, **77**, 397—407).—The co-ordination of results by visual and photo-electric methods is discussed, and the properties of different opal glasses are treated in detail. Conditions to be fulfilled so that the results may be closely comparable with visual readings are suggested. An experimental instrument is described. J. L.

Effect of type of emulsion on the photographic intermittence effect. A. Kochs (Z. wiss. Phot., 1937, **36**, 97—115).—This effect depends on the type of emulsion and its pretreatment. Plates which have been treated with boiling H_2O show a greater difference of density for continuous and intermittent light than those which have been washed with dil. aq. NH_3. Desensitisation of plates lessens this difference. A. J. M.

Fine-grain [photo-]chemical development. R. Namias (Progr. fot., 1934, **41**, 97—102, 139—145).—Many fine-grain developers required increased exposure. The results are sometimes no better than those with a metol developer containing enough alkali to free the base. Such developers are improved by adding a small amount of safranine. Ch. Abs. (*e*)

Theory of photographic development. H. D. Murray (Phot. J., 1937, **77**, 388—396).—Three assumptions are made: (1) that development will take place only at points on Ag halide grain surfaces where the $Ag^{\cdot}$ of the lattice is not covered by adsorbed ions; (2) that development is catalysed at the interface of reduced Ag and Ag halide; (3) that the action of light on the Ag halide grain produces a Ag deposit, permeable to substances in solution, in the neighbourhood of development centres. Equations are worked out for reaction rates, based on the above, and expressions are derived for developability vals., the threshold val. required to permit development, and the rate of active development after initial stages are passed. The concept of negative development is incorporated, and explanations are offered for the effects of adding bromide, iodide, or thiosulphate to the developer. J. L.

Development and fineness [of grain] of photographic negatives. A. Charriou and (Mlle.) S. Valette (Bull. Soc. Franç. Phot., 1937, **24**, 64—75).—Four makes of plates have been tested for four different times of development in each of six different types of developer; fineness of grain has been ascertained by determining the resolving power of the negative and of a five-times enlarged print. The Capstaff–Abram borax fine-grain developer gave the best results on the whole, p-$C_6H_4(NH_2)_2$ developer being too slow. The tests have been made with special reference to the requirements of aerial photography. J. L.

Production of fine-grain images by development followed by intensification. A. Seyewetz (Bull. Soc. Franç. Phot., 1937, **24**, 45—47).—Photographic images may be developed with a 1 : 2 : 4-$NH_2{\cdot}C_{10}H_5(OH){\cdot}SO_3H$ developer and then intensified with the Lumière " Chromo-intensifier," which consists essentially (*i.e.*, is formed from the components) of $Cu(CNS)_2$ and a mixture of dyes producing a neutral tint. This intensifier does not cause increased grain size, and the image produced has good contrast and shadow detail, and is comparable with those produced by " Lumicros " developer; developers hitherto unusable owing to the low contrast produced are therefore now utilisable. J. L.

Effect of processing conditions on [photographic] graininess. A. Marriage (Phot. J., 1937, **77**, 379—380).—No accentuation of graininess was observed when variations were made in the temp. of the stop bath or fixing bath, or in the methods of washing or drying used in the processing of Panatomic film. The degree of development and composition of the developer alone affected the grain obtained in these photographic films. J. L.

New Agfacolor process. J. Eggert (Chem.-Ztg., 1937, **61**, 237—238).—This is a subtractive process. Three very thin emulsions are superimposed on a paper base, each incorporating suitable colour-forming compounds to give blue-green, purple, and yellow images. After exposure and development, the residual AgBr is exposed to light and developed with a p-$C_6H_4(NH_2)_2$-type developer, which reduces the halides to Ag and forms the dyes required. The Ag is then removed from all layers, and the correctly coloured picture is obtained. J. L.

Mercury hypersensitisation. P. C. Smethurst (Brit. J. Phot., 1937, **84**, 337—338).—The Agfa-Ansco process of increasing effective speed by subjecting an exposed photographic plate to Hg vapour for 24—30 hr. has been substantiated by quant. tests. Development to a low γ shows up to 100% increased effective speed; 40% increase was obtained with more contrasty plates. The effect is not shown by treatment in contact with liquid Hg. J. L.

Sensitometric testing without a photometer. T. Mendelssohn (Phot. Ind., 1934, **32**, 886—887).—Hübl's method gave satisfactory results.

Ch. Abs. (*e*)

Detecting Th oxide in lamp filaments.—See XI.

See also A., I, 370, **Liberation of Ag in emulsions.** 281, **Photochemistry of cystine.**

Patents.

Manufacture of photographic silver halide emulsions. W. W. Groves. From I. G. Farbenind. A.-G. (B.P. 465,823, 12.8.35).—Wandering of dyestuff components from one gelatin layer to another is prevented by introducing a substituent $\not< C_5$ into the component. The following are specifically named, their prep. being described and directions given for their incorporation in alkaline solution into the gelatin–Ag halide emulsion: 1-m-ole- and 1-m- and -p-stear-amidophenyl-3-methyl-5-pyrazolone, 1-hydroxy-2-naphthyldecylamine, decoamidoacet-p-anisidide, p-laur- and m-stear-amidobenzoylacetanilide, 1-3′-sulphophenyl-3-4″-stearamidophenyl-5-pyrazolone, 1-5′-sulpho-3′-stearamidophenyl-3-methyl-5-pyrazolone, and N-stearoyl-N'-1′-hydroxy-2′-naphthoyl-p-phenylenediamine; other less defined compounds are also described. R. S. C.

Light-sensitive photographic material. I. G. Farbenind. A.-G. (B.P. 463,560, 1.10.35. Ger., 12.10.34).—Opaque paper sheets are glued on to each side of metal foil, with an adhesive which is not sol. in photographic baths. The paper may be coated with baryta, gelatin, or other layers for preparing the surface to receive emulsions. Photographic emulsions are then coated on the paper on one or both sides; when on both sides, curling in processing is avoided, and different pictures are obtainable on the two sides without interference. J. L.

Light-sensitive photographic element. M. W. Seymour, Assr. to Eastman Kodak Co. (U.S.P. 2,043,905, 9.6.36. Appl., 8.1.35).—Light-sensitive materials are composed of dichromated layers of a mixed org. ester of cellulose having free CO_2H groups, *e.g.*, cellulose acetate-phthalate or -citrate. $(NH_4)_2Cr_2O_7$ is preferred for the sensitiser. After exposure, the non-exposed parts are removed by washing off with MeOH or with dil. aq. NaOH or KOH, or NH_3 solution in 1 : 1 H_2O–$COMe_2$. The remaining image may be further hardened by treatment with an acid solution. These layers are resistant to acid, the phthalate being especially suitable for photomechanical resists; mordants are not necessary when dyeing the images. Layers formed from the citrate ester and kept for several days before use yield generally insolubilised layers in which the exposed portions only repel basic dyes in acid solution, a negative dye image thus being produced. J. L.

Production of matt surfaces [on photographic supports]. S. E. Sheppard and J. H. Hudson, Assrs. to Eastman Kodak Co. (U.S.P. 2,043,906, 9.6.36. Appl., 22.3.35).—A suspension is prepared from gelatin powder or spray-dried gelatin (10%) in 95% EtOH containing ½—2% of CH_2O; this suspension is ground in a ball or pebble mill for 12—14 hr. and then coated on the back of a film or plate. EtOH-sol. gums or alkali-sol. proteins may be added to aid adhesion to the support. On drying, the fine hardened gelatin particles form a matt surface which will take retouching. J. L.

Photographic developing solutions for colour photography. Kodak, Ltd., and E. E. Jelley (B.P. 462,140, 7.9.35).—Colour developers, *i.e.*, developers which on oxidation (and coupling with a diazo compound) give dyes, are preserved against air-oxidation by addition of a hydrazine, hydroxylamine, or (Na) formaldehydesulphoxylate. H. A. P.

[Camera for] colour kinematography. M. H. Carpmael. From G. Wolf (B.P. 466,528, 11.2.36).

Photographic [optical] copying on lenticular films. I. G. Farbenind. A.-G. (B.P. 466,582, 26.11.35. Ger., 27.11.34).

[Sensitising] dyes.—See IV. **Printing element.**—See XIII.

XXII.—EXPLOSIVES; MATCHES.

Coal-mining explosives used in other countries. W. Payman (Colliery Eng., 1937, **14**, 93—96; cf. B., 1937, 396).—The types employed in the United States, France, Germany, etc. are reviewed.

R. B. C.

Rocket propulsion. W. Ley (Aircraft Eng., 1935, **7**, 227—231).—A review. Ch. Abs. (*e*)

Simple smell method for gas detectors. Subjective methods for detection of offensive substances. D. H. Wester (Pharm. Weekblad, 1937, **74**, 476—494).—Details are given of methods used in Holland for selecting persons as gas detectors. The limitations of such methods and the importance of physiological factors are discussed. S. C.

Detection of war gases with coloured powders. H. L. Ligtenberg (Chem. Weekblad, 1937, **34**, 321; cf. B., 1937, 396).—The area is strewn with a mixture of 1 pt. of Sudan-red with 1000 pts. of ground chalk and 3000 pts. of sea sand. Red flecks, turning green when treated with a mixture of $FeCl_3$ and 7 pts. of ground chalk, show definite contamination with mustard gas, CHPhBr·CN, or phenylcarbylamine chloride. Other liquids give the red colour, but the green is sp. for the above. S. C.

Cellulose nitration.—See V. **Cellulose nitrate.**—See XIII.

See also A., II, **Determination of ββ-dichlorodiethyl sulphide.** 278, **Nitration of cellulose.**

Patent.

[Gas-generating] blasting device. J. Taylor, and Imperial Chem. Industries, Ltd. (B.P. 464,793, 24.10.35).

XXIII.—SANITATION; WATER PURIFICATION.

Physical and physiological principles of air conditioning. C. P. Yaglou (J. Amer. Med. Assoc., 1937, **108**, 1708—1713).—A discussion of the effect of air temp., humidity, and movement on human comfort. E. M. W.

Methods for detection of toxic gases in industry. Hydrogen sulphide. Anon. (Dept. Sci. Ind. Res., 1937, Leafl. 1, 6 pp.).—The following test is prescribed for use before any person is allowed to enter a vessel which may contains H_2S. The atm. is sampled by a hand pump (barrel 1·25 in. bore, capacity 126 ml.). To the inlet of the pump is clamped, in a holder, dry $Pb(OAc)_2$ paper through which the sample must pass. The stain, using 1—5 strokes of the pump as required, is compared with that given by standards; concns. down to 1/150,000 may be so determined. Concns. $<1/30,000$ are not harmless, but are unlikely to cause serious effects if exposure is not continuous or prolonged. C. I.

Health hazards among painters with reference to industrial lead poisoning. E. Holstein (Med. Welt, 1935, **9**, 183—185, 224—226, 302—304).—A review. Ch. Abs. (*e*)

Detergents and disinfectants for use in dish-washing. W. L. Mallmann (Amer. J. Publ. Health, 1937, **27**, 464—470).—$(NaPO_3)_6$ (I) added to detergent mixtures prevents film formation and aids the removal of bacteria from glassware. The following detergent mixture as a 1% solution is recommended: (I) 40, Na_3PO_4,H_2O 15, $Na_2SiO_3,5H_2O$ 40, NaOH 5%. Wash-H_2O at 60° and rinse-H_2O at 75° destroy bacteria effectively on plates and Ag ware. Cl disinfectants are used in cold-H_2O disinfection. W. L. D.

Non-poisonous disinfecting fluids. Anon. (Oil & Col. Tr. J., 1937, **91**, 1435—1437, 1440).—The use of $KMnO_4$, H_2O_2, alkali peroxides and perborates, NaOCl, CH_2O, and essential oils as disinfectants, and of $N(C_2H_4{\cdot}OH)_3$ soaps as emulsifying agents in disinfectants, is reviewed, formulæ for disinfectant mixtures being given. D. R. D.

Comparison of the efficacy of disinfectants. R. Hanne (Pharm. Ztg., 1937, **82**, 464—470).—For accurate comparison of disinfectant vals. by the suspension method each determination of the killing time must be replicated 4—6 times. *B. coli* gave more consistent results than staphylococci or *Bact. prodigiosum*. L. D. G.

Effect of organic substances on the phenol coefficient [of disinfectants]. E. Jensen and V. Jensen (Dansk Tidsskr. Farm., 1937, **11**, 96—106; cf. B., 1933, 525).—The PhOH coeff. of various disinfectants has been determined in presence of substances of biological importance. The coeff. varies with the nature and amount of the added substance, and it is impossible to recommend any standard substance for the determinations. M. H. M. A.

Rotenone in household insect control. W. M. Boyd (Soap, 1937, **13**, No. 6, 125, 129).—Uses of rotenone and of rotenone–pyrethrum household sprays are discussed. L. D. G.

[Poisonous nature of] red squill. Brüning (Seifens.-Ztg., 1937, **64**, 322; cf. Mann, B., 1937, 733).—Cases are cited showing that, contrary to widespread statements, repeated by Mann (*loc. cit.*), red squill (which contains a typical heart poison) is in fact toxic to man and domestic animals as well as to rats. E. L.

***Lonchocarpus* species (barbasco, cubé, haiari, nekoe, and timbo) used as insecticides.** R. C. Roark (U.S. Dept. Agric., Mar., 1936, E-367, 133 pp.).—Of four identified and several unidentified species showing toxicity, *L. nicou* appears to be the richest in insecticidal constituents. Activity is due mainly to rotenone and deguelin, but other toxic compounds of uncertain composition are also present. Rotenone content of 14 samples of commercial cubé root ranged from 0·5% to 7·7%, and total matter extractable with CCl_4 from 11·6% to 21·6%. The literature relating to *Lonchocarpus* is reviewed. L. D. G.

Testing liquid insecticides against crawling insects. W. F. Kroneman (Soap, 1937, **13**, No. 6, 121—123).—The suggested method employs a glass chamber (3-ft. cube) with an air pressure of 6 lb. and temp. 24—29°. The insecticide (2 c.c.) is sprayed in from above, and 24 roaches (*Blatella germanica*) are given 30-min. exposure and then transferred to an observation cage. L. D. G.

Standardisation of Peet–Grady results [with control insecticide]. J. H. Ford (Soap, 1937, **13**, No. 6, 116—119).—Existing methods for reporting tests ignore the variation in individual resistance of test insects. A table is given for the adjustment of results to a kill of 50% with the standard insecticide. L. D. G.

Vacuum filtration of [sewage] sludge after various digestion periods. C. E. Keefer and H. Kratz, jun. (Sewage Works J., 1937, **9**, 197—206).—Determination of the relative filterability of sewage sludge after various periods of digestion showed considerable variations both before and after elutriation. Very low filter rates with elutriated sludges occurred for a short time during the digestion period, coincident with very active gasification (at about 60—70% digestion), which agitation possibly increased the amount of colloid matter. Storage of the digested sludge appeared inadvisable as filtration rates greatly decreased, requiring larger quantities of coagulants. O. M.

Factors influencing the clarification of sewage by activated sludge. H. Heukelekian (Sewage Works J., 1937, 9, 431—445).—From experiments on the relative effect of aëration, mechanical stirring, and agitation by N_2 gas, aërobic conditions appear essential even in the initial clarification stage. As saturation of activated sludge with sewage colloids impaired clarification, whereas treatment with kaolin, $PrCO_2H$, or NH_3 did not, it appears that clarification must be a complex phenomenon affected by several factors. The removal of inorg. colloid matter may be the result of adsorption or ion exchange, but biological factors must be considered in the removal of sewage org. impurities. Activated sludge is readily deflocculated by excessive agitation, agitation by N_2 gas, and by washing, and the dispersed floc is very different from the whole sludge floc as indicated by the differences of volatile matter and N content. In a well oxidised sludge, the amount of volatile matter in the dispersed floc is $<$ that in the whole sludge, whilst in a poorly oxidised sludge it is nearly as high as the volatile matter of the whole sludge. O. M.

Bulking of sludge in the activated-sludge process of sewage treatment. Anon. (Amer. Publ. Health Assoc. Year Book, 1936/37, 164—179).—A Committee Report. The two types of true bulking are differentiated : (*a*) Flocculated sludge with high index, low settling rate, and high volatile content. *Sphærotilus* may be absent (this type includes "blanket rising" of sludge due to minute gas particles). The suggested remedies are addition of inert mineral solids and $Ca(OH)_2$, increased aëration, and maintenance of dissolved O_2 in the aëration mixture. (*b*) Slimy deflocculated sludge with no definite line of demarcation between solids and liquids, caused by excessive presence of *Sphærotilus* and other thread-like organisms, which are usually stimulated by carbohydrates or excessive org. matter in sewage; inadequate aëration is also a factor. The most helpful remedies are application of Cl_2, $Ca(OH)_2$, or $Cu(NH_4)_2SO_4$, increased aëration, and re-aëration. O. M.

Coagulation contrasted with chemical precipitation in [sewage-]sludge digestion. A. L. Genter (Sewage Works J., 1937, 9, 285—292).—A clear distinction is drawn between chemical pptn. and coagulation, both of which occur in the treatment of sludge with coagulants. The sol. matters of the sludge-H_2O are pptd., whilst the sludge colloids are coagulated by neutralisation of their electric charge. Raw sludge becomes progressively more difficult to dewater with increased putrefaction, due to the complex protein decomp. products (NH_2-acids and fatty acids etc.) forming gelatinous ppts. Digested sludge with cultivated anaërobes under controlled conditions becomes easier to dewater with increased digestion, due to the simpler products of decomp. [CH_2, N_2, CO_2, H_2, $(NH_4)_2CO_3$, etc.]. $CaCO_3$ formation renders the sludges more porous. Elutriation removes the objectionable sol. matter of sludge-H_2O, yielding a more uniform sludge and resulting in diminished consumption of coagulants and considerable saving in costs. O. M.

Stabilisation of settling-basin [sewage] sludge by activated carbon at Sacremento. R. E. Mittelstaedt (Taste and Odour Control, 1935, 1, No. 5, 1—2).—Sludge decomp. in settling basins imparted taste and odour to the effluent. Activated C (min. 2 lb. per 10^6 gals.) effectively removed all odour. Ch. Abs. (*p*)

Activated carbon in sewage-sludge digestion. C. L. Walker (Sewage Works J., 1937, 9, 207—223).—Addition of activated C to fresh domestic sewage sludge in sludge digestion reduced the odour, increased the CH_4 content of the gas evolved, improved the drainability of the digested sludge (max. effect with 30 p.p.m. of C), and raised the temp. When 5—15 p.p.m. of C were used at 20° more gas appeared to be evolved at an increased rate of digestion than with larger amounts, which at all temp. appeared to reduce the gas production but offered no advantage in the rate of digestion. O. M.

Disinfection of sewage with minimum amounts of chlorine. W. L. Mallmann and W. F. Shepherd (Michigan Eng. Expt. Sta. Bull., 1935, No. 64, 21—26).—Results of a full-scale trial of the work of Rudolfs *et al.* (B., 1935, 208) are recorded. Excess of Cl_2 kills exposed bacteria and decomposes org. matter surrounding others. Prolonged treatment effectively reduces bacterial counts. The safety of an effluent is decided by the actual bacterial count and not by the % reduction effected by treatment. Partial satisfaction of the Cl requirement gives unsatisfactory results in sewage sterilisation. Ch. Abs. (*p*)

Oxygen demand [of sewages]. J. Burtle [with A. M. Buswell] (Sewage Works J., 1937, 9, 224—238).—A comparison of (1) moist combustion, using a mixture of $H_2Cr_2O_7$, H_3PO_4, and H_2SO_4, (2) dilution, biochemical O_2 demand test, (3) $KMnO_4$ absorption test, and (4) direct absorption, using the Nordell Odeeometer, for determining the O_2 demand of sewage, showed close agreement between (2) and (4), with both higher than (3). As (3) gives only partial oxidation with domestic sewage and erratic results with trade wastes, its exclusion from the Standard Methods is recommended. Although (2) and (4) are both empirical determinations, depending on experimental conditions, the results are obtained with (4) in 8—10 hr. instead of 5 days, and without the necessity of dilution as with (2). (1) is a measure of the C present, whilst (2), (3), and (4) measure the amount of O_2 required to oxidise some portion of the C. O. M.

"Slope" method of evaluating the constants of the first-stage biochemical oxygen demand curve. H. A. Thomas, jun. (Sewage Works J., 1937, 9, 425—430).—A simple method of evaluating the reaction velocity coeff. (k) and the ultimate first-stage O_2 demand (L) in a single computation is presented, employing a least squares determination of the most probable slope of a unimol. reaction equation. Examples are given. O. M.

Effect of modern sewage treatment on sources of public water supplies. K. L. Mick (J. Amer. Water Works Assoc., 1937, 29, 496—503).—Where the river systems are used for the dual purpose of sewage disposal and H_2O supply, the use of sewage treatment as a sp. measure for protecting the sources of H_2O supply is shown to be secondary to the use of H_2O purification, and not as a substitute for it. With the increasing pollution of the river systems and the possible over-burdening of the H_2O-purification plants, extended sewage treatment may be necessary. O. M.

Sewage chemistry, sewage treatment, and stream pollution. H. A. Faber, H. F. Gray, W. S. Mahlie, H. Heukelekian, W. Rudolfs, H. W. Streeter, B. A. Whisler, and E. B. Phelps (Sewage Works J., 1937, 9, 135—172).—A review of the literature, outlining the progress of sewage treatment during 1936. O. M.

Digestion of ground garbage. W. L. Malcolm (Sewage Works J., 1937, 9, 389—405).—Tests show no apparent difficulty in the digestion of macerated garbage, either alone or in any proportion with raw sewage sludge, in tanks seeded with well digested (Ithaca) sludge. O. M.

Activated carbon—its value and proper points of application [in water purification]. E. A. Sigworth (J. Amer. Water Works Assoc., 1937, 29, 688—698).—Tabulated replies are given to a circularised questionnaire into the use of activated C in H_2O treatment, dealing with types of taste and odour predominating, methods of feed and application, dosage, etc. O. M.

Use of powdered activated charcoal in Florida [water purification]. F. E. Stuart (Proc. 9th Ann. Meet. Florida Sec. Amer. Water Works Assoc., 60—62).—To eliminate tastes and odours, C is applied to the filter bed, to the sludge, and to the H_2O with the alum. Ch. Abs. (*p*)

Feeding of powdered activated carbon [in water purification]. J. P. Harris and E. A. Sigworth (J. Amer. Water Works Assoc., 1937, 29, 504—512).—The characteristics of activated C (insolubility, fineness, lightness, difficulty of wetting, and tendency to float) are discussed in relation to the most suitable equipment for automatic feeding. O. M.

Use of bentonite as a coagulant in water treatment. H. L. Olin and H. W. Petersen (J. Amer. Water Works Assoc., 1937, 29, 513—522).—For H_2O having sufficient dissolved electrolytes, Na-bentonite reduces the turbidity to zero, but with turbid soft H_2O CaO etc. must be added. It appears to be superior to alum as the coagulation effect is independent of p_H (occurring even in the acid range), the flocs are more voluminous and more rapid in pptn., whilst its base-exchange properties do not convert CO_3'' hardness into the more troublesome SO_4'' hardness. O. M.

Controlled coagulation [in water purification] maintains filters in good condition. F. W. Bouson (J. Pennsylvania Water Works Operators Assoc., 1934, 6, 15—16).—A gummy mat forming on rapid sand filters was obviated by lowering the p_H of coagulated H_2O to 6·9, thus pptg. Fe and Al from the acid raw H_2O. Ch. Abs. (*p*)

Effect [on water] of filtration through rapid filters on the operation of slow filters. I. Piotrovski (Gaz i Woda, 1934, 14, 183).—Rapid sand filters without preliminary coagulation remove suspended matter and 90—95% of micro-organisms. Subsequent working of slow filters is correspondingly more efficient. Ch. Abs. (*p*)

Chemicals used for cleaning rapid sand filters. J. C. Geyer and H. L. Chang (J. Amer. Water Works Assoc., 1937, 29, 668—682).—Comparison of the effectiveness of various chemicals used for removing the plastic, clay-like coating on the sand grains showed that H_2SO_4 was the quickest and most economical. Spraying the acid on the bed, after drawing the H_2O level below the sand surface, is apparently the safest method of application. The mud balls are broken up by raking. The acidity is quickly removed by back-washing. O. M.

Controlling pollution of Rhode Island waters. W. J. Shea (Sewage Works J., 1937, 9, 493—502).—The control of pollution of tidal waters as related to shell fish is discussed. O. M.

Streptococci test for pollution of water. C. K. Calvert (J. Amer. Water Works Assoc., 1937, 29, 683—687).—Examination of both Houston's and Clemsha's results leads to the conclusion that the presence of streptococci in H_2O indicates very recent and dangerous pollution. Mallman's observation that in bathing pools, whilst streptococci were less resistant to exposure than *coli–aërogenes*, they are more resistant to Cl_2, indicates that it is possible for the *coli–aërogenes* index in a chlorinated pool to be acceptable and yet streptococci to be present excessively; hence the need of the streptococci test, details of which are given. The characteristics of *S. salivarius*, *S. fæcalis*, and *S. equinus* are tabulated. O. M.

MacConkey's bile salt–lactose broth and standard lactose broth compared as presumptive media for water analysis. M. A. Farrell (J. Amer. Water Works Assoc., 1937, 29, 553—556).—Raghavachari's claim (Indian J. Med. Res., 1936, 23, 619) that MacConkey's medium is superior to standard lactose broth as a selective enrichment medium is considered invalid. O. M.

Value of thiosulphate-treated bottles for counts on shipped swimming-pool samples. C. Ritter (J. Amer. Water Works Assoc., 1937, 29, 548—552).—Partial sterilisation of swimming-pool samples, during transit, by the residual Cl_2, resulting in low counts, is overcome by the use of $Na_2S_2O_3$ in the sampling bottles. Inaccurate results are obtained in samples subject to a delay by shipping. O. M.

Potable water supply and hygiene. O. Spitta (Gas- u. Wasserfach, 1937, 80, 298—304).—Evidence that certain epidemic outbreaks, especially of typhus, are due to bacterial infection of the H_2O supply is reviewed and Pettenkofer's soil-emanation theory refuted. Generally, sand-filtration or other mechanical purification is sufficient safeguard, with chlorination in reserve. A. R. Pe.

Removal of lead and copper from drinking water. K. Holl (Arch. Hyg. Bakt., 1935, **113**, 296—304).—Cotton wool does not remove Pb if >1 mg. per litre is present. Filter-paper pads are effective for concns. $\ngtr 2{\cdot}5$ mg. per litre. Activated C gives best results. Filtration through a Berkefeld candle removes $\ngtr 2{\cdot}5$ mg. of Pb per litre, but is less effective in presence of Cl'. Filtration through a bed containing granular MgO removes Pb and Cu.
Ch. Abs. (*p*)

Determination of lime-solvent carbonic acid [in waters] from the values for hydrogen-ion concentration and for bound carbonic acid. R. Strohecker (Gas- u. Wasserfach, 1937, **80**, 524—526).—From the relationship (A., 1936, 1430) $p_H = 11{\cdot}49 - \log$ combined $CO_2 - \log$ CaO existing at equilibrium, a method is derived for calculating, by means of graphs, from the vals. found for a given H_2O, the amount of CaO needed for equilibrium.
A. R. Pe.

Microchemical investigation of drinking water. [Determination of total solids.] J. Gangl and A. Waschkau (Mikrochem., 1937, **22**, 78—88).—Total solids are determined by evaporating 5 c.c. of H_2O, the residue deing dried at 180°. J. S. A.

Use of inhibitors in acid solutions employed to clean water-pipes. A. R. Hollett (J. Amer. Water Works Assoc., 1937, **29**, 663—667).—Metal water-pipes can be cleaned of accummulated corrosion products, without danger to the metal surface, by acid solutions containing a known pickling inhibitor.
O. M.

Toxicity of hydrocarbons to fish in rivers. E. Hubault (Compt. rend. Acad. Agric. France, 1936, **22**, 130—133; cf. B., 1936, 1022).—The toxicity of *cyclo*hexene, *cyclo*hexane, and methyl*cyclo*hexane to white roach decreased in the order named.
A. W. M.

Tastes and odours as found in the Kaw River water. F. E. Willey (J. Amer. Water Works Assoc., 1937, **29**, 406—407).—Thawing of the frozen river caused difficulties in treatment. O. M.

Taste and odour problems [of water supplies]. W. T. Bailey (J. Amer. Water Works Assoc., 1937, **29**, 392—398).—Treatment of Council Bluffs (Iowa) H_2O supply is described. O. M.

Taste and odour problems at St. Joseph, Mo. J. P. Smouse (J. Amer. Water Works Assoc., 1937, **29**, 401—405).—Activated C proved an efficient adjunct to the Cl_2–NH_3 process in the control of tastes and odours of short duration. O. M.

Possible value of hydrogen ions in forecasting taste and odour periods by algæ and decomposition of organic matter. W. Yegan (N. Dakota Water and Sewage Works Conf., 1935, I, No. 6, 3—4).—Algæ consume free and partly bound CO_2, thereby raising the p_H of the H_2O. Bacterial decomp. of org. matter releases CO_2. Taste produced by either action may be predicted by means of p_H observations.
Ch. Abs. (*p*)

Artificial alteration of reaction of water reservoirs for control of larvæ of the malaria mosquito. P. I. Pavlova (Med. Parasitol. Parasit. Dis. Moscow, 1933, **1**, 265).—Addition to H_2O of H_2SO_4 sufficient to produce p_H 1·9 destroyed larvæ of *Anopheles maculipennis*. In acid peat bogs or in pits lined with clay the p_H of H_2O remained practically const. for several months. Ch. Abs. (*p*)

Relation of bacteria and bacterial filtrates to development of mosquito larvæ. L. E. Rozeboom (Amer. J. Hyg., 1935, **21**, 167—179).—Bacteria appear necessary for the normal growth of the larvæ, probably by furnishing an intra- or extra-cellular substance which acts as a stimulus to larval development. Bacterial suspensions in H_2O are not entirely satisfactory as food for larvæ which do not utilise colloids or solutes. Ch. Abs. (*p*)

Use of chloropicrin as a mosquito larvicide. F. Jatsenko (Med. Parasitol. Parasit. Dis. Moscow, 1934, **3**, 91—93).—For dusting the surface of H_2O a prep. containing chloropicrin (I) 1 litre, dust 1 kg., paraffin oil 1 litre is described. Mosquito eggs, larvæ, and pupæ are killed. Fish are affected only when the depth of H_2O is $\ngtr 12$—15 cm. For use as a stomach poison 150 g. of (I) are mixed with flour 1 kg., dust 1 kg., paraffin oil 100—150 g.
Ch. Abs. (*p*)

Anthracene: mosquito larvicide. S. Kutscher (Med. Parasitol. Parasit. Dis. Moscow, 1934, **3**, 141—148).—A dust prepared with refuse from coke C_6H_6 plants [containing 12—15% of anthracene (I)] diluted to contain 10% of (I) gave 100% kill of larvæ when spread over the surface of H_2O. Ch. Abs. (*p*)

Wastes disposal as related to shellfish. A. P. Millar (Sewage Works J., 1937, **9**, 482—492).—Combating the pollution of shellfish-growing areas by sewage and trade waste is discussed. Sp. trade wastes (acidity, salts of Cu, Pb, and Zn, dyes, oil, etc.) have both a direct and an indirect deleterious effect on bivalves. O. M.

Mechanical filtration of effluents. S. I. Zack (Sewage Works J., 1937, **9**, 466—475).—Mechanical effluent filters afford a direct means of improving primary, chemically treated, or final biological effluents by straining out the fine solid matter that fails to settle. The operation, analytical results, costs, and advantages of the magnetite filters are discussed. (Cf. B., 1936, 573.) O. M.

Chromate-containing effluent from chromium-plating works. F. Lieb (Arch. Hyg. Bakt., 1937, **118**, 126—128).—The sludge of ordinary town sewage absorbs under experimental conditions some, but not all, of the CrO_4. In practice, where the ratio of sludge to CrO_4-containing effluent is high, the absorption is sufficient for purification purposes. W. L. D.

Usefulness of the [potassium] permanganate number in determining the degree of contamination of effluents. W. Steffens (Chem.-Ztg., 1937, **61**, 307—308).—The $KMnO_4$ consumption of a household effluent fell rapidly on keeping, and after several weeks amounted to only 20% of the original figure, whereas the effluent from a sulphite-cellulose factory having the same $KMnO_4$ no. showed only slow decrease and after several weeks was 1/3 of the original. It is inferred that the bacteria behave differently according to the impurities present and the $KMnO_4$ nos. do not provide a method of comparison. S. M.

Evaporation of purified waters.—See I. **Toilet agents.**—See III. **H_2O for pulp etc. industry.**—See V. **Sterilisation.**—See XI. **Air conditioning of milk plant.**—See XIX.

See also A., I, 375, **Detecting HNO_3 in drinking H_2O. Analysis of N compounds in sea-H_2O.**

Patents.

Purification of air. A. Shardlow & Co., Ltd., and H. Wright (B.P. 466,397, 29.9. and 25.11.36).—The air passes upwards from a low inlet through trumpet-shaped baffles which continually deflect it downwards so that the coarser dust falls into a pool of H_2O; it then continues upwards through alternate baffles and dust-collecting chambers (filters). B. M. V.

Removal of stains from teeth. G. D. Laymon (U.S.P. 2,031,169, 18.2.36. Appl., 15.10.34).—The mucin film is impregnated with a 3·3% solution of I and then treated with 5% aq. $Na_2S_2O_3$ which dissolves the I and loosens the film. A. R. P.

Cuticle remover. D. G. Thuesen, Assr. to Egyptian Lacquer Manufg. Co. (U.S.P. 2,041,158, 19.5.36. Appl., 21.11.35).—Solutions (40—60 wt.-%) of lower aliphatic amides, *e.g.*, $H{\cdot}CONH_2$, are applied to the cuticle. E. H. S.

Treatment of decomposable organic matter. G. H. Roeder, Assr. to Bio Reduction Corp. of New York (U.S.P. 2,043,265, 9.6.36. Appl., 12.2.32).—An apparatus and process for effectively stabilising and/or decomposing sewage sludge and garbage without nuisance to produce a dry, finely-divided fertiliser are claimed. The org. matter is inoculated with a suitable mixture of bacteria, possibly with a catalyst or symbiotic substance, and aërated at a relatively high temp. on a series of foraminous screens to engender in it a porous condition. O. M.

Treatment of garbage. A. Boniface (U.S.P. 2,049,889, 4.8.36. Appl., 8.6.28).—The garbage is anaërobically fermented while in the form of a large but subdivided mass, drainage being permitted; when the temp. has risen to a max. a large vol. of air is passed through and around the product until the masses are dry. B. M. V.

Disposal of refuse. R. F. Leftwich, Assr. to Greenawalt Incinerating Corp. (U.S.P. 2,047,375, 14.7.36. Appl., 17.5.32).—The refuse is placed in a grate car and passed through the stages of ignition, combustion, and cooling in separate chambers of the furnace, with clinker discharge outside. Forced draught is applied under the car while in the furnace, and additional refuse may be added at an intermediate stage. B. M. V.

Sewage disposal. W. K. Porteous (B.P. 464,533, 6.4. and 28.5.36).—A method of disposal for ships' sewage while in port is claimed. The sewage is disintegrated, centrifuged, and the sludge stored for subsequent discharge at sea. Sterilisation at about 150° may be included. O. M.

Activated-sludge system of sewage treatment. J. B. Sperry, Assr. to Amer. Well Works (U.S.P. 2,048,640, 21.7.36. Appl., 28.2.31).—A mechanical aëration device for the activated-sludge process, comprising a mixing cone, downfall tube, and circulating pump, is claimed. The surface liquor of the aëration tank is aërated and circulated by the pump drawing it through the mixing cone and forcing it down the downflow tube. The mixing cone is constructed so that a no. of separate thin streams, each having a large surface area exposed to air, are formed and the ratio of the vol. of flow to exposed surface area is adjustable. O. M.

Plant for treating sewage. M. Hoffmann (B.P. 465,271, 4.11.35. Ger., 21.2.35).—A compact, circular, primary and secondary settling chamber is described. B. M. V.

Plant for treating sewage. M. Hoffmann (B.P. 466,951, 4.11.35).—A lip fitted to the settling chamber of a device in the form of a helical track for separating solid from liquid matter is claimed to facilitate sampling. O. M.

Recovery and treatment of sludge. J. G. Thomas (U.S.P. 2,046,756, 7.7.36. Appl., 17.6.31).—Liquid sludge, trade waste, or the like is passed upwards through a bed of non-capillary carrier material, clear liquid being exhausted at the top; the carrier with entrained solids is squeezed in a helical conveyor, elevated, and caused to descend a column transversely of which hot products of combustion are passed twice. The claims relate only to apparatus for the first stage of the process. B. M. V.

Treatment of sewage or other sludge-containing liquors. W. K. Porteous (B.P. 463,990, 5.11.35).—Improvements in the apparatus for the wet-carbonising process of sewage treatment are claimed, utilising the heat of the outgoing treated sewage sludge, prior to H_2O separation and filter-pressing, to heat the incoming cold sludge in a heat recuperator. O. M.

Removal of fluorine from potable waters. G. H. Meinzer (U.S.P. 2,043,705, 9.6.36. Appl., 28.11.33).—The H_2O is treated with $Al(OH)_3,2H_2O$ (pptd. or as bauxite) in quantities $\nless 5$ times the F present and additional to the amount required for pptn. of colloids and suspended matter. O. M.

Water-purifying and -degasifying apparatus. V. A. Rohlin, Assr. to Cochrane Corp. (U.S.P. 2,047,291—2, 14.7.36. Appl., [A] 19.12.32, [B] 20.7.35. Renewed [A] 3.1.36).—Combined apparatus for hot-process softening and degasification by spraying in steam are described. B. M. V.

Determining the excess of oxidising agent in chemically purified water. A. Schnorf (B.P. 464,902, 9.10.36. Fr., 9.10.35 and 27.5.36).—The process claimed uses the p.d. between two identical couples, one immersed in H_2O containing excess of an oxidising agent (I), and the other in H_2O from which the excess of (I) has been removed by physical treatment (*e.g.*, activated C). This p.d. may be measured: (1) directly as excess of (I), on a milliammeter by arranging both couples in opposition; (2) separately as two curves on a recorder chart; or (3) by utilising the Wheatstone bridge principle. O. M.

Purifying air.—See I. **Insecticide.**—See XVI.