

BRITISH CHEMICAL ABSTRACTS

B.—APPLIED CHEMISTRY

NOV. 6 and 13, 1936.*

I.—GENERAL ; PLANT ; MACHINERY.

Factors in economical grinding and pulverising.

ANON. (Fuel Econ., 1936, 11, 452—456).—Various types of mills (classified according to speed of operation) are described; they include the ball and ring-and-roller mills, and impact pulveriser. Factors influencing their economy of operation in the grinding of coal are discussed, with particular reference to the effect of surface moisture and atm. humidity on output. H. C. M.

Influence of degree of vacuum and time of soaking on determination of apparent porosity and true specific gravity. H. OLIVER and K. M. ROBERTS (Trans. Ceram. Soc., 1936, 35, 337—351).—Tests on various types of brick, using H_2O or paraffin at pressures from 1 atm. to a vac. of 29 in. of Hg, showed that usually a high degree of vac. is necessary for accurate results. The influence of degree of vac. is $>$ that of "soaking" time, but the latter factor becomes important for vac. of $<$ 25 in. of Hg. An accurate "powder"- d determination is possible at 10 in. of Hg if the powder is stirred periodically. J. A. S.

Determination of dissolved oxygen in boiler feed-water. A. H. WHITE, C. H. LELAND, and E. W. BURTON (Amer. Soc. Test. Mat., Preprint, June, 1936, 17 pp.).—The Winkler method is accurate in absence of interfering substances and when the end-point is determined electrometrically. Non-volatile substances should be removed by boiling off dissolved O_2 and collecting it in H_2O , where it is determined. R. B. C.

Parallel slide rule for calculating vapour-pressure data. F. J. SMITH and H. P. SHARP (Oil and Gas J., 1936, 34, No. 52, 188).—This instrument enables the v.p. of hydrocarbons up to and including C_7H_{16} to be calc. at temp. from -45° to 232° . R. B. C.

Constructing chemical apparatus.—See X. **Hardness rocker.** Determining η .—See XIII.

PATENTS.

Furnaces for solid fuels. E. J. B. COENEN, JUN. (B.P. 451,828—9, 24.8.35. Belg., 4.4.35).—Apparatus especially suitable when the furnace (F) is separate from the boiler (B) or other heat-consuming device comprises (A) a twin inclined grate with pokers, and (B) a conduit for connecting F to B , provided with a jacket of air subsequently used as secondary air of combustion. B. M. V.

Manufacture of thermal insulation. M. C. HUGGETT, Assr. to RESEARCH, INC. (U.S.P. 2,023,422, 10.12.35. Appl., 25.4.35).—An intimate mixture of Ag_2S 40, casein 40, and wax 20% is applied to the surface of paper, cardboard, or other flexible backing material, and

the coating is burnished by passing the material through calendar rolls heated to $150-205^\circ$. A. R. P.

Disintegrating or grinding machines. G. GREENHALGH (B.P. 451,522, 14.3.35).—The beater revolves on a vertical axis; the arms are not all in the same plane, but run between serrated discs and are surrounded by a screen, or, preferably, by two perforated plates adjustable relatively so that the apertures may or may not coincide. B. M. V.

Apparatus for separating dirt from coal, and for other analogous uses. W. BARKER (B.P. 451,804, 18.6.35 and 29.2.36).—Discharge means for dirt and middlings from a pervious shaking table operated with upward air currents are described. B. M. V.

Rotary separating apparatus. INTERNAT. COMBUSTION, LTD., Assees. of R. F. O'MARA (B.P. 451,642, 15.2.36. U.S., 15.4.35).—A pneumatic separator situated above a pulveriser but independently driven is described. Classification is effected mainly by a rotary deflector, the speed of which is adjustable. B. M. V.

Apparatus for fractionating finely-divided material. P. S. ROLLER (U.S.P. 2,019,507, 5.11.35. Appl., 26.10.29).—In a pneumatic elutriator a small jet of air at high velocity is caused to blow slightly under the surface of a mass of the feed material in the lower part of a U-tube; rapping is also effected and the combined action results in the mass of feed circulating slowly. The air with fines entrained ricochets from side to side of the leg of the U-tube and emerges into the settling chamber (S) with most of its velocity lost. S is capped with a filter thimble to collect the finest size, the speed of the air or size of the nozzle being increased to obtain the next size, and so on. B. M. V.

Classification apparatus. R. S. HANDY (U.S.P. 2,025,412, 24.12.35. Appl., 10.9.34).—In a wet classifier (C) for sand of the hindered-settling type the underflow is controlled by a valve operated by a float on a column of H_2O which is in balance with and higher than the total pulp in C . To prevent sticking, the valve rod and some part of the lever system is kept reciprocating by a power-driven mechanism. B. M. V.

[Rake] classifier. C. K. McARTHUR, Assr. to DORR Co., Inc. (U.S.P. 2,025,690, 24.12.35. Appl., 12.10.32. Chile, 27.5.32).—The blades of the rakes are reduced in depth downwards in progression in $<$ 3 sets, the set with narrowest blades being entirely submerged in the classifying pool and the intermediate set passing in and out of the pool. B. M. V.

Centrifugal bowl for separating heavy sludge and solids from lighter liquids. G. J. STREZYNSKI, Assr. to DE LAVAL SEPARATOR Co. (U.S.P. 2,022,814—7,

* The remainder of this set of Abstracts will appear in next week's issue.

3.12.35. Appl., [A] 27.9.33, [B] 20.10.33, [C] 1.12.33, [D] 29.12.33.—Separators having three outlets for solid (*S*), heavy liquid (*H*), and lighter liquid (*L*), respectively, are claimed. (A) A hollow valve member floats between *H* and *L*, is pierced to receive *L* only, moves outward to close the outlet for *S*, and stays closed until sufficient *L* has leaked away through a small aperture provided. In addition to this automatic arrangement a supply of liquid direct from outside is arranged under human control. (B) The automatic operation is adjusted by altering the tension of a spring opposed to centrifugal force. (C) A fixed displacer is provided to reduce the capacity of the hollow body without reduction of the forces at work. (D) The valve still floats in the liquids, but its inner end is nearer the axis than any outlet from the centrifuge, so that external liquid only is admitted to operate the valve.

B. M. V.

Apparatus for separating granular material in an ascending current of a fluid medium. BAYERISCHE BERG-, HÜTTEN-, U. SALZWERKE A.-G. (B.P. 451,942, 11.2.35. Ger., 7.12.34).—Classification is effected in an upward turbulent current, the wall of the separating vessel being provided with toothed rings (the teeth being staggered in successive stories) extending inwards for 20–30% of the area.

B. M. V.

Centrifugal pulp screens or strainers for cellulose or the like. W., H., and H. VOITH (J. M. VOITH) (B.P. 451,821, 28.11.35. Ger., 30.11.34).—The net pressure forcing the pulp through the screen is finely adjusted by altering the height of an overflow weir above the apparatus.

B. M. V.

Centrifugal dust collectors. NORTON'S (TIVIDALE), LTD., and C. G. McKEOWN (B.P. 451,502, 1.2.35).—A cyclone separator is formed (downwards in order) with (1) cylindrical, (2) truncated, inverted, distorted conical, (3) cylindrical, (4) inverted conical, walls; the cylindrical outlet (5) extends only into (1). The diam. of (3) is > that of (5); (5), (4), (3), and the lower edge of (2) are mutually co-axial, but eccentric to (1) and to the upper edge of (2).

B. M. V.

Mixture of powders. FERRANTI, LTD., and M. K. TAYLOR (B.P. 451,717, 15.5.35).—Fine powders are agitated in vac.

B. M. V.

Revivification of adsorbents. C. L. JONES, Assr. to ADICO DEVELOPMENT CORP. (U.S.P. 1,933,345, 5.3.35. Appl., 14.7.33).—The adsorbent, e.g., active C, is revived by heating in superheated steam and then cooling in boiling liquefied CO₂ at < 75 lb. per sq. in. L. C. M.

Method and material for treating boiler feed-water. NAT. ALUMINATE CORP. (B.P. 451,929, 9.11.34. U.S., 10.11.33).—Starch or dextrin (I) in readily dispersible form is added at the rate of 1 oz. per 1000 gals., and also, if desired, a sol. phosphate and carbonate, the wt. of (I) being preferably = (P₂O₅/2.25) + (CO₃/2.85).

B. M. V.

Preventing the harmful deposition of carbonates contained in water. F. HÄHN (B.P. 451,826, 3.1.36).—Water-glass is added, the proportion used being < 24 g. (< 30 g.) per English (German) degree of hardness per cu. m.

B. M. V.

Non-corrosive [cooling] liquid. R. G. CLARKSON, Assr. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,993,773, 12.3.35. Appl., 1.3.33).—A liquid for radiators of internal-combustion engines contains 0.5–5% of mercaptobenzthiazole and 5% of *o*-toluidine or liquid paraffin containing an emulsifying agent, with or without glycerol or C₂H₄(OH)₂ as a f.-p. depressant. L. C. M.

Skimming devices for centrifugal machines. MASCHINENFABR. CHAM A.-G., and K. EGG (B.P. 451,492, 3.4.36. Switz., 6.11.35).—A device containing a spiral blade for lifting out the liquid which surrounds the feed nozzle and is attached to the cover is described.

B. M. V.

Separating a mixture of liquids by vacuum distillation. J. BANYAY (B.P. 452,087, 21.1.36).—Used lubricating oil, e.g., is preheated by hot purified oil and further distilled by vac. while flowing down a spiral trough arranged on a conical surface.

B. M. V.

Dialysis. E. WEINBERGER (B.P. 452,000, 21.1.36. Czechoslov., 22.1.35).—Dialysis is accelerated by placing an absorbent or reactant in the compartment into which the electrolyte is to diffuse.

B. M. V.

Facilitating the action of a gas or vapour on a liquid or mixture of liquids. ÉTABL. A. OLIER (B.P. 451,756, 21.1.36. Fr., 21.1.35).—A column with stacked filling elements is provided with an axial gas-lift pump for circulating the liquid, operated by a minor supply of the gas or vapour. Heat may be applied.

B. M. V.

Distribution of gases or vapours in liquids or other fluids. K. BRAEM (B.P. 451,485, 27.1.36).—The packing strip in a metallic hose is of porous material and the leaky hose is used as distributing elements.

B. M. V.

Apparatus for separating gas and/or vapour from a mixture of gas and/or vapour and liquid flowing through a tube. M. SCHMIDT (B.P. 451,905, 28.5.35. Ger., 6.8.34 and 2.11.34).—Separators involving a slight deflexion of the lighter constituent are described.

B. M. V.

(A) **Cooling and dehumidifying gases such as air.** (B, C) **Conditioning of gases by cooling.** KELVINATOR CORP. (B.P. 451,847, 452,504, and 452,765, [A] 6.11.34, [B, C] 17.11.34. U.S., [A] 8. and 14.11.33, 23.12.33, 15.2.34, 17.3.34, [B] 3.2.34, and [B, C] 7.3.34).—(A) Gas is conditioned by contact with a cooling surface part only of which (*C*₁) is automatically caused to be cooler if the temp. or R.H. of the exit gas rises, or warmer if either decreases. If desired, the other portion (*C*₂) may change the opposite way, but to a smaller extent, or *C*₁ may be controlled by temp. and *C*₂ by R.H. Control is effected by adjusting both the speed of the compressor acting on the refrigerant and the area of the cooling-coils. (B) *C*₁ is screened adjustably in accordance with the R.H. of the feed gas. If the R.H. is too high an adjustable proportion only of the gas may be overcooled to ppt. H₂O. (C) The propelling motor is controlled by the R.H. of the feed gas and, if desired, by its temp., but preferably the temp. controls the circulation of the refrigerant. [Stat. ref.] B. M. V.

Production of dehydrating agents for drying gases. G. F. JAUBERT (B.P. 448,359, 30.5.35. Fr.,

18.6.34).—Porous lump gas C or wood charcoal is impregnated in vac. with aq. CaCl_2 so that, after drying, the C: CaCl_2 ratio is 11:9. [Stat. ref.] A. R. P.

Detecting the presence of foreign solid, liquid, and gaseous materials in gases. C. F. RENSCH (B.P. 447,813, 22.6.35).—Use is made of the variation in resistance of a Pd-Ag alloy wire when impurities are present in the gas. A. R. P.

Chemical [laboratory] apparatus. W. O. GEYER (U.S.P. 1,993,001, 5.3.35. Appl., 7.4.34. Cf. U.S.P. 1,973,755; B., 1935, 611).—A system for filling a burette by pressure is claimed. L. C. M.

[Lifting of] lids for furnaces, ovens, and the like. J. P. D. COLEMAN, G. H. S. GREENE, and WILD-BARFIELD ELECTRIC FURNACES, LTD. (B.P. 451,807, 3.7.35).

Separation of materials of different specific gravities. H. M. CHANCE (B.P. 449,085, 19.12.34).—See U.S.P. 1,988,371; B., 1935, 1075.

Producing gastight seals in the pistons of internal-combustion engines. H. S. BRINKER and W. B. THOMAS (B.P. 447,460, 2.8.35).—See U.S.P. 2,012,951; B., 1936, 674.

Permeable ceramic diaphragm.—See VIII. **Steel tubes.** **Anticorrosive solution.** **Corrosion inhibitor.**—See X. **Paint-mixing and -grinding machines.**—See XIII. **Grinding corn.**—See XIX.

II.—FUEL; GAS; TAR; MINERAL OILS.

Nomenclature and appearance of the constituents in bituminous coal petrography. E. HOFFMANN (Brennstoff-Chem., 1936, 17, 341–351).—Systems of nomenclature used by different workers are correlated and the system adopted as a result of the Haarlem conference (cf. B., 1936, 257) is described. The appearance of the various constituents is illustrated by photomicrographs. A. B. M.

Microscopical characters of the Courrières coals. H. RINGARD and A. DUPARQUE (Compt. rend., 1936, 203, 375–377).—The characters are described and their origin is discussed. R. S.

Relative transparency of coal constituents to X-rays. B. G. ŠIMEK (Mitt. Kohlenforschungsinst. Prag, 1935, 2, 280–291).—X-Ray photographs were taken under different conditions of voltage, intensity, and time of exposure of purified brown-coal bitumen, humic acids, and Ca, Fe^{III} , and Ba humates. The relative transparencies of the negatives were compared by means of a photoelectric cell. The dependence of the degree of blackness of the negative on the conditions of exposure was determined for three thicknesses of these substances. The sequence, in order of increasing absorption coeff., was: pure org. substance, Ca, Fe^{III} , and Ba humate, little difference being observed in the behaviour of bitumen and humic acids. R. B. C.

Cleaning bituminous coal while cutting. W. REYNOLDS, JUN. (Amer. Inst. Min. Met. Eng., Tech. Publ., 1936, No. 739, 10 pp.).—The results of a study of the application and development of mining machines for cutting out and removing dirt bands in bituminous coal seams are discussed. H. C. M.

Evolution of firedamp in Belgian coal mines. A. BREYRE (Fuel, 1936, 15, 253–257).—Gas samples were taken at 1-hr. intervals over 24-hr. periods, by means of an automatic sampler, in a no. of Belgian mines, and their CH_4 content was determined. The evolution of CH_4 does not cease with the getting of the coal, showing that it comes not only from the coal face, but from fissures behind the face and from the waste. The analyses of return air taken throughout the country during 1934 have been examined in the light of the 24-hr. sampling results. Some seams of coal yield no CH_4 , whereas the flow of gas from others may reach vals. of the order of 200 cu. m. of CH_4 per ton of coal mined. The large amounts evolved in some districts are difficult to explain on the hypothesis of adsorption by the coal. A. B. M.

Sampling analysis, with application to coal. M. C. HOLMES and R. DOWNS (J. Franklin Inst., 1936, 222, 337–343).—The expression derived previously (B., 1935, 609), connecting the no. of increments per sample required for a given accuracy, has been applied to a crit. analysis of data obtained by Morrow and Proctor (B., 1935, 1078). For the same accuracy, whereas the no. of increments per sample increases slowly, the gross wt. of sample decreases rapidly with decrease in the size of increment. It is considered that the fundamental principle in sampling is to take, not a const. size of sample, as recommended by the A.S.T.M., but the greatest possible no. of increments per sample. Experimental evidence given in support of this view is held to indicate the need for a re-examination of existing methods of sampling coal for chemical analysis. H. C. M.

Separator for float-and-sink analyses [of coal]. A. PELZER (Glückauf, 1936, 72, 688).—The apparatus comprises two separating funnels one above the other, the outlet of the upper funnel (U) being ground into the inlet of the lower one (L). With the top (C_T) and bottom cocks (C_B) open and closed, respectively, the apparatus is filled to $\frac{2}{3}$ the height of U with the separating liquid and the coal sample is added. With light liquid from which a large sink fraction is expected C_T may be left open so that settlement occurs at once in L . When settlement is complete C_T is closed and U and L are taken apart; each fraction is then examined separately. R. B. C.

Construction and operation of a thermostat with moisture regulation for determination of the hygroscopic point of brown coal. M. MATSCHAK (Braunkohlenarch., 1936, No. 44, 46–49). R. B. C.

Capillary behaviour of coals. P. NASHAN (Mitt. Forschungsanst. Gutehoffnungshütte-Konz., 1936, 4, 133–138).—The Enslin apparatus was employed. The difference in capillary behaviour is a characteristic of the various kinds of coal, and originates in the micro-structure of the coal substance itself. R. B. C.

Smokeless briquettes impacted from partly volatilised Illinois coals. R. T. PERSOL (Dept. Registr. and Educ., Illinois State Geol. Surv., Rept. Invest. No. 41, 1936, 30 pp.).—Smokeless briquettes may be made from coal fines from which 15% of volatile matter (dry basis) has been expelled with the same briquetting equipment and magnitude of impact as

briquettes from raw coal using no artificial binder. The briquetting temp. of the prepared fines should be 300–400° as compared with 250° for natural coal fines.

R. B. C.

Colloidal fuel. J. L. STREVEIS (Coll. Eng., 1936, 13, 124–126, 200–202, 275–277).—A review of the manufacture, stabilisation, properties, and uses of coal-oil fuels. Particulars of the results of tests of these fuels in boiler furnaces and in Diesel engines are given.

R. B. C.

Analogy of melanoidins and humic acids. C. ENDERS and G. FRIES (Kolloid-Z., 1936, 76, 289–291).—The mol. wts., determined from the diffusion coeffs., are the same.

E. S. H.

Contribution of the humic constituents of coal to the products of distillation. B. G. ŠIMEK and J. LUDMILA (Mitt. Kohlenforschungsinst. Prag, 1935, 2, 308–317).—Distillation tests at 500° were carried out on an immature Bohemian humous coal, the humic acids contained therein, various humates, and the NH_3 -insol. residue of the coal. The yields of tar, gas, and semi-coke are tabulated. The humic acids and humates yield only a small % of the tar, which is mainly derived from the NH_3 -insol. residue. As the quantity of tar formed by the latter exceeds that which would correspond to the concn. of bitumen in it the existence of insol. compounds of bituminous substances with the humic coal substance is probable.

R. B. C.

Leakage of crude gas through the walls into the flues of coke ovens and its influence on the heating of the ovens. K. H. OSTHAUS (Glückauf, 1936, 72, 553–560, 587–591).—A method for determining, from the analysis of the flue gas, the quantity of crude gas leaking from the coking space into the heating flues is described. The utility of the method is illustrated by prolonged tests carried out with a SiO_2 oven. The influence of infiltration on the thermal efficiency is discussed.

R. B. C.

Combustion of bituminous coal on the small underfeed stoker. R. A. SHERMAN and E. R. KAISER (Amer. Inst. Min. Met. Eng. Tech. Publ., 1936, No. 750, 17 pp.).—An analysis is made of the reactions occurring during the combustion, the relations between rate of coal feed, rate of air supply, rate of combustion, and depth of fuel bed being discussed. Conditions are favourable to coke formation, coals normally considered as free-burning forming cokes in the stoker fuel bed. The performance of a coal is determined by its caking and coking properties and by its size range, the two being, for many coals, closely related. The advantages of automatic air control are also discussed.

H. C. M.

Rapid calculations concerning the combustion of coal. V. R. L. REES (Ind. Chem., 1936, 13, 410–412; cf. B., 1936, 482).—A nomograph for obtaining the heat lost in the combustible gases in flue gas and the basis on which it is derived are given.

D. K. M.

Carbonisation of coal with electricity. H. STEVENS (Fuel Eng. Appalachian Coals, May 11, 1936, 30 pp.).—Coal is carbonised in a vertical retort by the passage of a current of electricity directly through the charge. The current is carried initially by a core of coke breeze in a suitable container introduced down the centre of

the charge; as carbonisation proceeds the current is carried by the coke produced (cf. U.S.P. 1,938,121–5; B., 1934, 916). The gases and vapours produced pass through the mass of uncarbonised material to the offtakes. Two retorts, of $1\frac{1}{2}$ tons and 30 tons capacity, respectively, have been constructed and operated. The products obtained indicate that the process is intermediate between a low- and a high-temp. carbonisation. High rates of processing and flexibility of control are claimed. About 350 kw.-hr. are required to carbonise 1 ton of coal. The economics of the process, utilising off-peak power from hydro-electric plant, is discussed.

A. B. M.

Steam-distilled coal gives low-temperature coke in the Karrich carbonisation process. S. C. JACOBSEN and G. W. CARTER (Coal Age, 1936, 41, 148–151).—In the Karrich low-temperature carbonisation process superheated steam (650°) is passed downwards through coal in a vertical retort. By combining three retorts in one unit the process can be made continuous. The plant installed at the University of Utah is described and yields per ton of coal are given.

R. B. C.

Coking properties of coals. F. COUFALÍK (Mitt. Kohlenforschungsinst. Prag, 1935, 2, 292–307).—Methods for investigating the changes in the plasticity of coal on heating are reviewed. The apparatus employed by Heuser and by Foxwell was used to study the plastic properties of Ostrau-Karwin coals. Comparison of the results obtained shows that the properties of coal in the plastic stage depend on such factors as particle size, rate of heating, etc. Neither method gives an exact measure of plasticity; Foxwell's method, however, is of more practical val.

R. B. C.

Micro-incineration. III. Shrinkage phenomena during carbonisation and ashing of wood. F. M. UBER and T. H. GODSPEED (Proc. Nat. Acad. Sci., 1936, 22, 463–469).—The influence of the quantity of adhesive used to fix sections on slides on the incineration pattern is examined. The use of the author's technique in the examination of charcoals is discussed.

A. G. P.

Determination of duration of incandescence of small particles of solid fuels. H. LÖFFLER (Feuerungstech., 1935, 23, 110).—The fuel tested consisted of dust of high calorific val. and low ignition point from a locomotive smoke box. The ash contents of the various gradings were: > 4 mm., 20%; 4–2 mm., 25%; < 2 mm., 50%. The volatile contents varied between 3 and 15%. The duration of incandescence was inversely \propto the speed of the air draught and depended on the particle size.

R. B. C.

Ceresin from coke. E. GRAEFE (Petroleum, 1936, 32, No. 37, 5–8).—The properties of the wax produced in the Fischer benzene synthesis are briefly discussed (cf. B., 1935, 582). Its high oil-binding properties make it suitable for the preparation of polishes etc. It may also prove a useful source of fatty acids, into which it can be converted by oxidation.

A. B. M.

Determination of the strength of coke. B. G. ŠIMEK and F. COUFALÍK (Mitt. Kohlenforschungsinst. Prag, 1935, 2, 262–279).—Comparative strength tests were carried out on coke samples taken from the coke

side, middle, and machinery side of a coke-oven chamber. The samples were subjected to the A.S.T.M. impact, the Micum-drum, and the sand-blast abrasion tests (*ibid.*, 194). The orders of the samples according to the different tests were not very consistent, so that only relatively large differences in strength could be recognised. Soft cokes gave inconsistent results. The last-mentioned test appears to be a reliable method of estimating strength. Comparison of the various test results showed that coals, in general, are stronger than cokes. The vals. of the strengths of various cokes varied only within limits of $\pm 20\%$. R. B. C.

Natural gases in France. V. CHARRIN (J. Usines Gaz, 1936, 60, 49—56).—A geological and geographical review includes analyses of various types of French natural gas. R. B. C.

Water-gas reaction apparently controls exhaust gas composition. G. W. GLEESON and W. H. PAUL (Nat. Petroleum News, 1936, 28, No. 8, 25).—Controlled proportions of CO_2 or H_2O were introduced into an internal-combustion engine, the exhaust gas from which was continuously analysed. Addition of H_2O decreased the CO/H_2 ratio and increased the $\text{H}_2\text{O}/\text{CO}_2$ ratio, whilst addition of CO_2 had the reverse effect. It is concluded that the water-gas reaction controls the composition of the exhaust gas, that the CO/H_2 ratio has more influence than the $\text{CO}_2/\text{H}_2\text{O}$ ratio on the val. of the water-gas const., and that there is no selective combustion of any fuel constituent. R. B. C.

Continuous production of water-gas and synthesis gas. E. GROH and R. SCHMIDT (Braunkohlenarch., 1936, No. 44, 50—53). R. B. C.

Production of "synthesis" gas in the Technical Research Plant, "Reiche Zeche," Freiberg i. Sa. A. JÄPELT and A. STEINMANN (Braunkohle, 1936, 35, 353—357, 372—377).—Heat and material balances are given. Production of 1 cu. m. (n.t.p.) of "synthesis" gas requires a heat expenditure of 607 kg.-cal. and costs < 1 Pf. R. B. C.

Dry desulphurisation of gas. K. BUNTE, H. BRÜCKNER, and A. LENZE (Gas- u. Wasserfach, 1936, 79, 669—672, 689—693).—An apparatus is described by which the rate of absorption (*A*) of H_2S by Fe_2O_3 and of regeneration (*R*) by O_2 of used Fe_2O_3 can be followed. Four different samples of Fe_2O_3 were studied and results are given. Each sample had its own characteristic *A* and *R*. There are optimum temp. for *A* and *R* which vary with the sample studied. Increased H_2O content greatly accelerates *A* and *R*; alkali addition has no effect. The method serves for rapid evaluation of Fe_2O_3 for use in gasworks. J. W.

Removal of free sulphur from spent [iron] oxide. E. L. SWEENEY and A. E. SANDS (Gas Age-Rec., 1936, 77, 657—662; Amer. Gas J., 1936, 144, No. 6, 16—19, 51).—Three methods were studied: (a) extraction with solvents, (b) extraction with $(\text{NH}_4)_2\text{S}$ or NH_3 liquor, and (c) melting out by treatment with steam. Methods (b) and (c) are not very satisfactory. Extraction with molten C_{10}H_8 , heavy solvent naphtha, kerosene, or "Solvesso" solvent gave a high yield of S. Addition

of 15% of Na_2SO_3 to the extracted oxide improved its activity only for a short time. R. B. C.

Determination of Prussian-blue in gas-purification masses. E. BOYE (Chem.-Ztg., 1936, 60, 757—758).—The material freed from S by extraction with CS_2 , and dried below 70° , is boiled for 30 min. with 5 g. of NaOH in 10 c.c. of H_2O , and 50% H_2SO_4 is then added. HCN is distilled into a trap containing 10% aq. Na_2CO_3 , and is determined colorimetrically. J. S. A.

Removal of carbon monoxide from town's gas. H. KIESEL and D. WITT (Gas- u. Wasserfach, 1936, 79, 618—620).—Removal of CO from town's gas, for which two processes have been proposed in Germany, in general involves the replacement of 20% of CO by CO_2 , N_2 , H_2 , and CH_4 and an increase of inerts up to 20%. This figure is not considered unreasonable, but the alteration of the rate of ignition in the Müller process would require a general alteration of burner design. Gas drying would probably be needed and the gas would not be less corrosive. A great throughput of coal and output of coke is involved and some minor additional working costs are anticipated. C. I.

Quantitative analysis of deposits in manufactured gas-distribution systems. A. R. BAYER (Amer. Gas J., 1936, 144, No. 6, 22—24, 50).—A 5—10-g. sample is extracted with a solution consisting of 95 vol.-% of EtOH and 5 vol.-% of a 0.5% Na oleate solution, which removes H_2O , light oils, and gums dissolved therein, and subsequently with Cellosolve, which removes the bulk of the liquid- and vapour-phase gums. Details of the methods used for separating the constituents of each extract are given. R. B. C.

Yield of primary tar from different density fractions of an East Elbe brown coal. W. GROSS and L. KREMSER (Braunkohlenarch., 1936, No. 45, 10—14).—Brown coal, dried and crushed to < 75 μ size, was separated into fractions of different *d* by means of a graded series of mixtures (xylene- CCl_4 and CCl_4 - $\text{C}_2\text{H}_2\text{Cl}_4$, respectively). The ash content of the lightest fraction (*d* < 1.315) was 3.6% and of the heaviest 9.3%. The yield of primary tar decreased with increasing *d* of the fractions. R. B. C.

Separation of a yellow oil in mixtures of tar and bitumen. R. LACAU (Compt. rend., 1936, 203, 492—493).—A microscopical examination reveals the yellow oil to be a colloidal constituent of the tar. D. C. J.

Manufacture of straight asphalts. V. Cementing strength, tensile strength, and impact test of Schultz asphalt. Y. ICHIKAWA (J. Soc. Chem. Ind., Japan, 1936, 39, 189 B; cf. B., 1936, 676).—Schultz asphalt (I) is stronger than steam-reduced asphalt as regards cementing and tensile strengths, but weaker in respect to impact test. It is concluded that the asphaltene content of (I) is very small and the susceptibility high. C. C.

Simultaneous treatment of brown-coal producer tar and Czechoslovakian crude petroleum. B. G. ŠIMEK (Mitt. Kohlenforschungsinstit., Prag, 1935, 2, 62—79).—A 1:1 mixture of brown-coal Mond producer tar and Gbely crude petroleum was treated with 1 wt.-% of conc. HCl at 70 — 80° . On settling, an upper oily

layer free from polymerised oils and a lower layer of "acid" pitch separated. The analyses and boiling ranges of the initial and final products are tabulated.

R. B. C.

Hydrogenation of primary tar from a Westphalian "flame" coal. H. WINTER, G. FREE, and H. MÖNNIG (Bergbau, 1936, 49, 147—150).—The highest yield of light oils was obtained when working at 480° in presence of $(\text{NH}_4)_2\text{MoO}_4$ on SiO_2 gel, with a H_2 pressure ≥ 200 atm. The olefinic, aromatic, naphthenic, and paraffinic constituents were determined in the various fractions of the primary and hydrogenated tar. Olefines decreased up to 250°, but did not completely disappear; aromatics decreased up to 200° and increased between 200° and 300°; paraffins and naphthenes increased up to 200°.

R. B. C.

Utilisation of Fushun green shale and refining of Fushun shale oil. VI. General properties of the oil. VII. Autoxidation of the oil. VIII. Mechanism of autoxidation of the oil. IX. Mechanism of oxidation and heating of the oil. K. ISHIBASHI (J. Soc. Chem. Ind. Japan, 1936, 39, 185—187 B).—VI. Fushun shale oil is a paraffin-base oil yielding about 1% of gasoline, 60% of heavy oil, and 23% of crude paraffin. (Cf. B., 1936, 581.)

VII. The oil oxidises and polymerises in air with gradual increase in the proportion of oil-insol. products, the latter increasing with the boiling range of the fractions. Light oils oxidise more quickly, but to a smaller extent, whilst the oxidation is greatest with cracked oil.

VIII. The separated products contain more N than petroleum asphaltene, and it is concluded that the mechanism of the autoxidation is similar to that of petroleum, but the greater deterioration is due to the high content of unsaturated compounds and to the effect of N compounds.

IX. When oxidised with air at 120° the composition of the product changes during the course of the oxidation; the proportion of N and S decrease and of O increases. It is concluded that the mechanism of accelerated oxidation is similar to that of autoxidation except that the absorption of O is greater in the former case.

C. C.

Thermal properties of petroleum. W. GOLDSTERN (Petroleum, 1936, 32, No. 36, 1—2; cf. B., 1935, 981).—The following empirical formulæ express the sp. heat (C), heat content (i), heat of vaporisation (r), and vapour vol. (v) of petroleum as functions of the temp. etc.: $C = (0.402 + 0.00081t)/\sqrt{\gamma}$ kg.-cal./kg./°C., $i = (0.402t + 0.000405t^2)/\sqrt{\gamma}$ kg.-cal./kg., $r = (60 - 0.09t)/\gamma$ kg.-cal./kg., and $v = 0.0281(t + 273)(1.03 - \gamma)/p\gamma$ cu. m./kg., where t = temp. °C., γ = sp. gr. in kg./litre at 15°, and p = pressure in atm. A. B. M.

Destructive hydrogenation of Rumanian petroleum residues from Moreni. C. CÂNDEA and A. MARSHALL (Chim. et Ind., 1936, 36, 463—468).—The experiments were carried out in a 1.9-litre autoclave. By the hydrogenation of a crude, paraffin-base petroleum residue at 350°/100—300 atm., in presence of a MoO_3 catalyst, 70—80% of liquid product was obtained. The yield of benzene (to 150°) reached a max. of 44% (of

the liquid product) at 230 atm., whilst that of benzene (to 200°) reached a max. of 58% at 87 atm. The proportions of aromatic and unsaturated hydrocarbons in the benzene (to 150°) fell, and that of naphthenes rose, with increasing reaction pressure. The S content of the product also fell as the pressure increased. The benzene was of better quality than that obtained by cracking.

A. B. M.

Evaluation of bleaching earths used in the Russian petroleum industry. M. BLAGODAROV (Petroleum, 1936, 32, No. 36, 2—6).—The relative efficiencies of different earths may vary with the temp., the material under treatment, and the quantity employed. These possibilities lead to difficulties in devising a standard test for the quant. comparison of the efficiencies of different earths. Various tests are discussed.

A. B. M.

Synthesis of benzene from carbon dioxide and hydrogen at ordinary pressures. XXVII. Nickel-cobalt or cobalt-alloy catalysts. XXVIII. Nickel catalysts. XXIX. Influence of tube width and length of layer of catalyst. S. TSUNEOKA and Y. MURATA. XXX. Influence of the amount of contact on the reaction. Y. MURATA and S. TSUNEOKA. XXXI. Influence of the velocity of gas stream on the reaction. Y. MURATA, S. ISHIKAWA, and S. TSUNEOKA (Sci. Papers Inst. Phys. Chem. Res. Tokyo, 1936, 30, 1—14, 15—29, 30—39, 40—51, 52—59; cf. B., 1935, 1081).—XXVII. The formation of benzene from CO and H_2 (1:2) has been studied at 195—250° on Ni-Co-Si (1:1:2), Ni-Co-Si-Mn, and Co-Si (1:2) catalysts. The catalytic activity is increased by fusion in a high-frequency oven owing to greater homogeneity, and by decrease in grain size; with Co-Si catalysts, however, a marked decrease in grain size gives a loss in activity. The Co-Ni catalyst gives less hydrogenation than the Ni-Co-Si alloy, has an optimum temp. of 230°, and is affected adversely by previous heat-treatment with H_2 . Mn acts as a poison on the Ni-Co-Si catalyst, decreasing hydrogenation and increasing polymerisation (cf. Fischer and Meyer, A., 1934, 389).

XXVIII. The alloys Ni-Al (1:1), Ni-Si (1:1), Ni-Mn-Si (1:0.2:1), and Ni-Fe-Al (1:1:2) have been studied as catalysts. Activity increases with decreasing grain size. Treatment with H_2 gives a better yield of benzene with the Ni-Al catalyst at 350°, but a poorer yield at 450°; the other alloys do not require H_2 treatment. Activity is in the order Ni-Si-Mn < Ni-Si < Co-Si. The Ni-Al alloy at 240—250° is a good catalyst for the prep. of CH_4 .

XXIX. A suitable tube width (W) for 10 g. of Ni-Co catalyst is 13 mm. The yield of gaseous hydrocarbons increases as W decreases. The tube length (L) for $W \geq 13$ mm. is 30 cm.; for $W = 20$ mm. $L = 50$ cm. Decrease in L (< 30 cm.) for equal W gives increase in yield of gas and increase in fluidity of benzene.

XXX. After reaching a limiting val., which depends on the reaction conditions, a further increase in quantity of Ni-Co-Si catalyst does not influence the yield of benzene, but increases the yield of CO_2 and gaseous hydrocarbons. With < the limiting amount of catalyst polymerisation and hydrogenation are hindered.

XXXI. Using a const. quantity of Ni-Co catalyst there is an optimum streaming velocity (V) of gas mixture, below and above which the yield of benzene decreases. Unsaturation of benzene increases with V ; d , polymerisation, and hydrogenation decrease as V increases. At small vals. of V the formation of CO_2 and CH_4 is favoured and that of heavy hydrocarbons repressed. R. S. B.

Influence of preheating on oxidation and ignition of hydrocarbons. R. WELLARD (Ann. Off. Nat. Comb. liq., 1936, 11, 275—343).—The ignition temp. (I) of mixtures of various fuels and air under an initial pressure of 1, 2, or 4 atm. were determined over a range of fuel-air ratios and with varying rates of heating (R). In the case of C_2H_4 , C_5H_{10} , and EtOH , having $I > 300^\circ$, an increase in R caused an increase in the "pressure rise on ignition" (P), and widened the explosive limits. Spontaneous inflammation (S) did not take place below a definite min. R . Petrol and C_6H_{14} , having $I < 300^\circ$, showed a decrease in P with an increase in R . cycloHexane occupied a position intermediate the above two groups, and was scarcely affected by R . It is suggested that the above phenomena are related to peroxide formation prior to ignition. The work performed on explosion of air-fuel mixtures when heated to various temp. and ignited, either spontaneously or by spark, was measured. A distinct increase in the work performed was noted at the temp. at which peroxides first appeared. This increase became greater with temp. rise. S corresponded with the max. amount of work. The variation in R , while leaving longer or shorter time for peroxide formation, modifies the nature of the explosive pressure. The presence of peroxides in internal-combustion engines as a result of abnormal heating of the fuel is probably responsible for pinking. R. B. C.

Interaction of sulphur with hydrocarbons. H. F. TAYLOR (Mem. Manchester Phil. Soc., 1934—5, 79, 99—105).—Tarry S from gasworks spent oxide after heating to b.p. gives a black residue (I) insol. in CS_2 and all other org. solvents, containing 37—38% C and approx. 0.15—2.5% H (corresponding with C_2S). A similar product is obtained from pitch and S and paraffin wax and S. (I) glows on heating, like charcoal, reacts slowly with H_2SO_4 and rapidly with HNO_3 and with dil. H_2SO_4 and $\text{K}_2\text{Cr}_2\text{O}_7$. On heating at 500 — 550° in a current of CO_2 , or on boiling with 10% NaOH , the S content of (I) decreases to 40—44% (C_4S ?). (I) is probably a compound. R. S. B.

[Continuous] electric purification of oil. G. SADAKIYO (J. Fuel Soc. Japan, 1936, 15, 78—79).—Oil is completely freed from emulsion or colloidal material by applying a unipole high-tension current to the warm oil and, at the same time, either blowing in steam or adding powdered or fibrous material. Eddy currents are thereby set up in the oil which result in the coagulation and subsequent pptn. of the emulsion or suspended material. H. C. M.

[Bunker] fuels. III. Homogeneity and stratification phenomena. IV. Alteration by heat. P. WOOG, J. GIVAUDON, and R. SIGWALT (Ann. Off. nat. Comb. liq., 1936, 11, 209—250, 251—259; cf. B., 1936,

723).—Different batches of fuel oils remained stratified when pumped in or out of storage tanks. Experiments with various pairs of liquids showed that the phenomenon is general. Liquids of similar composition mixed more easily than those of different composition. Deterioration occurs when some fuel oils are passed through preheating coils at 200° . A method for determining the extent of deterioration is described. 18 g. of oil are heated for 6 hr. at 300° in a sealed tube containing N_2 . On cooling, the residue is filtered from the oil and weighed. Oils yielding < 2 g. of residue do not deteriorate in service. R. B. C.

Measurement of the quality of high-speed oil engine fuels. A. L. BIRD and S. G. BAUER (Engineering, 1936, 142, 164—166).—The ignition lag (I) of Diesel fuels is ascertained by continuous observation of the crank angle at which the fuel injector opens and the angle at which the fuel begins to ignite. The injection is timed by the closing of a contact within the first 5% of the needle lift, whilst the ignition time is taken from an ionisation gap at a suitable point. When the flame reaches the gap, a discharge of a thyatron valve is started which lights up a Ne lamp. This is observed stroboscopically as a band of light until the fuel-injection valve again lifts, when the lamp is short-circuited, putting out the discharge. The length and location of the dark space between the stop and start of the band of light in the stroboscope correspond to the duration and timing of I as measured on a scale divided in degrees of crank angle. Fixing the end of the delay period at top dead centre, it is shown that I varies with load or amount of excess air, and with water-jacket temp. The application of the method for investigating the performance of fuels under various conditions is further described. C. C.

Viscosity as a function of volume and temperature of oils. R. B. DOW (Physics, 1935, 6, 270—272; cf. A., 1935, 24).—The η -vol. isotherms for lard, sperm, and medium Pennsylvania oil sat 25° , 40° , and 75° were examined. They are not a function of sp. vol. alone. Pressure and temp. changes affected η differently. The oils do not obey Batschinski's equation at 1—4000 kg./sq. cm. CH. ABS. (c).

Vapour tensions of motor fuels. J. VERDIER and L. HUREL (J. Usines Gaz, 1936, 60, 218—220).—The vals. for various samples of fuel were determined in vac. (H_2O -pump) and in air at 1 atm. When working in vac. the liquids must be previously degassed to give results agreeing with those obtained at 1 atm. R. B. C.

Non-freezing lubricants. III. Production by adding solid fats, solid waxes, or depolymerised oil produced from caoutchouc. Y. TANAKA, R. KOBAYASI, and T. TSUKUDA. **IV. Production by dechlorination of chlorinated liquid paraffin or by adding dechlorinated oils resulting from condensation products of chlorinated paraffin-naphthalene to freezing lubricating oils.** Y. TANAKA and R. KOBAYASI (J. Soc. Chem. Ind., Japan, 1936, 39, 197—199 B, 199—201 B).—III. Solid fats and waxes depress the m.p. of lubricating oils, the triglycerides of higher fatty acids having a greater effect than solid waxes or

mono- or di-glycerides of these acids. Depolymerised oil from caoutchouc (obtained by refluxing the latter with xylene or by topping a solution of caoutchouc in spindle oil in vac.) also lowers the m.p. when blended with either asphaltic or paraffin-base oils. The η of the latter is increased, whereas the η -temp. curves differ little from those of the original oils, and the blends have comparatively high fluidity at low temp. The η of the blends does not change on prolonged heating. There is a crit. concn. (usually $< 1\%$) of depolymerised oil below which the latter acts as a pro-oxidant and above which it is an antioxidant. Flash point is not affected, but cloud point is lowered so that the formation of paraffin crystals is inhibited.

IV. By catalytically dechlorinating liquid paraffin which has been chlorinated by the action of Cl_2 at 5° , a high-grade, non-freezing lubricating oil is produced. The d , mean mol. wt., and flash points of the dechlorinated oils steadily increase with increasing amounts of Cl added to the original oil. The η -temp. change at low temp. is extremely small. By dechlorinating a condensation product obtained by chlorinating paraffin wax, adding C_{10}H_8 , and continuing the chlorination, a product is obtained which when blended with lubricating oil resembles Parafflow in effect. The blend (with a paraffin-base oil) has a lower η -temp. change at low temp. than has an asphaltic-base oil of similar η at room temp. C. C.

Lubricating properties of mineral lubricating oils. J. J. TRILLAT and (Mlle.) R. VAILLÉ (Compt. rend., 1936, 203, 159–161).—Filter paper, glass wool, cotton, and metal surfaces adsorb selectively oleic acid (I) from a 1 : 3000 mixture of (I) and paraffin oil. The no. of dipolar mols. similarly adsorbed from technical lubricating oils is probably a characteristic for each oil.

J. G. A. G.

Treating lubricating oils to improve their viscosity index. G. M. WOOD (Petroleum Eng., 1935, 7, No. 3, 56).—The possibility of improving the η index of Mid-continent lubricating oil by acid treatment to enable it to compete with solvent-treated oils was investigated. Three grades of dewaxed oil having A.P.I. gravities of 26.6, 23.1, and 21.4, and η indices of 76, 70 and 84, respectively, were treated with 75 lb. of 98% H_2SO_4 per barrel, agitated with air, and allowed to settle for 24 hr. Treating losses amounted to 20.4, 31.5, and 48% respectively. The acid oils were placed in contact with Filtrol clay in the proportion of 0.5, 0.6, and 1.0 lb./gal. at 204° , 232° , and 287° respectively. Mechanical and steam agitation were both employed. After contact for 1 hr. the gravities of the filtered oils were 30.1, 28.3, and 26.1, and the η indices 102, 98, and 101. The high treating losses by this method would be partly offset by being able to dispense with solvent-treating equipment.

R. B. C.

Manufacture of thick greases: II, III. W. MAASS (Petroleum, 1936, 32, No. 28, 1–8; No. 32, 1–4; cf. B., 1936, 729).—II. Manufacturing methods and specifications for various types of greases are described.

III. A penetrometric method of testing thick greases is outlined.

J. W.

Cutting media. Modern sulphurised oils. E. E. HALLS (Ind. Chem., 1936, 13, 403–406).—The characteristics of fixed and mineral oils and mixtures of these to which S has been added as cutting media are discussed and the advantages of the blended oils are indicated.

D. K. M.

Generation and absorption of gas in insulating oils under the influence of an electric discharge. G. W. NEDERBRAGT (J. Inst. Electr. Eng., 1936, 79, 282–290).—Measurements were made of the gas generated by mineral oils at 1 mm. and 1 atm. pressure when subjected to an electric discharge. Under reduced pressure highly refined spindle oils show much greater gas generation than does an aromatic Edeleanu extract, but in the latter case gas evolution is greatly increased by addition of 10% of gasoline, whilst for non-aromatic oils the gas generation is greatly reduced by addition of a low (0.5–5) % of more volatile aromatic substance (but not by one having the same volatility). The gas generated from liquid paraffin increases with rise of temp., whilst for pure paraffin hydrocarbons it is the greater the lower is the b.p. Under 1 atm. of H_2 , the pressure above a highly refined spindle oil rose both at 20° and 60° , but the more rapidly at 60° . A less refined oil showed a decrease in pressure at 20° but an increase at 60° . With a highly refined spindle oil containing 3% of C_{10}H_8 , the H_2 pressure decreased when the discharge was applied both at 20° and 60° , but the more quickly at 60° . Well-refined cable and switch oils and also condenser and transformer oils, which will generate little gas and yet retain their high resistance to oxidation, high breakdown voltage, and low loss angle, can be prepared by adding $\approx 10\%$ of aromatic substance more volatile than the oil, e.g., C_6H_6 , C_{10}H_8 , tetralin, 1- $\text{C}_{10}\text{H}_7\text{Me}$, Ph_2 , $\text{C}_5\text{H}_5\text{N}$, quinoline, NH_2Ph , etc. The most suitable substance to add and the best proportion differ with different oils.

C. C.

Grinding and pulverising. Calculating v.p. data.—See I. **Asphalt etc. cements.**—See IX. **Bitumen in paint.**—See XIII. **C blacks for rubber.**—See XIV.

PATENTS.

Purification of coal or like products. F. J. MEUNIER (B.P. 451,402, 29.11.35).—In apparatus of the heavy-liquid type, especially for medium sizes, e.g., 15–100 mm., the floating stratum is moved by a rake conveyor dipping into it from above; means for removing several different grades of underflow separately are provided, and the addition of make-up liquid of high d is controlled by a densimeter.

B. M. V.

Prevention of coal-dust explosions in coal mines. W. WARR (B.P. 451,934, 10.2.36).—10 lb. of a mixture of MgSO_4 with NaCl or NH_4Cl and 1 lb. of a wetting agent (Perminal W) in 2 gals. of H_2O are sufficient to treat 60–100 lb. of coal dust.

B. M. V.

Coke ovens. G. CELLAN-JONES (B.P. 451,747, 20.11.35).—The coke ovens comprise longitudinal coking chambers (C) alternating with heating units, each of which comprises two series of vertical flues (F), one lying adjacent to one C and the other adjacent to the other C. A series of chambers lying below F communicate therewith; combustion gases from suitable burners

pass through supply passages to these chambers and thence to *F*. All *F* in one heating unit communicate with a horizontal flue lying above them; this in turn communicates by means of a vertical flue or flues at one end of the heating unit with a horizontal waste-gas flue lying below the sole of the *C*. A. B. M.

Cracking and coking hydrocarbon mixtures. H. A. BRASSERT & Co., LTD., A. FISHER, and H. A. BRASSERT (B.P. 452,500, 19.11. and 1.12.34).—Mixtures of coal and oil are carbonised in sole-fired ovens (cf. B.P. 440,181; B., 1936, 259) and the volatile products are washed, refluxed, and fractionated in a single processing column (*C*), which preferably contains baffle plates in the lower sections and bubble trays in the upper. The temp. at the bottom of *C* is maintained at 315–370° by circulating part of the liquid which collects therein through a heater. A. B. M.

Distillation treatment of materials containing hydrocarbons. J. SWALLOW (B.P. 452,702, 16.3.36).—The inner side of the upper end of an inclined rotary retort (*R*) of the type described in B.P. 393,601—2 (B., 1933, 738) has intersecting longitudinal and circumferential flanges in order to improve the control of the mixture of coal and oil which is being carbonised. The middle part of *R* has only longitudinal flanges, whilst the lower end has none. A. B. M.

Preheating of carbonaceous materials prior to destructive hydrogenation and like conversion processes. COUTTS & Co., and F. JOHNSON. From I. G. FARBERIND. A.-G. (B.P. 452,512, 25.2.35).—The initial materials are preheated in heat interchangers by indirect heat exchange with the hot products leaving the reaction chamber, the temp. of which has been further raised by addition of a heating medium, e.g., superheated steam. A. B. M.

Hydrogenation of coal and other carbonaceous compounds. COMP. DE BETHUNE (B.P. 452,821, 22.10.35. Fr., 22.10.34).—The apparatus comprises a no. of units arranged in series and heated externally. Each unit consists of a long, narrow tube closed at the lower end, down the centre of which projects an inner tube, open at the end, so that the material (tar, coal suspended in oil, etc. admixed with H_2) passes down the inner tube and up through the annular space between the two tubes. The inner tube has hollow walls packed with a heat-insulating medium, to prevent the material entering the unit from unduly cooling that leaving the unit. A. B. M.

Manufacture of gas by the complete gasification of coal. A. R. GRIGGS and G. W. WALLACE (B.P. 452,538, 17.8.35).—Coal is gasified in a generator of the type containing an upper carbonising zone, and a lower, water-gas-production zone. The blast gases are withdrawn through a circumferential offtake between the two zones; the water-gas formed during the "run" is passed through the upper zone to effect the desired carbonisation, and is withdrawn admixed with the carbonisation gases. To facilitate uniform and complete carbonisation, a core of coke, non-coking coal, or other suitable granular carbonaceous material is formed within the generator by feeding this material thereto

through a duct passing centrally through the coal-feeding device. A. B. M.

Removal of sulphur compounds from gases. GAS LIGHT & COKE CO., H. HOLLINGS, R. H. GRIFFITH, and R. N. B. D. BRUCE (B.P. 452,167, 30.4.35).—Coal gas etc. is scrubbed with a relatively large quantity of oil, e.g., > 25 gals. per 1000 cu. ft. The oil is freed successively from CO_2 by washing with aq. K_2CO_3 or aq. $N(C_2H_4.OH)_3$, and from CS_2 by washing with 70–98% aq. MeOH containing 5% of NaOH, and, after a final H_2O wash, is recirculated. The aq. $KHCO_3$ formed is decomposed by heating to regenerate aq. K_2CO_3 , and the alcoholic Na xanthate is acidified and distilled to recover the MeOH and CS_2 . A. B. M.

Desulphurisation of gases. STUDIEN- U. VERWERTUNGS-GES.M.B.H. (B.P. 452,417, 21.1.35. Ger., 31.1.34).—Gases containing H_2 and CO are freed from org. and other S compounds by treating them with a mixture of < 10% of alkali carbonate with reactive oxides or hydroxides of Fe (e.g., Luxmasse) at 150–300°, but below the temp. at which undesirable side reactions with the CO occur. A. B. M.

Detection of the presence of combustible gases in the atm. J. H. NAYLOR, LTD., and J. E. SMITH (B.P. 451,678, 12.2.35).—A pair of matched electric filaments is used, one being placed in a const. atm. and the other in connexion with the mine atm. through Davy gauzes. The rays from each lamp fall on photoelectric devices connected in opposition and in series with a galvanometer. B. M. V.

Distillation of tar and like hydrocarbon oils [for recovery of tar acids]. H. G. C. FAIRWEATHER. From BARRETT Co. (B.P. 452,710, 27.11.34).—The preheated tar is scrubbed with an inert gas, e.g., steam, containing neutral oil vapours, at < 125°, and is thereby freed from tar acids. The latter are recovered by washing the gas and vapours with conc. aq. NaOH at < 120°, and the gas and neutral oil vapours are recirculated. A. B. M.

Treating waste [sulphuric] acid [from petroleum refining]. A. B. BROWN and D. W. BRANSKY, ASSRS. to STANDARD OIL Co. (U.S.P. 2,022,800, 3.12.35. Appl., 30.6.32).—The C content of the acid sludge obtained by treating cracked refined oils and naphthas with 75–93% H_2SO_4 is reduced by adding to it a proportion of oil-insol. sulphonated products obtained in the treatment of lubricating oils with oleum, diluting to 30% acid, heating to 90–95° with agitation, settling the sludge, and decanting the clear acid. The product is suitable for use in pickling baths, or may be conc. for re-use in oil refining. A. R. P.

Treatment of [oil-refinery] mineral absorbent material. G. R. LEWERS, ASSR. to NICHOLS ENG. & RES. CORP. (U.S.P. 2,024,589, 17.12.35. Appl., 15.5.29. Renewed 19.10.34).—Fuller's earth from the decolorising of mineral oil is heated at > 300° in an inert atm. to recover its oil content, and then through a multiple-hearth furnace in an oxidising atm. to burn off C. A. R. P.

[Anticorrosion] lubricants. W. V. GILBERT (B.P. 447,687, 22.11.34. Ger., 23.11.33).— $ZnCrO_4$, $BaCrO_4$, or

SrCrO₄ is added to steam-heated glycerin or castor oil to produce a colloidal suspension; *e.g.*, the mixture consists of ZnCrO₄ 1, CaCrO₄ 2, and castor oil 50 pts.

A. R. P.

Separating dirt from coal. Revivifying adsorbents. Separating mixed liquids [*e.g.*, oils]. Drying gases.—See I. Cyanide composition.—See III. Sulphates and S. Bauxite catalysts for oil-cracking. Bentonites.—See VII. Steel tubes.—See X. Combustion of refuse etc.—See XXIII.

III.—ORGANIC INTERMEDIATES.

(A) Chloro-organic solvents. Prospects of development and uses of such solvents in U.S.S.R. P. I. ASTRACHANTZEV and N. N. DOROGOV. (B) Production of dichloroethane. A. F. DOBRJANSKI, R. A. GUTNER, and M. K. SCHTSCHIGELISKAJA. (C) Production of dichloroethane from ethylene and chlorine on a semi-commercial scale. A. F. DOBRJANSKI and M. S. CHOMUTIN. (D) Synthesis of tetrachloroethane from acetylene and chlorine. A. E. FAVORSKI, E. Z. MARGULES, and M. I. DAVUIDOVA. (E) Production of tetrachloroethane from acetylene. I. F. SUKNEVITSCH and M. S. CHOMUTIN. (F) Production of trichloroethylene from tetrachloroethane. A. J. SCHAGALOV and I. M. DOBROMILSKAJA. (G) Chlorination of di- and tri-chloroethane. L. G. TZJURICH. (H) Constants of di- and tri-chloroethane. M. A. PORTNOV and J. E. SEFEROVITSCH. (I) Production of chloroacetic acid from trichloroethylene. I. F. SUKNEVITSCH, A. J. SHAGALOV, and I. M. DOBROMILSKAJA. (J) Production of amyl alcohols from pentanes. A. F. DOBRJANSKI, E. Z. MARGULES, M. I. DAVUIDOVA, and A. S. VOLKENSCHTEIN. (K) Production of dichloropropane from propylene. A. F. DOBRJANSKI, R. A. GUTNER, and M. K. SCHTSCHIGELISKAJA. (L) Production of chloroform from alcohol. I. F. SUKNEVITSCH, A. A. CHILINGARJAN, and M. D. SERGEËNKO. (M) Electrothermal production of carbon tetrachloride. L. S. MAIOFIS, G. M. SCHUSTEROVICH, and N. N. BIBIKOV. (N) Effect of chloro-organic solvents on the human organism. N. V. LAZAREV (Trans. State Inst. Appl. Chem. U.S.S.R., 1935, 24, 5–20, 21–31, 32–47, 47–54, 54–66, 67–77, 77–80, 81–89, 89–96, 97–101, 101–108, 108–119, 119–127, 128–139).—(B) Equal parts of C₂H₄ and Cl₂ conducted into an Fe chlorinator (70–120°) gave a 92–99% yield (of theory) of C₂H₄Cl₂. Poor results were obtained in a Pb chlorinator. The method of fractional chlorination of waste cracking gases is based on the greater rate of chlorination of C₃H₆ and C₄H₈ than of C₂H₄. Waste gases from the production of synthetic rubber (C₂H₄ 20–25, CO 2–6%) can be chlorinated without forming COCl₂.

(C) The fractional chlorination of cracking gases is described.

(D) A jacketed column filled with Fe shavings is fed at the top with dry C₂H₂ and Cl₂, and C₂H₂Cl₄ (I) is sprayed in under pressure. At 60–70° a 95–98.5% yield of (I) is formed. Above 100° considerable C₂Cl₆ is formed.

(E) The semi-commercial process is described.

(F) C₂HCl₃ is formed by decomp. of (I) with aq. Ca(OH)₂.

(G) A high yield of (I) was obtained by chlorinating C₂H₄Cl₂ and CH₂Cl-CHCl₂ (II) with an AlCl₃ catalyst at 70–80°.

(H) Data for the *d* and *η* of mixtures of C₂H₄Cl₂ and (II), and vals. for the solubility of C₂H₄ in C₂H₄Cl₂, are given.

(L) To avoid excessive formation of EtOCl in the continuous process, the reaction mixture should be heated slowly. Fe reduces the yield of CHCl₃.

(M) A 68–80% yield of CCl₄ was obtained by passing S₂Cl₄ over C at 1000° in a special furnace.

CH. ABS. (e)

Calculating v.p. data.—See I. **Determining C₂H₄(NH₂)₂, (CH₂)₆N₄, etc.**—See XX.

PATENTS.

Manufacture of carbon disulphide. F. J. MOOTZ, Assr. to P. C. REILLY (U.S.P. 1,992,832, 26.2.35. Appl., 14.7.32).—A mixture of coal, coal tar, or pitch with NaOH (3–12%) is coked at 700–900°, and the product treated with S at > 1000°.

L. C. M.

Acetylation of liquid aliphatic polyhydroxy-aliphatic alcohols by means of a keten. P. K. FROLICH and P. J. WIEZEVEICH, Assrs. to STANDARD OIL DEVELOPMENT Co. (U.S.P. 2,018,759, 29.10.35. Appl., 5.3.32).—Acetylation (*e.g.*, of glycerol) is effected in an inert solvent (EtOH + COMe₂) by treating with keten at < 100°.

A. H. C.

Manufacture of a cyanide composition. H. D. YOUNG, Assr. to VAN SCHAACK BROS. CHEM. WORKS, INC. (U.S.P. 2,014,546, 17.9.35. Appl., 28.5.30).—Gas oil is cracked at 500–600° and the products are fractionated; each fraction is treated separately with conc. H₂SO₄, and the resulting alkyl sulphates are treated with NaCN at 20° to obtain the corresponding nitriles.

A. R. P.

Halogenation of diphenyl. C. R. MCCULLOUGH, Assr. to SWANN RES., INC. (U.S.P. 2,019,015, 29.10.35. Appl., 11.11.33).—Ph₂ or lower halogenated derivatives are chlorinated in the vapour phase in presence of catalysts at temp. < the ignition point.

A. H. C.

Production of an amine of high colour stability. R. P. and J. M. WEISS, Assrs. to WEISS & DOWNS, INC. (U.S.P. 2,019,032, 29.10.35. Appl., 19.9.34).—Darkening of NH₂Ph on storage is slower after distillation with < 2% of maleic anhydride.

A. H. C.

Purifying high-boiling mineral acids.—See VII. BuOH and COMe₂.—See XVIII.

IV.—DYESTUFFS.

Flavinduline derivatives. II. K. YAMADA and K. OIWA (J. Soc. Chem. Ind., Japan, 1936, 39, 207 B).—Naphthaquinone with *o*-aminodiphenylamine (cf. B., 1935, 586) affords a product, C₂₂H₁₄N₂, the hydrochloride [+0.5ZnCl₂, m.p. 278–279° (decomp.)], *hydrobromide*, m.p. 281–282° (decomp.), and *hydriodide*, m.p. 220–221° (decomp.), of which dye cotton, silk, and wool. The colours are fast to light and acids, but not to alkalis.

J. L. D.

Flavinduline and its derivatives. III. K. YAMADA and T. NOGUCHI (J. Soc. Chem. Ind., Japan, 1936, 39,

207—208 B).—Phenanthraquinone with *o*-aminomonomethylaniline in AcOH affords flavinduline, the hydrochloride [$+0.5\text{ZnCl}_2$, m.p. 200—205° (decomp.)], *hydrobromide*, m.p. 216—217° (decomp.), and *hydriodide*, m.p. 195—200° (decomp.), of which dye cotton, silk, and wool. The colours are fast to light and acids, but not to alkalis. J. L. D.

Flavinduline derivatives. IV—V. K. YAMADA and K. OIWA (J. Soc. Chem. Ind., Japan, 1936, 39, 208—209 B).—IV. Naphthaquinone with *o*-aminomonomethylaniline affords a flavinduline (I), $\text{C}_{17}\text{H}_{12}\text{N}_2$, the hydrochloride [$+0.5\text{ZnCl}_2$, m.p. 238—240° (decomp.)], *hydrobromide*, m.p. 223—225° (decomp.), and *hydriodide*, m.p. 226—228° (decomp.), of which dye wool, silk, and cotton; the colours are fast to acids, but not to alkalis.

V. The hydrochloride [$+0.5\text{ZnCl}_2$, m.p. 198—200° (decomp.)], *hydrobromide*, m.p. 246—247° (decomp.), and *hydriodide*, m.p. 186—187° (decomp.), of the Et analogue of (I) have similar dyeing properties. J. L. D.

Dyes in paint.—See XIII.

PATENTS.

Manufacture of vat-colour powders. E. I. DU PONT DE NEMOURS & Co. (B.P. 451,419, 5.2.35. U.S., 5.2.34).—A H_2O -insol. vat-dye paste is mixed with CH_2O -naphthalenesulphonic acid condensation product and dextrin, and dried to give an easily dispersible prep. The dry powder may be used to colour paper pulp. C. H.

Manufacture of [vat] dyes of the anthraquinone series. Soc. CHEM. IND. IN BASLE (B.P. 450,700, 27.2.35. Switz., 27.2.34).—A 1:1'-dianthraquinonyl (or corresponding *meso*-benz- or naphtha-dianthrone), carrying a 2- NH_2 or 2-acylamino-group and having in position 2' Me or no substituent, is treated with acid or alkaline condensing agents, e.g. H_2SO_4 , NaOH, or AlCl_3 , whereby a carbazole or phenanthridine is formed by linking between 2:2' positions by NH or N'CH. Examples are vat dyes from: 2-amino-1:1'-dianthraquinonyl (olive); 2-amino-*mesobenz*dianthrone (reddish-brown); 2-amino-2'-methyl*mesobenz*dianthrone (salmon-red); 2-amino-2'-methyl*mesonaphthad*ianthrone (orange). C. H.

Manufacture of [chromable] azo dyes. A. CARPMAEL. From I. G. FARBENIND. A.-G. (B.P. 451,420, 5.2.35).—Aminosulphones of the type $\text{NH}_2\cdot\text{C}_6\text{H}_4\cdot\text{CH}_2\cdot\text{SO}_2\cdot\text{C}_6\text{H}_3(\text{OH})\cdot\text{CO}_2\text{H}$, the OH being *ortho* to the CO_2H , are diazotised and coupled with pyrazolones, naphthylamine- or aminonaphthol-sulphonic acids. Examples are: 5-*o*-aminobenzylsulphonylsalicylic acid \rightarrow γ -acid in acid (on wool; + Cr, yellowish-red); 5-(2'-chloro-5'-aminobenzylsulphonyl)salicylic acid \rightarrow 1-(2'-chloro-5'-sulphophenyl)-3-methyl-5-pyrazolone (+ Cr, greenish-yellow); 5-(3'-amino-4'-methoxybenzylsulphonyl)-*o*-cresotic acid \rightarrow 3-methyl-5-pyrazolone (+ Cr, reddish-yellow); 5-(5'-nitro-2'-aminobenzylsulphonyl)salicylic acid \rightarrow γ -acid in acid (+ Cr, violet). C. H.

Photosensitising dyes.—See XXI.

V.—FIBRES; TEXTILES; CELLULOSE; PAPER.

Fundamental principles of raw wool washing. H. PHILLIPS (J. Text. Inst., 1936, 27, p 208—218).—

The interfacial tension (drop no. method) between soap solutions and lanoline decreases as the p_{H} rises from 8 to 10 (rapidly at about p_{H} 10). This rapid decrease occurs at lower p_{H} vals. as the soap concn. rises; with suint the decrease occurs at about p_{H} 8.5, and this low val. may be due to the high concn. of suint in scouring bowls. H_2O extracts of raw wools usually have the lower p_{H} vals., and this may be advantageous as it may allow dirt to drop out in the first bowl without too much emulsification of the grease. A. G.

Partial cleaning of wool by low-temperature treatment. S. TOWNEND (J. Text. Inst., 1936, 27, p 219—230).—The frosting process consists of a dusting treatment at -35° to -45° ; at this temp. the grease becomes hard and brittle, so that the greater part of the vegetable matter and a part of the grease are readily removed. The severity of the scour can then be diminished. Wool so treated has a better colour and handle than are obtained by normal processing, but there is possibly more fibre breakage. A. G.

Adsorption of water by wool. I. Adsorption hysteresis. J. B. SPEAKMAN and C. A. COOPER. II. Influence of drying conditions on the affinity of wool for water. J. B. SPEAKMAN and (MISS) E. STOTT. III. Influence of temperature on the affinity of wool for water. J. B. SPEAKMAN and C. A. COOPER (J. Text. Inst., 1936, 27, t 183—185, t 186—190, t 191—196).—I. Data are recorded for the limiting curves for adsorption and desorption of H_2O by wool at 25° , and for desorption from various initial R.H. vals. The range of R.H. over which wool must be dried in order to pass from adsorption to limiting desorption conditions is about 18%. For optimum spinning conditions tops should therefore be stored at R.H. \leq 18% above that of the spinning room.

II. When wool is partly or wholly dried from a regain below saturation its adsorptive power for H_2O is less the higher is the drying temp., but no such diminution of adsorptive power occurs if the wool is dried from the saturation regain or if it is heated after drying. The adsorptive power is restored by saturation with H_2O .

III. When the R.H. is \geq 80% the amount of H_2O adsorbed by wool falls linearly with rising temp.; at higher R.H. the isobars are curved, and at 97.5% R.H. the adsorption is a min. at 43° . At temp. $> 55^\circ$ and high R.H. rupture of disulphide linkings occurs. A. G.

Reactivity of the sulphur linking in animal fibres.

I. Chemical mechanism of permanent set. J. B. SPEAKMAN (J. Soc. Dyers and Col., 1936, 52, 335—346).—When strained animal fibres are steamed the strain is dissipated by the rearrangement of the salt linkings and the hydrolysis of the cystine linkings, $\text{R}\cdot\text{S}\cdot\text{S}\cdot\text{R} + \text{H}_2\text{O} = \text{R}\cdot\text{SH} + \text{R}\cdot\text{S}\cdot\text{OH}$. If released at this stage the fibres shrink to $<$ their original length. Prolonged steaming results, however, in a permanent set, and this must be due to the formation of fresh cross-linkings. These are resistant to alkali and to hot H_2O , 0.1N-acid, and aq. NaHSO_3 . Permanent setting is facilitated by substances such as Na_2SO_3 , NaHSO_3 , and borax which hydrolyse the cystine linkings, but not the peptide linkings, of the main chain. It is prevented by substances such as

HNO₂ and benzoquinone which attack free NH₂ groups, and by substances such as Ba(OH)₂, Ag₂SO₄, and oxidising agents which break cystine linkings, forming substances incapable of condensation with NH₂ groups. The new linkings are therefore formed by the reaction $R\cdot S\cdot OH + R\cdot NH_2 = R\cdot S\cdot NH\cdot R + H_2O$. A. G.

"Lanital" + wool mixture fabrics. H. C. BORGHETTI (Text. Res., 1936, 6, 463—464).—Although the Italian "Lanital" (I) is an inferior substitute for wool (cf. B., 1936, 880), it yields satisfactory fabrics if mixed with an equal wt. of wool. The felting properties of wool fabrics are much increased by the presence of (I), but are reduced by cotton and rayons. (I) may be distinguished from wool by its higher resistance to swelling in boiling aq. NaOH containing CH₂O.

A. J. H.

General histological examination of normal or mildewed cotton fibres. B. PRINDLE (Text. Res., 1936, 6, 481—487).—For microscopical examination such that the effect of mildew on the fine structure can be observed clearly, cotton fibres are first stained by immersion for 1 min. in a boiling 0.15% aq. solution of Victoria Blue B followed by thorough rinsing with boiling H₂O (only the fungi growth and the cuticle and lumen substances of each fibre are thereby stained), and then swelled by treatment on a glass microscope slide with a few drops of a cuprammonium solution (8 g. of Cu per litre). Mildewed fibres usually stain to a clearer brighter blue colour than normal fibres, and in the swelling treatment the fungi hyphae change to dark purple. Several photomicrographs of normal and mildewed cotton fibres are reproduced.

A. J. H.

Sorptive properties of silk fibre. R. CUTHILL (J. Text. Inst., 1936, 27, p 275—281).—A summary of the literature.

A. G.

Strength and X-ray diagrams of regenerated silk fibres. C. MATANO and M. NAKAMOTO (J. Soc. Chem. Ind., Japan, 1936, 39, 194—197 B).—X-Ray examination of filaments obtained by spinning coagulated fibroin sols under various conditions shows that with decreasing strength the orientation of the micelles falls, but the extensibility rises to a max. and then falls abruptly. Filaments with a low strength and extensibility become weaker by previous stretching, and the behaviour is explained by assuming that micelles orientated at large angles to the direction of stretch are unable to rotate under tension.

A. G.

Separation of flax fibres from the plant stem. W. H. GIBSON (J. Text. Inst., 1936, 27, p 298—306).—A review. Successful retting results in the separation of the fibre bundles from the surrounding tissues without breaking down the bundles to their ultimate fibres. Chemical retting lends itself to accurate control and results in yarns which are denser and stiffer and less discoloured.

A. G.

Past and future of flax production in Great Britain. G. O. SEARLE (J. Text. Inst., 1936, 27, p 197—207).

A. G.

Molecular structure of cellulose. I. Review of current theories. II. Evidence of the chemically

modified cotton celluloses. G. F. DAVIDSON (J. Text. Inst., 1936, 27, p 144—158, p 159—168).—I. A review.

II. When cotton cellulose is attacked by acids there is a continuous decrease in tensile strength and in η in cuprammonium solution, and a continuous increase in Cu no. and in solubility in cold aq. NaOH. The relations between these four properties are independent of the nature of the acid and the conditions of hydrolysis. This is explicable by the mol. chain theory if rupture of glucosidic linkings occurs always at points randomly distributed along the chain mols. For a given average chain length the distribution of chain lengths will then always be the same. When cotton cellulose is attacked by oxidising agents the relations between the properties of the oxycelluloses depend on the nature of the oxidising agent, and this would be expected if the mechanism of oxidation varied. Different types of oxycellulose are differently affected by hot dil. alkalis, and this also can be explained by the mol. chain theory.

A. G.

Lyophilic properties of cellulose and its derivatives. III. Hydration of cellulose. K. KANAMARU (J. Soc. Chem. Ind., Japan, 1936, 39, 240—244 B; cf. B., 1932, 880).—Determinations of ζ -potentials in H₂O of various cellulosic substances indicate that $\zeta_0 - \zeta_\infty$ is a measure of the hydration capacity, $\zeta_0 - \zeta_t$ of the degree of hydration, and $-d\zeta/dt$ of the rate of hydration. There is a parallelism between the vals of $\zeta_0 - \zeta_\infty$ and of the equilibrium H₂O content in an atm. of 70% R.H., and between the vals of $\zeta_0 - \zeta_t$ ($t = 40$ min.) and the H₂O content after 40 min.

A. G.

Calorimetric examination of the chlorolysis of cellulose. O. IRJALA (Suomen Kem., 1936, 9, A, 71).—Heat exchange during the first 30 min. action of HCl on cellulose (I) is traceable to the heat of wetting of (I), HCl adsorption, and dilution of the acid. The actual hydrolysis of (I) either proceeds very slowly or involves no heat change.

A. G. P.

X-Ray diffraction pattern of soda-cellulose. N. MATSUMOTO and G. HORI (J. Soc. Chem. Ind., Japan, 1936, 39, 183 B).—Soda-celluloses III and III' are found to be identical. Hydrocellulose from soda-cellulose has a fibre period of 10.39 Å.

A. G.

Incrustations of cellulose. Lignin. A. BARRETO (Bol. Min. Agric., Brazil, 1936, 25, 69—75).—The formation and constitution of lignin are discussed.

L. A. O'N.

Bacterial decomposition of lignified residues. L. GÉNEVOIS and DUFRENOY (Bull. Inst. Pin, 1936, 135—142).—A review. Aërobic and anaërobic processes of fermentation and humification of the constituents of lignified tissues, and the inhibitory effect of lignin on these processes, are discussed.

E. A. R.

Discontinuous delignification of straw cellulose. P. S. LARIN (Mat. Inst. Bumashn. Prom., 1935, No. 3—4, 11—44).—Good-quality cellulose is obtained in 46.5% yield by combining the discontinuous delignification and continuous maceration processes. The advantages and disadvantages of the method are discussed.

R. T.

Wood cellulose as a substitute for rag pulp for manufacture of millboard. M. F. MARTINOV, A. O. GILLER, and F. I. KORTSCHEMKIN (Mat. Inst. Bumashn.

Prom., 1935, No. 3—4, 45—68).—Up to 50% of the rag pulp used in the manufacture of millboard may be replaced by sulphite pulp without significant impairment of the mechanical properties of the product. R. T.

Pulp woods and rayon pulp. IX. Chemical constituents of woods of Chosen. M. SHIKATA, A. UMEMURA, H. NISHIDA, and N. URANO. X. Manufacture of rayon pulp from hard woods. M. SHIKATA, S. HONDA, H. NISHIDA, and M. SAITO (J. Agric. Chem. Soc. Japan, 1936, 12, 626—628, 629—638).—IX. Analytical data for seven woods are given.

X. Analytical data for poplar and birch woods are given. With Manchurian and Japanese birch, a digestion temp. of 160° for 1—2 hr. was sufficient to give a 45% yield of a good pulp with > 88% of cellulose. J. N. A.

Pulp from Manchurian cotton stem. I. M. SHIKATA, S. FUKUWATARI, and K. AKAGI (J. Agric. Chem. Soc. Japan, 1936, 12, 622—625).—Analyses are given for upland cotton stems. Treatment with alkali or dil. HNO_3 followed by the soda process gave a good yield of pulp (α -cellulose 77—90%). J. N. A.

Wood pulp for the rayon industries. L. HEBBS (J. Text. Inst., 1936, 27, p 169—180).—A description of the properties desired in bleached wood pulp for the viscose process. A. G.

Selection of materials used in millboard factories. (A) D. M. FLATE. (B) M. J. MARSCHAK (Mat. Inst. Bumashn. Prom., 1935, No. 3—4, 200—239, 239—252).—(A) Thermosilit (Fe 85, Si 15%), electrolytic Cu, and bakelite are not corroded by aq. ZnCl_2 containing no Fe salts or free acid; a no. of other metals and alloys are corroded.

(B) The economic aspects of the problem of selecting materials for use with aq. ZnCl_2 are considered. R. T.

Water- and air-proofing of packing paper, by introducing bitumen and paraffin emulsions into the pulp. V. A. GRABOVSKI and V. V. JAKIMANSKI (Mat. Inst. Bumashn. Prom., 1935, No. 3—4, 90—124).—The best results are given by incorporating such emulsions, stabilised by stearin, into the pulp. The product has slightly inferior mechanical properties to that obtained without waterproofing, and is more permeable to air than is ordinary impregnated paper; the cost is the same. R. T.

Erratum.—On p. 94, col. 2, line 25 from bottom, for "remedy" read "preventive."

Cellulose dielectrics.—See XI. **Cloth oils.**—See XII. **Heat development from nitrocellulose dissolution.**—See XIII.

PATENTS.

Drying of yarn. E. KOLACZEK (B.P. 451,991, 22.8.35. Czechoslov., 22.8.34, 21.11.34, and 29.7.35).—The yarn is dried by radiant heat in a space evacuated to aq. b.p. 45°; the radiators may comprise low-pressure steam pipes. B. M. V.

Manufacture of paper embodying alkaline-earth carbonate fillers. C. P. DYER, Assr. to MERRIMAC CHEM. CO., INC. (U.S.P. 1,993,265, 5.3.35. Appl., 28.2.33).—Paper is sized with a rosin-alum mixture, and CaCO_3 is used as a filler; any reaction between the size and

CaCO_3 is prevented by use of CO_2 , which maintains a p_{H} of 6.2—7.2. Na_3AlO_3 is then added to produce an opaque floc. L. C. M.

Removal of ink from and bleaching of printed paper. W. S. CRISP, Assr. to W. J. WEIR (U.S.P. 1,993,362, 5.3.35. Appl., 22.7.33).—A mixture of Na_2CO_3 50, pine oil 5, Cl_2 30, and $\text{C}_5\text{H}_5\text{N}$ oil or similar compound 5 lb. is used per ton of paper. L. C. M.

Thermal insulation. Pulp screens for cellulose etc.—See I. Vat-colour powders [for pulp].—See IV. NH_3 recovery from paper-pulp manufacture.—See VII. Abrasive paper.—See VIII. Insulating material.—See XI.

VI.—BLEACHING; DYEING; PRINTING; FINISHING.

Comparison of the dyeing properties of Australian grown cotton and native American cotton. Elimination of a difference by a compensating treatment. H. A. THOMAS (J. Soc. Dyers and Col., 1936, 52, 325—335).—Australian cotton dyes weaker shades than American with direct, S, vat, and azoic dyes, but deeper shades with unmordanted basic dyes. This is due to Australian cotton being thinner-walled and containing more acidic impurities. The difference can be corr. by swelling in 10.5% aq. NaOH, followed by bleaching with aq. NaOCl (d 1.01). A. G.

Modifying rayon crêpe fabrics. ANON. (Silk J. and Rayon World, 1936, 13, Aug., 32—33).—The pebble appearance of a crêpe fabric is controlled by addition to the crêping bath of NaCl (I) or glycerin (II); the pebble is finer and smoother as the concn. of (I) and (II) is increased. Curves showing the area-shrinkages (A) of viscose + acetate rayon and cotton + acetate rayon crêpe fabrics in baths containing various amounts of (I) and (II) indicate that quite small amounts of (I) and (II) considerably reduce A . The A of viscose-acetate rayon is reduced 33% by addition of 5% of (I) to the bath. A. J. H.

[Rubber] Lactron thread and Lastex yarn. R. G. JAMES (Trans. Inst. Rubber Ind., 1936, 12, 104—123).—The production of rubber thread of circular cross-section from latex is described. Details of the prep. of the ingredients and of the mixtures, of the method of extrusion into a bath of coagulant, of the control of thread size, and of the washing, drying, and vulcanising processes are given. The thread is wrapped spirally with textile fibre to form elastic yarns, for which the use of finer types of thread is advantageous; the yarn can be woven into fabric as warp threads or as warp and weft. Such fabrics can be repeatedly dry-cleaned. D. F. T.

PATENTS.

Coloration of textile or other materials. BRIT. CELANESE, LTD. (B.P. 452,867, 2.3.35. U.S., 2.3.34).—Any dye having affinity for cellulose ethers or esters (I), and being insol. or practically so in H_2O , is emulsified together with a vegetable or animal fatty oil in H_2O by means of a sulphonated oil (or a naphthenic acid) and the fabric containing (I) is dyed from the bath, preferably at p_{H} 7.5—8.0, with addition of any further desired agents. Even dyeing and greater exhaustion of the bath are obtained. E. J. B.

Fireproofing compositions. V. J. TRURO (B.P. 453,109, 19.5.36).— $(\text{NH}_4)_2\text{HPO}_4$, NH_4Cl , borax, and Na_2WO_4 are mixed in the proportions of 25, 50, $18\frac{3}{4}$, and $6\frac{1}{4}$ and dissolved in H_2O . W. J. W.

Anti-crease treatment for fabrics. H. MOLINARI (B.P. 452,891, 1.8.35).—Textile materials are impregnated with (solutions of) the uncondensed constituents of synthetic resins containing CH_2O and, *e.g.*, urea or PhOH , and resinification in the fabric is effected at $80\text{--}120^\circ/2\text{--}3$ (10) atm. for approx. 15 min. Soft, crease-resisting material is obtained and economies of time and material are effected. E. J. B.

Preservation of woven fabrics. P. R. ANDREWS and A. FINLAYSON, ASSRS. to SEALTH CORP. (U.S.P. 1,993,354, 5.3.35. Appl., 28.7.32).—Fishing nets etc. are protected against attack by fungi and molluscs by weaving strands of amalgamated or Zn-coated Cu wire into the material; poisonous salts are slowly produced on immersion in sea- H_2O . L. C. M.

Finishing [crease-proofing] of textile fabrics and yarns. A. E. ROBERTS and W. WATKINS (B.P. 452,766, 28.12.34).—The fabric is treated with an alkaline solution of casein and CH_2O (or a substance yielding CH_2O), under such conditions that only 1—1.5% (on the wt. of material) of casein is absorbed, and then dried and heated (at 145° for 0.5 hr.) alone or in presence of CH_2O . H. A. P.

Bleaching printed paper.—See V.

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

Determination of phosphoric acid in superphosphates. R. MEURICE (Ann. Chim. Analyt., 1936, [iii], 18, 229—230).—Desiccation of superphosphates at temp. $> 100^\circ$ leads to low results for free H_3PO_4 ; improved results are obtained by pretreatment with EtOH or MeOH. J. S. A.

Determination of available phosphorus in calcium phosphate and other water-insoluble phosphates. K. D. JACOB, L. F. RADER, JUN., and T. H. TREMEARNE (J. Assoc. Off. Agric. Chem., 1936, 19, 449—472).—In presence of filter-paper or asbestos fibre low results are obtained unless the sample is shaken during the digestion with citric acid (I) or NH_4 citrate. Variations in p_{H} between 6.1 and 7.5 have little effect on the solubility of these phosphates, but at p_{H} 5.0 the solubility is approx. = that at p_{H} 2.0. Solubility in neutral aq. citrate is markedly affected by particle size within the range 0.833—0.074 mm.; that in acid is less affected. In general, variations in procedure have less effect on solubility in (I) than in neutral citrate. E. C. S.

Chromium in cyanide solutions. H. D. BELL (J. Chem. Met. Soc. S. Africa, 1936, 36, 385—392).—The presence of CrO_4^{4-} in $\text{KAu}(\text{CN})_4$ solutions inhibits the pptn. of Au by Zn dust; preliminary pptn. of the Cr with Pb salts affords effective pptn. of the Au. H. D.

Analysis of feldspar. Determination of normalities of potassium bromate and sodium thiosulphate in the Knowles-Redmond volumetric procedure for determination of alumina. E. W. KOENIG (J. Amer.

Ceram. Soc., 1936, 19, 257—258; cf. B., 1935, 451).—Two known wts. of pure Al are pptd. as $\text{Al}(\text{C}_9\text{H}_6\text{ON})_3$, redissolved in HCl, and titrated with two different amounts of KBrO_3 and $\text{Na}_2\text{S}_2\text{O}_3$ solutions. These data provide equations which are solved simultaneously for the unknown normalities. J. A. S.

Decolorising action of fuller's earth. B. S. KULKARNI and S. K. K. JATKAR (Current Sci., 1936, 5, 18—19).—The decolorising action and the activation by acids of these earths are directly related to the exchangeable H contained in them. D. C. J.

S from spent oxide. Determining Prussian-blue. See II. **Diaphragms for electrolysis.**—See XI. **Cr-yellow.**—See XIII. **Determining PO_4^{3-} in fertilisers.**—See XVI.

PATENTS.

Manufacture of sulphuric acid. H. F. MERRIAM, ASSR. to GEN. CHEM. CO. (U.S.P. 2,023,203, 3.12.35. Appl., 24.6.30).—An arrangement of heat-exchange units and catalyst chambers for the oxidation of SO_2 (from S burning) to SO_3 is claimed. A. R. P.

Purification of high-boiling mineral acids. J. F. M. CAUDRI, ASSR. to SHELL DEVELOPMENT CO. (U.S.P. 2,015,254, 24.9.35. Appl., 10.10.32. Holl., 14.6.32).—Waste H_2SO_4 from org. syntheses is decarbonised by heating with a small amount of Se or Te and blowing air through the mixture. A. R. P.

Manufacture of highly concentrated nitric acid. HYDRO NITRO SOC. ANON., and T. HOBLER (B.P. 447,952, 13.8.35. Ger., 13.8.34).— HNO_3 (50%) from the absorption towers in the NH_3 oxidation process flows down a packed tower up which the hot gases containing NO from the catalyst are passed. The NO and HNO_3 react to form N_2O_4 and H_2O , $\frac{2}{3}$ of the N_2O_4 is condensed, and the remainder cracked at 550° to NO and O_2 ; the NO is used again in the first step and the O_2 with sufficient H_2O is caused to react with the liquid N_2O_4 under pressure to form 98% HNO_3 . A. R. P.

Purification of [roaster] gases [from hydrogen fluoride]. J. G. MELENDY, ASSR. to GEN. CHEM. CO. (U.S.P. 2,013,313, 3.9.35. Appl., 9.7.31).—The gas is passed through coke towers, and then through 98% H_2SO_4 to remove H_2O and HF. A. R. P.

Generation of toxic gas [hydrogen cyanide]. P. L. MAGILL, J. W. DUNNING, and I. L. RESSLER, ASSRS. to E. I. DU PONT DE NEMOURS & CO., INC. (U.S.P. 2,015,406, 24.9.35. Appl., 18.5.32).—A mixture which generates HCN when moistened with H_2O consists of NaCN 1 and powdered $\text{Al}_2(\text{SO}_4)_3$ 1.5 mols. mixed with 5% of Sil-o-cel to produce a loose, friable residue after reaction. A. R. P.

Ammonia recovery [from paper-pulp manufacture]. J. L. BRILL, ASSR. to E. I. DU PONT DE NEMOURS & CO. (U.S.P. 2,014,374, 17.9.35. Appl., 26.2.32).—The waste NH_4HSO_3 liquors are mixed with an excess of milk-of-CaO and air and steam are blown through to expel the NH_3 , which is condensed as dil. aq. NH_3 . This is allowed to trickle down an absorption tower up which a mixture of SO_2 and NH_3 is passed, and the uncondensed NH_3 from the distillation is

passed into the tower at a point about $\frac{1}{8}$ of the distance from the top. A. R. P.

Treatment of liquids with ammonia. E. W. HARVEY, Assr. to BARRETT Co. (U.S.P. 2,023,199, 3.12.35. Appl., 20.10.32).—Liquid NH_3 is introduced into the bottom of a vessel filled with saturated aq. NaNO_3 and more of the latter is added until no more dissolves. The product is used in making compound fertilisers with superphosphate. A. R. P.

Storage of soluble salts [sodium carbonate]. W. R. McCANN, Assr. to ATMOSPHERIC NITROGEN CORP. (U.S.P. 2,024,830, 17.12.35. Appl., 3.7.33).—To decrease the bulk of soda ash used for making aq. Na_2CO_3 the ash in the storage chamber is sprinkled with H_2O to convert it into $\text{Na}_2\text{CO}_3 \cdot \text{H}_2\text{O}$. A. R. P.

Manufacture of sodium carbonate decahydrate. G. L. CUNNINGHAM, Assr. to MATHIESON ALKALI WORKS INC. (U.S.P. 2,024,679, 17.12.35. Appl., 26.7.32).— NaHCO_3 is treated at $< 15^\circ$ with ammoniacal aq. NaCl in such proportions that the $\text{CO}_2:\text{NH}_3$ ratio in the solution after the $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$ has crystallised is $> 1:2$. A. R. P.

Production of nitrogen-free alkali carbonates. R. B. MACMULLIN and G. L. CUNNINGHAM, Assrs. to MATHIESON ALKALI WORKS, INC. (U.S.P. 2,014,536, 17.9.35. Appl., 21.4.32).— $\text{NaNH}_4\text{CO}_3 \cdot 2\text{H}_2\text{O}$, produced by the method claimed in U.S.P. 1,980,691 (B., 1936, 273), is heated at $50\text{--}104^\circ$ to obtain $\text{Na}_2\text{CO}_3 \cdot \text{H}_2\text{O}$. A. R. P.

Manufacture of an alkaline-earth carbonate of improved colour. J. W. CHURCH and R. R. McCLURE, Assrs. to PURE CALCIUM PRODUCTS Co. (U.S.P. 1,994,271, 12.3.35. Appl., 23.2.33).—An aq. slurry of $\text{Ca}(\text{OH})_2$ containing Fe is treated with a slight excess of Na_2S , K_2S , $(\text{NH}_4)_2\text{S}$, or H_2S and then carbonated. L. C. M.

Manufacture of magnesia poor in lime from dolomite. G. W. JOHNSON. From KLÖCKNER-WERKE A.-G. (B.P. 447,246, 22.11.35).—Calcined dolomite is slaked with $20\text{--}30\%$ of H_2O and the resulting fine powder separated from the coarse particles by sieving. The powder is agitated at $> 25^\circ$ with aq. MgCl_2 containing NH_4Cl to produce $\text{Mg}(\text{OH})_2$ and ammoniacal aq. CaCl_2 . After filtering and washing, the ppt. is calcined to MgO and the filtrate treated with CO_2 after addition of the ground oversize material to regenerate the $\text{NH}_4\text{Cl}\text{--MgCl}_2$ solution and form a ppt. of CaCO_3 . A. R. P.

Apparatus for manufacture of ammonium chloride. E. C. CURTIS, Assr. to MATHIESON ALKALI WORKS, INC. (U.S.P. 2,024,680, 17.12.35. Appl., 17.9.32).— HCl , NH_3 , and H_2O are passed simultaneously through separate tubes into a small vessel inside a large saturator, and the resulting aq. NH_4Cl is passed to a crystalliser. The heat of reaction ensures the production of a saturated hot solution by proper adjustment of the H_2O added. A. R. P.

Production of sulphates and sulphur. C. HARNIST (U.S.P. 1,992,572, 26.2.35. Appl., 20.4.25. Renewed 17.11.33. Ger., 25.4.24).—Gas liquor containing aq. NH_3 , $(\text{NH}_4)_2\text{CO}_3$, $(\text{NH}_4)_2\text{S}$, NH_4CN , and H_2S is treated with gases containing SO_2 and the $(\text{NH}_4)_2\text{S}_2\text{O}_3$ and

NH_4 polythionates formed are converted into $(\text{NH}_4)_2\text{SO}_4$, H_2SO_4 , and S by autoclaving at 150° . L. C. M.

Manufacture of ammonium sulphate in the form of scales. COUTTS & Co., and F. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 445,120, 8.10.34).—The solution with $p_{\text{H}} 5.8\text{--}7$ is treated with $0.003\text{--}0.7$ g. of Al_2O_3 [as $\text{Al}_2(\text{SO}_4)_3$] per 1000 g. of $(\text{NH}_4)_2\text{SO}_4$ and evaporated to obtain non-caking, hexagonal scales. A. R. P.

Production of moulded salt mixtures. KALIFORSCHUNGS-INST. G.M.B.H. (B.P. 447,215, 21.1.35. Ger., 26.1. and 8.2.34).—Mixtures of (a) NH_4NO_3 , (b) NaNO_3 , or (c) Na_2SO_4 with KCl are moistened with $6\text{--}10\%$ of H_2O and pressed into cylinders, which are dried at 80° and crushed to produce granules of the desired size. A. R. P.

Recovering lithium compounds. J. H. COLEMAN and N. E. JAFFA, Assrs. to WARNER CHEM. Co. (U.S.P. 2,024,026, 10.12.35. Appl., 17.11.33).—Amblygonite is digested with 40% aq. NaOH to remove most of the AlPO_4 , the washed residue extracted with dil. H_2SO_4 , the solution treated with $\text{Fe}_2(\text{SO}_4)_3$ and Na_2CO_3 to ppt. the remaining P_2O_5 at $p_{\text{H}} 6\text{--}6.5$, the filtrate treated with more Na_2CO_3 (to $p_{\text{H}} 7\text{--}7.5$) to ppt. CaCO_3 and MgCO_3 , and the final filtrate treated with a large excess of Na_2CO_3 to ppt. Li_2CO_3 . A. R. P.

Production of coloured [insecticidal] salts [sodium fluoride]. C. S. BENJAMIN, Assr. to GEN. CHEM. Co. (U.S.P. 2,015,062, 24.9.35. Appl., 30.7.31).— Na_2CO_3 is added to dil. aq. HF and the pptd. NaF sprayed while moist with a solution of an alkali-fast green dye. A. R. P.

Non-caking metaphosphate. G. W. SMITH, Assr. to HALL LABS., INC. (U.S.P. 2,024,543, 17.12.35. Appl., 21.8.33).—A mixture of $\text{Na}_6\text{P}_6\text{O}_{18}$ with $3\text{--}20\%$ of powdered intumesced borax is claimed for use as H_2O softener or detergent. A. R. P.

Treating the residual gases of superphosphate manufacture. N. V. PHILIPS' GLOEILAMPENFABR. (B.P. 447,647, 17.8.35. Ger., 23.8.34).—The moist SiF_4 gases generated in the acid treatment of phosphate rock are passed over moist Pb, e.g., old battery plates, in presence of air to form aq. PbSiF_6 . A. R. P.

Production of water-resistant (A) basic or (A, B) neutral calcium sulphite in the form of lumps. L. MELLERSH-JACKSON. From MINING & INDUSTRIAL WORKS (J. D. STARCK) (B.P. 445,411 and Addn. B.P. 445,412, 29.8.34).—Lump CaO is sprayed with just sufficient H_2O to slake it without causing the lumps to crumble, treated with SO_2 in a closed chamber until nearly saturated, and then slowly heated to $150\text{--}180^\circ$ in SO_2 to expel the H_2O and cooled in the same gas. In (B) CO_2 is used instead of SO_2 in the heating and cooling stages. A. R. P.

Manufacture of chemical feeder [stable calcium hypochlorite pellets]. W. S. BACHMAN (U.S.P. 2,023,459, 10.12.35. Appl., 27.4.34).—Bleaching powder with 65% of available Cl (60) is mixed with plaster of Paris (30) and H_2O (40 lb.) and the resulting dough-like mass is formed into bricks or pellets which after drying and hardening contain 36% of available Cl. A. R. P.

Production of magnesium chloride from calcium chloride. E. O. BARSTOW, S. B. HEATH, and F. R. MINGER, Assrs. to DOW CHEM. CO. (U.S.P. 2,013,334, 3.9.35, Appl., 17.10.34).—Aq. CaCl_2 is treated with pptd. MgCO_3 to ppt. the greater part of the Ca as CaCO_3 . After filtration the remainder of the Ca is pptd. by suspending Mg(OH)_2 in the solution and passing in CO_2 ; this ppt. is returned to the first stage of the process.

A. R. P.

Production of anhydrous magnesium chloride. W. MOSCHEL, Assr. to MAGNESIUM DEVELOPMENT CORP. (U.S.P. 2,024,242, 17.12.35, Appl., 23.11.34, Ger., 20.6.29).—By means of an arrangement of partition walls in a divided cell $\text{MgCl}_2 \cdot 2\text{H}_2\text{O}$ is dehydrated in one part of the cell and the anhyd. MgCl_2 electrolysed in another, the Cl_2 evolved being used in the dehydration process.

A. R. P.

(A) Manufacture, (B) purification, of magnesium products. (A, B) W. H. FARNSWORTH and (A) M. MONTGOMERY, Assrs. to MARINE CHEMICALS CO., LTD. (U.S.P. 2,021,501 and 2,019,488, [A] 19.11.35, [B] 5.11.35, Appl., [A] 21.5.34, [B] 19.7.32).—(A) For the prep. of Mg(OH)_2 in floc form from brines containing Mg salts, excess of dry Ca(OH)_2 is mixed with a portion of the brine so as to form particles of Ca(OH)_2 coated with a film of Mg(OH)_2 and this mud is added in equivalence or less to the main part of the brine, the Mg(OH)_2 being settled out through the mother-liquor and washed as in (B). (B) The Mg(OH)_2 mud is extruded by its own wt. through holes in the bottom of a pan submerged in the upper part of a column of H_2O rising slowly from a rose inlet part way down. The Mg(OH)_2 takes the form of filamentary flocs and eventually settles below the wash inlet.

B. M. V.

Decolorisation of alkaline-earth sulphates. H. S. BOOTH (U.S.P. 2,013,401, 3.9.35, Appl., 20.7.32).— BaSO_4 (mineral) is dissolved in fused NaCl , and the melt freed from impurities by settling and decantation, treated with a small amount of NaH_2PO_4 , and poured into H_2O to obtain a ppt. of white BaSO_4 of high covering power.

A. R. P.

Froth-flotation concentration of copper sulphides. FRANCO WYOMING OIL CO. (B.P. 447,521, 28.6.35, U.S., 21.7.34).—Complex Cu-Zn-Pb-Fe sulphide ores are floated in a pulp containing NaCN to recover a Pb concentrate; NiSO_4 is then added to activate the Cu minerals and depress the ZnS and FeS_2 , and the Cu is floated with the usual xanthate reagents.

A. R. P.

Manufacture of copper sulphate. M. SERCIRON (B.P. 444,367, 3.4.35, Belg., 7.4.34).—Cu scrap is treated with dil. H_2SO_4 containing Cl ≥ 70 –80 and NH_4 ≥ 20 g./litre, the liquor being agitated with finely-divided streams of air.

A. R. P.

Removal of contaminating metals and metalloids from zinc-bearing materials. ASSOCIATED METALS & MINERALS CORP., and A. L. J. QUENEAU (B.P. 447,553, 31.1.35).—A mixture of roasted Zn concentrates (56–72% Zn) 93, NaCl 3, and C 4% is moistened with 12% of H_2O , pressed into crude lumps, and sintered on a blast-roasting grate to remove Pb and Cd as volatile chlorides.

A. R. P.

Manufacture of lead carbonate. A. APPLEGATE (U.S.P. 2,013,531, 3.9.35, Appl., 28.8.30).—Pb is atomised in a stream of hot air containing AcOH and H_2O vapours, and the resulting powder is agitated with dil. AcOH in a stream of air or O_2 , the milky suspension of white-Pb being continuously removed and settled to recover the ppt.

A. R. P.

Iron oxide. H. FREEMAN, Assr. to NICHOLS ENG. & RES. CORP. OF CANADA, LTD. (U.S.P. 2,015,053, 17.9.35, Appl., 16.9.32, Can., 31.8.32).—Finely-divided FeS_2 is blown in suspension in air into a hot chamber in which it is allowed to burn while falling freely so as to produce Fe_3O_4 in the form of fused, hollow shells.

A. R. P.

Recovery of aluminium compounds [from low-grade aluminous material]. L. FRÉLING and J. DORREN (B.P. 448,107, 24.11.34).—The material is heated with HCl under pressure, the insol. filtered off, the filtrate evaporated, the residue heated to expel and recover HCl , and the Al_2O_3 leached out by digestion with aq. NaOH .

A. R. P.

Continuous extraction of aluminium oxide from bauxite. VEREIN. ALUMINIUM-WERKE A.-G. (B.P. 451,090, 27.1.36, Ger., 2.2.35).—Lump bauxite is extracted with hot aq. NaOH , e.g., stirred aluminate liquor (d 1.16–1.24), under pressure in a tower having a filter base of porous C .

A. R. P.

[Bauxite] catalysts [for oil-cracking]. H. W. F. GIFFORD (B.P. 445,727, 24.11.34).—Bauxite is ground to a stiff paste with H_2O , the paste calcined at 900–1000°, and the product mixed with an aq. suspension of Al(OH)_3 , Zn(OH)_2 , Mg(OH)_2 , or bleaching powder and dried.

A. R. P.

Manufacture of alumina adsorbents. R. B. DERR, Assr. to ALUMINUM CO. OF AMERICA (U.S.P. 2,015,593, 24.9.35, Appl., 24.2.32).—Bauxite or other material high in Al_2O_3 is acid-washed, and then heated in a closed vessel at 250–800° (300–400°) in a current of dry air or in vac. to remove combined H_2O as rapidly as possible.

A. R. P.

Highly swellable inorganic substances [bentonite]. S. ERBSLÖH (B.P. 447,710, 12.6.35, Ger., 16.6.34).—Ca-bentonite is agitated with 2–2.5% of Na_2CO_3 in a thin slurry and the product washed and dried. The resulting Na-bentonite gives a thixotropic gel with 15–20 times its wt. of H_2O .

A. R. P.

Activating treatments of bentonites and sub-bentonites for filtering and decolorising purposes. E. MCKELLAR and R. R. COOPER (B.P. 450,738, 21.10.35).—The clay is digested with hot 6–24% H_2SO_4 , washed twice to remove acid and sol. salts, and the slurry neutralised with NaOH or Na_2CO_3 to any desired pH and dried.

A. R. P.

Treatment of base-exchange bodies. UNITED WATER SOFTENERS, LTD. (B.P. 451,899, 5.11.35, U.S., 31.7.35).—Base-exchange material containing humic acid, e.g., lignite which has been heated with oleum at 100–150° or extracted with boiling aq. NaHCO_3 or NaOH , is thoroughly washed and then boiled in a solution containing 2–7 g. of Cr_2O_3 /litre as chrome alum or Cr(OAc)_3 , washed till free from sol. salts, and dried.

A. R. P.

Manufacture of base-exchange materials. N. V. OCTROOIEEN MAATS. "ACTIVIT," and P. SMIT (B.P. 450,540, 14.1.35).—Anthracite or coal is treated with SO_3 at $< 250^\circ$ (150°) until the material has gained $\frac{1}{4}$ 40 (60)% in wt., and the product is washed with H_2O and dried at 30 – 35° for $\frac{1}{2}$ 36 hr. A. R. P.

Manufacture of ion-exchange materials. UNITED WATER SOFTENERS, LTD. (B.P. 450,574, 13.4.35. Ger., 13.4.34).—Powdered lignite is heated with 4 pts. of H_2SO_4 to 150° , the excess of acid is removed by filtration, and the residue washed free from acid. A. R. P.

Manufacture of manganous phosphate dihydrate. I. G. FARBENIND. A.-G. (B.P. 447,918, 27.11.34. Ger., 28.11.33).— $\text{MnH}_4(\text{PO}_4)_2 \cdot 2\text{H}_2\text{O}$ is obtained by adding MnCO_3 to the theoretical quantity of H_3PO_4 containing $\frac{1}{2}$ a slight excess of H_2O above the theoretical and preferably also a little H_2O_2 . A. R. P.

Manufacture of arsenic acid. GRASSELLI CHEM. Co., and E. R. BOLLER (B.P. 445,468, 3.10.34).—A suspension of As_2O_3 and H_2O is treated with air or O_2 at 60 – 70 lb./sq. in. and 130 – 140° in presence of activated C and I or KI. A. R. P.

Manufacture of antimony trifluoride. T. MIDGLEY, JUN., A. L. HENNE, and R. R. McNARY, ASSRS. to GEN. MOTORS CORP. (U.S.P. 2,024,008, 10.12.35. Appl., 26.2.31. Renewed 30.6.34).—HF is passed into molten SbCl_3 until solidification occurs. The product is used in the manufacture of CCl_2F_2 , and the SbCl_3 resulting from this process is again treated with HF. A. R. P.

Preparation of titanium compounds. S. F. W. CRUNDALL, and P. SPENCE & SONS, LTD. (B.P. 447,744, 21.8.34).—A 2–3% solution of TiO_2 as sulphate is treated with NaCl 3 and $\text{H}_2\text{C}_2\text{O}_4$ 0.5 mol./mol. of TiO_2 and then with Na_2CO_3 until 90–95% of the TiO_2 is pptd. The ppt. is washed and boiled with H_2O to give a colloidal solution suitable for use as an initiator in the hydrolysis of aq. $\text{Ti}(\text{SO}_4)_2$. A. R. P.

Preparation of hydrogen peroxide. A. PIETZSCH, Assr. to ELEKTROCHEM. WERKE MÜNCHEN A.-G. (U.S.P. 2,015,040, 17.9.35. Appl., 27.5.35. Ger., 31.5.33).—A mixture of H_2 and O_2 saturated with H_2O vapour at 40° is passed at $> 50^\circ$ through an apparatus in which it is subjected to a silent electric discharge. A. R. P.

Hydrogen peroxide process. L. H. DAWSEY (U.S.P. 2,022,650, 3.12.35. Appl., 11.6.31).—A mixture of H_2 and O_2 is passed at high velocity through narrow tubes subjected to a silent electric discharge with a frequency of 500–3000 cycles/sec. A. R. P.

Fractionally condensing hydrogen peroxide vapours from mixtures with water vapour. J. D. RIEDEL-E. DE HAEN A.-G., and J. SEEMANN (B.P. 445,334, 9.11.35).—The vapours from the distillation vessels are passed up a packed tower which is sprayed with a limited amount of H_2O or dil. H_2O_2 containing stabilising substances. A. R. P.

Stabilised hydrogen peroxide composition. A. KUNZ (U.S.P. 2,022,860, 3.12.35. Appl., 13.3.35).—Antipyrine (0.5 g. per litre) is added as stabiliser. A. R. P.

Production of hydrogen sulphide. R. S. BLEY, Assr. to NORTH AMER. RAYON CORP. (U.S.P. 1,992,895–6,

26.2.35. Appl., 16.11.33).—A mixture of (A) vegetable or mineral oil, or (B) carbohydrate waste, e.g., sawdust, molasses, starch, or peat, with rayon waste containing Cu as a catalyst, is autoclaved with H_2O and S at 75–450 lb./sq. in., and the resulting H_2S liquefied.

L. C. M.

Apparatus for generation of oxygen, especially for breathing purposes. W. H. A. THEIMANN. From I. G. FARBENIND. A.-G. (B.P. 451,170, 16.4.36).—A mixture of chemicals which generate O_2 on heating is compressed into a rod provided with a recess at one end for the reception of an igniter, and the whole is packed in a container from the walls of which it is separated by a layer of kieselguhr, MgO , CaO , asbestos, or sand which acts as a heat insulator and gas filter. The gas liberated by striking a pin which acts on a primer in the igniter is further filtered by passage through more of the filtering material located in a narrow neck portion to which the flexible tube for delivery of the O_2 is attached.

A. R. P.

Manufacture of sulphur. I. G. FARBENIND. A.-G. (B.P. 445,171, 12.10.35. Ger., 20.10.34).— H_2SO_4 is sprayed into hot gases containing H_2S and the mixture passed over bauxite, an Fe oxide, or a Mn, Cr, or V oxide catalyst at 180 – 500° , preferably first at 300° and then at 200° .

A. R. P.

Treatment of sulphur. G. E. GRINDROD, Assr. to GRINDROD PROCESS CORP. (U.S.P. 1,992,611, 26.2.35. Appl., 13.5.31).—Colloidal S is produced by agitating an aq. suspension of flowers of S (15%) containing skimmed milk (25%) by high-pressure steam jets at 120° .

L. C. M.

Manufacture of prepared sulphur. F. W. WIEDER, Assr. to SAN FRANCISCO SULPHUR CO. (U.S.P. 2,022,796, 3.12.35. Appl., 4.6.34).—S is heated at 140° with 0.5% of a heavy mineral oil, cast into slabs, and ground to obtain a free-flowing, non-caking powder. A. R. P.

Recovery of sulphur dioxide from gas mixtures. A. M. CLARK, W. E. BATTEN, C. F. R. HARRISON, and IMPERIAL CHEM. INDUSTRIES, LTD. (B.P. 445,711, 16.10.34, 15.5., 14.6., and 28.8.35).—The SO_2 is absorbed in towers down which is passed a solution of basic Al sulphate (I), and regenerated by heating the solution to $> 80^\circ$. Accumulation of SO_3 in the solution is prevented by occasional treatment with $\text{Ca}(\text{OH})_2$ or CaSO_3 . The (I) is prepared by dissolving an excess of amalgamated Al in dil. H_2SO_4 , or treating aq. $\text{Al}_2(\text{SO}_4)_3$ with $\text{Ca}(\text{OH})_2$ or CaSO_3 and removing the CaSO_4 ppt.

A. R. P.

Recovery of iodine [from silver iodide]. C. W. GIRVIN, Assr. to Iod-Dow CHEM. Co. (U.S.P. 1,994,416, 12.3.35. Appl., 5.4.34).—A suspension of AgI in CCl_4 is chlorinated, filtered off from AgCl , and extracted with aq. NaOH ; I is liberated from the solution by H_2SO_4 . Alternatively, an excess of Cl_2 is used, and the CCl_4 containing ICl is shaken with H_2O ; the ppt. of I is filtered off and the HIO_3 in solution reduced to I with Na_2SO_3 .

L. C. M.

Production of silicic acid gels. GRASSELLI CHEM. Co. (B.P. 448,125, 30.11.34. U.S., 1.12.33).—Porous SiO_2 for catalytic purposes is prepared by mixing freshly prepared moist gel with CaCO_3 , extruding the

plastic mass into shaped particles, drying these, and removing the CaCO_3 by leaching with HCl . A. R. P.

Dehydrating agents for gases.—See I. **S from gases.**—See II. **CS_2 .**—See III. **Corrosion-resistant material.** **Pickling baths.**—See X. **Persulphates.**—See XI. **Ti pigments.**—See XIII. **Fertilisers.**—See XVI.

VIII.—GLASS; CERAMICS.

Volatilisation of sulphate from soda-lime-silica glasses. E. PRESTON, W. E. S. TURNER, and H. LAITHWAITE (J. Soc. Glass Tech., 1936, 20, 127—138 T).—The loss of sulphate at 1300—1450° from glasses containing Na_2O 16% and SO_3 0.31—0.83% \propto the initial sulphate content. After 100 hr. at 1350°, 1400°, and 1450° the sulphate content was reduced to $\frac{2}{3}$, $\frac{1}{2}$, and $\frac{1}{3}$ of the initial val., respectively. The total volatilisation loss obeys a v.-p. law, and the addition of sulphate doubles the rate of volatilisation of Na_2O from a sulphate-free glass. J. A. S.

The question of the presence of compounds in molten glass. E. PRESTON and W. E. S. TURNER (J. Soc. Glass Tech., 1936, 20, 144—151 T).—It is claimed that the recent determinations of d and η of Na_2O - SiO_2 glasses at high temp. by Heidtkamp and Endell (Glastech. Ber., 1936, 14, 89) indicate the presence of the compounds $\text{Na}_2\text{O} \cdot 2\text{SiO}_2$ and $\text{Na}_2\text{O} \cdot \text{SiO}_2$. This hypothesis is supported by the rates of volatilisation, the glass-making reactions, and the obvious chemical changes in coloured glasses. The compounds are known to be stable at their m.p. and their existence in the liquid state cannot be denied without proof. J. A. S.

Electrical conductivity of glass in the annealing zone as a function of time and temperature. J. T. LITTLETON and W. L. WETMORE (J. Amer. Ceram. Soc., 1936, 19, 243—249).—Measurements with a thermionic potentiometer showed that glasses undergo a stabilising process at const. temp. at a rate depending on the η . The resistance of a stabilised glass varies linearly with $1/T_{\text{abs}}$ and no transformation point (as indicated by a discontinuity) was observed. J. A. S.

Viscosity of glass. II. P. GILARD, L. DUBRUL, G. HENRY, SCOHY, and PIÉRET (Bull. Soc. chim. Belg., 1936, 45, 379—437; cf. B., 1936, 594).—The construction and standardisation of a viscosimeter of the Margules type for the determination of the η is described. The end correction, l' , in the Margules formula, $C = K(L + l')\Omega\eta$, for a rotating cylinder of finite immersion L , determined by experiments with oil, is independent of temp. The action of molten glass on Al, sillimanite, porcelain, Zr_2O_3 , MgO , and Verrax has been investigated. Verrax is the most resistant. The variation of the viscosimeter const. (K) with temp. has been determined by measurement of the dimensions at different temp. R. S.

Determination of the viscosity of quartz glass within the softening range. M. P. VOLAROVITCH and A. A. LEONTIEVA (J. Soc. Glass Tech., 1936, 20, 139—143 T).—The η , determined by the elongating-rod method, varied from 5×10^{13} poises at 1100° to 9×10^{11} poises at 1450°. There is a change in slope of the temp.-log η curve at $10^{12.5}$ — 10^{13} poises, corresponding

to a lower limit of softening range of 1220—1240°. Presence of impurities in the various samples of SiO_2 caused slight variations in results. J. A. S.

Transformation in glass. (MLLE.) N. KLEIN (Compt. rend., 1936, 203, 180—182; cf. B., 1935, 992).—Measurements of n show that for each temp. there is a sp. equilibrium mixture of the high- (β) and the low-temp.-stable (α) modifications of a borosilicate glass. The data indicate changes of temp. whereby the annealing time can be curtailed. J. G. A. G.

Chemistry of the Chinese copper-red glazes. J. W. MELLOR (Trans. Ceram. Soc., 1936, 35, 364—378).—A historical review with extensive bibliography. Stress is laid on the function of SnO_2 or Fe_2O_3 in stabilising the colouring agent (Cu or Cu_2O). J. A. S.

Effect of neutralising solutions on groundcoat draining. G. H. MCINTYRE and P. E. GERDES (J. Amer. Ceram. Soc., 1936, 19, 253—256).—The amount of neutraliser carried over from the pickling bath varies with the particular composition and increases with the pickling time, but is little affected by temp. Neutraliser contamination may seriously affect enamel consistency. All the neutralisers tested had rust-inhibiting properties. J. A. S.

Frit solubility. I. Comparison of methods of determination and relation of soluble salts to enamel slip consistency. G. H. MCINTYRE and R. E. BEVIS (J. Amer. Ceram. Soc., 1936, 19, 249—252).—Solubilities were determined by (1) milling and (2) Soxhlet extraction, the titrations being carried out with indicators and the potentiometric method using a glass electrode. Potentiometric titrations were the more accurate, but no consistent relation between the two methods of dissolution were found. There appear to be definite relations between the solubility and consistency ("set") of an enamel. J. A. S.

Mechanics of enamel adherence. XII. Chemical and X-ray examination of metallic precipitates from enamels containing iron and cobalt oxides. R. M. KING (J. Amer. Ceram. Soc., 1936, 19, 246—249; cf. B., 1935, 1093).— SiC was used as the reducing agent to produce metallic pptn. in a Fe_2O_3 - Co_2O_3 enamel. Fe, Co, and an Fe-Co alloy were formed. The amount of oxide in solution influences the amount of pptn., but for equal oxide concn. Co is pptd. in the greater amount. Co, Ni, and α - and β -Mn were formed from a commercial groundcoat frit. J. A. S.

Colloidal properties of clay suspensions. W. K. LEWIS, L. SQUIRES, and W. I. THOMPSON (Trans. Amer. Inst. Min. Met. Eng., 1935, 114, 38—52; cf. A., 1935, 1313).—Plastic properties are not developed until the particle size is < 0.01 mm. Agitation decreases the yield point (Y) and, to a smaller extent, increases mobility (M). Clay in 95% EtOH has M practically the same as that of the clay suspended in H_2O , but Y is approx. 50% higher. Conc. HCl decreases M slightly but reduces Y to 50% of that for H_2O . The high η shown by ordinary suspensions is due solely to the volumetric interference of the suspended particles with the movement of the liquid. When the relation between r.p.m. and torque is not a straight line through the origin some factor other than volumetric interference

is operative. The effect of polar character and adsorption on η and M is discussed. CH. ABS. (e)

Laboratory de-airing machine [clay-extrusion press]. H. FRÉCHETTE (J. Amer. Ceram. Soc., 1936, 19, 233).—A simply adapted screw press is briefly described. J. A. S.

Effects of various treatments on ageing of a ceramic body. D. P. GLICK (J. Amer. Ceram. Soc., 1936, 19, 240–242).—Porcelain bodies, treated with urine, manure H_2O , tannic acid (I), peptone, and NH_4NO_3 were examined, after ageing for 1 year in the raw and sterile states, for plasticity, shrinkage, strength, etc. and for bacterial growth. (I) exerted an immediate effect on the clay which was diminished by ageing, due to a partial destruction of the (I) by bacterial activity. (I) gave the clay high modulus of rupture but a lower plastic range and a marked thixotropy. All the addenda enhanced the bacterial activity, the extent of which appears to be indicated by the oxidation-reduction potential. J. A. S.

Persian description of the faience technique at Kashan in 1301 A.D. R. WINDERLICH (J. Chem. Educ., 1936, 13, 361–362). L. S. T.

Systems composed of silica, alumina, and magnesia. I, II. T. NAKAI and Y. FUKAMI (J. Soc. Chem. Ind., Japan, 1936, 39, 230–232 B).—X-Ray and d data are recorded for the binary systems $SiO_2-Al_2O_3$, Al_2O_3-MgO , and SiO_2-MgO after various heat-treatments. T. W. P.

Refractory linings for cement kilns. D. STEINER (Zement, 1936, 25, 619–624).—Materials of high MgO content are suitable. The loss is insufficient to contaminate the clinker, and damage arising from temp. variation can be avoided by suitable design of the lining. The heat conductivity falls with rising temp., giving a favourable temp. gradient, and the permeability to gases is $<$ that of the high- Al_2O_3 (chamotte) materials commonly used. Data are given for two commercial lining materials. G. H. C.

Failure of refractory melting-furnace bricks on softening and fusion. E. T. RICHARDS (Feuerungstechn., 1936, 24, 73).—The effects of mechanical forces, metallic vapours, gases, and powdered fluxes on refractories are described. Bricks can be protected from excessive pressures by correct design of the kiln, especially of the arches, and by trimming them carefully before use. Diagrams show correct and incorrect arch construction. Protection of bricks against foreign substances, which tend to lower their m.p., can be afforded by application of pore-closing materials. Fireclay bricks should be dipped in an emulsion of fine Al_2O_3 powder, and magnesite bricks in tar oil. R. B. C.

Refractories in metallurgical industries. J. D. SULLIVAN (J. Amer. Ceram. Soc., 1936, 19, 213–233).—The refractory requirements for all types of ferrous and non-ferrous metal furnaces are discussed in detail. J. A. S.

Manufacture and use of the insulating firebrick in the United States. F. H. NORTON (Trans. Ceram. Soc., 1936, 35, 301–311).—The various methods of making porous bricks are briefly described and typical

data for d , porosity, thermal conductivity, and under-load refractoriness are recorded. The use of insulating firebricks (*i.e.*, a porous, highly refractory brick) for the inner lining of an intermittent furnace may enable the temp. to be attained in $\frac{1}{2}$ the normal time and also save fuel. The uniformity of heating is improved and the efficiency of combustion increased by the surface of the insulating brick. The disadvantage of such brick are their low resistance to abrasion, slag attack, and thermal shock. Methods of installation (sometimes using panels for quick erection) are described. Cements and mortars for porous brick are not yet satisfactory. Examples of the uses of insulating firebrick are quoted. J. A. S.

Crushing of non-plastics in dry-pressing. F. R. HENRY (J. Amer. Ceram. Soc., 1936, 19, 235–239).—The sieve analyses of bonded Al_2O_3 and SiC abrasive grains were made before and after the mixtures were dry-pressed. Irregular and poorly shaped grains crush the most rapidly at low pressures. The method of study readily shows the effect of various grit combinations. J. A. S.

Measuring apparent porosity etc. [of brick].—See I. Analysis of felspar.—See VII.

PATENTS.

Manufacture of articles of glass in combination with plastic materials. PILKINGTON BROS., LTD., and L. J. B. FORBES (B.P. 451,507, 6.2.35).—A combination of glass and a rim of synthetic resin or other material needing 1000 lb. per sq. in./130° to harden it is effected by placing tempered glass in a mould which fits closely top and bottom so that only the edge of the glass projects partly across a channel (C); the resin is charged into C and pressed therein by a no. of plungers distributed above and below the glass. B. M. V.

Manufacture of stratified bodies such as safety glass. TRIPLEX SAFETY GLASS CO., LTD., and J. WILSON (B.P. 451,872, 9.4.35).—A secondary cellulose acetate (35.5–39% Ac) completely sol. in $COMe_2$ is obtained by treatment with $N/7-N/12-HCl + H_3PO_4$ at the b.p.; this is powdered and dissolved to make a 5% solution in 75–90 vol.-% $COMe_2$. The glass is coated first with gelatin and then with the solution, drying being effected at 30° at 33% R.H. after each application; the sandwich is then made at 45° in a bath of commercial methylcyclohexanols. Plasticisers, *e.g.*, $o-C_6H_4(CO_2Me)_2$, triacetin, may be present. B. M. V.

Treatment of ceramic materials [clay or shale]. M. LASLEY (U.S.P. 2,023,426, 10.12.35. Appl., 8.2.33).—Clay or shale containing a high proportion of volatile org. matter is passed through a multiple-hearth furnace the temp. in which is controlled to burn off the org. matter and partly dehydrate the clay without removing the whole of its plasticity. A. R. P.

Clay working. D. E. and J. L. CHILD, Assrs. to HANCOCK BRICK & TILE CO. (U.S.P. 2,024,025, 10.12.35. Appl., 25.4.34).—A form of pug mill is claimed. A. R. P.

Permeable ceramic diaphragm. R. C. BENNER and H. N. BAUMANN, JUN., Assrs. to CARBORUNDUM CO. (U.S.P. 1,993,955, 12.3.35. Appl., 2.9.33).—Porous

filter slips are manufactured from a mixture of MgO 12—18, Al_2O_3 32—38, and SiO_2 49—55%, with or without 20—40% of battery coke, by mixing to a cement consistency with 5% of ball clay and aq. 10% water-glass, casting, drying, and firing at 1300—1400°.

L. C. M.

Manufacture of refractory materials. W. W. TRIGGS and G. E. SEIL (B.P. 451,493, 2.11.34. Addn. to B.P. 409,130; B., 1934, 579).—No periclase is added to correct chemically the Cr ore, fine grinding and pre-heating to $\leq 1700^\circ$ being relied on to distribute the gangue.

B. M. V.

(A) **Bond for abrasive particles.** (B) **Manufacture of abrasive paper.** (A) R. C. BENNER and G. H. PORTER, (B) H. C. MARTIN, Assrs. to CARBORUNDUM Co. (U.S.P. 1,993,821 and 1,994,283, 12.3.35. Appl., [A] 3.10.31, [B] 16.7.32. Renewed [A] 14.9.34. [B] Can., 13.6.29).—(A) Abrasive is applied to cloth coated with a mixture of metastyrene, shellac, and synthetic resin, at 150—180°. (B) The curling of open-coated abrasive cloth is counteracted by a coating of glue on the reverse side.

L. C. M.

[Plant for] preparation of material for making bricks and the like. T. C. FAWCETT, LTD., D. L. FAWCETT, and A. E. BOTTOMLEY (B.P. 451,880, 17.5.35. Addn. to B.P. 415,243).

Refractory cement.—See IX.

IX.—BUILDING MATERIALS.

The insulating brick of a cement rotary kiln. T. YOSHII (J. Soc. Chem. Ind., Japan, 1936, 39, 204—206 B).—Heat losses due to radiation and convection from the shell are reduced by about 50% when insulating brick is used, but the kiln capacity is much reduced and bricks of higher compressive strength than exist at present are necessary.

T. W. P.

Effects of various fluorides on the thermal combination of Portland cement raw mixture. S. NAGAI and M. TAKAHARA (J. Soc. Chem. Ind., Japan, 1936, 39, 183—184 B).—Fluorides increase the rate of combination at 1200—1350° ($\text{NaF} > \text{CaF}_2 > \text{MgF}_2$). Test data are given.

T. W. P.

Asphalt, pitch, and tar cements. E. J. FISCHER (Teer u. Bitumen, 1936, 34, 87—90, 98—101).—The composition and uses of various types are given.

R. B. C.

Organic binders for roads. A. SIROT (Angew. Chem., 1936, 49, 709—712).—A review.

Effect of chemical solutions on some woods. M. B. WELCH (J. Proc. Roy. Soc. New South Wales, 1936, 69, 159—166).—Specimens of 25 commercial Australian timbers were exposed to the action of common acids, alkalis, and salts. Resistance to chemical attack, judged by % swelling and general appearance, was greatest with coniferous woods and with teak and sycamore. Most hardwoods, notably beech, were definitely inferior.

E. A. R.

Shrinkage of wood. II. M. B. WELCH (J. Proc. Roy. Soc. New South Wales, 1936, 69, 174—181).—Shrinkage and d data for further samples of green

timbers are given, using the general procedure described previously (*ibid.*, 1932, 65, 235).

E. A. R.

Wood fillers. ANON. (Decorator, 1936, 35, No. 413, 69—70).—The manufacture, method of application, and advantages of ground quartz as a filler are discussed. Special media for fillers to be used under particular types of finishing media are considered.

D. R. D.

Cement-kiln linings.—See VIII.

PATENTS.

Sintering [cement clinker]. T. E. LLOYD, Assr. to DWIGHT & LLOYD SINTERING Co., INC. (U.S.P. 2,024,176, 17.12.35. Appl., 11.12.34).—A mixture of the pulverised raw materials with 18% of anthracite and 1% of oil is formed into pellets which are blast-roasted on a moving grate.

A. R. P.

Production of cements with the aid of blast-furnace slag. F. KRUPP GRUSONWERK A.-G. (B.P. 445,164, 12.7.35. Ger., 12.7.34).—A mixture of granulated blast-furnace slag, CaCO_3 , or cement meal, and pulverised fuel with just enough H_2O to form a damp mass is burned on a continuous grate or sintering machine and the resulting sinter ground.

A. R. P.

Manufacture of (A) refractory material [cement], (B, c) iron-bearing briquettes. C. E. WILLIAMS and J. D. SULLIVAN, Assrs. to BATTELLE MEMORIAL INST. (U.S.P. 1,994,377—9, 12.3.35. Appl., [A] 28.4.33, [B] 17.3.33, [c] 6.1.34).—(A) A refractory cement is made from a mixture of dolomite with SiO_2 5—11 and Fe_2O_3 0.5—15% by grinding to 100-mesh and clinking in a rotary kiln; bricks moulded from this are fired at $\leq 1300^\circ$. (B) Briquettes suitable for use in the refining of Fe by the open-hearth process are moulded from a moistened mixture of mill scale, flue dust, or Fe ore with 5% of dolomite cement [cf. (A)], under pressure (6000 lb./sq. in.). (c) A mixture of mill scale etc. with clay 5 and Portland or dolomite cement 2% is employed.

L. C. M.

Cementitious composition. L. L. CAILLOUX (U.S.P. 2,013,132, 3.9.35. Appl., 2.8.33. Can., 2.8.32).—A Mg oxychloride cement consisting of MgO 20, talc 1—2, and SiO_2 sand 10—70 pts. mixed with aq. MgCl_2 (d 1.12—1.21) containing $\text{BaCl}_2 \equiv 3.3$ —1.7% of the MgCl_2 present is claimed.

A. R. P.

Production of gypsum products. J. C. BEST and F. L. MARSH, Assrs. to BEST BROS. KEENE'S CEMENT Co. (U.S.P. 1,993,238, 5.3.35. Appl., 9.3.32).—Keene's cements of predetermined setting times are prepared by the calcination of gypsum in rotary kilns under controlled conditions of time and temp. (510—760°).

L. C. M.

Production of plasters. S. K. SMITH, and IMPERIAL CHEM. INDUSTRIES, LTD. (B.P. 447,753, 23.10.34).—Chlorinated C_{10}H_8 is added to the plaster mix, preferably in the form of an emulsion in H_2O containing casein, oleic acid, aq. NH_3 , and NaOH . The resulting plaster is resistant to attack by vermin.

A. R. P.

Manufacture of sound- and heat-insulating covering sheets or slabs, particularly for flooring. E. SCHREIBER (B.P. 451,625, 30.5.35).—One face of a wood-fibre sheet is impregnated with fatty oil and resin,

penetrating only partly through and not completely covering the fibres; this is effected, if desired, by vac. applied to the other side of the sheet. The coated sheet is dried and hot-pressed, with an intermediate exposure to moist air. B. M. V.

Impregnation of wood and other cellulosic materials. E. F. HARTMAN and W. F. WHITMORE, Assrs. to PROTEXOL CORP. (U.S.P. 1,994,073, 12.3.35. Appl., 12.7.30).—Aq. solutions containing $(\text{NH}_4)_2\text{SO}_4$ (A)—(c) 200—240, $\text{NH}_4\text{H}_2\text{PO}_4$ (A)—(c) 36—50, (d) 120, H_3BO_3 (A), (c), (d) 36—40, ZnCl_2 (A) 40, (B), (D) 100—160, Na_2CrO_4 (B) 1.7, CuSO_4 (c) 72 g., and HCl 8—18 c.c. per litre, are claimed. L. C. M.

Manufacture of laminated wood products. A. DE SAMSONOW (B.P. 444,893, 26.9.34. Belg., 27.9.33).—The cement used is a heat-hardenable artificial resin, and consolidation of the layers is effected by pressure and heat (200 kg./sq. cm. at 120—145°). A. R. P.

X.—METALS; METALLURGY, INCLUDING ELECTRO-METALLURGY.

Corrosion-resistance of ancient iron. A. W. SIMPSON and F. N. SPELLER (Met. & Alloys, 1936, 7, 199—203).—Corrosion tests in warm Pittsburgh H_2O on specimens of ancient Fe from Dura-Europos on the Euphrates and from an ancient Egyptian monument showed that the metal was no more resistant to corrosion than modern wrought Fe. Its preservation is attributed to favourable climatic conditions, especially a very dry atm. A. R. P.

Nitriding of iron and steel. A. BABINET (Bull. Soc. d'Encour., 1936, 135, 510—523).—A lecture.

[Testing the] zinc coating on galvanised iron. J. A. D. NASH (Analyst, 1936, 61, 540—541).—The HCl-SbCl_3 method for determining the distribution of Zn is the quickest, but the following method is probably the more accurate and economical. The sample is immersed in 10% H_2SO_4 in contact with a piece of Pt, and after violent action ceases (20 min.) the sample is removed and weighed and the solution and washings are titrated with 0.1N- KMnO_4 . E. H. S.

Zinc ammonium chloride: its place in modern galvanising. H. G. HOBBS (Iron Age, 1935, 135, No. 21, 10—13, 84—90; No. 24, 22—27, 90; 136, No. 3, 18—21, 92—94).—A review. CH. ABS. (e)

Mechanism of the γ - α transformation in stainless Invar caused by stress. Z. NISHIYAMA (Sci. Rep. Tôhoku, 1935, 25, 94—100).—The γ - α transformation in vac.-melted and annealed rods of 36.0: 8.7: 55.3 Fe-Cr-Co alloy occurs at a tensile stress = its yield point (20 kg. per sq. mm.), the mechanism of the change being similar to that brought about by heat-treatment. A. R. P.

Physical chemistry of flotation. VIII. Process of activation. E. E. WARK and I. W. WARK (J. Physical Chem., 1936, 40, 799—809; cf. A., 1935, 1458).—Salts of Pt, Au, Bi, Mg, Ag, Cu, Cd, Pb, Ce, Sb, and As "activate" sphalerite so that it responds to Et xanthate and floats readily. Ti and Co induce weaker response, whilst with Ti the influence is so slight as not to cause flotation. The metals effective as activators

generally form relatively insol. sulphides, whilst the ineffective ones form relatively sol. sulphides, but Ti, which forms a relatively sol. sulphide, does activate it, whereas Sn, of which the sulphides are less sol., does not. J. W. S.

Bearing metals with a copper-zinc-tin base. F. HANSEN (Z. Ver. deut. Ing., 1936, 80, 807—808).—The properties and uses of special bearing metals with a high Zn and low Sn content are discussed. R. B. C.

Quantitative spectral-analytical investigations on copper alloys for analysis of prehistoric bronzes. J. E. R. WINKLER (Veröff. Landesanst. f. Volkheitsk. Halle, 1935, No. 7; Chem., Zentr., 1935, ii, 1222).—Procedure and the choice of lines for the determination of Ag, Ni, Sn, Bi, As, and Sb are discussed. J. S. A.

Welding non-ferrous metals. C. STIELER (Z. Ver. deut. Ing., 1936, 80, 657—660).—Cu and its alloys are more amenable to welding than the other non-ferrous metals. The best methods to use, with their limitations, are given for Cu, Ni, and Al and their alloys, Zn, Pb, and Mg alloys. In general, resistance-welding appears to be the most satisfactory method. R. B. C.

Deoxidation of bronzes by phosphorus. H. NISHIMURA (Suiy. Shi, 1935, 8, 751—762).—Industrial bronzes contain 0.1—0.3% of Sn oxide. When they are deoxidised by P a certain amount of P always remains in the bronze. Deoxidation by P before adding Sn is discussed. CH. ABS. (e)

Etching solution for zinc and zinc alloys. J. SCHRAMM (Z. Metallk., 1936, 28, 159—160).—The solution is prepared by mixing conc. aq. KOH 51, H_2O 50, and conc. aq. $\text{Cu}(\text{NO}_3)_2$ 20 c.c. and stirring in 25 g. of powdered KCN; after filtration, 2.5 c.c. of conc. aq. citric acid are added. Etching is effected by immersion of the specimen for 10—20 sec. in the undiluted solution, whereby the Zn-rich constituents are blackened, the Mg, Fe, Cu, Pb, and Ni constituents remaining white. A. R. P.

Production and application of silver solders. E. R. THEWS (Engineer, 1935, 160, 113—114).—Data for 14 Ag-Cu-Zn alloys are given. Replacement of Cu by Cd lowers the m.p. and ductility. 2% of Ni increases the strength, hardness, and corrosion-resistance. Sn, Fe, and Pd are undesirable impurities. CH. ABS. (e)

Determination of fineness of silver alloys by streak test. K. BIHLMAIER (Mitt. Forsch. Inst. Probieramtes Edelmetalle Schwäb. Gmünd, 1935, 9, 22—24; Chem., Zentr., 1935, ii, 1222).—The colour of the streak made by an unknown alloy on the test-stone is compared with that of alloys of known Ag content. J. S. A.

Protective action of inorganic and organic substances in the acid corrosion of metals. (Inhibitors.) W. MACHU (Oesterr. Chem.-Ztg., 1936, 39, 144—147, 152—155).—Published work is reviewed. E. S. H.

Spraying liquid metal to decrease corrosion. R. E. KUNKLER (World Petroleum, 1935, 6, 525).—Examples of the spraying of liquid Al are given. CH. ABS. (e)

Density of sprayed metal coatings. T. EVERTS (Z. Metallk., 1936, 28, 143—150).—The min. thickness of deposit to obtain min. porosity with a distance of 20 cm. between pistol and work under the optimum conditions of spraying is Zn 0.09, Pb 0.13, Cu 0.18, Al 0.22, monel metal 0.22, Fe 0.22, and V2A steel 0.26 mm. The freedom from porosity increases with increasing H_2 pressure and, except in the case of Zn and Pb, with increasing $O_2 : H_2$ ratio between a deficiency of 8% and an excess of 4% of O_2 . Increase in the rate of feed of metal to the pistol rapidly increases the porosity, but hammering and polishing the deposit closes up the pores. A. R. P.

Corrosion tests in various refinery services. J. E. POLLOCK, E. CAMP, and W. R. HICKS (Amer. Inst. Min. Met. Eng., Inst. Met. Div., 1935, Tech. Publ. 639, 19 pp.).—Tests for corrosion of a wide range of metals by H_2O , salt H_2O , dil. acids, still vapours, naphtha, NaOH, and steam are described. CH. ABS. (e)

Porosity in metallic arc-welding under specified conditions. J. S. JOHNSON (Amer. Weld. Soc. J., 1935, 14, 10—14).—Tests on one-pass, full-bead welding, using a Cu backing plate, are described. CH. ABS. (e)

Welded components in construction of chemical apparatus. J. SEHRING (Chem. Fabr., 1936, 9, 341—343).—The advantages of welded sheet-metal construction for chemical engineering plant are discussed. J. S. A.

Influence of inhomogeneity of the metal on the mechanism of flow in the Dick extrusion process. H. UNCKEL (Z. Metallk., 1936, 28, 151—154).—Tests on wax-chalk mixtures and on hot Al show that the region of principal flow in the latter is much more extensive and a radial component of the velocity of flow is set up in the neighbourhood of the piston which leads to instability in the flow. These difficulties can be overcome by making the bottom of the piston concave, by heating the receiver, and by using a conical opening in the die. A. R. P.

Effect of annealing on the length of cold-drawn [metallic] rods. K. SAITO (Sci. Rep. Tôhoku, 1935, 25, 128—140).—Hard-drawn Cu and 70:30 brass contract on annealing, contraction practically ceasing at 200° and 300°, respectively. With 60:40 brass there is an irregular contraction up to 300°, then a rapid expansion up to 500°, followed by a further small contraction at higher temp. With Armco Fe very little change occurs below 900°, but above this there is a rapid contraction. With 0.3% C steel a somewhat irregular expansion occurs up to 800°, followed by a sudden sharp contraction; with 0.8% C steel expansion occurs up to 350°, contraction between 350° and 650°, and expansion between 650° and 800°, and with 1.3% C steel an initial small expansion up to 350° is followed by a rapid and severe contraction up to 750°. Internal stress produced by cold-drawing is removed from Cu at 300°, brass at 370°, and Fe and steel at 650°; at these temp. the hardness returns to its original val. before cold-work. A. R. P.

Modern electrochemical processes for the protection of metallic surfaces, and their chemical and physico-chemical bases. H. FISCHER (Angew.

Chem., 1936, 49, 493—498).—Technical methods of protecting Al surfaces are reviewed. When Al is treated with $FeCl_3$ it is difficult to stop the reaction at the stage of a thin Fe film, before local Fe-Al cells begin to be active and to weaken the surface. Electrolytically-deposited metallic surfaces have the disadvantage that Cl^- can diffuse in through fine pores which remain. Electrolytically-prepared oxide films are more satisfactory, but here c.d. increases as the surface becomes more protected, until at small pores it causes local heating which promotes attack on the oxide layer; also, O_2 may be liberated and weaken the surface. In technical practice the pores are filled mechanically or chemically. E. W. W.

Theory of electrolytic chromium-plating. I. R. WEINER (Z. Elektrochem., 1936, 42, 377—397).—Measurements have been made of the c.d.-potential curves during the electrolysis of CrO_3 solutions (with and without addition of SO_4^{2-}) at the following cathodes: Pt, Pd, Ir, Rh, Au, Ag, Cu, Ni, Fe, Sn, Pb, Zn, Al, and C. Some measurements with electrolytes containing Cl^- are also described, and a preliminary discussion is given. (Cf. B., 1936, 997.) O. J. W.

Properties of nickel electrodeposits. R. J. MCKAY (Met. & Alloys, 1936, 7, 193—198).—Modern practice in the operation of Ni-plating baths is briefly reviewed and recent work on the mechanical and protective properties of electroplated Ni summarised in tables and graphs. A. R. P.

Cr in cyanide solutions.—See VII. Ground-coat draining. Enamel adherence. Refractories. —See VIII. Ni-Fe alloys. —See XI. H_2S as mining hazard. —See XXIII.

PATENTS.

[Refining of a] liquid iron bath. DORTMUND-HÖRDER HÜTTENVEREIN A.-G. (B.P. 447,285, 19.11.34. Ger., 30.11.33).—The molten Fe is tapped from the Thomas furnace into a ladle rotated at 25 r.p.m., whereby the MnS rises to the surface and is there oxidised to SO_2 and MnO. A. R. P.

Substance [slag] preparation and article of manufacture. E. E. BROSIUS (U.S.P. 2,023,511, 10.12.35. Appl., 13.7.31).—Blast-furnace slag is submitted to violent agitation during the addition of granulating H_2O , the amount of which is controlled to produce a dry product. A. R. P.

Production of cast iron. CARBORUNDUM CO., LTD. From CARBORUNDUM CO. (B.P. 447,539, 9.10.34).—A mixture of cast Fe and other Fe scrap is melted in the cupola and SiC added to obtain the desired Si and C content for grey cast Fe. A. R. P.

Preparation of [white cast] iron having improved characteristics. E. L. CROSBY and A. E. RHODES, Assrs. to DETROIT ELECTRIC FURNACE CO. (U.S.P. 2,014,559, 17.9.35. Appl., 27.6.32).—Molten white Fe is heated at 1600° in a reducing atm. and agitated for 5—10 min., then cast and reheated at 960° for 3—5 hr., cooled at 42° per hr. to 700°, and quenched. A. R. P.

Improvement of malleable iron castings. C. S. SMITH, Assr. to BATTELLE MEMORIAL INST. (U.S.P.

2,024,014, 10.12.35. Appl., 13.10.32).—Malleable Fe castings containing Cu 0.6—5 (1), C 1.75—3, and Si 0.6—2.5% are annealed at 700—850°, then cooled at > 25° per hr. to 400—600° (500°), and maintained at this temp. until pptn.-hardening is complete.

A. R. P.

[Cast-iron] alloy. W. H. W. PROCTOR (B.P. 450,680, 18.12.34 and 2.9.35).—The Fe contains C 2—2.6, Si 0.6—1, Mn 0.5—1, and Cr 1.75—2.5%; the castings are annealed at 950° and slowly cooled.

A. R. P.

Manufacture of case-hardened [cast-iron] piston rings. SHEEPBRIDGE STOKES CENTRIFUGAL CASTINGS Co., LTD. (B.P. 447,932, 6.2.35. Ger., 11.5.34).—The rings are case-hardened in NH_3 at 500° while being tensioned.

A. R. P.

Cast-iron pipes. H. BROADBENT (B.P. 447,693, 4.12.34).—The pipe is cast on to a preformed "ear" of malleable Fe.

A. R. P.

Manufacture of iron. A. A. FREY (U.S.P. 1,992,999, 5.3.35. Appl., 23.1.32).—Pig Fe is melted in a basic-lined, open-hearth furnace under a reducing CaO -carbide slag; this slag is removed and an oxidising $\text{CaO-Fe}_2\text{O}_3$ slag substituted. The metal is then blown with air to oxidise C, Si, Mn, and P, the slag removed, and the Fe treated with H_2 or producer gas to reduce dissolved oxides.

L. C. M.

Production of sponge iron. H. G. WILDMAN (U.S.P. 2,014,873, 17.9.35. Appl., 11.11.33. Renewed 8.8.35).—A mixture of finely-ground Fe ore, Na_2CO_3 , and macerated peat is briquetted, the briquettes are heated at 600—1000° in a non-oxidising atm., and the sponge Fe produced is recovered by crushing the briquettes and passing the powder over magnetic pulleys.

A. R. P.

Low-carbon steel. G. F. NELSON (U.S.P. 2,013,249, 3.9.35. Appl., 24.10.32).—A martensitic structure in steel containing C 0.05—0.4 and Mn \geq 0.5% is produced by quenching from \geq 940° into 40% aq. KOH or NaOH.

A. R. P.

Normalising of steel. W. C. CHANCELLOR, ASST. to NAT. TUBE Co. (U.S.P. 2,025,016, 17.12.35. Appl., 18.4.33).—The steel is heated above the Acl point and subjected to alternate tensile and compression stresses to effect a slight reduction in area during cooling through the transformation range.

A. R. P.

Surface hardening of rails. OSWELD RAILROAD SERVICE Co., ASSEES. of H. S. GEORGE (B.P. 448,416, 27.8.34. U.S., 6.9.33).—Mechanical devices for the controlled heating of rails *in situ* are claimed.

A. R. P.

Device for hardening metal [steel] surfaces. I. G. FARBENIND, A.-G. (B.P. 445,425, 8.10.34. Ger., 7.10.33).—Automatic devices controlled by pyrometers are claimed for regulating the surface temp. and for cutting off the gas and applying the quenching medium when the desired temp. is reached.

A. R. P.

Alloy steel. C. H. WILLS (U.S.P. 1,992,905, 26.2.35. Appl., 17.7.34).—Tough, ductile steels, characterised by appreciable dispersion of cementite, contain C 0.15—0.2 or 0.6—0.7 (0.65), Mn 0.3—3 or 0.7—9 (0.8),

Mo 0.2—1.5 or 0.2—3 (0.25), and SiO_2 0.15—2.5 or 0.2—0.3 (0.25)%.

L. C. M.

[Free-machining] alloy steel. W. CRAFTS, ASST. to ELECTRO METALLURG. Co. (U.S.P. 2,013,137, 3.9.35. Appl., 17.10.31).—The steel contains S 0.075—0.5 (0.11), V 0.05—1 (0.2), Mn \geq 1.25 (1.2), and C \geq 0.5 (0.15)%.

A. R. P.

Improving the physical properties of austenitic alloy steels. GOODYEAR-ZEPPELIN CORP. (B.P. 447,606, 15.8.34. U.S., 22.6.34).—Austenitic 18 : 8 Cr-Ni steel with C \geq 0.2 and Ti 0.2—1 or Nb \geq 3% is annealed above the Acl point, quenched, work-hardened, and pptn.-hardened at 320—650° (450°) for 1 hr.

A. R. P.

Heat-treatment of chromium alloy steels. F. M. BECKET and R. FRANKS, ASSTS. to ELECTRO METALLURG. Co. (U.S.P. 2,024,561, 17.12.35. Appl., 9.4.34).—Ferritic steels with Cr 4—30, C \geq 0.25%, and Ti = \leq 4 × % C and \geq 4 × % C + 1.5% are heated at 700—1000° (700—800°) for \geq 1 hr. to ppt. the C as TiC .

A. R. P.

[Chromium] alloy steels. ELECTRO METALLURG. Co., ASSEES. of F. M. BECKET and R. FRANKS (B.P. 447,265, 12.10.34. U.S., 18.10.33).—Steels resistant to oxidation at high temp. and free from air-hardening effects contain Cr 3.5—20 (3.5—7.5), C \leq 0.1, and V \geq 1%, the % V being \leq 10 × % C.

A. R. P.

Iron-chromium alloys. ALLOY RES. CORP. (B.P. 447,580, 20.6.35. U.S., 20.6. and 10.7.34).—Scrap Fe, chromite, and Fe_2O_3 are smelted in an arc furnace to give a Cr_2O_3 -rich slag and a low-Cr-Fe alloy which is tapped off. The slag is then reduced to a low-C, high-Cr alloy by addition of Si or Fe-Si.

A. R. P.

Corrosion-resistant constructional elements. A. L. MOND, FROM I. G. FARBENIND, A.-G. (B.P. 447,574, 27.5.35).—In chemical plant dealing with moist Cl_2 and O_2 the parts exposed to corrosive action are made of an alloy of Fe with 20—30% Cr and \geq 1% C, preferably of 70 : 30 Cr-Fe alloy.

A. R. P.

High-silicon and high-manganese steel. A. C. JONES, ASST. to LEBANON STEEL FOUNDRY (U.S.P. 2,013,443, 3.9.35. Appl., 24.11.33).—The steel contains C 0.12, Si 1.76, Mn 1.53, S + P \geq 0.06%.

A. R. P.

Manufacture of aluminised steel articles [heating tubes]. B. J. SAYLES (B.P. 444,952, 26.7.34. U.S., 12.8.33 and 15.6.34).—Tubes for oil stills, superheaters, etc. operating at \geq 800° are made of steel containing 0.25—2.5% Mo which has been calorised in the usual way and then heated until the Al has diffused into the surface layers to produce an alloy containing 5—35 (10—20)% Al.

A. R. P.

Magnetic materials [ferronickel alloys]. N. V. PHILIPS' GLOEILAMPENFABR. (B.P. 448,046, 3.12.34. Ger., 4.12.33).—Ni-Fe alloy (50 : 50) strip is rolled to 90% reduction, annealed in H_2 at 1100° for 1 hr. to obtain regular crystal orientation, rolled further in one direction only, and finally given a stress-relief anneal at 400°.

A. R. P.

Insulated [metal] wire. S. RUBEN, ASST. to VEGA MANUFG. CORP. (U.S.P. 2,022,827, 3.12.35. Appl.,

29.9.32).—Magnet wires are insulated with a plastic mixture of Cr_2O_3 (200 g.), H_3BO_3 (25 g.), and a 1:3 solution of rubber in a resinous oil (400 c.c.), and then wrapped with an asbestos or cotton fabric impregnated with a similar mixture. A. R. P.

Magnet steels containing nickel, aluminium, and (A) chromium and cobalt, (B) cobalt, (C) manganese, (D) tungsten, (E) chromium. R. BOSCH A.-G. (B.P. 444,702—5 and 444,901, [A—D] 25.9.34, [E] 28.9.34. Jap., [A—D] 26.9.33, [E] 4.10.33. Addn. to B.P. 392,656—62; B., 1933, 712).—The steels contain (A, E) Ni 5—40, Al 5—20, or (B—D) Ni 8.1—29.5, Al 5.1—20% with (A) Cr 0.01—4 and Co 0.01—4%, (B) Co 0.01—0.5%, (C) Mn 0.01—0.5%, (D) W 0.01—0.5%, (E) Cr 0.01—4%. In addition C \geq 1.5 and Mo, V, or Cu 0.01—0.5% may be present. A. R. P.

Coated [ferrous] welding rod. W. B. MILLER, ASSR. to OXWELD ACETYLENE CO. (U.S.P. 2,024,991, 17.12.35. Appl., 30.12.33. Renewed 12.4.35).—The coating comprises a mixture of slag-forming material 65—98 and cannel coal 25—2% with a binder, e.g., a mixture of slip clay 50, Fe_2O_3 20, CaCO_3 20, rutile 10, MnO_2 5, and coal 10%. A. R. P.

Material [coated ferrous metal rods] for use in arc-welding. WILSON WELDER & METALS CO., INC. (B.P. 447,976, 26.10.34. U.S., 7.7.34).—The rods are coated with a mixture containing TiO_2 15—73, SiO_2 19—58, and MgO and/or Al_2O_3 3—29%, e.g., a paste made by mixing α -cellulose 200, Fe—Mn 40, TiO_2 150, MnO_2 30, and pyrophyllite 60 g. with water-glass (d 1.4; $\text{Na}_2\text{O}:\text{SiO}_2 = 1:3.22$) 450 c.c. A. R. P.

Composite welding rod for hard facing. W. A. WISSLER and W. B. MILLER, ASSRS. to HAYNES STELLITE CORP. (U.S.P. 2,024,992, 17.12.35. Appl., 29.5.35).—An Fe welding rod is coated with a mixture of flux, binder, and ferro-alloys such that the weld will contain Cr 3—40, Mn 1—10, C 0.5—3, and Si \geq 3%.

A. R. P.

Fusion welding. M. NAEDER (B.P. 448,401, 5.2.36. Fr., 19.2.35).—Fe welding rods composed of flat strips of metal folded longitudinally are claimed; flux or other addition agent may be inserted in the folds.

A. R. P.

Rustproofing of ferrous articles. VICTOR CHEM. WORKS (B.P. 447,704, 19.3.35. U.S., 20.4.34 and 2.2.35).—The articles are immersed in hot dil. H_3PO_4 (15%) containing $\text{Na}_2\text{Cr}_2\text{O}_7$ (13.3%), rinsed, and baked at 200°.

A. R. P.

Rustproofing compositions. W. I. WALTERS (B.P. 447,176, 30.9.35. Fr., 29.9.34. Addn. to B.P. 419,487; B., 1935, 155).—FeS (336 g.) is dissolved in 1 litre of 1:1 H_3PO_4 (d 1.7).

A. R. P.

Compositions for use in applying hard facing material to metal articles. W. W. TRIGGS. From P. R. MALLORY & Co., Inc. (B.P. 448,423, 3.10.34).—Finely-powdered mixtures containing Fe 30—65, W 2—30, C 3.5—6.5, Ni 2—5%, with Mo and Cr in the ratio 1—2:2—3 (Cr + Mo + W = 25—60%) and a paraffin wax binder are compressed into shape and sintered at 1150—1250° in H_2 . The Cr, Mo, and W

are preferably added as high-C ferro-alloys, and part of the W may be added as WC. A. R. P.

Anticorrosive solution. F. A. WEIHE, JUN., ASSR. to McALEER MANUF. CO. (U.S.P. 2,023,755, 10.12.35. Appl., 10.3.34).—Non-corrosive, anti-freeze liquids consist of 40% aq. EtOH, PrOH, $\text{C}_2\text{H}_4(\text{OH})_2$, or glycerin containing 0.2% of blown castor oil or soya-bean oil with 0.05—0.1% of $\text{N}(\text{C}_2\text{H}_4\cdot\text{OH})_3$. A. R. P.

Corrosion inhibitor. H. L. COX, ASSR. to CARBIDE & CARBON CHEMICALS CORP. (U.S.P. 1,992,689, 26.2.35. Appl., 12.11.30).—Corrosion of the radiators of internal-combustion engines is retarded by addition of 0.25% of $\text{N}(\text{C}_2\text{H}_4\cdot\text{OH})_3$ or 1% of its phosphate to the cooling liquid. L. C. M.

(A) **Metal-cleaning composition.** (B) **Degreasing agent.** (C) **Rust inhibitor.** P. HODGES, ASSR. to GULF STATES PAPER CORP. (U.S.P. 1,993,097—9, 5.3.35. Appl., 20.4.33).—(A) Claim is made for mixtures containing (A) "floating soap" (I) (obtained from soda- or sulphate-cellulose black liquors) 10%, and H_2O 67, oleic acid 3, and $\text{C}_5\text{H}_{10}\text{Cl}_2$ (II) 20%; or (I) 25, EtOH 37.5, and (II) 37.5%; or (I) 20, 85% H_3PO_4 50, and $\text{OH}\cdot\text{C}_2\text{H}_4\cdot\text{OBu}$ (III) 30%; (B) (I) 20, with oleic acid 3, C_2HCl_3 60, and H_2O 17%; or with EtOH 37.5 and C_2HCl_3 37.5%; or with 85% H_3PO_4 50 and (III) 30%; and (C) (I) 0.5—25, EtOH \geq 10, and H_2O to 100%. L. C. M.

Degreasing of metals and like non-absorbent materials. N. R. HOOD, and IMPERIAL CHEM. INDUSTRIES, LTD. (B.P. 444,404, 19.9.34).—Vapour degreasing apparatus is claimed. A. R. P.

Substances for use in the pickling and cleaning of metals. IMPERIAL CHEM. INDUSTRIES, LTD. (B.P. 442,885, 17.8.34. U.S., 17.8.33).—Claim is made for corrosion inhibitors comprising the carboxylic acid derivatives (II) of sulphurised quinoidine (I); (II) are prepared by heating (I) with the conc. acid, if liquid (e.g., HCO_2H , AcOH); by fusion with the molten acid, if solid (e.g., stearic, $\text{CH}_2\text{Cl}\cdot\text{CO}_2\text{H}$); or in aq. solution (e.g., citric, $\text{H}_2\text{C}_2\text{O}_4$), and 0.25 g. per litre of pickling bath is employed. L. C. M.

Pickling, swilling, washing, or other liquid treatment of metal rods, tubes, bars, and the like. TAYLOR & SONS, LTD., and G. A. TAYLOR (B.P. 447,120, 8.11.34).—Cradles for holding the articles and keeping them in movement while immersed in the solution are claimed. A. R. P.

Regeneration of phosphoric acid pickling baths. COMP. NAT. DE MAT. COL. ET MANUF. DE PROD. CHIM. DU NORD RÉUNIES, ETABL. KUHLMANN (B.P. 447,524, 19.8.35. Fr., 16.7.35).—When the Fe^{II} has accumulated to such an extent that the time of pickling is doubled, H_2SO_4 equiv. to nearly all the increased quantity of Fe^{II} present is added to the bath to reduce the time of pickling to its original val. A. R. P.

Etching compound. F. COSTA and C. MUNUMER (U.S.P. 1,993,920, 12.3.35. Appl., 18.9.33).—An etching solution, particularly suitable for the recording of finger-prints on Fe, Zn, Sn, or Ag, consists of gelatin 1.5, NaCl 28.4, CuSO_4 35.5 g., and H_2O 113.6 c.c. L. C. M.

Etching processes for production of moulds, shaped articles, or patterns. A. KLUMPP (B.P. 444,366, 29.3.35. Austr., 29.3.34).—The design is applied as a transfer and the uncoated portions of the metal are etched in any suitable manner. A. R. P.

Production of protective coatings on exposed surfaces of steel- or iron-work. D. RONALD and B. WYLAM (B.P. 447,305, 18.2.35).—The metal surface is sprayed with a thick coating of an oil paint, and, when this has partly hardened, with granite chips pre-coated with a thin film of the same paint. A. R. P.

Providing [iron or steel] wire with protective metallic coatings [by galvanising]. VEREIN. STAHLWERKE A.-G. (B.P. 445,228, 4.6.35. Ger., 22.8.34).—A sand scouring box is provided between the pickling and washing baths in the usual continuous wire-galvanising process. A. R. P.

Manufacture of metal-coated ferrous article [galvanised iron wire]. F. M. CRAPO, ASST. to INDIANA STEEL & WIRE CO. (U.S.P. 2,023,364, 3.12.35. Appl., 17.8.34).—Hot-dipped galvanised wire is given an outer coat of Cd by electrodeposition. A. R. P.

Bimetallic [(A) zinc- and (B) tin-plated] articles. H. W. GRAHAM and S. L. CASE, ASSTS. to JONES & LAUGHLIN STEEL CORP. (U.S.P. 1,994,275—6, 12.3.35. Appl., 16.3.33).—(A) In the galvanising of Fe, the Zn coating is improved by addition of $\geq 2\%$ of Na. (B) In Sn-plating, the use of a Sn alloy containing 0.2–2% of Na prevents pinhole formation. L. C. M.

Coating iron or steel articles [with tin]. A. C. SIMMONS, ASST. to KEYSTONE STEEL & WIRE CO. (U.S.P. 2,073,364, 3.9.35. Appl., 3.7.33).—The heated wire is passed into molten Sn through a layer of flux containing SnCl_2 floating on one part of the bath and out through a layer of charcoal floating on another part. A. R. P.

Production of bright coatings of tin or tin alloys on iron and steel. R. THOMAS & CO., LTD., A. W. KIEFT, E. MEHL, and O. SMETANA (B.P. 448,288, 7.3.35).—The metal is degreased, pickled in 10% H_2SO_4 , plated with half the desired deposit of Sn, immersed in a $\text{ZnCl}_2\text{--NH}_4\text{Cl}$ flux at 280° to melt the deposit, and then plated with the remainder of the Sn. A. R. P.

Removal of metal from the surfaces of [ferrous] metallic bodies. LINDE AIR PRODUCTS CO. (B.P. 447,751 and Addn. B.P. 447,975, 22.10.34. U.S., [A] 28.10.33, [B] 31.10.33).—Mechanical devices are claimed for heating the surfaces and directing streams of O_2 thereon at acute angles so that the oxide formed is simultaneously blown away. A. R. P.

(A) [Bearing metal] structure made from comminuted materials. (B) Powdered iron and zinc alloy. (A, B) C. R. SHORT and (B) R. P. KOEHRING, ASSTS. to GEN. MOTORS CORP. (U.S.P. 1,992,548—9, 26.2.35. Appl., [A] 16.1.29, [B] 27.2.30).—(A) Bearing metal is made by heating a mixture of cast-Fe powder (100-mesh) and Zn powder (100-mesh) at 370°, adding Cu and Sn powders, briquetting, and sintering in a closed vessel, using NH_4Cl as flux. Mixtures of Fe 50, Cu 80, Zn 20, and Sn 2 pts., and Fe 50, Cu 90, and Sn 10 pts. are

claimed. (B) Claim is made for an alloy of sherardised Fe powder. L. C. M.

Refining of copper. A. L. MOND. From SOC. GÉN. METALLURG. DE HOBOKEN (B.P. 445,268, 31.8.34).—The metal is melted in a reducing or neutral atm. in an electric furnace, which rotates or oscillates about its source of heat, and cast in an atm. of non-oxidising gas. A. R. P.

Casting of metals [copper]. T. BOLTON & SONS, LTD., and J. HAYES (B.P. 444,959, 24.9.34).—To prevent the formation of a wrinkled, porous surface when Cu bars are cast in open moulds the moulds are covered with an H-shaped plate and filled with Cu until it just overflows without touching the cover. A. R. P.

Bronzing of copper and copper alloys. METALLWERKE A.-G. DORNACH (B.P. 447,446, 24.4.35. Ger., 2.5.34).—The metal is degreased, etched by rubbing with a solution containing HCl 20 c.c. and CuSO_4 20 g. per litre, washed, dried, and treated with a current of air which has been passed through 10–20% aq. $(\text{NH}_4)_2\text{S}$. A. R. P.

Copper alloys. BRIT. THOMSON-HOUSTON CO., LTD. (B.P. 448,400, 31.1.36. U.S., 31.1.35). Pptn.-hardenable Cu alloys contain Co 0.5–3 (2.6) and Be + Al 0.25–1 (Be 0.32, Al 0.08)%. A. R. P.

Die-casting [copper] alloy. J. R. FREEMAN, JUN., ASST. to AMER. BRASS CO. (U.S.P. 2,023,129, 3.12.35. Appl., 12.10.34).—The alloy consists of Cu 55–75 (60), Pb 0.25–3 (1), Sn 0.25–3 (1), Al 0.05–1 (0.1), Si 0.05–0.5 (0.15), and Zn the remainder (35.75%). A. R. P.

Metallurgy. [Recovery of copper and zinc from scrap brass.] F. LAIST, ASST. to ANACONDA COPPER MINING CO. (U.S.P. 2,023,424, 10.12.35. Appl., 5.1.34).—Scrap brass is melted in a converter and blown with air to remove most of the Zn, which is recovered as ZnO fume; the residual crude Cu is cast into anodes which are electrolysed in an acid ZnSO_4 bath containing 30 g. of CuSO_4 per litre to obtain pure Cu, anode slime containing any Pb and Sn present, and a solution in which ZnSO_4 accumulates. The spent Cu electrolyte is treated with the ZnO fume to obtain pure aq. ZnSO_4 for the recovery of electrolytic Zn, and a ppt. of $\text{Cu}(\text{OH})_2$ which is returned to the Cu bath; the acid ZnSO_4 solution from the Zn tanks is used for making more Cu electrolyte. A. R. P.

Refining [the grain structure of] zinc. P. OAKLEY (B.P. 448,078, 16.10.35).—Zn (99.5–99.9%) is treated with 0.3% of 99.9% Al. A. R. P.

Bearing-metal alloys. NAT. SMELTING CO., LTD., ELECTROLYTIC ZINC CO. OF AUSTRALASIA, LTD., and H. L. EVANS (B.P. 448,640, 15.12.34).—The alloys consist of Cd with Zn 15–30 and Cu 1–2.5 (1.5)%. A. R. P.

Bimetal thermostat. H. SCOTT, ASST. to WESTINGHOUSE ELECTRIC & MANUF. CO. (U.S.P. 1,993,020, 5.3.35. Appl., 11.5.34).—Pairs of Ni-steel alloys are claimed, containing, e.g., (high-expansion member) Ni 7–26, Mn 2–6, Cr 0.1–5, Co ≥ 0.1 , and C 0.1%; (low-expansion member) Ni 12–35, Mn 0.1–1, Cr, Ti, Mo, or W 0.1–8, Co 0.1–35, and C 0.05–0.25%. L. C. M.

Manufacture of drawn article [wire]. H. J. FRASER, R. J. OWENS, E. K. JENCKES, and J. K. LENDHART, ASSTS. to INTERNAT. NICKEL CO. (U.S.P. 1,993,600, 5.3.35. Appl., 18.2.33).—Wires of Ni, Ni-Cr, or Ni-Cu are heated in H_2 at 670–1220° and passed through first a bath of flux comprising $ZnCl_2$ (8), NaCl 4 (pts.), and NH_4Cl (1 pt.) at 380–400°, and then one of molten Pb; the Pb-coated wire is drawn (reduction > 35%) without annealing, and finally the coating is removed by 10% HNO_3 . L. C. M.

Bright annealing of metallic products [nickel-chromium alloys]. A. SADLER. From INTERNAT. NICKEL CO., INC. (B.P. 445,190, 5.9.34).—The metal is passed countercurrent to a stream of protective gas through an electric muffle with a graphite hearth extending into a H_2O -cooled chamber. A. R. P.

Production of [metallic] heat-resistant articles for use at high temperatures. HERAEUS-VACUUM-SCHMELZE A.-G. (B.P. 451,601, 7.2.35. Ger., 24.3.34).—The production of Ni-alloy articles containing Cr 1–30, Fe 0–50, rare-earth metal 0.02–1.20, C < 0.065% is claimed. B. M. V.

Treatment of metals or alloys containing tin. E. L. W. BYRNE. From AMER. SMELTING & REFINING CO. (B.P. 447,713, 29.7.35).—Sn-Pb or Sn-Sb-Pb alloys are melted under a $PbCl_2$ -NaCl flux and PbO is stirred in until the whole of the Sn is oxidised. The slag is removed and heated at 900–950° to volatilise the excess of $PbCl_2$ and leave a Sn-rich residue for smelting. A. R. P.

[Silver solder] alloy. R. H. LEACH, ASSR. to HANDY & HARMAN (U.S.P. 2,015,345, 24.9.35. Appl., 5.2.35).—The alloy consists of Ag 30–60 (40), Cu 12–35 (21), Zn 5–20 (18), Cd 5–20 (19), and Ni 1–3 (2%). A. R. P.

Dental [tin-silver] alloy. J. R. STACK, ASSR. to L. D. CAULK CO. (U.S.P. 2,024,545, 17.12.35. Appl., 4.10.33).—An alloy for preparing amalgam fillings consists of Ag > 65, Sn > 25, and Be 0.06–1%, with optional additions of Cu (> 6) and Zn (> 2%). A. R. P.

Recovery of precious metals [gold from pyritic ores]. A. GORDON (B.P. 447,626, 4.2.35).—The ore is roasted, then leached with 2–5% HCl containing $FeCl_3$ and 1–3% of $NaClO_3$. A. R. P.

Gold alloy. J. K. SMITH, ASSR. to BERYLLIUM CORP. (U.S.P. 2,015,499, 24.9.35. Appl., 22.12.31).—The alloy contains Be 0.2–5%. A. R. P.

Manufacture of plated metal [rolled gold on stainless steel]. E. H. DAVIGNON, ASSR. to GEN. PLATE CO. (U.S.P. 2,024,150, 17.12.35. Appl., 31.7.33).—Claim is made for rolled Au having Ni-plated stainless steel as the base metal. A. R. P.

Concentrating (A) chromite ores, (B) iron ores, (C) non-sulphide minerals, by froth flotation. (D) Flotation of manganese ores. (A–D) F. WEED and (C) E. E. ELLIS (U.S.P. 2,014,404–7, 17.9.35. Appl., [A–C] 12.10.32, [D] 26.8.33).—(A) The coarsely crushed ore is treated by gravity concn. to obtain a crude chromite concentrate which is ground through 48-mesh, deslimed by classification, and suspended in H_2O (p_H 7);

the suspension is agitated with a colloidal dispersion of oleic acid (25), $N(C_2H_4 \cdot OH)_3$ (I) 0.25, and H_2O (75%), the p_H adjusted to 6, and the pure chromite recovered by aeration of the pulp. (B) Crushed and deslimed Fe ores are floated with a dispersion of coal-tar creosote and/or linseed oil in (I) oleate solution. (C) Oxidised ores are floated with a dispersion of a higher fatty acid in an alkylamine [e.g., (I)] soap solution. (D) Mn oxides are floated with a dispersion of kerosene in a (I) soap solution. A. R. P.

Flotation process [for oxidised ores]. C. L. BURDICK, ASSR. to E. I. DU PONT DE NEMOURS & CO. (U.S.P. 2,014,717, 17.9.35. Appl., 16.8.33).—A collector for the flotation of ilmenite, zircon, phosphate rock, etc. is produced by the catalytic hydrogenation of C oxides at high temp. and pressure, treatment of the fractionated products with oleum, neutralisation of the acid with CaO , and conversion of the alkyl sulphates into mercaptans with Na_2S . A. R. P.

Duplex metal article. R. H. BROWN, ASSR. to ALUMINUM CO. OF AMERICA (U.S.P. 2,023,512, 10.12.35. Appl., 20.10.33).—The surface of strong but readily corroding Al alloy sheets is protected by a rolled-on laminated layer of Al alloys, the potential of the laminations increasing from the base metal to the surface. The alloys used in the laminations are prepared by addition of small quantities of Ag, Cd, Pt, Ca, Ba, Sr, Ga, In, Bi, Sn, or Zn to 99.9% Al. A. R. P.

Manufacture of hard metals. RHEINISCHE METALLWAAREN U. MASCHINENFABR., and G. BOECKER (B.P. 444,995, 4.6.35).—Hard carbides, nitrides, borides, or silicides, or mixtures of these, are pressed into the desired shape, which is then made the cathode in a plating solution of a bonding metal (Ni or Co) so that the pores are filled with this metal. No subsequent heat-treatment is necessary. A. R. P.

Sintered hard metal alloy. K. SCHRÖTER, K. AGTE, K. MOERS, and H. WOLFF, ASSRS. to GEN. ELECTRIC CO. (U.S.P. 2,015,536, 24.9.35. Appl., 24.3.32. Ger., 18.7.31).—The alloy consists of WC 60–85, TiC, TiN, or TiB 10–30, and Fe, Co, or Ni > 25%, e.g., WC 75, TiC 10, Ni 15, or TiC 30, WC 60, Co 10%. A. R. P.

Production of sintered hard metal alloys. K. M. TIGERSCHÖLD and K. BONTHRON (B.P. 444,724, 14.6.35).—A mixture of WC with TiC 5–25 and NiO, CoO, $NiCO_3$, or $CoCO_3$ > 30% is pressed into shape and sintered in H_2 at > 1300°. Part or all of the TiC may be replaced by ThC or ZrC, and 1–25 (2–4)% of the WC by NbC and/or TaC. A. R. P.

Manufacture of massive bodies of density greater than that of lead [for absorption of penetrating radiating]. GEN. ELECTRIC CO., LTD., and C. J. SMITHELLS (B.P. 447,567, 15.3.35).—A finely-divided mixture of fine W powder (90) with Cu (5) and Ni (5%) is pressed into shape and sintered at 1500°. The product has d 16.5, is slightly ductile, and can readily be machined. A. R. P.

Manufacture of hard tantalum. M. M. AUSTIN, ASSR. to FANSTEEL PRODUCTS CO., INC. (U.S.P. 2,015,509, 24.9.35. Appl., 28.2.31).—Ta is heated in vac. at 1200–1400° to remove adsorbed gas, and air is admitted

until the metal has absorbed 1 c.c./g. and has become uniformly hardened throughout. A. R. P.

Manufacture of bodies containing metallic carbide. G. FODOR, and E. ALLEN & Co., LTD. (B.P. 447,822, 16.11.35).—WC or other hard carbide is intimately ground with Fe, Co, or Ni powder in C_6H_6 or other volatile hydrocarbon, which is later removed, the powder mixed with a small quantity of H_2O , pressed into shape and machined, and the shapes are sintered in H_2 . A. R. P.

Centrifugal casting of [tungsten] carbide and like materials. J. H. L. DE BATS (U.S.P. 1,993,774, 12.3.35. Appl., 18.1.32).—WC alloyed with Fe, Ni, or Co is applied to the faces of extrusion or forming dies by heating to 1900–2000° in the electric arc and centrifugal casting at 300–7200 r.p.m. L. C. M.

Preparation of magnesium. G. N. KIRSEBOM, and CALLOY, LTD. (B.P. 444,957, 21.9.34).—A mixture of calcined MgO and Al in lumps is heated at above the b.p. of Mg. Alternatively, a Mg–Al alloy prepared according to B.P. 397,844 (B., 1934, 105) is similarly heated. A. R. P.

Production of metals [magnesium]. OESTERR. AMERIKANISCHE MAGNESIT A.-G. (B.P. 448,186, 29.11.34. Austr., 12.12.33).—Briquettes of MgO and C are fed singly but continuously into an electric furnace so that only the impurities are allowed to accumulate, the Mg vapour and CO being evolved continuously at a const. rate. A. R. P.

Manufacture of metallic magnesium from magnesium oxide. OESTERR. AMERIKANISCHE MAGNESIT A.-G. (B.P. 448,536, 22.3.35. Austr., 4.5.34. Addn. to B.P. 381,115; B., 1932, 1123).—The Mg vapour–CO mixture from the electrothermal reduction of MgO with C is sprayed with a mist of hydrocarbon oil to condense the Mg, and the resulting oily sludge of Mg is filtered off from excess of oil and heated in an inert atm. to crack the remainder and form coked Mg lumps from which the Mg is recovered by distillation. A. R. P.

Thermal production of magnesium from magnesia or materials containing it. I. G. FARBENIND. A.-G. (B.P. 444,701, 25.9.34. Ger., 28.10.33).—The mixture of CO and Mg vapour obtained by electrothermal reduction of MgO is passed through a tower containing large pieces of carnallite (I) supported on a grate. The Mg condenses on the (I) and a fused mixture of Mg and (I) collects below the grate. A. R. P.

Surface treatment of magnesium and high-percentage magnesium alloys to increase their resistance to corrosion. W. H. A. THIEMANN. From I. G. FARBENIND. A.-G. (B.P. 450,589, 4.3.36).—The alloys are immersed for 1–2 hr. in a bath containing $Na_2Cr_2O_7$ 35–45 (40) and $MgSO_4$ 55–65 (60) g. per litre. A. R. P.

[Magnesium] alloy. E. F. FISCHER, Assr. to MAGNESIUM DEVELOPMENT CORP. (U.S.P. 1,992,655, 26.2.35. Appl., 6.2.34).—Alloys of Mg with 0.5–5% of Sb having a high tensile strength and ductility are claimed. L. C. M.

Production of composite wrought forms of magnesium alloys. A. W. WINSTON, Assr. to Dow

CHEM. CO. (U.S.P. 2,023,498, 10.12.35. Appl., 21.7.32).—Suitably shaped ingots of a strong and a corrosion-resistant Mg alloy are extruded simultaneously through a common die at 230–450° to obtain a composite ingot which is hot-rolled at > 220°. A. R. P.

Treatment of aluminium and its alloys. P. T. STROUP, Assr. to ALUMINUM CO. OF AMERICA (U.S.P. 2,024,751, 17.12.35. Appl., 14.2.34).—The molten metal is degassed before casting by treatment with 0.05–5% of $NaBF_4$. A. R. P.

Manufacture of aluminium alloy castings. J. A. NOCK, JUN., Assr. to ALUMINUM CO. OF AMERICA (U.S.P. 2,022,686, 3.12.35. Appl., 21.4.32).—Castings of Al alloy with Cu 2–12, Sn 0.005–0.1, and, if desired, a hardening element of the group Be 0.2–1, B 0.2–0.5, Cr 0.1–1, Mn 0.2–1.5, Mo 0.1–1, Ti 0.03–0.5, Zr 0.05–0.5%, are heat-treated at > 400° (515°) without artificial ageing. The presence of Sn improves the ductility. A. R. P.

Aluminium solder. F. STRASSER (U.S.P. 1,993,490, 5.3.35. Appl., 23.12.33. Ger., 30.12.32).—A low-m.p. Al alloy containing Sn 33, Zn 11, and Ag 23% is claimed. L. C. M.

Manufacture of [aluminium] solder. J. E. DEMPSEY (U.S.P. 2,013,340, 3.9.35. Appl., 6.4.35).—Zn 95 and Al 5% are melted together under a NaCN flux. A. R. P.

Sterilising solution [for aluminium]. L. J. BENSON, Assr. to ALUMINUM CO. OF AMERICA (U.S.P. 2,024,755, 17.12.35. Appl., 14.4.32).—The solution contains Cl_2 and a small quantity of $Na_2O \cdot 2SiO_2$ to prevent corrosion of the Al. A. R. P.

Manufacture of coated aluminium articles. H. BENGSTON, Assr. to ALUMINUM COLORS, INC. (U.S.P. 2,022,798, 3.12.35. Appl., 13.5.31. Renewed 15.1.35).—The articles are anodised in 60–77% H_2SO_4 to produce a porous Al_2O_3 film in which inorg. pigments are deposited by a pptn. process; e.g., the film is soaked in aq. CrO_3 and then exposed to SO_2 to produce Cr_2O_3 in the pores. A. R. P.

Production of characters, drawings, patterns, or other representations on aluminium and its alloys. SIEMENS & HALSKE A.-G. (B.P. 445,242, 19.9.35. Ger., 23.11.34).—The metal is anodically oxidised in dil. H_2SO_4 , $H_2C_2O_4$, or aq. CrO_3 and the design applied by printing with colours which dye the resulting oxide film. A. R. P.

Recovery of sound fine-grained metal from aluminium scrap foils, dross, turnings, and the like. C. C. LUNNISS (B.P. 445,095, 21.11.35).—The material is melted with a large proportion of NaCl flux and stirred at 810–840° until the metal has separated from the dross. A. R. P.

Lead alloy [for storage-battery anodes]. R. H. CANFIELD and H. F. KAISER (U.S.P. 2,013,487, 3.9.35. Appl., 7.6.34).—The alloy consists of Pb with Sr 0.2–0.6 and Sn 0.2–2%. A. R. P.

Protection of metals [underground cables] against electrolytic corrosion. SOC. D'EXPLOIT. DES CABLES ELECTR. SYSTÈME BERTHOUD, BOREL, & Co., and J. BOREL (B.P. 447,064, 9.11.34. Switz., 16.12.33).—

Underground Pb cables or Fe pipes are coated with a mixture of tar, bitumen, and gas C, then wrapped in fibre soaked in tar or bitumen. A. R. P.

Aluminothermic welding of metals. ELEKTRO THERMIT GES.M.B.H., and W. AHLERT (B.P. 450,643, 4.3.36. Ger., 5.1.35).—The parts are butted together, heated to a high temp., and then raised to the m.p. by producing a thermit reaction around the joint. A. R. P.

Electrolytic production of lead. NAT. PROCESSES, LTD., A. R. GIBSON, and S. ROBSON (B.P. 448,328, 5.11.34).—In the electrolysis of molten PbCl_2 3–5% of PbS is added to the electrolyte to react with the Cl_2 evolved at the anode. More PbS is added when the amount present falls to 1–2%. A. R. P.

Electrolytic manufacture of metallic magnesium. Y. KATO (B.P. 447,083 and Addn. B.P. 447,600, [A, B] 11.1.35. Jap., [A] 30.3.34).—(A) A mixture of MgCl_2 and alkali or alkaline-earth chloride is electrolysed in a divided cell, the electrolyte being replenished by adding MgO and C to the anode compartment. (B) The anode is disposed at the bottom of the bath or extends laterally below the cathode. A. R. P.

Electrolytic deposition of chromium and preparation of solutions therefor. W. W. SCOTT, A. A. BISSIRI, and W. C. GREGORY (U.S.P. 1,993,186, 5.3.35. Appl., 22.4.32).—The electrolyte contains 1 pt. of Se or Te per 50–10,000 (250–1000) of CrO_3 . L. C. M.

Electrolytic production of bright (A) metallic deposits, (B) deposits of tin. M. SCHLÖTTER (B.P. 443,428–9, 27.8.34. Ger., 5.6.34).—The electrolyte consists of (A) the double cyanide or thiocyanate of the metal (Ag, Cu, or Au), free KCN, free KOH, and a colloid, a suitable solution containing, e.g., Ag (as salt) 15, KCN 140, KOH 50, and glue 0.2 g. per litre; and (B) a colloid, e.g., gelatin 0.8 g. and beechwood tar 20 c.c., with Sn [as $(\text{C}_6\text{H}_4\cdot\text{SO}_3)_2\text{Sn}$] 30 and $\text{C}_6\text{H}_4(\text{SO}_3\text{H})_2$ 90 g. per litre. The c.d. employed are (A) 0.3 and (B) 3–6 amp./sq. dm. L. C. M.

Production of anodic coatings on aluminium or aluminium alloys. C. H. R. GOWER and E. WINDSOR-BOWEN (B.P. 447,420–1, 17.11.34).—The electrolyte comprises (A) AcOH 10–12, H_3PO_4 2–2.5, H_2SO_4 2.5–3, and H_2O 85.5–82.5 vol.-%, or (B) a solution containing H_2SO_4 7–8.25, gallic acid 0.55, and H_3BO_3 0.55 oz./gal. (A) is operated at 27–30° with 3–4 amp./sq. ft. and (B) at 25–35° with 8–12 amp./sq. ft. A. R. P.

[Regeneration by filtration of] electroplating baths. SCHERING-KAHLBAUM A.-G. (B.P. 444,464, 28.10.35. Ger., 26.10.34).—Kieselguhr, fuller's earth, or SiO_2 gel is added to collect the suspended impurities, and oxidising agents to ppt. dissolved impurities, e.g., Fe from a Ni-plating bath. A. R. P.

Treatment of antimonial lead. AMER. SMELTING & REFINING Co., and H. H. MONSON (B.P. 447,451, 24.5.35).—See U.S.P. 2,007,545; B., 1936, 796.

Cutting of metal by high-temperature heating agents and conditioning the cut surfaces. LINDE AIR PRODUCTS Co., Assees. of R. L. WAGNER (B.P. 448,432, 8.11.34. U.S., 29.11.33).

[Die-moulds for] casting of aluminium and other non-ferrous metals. A. C. ALLDAY (B.P. 445,416, 8.9.34).

Anticorrosive lubricants.—See II. **Slag cements.** **Fe-bearing briquettes.**—See IX. **Metal-melting furnace.** **Welding electrodes.** **Etching machines.** **Persulphates.**—See XI.

XI.—ELECTROTECHNICS.

Electrical installations in places where there is danger of explosions. Carrying out of regulations (VDE 0165) for erection of electrical installations in workshops and storehouses according to present state of electrotechnics. D. U. WEBER (Chem. Fabr., 1936, 9, 344–352, 387–393).—Current official German specifications for the design of motors and other electrical plant, for use where there is a risk of dust-air or vapour-air explosions, are exhaustively reviewed. J. S. A.

Self-acting arrangement for uniform continuous elevation of temperature of electrical heating apparatus. H. MACURA and E. ALTMANN (Chem. Fabr., 1936, 9, 386–387).—The contact arm of a rheostat is slowly and uniformly traversed by a clockwork drive, using a metronome to obtain a variable speed. J. S. A.

Residual moisture in cellulose dielectrics. E. W. GREENFIELD (J. Franklin Inst., 1936, 222, 345–358).—Dried cable paper shows a regular decrease in dielectric absorption with decrease in H_2O content. Application of stress produces a polarised distribution of adsorbed ions, and these ions undergo elastic displacements with changes in the field. The changes of relaxation time and dielectric absorption can thus be qualitatively explained. A. G.

Magnetic characteristics of nickel-iron alloys with alternating magnetising forces. E. HUGHES (J. Inst. Electr. Eng., 1936, 79, 213–223).—The a.c. permeability of thin Mumetal and Permalloy laminations for magnetising forces for which the d.c. permeability is a max. is < 0.1 of the val. with d.c. For large magnetising forces the a.c. and d.c. permeabilities are almost the same. A dissymmetry in the B - H loops with alternating magnetisation, determined by means of a cathode-ray oscillograph, was found. A. J. M.

(A) **Asbestos diaphragms.** Properties of [electrolytic] asbestos-board diaphragms. M. I. RAVITSCH and S. A. MAMULOV. (B) Factors affecting the properties. V. V. STENDER, S. A. MAMULOV, and M. I. RAVITSCH. (C) Laboratory tests of asbestos diaphragms for electrolysis of aqueous solutions. S. N. LURE, B. I. RIMMER, G. A. VOLIN, and L. B. POLJAKOVA. (D) Tests of the diaphragms in commercial cylindrical electrolytic cells. V. V. STENDER, P. I. ANDREEV, E. A. SERGEEV, and R. N. KINKULSKAJA. (E) Formation of diaphragms during electrolysis. V. V. STENDER, M. I. RAVITSCH, S. A. MAMULOV, I. G. SHORNITZKI, J. K. MASLOV, and E. M. ARONSON. (F) Performance of the diaphragms under varying working conditions of commercial electrolytic cells. V. V. STENDER, P. I. ANDREEV, R. N. KINKULSKAJA, and E. P. BISSEKOK.

(a) **Methods of testing asbestos cloth.** S. A. MAMULOV and J. K. MASLOV (Trans. State Inst. Appl. Chem. U.S.S.R., 1934, No. 22, 7—24, 23—34, 35—40, 40—48, 48—68, 68—77, 77—86; cf. B., 1935, 558).—(b) Increasing the amount of uncooked potato starch (0.5—7%) decreased the permeability considerably and the d slightly and increased the porosity. The starch content should be $\geq 3\%$. With rising temp. of preliminary calcining of asbestos materials (150—400°) the boards (with 3% of starch) had progressively inferior properties.

(c, d) The construction of electrolytic cells is described and the results of comparative tests on Soviet and American asbestos board diaphragms are given.

(e) Factors affecting the permeability of the diaphragm are discussed. Cl_2 - H_2O extracts Mg from the diaphragms. NaOH decomposes Mg silicate, $\text{Mg}(\text{OH})_2$ being deposited. The permeability is nearly independent of the hydrostatic pressure.

(f) The most rapid formation of diaphragms occurs with brine with the addition of asbestos pulp. Temporary interruptions have no effect on performance. With increased current the alkali concn. in the catholyte of a Vorce cell does not increase proportionately. The permeability of the diaphragm may increase.

(g) Tests are described. Crocidolite (a blue-asbestos cloth) has the highest acid-resistance. CH. ABS. (e)

Coal carbonisation. Measuring quality of engine fuels. Oil purification. Generation and adsorption of gas in insulating oils.—See II. **Conductivity of glass.**—See VIII. **Protecting metal surfaces. Cr-plating. Ni electrodeposits.**—See X. **Automatic liming systems. Pan-boiling control. Determining reducing sugars.**—See XVII. **Electronic optics and photography.**—See XXI.

PATENTS.

Electric furnaces. BRIT. THOMSON-HOUSTON CO., LTD. (B.P. 451,484, 25.1.36. Ger., 25.1.35).—Electric heating elements are situated near the floor and roof and are separated from the goods chamber by baffles; the atm. is circulated by a fan at the back through apertures in the baffles above and below the doorway, over the goods, and back to the eye of the fan. The fan is automatically stopped when the door is opened.

B. M. V.

Electric furnaces for melting metals. ELECTRIC RESISTANCE FURNACE CO., LTD., and W. J. MILLAR (B.P. 448,522, 10.1.35).—The furnaces are of the reverberatory type with the heating elements in the roof and a dividing wall extending from the roof to below the surface of the molten metal to act as a buffer for preventing floating dross etc. from passing through the pouring spout.

A. R. P.

Operation of electric eddy-current furnaces. ALLMÄNNA SVENSKA ELEKTRISKA AKTIEB., and L. DREYFUS (B.P. 451,473, 12.11.35).—Electrical positions of the condensers are described.

B. M. V.

Ferrous welding electrodes. R. S. JOHNSTON, Assr. to J. A. ROEBLING'S SONS CO. (U.S.P. 1,993,789 and 1,993,931, 12.3.35. Appl., 28.10.32).—Rods for arc-welding are coated with a mixture of (A) SiO_2 40 with

Fe_2O_3 45 and MnO [as $\text{Mn}(\text{OH})_2$] 15 or Fe_2O_3 49 and TiO_2 (as ilmenite) 11%; (B) SiO_2 46 with Fe_2O_3 30 and MnO 24, or SiO_2 40 with Fe_2O_3 45 and TiO_2 15%. In all cases with 5—25% of Na silicate flux. L. C. M.

Dry batteries. F. MACCALLUM and A. H. REDFERN (B.P. 447,974, 25.8.34 and 18.4.35).—The Zn plate is coated with a colloidal suspension of graphite or C_2H_2 soot in an NH_3 -resistant adhesive or varnish.

A. R. P.

Galvanic cell, particularly an electrical accumulator. ACCUMULATOREN-FABR. A.-G. (B.P. 447,757, 19.11.34. Ger., 18.11. and 16.12.33).—The H_2 and O_2 which escape from an accumulator while the cell is "after-gassing" after charging are absorbed in catalytic material containing Pd and Pt, respectively, and pressed into pockets in the plates.

A. R. P.

Primary cell. M. L. MARTUS and E. H. BECKER (U.S.P. 2,023,815, 10.12.35. Appl., 31.10.34).— ZrO_2 (1—8 g. per litre) is added to the NaOH electrolyte of cells containing a Zn electrode and a CuO depolariser.

A. R. P.

Electric battery cell. G. WILLIMEK (U.S.P. 2,023,717, 10.12.35. Appl., 15.7.33. Ger., 23.7.32).—The cell has a PbO_2 anode, a cathode of a 2:2:96 Sb-Pb-Sn alloy, and an electrolyte of H_2SO_4 (d 1.2) containing $\text{Cr}_2(\text{SO}_4)_3$ 3, $\text{Na}_2\text{Cr}_2\text{O}_7$ 1, and SnSO_4 30 g./litre.

A. R. P.

Electrolytic rectifier and condenser. R. D. MERSHON (U.S.P. 2,024,240, 17.12.35. Appl., 19.4.34).—The electrodes comprise Al alloys with small amounts of Ni and Ca or Cd into which glass wool has been stirred to form a thick melt just prior to casting.

A. R. P.

High-voltage electrolytic couple. P. E. EDELMAN, Assr. to R. T. MACK (U.S.P. 2,024,210, 17.12.35. Appl., 9.10.30).—A film-forming electrolyte for Al condensers comprises a solution containing NH_4OBz , NH_4 H tartrate, and $(\text{NH}_4)_2\text{MoO}_4$, with traces of Fe and/or Sn salts.

A. R. P.

Electrolytic etching machines. BRIT. INSULATED CABLES, LTD., S. D. SYND., LTD., E. G. HARTEL, F. J. BRISLEE, and R. BLACKBURN (B.P. 447,909, 24.11.34).—Constructional details of the rotating perforated cathode in Zn-etching machines are claimed.

A. R. P.

Manufacture of [platinum-coated] electrodes for electrolytic process [manufacture of persulphates]. B. LAPORTE, LTD., and I. E. WEBER (B.P. 447,827, 26.10.34).—Cu, Ag, or bronze rods are coated with Pt by welding, brazing, or soldering and drawn down to wire, which is annealed at 700—900° for 20—25 min.

A. R. P.

Electrolytic condensers. (A, B) PLESSEY CO., LTD. (A) From P. R. MALLORY & Co., INC. (B.P. 447,639—40, [A] 5.6.35, [B] 4.7.35. U.S., [B] 15.11.34).—(A) The Al plates are coated with a layer of lacquer or varnish containing TiO_2 , ZnO , or Cr_2O_3 , the lacquer layer being scratched in parts to permit contact with the electrolyte (H_3BO_3 -glycerin). (B) The plates are spaced by a laminated sheet built up of blotting paper layers impregnated with regenerated cellulose and soaked in the electrolyte.

A. R. P.

Manufacture of thermionic valves. M.-O. VALVE CO., LTD., and C. J. SMITHELLS (B.P. 447,513, 31.12.34).—The valves have indirectly heated cathodes having cores of tubes of 2 : 98 Al-Ni alloy. A. R. P.

Vacuum tube [thermionic valve]. O. T. McILVAINE, ASSR. to McILVAINE PATENT CORP. (U.S.P. 1,993,108, 5.3.35. Appl. 15.11.27).—The construction includes an anode of Si-Ba or Si-Li alloy, and a cathode coated with BaO, SrO, or amalgamated Mg-Ba alloy. L. C. M.

Cathode [for electron-emission devices] and its preparation. D. V. EDWARDS and E. K. SMITH (B.P. 448,555, 9.11.34).—A Ni wire is oxidised superficially, coated with BaCO₃, and heated first at 900° to expel CO₂ and form black BaNiO₂, later at 1000° to melt this compound and cause it to diffuse into the metal, and finally at 1100° in vac. to render the surface electron-emissive. A. R. P.

[Electrode structures for] gaseous electric-discharge devices. BRIT. THOMSON-HOUSTON CO., LTD. (B.P. 447,617, 22.11.34. U.S., 22.11.33).—Ultra-violet lamps containing A and Hg vapour at low pressure have as one electrode a roll of gauze the longitudinal wires of which are of Mo or W and the wires around the axis of Ni. A. R. P.

Materials for electric-discharge lamps adapted to be excited to luminescence by the electric discharge. GEN. ELECTRIC CO., LTD. From PATENT-TREUHAND GES. F. ELEKTR. GLÜHLAMPEN M.B.H. (B.P. 447,202, 19.11.34).—A 2 : 1 mixture of ZnO and SiO₂ gel with 0.1–0.5% of a Mn salt is made into a paste with H₂O, dried at 150°, ground, heated to 1100° in air, and ground until the particles are 1–5 μ in size. The interior of the lamps is then sprayed with a suspension of this powder in H₂O. A. R. P.

Electric-discharge devices. BRIT. THOMSON-HOUSTON CO., LTD. (B.P. 451,353, 2.1.35. U.S., 3.1.34).—Heating of an arc lamp filled with Ne or Ar is effected by discharge from thermionic coatings on the refractory metal electrodes. B. M. V.

Electric-discharge tubes. N. V. PHILIPS' GLÖEL-LAMPENFABR. (B.P. 451,474, 14.11.35. Ger., 11.2.35).—A pinch seal is made with an intermediate layer of a different kind of glass; e.g., the main part is of Pb glass, but immediately next the wire is Ca glass. B. M. V.

Treatment of [incandescence lamp] (A) filaments, (B) leading-in wire. W. P. ZABEL, ASSR. to GEN. ELECTRIC CO. (U.S.P. 1,992,797–8, 26.2.35. Appl., [A] 31.12.32, [B] 5.1.33).—(A) W filaments, coiled on a steel mandrel, are slowly heated in H₂ to 1100°, transferred to a W mandrel, and heated first to 2250° (in 15 sec.) and then to 2800° (in 30 sec.) to allow grain growth to occur. (B) Lead-in wires consist of a Cu wire, welded to a short portion, passing through the glass, of a suitable alloy, the inner end of which is welded to a Ni or Mn-Ni alloy wire, which is rendered passive by annealing in a reducing flame and cooling in H₂. L. C. M.

[Electric] glow-indicator lamp. J. A. LINDER and C. L. E. DE GAUGUE, JUN., ASSRS. to WESTINGHOUSE

LAMP CO. (U.S.P. 1,993,012, 5.3.35. Appl. 3.6.31).—In small, Ne-filled, ornamental lamps intended for series-wiring, the internal leads are coated with a paste of Mg, Al, or Th powder and water-glass; when failure of the filament occurs the full line voltage produces a glow between these electrodes and the faulty lamp is detected. L. C. M.

Cathode-ray tubes. TELEFUNKEN GES. F. DRAHTL. TELEGRAPHIE M.B.H. (B.P. 451,590, 4.2.35. Ger., 2.2.34).—The fluorescent screen has deposited on it, on the side facing the cathode, a thin conductive layer of metal of low electron-withdrawal energy and substantially transparent to the cathode rays, e.g., of Ba, K, Cs, or Mg deposited by vaporisation from a point within the tube after it has been sealed off. B. M. V.

Manufacture of cathode-ray tubes. MARCONI'S WIRELESS TELEGRAPH CO., LTD., ASSRS. of R. T. ORTH (B.P. 451,451, 23.5.35. U.S., 2.6.34).—The envelope is made of two portions coated with fluorescent and conducting material, respectively, the parts being afterwards joined by fusion. B. M. V.

Cold cathode-discharge tube. H. J. SPANNER and E. GERMER, ASSRS. to ELECTRONS, INC. (U.S.P. 1,993,187, 5.3.35. Appl. 21.10.29. Ger., 4.5.29).—A cathode for a rectifying valve, requiring no heater current, consists of Ni gauze coated with a mixture of Ba or Cs with MgCuO₂, Cs₂WO₄, or Sr₂ZrO₄; the bulb contains Ar (1.8 mm.) or Ne (5 mm.) with a little Hg or Cs vapour. L. C. M.

Material for electrical insulating purposes. CALLENDER'S CABLE & CONSTRUCTION CO., LTD., and S. H. COX (B.P. 436,876, 9.4.35).—Fibrous sheet or tape (e.g., of cotton, linen, or paper) is impregnated with a mixture of non-oxidising pitch, synthetic resin 1–76, and castor oil 20 wt.-%. L. C. M.

Magnetic separators. H. H. THOMPSON and A. E. DAVIES (B.P. 451,581 and 451,585, [A] 3.1.35, [B] 2.2.35).—(A) An apparatus of the high-intensity type comprises a feed belt (B) below which is a stationary electromagnet (M) and above which a rotating disc (D). The width of B is < the radius of D, and the outer edges are approx. tangential so that D has substantial motion in the same direction as the ore. D is adjustable for height and M for height and angle. (B) A Wetherill type of machine is modified so that B travels parallel, or at a small angle, to the edge of the pole and to the belt for removal of magnetic material. B. M. V.

Electric capacitors. BRIT. THOMSON-HOUSTON CO., LTD. (B.P. 447,625, 26.1.35. U.S., 27.1.34).—The armatures consist of unfilmed Al plates and are immersed in a solution (> 5%) of Na K tartrate in C₂H₄(OH)₂. A. R. P.

Electrical resistors [shunts]. GEN. ELECTRIC CO., LTD. From PATENT-TREUHAND GES. F. ELEKTR. GLÜHLAMPEN M.B.H. (B.P. 447,557, 8.2.35).—The shunts are built up of Ni strip plated with Cu and heated to oxidise the Cu. A. R. P.

Detecting foreign materials in gases.—See I. Detecting combustible gases.—See II. Anhyd. MgCl₂. H₂O₂.—See VII. Fe-Ni alloys. Insulated wire. Magnet steels. Welding rods. Galvanised Fe wire. Sn-plated Fe. Scrap brass. Hard

metals. High-*d* massive bodies. Coated Al articles. Characters on Al etc. Pb alloy for storage-battery anodes. Protecting cables. Pb. Mg. Cr-plate. Bright metal deposits of Sn etc. Anodic coatings on Al. Plating baths.—See X. Fluorescent layers.—See XIII. Conditioning chilled meat.—See XIX. Rendering H_2O free from gases etc.—See XXIII.

XII.—FATS; OILS; WAXES.

Dependence of viscosity of fats and fatty acids on temperature. G. B. RAVITSCH (Kolloid-Z., 1936, 76, 341—345).—Determinations of η for sunflower-seed oil (natural and hydrogenated), linseed, cottonseed, and seal oils at 15—100° show that η decreases as the degree of saturation increases, and varies with temp. according to $\log \eta = c/(t - t_0) + \log \eta_0$, where *c* is a const.

E. S. H.

Viscosity and plasticity of disperse systems. IX. Viscosimetric and X-ray investigations of hydrogenated fats. M. P. VOLAROVITSCH, G. B. RAVITSCH, and K. F. GUSSJEV (Kolloid-Z., 1936, 76, 338—341; cf. A., 1936, 156).—X-Ray analysis of the solid and determination of η of the melted fat serve as means of following the course of hydrogenation. E. S. H.

Determination of stability of edible fats and oils. AMERICAN OIL CHEMISTS SOCIETY (Oil & Soap, 1936, 13, 203).—The majority report regards the peroxide test (cf. B., 1933, 876) as valuable for factory-control work, and, despite its limitations, the best method available for determining relative stability, and recommends its adoption as a tentative standard method. Results of co-operative tests are tabulated.

E. L.

Hydroxyl number and acetyl value of fats and oils. W. L. ROBERTS (J. Assoc. Off. Agric. Chem., 1936, 19, 420—427).—Comparative determinations by 5 observers of the sap. and Ac vals. and the OH no. (the last-mentioned by the André-Cook, Roberts-Schuette, and West-Hoagland-Curtis methods) of abnormal oils are recorded.

E. C. S.

Soaps: electric charge effects and dispersing action. W. M. URBAIN and L. B. JENSEN (J. Physical Chem., 1936, 40, 821—832).—The presence of soap increases the val. of the negative ζ -potential on the droplets of emulsions of paraffin or cottonseed oil in H_2O , and of the particles of C black, H_2O -insol. dye, Fe_2O_3 , or of a strain of staphylococci bacteria in H_2O . The high vals. obtained with oil emulsions are considered sufficiently high to account for the stability of the emulsions. The ζ -potentials of particles of C black suspended in soap solution (Na oleate) are much > those obtained in H_2O or in aq. NaOAc, Na_2SO_4 , Na_3PO_4 , or $K_4Fe(CN)_6$. For fatty acid salts, the potential increases with increasing length of C chain in the salt. Soaps producing a high negative potential on certain C particles also form a stable suspension of the C, and *vice versa*. It is suggested that soaps act as emulsifying and deflocculating agents through increasing the ζ -potential of the droplets of an emulsion, and measurement of this increase is suggested as a means of determining the detergent powers of a soap. J. W. S.

Indian vegetable oils. II. Dielectric constant and electric moment. G. N. BHATTACHARYYA (Indian J. Physics, 1936, 10, 281—294; cf. B., 1936, 750).—The dielectric consts. of castor, olive, sesamé, coconut, linseed, poppy, and rape oils were determined by the Nernst bridge method, and their mol. wts. were found by the cryoscopic method. The electric moments are calc. and the results discussed in connexion with the constitutional formulæ of the oils.

A. J. M.

Cloth oils and catalysts in the Mackey test; oxidation of olive oil. W. GARNER (Analyst, 1936, 61, 519—528).—Natural oils contain oxidising catalysts and the rate of oxidation in the Mackey test is primarily determined by the presence of an active catalyst, the influence of which may be determined by carrying out the test on the oil. Potential catalysts may also be present and they can be determined by heating the filtered oil from the Mackey test for 3 hr. at 110° and then carrying out a second test. Refined or treated oils often contain only potential catalysts. The rate of oxidation is not determined by the degree of unsaturation of the oil, and there is little relationship between the I val. of the oil and its behaviour in the test. Et and oleyl oleates do not rise in temp. during the test. Metals vary in catalytic activity and there are large differences in activity between compounds of the same metal. Fe rust is almost inactive.

E. H. S.

Tea-seed oil: test for its detection in olive oil.

W. SIEBENBERG and W. S. HUBBARD (Oil & Soap, 1936, 13, 194—197).—3 c.c. of oil are mixed with 3 c.c. each of $CHCl_3$ and Ac_2O and, after chilling in an ice-bath, 0.8 c.c. of a freshly prepared mixture of 100 c.c. of H_2SO_4 with 10 c.c. of glycerol is added dropwise while constantly shaking and chilling; the mixture is left for 1 hr. at room temp. (shaking every 5 min. until nothing more separates), and then rechilled at 0° for 5 min. and while 3 c.c. of H_2O are very slowly admixed. After keeping for 5—10 min. the final max. (but fugitive) colour is noted. The dark green colour appearing in the first stages of the test persists in the case of pure olive oils (I), but changes to dark red at the end in the case of tea-seed oil (II); mixtures give intermediate tints, the red-brown being recognisable with as little as 5% of (II) in (I). [If the final reaction mixture is cleared by addition of EtOH, pale yellow-brown colorations are obtained with (I).] Strongly rancid (I) and cottonseed oils give positive (red) reactions and sesamé (but not arachis) oil may also interfere.

E. L.

Colorimetric detection of tea-seed oil in olive oil.

J. FITELSON (J. Assoc. Off. Agric. Chem., 1936, 19, 493—497).—Tea-seed oil or the unsaponifiable matter therefrom, when treated as for the Liebermann-Burchard cholesterol reaction, followed by anhyd. Et_2O , gives an intense red colour. This test is not given by other common edible vegetable oils.

E. C. S.

The linseed oil question. H. A. BOEKENOOGEN (Verfkronek, 1936, 9, 254—255).—Polemical against Riep (B., 1936, 1003).

D. R. D.

Partial hardening of highly unsaturated oils.

I. Linseed oil. F. WITTKA (Allgem. Oel- u. Fett-Ztg., 1936, 33, 305—309).—By hydrogenating for, e.g., 60

min. at 70° (lower temp. may also be used) over a specially active Ni-kieselguhr catalyst, linseed oil (I) was converted into a non-drying oil [e.g., I val. 97, containing 16% of saturated acids and 12% of solid unsaturated acids (II) and yielding no hexabromides] which remains fluid (viscous) at 0°. The proportion of (II) formed increases sharply when the hydrogenation temp. is raised above 70°, the product obtained by treating (I) at, e.g., 90° for 50 min. having I val. 99 and f.p. 30°. E. L.

Chinese cotton[seed] oil. P. E. RONZONE (Oil & Soap, 1936, 13, 165—167).—Crude Chinese-produced oil (I) is clean, but malodorous and very dark; the figures for several batches were very close to the average vals: I val. 104.7, sap. val. 193.0, unsaponifiable matter 1.51%, titer 31.0°, free fatty acids 3.35% (2.9—4.1%). (I) alone cannot be refined (bleached) without excessive loss, but good results were obtained with mixtures of (I) with a domestic (U.S.) crude (II) (2:1) or with Chinese "refined oil" (1:2). On "winterising," (I) remains fluid down to -1.7°, when the whole sets solid. Normal crystallisation is obtained by diluting (I) with 25% of (II) or by seeding with 0.5% of cryst. stearine at 7°; the latter method gives an oil of exceptionally fine cold test and a low yield of bleachable stearine. E. L.

Variations in the gossypol and oil content of cottonseed. W. D. GALLUP (Oil & Soap, 1936, 13, 191—194).—The gossypol (I) content of cottonseeds (var. Oklahoma Triumph) depends largely on the locality in which they are grown; high rainfall and/or the application of artificial "complete" fertilisers tend to increase the (I) content, but the effect of the latter factor is small. Factors influencing the (I) content influence also the oil content of the seed in the same sense, but in smaller proportional degree. Thus, the ratio of oil to (I) contents ranged from 55:1 for seeds of low oil content to 35:1 for seeds rich in oil. Correspondingly, calculations from the data of Schwartze and Alsberg (B., 1924, 22) show ratios of 70:1 and 31:1 in cottonseed meats containing 28.4% and 36.85% of oil, respectively. Seeds from poorly developed plants show about the same oil content, but slightly less (I), than healthy plants from the same plot. E. L.

Photochemical studies of rancidity: induction period of protected and non-protected oils. M. R. COE (Oil & Soap, 1936, 13, 197—199).—Cottonseed and maize oils which have been protected from light by means of green wrappers (passing light of λ 4900—5800 Å.) but exposed to a moist air current develop considerable peroxide vals. (*P*), although the onset of organoleptic rancidity is delayed (cf. B., 1934, 412); when such protected oils of various *P* are exposed to clear daylight they develop rancidity in the same time as do fresh samples of the same oil having much lower *P*. Hence, except in accelerated tests, the time required for rancidification to occur under the influence of light cannot be correlated with the initial magnitude of the *P* of the oil, especially in the case of oils which have been protected from light. With these, however, there appears to be a close correspondence between the numerical increase in *P* from the time the protected oil is exposed to light and until it becomes rancid and the *P* acquired by a fresh sample of the same oil at the onset of rancidity. E. L.

Composition of the oil of the American black walnut. G. S. JAMIESON and R. S. MCKINNEY (Oil & Soap, 1936, 13, 202).—The shelling-plant by-product of meats and shell fragments contained 55.8% of oil. Two samples of oil (expeller- and hydraulic-pressed respectively) had: n_D^{25} 1.4730, 1.4731; acid val. 7.8, 9.7; I val. (Hanus) 135.1, 140.5; SCN val. 86.0, —; sap. val. 193.5, 191.5; unsaponifiable matter (I val. 103.7) 0.42%, —; saturated acids 5.53, 5.24% (corr.); unsaturated acids 88.14, 88.96% (corr.). The composition of the fatty acids of the expeller oil was (% of oil): myristic 0.43, palmitic 3.29, stearic 1.77, lignoceric 0.04, oleic 34.1, linoleic 46.8, linolenic 7.2 (calc. from I and SCN vals.). The oil gives a firm soap and could be used for paints etc. or as an edible oil. The press-cake (containing about 60% of protein on a 6% oil basis) is suitable as poultry food. E. L.

Report of [A.O.C.S.] Committee on [determination of] soap in refined oils. L. A. SPIELMAN, N. T. JOYNER, J. J. LAPPEN, and R. C. STILLMAN (Oil & Soap, 1936, 13, 177—178, 205).—Fair accuracy was obtained in collaborate determinations of traces of soap (e.g., of the order of 0.01—0.004%) by the following method: 50 g. of oil are shaken with 50 ml. of hot H₂O (65.5°, 2 min.) and 5 ml. of 0.5*N*-HCl (5 min.), washed with hot H₂O till free from HCl, allowed to settle (at 71°), and the oil is filtered; free fatty acids formed are determined by titrating with 0.02*N*-NaOH (phenolphthalein indicator to a pink tint). A parallel titration of the untreated oils (I) provides a correction for any free fatty acids present in (I). E. L.

Tall oil as varnish material. H. REINERT (Farbe u. Lack, 1936, 461—462).—The prep. and nature of tall oil obtained by the sulphate wood-pulp process are described. The crude oil dries only slowly even after esterification with glycerol. Distillation gives a yellow product (acid val. 180) which, when esterified, should be capable of use as a substitute for linseed oil. S. M.

Physical and chemical constants of some Chilean fish oils. A. PFISTER (Pharm. Ztg., 1936, 81, 933—934).—Oils from (I) Tollo, *Galeorhinus mento* (selacionoid), (II) Pescada, *Merluccius Gayi* (gadidae), (III) Pejegallos, *Gallorynchus gallorynchus* and *G. antarcticus*, Linn. (chimerinae), and (IV) Congrio Colorado, *Genypterus blacodes* and *G. chilensis* (ophidae), respectively, gave the following vals. for d_4^{25} , f.p., n_D^{25} , I val. (Wijs), sap. val., acid val., and unsaponifiable matter, in that order: (I) 0.934, -9°, 1.4794, 185, 184, 1—2, 0.5—1.84%; (II) 0.93, -6°, 1.4726, 185, 176, 1.6, 2%; (III) 0.909—1.0°, 1.4723, 168, 186, 3, 0.55%; and (IV) 0.95, -3°, 1.4812, 169, 188, 2.4, 0.2%. The vitamin-A factor, determined with SbCl₃, was (I) 6 times, (IV) 4 times, (II) and (III) equal to, that of cod-liver oil. F. C. B. M.

Vitamin-D content of cod-liver oil. L. W. VAN ESVELD (Nederl. Tijds. Geneesk., 1935, 79, 2924—2927; Chem. Zentr., 1935, ii, 1213).—16 samples had 50—200 international units/g. H. N. R.

Acid value of officinal oils and waxes; the lime-water-oil liniment of the Belgian Pharmacopoeia IV. G. P. WEIL and C. ANSELME (J. Pharm. Belg., 1935, 17, 377—381, 399—401; Chem. Zentr., 1935, ii, 1216).—

The acid val. of the oil should be controlled; a simple titration method for its determination is described, and vals. for various oils, fats, and waxes are given.

H. N. R.

Bleaching of Japan wax. V—VII. I. SAKUMA and I. MOMOSE (J. Soc. Chem. Ind., Japan, 1936, 39, 187—189 B; cf. B., 1936, 799).—V. Haze-kernel oil inhibits the bleaching action of sunlight on the pigment in xylene.

VI. Castor oil was the best inhibitor of many vegetable oils tried.

VII. 96% EtOH extracts from haze-berry mesocarp a pigment partly sol. in xylene. Absorption at 660 m μ of the sol. and insol. fractions is scarcely affected by sunlight.

J. L. D.

Ceresin from coke. η of oils. Non-freezing lubricants. Greases.—See II. **Wool fat in paints.**—See XIII. **Soya-bean analysis.**—See XIX.

PATENTS.

Detergent. L. H. ENGLUND, Assr. to B. BASLAW and C. N. ASH (U.S.P. 1,992,692, 26.2.35. Appl., 20.4.32).—A mixture of Na₃PO₄ (90), water-glass (5), vegetable oil soap (2½), and paraffin oil containing 5% of Al stearate (2½%) is softened by heat, kneaded into granules, and compressed into blocks under 30,000—40,000 lb./sq. in.

L. C. M.

Anticorrosive lubricants.—See II. **Degreasing materials.**—See X.

XIII.—PAINTS; PIGMENTS; VARNISHES; RESINS.

Rate of decomposition of turpentine oil peroxide. I—III. T. YAMADA (J. Soc. Chem. Ind., Japan, 1936, 39, 189—194 B).—I. The amount of I absorbed by turpentine oil (I) is \propto the [I], and reaches a max. within a few min. In determining peroxides in (I) by the KI method a correction must be applied for absorption of I.

II. (I) with O₂ at 60° affords some peroxide (II) which decomposes at 90—120° by a bimol. reaction without liberation of O₂.

III. (II) is decomposed at 50—70° in presence of Mn or Co rosinate by a third-order reaction; without a catalyst decomp. is very slow. At 100—110° the reaction is unimol., the rate being compounded of thermal and catalytic reactions.

J. L. D.

Bitumen in the paint industry. R. J. FORBES (Verfkronek, 1936, 9, 263—271).—A historical review.

D. R. D.

Coal-tar dyes for use in the paint industry. P. M. HEERTJES (Verfkronek, 1936, 9, 191—194, 258—263).—A comprehensive review.

D. R. D.

Wool fat in chlorinated rubber paints. E. STERN (Oil and Col. Tr. J., 1936, 90, 758—759).—A durable, rust-resistant paint can be made by adding a solution of lanoline in tung oil to one of chlorinated rubber in solvent naphtha and pigmenting the product.

D. R. D.

Improved hardness rocker [for paint films etc.]. G. G. SWARD (Sci. Sect. Nat. Paint, Var. Assoc., Aug., 1936, Circ. 510, 223—224).—In place of the pendulum and scale used previously (cf. B., 1932, 867), two spirit levels are used for recording extremes of swing. The method of use and the results obtained are unchanged.

S. S. W.

Rocker value and drying time of soft films.

F. SCOFIELD (Sci. Sect. Nat. Paint, Var. Assoc., Aug., 1936, Circ. 511, 225—227).—For soft films the Sward hardness rocker (cf. preceding abstract) does not give reliable results by the normal method of counting oscillations. The time taken for the rocker to come to rest, however, does give a classification of such films as unpigmented oils, elastic oil paints, etc., typical vals. being quoted and graphed.

S. S. W.

Topical structure of oil molecules and the filming process. A. V. BLOM (Kolloid-Z., 1936, 76, 351—352).—Polemical (cf. B., 1936, 894).

E. S. H.

Molybdenum oxide in paints. H. A. GARDNER (Sci. Sect. Nat. Paint, Var. Assoc., Aug., 1936, Circ. 513, 234—238).—White MoO₃ is light-sensitive, changing to yellow and then bluish-green. It has possibilities as a "chalking" retarder in combination with other pigments, and appears to improve flow and film smoothness. Other possible uses discussed are in making rubber mixes and improving the colour of PbCrO₄. A bibliographical résumé on the use of Mo compounds in lakes, pigments, and drying oils is given.

S. S. W.

Preparation of chrome-yellow. WALDMANN (Farbe u. Lack, 1936, 463—464).—A brief review of its prep. and properties.

Preparation of cold enamel [light-sensitive coating]. J. MATUMOTO and E. KOBAYASI (Res. Bull. Govt. Printing Bur., Tokyo, 1935, No. 2, 6 pp.).—50—60 g. of purified dewaxed shellac (details given) are heated with 75 ml. of aq. NH₃ (d 0.91) and 250 ml. of H₂O until dissolved; the solution is treated with 70 ml. of 3% aq. (NH₄)₂Cr₂O₇ solution and diluted with 100 ml. of 90% EtOH. Plates coated with this prep. are light-sensitive, and require 50—90 sec. exposure to an open arc to give a fully exposed negative. Development is carried out by 20—40 sec. immersion in 1000 ml. of MeOH or EtOH (preferably denatured with solvent naphtha) containing 10—15 g. of castor oil, 30—35 ml. of glacial AcOH, and 4—5 g. of dye (Rhoduline-blue or Malachite-green).

F. C. B. M.

Rubber varnishes. S. REINER (Farben-Chem., 1936, 7, 325—326).—A brief review of the types of varnishes and lacquers which contain raw, chlorinated, or vulcanised rubber.

S. M.

Composition and testing of "EL" varnish. K. BRÜCKEL (Farbe u. Lack, 1936, 451—452).—"EL" varnish has been produced to meet a shortage of linseed oil in Germany and contains rosin ester (12), alkyd resin (16), linseed stand oil (21), drying agent (1), and benzoline (50%). Its examination is discussed with particular reference to the determination of the C₆H₄(CO₂H)₂ content.

S. M.

Testing [the porosity of] chlorinated rubber-lacquers. A. V. BLOM (Farben-Ztg., 1936, 41, 939—940).—Fe tubes are dip-coated with the lacquer under test, allowed to dry, and immersed in a slightly acidified 0.5% aq. solution of CuSO₄; Cu "trees" grow at pores in the coating. Experiments, using this technique, to compare the efficiency of four plasticisers in such lacquers are described and illustrated. A rough "sorting" test is afforded by coating glass plates with the lacquers,

allowing to dry for 24 hr., and immersing in H_2O for 48 hr., when the pores develop craters. S. S. W.

Use of Wood's light in measuring impermeability and water-resistance [of films]. M. DÉRIBÉRE (Caoutchouc & Gutta-Percha, 1936, 33, 17,656—17,657).— H_2O is forced up through the film under test at a rate controlled by hydrostatic pressure. The upper surface is dusted with a dry powder containing a material fluorescing in solution, but not in the dry state (fluorescein, rhodamine), and observed under dark-filtered, ultra-violet light, the appearance of fluorescence indicating penetration by H_2O . The method can be extended to liquids other than H_2O , the "indicator" then having to be chosen with due regard to the p_H of the liquid. S. S. W.

Development of heat in the action of solvents on nitrocellulose. V. KARGIN and S. PAKOV (Acta Physicochim. U.R.S.S., 1935, 3, 839—856).—The amount of heat evolved on mixing cellulose nitrate with various light petroleum (I)— $COMe_2$ and (I)— C_5H_5N solutions has been determined calorimetrically. Approx. 1 mol. of $COMe_2$ or C_5H_5N is bound chemically per NO_2 group. The interaction between the solvated particles is very small. R. S.

New lacquer materials: (A) organic silicon compounds; (B) oiticica products. (c) **Exterior exposure tests on some plasticisers.** A. W. VAN HEUCKEROTH (Sci. Sect. Nat. Paint. Var. Assoc., Aug., 1936, Circ. 512, 228—233).—(A) $Si(OEt)_4$ (85% on the nitrocellulose content) tends to decrease the tensile strength of nitrocellulose lacquer films, but has a marked effect in increasing the elongation and adhesion (to glass). Improved adhesion to galvanised Fe, Mg alloys, etc., to which normal lacquers adhere badly, is anticipated. General notes on the properties of org. Si compounds are given.

(B) A series of nitrocellulose lacquers were prepared containing, respectively, the following oiticica oil (I) products: raw, blown, and polymerised (I), (I) fatty acids, and polymerised linseed oil (II) and soya-bean oil, the keto-groups in (I) affording compatibility. Blown (I) gives the best results, comparing favourably with polymerised (II). With (I) fatty acids there is a tendency for "crystallisation" during drying of the lacquer.

(c) After 90 days' exterior exposure, the extent of rusting of coated steel panels and the condition of nitrocellulose lacquer films containing a range of 72 plasticisers (cf. B., 1936, 651) are reported. It is stressed that all the lacquers tested contained 1 pt. of plasticiser to 2 pts. of nitrocellulose, no attempt having been made to establish optimum proportions. S. S. W.

Collection of resin under the influence of acids. L. GÉNEVOIS (Bull. Inst. Pin, 1936, 150—155).—Tests have been made to increase the yield of oleoresin from pine trees in Germany by applying various compounds to the tree incisions. Only acids had any action, the most effective being 25% HCl and 50% H_2SO_4 (data tabulated), but even with these the seasonal yield was increased by only < 10%. The process does not appear to offer any advantage to the French industry. S. M.

Physical and chemical changes in Congo resin during running. C. L. MANTELL, C. H. ALLEN, and

K. M. SPRINKEL (Paint, Oil, Chem. Rev., 1936, 98, 9—11, 29—33).—The changes in acid val., softening point, and m.p. of hard dark amber Congo on running at 400—700° F. in open and closed kettles to various losses in wt. have been determined and the η vals. and solubility of the run Congos in different solvents studied. Observations are made on the appearance of the resin at different stages of the running. L. A. O'N.

Chemistry of natural and synthetic resins. I. Factors encouraging complex molecules. F. W. BROWN (Paint, Oil, and Chem. Rev., 1936, 98, No. 18, 9—10).—The occurrence among inorg. compounds of polymerisation to resinous products is discussed.

D. R. D.

Destructive hydrogenation of phenol-formaldehyde resins. H. I. WATERMAN and A. R. VELDMAN (Brit. Plastics, 1936, 8, 125—128, 182—184).—A fusible acid- and three infusible alkali-condensation $PhOH-CH_2O$ resins were hydrogenated and the products distilled; the b.p., d , and n of the various fractions are tabulated. The fusible type gave a greater yield of $PhOH$ than of cresols; the infusible type gave more cresols. These results support the view that the nuclei in the resin mols. are bridged by CH_2 groups. S. M.

Formation of resin from hexamethylenetetramine. J. HEUBERGER (Svensk Kem. Tidskr., 1936, 48, 175—176).—During the production of an alcoholic bakelite resin of the phenol-aldehyde type with $(CH_2)_6N_4$ (I) as hardening agent the formation of a fusible black resin in the ventilating shafts is occasionally observed. It is due to sublimed (I) or (I)— $(PhOH)_3$, and is observed only when $PhOH$ is present in excess and when the atm. humidity exceeds a certain degree. Apparently it is formed in the gas phase. H. W.

Formation and structure of synthetic resins. R. RAFF (Osterr. Chem. Ztg., 1936, 39, 136—139).—The work of Mark, Dostal, Raff, and Breitenbach on the kinetics of polymerisation (styrol, indene, vinyl acetate, and Me acrylate) and condensation reactions [cresol- CH_2O condensation, and poly-esterifications, e.g., succinic acid and $C_2H_4(OH)_2$] is summarised. F. C. B. M.

Determination of viscosity of colloidal systems with special reference to plastic masses. A. KÖSTER (Chem. Fabr., 1936, 9, 381—386).—A continuously-acting recording viscosimeter for non-Newtonian liquids is described. The apparatus operates by measuring the resistance of the material towards kneading, and is applicable to the investigation of the changes in structure and pseudo-elasticity of plastic masses (e.g., synthetic plastics and doughs) under varying conditions of mechanical stress, dilution, temp. etc. J. S. A.

Determining Prussian-blue.—See II. **Black-walnut oil.** Tall oil.—See XII.

PATENTS.

Paint-mixing and -grinding machines. J. RÜCKER (B.P. 451,643, 25.2.36).—The apparatus is similar to a gear wheel pump, but the material from the delivery side is deflected back to the nip between the toothed rolls and escapes through passages in the roots of the

teeth of one roll into a hollow space within; thence it goes back to the feed side, or, when sufficiently ground, axially out under control of a plunger valve. A final discharge grinder and sieve may be placed on the end of the hollow shaft. B. M. V.

Distillation of marking nutshell liquid and products therefrom. M. T. HARVEY, Assr. to HARVEL CORP. (U.S.P. 2,016,282, 8.10.35. Appl., 17.3.31).—The isolation of phenolic compounds of b.p. $> 250^\circ$ and of the residual products of b.p. $> 750^\circ$ obtained by the distillation of marking nutshell liquid is claimed. Various applications of the products for making paints etc., perfume bases, insecticides, etc. are indicated.

E. H. S.

Production of titanium pigments. BRIT. TITAN PRODUCTS CO., LTD. (B.P. 447,059, 7.11.34. U.S., 9.11.33).—Dil. (1–5%) H_2SO_4 is treated with an excess of $\text{Ti}(\text{OH})_4$ and MgSO_4 or Na_2SO_4 to obtain an opalescent colloidal solution which is heated to 60 – 100° to produce pptn. nuclei; the whole is then added to a large vol. of $\text{Ti}(\text{SO}_4)_2$ solution from the treatment of ilmenite and the mixture boiled to ppt. $\text{TiO}(\text{OH})_2$. A. R. P.

Manufacture of titanium pigments. A. CARPMAEL. From I. G. FARBENIND. A.-G. (B.P. 448,345, 8.12.34).— TiO_2 is stirred into aq. NH_4F containing MgCl_2 or 40% H_2SiF_6 and aq. NH_3 , or $\text{Ba}(\text{OH})_2$ is added so that the individual TiO_2 particles become coated with basic MgF_2 or with BaSiF_6 . A. R. P.

Fluorescent layers [for monochromatic light]. N. V. PHILIPS' GLOTELAMPENFABR. (B.P. 452,747, 4.12.35. Ger., 4.2.35).—A red fluorescence is given by a Rhodamine dye and PbCrO_4 dispersed in a glyceryl phthalate or polyvinyl acetate lacquer. H. A. P.

Safety glass. Glass-plastic articles.—See VIII. **Laminated wood.**—See IX. **Protecting steelwork etc.**—See X.

XIV.—INDIA-RUBBER; GUTTA-PERCHA.

Carbon blacks for the rubber industry. F. STAPEL-FELDT (Kautschuk, 1936, 12, 174–178).—The various types of C black and lampblack and their methods of formation are reviewed. Of the various methods for testing these compounding ingredients for rubber the most trustworthy is to prepare a range of mixtures with rubber and to submit the vulcanised products to the appropriate physical and mechanical tests. Some of the C blacks now being produced in Germany from C_{10}H_8 have greater reinforcing val. for rubber than the best American products; no manufacturing details are given. D. F. T.

Vulcanisation of rubber with *m*-dinitrobenzene. J. M. WRIGHT (Trans. Inst. Rubber Ind., 1936, 12, 183–196).—Many metallic oxides induce vulcanisation with $m\text{-C}_6\text{H}_4(\text{NO}_2)_2$, the highest tensile strength being obtained with PbO and BaO , the latter being the more rapid. Of various org. compounds tested only urea is particularly active; PhOH and cresol are slightly active. Some of the serum solids normally present in rubber have a slight influence in the additional presence of PbO . The addition of a commercial antioxidant improves

the ageing of rubber vulcanised with the aid of BaO but not PbO . D. F. T.

Effect of organic accelerators on the temperature coefficient of vulcanisation [of rubber]. K. W. ELLIEL (Trans. Inst. Rubber Ind., 1936, 12, 161–167).—Vulcanisation experiments at 110 – 150° with four commercial accelerators show that the temp. coeff. (judged by the physical condition of the rubber) is const. and there is no indication of a crit. temp. The different tendency to “scorching” with various accelerators of similar activity may be due to differences in the rates at which “modulus” develops. D. F. T.

Tensile testing [of vulcanised rubber] with the Schopper eccentric ring. E. J. MAY (Trans. Inst. Rubber Ind., 1936, 12, 168–182; cf. B., 1932, 131).—Experiments with a vulcanised mixture or rubber 100, ZnO 5, S 3, diphenylguanidine $1\frac{1}{2}$ pts. confirm that eccentric rings give results $>$ those from standard Schopper tests and approaching Scott machine results; the differences generally are smaller with decrease in breaking-elongation. The eccentric ring appears to reduce considerably the risk of premature breaking through flaws in the test-piece and does not greatly alter the shape of the stress-strain curve. D. F. T.

Coefficient of linear expansion for stretched rubber bands at room temperatures. M. L. BRAUN (Physical Rev., 1935, [ii], 47, 798).—Variations in the coeff. with time and load at temp. $>$ and $< 27^\circ$ are discussed. L. S. T.

Viscosity properties of rubber solutions. W. PHILIPPOFF (Kautschuk, 1936, 12, 179–182).—A discussion of the “structure η ” of solutions of rubber and other colloids as revealed in a decrease of the apparent η with increase in the speed of flow is devoted mainly to methods for the graphic representation of the relation between η , the pressure, and concn. Measurement of the force, velocity, and frequency of vibratory movement of a rod in a solution-filled tube indicates a degree of elasticity in PhMe solutions of sheet, crêpe, and Para rubber, but shows a marked difference between the alteration in the damping effect of these solutions with different frequencies. D. F. T.

Lactron thread etc.—See VI. **MoO_3 in paints.** **Chlorinated rubber paints and lacquers.** **Rubber varnishes.**—See XIII.

PATENTS.

Manufacture of sponge rubber. H. R. MINOR, Assr. to INDUSTRIAL PROCESS CORP. (U.S.P. 2,017,217, 15.10.35. Appl., 28.11.32).—Compounded rubber in which $\text{N}(\text{C}_2\text{H}_4\cdot\text{OH})_3$ containing absorbed CO_2 has been incorporated at a low temp. is vulcanised by heat with concurrent formation of a cellular structure. D. F. T.

Vulcanisation of rubber. H. R. THIES, Assr. to WINGFOOT CORP. (U.S.P. 2,017,808, 15.10.35. Appl., 16.1.32).—Danger of premature vulcanisation in presence of an active accelerator (of the thiazyl sulphide class) is prevented by incorporating a small % of furoic acid. D. F. T.

Surface coatings of soft to hard rubber or the like. M. and P. WILDERMAN (B.P. 453,123, 1.3.35).

XV.—LEATHER; GLUE.

Characteristics of vegetable tannins. XI. Solubility numbers for differentiating vegetable tanning extracts. F. STATHER and R. LAUFFMANN (Collegium, 1936, 437—439; cf. B., 1936, 947).—The solubility vals. obtained are: (in $C_5H_{11}OH$) quebracho (untreated) 72—86, chestnut 7—10, oakwood 2—4, valonia 5—16, mimosa 18—43, sumach 58—63, pine bark 6—29, mangrove 0.5—3.5, myrobalans 46—59; (in EtOH) chestnut 53—70, oakwood 5—30; (in MeOH) chestnut 83—92, oakwood 50—71; (in $COMe_2$) quebracho (untreated) 79—87, quebracho (sulphited) 0.5—25, chestnut 3—7.5, oakwood 0.2—1.5, mimosa 13—35, mangrove 0.5—1.0, pine bark 3—11. D. W.

Currying [of vegetable-tanned leather]. I. Factors which affect hand- and drum-stuffing. II. Experiments on hand- and drum-stuffing. M. P. BALFE (J. Soc. Leather Trades Chem., 1936, 20, 368—379, 415—428).—I. Grease is absorbed to a greater extent by damp leather as the rate of evaporation of the H_2O is increased, which latter is a max. at p_H 3.7—5.0. Polar animal or vegetable oils penetrate more rapidly than non-polar oils. The grain of the stuffed leather is rendered brittle if the H_2O -sol. matter therein is $> 16\%$. The fibres of the leather are split up into fibrils by the wetting-back of vegetable-tanned leather and the introduction of grease into the wet leather. The fibrils are split up in hand-stuffing $>$ in drum-stuffing. The angle of weave of the fibres is unaffected by hand-stuffing but may be increased by drum-stuffing.

II. Drum-stuffed leathers are weaker than hand-stuffed, due to differences in fibre structure, which are not serious under satisfactory stuffing conditions, but may be great if conditions are unsatisfactory. Leathers stuffed with mineral oils are weaker than those stuffed with cod oil and tallow or with wool grease and stearine. Free fatty acids may be formed during the ageing of stuffed belting leather and the grease may migrate towards the interior of the leather. D. W.

Determination of water-solubles in [vegetable-tanned] sole leather. P. WHITE and F. G. CAUGHLEY (J. Soc. Leather Trades Chem., 1936, 20, 409—415).—By Page's method (B., 1926, 66) it is shown that fixation of tannin occurs during the drying of the leather, and that there is a deficiency of tannin in the liquor in the wet leather as compared with that in the outside tan liquor. It is not possible to calculate the free H_2O -sol. matter in sole leather. D. W.

Machine for determining the wearing properties of sole leather. J. N. GERSSEN (Collegium, 1936, 440—455).—The leather sample is worn (eccentric motion) by sand and a carborundum stone. Comparisons have been made with this and the Thuau machine (B., 1932, 564). The flesh and grain of different leathers possessed the same relative wearing properties by the former, but not by the latter, machine. D. W.

Effect of mode of tannage on the analytical data of [vegetable-tanned] sole leather. A. KÜNTZEL (Collegium, 1936, 455—468).—The H_2O -sol. matter in leather tanned slowly in pits with relatively dil. liquors was $<$ that of extract-tanned leather. Their micro-

scopical structure differed only slightly, but in favour of the quick-tanned product. They possessed the same wearing properties (as determined by the Gerssen machine; cf. preceding abstract), but the slow-tanned leather was generally stronger and absorbed H_2O more readily than the quick-tanned leather. Agreement is expressed with Kubelka's views (B., 1936, 804) that only free H_2SO_4 and the mode of tannage can be ascertained from the chemical analytical data. Quality must be judged on physical tests, e.g., wearing tests, tensile strength, H_2O absorption. D. W.

Detecting gelatin.—See XIX.

PATENTS.

Unhairing of hides and skins. H. G. TURLEY (U.S.P. 2,016,260, 1.10.35. Appl., 24.10.32).—Skins are immersed in aq. Na_2S the p_H of which has been adjusted to 11.8—12.2 by addition of an acid salt, washed, and subsequently immersed in milk-of- CaO . D. W.

Tanning skins or hides. C. K. REIMAN (U.S.P. 2,016,559, 8.10.35. Appl., 2.5.32).—Hides or skins are treated with a conc. Cr-tanning liquor at 35—50° in such quantity that it loses $< 50\%$ of its concn. during the tannage. They may be treated with a conc. vegetable tan liquor in such quantity that it loses $< 1\%$ of its concn. D. W.

Composition for treating [finished] leather goods and its application. A. C. LOGES (U.S.P. 2,015,943, 1.10.35. Appl., 7.11.32).—Suede and chamois leather goods are dry-cleaned with a mixture of mineral oil, $COMe_2$, $CHCl_3$, naphtha, CCl_4 , and $C_2H_4Cl_2$. D. W.

Manufacture of glue. H. W. KELLEY, Assr. to UNION PASTE Co. (U.S.P. 2,017,029, 8.10.35. Appl., 20.12.33).—Liquid animal glue is mixed with sufficient sol. Ag salt to combine with the available S present therein. D. W.

Casein glue. T. W. DIKE, Assr. to I. F. LAUCKS, INC. (U.S.P. 2,016,707, 8.10.35. Appl., 25.11.32).—A mixture of casein, NaF , ZnO , china clay, colloidal bentonite, $Ca(OH)_2$, and H_2O is claimed. D. W.

Removal of liquid materials from hides or skins. BRIT. UNITED SHOE MACHINERY Co., LTD. From TANNING PROCESS Co. (B.P. 451,414, 28.11.34).

XVI.—AGRICULTURE.

Characteristics of morphological solonetz soils of Minnesota. C. O. ROSE (J. Amer. Soc. Agron., 1936, 28, 92—105).—The p_H and exchangeable-base contents of the different horizons of 6 solodised solonetz soils are examined and discussed. A. G. P.

Form of combination of humus matter especially in forest soils. V. SPRINGER (Z. Pflanz. Düng., 1936, 45, A, 327—352).—Pretreatment of a base-saturated soil with dil. acid or $AcBr$ increases the colour intensity of the alkaline extract as a result of liberation of humus from combination with Ca or Mg . In unsaturated soils in which humus exists free or in loose forms of combination the acid treatment has no effect. In podsolis containing humus in combination with Fe and Al , acid dissolves these compounds, thereby decreasing the colour

intensity of the alkaline extract, whereas AcBr dissolves the Al and Fe oxides and permits the extraction of previously combined humus by alkali with consequent increase in colour. The bearing of these results on examinations of humus materials by Na_2CO_3 and NaOH extracts is discussed. A profile examination of a forest soil by the above methods is described.

A. G. P.

Oxidation of soil humus with potassium permanganate. C. B. GREENING (J. Roy. Hort. Soc., 1936, 61, 369—372).—Preliminary experiments indicate that aq. KMnO_4 (0.25 oz. per 2 gals. per 3 sq. yd.) applied to lawns eradicates moss, kills earthworms, and has a definite manurial action. Beneficial effects on vegetable crops are recorded.

A. G. P.

Characterisation of the forms of soil water by its influence on the exchange reaction between soil and salts. H. KURON (Z. Pflanz. Düng., 1936, 45, A, 352—363; cf. B., 1935, 197).—The H_2O -absorption curves of mixtures of dried Ca-clay and Na_2CO_3 in atm. of varying R.H. show a crit. difference of form (relative to the curves for Ca-clay alone) when the R.H. reaches approx. 38%. The amount of H_2O absorbed with R.H. \geq 38% is bound in a form incapable of acting as a solvent. With a higher R.H. the additional H_2O taken up acts as a solvent and permits the exchange reaction to proceed with a consequent alteration of the absorption curve.

A. G. P.

Addition to arable soils of combined sulphur from the atmosphere. G. BERTRAND (Compt. rend. Acad. Agric. France, 1935, 21, 1015—1018).—The SO_4^{--} in rain- H_2O approaches amounts necessary to cover the requirements of many crops.

A. G. P.

Effect of trituration of agricultural soils with water on the content of aqueous extracts in substances essential as fertilisers. D. LEROUX (Compt. rend., 1936, 203, 117—120).—Soil triturated with H_2O at intervals during 45 days contains more total sol. inorg. and org. materials than do controls. Sol. K salts and nitrates are increased, particularly in K-rich soils, but phosphates are unchanged.

J. L. D.

Effect of nitrogenous fertilisers, organic matter, sulphur, and colloidal silica on the availability of phosphorus in calcareous soils. H. D. CHAPMAN (J. Amer. Soc. Agron., 1936, 28, 135—145).—In pot cultures with Sudan grass, physiologically acid N fertilisers increased the availability of P in calcareous soils to extents which were influenced by the $\text{CO}_3^{--}/\text{PO}_4^{--}$ ratio of the soil and the nature of the materials used. Increased availability of P due to treatment of soil with S was most marked in low- CO_3^{--} , high-P soils. Colloidal SiO_2 produced slightly beneficial effects, but Na silicate had no action. Additions of filter-paper without P dressing depressed crop yields, probably as a result of utilisation of soil P by cellulose-decomp. organisms. Supplementary dressings of P with filter-paper produced better crops than did the P dressing alone. Barley straw produced no effect other than could be ascribed to the P which it contained.

A. G. P.

Use of dunite for improving the [manurial] properties of superphosphate. D. V. DRUSCHININ

(Z. Pflanz. Düng., 1936, 45, A, 303—305).—Admixture of dunite with superphosphate improved its manurial efficiency on several soil types.

A. G. P.

Fixation of potash by muck soils. G. H. ENFIELD and S. D. CONNER (J. Amer. Soc. Agron., 1936, 28, 146—155).—In K-deficient mucks to which K salts were applied in a layer below the seed larger crops were obtained than when K was mixed with the whole of the soil. In K-rich soils uniform admixture of K with all the soil in the pots gave the better results. Neubauer tests showed higher vals. for recovery of added K from K-deficient than from K-rich soils. Liming caused no appreciable fixation of K in these tests. On very acid, K-deficient soils CaO increased the removal of K by plants. The exchangeable K, the results of Neubauer tests, and the response of plants to K fertilisation were closely related.

A. G. P.

Fixation of potassium in soils. J. S. JOFFE and L. KOLODNY (Science, 1936, 84, 232).—Phosphates, particularly those of Fe and Al, can fix K ions in soils, rendering them unavailable. NH_4^+ and possibly other cations may also be fixed in this way. Artificially-prepared silicates produced no fixation of K.

L. S. T.

Migration of phosphates during podsolisation. JORET and MALTERRE (Compt. rend. Acad. Agric. France, 1935, 21, 943—946).—Loss of fertility during the podsolisation process is attributable to leaching of PO_4^{--} as well as of bases. Movement of PO_4^{--} into lower horizons is paralleled by that of Fe^{++} . There is normally a surface accumulation of PO_4^{--} the concn. of which becomes min. in the B_1 and max. in the B_2 horizon. In glauconitic sands pptn. of leached material at the chalk level is initiated by the formation of an impermeable layer of glauconitic grains cemented together by Fe_2O_3 ; this retains the clay, which tends to accumulate in the B_1 horizon. [Fe] reaches a max. in B_2 .

A. G. P.

Loss of phosphates and ammonia from padi soils kept in the laboratory under anaërobic conditions. J. H. DENNETT (Malay. Agric. J., 1936, 24, 366—373).—Loss of NH_3 in drainage from H_2O -logged soils treated with $(\text{NH}_4)_2\text{SO}_4$ (I) increased with the amount of (I) added. Losses from rich soils were $>$ those from poor ones. Superphosphate (II) added to the soils was almost entirely absorbed. Leaching losses were small and did not tend markedly to increase with the amount of (II) added. Monthly losses of NH_3 decreased gradually, until after 9 months they became approx. the same irrespective of the manurial treatment or type of soil. Monthly losses of PO_4^{--} were highest in the second month and subsequently decreased at relatively much smaller rates than did those of NH_3 . Losses of PO_4^{--} tend to be periodic.

A. G. P.

Colorimetric determination of phosphoric acid in fertilisers with the Pulfrich photometer. K. C. SCHEEL (Z. anal. Chem., 1936, 105, 256—269).—The material is dissolved in $\text{H}_2\text{SO}_4 + \text{HNO}_3$, and diluted so as to contain 1—2.5 mg. of P_2O_5 per c.c. Monomethyl-p-aminophenol sulphate + NaHSO_3 is added as reducing agent, followed by 5% aq. $(\text{NH}_4)_2\text{MoO}_4$. The Mo-blue is stabilised by addition of 2.5N-NaOAc.

J. S. A.

Rapid agricultural analysis, using "kit" methods. F. E. HANCE (Proc. 5th Meet. Hawaiian Sugar Planters' Assoc.; Internat. Sugar J., 1936, 38, 267).—A simple and rapid technique, for which a high degree of accuracy is claimed, has been elaborated. Details are given of the determination of NH_3 - and nitrate-N and of Ca. J. P. O.

Sulphur in seaweed, marine slimes, and rain water in Brittany. VINCENT, SARAZIN, and HERVIAUX (Compt. rend. Acad. Agric. France, 1935, 21, 1032—1034).—Analytical data are given, and the application of marine materials to arable soils to maintain supplies of S is discussed. A. G. P.

[Analysis of] plants. O. B. WINTER (J. Assoc. Off. Agric. Chem., 1936, 19, 359—365).—The A.O.A.C. colorimetric and the TiCl_3 methods for Fe are compared. Haddock and Evers' method for Cu gives satisfactory results. $\text{Mg}(\text{OAc})_2$ is recommended as a fixative for F during ignition. The determination of K, Na, and Pb is discussed. E. C. S.

Determination of chlorine in plants. ANON. (J. Assoc. Off. Agric. Chem., 1936, 19, 72—74).—The material is digested with 0.3N- AgNO_3 , HNO_3 , and KMnO_4 , and the AgCl converted by means of $\text{CuSO}_4 \cdot \text{K}_2\text{SO}_4$ into Ag_2SO_4 , which is titrated with KI.

Total chlorine in plants. H. L. WILKINS (J. Assoc. Off. Agric. Chem., 1936, 19, 366—371).—The method described above gives results within ± 0.05 mg. on 10—40 mg. of Cl^- . E. C. S.

Hellriegel's examination of the nitrogen nutrition of Gramineæ and Leguminosæ. O. LEMMER-MANN (Z. Pflanz. Düng., 1936, 45, A, 257—276).—A discussion. A. G. P.

Relation of growth-substances or hormones to horticultural practice: a review. M. A. H. TINKER (J. Roy. Hort. Soc., 1936, 61, 380—388). A. G. P.

Significance of the physiological antagonism between calcium and magnesium for plant growth. S. DOJMI DI DELUPIS (Z. Pflanz. Düng., 1936, 45, A, 296—303).—Plant growth causes a definite reduction in the Ca/Mg ratio of the colloidal complex of the soil and of the soil solution. A reduction of the ratio in the nutrient corresponds with a still greater decrease of that in the plant. Min. crop yields correspond with high Ca/Mg ratios. The plant is able to effect changes in the ratio, both in the substrate and in its own tissues, by means of exchange reactions with active H^+ and CO_3^{--} , whereby a protective action against physiological disturbances by unsuitable $[\text{Ca}^{++}]$ is effected. Energy exchanges involved in the transformation of sol. Ca^{++} into exchangeable or insol. Ca^{++} indicate that max. yields are obtained when the course of growth is such that energy consumption by the plant is a min. A. G. P.

Relation between plant growth, soil, and nutrient ratios of fertilisers. IV. K. RACKMANN (Z. Pflanz. Düng., 1936, 45, A, 305—326; cf. B., 1936, 292).—On sand-peat mixtures 50% more dry matter was obtained in two cuts than in four cuts of cocksfoot per season. This is attributable to the heavy depletion of N in the early cut. The optimum nutrient ratio of

fertilisers was $\text{N}:\text{P}_2\text{O}_5:\text{K}_2\text{O} = 1:1:2$, the actual yields obtained being largely controlled by the N supply. The nutrient intake in the first growth period was approx. the same for the lighter and heavier applications of fertiliser given, that of subsequent cuts being conditioned by the amount of fertiliser applied. N and K were rapidly absorbed by the plants, but the intake of P was practically uniform over the whole growth period. The % utilisation of N was the same for light and heavy dressings; that of K and P declined rapidly with increasing amounts applied, but was increased by raising the proportion of N in the fertiliser. The proportion of K and P in relation to N in the grass may be increased without change of total yield, when the supply of these nutrients is relatively in excess, but with fertilisers of the same nutrient ratio it tends to decrease with increasing amounts of fertiliser applied. The amount of N removed by the crop is greater, and that of K and P less, when four cuts than when two cuts are taken per season. A. G. P.

Significance of straw manuring for [crop] yield and the carbon and nitrogen content of a light soil. K. OPITZ and K. RATHSACK (Z. Pflanz. Düng., 1936, 45, A, 276—296).—Applications of straw to unmanured soil or to that receiving complete fertiliser tended slightly to reduce yields in the first year but to increase these somewhat in subsequent years' treatment. $(\text{NH}_4)_2\text{SO}_4$ gave better results than CaCN_2 with potatoes when used in conjunction with straw or farmyard manure. Repeated applications of straw or cattle manure or a single heavy dressing of straw produced only small changes (0.04—0.05%) in the N content of the soil. Seasonal variations exceeded differences produced by the manurial treatments. No evidence was obtained of fixation of N following straw manuring. The C content and C:N ratio were somewhat increased one year after heavy applications of straw, but the proportion of humus-C was not greatly changed. A. G. P.

Destruction of weeds in cereals with phenolic products of tar oil. C. CHABROLIN (Compt. rend. Acad. Agric. France, 1935, 21, 1088—1091).—*Raphanus raphanistrum*, *Fumaria parviflora*, and *Papaver Rhæas* in wheat were more satisfactorily controlled by tar oil emulsions than by H_2SO_4 . The resistance of wheat to the emulsion is similar to that to H_2SO_4 . C_{10}H_8 oil (hydrocarbons 70, phenols 25%) applied as a 6% emulsion was particularly effective. A. G. P.

Composition of carpet grass from Serdang. C. D. V. GEORGI (Malay. Agric. J., 1936, 24, 393—396).—Analyses (including HCN content) are recorded and compared with those of guinea-grass. A. G. P.

Comparison of winter legume green manure and sodium nitrate for fertilising cotton. G. A. HALE (J. Amer. Soc. Agron., 1936, 28, 156—159).—Use of green manure with NaNO_3 gave somewhat better results than green manure alone. A. G. P.

Relation of fallow to restoration of subsoil moisture in an old lucerne field and subsequent depletion after reseeding. C. O. GRANDFIELD and W. H. METZGER (J. Amer. Soc. Agron., 1936, 28, 115—123). A. G. P.

Differential influence of certain vegetative covers on deep subsoil moisture. H. E. MYERS (J. Amer. Soc. Agron., 1936, 28, 106—114).—Effects of lucerne, sweet clover, and soya beans are examined. A. G. P.

Yield of green plants in relation to the oxygen content of the surrounding atmosphere. M. MOLLIARD (Compt. rend., 1936, 203, 8—10; cf. A., 1936, 392).—Radish plants grown in an atm. containing 1% of CO_2 and 5% of O_2 have a dry matter content 1.57 times as great as when the $[\text{O}_2]$ is 20%. When the $[\text{O}_2]$ is $> 20\%$ no tubers are formed and the chlorophyll is affected, probably by oxidation. J. L. D.

Effect of petroleum oils on respiration of bean plants, apple twigs and leaves, and barley seedlings. J. R. GREEN (Plant Physiol., 1936, 11, 101—113).—Spraying with poorly refined oils increased respiration rates in most cases. Highly refined oils caused a similar but smaller change. The effect of oils extended over prolonged periods. The change in respiration of barley seedlings was not greatly altered by large increases in the amount of oil used. A. G. P.

Relation of soil moisture to pear tree wilting in a heavy clay soil. R. A. WORK and M. R. LEWIS (J. Amer. Soc. Agron., 1936, 28, 124—134).—The H_2O content of soil in immediate contact with plant roots may be at or near the wilting point, whereas within a few mm. vals. may be considerably higher. The H_2O content of an average soil sample may thus be $>$ the wilting point when permanent wilting occurs. A. G. P.

Fruit tree and vine spraying trials, 1935. G. ARNAUD and J. BARTHELET (Compt. rend. Acad. Agric. France, 1935, 21, 1094—1100).—Field trials are recorded. Pear scab was most effectively treated with Bordeaux mixture (I) 15 days after flowering. Injury through spraying during flowering was small. For vine mildew (I) gave best results. CuS preps. caused injury and were less effective. A. G. P.

Mineral nutrition of the vine: effect of manure on the development of cutting wood in relation to mineral composition and productivity. E. VINET (Compt. rend. Acad. Agric. France, 1935, 21, 911; cf. B., 1935, 471).—The action of manure on wood growth, mineral composition, and productivity is exerted simultaneously and in a corresponding manner. K fertilisers produce the most marked effect, that of SO_4^{2-} being $>$ that of Cl^- . Lack of K leads to disturbance of physiological equilibrium, poor yields, and impoverished wood development. A. G. P.

Colloid-chemical characteristics of sugar beet as dependent on the conditions of its growth. T. T. DEMIDENKO and V. P. POPOV (Compt. rend. Acad. Sci. U.R.S.S., 1936, 3, 67—70).—The colloid content of diffused beet juice increases as the beet ripens and is higher in wet than in dry periods. K fertilisers and well-decomposed manure tend to lower the proportion of colloid, whereas the growth of legumes preceding the beet tends to increase it. Close planting increases the dry matter content of beet and the colloid content of the juice. A. G. P.

Borax-phosphate fertiliser for beets. M. GERLACH (Deut. Zuckerind., 1936, 61, 399—400; Internat.

Sugar J., 1936, 38, 271).—A fertiliser containing 5% of borax and 17—18% of P_2O_5 is recommended for soils producing beets which are notoriously affected by heart-rot; it should not be used year after year, as an accumulation of borax may eventually prove harmful to the plant. J. P. O.

Effect of boron on heart-rot of sugar beet. E. FOEX and H. BURGEVIN (Compt. rend. Acad. Agric. France, 1935, 21, 979—982).—Satisfactory field trials are recorded. Applications of 8—10 kg. of H_3BO_3 or of 13—16 kg. of borax per hectare are recommended, the material being thoroughly mixed with the fertiliser. The protective action of B persists in the second season. A. G. P.

Effect of boron on sugar-beet disease. BRIOUX and JOVIS (Compt. rend. Acad. Agric. France, 1935, 21, 1039—1042).—Beneficial effects of B in controlling heart-rot are recorded. Greater incidence of disease on alkaline soils may be associated with diminished ability of plants to assimilate B under these conditions. Applications of borax up to 100 kg. per hectare does not depress the growth of white mustard. A. G. P.

Effect of nitrogen on [sugar] cane yield and juice quality. U. K. DAS and A. H. CORNELISON (Hawaiian Sugar Planters' Rec., 1936, 40, 35—55; Internat. Sugar J., 1936, 38, 270).—In experiments with H 109 cane, it was noticed that the higher was the application of N the greater were the tiller production, the no. of joints formed, and the rate of cane growth, and the higher was the tonnage. However, with the highest applications of N the mortality may be so great as to result in less cane than with moderate applications of N. Moderately high applications gave the highest sucrose contents, though this was offset by higher amounts of glucose, and also increased the amounts of N and of mineral matter of the juices. J. P. O.

Fluctuations of sugars in leaf blades of sugar cane. C. E. HARTT (Hawaiian Sugar Planters' Rec., 1935, 39, 298—326; Internat. Sugar J., 1936, 38, 270).—The H_2O content of the blade is lowest in the early afternoon and highest in the early morning. Sucrose content is at its max. between 5 and 6 o'clock in the evening and decreases rapidly during the night, but did not at any time disappear entirely from the blades. J. P. O.

Rotenone content of some Brazilian species. A. C. FILHO (Ind. y Quim., 1936, 1, 171—172).—The rotenone contents of *L. urucú* and *L. nicou* from Brazil are 5—12% and 15—17%, respectively, compared with *Derris elliptica*, from the Orient, 3—12%, and *Lonchocarpus* sp., from Peru, 7—12%. The conditions of cultivation and export of the Brazilian species are indicated. L. A. O'N.

Derris cultivation in Perak. J. N. MILSUM (Malay. Agric. J., 1936, 24, 390—392).—*Derris malaccensis* of the type grown in the Kinta valley contains Et_2O extract 19.2, rotenone 0.2%, in prepared roots. A. G. P.

Selection experiments with derris. C. D. V. GEORGI, J. LAMBOURNE, and G. L. TEIK (Malay. Agric. J., 1936, 24, 374—389).—Analyses of a no. of species are recorded. A. G. P.

Treatment of *Laspeyresia pomonella*, L., in Normandy. R. REGNIER (Compt. rend. Acad. Agric. France, 1935, 21, 1100—1107).—Application of As sprays in late June—July gave best results on plums and pears. A. G. P.

Importance of cobalt in the treatment of certain stock ailments in South Island, New Zealand. H. O. ASKEW and J. K. DIXON (New Zealand J. Sci. Tech., 1936, 18, 73—92).—Use of CoCl_2 drenches (8 mg. of Co weekly) controlled bush sickness ("Morton Mains" disease) in sheep. The effectiveness of previously used soil drenches and limonite is probably due to their Co content. A. G. P.

Technique of insect control. K. GALLWITZ (Chem.-Ztg., 1936, 60, 764—766).—Methods of reducing corrosion of metallic apparatus by liquid insecticides are discussed. E. C. S.

Erratum.—B., 1936, p. 755, col. 2, line 9 from bottom, before "acid" insert "org."

Determining PO_4''' in superphosphates.—See VII. Beet leaves as silage.—See XIX. Analysing pyrethrum.—See XX. Disposal of dairy waste H_2O .—See XXIII.

PATENTS.

Production of fertilisers. P. PARRISH (B.P. 445,029, 25.9.34).—Ground phosphate rock is heated at 60—75° with a mixture of $(\text{NH}_4)_2\text{SO}_4$ and H_2SO_4 containing $\geq 45\%$ of free acid, to obtain a dry powder; $\geq 4\%$ of free S may be added to the rock during grinding. A. R. P.

Preparation of mixed fertilisers. KALI-CHEMIE A.-G. (B.P. 447,714, 13.8.35. Ger., 4.9.34).—Calcined phosphates are mixed with KCl or K_2SO_4 , small amounts of oil or grease being incorporated with one or both constituents to prevent separation of the mixture. A. R. P.

Preparation of (A—C) composition (A) for production of fertilisers, (B) containing fertiliser materials, (C) containing urea and nitrates, (D) ammoniacal composition containing calcium nitrate, (E) a composition comprising ammonia, urea, and potassium salts, (F) urea composition. W. H. KNISKERN and (A—C, E) C. K. LAWRENCE, (D) L. V. ROHNER, (F) W. C. KLINGELHOEFER, Assrs. to ATMOSPHERIC NITROGEN CORP. (U.S.P. 2,022,672—7, 3.12.35. Appl., [A] 13.5.32, [B—E] 21.1.33, [F] 4.5.34).—Addition of urea and of NH_4 , K, Na, or Ca salts to liquid NH_3 simultaneously increases the solubility of both constituents in the liquid. Claims are made for such supersaturated solutions comprising urea and (A) NH_4NO_3 , (B) NH_4Cl or $(\text{NH}_4)_2\text{SO}_4$, (C) NaNO_3 , (D) $\text{Ca}(\text{NO}_3)_2$, (E) KNO_3 , and for their use in making compound fertilisers with superphosphate. (F) NH_4Cl or NH_4NO_3 is dissolved in the reaction mixture obtained in urea synthesis from CO_2 and NH_3 and the product used for mixing with double or triple superphosphate. A. R. P.

Extraction and recovery of fertilising materials contained in the wash of distilleries and purification of this wash. Soc. INDUST. DE NOUVEAUX APPAREILS S.I.N.A. (B.P. 452,549, 22.11.35. Fr., 13.12.34).—Spent distillery wash is rendered slightly

alkaline by addition of CaO , and org. materials are flocculated by appropriate addition, with agitation, of aq. $\text{Fe}_2(\text{SO}_4)_3$ and $\text{Al}_2(\text{SO}_4)_3$. After settling, the clear liquid is decanted and may be used again in the distillery, or purified by biological means followed by an active C filter for discharge to a river etc. The settled sludge may be used as such, or after concn. or drying, with or without mixing with other materials, as a fertiliser. Suitable apparatus is described. I. A. P.

Fumigant. R. T. COTTON and H. D. YOUNG, Ded. to U.S.A. (U.S.P. 2,024,027, 10.12.35. Appl., 10.4.31).—Solid CO_2 impregnated with about 10% of $(\text{C}_2\text{H}_5)_2\text{O}$, CS_2 , CCl_4 , or chloropicrin is used as an insecticide, e.g., for killing flour weevils. The CO_2 increases the toxicity of the insecticide. A. R. P.

Treating liquids with NH_3 . Coloured insecticidal salts. Prepared S.—See VII. Land reclamation.—See XXIII.

XVII.—SUGARS; STARCHES; GUMS.

Automatic liming systems [for sugar juice]. N. CRITES (Repts. Assoc. Hawaiian Sugar Tech., 1935, 41—42; Internat. Sugar J., 1936, 38, 274).—Using the "Micromax" p_{H} assembly with Sb and saturated calomel cell electrodes, in conjunction with a 12-watt synchronous reversible motor, the CaO supply was diverted into either the juice tank of the return tank, depending on whether the p_{H} of the juice was $<$ or $>$ the optimum set for operation. Essential conditions for uniform liming were: an even flow of juice to the heater; a small change in the quantity of CaO by either high dilution of the milk-of- CaO or the min. movement of the CaO distributor, and the placing of the electrodes as near as possible to the juice after addition of CaO . J. P. O.

Determining supersaturation in pan-boiling control. K. ŠANDERA (Z. Zuckerind. Czechoslov., 1936, 60, 225—230; Internat. Sugar J., 1936, 38, 271).—Simplified diagrams are given by means of which the supersaturation can be quickly determined from temp. and vac. readings, for juices, syrups, and first-product massecuites. In one of them, simplified for the use of the pan attendant, the ranges of temp. and of vac. to be observed in graining and in finishing are shown. J. P. O.

Pan boiling by conductivity control. D. L. McBRIDE (Internat. Sugar J., 1936, 38, 224—226, 259—263; cf. B., 1936, 710).—Using an electrical conductivity instrument for control of supersaturation, the crop was established by the true seeding method and boiling continued over the first part of the process at a supersaturation avoiding grain formation until the crystals were about $\frac{2}{3}$ their final size. After this, the pan was "heavied" steadily at the max. boiling rate until the supersaturation was above the "active graining zone" as shown by the instrument. Throughout the process of boiling, "balancing H_2O " was fed into the pan to compensate increases in η . In this way it was possible to boil a seeded strike without the formation of false grain. Charts are reproduced showing a master curve for the conductivity-control method, besides several curves illustrating the "danger zone" and the operation of "free boiling." J. P. O.

Reactivation of bone-black without oven treatment, and its use in beet-sugar and glucose processes. A. HINZE (Z. Spiritusind., 1936, 59, 307—308).—The reactivation of bone-black (*B*) after its use in sugar refineries etc. is critically discussed. The effects of treatment of *B* with HCl are described and discussed. The influence of grain size on the absorptive power for colouring matters is shown, whilst recommendations are made for the most economical utilisation of *B*. I. A. P.

Use of chlorine as [sugar] juice clarifying agent. K. SUZUKI and T. TANABE (Rept. Govt. Sugar Expt. Stat., Tainan, Formosa, 1935, 56—68; Internat. Sugar J., 1936, 38, 277).—When in the clarification of juice small amounts of Cl₂ are used and the temp. is maintained below 40°, practically no sucrose is inverted, whereas proteins and gums are eliminated. A rise in the true purity as high as 1.5 could be observed. J. P. O.

Lead precipitate [in sugar clarification]. F. W. ZERBAN (J. Assoc. Off. Agric. Chem., 1936, 19, 401—406).—The effect of Pb(OAc)₂ and Hg(OAc)₂ on the $[\alpha]_D$ of sugar solutions containing salts of aspartic and aconitic acids is discussed. E. C. S.

Purity and glucose-ash relationship of [cane] molasses. W. L. MCCLEERY (Proc. 55th Meet. Hawaiian Sugar Planters' Assoc., 1935, 93—95; Internat. Sugar J., 1936, 38, 277).—Examination of data on boiling-down tests emphasised the marked relation of glucose-ash ratio to purity rather than the glucose ratio alone. An "expectancy table" was constructed, covering the entire range of glucose-ash ratios for a saturation temp. of 50°, and was found to be an aid to operators in judging the general quality of their molasses work from week to week. J. P. O.

Determination of reducing sugars, using Tryller's method. C. R. VON STIEGLITZ and L. C. HOME (Proc. Queensland Soc. Sugar Cane Tech.; Internat. Sugar J., 1936, 38, 268).—A modification of Tryller's electrometric method of determining the end-point in the Fehling titration is described. It yielded results agreeing excellently with the Eynon-Lane method, and the authors urge that more use be made of it, particularly with dark solutions. It is easily manipulated and the end-point very definite. J. P. O.

Determination of cuprous oxide as applied to sugar analysis. R. A. STEGEMAN and D. T. ENGLIS (J. Assoc. Off. Agric. Chem., 1936, 19, 480—489).—The K₂Cr₂O₇, Ce(SO₄)₂, and KMnO₄ methods are compared with the gravimetric method. The two first-mentioned are more trustworthy than is the last-mentioned, although the accuracy of this can be improved by the use of *o*-phenanthroline-Fe⁺⁺ complex (I) as indicator. The use of Ba diphenylaminesulphonate or (I) in conjunction with K₂Cr₂O₇ is recommended. E. C. S.

Changes in the polarisation of raw sugars during warehousing. R. AVICE (Rev. agric. [Mauritius], 1936, No. 85, 10—11; Internat. Sugar J., 1936, 38, 274).—During variations of R.H. between 68 and 80 the sugars kept well, but during the wet weather (R.H. 72—96) moisture was absorbed by the sugars and deterioration set in. No relation between the composition of the sugars and their keeping qualities could be observed, though precautions taken during

the course of manufacture to diminish the no. of micro-organisms have a great influence in this direction. Certain sugars having a factor of safety < 0.25 commenced to invert without absorbing further moisture. Much importance should not be given to this factor in the case of sugars composed of crystals derived from several massecuites, and having a molasses layer which has been diluted by H₂O during washing. J. P. O.

Molecular refraction of sucrose. E. LANDT (Centr. Zuckerind., 1935, 43, 910; Internat. Sugar J., 1935, 38, 269).—The sp. refraction (*R*) vals. for solid sucrose were found to be < those for sucrose in solution, from which it is concluded that the physical properties of sucrose may undergo a change when in solution, at least for *R* vals. in concns. < 30%. J. P. O.

[Examination of] maple products. J. F. SNELL (J. Assoc. Off. Agric. Chem., 1936, 19, 396—399).—An attempt to detect adulteration with cane and beet sugar by microscopical examination of sediments was unsuccessful. Filtration and washing of Canadian Pb ppts. are facilitated by addition of asbestos fibre. E. C. S.

Determination of starch in potatoes. L. W. JIRAK (Z. Spiritusind., 1936, 59, 283).—The error in starch determinations in well-mixed potato pulp (MgCl₂-polarimetric method, *M*) is $\pm 0.5\%$ on pulp solids; the error is negligible after a preliminary air-drying (60°) followed by mixing of the sample. The starch content (*S*) of potatoes tends to fall towards the end of the campaign; *M* tends to give somewhat higher results at the beginning, but lower results at the end, of the campaign than other methods, and is to be preferred. The deterioration in *S* as a result of frost or low temp. during storage is discussed. I. A. P.

Fertiliser for beets. Sugar cane and beet. Honey.—See XIX.

PATENT.

Treatment of sugar. P. SANCHEZ (B.P. 453,129, 4.3.35. U.S., 9.4.34).—See U.S.P. 1,989,156; B., 1936, 388.

XVIII.—FERMENTATION INDUSTRIES.

Viticulture and enology. Constitution of the grape and the must. M. M. DA FONSECA (Bol. Min. Agric., Brazil, 1936, 25, 61—68).—A review. L. A. O'N.

Granulation of pressed yeast. R. ILLIES (Z. Spiritusind., 1936, 59, 270; cf. B., 1936, 518, 565).—Two granular samples of yeast, of low H₂O content on receipt, were treated with H₂O and pressed to normal H₂O content. The granular nature of the first completely, and that of the second almost completely, disappeared. The possible implications of this observation and the mineral analyses of the yeasts are discussed. I. A. P.

Use of the new Swedish vacuum dryer in the malting and brewing industries. C. WIRTH and O. ANDERSSON (Woch. Brau., 1936, 53, 257—259, 267—271).—The construction of the Johnsson vac.-dryer (*V*) is briefly described and its use discussed for the drying of cereals, brewing barley, and vegetables, and for the drying and curing of malt. Part of a sample of green malt was dried and cured on *V*, and part on a normal double-floor kiln (*D*). With *V*, the drying time was $\frac{1}{2}$ that on *D*, whilst the extract yield was $\frac{1}{2}\%$ higher, the

fine meal and grist giving closer results than with *D*. Further, the malt from *V* gave more cold-H₂O-sol. and formol N, and a higher titratable acidity both in cold-H₂O extract and in Congress wort. Saccharification was shorter and the wort brighter. The results of parallel brews with the 2 malt samples were compared. Beers from *V* malts were appreciably more resistant to cold than those from *D*, but the worts of the former required more hops. I. A. P.

Dependence of caramelisation of distillery mash on steam pressure and duration of steaming. A. FREY and M. MILLER (Z. Spiritusind., 1936, 59, 306, 308—309).—The colours of filtrates from rye mash made under two described sets of pressure-cooking conditions for varying times have been measured (Duboscq) by comparison with standard caramel solution, the results being considered mathematically, thus yielding equations which are of val. for process control. I. A. P.

Proteolytic activity of malt extracts and worts. P. KOLBACH and H. SIMON (Woch. Brau., 1936, 53, 297—303).—The method described depends on the hydrolysis of commercial edestin, at 35° and p_H 4.3—4.5 (final val.) for 6 hr., by a fixed vol. of extract or wort, the N rendered sol. being determined (Kjeldahl). Proteolytic activity (*A*) is read off from a previously prepared graph showing the relation between enzyme quantity and sol. N production. The proteinase (*P*) passes most readily into solution at 20°, at p_H 4.5, and during an extraction time of $\frac{1}{2}$ hr. The Congress method of mashing results in great loss in *A* when the temp. is raised above 45°. *A* decreases rapidly when mashing temp. are raised above 20° (1-hr. mash), and, though measurable at 65°, is inappreciable at 70°. The sensitivity of *P* to heat (55°, 1 hr.) is least at approx. p_H 4.6, the optimum for its action; inactivation proceeds rapidly below this val. or above 5.8 (the normal for the mash). During edestin hydrolysis, the p_H of the reaction mixture tends to shift towards the isoelectric point. I. A. P.

Determination of tryptophan in beer wort. E. SCHILD and F. STRICKER (Woch. Brau., 1936, 53, 289—292).—Methods depending on the reducing capacity of tryptophan (*I*) cannot be used for its determination in wort, and the Voisenet reaction is similarly inapplicable. The colorimetric method using p -NMe₂·C₆H₄·CHO (Ehrlich's reagent) in presence of HCl and NaNO₂ gives reproducible results which are not affected by, e.g., melanoidin. Further, the necessary preliminary removal of colour from strongly coloured worts by basic Pb acetate treatment has no appreciable influence on the results. The method determines only free (*I*) and (*I*) terminally bound in peptides. I. A. P.

Determination of iron in beer. W. SIEBENBERG and W. S. HUBBARD (J. Assoc. Off. Agric. Chem., 1936, 19, 489—493).—Fe is determined colorimetrically with K₄Fe(CN)₆ after removal of Cu, Sn, and Ni. E. C. S.

Influence of the amount of diastase on the alcohol yield from rye. F. WENDEL (Z. Spiritusind., 1936, 59, 321).—Independently of the hydrolysis process used, increasing amounts of malt increase the certainty of obtaining max. yields of EtOH from rye. The

increased diastase (*I*) tends to correct errors of the gelatinisation process and further increases resistance to (*I*) inactivation by the acids of the fermenting mash; working without malt, such resistance is alternatively increased by yeast complement, which also accelerates the after-saccharification. The amount of malt which may be used, however, is limited by economic considerations, so that the most appropriate process should be chosen for each individual rye sample, and the necessary min. amount of malt determined. I. A. P.

Increasing the alcohol content of spirits. C. LUCKOW (Z. Spiritusind., 1936, 59, 270).—Methods of calculation are discussed for determining the vol. of conc. spirit to add to dil. spirit in a partly full vessel to produce a desired [EtOH], or for determining the vol. of conc. spirit to be substituted for an equal vol. of dil. spirit in a completely full vessel to reach a like result. I. A. P.

Detection and determination of sodium in wine and the sodium content of Palatinate wines. O. REICHARD (Z. Unters. Lebensm., 1936, 71, 501—515).—Pptn. of Na as NaOAc, Mg(OAc)₂·3UO₂(OAc)₂·6H₂O is a sensitive and sp. means of determination. A procedure is outlined for its determination in wine, and the ash and Na contents of 70 Palatinate wines of 1934 and 1935 are recorded. E. C. S.

Detection of vermouth in vinous beverages. O. NOETZEL (Z. Unters. Lebensm., 1936, 71, 538—546).—The essential oils are extracted with light petroleum and recognised by their characteristic odour and by a colour reaction with vanillin and HCl. The bitter substances are adsorbed on animal C, extracted with CHCl₃, and detected (and approx. determined) by taste. E. C. S.

[Determination of] papain. T. L. SWENSON (J. Assoc. Off. Agric. Chem., 1936, 19, 373—375).—The results of tests by 5 independent observers are tabulated. E. C. S.

Enzymes in flour.—See XIX. **Pb from certain drinks.**—See XIX.

PATENTS.

[Seed-]yeast [manufacture]. H. RILEY (U.S.P. 2,016,791, 8.10.35. Appl., 5.12.34).—A highly aerated, aq. CaSO₄ cream is mixed with yeast and $\frac{1}{2}$ —1% of maize starch, the mixture incubated at 28° for 30 hr., diluted with aerated H₂O, and further incubated for 18 hr. The product contains thick-walled "durable yeast" and sporulated cells, and may be propagated by gradual addition of clarified molasses wort, preferably in presence of yeast autolysate. I. A. P.

Brewing of [sweetened] beer. A. HASELBACH (B.P. 453,082, 14.10.35).—In producing a sweetened beer of low EtOH content, completely or partly fermented unfiltered beer is mixed with the requisite amount of sugar in a closed, pressure-resisting vessel, and fermentation is allowed to proceed till the required head is obtained. The product is then filtered, with concurrent cooling, and either pasteurised or submitted to sterile filtration, thus yielding a stable product. I. A. P.

Producing butyl alcohol and acetone [by fermentation]. A. IZSAK and F. J. FUNK, Assrs. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 2,016,112, 1.10.35.

Appl., 19.10.32).— NH_3 (to give p_{H} 6.7–7.0) or $(\text{NH}_4)_2\text{CO}_3$ or urea (2 lb. per 1000 gals.) is added to molasses mash before or after sterilisation and/or during fermentation with *Clostridium saccharobutylicum*, γ . The fermentation time is thus reduced and the solvent yield increased. I. A. P.

Fertilisers from distillery wash.—See XVI.

XIX.—FOODS.

Fermentable sugars of flour and dough. R. GUILLEMET (Compt. rend. Acad. Agric. France, 1935, 21, 889–892).—The fermentable, non-reducing sugar previously recorded (B., 1935, 425) is now characterised as a fructoholoholide. A. G. P.

Enzymes [in flour]. A. K. BALLS and W. S. HALE (J. Assoc. Off. Agric. Chem., 1936, 19, 372–373; cf. B., 1935, 520).—Proteinase (I) activity is determined by noting the change in the rate of fall of a Pb shot through a paste of flour and H_2O saturated with CO_2 . (I) is inactivated by bleaching with an oxidising agent, and reactivated by addition of cysteine. E. C. S.

Study of peptisation of gluten-protein by the triangular-diagram method. O. N. GOROSSOVA (Kolloid-Z., 1936, 76, 345–351).—The conditions of peptisation of the gluten-protein of wheat flour in H_2O by EtOH, NaCl, lactic acid, and KOH, respectively, have been determined. E. S. H.

Action of substances used for treating flour on the animal organism. E. BECKER and B. VON HANGAI-SZABÓ (Z. Unters. Lebensm., 1936, 71, 521–528).—A no. of proprietary improvers containing perborates, bromates, persulphates, or peroxides were administered to rats in amounts tenfold (in one case one hundredfold) those contained in a diet of flour. No deleterious effect was observed. E. C. S.

Determination of ash of bread. P. NOTTIN and A. DARON (Ann. Falsif., 1936, 29, 341–344).—Flour contains Cl combined otherwise than as chloride, consequently the ash content is no indication of the Cl content of the flour. Chlorides are best determined volumetrically in the aq. extract of the flour after coagulation of protein. Owing to the introduction of salts in H_2O and yeast, the ash content of bread gives no indication of that of the flour. E. C. S.

Milk record of several herds during one year. A. BURR (Z. Unters. Lebensm., 1936, 71, 546–580).—The vol., d , n , f.-p. depression, curd strength, and % of fat and solids-not-fat are recorded. The daily and monthly variations in these vals. are discussed. E. C. S.

Effect of various factors on the renneting process. W. NEUDERT (Milch. Forsch., 1936, 18, 87–106).—A photoelectric method of measuring the degree of dispersion of casein in milk is applied to the study of the various phases of rennet coagulation. By this method the effect of concn. of rennet on the time of coagulation was proved to be logarithmic; the effect of increasing $[\text{Ca}^{++}]$ was to shorten the time of appearance and to hasten the syneresis of the curd. Acetates and phosphates had only a slight effect on coagulation. At $p_{\text{H}} < 6.3$ the time of coagulation was shortened considerably, whilst at $p_{\text{H}} 6.3$ the time of coagulation

was variable, other factors being responsible. The time of coagulation was appreciably lengthened at renneting temp. of 20–30°, but did not vary much at 30–45°. Pasteurising and boiling milk lengthened the coagulation time by variable amounts. W. L. D.

Milk-proteins. W. E. PETERSEN (J. Assoc. Off. Agric. Chem., 1936, 19, 383–385).—Pptn. of casein is at a max. at p_{H} 4.3–4.5. E. C. S.

Cremometric and phosphatase tests for detecting pasteurisation of milk by the holding process. J. E. JACOBSEN (Z. Unters. Lebensm., 1936, 71, 515–521).—Milk heated at 62–63° for 15 min. gives a negative cremometric test (cf. B., 1932, 748). When heated for 20–30 min. it gives a negative phosphatase test (cf. B., 1936, 120). The former is the simpler and more suitable for use in the dairy, and will indicate a stronger than necessary heating of the milk. The latter can be used for homogenised or skim milk and cream, and for the detection of addition of raw to pasteurised milk. E. C. S.

Comparison of methods for detection of gelatin in dairy products. C. S. FERGUSON and P. A. RACICOT (J. Assoc. Off. Agric. Chem., 1936, 19, 476–480).—The Jacobs-Jaffe tests give positive results with sour cream and cream cheese in absence of gelatin. The Richardson-Tarussuk modification (B., 1934, 984) possesses no advantages over the official method, since $\text{CCl}_3\text{-CO}_2\text{H}$ does not ppt. all interfering substances and presence of gelatin must be inferred from the character of the cloudiness produced with picric acid. E. C. S.

[Detection of] gelatin [in dairy products]. G. A. RICHARDSON (J. Assoc. Off. Agric. Chem., 1936, 19, 386–390).—The application of the author's method (cf. B., 1934, 984) to cream cheese and buttermilk is described. E. C. S.

Body colour of butter and of artificial butter colours. W. MOHR and H. AHRENS (Milch. Forsch., 1936, 18, 1–14).—The colour of butter was measured by comparison with standards given in Ostwald's colour atlas, further colour characteristics being given by the % absorption by the butter of light filtered through special coloured glasses. Variations in colour (Ostwald indexes) of 1.83–3.00 with % absorptions (blue light filter L_{111}) of 20–59 were found. Butter colours dissolved in arachis oil showed the same colour characteristics as natural butter colour. W. L. D.

Crude protein fraction of fish meal and other meat meals. W. L. DAVIES (Analyst, 1936, 61, 512–515).—The N content of the non-protein-N of the meals examined was slightly < that of the true protein, but the products are so variable in composition that any alteration of the usual factor (6.25) could not effect any improvement. For two blood meals the N factors for crude protein were 6.31 and 6.38; three meat and bone meals gave factors of 6.93, 7.11, and 8.00; five fish meals 6.43–7.26, and three whale-meat meals 6.77, 7.01, and 7.07. E. H. S.

Simplification of Sudendorff-Lahrman method for determining creatinine in meat cubes. G. WALTER (Z. Unters. Lebensm., 1936, 71, 529–530; cf. B., 1915, 1027).—After oxidising with KMnO_4 , instead of completely washing the ppt. of MnO_2 , an

aliquot part of the filtrate is taken. The time required for the determination is halved without loss of accuracy.

E. C. S.

Maturation of meat. How to improve "xarque."

J. S. FERNANDES (Bol. Min. Agric., Brazil, 1936, 25, 77—81).—The coeffs. of maturation of fresh meat and of meat and fish products have been determined. "Xarque" (prep. discussed) has a higher sol. protein content than have most of the other products.

L. A. O'N.

Soya-bean analysis. C. H. COX (Oil & Soap, 1936, 13, 167—168).— NH_3 may be determined on 1.4—1.7 g. by the ordinary method employed for cottonseed. For the determination of H_2O 8—10 g. of whole beans are dried for 3 hr. at 130° in a Freas forced-draught oven. To ascertain the oil content, 60 g. of beans are predried for 2 hr. as above and twice ground in a Bauer mill before extracting 2-g. samples for 2 hr. and again, after regrinding in a mortar, for a further 3 hr. E. L.

Determination of pentosan in potato flakes. B. LAMPE, R. DEPLANQUE, and E. ROEHRICH (Z. Spiritusind., 1936, 59, 315—316).—The five samples of potato flakes examined gave pentosan (I) results (barbituric acid method) of 1.25—1.83% on dry wt. No relation was found between the (I) and peel contents. I. A. P.

Effect of salting on the calcium content of vegetables. L. C. KUNG (J. Chinese Chem. Soc., 1936, 4, 322—323).—The % Ca in different fresh vegetables, when immersed in saturated NaCl, tends towards equality, probably owing to osmosis and diffusion.

J. G. A. G.

Shortening the period of sterilisation of vegetable conserves by addition of small amounts of lactic acid. H. SERGER and F. FLEISCHER (Obst- u. Gemüse-Verwertung-Ind., 1935, 22, 342—345; Chem. Zentr., 1935, ii, 1274).—Addition of 0.1—0.15% of lactic acid halved the necessary time of sterilisation of a no. of vegetables. The flavour was not appreciably affected.

A. G. P.

Distribution of certain sugars in Bosc pears. W. E. MARTIN (Plant Physiol., 1936, 11, 139—147).—Fructose was the predominant sugar in all parts of the pear but the skin and was most abundant in the cortical and core regions. Sucrose concn. was max. in the stone-cell region. Glucose predominated in the skin and was fairly uniformly distributed in the other parts of the fruit. The bearing of these results on sampling is discussed.

A. G. P.

Control of ripeness of table grapes in the Avignon district. G. MATHIEU (Ann. Falsif., 1936, 29, 355—356).—The vals. observed for the ratio of sugars to acidity support the conclusions of Hugues and Bouffard (cf. B., 1936, 810).

E. C. S.

p_{H} values and titratable acidity of apple juices. H. O. ASKEW (New Zealand J. Sci. Tech., 1936, 18, 131—136).—The form of titration curves of the juices was similar to that of aq. malic acid (I), tending in both cases to approach the same const. val. at high acidities. The buffering substances in juices increases the p_{H} vals. beyond those of (I) at the same titratable acidity. The p_{H} val. alone is insufficient to express the

acidity status of apples since a large difference in titratable acidity involves only a small change in p_{H} .

A. G. P.

Influence of preservatives on the flavour of fruit juices. L. HESS (Obst- u. Gemüse-Verwertung-Ind., 1935, 22, 342—345; Chem. Zentr., 1935, ii, 1274).— HCO_2H and BzOH affected the flavour of the juices. The ester "Nepakombin" caused scarcely any change.

A. G. P.

Detection of greening of preserved fruits and vegetables. SERGER and G. LÜCHOW (Chem.-Ztg., 1936, 60, 762—764).—The methods of greening, their detection, and their pharmacological importance, especially that of the Cu method, are reviewed.

E. C. S.

Composition of New Zealand honey. R. H. K. THOMSON (New Zealand J. Sci. Tech., 1936, 18, 124—131).—Analyses of honeys from different areas are recorded. Vals. are similar to those of honey from Great Britain and the United States except that the contents of ash and undetermined matter (dextrins etc.) are definitely lower. Data indicate that the N content increases and p_{H} decreases with increasing titratable acidity, and that the formol titration increases with the N content and decreases as the p_{H} rises. In most cases p_{H} increases with N content.

A. G. P.

Rapid differentiation of ordinary and caffeine-free coffee. C. GRIEBEL (Z. Unters. Lebensm., 1936, 71, 531—537).—The infusion is extracted with CHCl_3 , the extract evaporated to dryness, and the residue taken up in H_2O . Caffeine is pptd. by addition of 50% aq. silicotungstic acid in characteristic crystals. The reaction is also given by theobromine and theophylline.

E. C. S.

[Determination of] shell in cacao products. W. O. WINKLER (J. Assoc. Off. Agric. Chem., 1936, 19, 414—417).—An improved cellulose method is described and specimen analyses are given.

E. C. S.

Preservation of foods with ultra-violet rays. H. KÜHL (Pharm. Zentr., 1936, 77, 561—564).—Any sterilising effect that may be observed is due to the formation of O_3 .

E. C. S.

Introduction of lead into the body through certain drinks and preserved foods. P. MANGEAU, GRIFFON, and R. BRETON (Ann. Falsif., 1936, 29, 325—341).—The material is oxidised with HNO_3 — H_2SO_4 — HClO_4 and Pb determined by a modification of the method of Mâchebœuf etc. (cf. B., 1933, 170), which is accurate to 5—10%. Pb was present in one third of the samples examined, which included flour, preserved beans and peas, tomato extract, sardines, foie gras, condensed milk, jams, wines, and beer. The max. amount was found in tinned sardines, viz., 8.33 mg. per kg. The max. intake in a normal ration is 0.25 mg.

E. C. S.

Determination of the calorific value and composition of [army ration] lunches. A. M. GOLDBERG (Z. Unters. Lebensm., 1936, 71, 580—591).—The material is burned in the Stohmann calorimeter, oxides of N being absorbed in aq. KOH and determined. From the fact that 22.7% of the protein-N appears in this form, the amount of protein present in the material can be determined. The amounts of fat and carbohydrate are calc.,

by means of the equation given, from the heat of combustion. The vals. so obtained agree to within 10% with vals. obtained by analysis. E. C. S.

Comparative feeding values for poultry of barley, oats, wheat, rye, and maize. E. W. CRAMP-
TON (Nat. Res. Counc. Canada, Rept., 1936, No. 29,
50 pp.).—A summary and review of published data.

A. G. P.

Causes and effects of a high free fatty acid content of the meat scraps in poultry rations. C. H. SCHROEDER, G. K. REDDING, and L. J. HUBER (Poultry Sci., 1936, 15, 104—114).—Ill effects on growth, food consumption, and calcification due to feeding meat scraps of high free fatty acid content are largely attributable to the inactivation of vitamin-*A* and, to a smaller extent, of -*D*. Formation of free acid in stored scraps is accelerated by a rise in temp., especially if accompanied by an increased H_2O content, and is prevented by sterilisation.

A. G. P.

Salt requirements of poultry. J. G. HALPIN, C. E. HOLMES, and E. B. HART (Poultry Sci., 1936, 15, 99—103).—Effects of various levels of NaCl supply are recorded. No advantage was found by increasing the NaCl content of the ration beyond 1%.

A. G. P.

Phosphorus requirement of growing chicken : value of controlled experimental feeding. W. E. WATKINS and H. H. MITCHELL (Poultry Sci., 1936, 15, 32—41).—In the self-inhibiting phase of growth chicken require $> 0.26\%$ P in the ration. For max. growth and calcification $> 0.5\%$ P is necessary.

A. G. P.

Vitamin- B_2 requirement of turkeys. G. F. HEUSER (Poultry Sci., 1935, 14, 376—378).—The - B_2 requirement during the first 8 weeks is \propto the rate of growth of the birds. During the first 4 weeks the ration should contain a - B_2 content equiv. to 16% of dry skim milk.

A. G. P.

Levels of meat scraps and dried milk in rations for young ducks. R. E. ROBERTS (Poultry Sci., 1936, 15, 136—140).—In mash feeds containing 5% of dried milk no benefit was derived from increasing the proportion of meat scraps to $> 10\%$.

A. G. P.

Determination of carotene in agricultural products. W. S. FERGUSON and G. BISHOP (Analyst, 1936, 61, 515—518).—The finely-chopped material, e.g., grasses or fodders, is boiled with 20% aq. KOH for 2 hr. and then filtered off. The residue is washed with Et_2O-H_2O and $COMe_2$ and the combined extracts are extracted with Et_2O . From the Lovibond tintometer readings of the Et_2O extract the total carotenoids are determined, using the curve prepared by Ferguson (A., 1935, 1487). The relative amounts of carotene and xanthophyll present (usually about 1:2.1) are determined by the MeOH and light petroleum partition method. Adaptations of the method to the determination in milk and butter are given.

E. H. S.

Beet tops and leaves compared with grass silage. J. C. DE RUYTER DE WILDT (Vers. Landb. Onderz., 1935, No. 41, [C], 211—264; Internat. Sugar J., 1936, 38, 271).—In a large-scale siloing and feeding experiment with dairy cattle, the animals readily ate the beet-top silage without apparent digestive disturbance. 24 kg.

of the beet tops were equiv. to 15 kg. of green grass silage.

J. P. O.

Stability of edible fats etc. Black-walnut oil.—See XII. Determining starch in potatoes.—See XVII. Swedish vac. dryer [for vegetables etc.].—See XVIII. Disposal of dairy waste H_2O .—See XXIII.

PATENTS.

Grinding process [for corn]. F. ABRAMOWSKY (B.P. 451,543, 16.9.35. Ger., 18.9.34).—Corn which has been cleaned and flattened is first split, then broken up, and set aside for some hr. before grinding.

B. M. V.

Treatment of cereals and grain. L. SCHWAB (B.P. 452,233, 13.7.35. Ger., 13.7.34).—Wheat or other cereal is treated with a solution of $NaHSO_4$ before grinding, to loosen the husk (? bran coatings). An increased yield of flour of lower ash content is claimed.

E. B. H.

Manufacture of dehydrated flour mixes. J. D. DUFF and L. E. DIETRICH, Assrs. to P. DUFF & SONS, INC. (U.S.P. 2,016,318—20, 8.10.35. Appl., 13.6.33).—Dry mixtures requiring only the addition of H_2O before baking to produce various pastry products are prepared by: (a) emulsifying molasses, sugar, and shortening by heating and stirring, vac. drying at 71—76°, and pulverising to form a fine powder; (b) making a homogeneous dough from molasses, shortening, and flour, and drying and powdering as in (a), whereby the formation of a dough at this stage prevents loss of volatile ingredients on drying; and (c) emulsifying molasses, shortening, and fresh eggs, and treating as in (a). The products are completed by adding baking powder, dry spices, etc.

E. B. H.

Making of leavened bakery products and compositions therefor. STANDARD BRANDS, INC. (B.P. 452,483, 21.2.35. U.S., 21.2.34).—Sol. V compounds in amount up to 0.6 p.p.m. of flour are used in conjunction with a bromate ($KBrO_3$) or iodate (5 p.p.m. of flour) as an improver, giving finer texture and better crumb colour to the bread than BrO_3^- or IO_3^- alone.

E. B. H.

Conditioning of chilled meat in storage or transit. SMITHFIELD & ARGENTINE MEAT CO., LTD., and J. A. BREWSTER (B.P. 451,282, 13.2.35).—Electrodes, preferably of stainless steel, are inserted at the upper and lower ends of each quarter, and an electric current is passed through to generate sufficient heat to prevent formation of ice crystals.

B. M. V.

Production of coffee free from caffeine. T. GRETHE (U.S.P. 2,016,634, 8.10.35. Appl., 12.12.33. Holl., 13.11.33).—Coffee, decaffeinated with $EtOAc$ and H_2O , is treated with wet expanded steam to remove solvent taste, dried at 40—45° and then at 80°, and finally heated in its own vapours at 80—135°.

E. B. H.

XX.—MEDICINAL SUBSTANCES; ESSENTIAL OILS.

Preservatives in pharmacy and cosmetics. Boric acid is not a preservative. O. SCHMATOLLA (Pharm. Ztg., 1936, 81, 942—943).—Addition of 0.15% of $BzOH$ to a purified and salt-free mixture of starch and gelatin prevented the formation of mould, but 0.6% of H_3BO_3 was ineffective and it is suggested that the H_3BO_3

supplies the mineral salt necessary for the growth of the micro-organisms. E. H. S.

Determination of hexamethylenetetramine, piperazine, dimethylpiperazine, and mixtures of these in pharmaceutical products. Determination of ethylenediamine. F. E. RAURICH SAS (Anal. Fis. Quím., 1934, 32, 979—984).—Foucry's method (A., 1934, 1093) is unsuitable for determination of $(\text{CH}_2)_6\text{N}_4$ (I) in presence of piperazine (II) or dimethylpiperazine (III), which yield $B\cdot\text{UO}_2\text{SO}_4\cdot 2\text{H}_2\text{SO}_4$, where B is (II) or (III); these and also $\text{C}_2\text{H}_4(\text{NH}_2)_2$, which forms an analogous complex, may be determined satisfactorily by Foucry's method. (I) in presence of (II) and (III) is determined as Ag by heating with AgNO_3 solution buffered to p_{H} 8 with CaCO_3 . F. R. G.

Analysis of hexamethylenetetramine anhydromethylenecitrate. M. J. SCHULTE (Pharm. Weekblad, 1936, 73, 1107—1111).—0.344 g. of the drug is dissolved in sufficient 0.1N-NaOH in MeOH to make neutral to phenolphthalein (approx. 20 c.c.) and the pure compound pptd. with 30 c.c. of CHCl_3 and filtered off. The ppt. is dried at 80° , dissolved in H_2O , heated in boiling H_2O for exactly 15 min. with excess of 0.1N-NaOH, and the excess titrated with acid. $(\text{CH}_2)_6\text{N}_4$ in the CHCl_3 -MeOH filtrate is determined by extraction with H_2O and hydrolysis by boiling with excess of 0.1N-NaOH, the excess being determined acidimetrically. S. C.

Methods of analysis of pyrethrum. J. RIEPERT (Ann. Falsif., 1936, 29, 344—354).—The loss of pyrethrins during steam-distillation is much < that reported by Graham (B., 1936, 812) and is largely due to loss of pyrethrin-I. Comparative analyses by the author's, Seyl's, the semicarbazone, and the OMe methods are tabulated and the wide differences observed discussed. As between the first and second methods, these are largely due to the inclusion in Seyl's extract of free fatty acids, an error which is overcome by preneutralisation. The OMe method gives high results owing to the inclusion of Me esters of chrysanthemic acids and of methylpyrethrolone. E. C. S.

Chromatographic adsorption analysis in pharmacology. Determination of cantharadin in tincture of cantharides. H. H. VALENTIN and R. FRANCK (Pharm. Ztg., 1936, 81, 943—946).—The limitations and advantages of the method are discussed. Results comparable with those given by the D.A.B. VI method for the determination of cantharidin (I) in the tincture are obtained by the chromatographic method, and also the recovered (I) is pure, the method is finished in 1 hr., and it is useful in detecting adulteration. E. H. S.

Stability of spiritus sinapis Ph. H. V. J. BÜCHI (Pharm. Acta Helv., 1935, 10, 90—96; Chem. Zentr., 1935, ii, 1216—1217).—On keeping, the allylthiocarbimide (I) is converted into allyloxythiourethane; methods of detecting the change and of determining (I) are described. H. N. R.

Dionine [ethylmorphine hydrochloride]. J. BOUILLLOT (J. Pharm. Chim., 1936, 24, [viii], 209—212).—Commercial dionine contains 9.1—9.4% of H_2O of crystallisation, corresponding with the formula $\text{C}_{19}\text{H}_{23}\text{O}_3\text{N}\cdot\text{HCl} + 2\text{H}_2\text{O}$. W. O. K.

Variations of content of medicinal plants during time of vegetation. O. DAFERT, W. HIMMELBAUR, and K. LOIDOLT (Sci. pharm., 1935, 6, 45—53; Chem. Zentr., 1935, ii, 1212).—The influence of external conditions on the yield of active principle of *Mentha piperita*, *Thymus vulgaris*, *Melissa officinalis*, *Digitalis lanata*, *Hyoscyamus niger*, and *Datura stramonium* is discussed.

H. N. R.

Vitamin-D in cod-liver oil. $\text{Ca}(\text{OH})_2$ -oil liniment.—See XII. **Rotenone.**—See XVI.

PATENTS.

Stable colloidal solution of iodine. W. M. MALISOFF, Assr. to MACKIE-HENKELS, INC. (U.S.P. 2,022,729, 3.12.35. Appl., 19.7.33).—I (0.1—0.2%) is dissolved in a 0.5—2% solution of α -amylose prepared by electrophoresis of filtered starch solution. A. R. P.

Medicinal [adrenal] compound. W. W. SWINGLE and J. J. PFIFFNER, Assrs. to PARKE, DAVIS & Co. (U.S.P. 2,017,080, 15.10.35. Appl., 10.8.31).—Extract of the adrenal cortex is purified and rendered free from adrenaline by dissolving in an immiscible org. solvent and treating the solution with aq. alkali. The solvent solution is evaporated and the residue dissolved in H_2O . E. H. S.

Anthrax antigen preparation. J. REICHEL and J. E. SCHNEIDER, Assrs. to SHARP & DOHME, INC. (U.S.P. 2,017,606, 15.10.35. Appl., 24.12.32).—Anthrax bacilli are grown in a suitable medium and then the massed bacilli are killed, removed from the medium, and washed or suspended in H_2O or aq. NaCl and again separated to remove sol. by-products, e.g., polysaccharides, and culture medium. E. H. S.

Manufacture of physiologically active derivatives of cyclopentanophenanthrol. A. CARPMAEL, From SCHERING-KAHLBAUM A.-G. (B.P. 448,183, 23.11.34).—9 : 11 - Dimethyltetradecahydrocyclopentanophenanthra-3 : 17-dione, m.p. 129° , $[\alpha]_D^{20} + 104.8^\circ$, is obtained from the phenanthr-17-on-3-ol by CrO_3 (1.5 O) at room temp. The corresponding Δ^5 -unsaturated diketone, m.p. 173° , is similarly obtained by CrO_3 or $\text{Br-KMnO}_4\text{-Zn}$. Dehydroandrostenone with $\text{Br-CrO}_3\text{-Zn}$ gives a similar diketone. Oxidation of androsten-17-on-3-ol gives androstene-3 : 17-dione, m.p. $169\text{—}170^\circ$. R. S. C.

Toilet powders. J. F. KAPP (B.P. 452,115, 14.2.35).—Granules of vegetable origin are caused to burst, and are treated with wax, fat, or other H_2O -repellent substance prior to or during milling. Optional additions are mineral adulterant and bactericide, e.g., Rivanol.

B. M. V.

Face paints. H. WINTERSTEIN (B.P. 447,939, 9.3.35. Austr., 16.3.34).—A wax mixture is melted with a black dye (e.g., Nigrosin), emulsified with a hot solution of borax, and mixed with turpentine and clove oils until a cream is obtained when cold. [Stat. ref.] A. R. P.

Stable H_2O_2 .—See VII. **Products from nutshell liquid.**—See XIII.

XXI.—PHOTOGRAPHIC MATERIALS AND PROCESSES.

Tests on commercial photographic printing papers. I—III. T. YANO and Y. ASAI (J. Soc. Chem.

Ind., Japan, 1936, **39**, 202—203 B).—The sensitivity max. of the gaslight, chlorobromide, and bromide papers examined were, respectively, at 390 m μ , 440 m μ , and 470 m μ . Analytical data on the emulsions are given. Microscopical examination showed that emulsions of high γ val. in the density curves have halide grains of uniform size.

T. W. P.

Application of electronic optics to photography. A. LALLEMAND (Compt. rend., 1936, **203**, 243—244).—By throwing an optical image on a K photocell and receiving the photo-electrons on a ZnS screen under an accelerating potential of 6000 volts, an amplification of the intensity of the image is obtained. The screen may be replaced by a photographic plate. It is suggested that by using increased accelerating potential and by multiplying this system by using photocells in series, high photographic amplification will be obtained, of particular use for astronomical purposes.

J. W. S.

Light-sensitive coating.—See XIII.

PATENTS.

Photographic emulsions and manufacture of dyes [sensitisers] therefor. KODAK, LTD. From EASTMAN KODAK CO. (B.P. 450,958, 15.10.34).—Sensitising dyes of the formula $A[CH:CH]_n \cdot C \cdot A'$ (where $n = 0, 1, \text{ or } 2$, $A = a 5\text{- or } 6\text{-membered heterocyclic ring containing the nuclear grouping } \cdot C \cdot N \cdot CO \cdot \dot{C} \cdot \text{ or } \cdot C \cdot N \cdot CS \cdot \dot{C} \cdot$ in which the $\cdot \dot{C} \cdot$ is joined directly or through the polymethine chain to the external C of A' , a second heterocyclic N ring, the linking being in position α or γ in A') are made by condensing a heterocyclic compound AH_2 with $A'X$ ($X = \text{halogen, } \cdot SR, Ar \cdot NH \cdot CH:CH \cdot$, or $ArNH[CH:CH]_2$), preferably in presence of NEt_3 or other strong org. base. Where a thiohydantoin or rhodanine is used the product may be further alkylated; where A' is a quinoline residue and the linking is to be at γ , a γ -unsubstituted quinoline may be used. 128 curves showing a complete range of sensitising effects are given. Examples include dyes from: 1-methylthiolbenzthiazole ethiodide (A') and 2-diphenylaminothiazol-4-one, or 1:3-diphenyl-2-thiohydantoin, or 2-thio-3-ethyl-2:3:4:5-tetrahydro-oxazole-2:4-dione; 2-phenylthiolquinoline ethiodide and 2-thio-3-ethyloxazole-2:4-dione, or 1-phenyl-3-ethyl-2-thiohydantoin, or 3-phenylrhodanine; 1-methylthiolbenzoxazole ethiodide and 3-ethylrhodanine, or 5-(1'-ethyl-2'-quinolydene)-2:4:6-triketohexahydropyridine; 1- β -acetanilidovinylbenzoxazole ethiodide and hydantoin, or barbituric acid, or 2-thio-oxazole-2:4-dione, or 3-allylrhodanine, or phenylmethylisothiohydantoin; 2-iodoquinoline ethiodide or quinoline ethiodide and rhodanine; 2- β -anilino-vinylquinoline ethiodide and diphenylisothiohydantoin; 1- ω -acetanilido- Δ^{γ} -butadienylbenzthiazole ethiodide and 3-phenyl-2-thiohydantoin, or 2-diphenylaminothiazol-4-one. 1-Phenyl-3-ethyl-2-thiohydantoin, m.p. 125.5—128.5°, 3-phenyl-4-thiorhodanine, m.p. 114—116° (decomp.), and 3- β -hydroxyethylrhodanine, m.p. 123.5—125.5° (decomp.), are described. [Stat. ref.]

C. H.

XXII.—EXPLOSIVES; MATCHES.

Laws of combustion of colloidal powders. H. MURAOUR and G. AUNIS (Compt. rend., 1936, **203**, 177—

179).—During the combustion in a closed vessel of an explosive of which the geometrical form ensures burning at a const. emission surface, the rate of increase of pressure, except at the beginning, is always \propto the pressure.

J. G. A. G.

Errata.—B., 1936, p. 732, col. 2, line 23 from bottom, for " Na_2CO_3 " read " Na_2SO_3 ," p. 764, col. 2, line 22, for "DEMOUGIN" read "DÉMOUGIN."

Electrical installations.—See XI. **Heat development from nitrocellulose dissolution.**—See XIII.

PATENTS.

Initiator [blasting cap]. E. T. LEDNUM, Assr. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 2,024,586, 17.12.35. Appl., 29.4.33).—A combination of a secondary detonating compound, a charge of PbN_3 , and a shell of Zn alloy containing Cu 1.5—4 and Ag 0.1—1% is claimed.

A. R. P.

Matches. R. RICHARDSON (B.P. 451,964, 25.2.35).—An unignitable protective composition of $KClO_3$, S, powdered glass, kieselguhr, glue, gum, and (optionally) $K_2Cr_2O_7$ is applied to the head; the main part is composed of glue, P_2S_5 , ZnO, $CaSO_4 \cdot \frac{1}{2}H_2O$, powdered glass and asbestos, and $KClO_3$.

B. M. V.

Blasting explosive devices. J. TAYLOR, W. YOUNG, and IMPERIAL CHEM. INDUSTRIES, LTD. (B.P. 436,860, 20.4.34).

XXIII.—SANITATION; WATER PURIFICATION.

Hydrogen sulphide as a mining hazard. B. SEGAL (J. Chem. Met. Soc. S. Africa, 1936, **36**, 366—377).—The distribution of H_2S between H_2O and air is studied in relation to the possibility of toxic concns. of the gas occurring in mines.

H. D.

Effect of humidity on toxicity of hydrogen sulphide gas. B. SEGAL and M. M. SUZMAN (J. Chem. Met. Soc. S. Africa, 1936, **36**, 378—384).—Guinea-pigs succumbed to inhalation of H_2S more rapidly in a humid atm. than in a dry one; with rats no significant difference was observed.

H. D.

Determining dusts or gaseous impurities in air or in moving gases. A. GILLET and E. LECLERO (Rev. univ. Min. Met., 1936, **12**, 137—144).—An apparatus for collecting dust, comprising vaseline-coated, hollow steel spheres fixed on supports, is described. Pollution of the atm. by such gases as SO_2 may be estimated by covering the spheres with an alkaline substance. The results of an investigation of the purity of air at the city of Liège are discussed.

R. B. C.

Fibres for gas-mask filters; their mode of action and possibilities of improvement. A. KAUFMANN (Z. Ver. deut. Ing., 1936, **80**, 593—599).—A discussion.

R. B. C.

Industrial poisoning by [various] chemical substances. F. KOELSCH (Chem. Fabr., 1936, **9**, 421—429).—A survey is made of types of chronic poisoning and industrial diseases from the medical viewpoint. To avoid dermatitis, washing with soap and H_2O before work should be restricted as liberated alkali destroys

the natural protection of the skin fat. A fatty acid condensation product, "Precutan," is recommended as a soap substitute and vaseline or paraffin as protective coating. Bleaching powder is liable to cause eczema and should be used only, with special precautions, to remove dye stains from the hands. In addition to the better-known industrial poisons, Zn stearate, H_2Se , and F_2 are discussed, together with the principally used org. solvents. C. I.

Construction of water filters. A. KOLIBAY (Gas- u. Wasserfach, 1936, 79, 624—625).—In a rapid H_2O filter bed which is periodically cleaned by reversing the flow, if the sand rests on fine gravel and the latter on coarse gravel the upper two layers become intermixed by the washing. It is better to place at the base of the sand a layer of coarse gravel the interspaces of which become filled with sand, and below this the fine gravel. C. I.

Cleaning of water mains with acid and dangers to health involved. E. NAUMANN (Gas- u. Wasserfach, 1936, 79, 623—624).—HCl is frequently used for the cleaning of rising mains in wells and of filters. If damage to the pipe is to be avoided the concn. should be $> 1\%$ and a protective colloid should be present. Apart from this, fatalities have occurred, especially in wells, in consequence of the gases liberated. The HCl should be free from As, but in any case liberation of CO_2 and H_2S may be expected. Men engaged should use a distance breathing apparatus and a safety belt. C. I.

Effect of cleaning mains on the water supply of Breslau. W. AUSTEN (Gas- u. Wasserfach, 1936, 79, 617—618).—This H_2O is a mixture of two supplies, one containing $Fe(HCO_3)_2$ and the other org. matter. From the mixture Fe is not readily pptd. by $Ca(OH)_2$ unless there is a considerable excess of $Fe(HCO_3)_2$ over Fe in org. combination. Pipes containing scale of Fe_2O_3 prematurely pptd. this Fe and resulted in bad working of the purification plant. Cleaning remedied this and the substitution of rotary pumps for ram pumps (which introduce air) would give a further improvement. C. I.

Fluorides in the natural waters of Rhode Island. W. G. PARKS, M. ROBINSON, and M. LAW (J. Amer. Water Works Assoc., 1936, 28, 1064—1067).—The natural H_2O of this state contains < 0.25 p.p.m. of fluorides. Since amounts < 1.0 p.p.m. are not considered to cause mottled tooth-enamel, treatment would appear unnecessary. C. J.

Water-quality deterioration in distribution systems. N. J. HOWARD (J. Amer. Water Works Assoc., 1936, 28, 1044—1050).—Deterioration in the quality of H_2O between the filtration plant and the consumer may be due to errors at the plant, e.g., excess of coagulant and subsequent pptn., or to incorrect pH val., faulty mains and services, insufficient flushing of mains and dead ends, or to cross-connexions between foul and drinking- H_2O pipes. C. J.

Recent advances in the control of chlorination [of water]. C. R. COX (J. Amer. Water Works Assoc., 1936, 28, 1090—1096).—The weaknesses of the o-tolidine test and factors affecting the result are discussed. A

neutral starch-iodide test is described which should be used when nitrites give difficulty. C. J.

Disposal of dairy waste waters. G. W. CAVANAUGH (Canad. Dairy & Ice Cream J., 1936, No. 9, 28, 45).—Pptn. of milk-proteins, fat, and bacteria with $Fe(OH)_2$ and $Fe(OH)_3$ is recommended as a first step. One lb. of a mixture of $Fe_2(SO_4)_3$ (4 pts.) and ground $CaCO_3$ (3 pts.) per 1000 gals. of waste is sufficient. The sludge is of val. as a fertiliser. W. L. D.

S in rain H_2O .—See XVI.

PATENTS.

Means for cleansing the skin. R. WILLE (U.S.P. 1,993,469, 5.3.35. Appl., 23.1.33. Ger., 5.1.31).—Oil and grease are removed from the hands by a leather felt impregnated with a mixture of $COMe_2$ 25 and 5% aq. soft soap 75%, or of soap in 10% aq. EtOH; the pad is stored in an airtight container. L. C. M.

Deodorant. M. CLINE, Assr. to INTERNAT. PAPER Co. (U.S.P. 2,024,145, 17.12.35. Appl., 28.4.31).—A spray liquid comprising a solution of $Zn(SPh)_2$ in aq. starch containing glycerin is claimed. A. R. P.

Manufacture of mineral water and the like. O. A. ELIAS (B.P. 451,354, 4.2.35).— CO_2 is bubbled at 30—50 lb. per sq. in. through H_2O , sea- H_2O or brine among gravel, steam-washed coke, granulated coke, and monazite, with, if desired, U ore. The liquid and gas are marketed together. B. M. V.

Rendering water practically free from gases, alkalis, acids, and organic and inorganic admixtures. K. GLÄSSNER and E. KLAUSNER (B.P. 448,118, 30.11.34).—The H_2O is subjected to electrodialysis, then distilled under low pressure at 50—60°, and finally irradiated with ultra-violet light. A. R. P.

Combustion of refuse and similar fuels of low calorific value. WOODALL-DUCKHAM (1920), LTD., and J. W. REBER (B.P. 451,617, 22.3.35).—Combustion is effected entirely on one grate and the temp. near the grate-bars is kept down by the return of a proportion of waste gases after cooling (e.g., in a boiler) to about 300°; they contain < 10 vol.-% of H_2O and $< 5\%$ of CO_2 , part being delivered over the fire and part under the grate with air. B. M. V.

Garbage, ashes, and refuse disposal and land reclamation. L. M. MCCARTHY (U.S.P. 2,017,417, 15.10.35. Appl., 6.11.33).—The waste material is buried in a series of parallel trenches, the soil excavated from one trench being used to cover the refuse placed in the preceding one. C. J.

Bacterial analysis of gaseous bodies. W. F. WELLS (U.S.P. 2,017,483, 15.10.35. Appl., 22.10.32).—The inside surface of a tube is coated with a film of culture medium and the bacteria present in a known vol. of air or other gas are deposited thereon by centrifugal means. C. J.

Dust filter against poisonous dusts. B. CORI (B.P. 452,112, 12.2.35. Ger., 13.2.34).

Non-caking metaphosphate. Base-exchange material. O_2 [for respirators].—See VII. Products from nutshell liquid.—See XIII.