

BRITISH CHEMICAL ABSTRACTS

B.—APPLIED CHEMISTRY

MAR. 30 and APRIL 6, 1934.*

I.—GENERAL; PLANT; MACHINERY.

Combustion control systems. Development of automatic combustion-control systems for industrial and power-station boilers. J. L. HODGSON and L. L. ROBINSON (Engineering, 1934, 137, 134—136, 162—164).—The characteristics of controllers in relation to stability are discussed. Advantages of automatic combustion control are enumerated and different systems are described. D. K. M.

Effect of water and steam on the fabric of steam boilers. W. CHRISTMANN (Stahl u. Eisen, 1933, 53, 1353—1357).—Under modern high-temp. conditions corrosion can be avoided only by maintaining the feed-H₂O at \leq 400 mg. per litre NaOH content, or at 20 mg. per litre P₂O₅ content and 100—400 mg. NaOH. The practical upper limit of the use of Na₂CO₃ to prevent the formation of CaSO₄ scale is a pressure of 15 kg. per sq. cm. Phosphate can be used at higher pressures, but some CaSO₄ scale is usually found in parts at the highest temp. Instances are recorded of liberation of H₂S by reduction of such scale *in situ*, with consequent corrosion. The use of special alloy steels for boiler construction is discussed. C. I.

High-temperature steam experience at Detroit. P. W. THOMPSON and R. M. VAN DUZER, JUN. (Engineering, 1933, 136, 661—663, 673—675).—For several years steam at 400 lb. per sq. in. superheated to 550—600° has been used for driving turbines at this plant. Parts in contact with steam at $>$ 430° were built of an alloy composed of Cr 17—20, Ni 7—10, Si $>$ 0.5, C 0.05%. This has given good results with only slight carbide segregation. A no. of test-pieces of other alloys of lower Cr content were included. Examination has shown that a steel containing Cr 4—6, W 1% does not suffer embrittlement at this temp., neither does a similar alloy containing 0.5% Mo, of which the turbine blades were built. "Nitalloy" is unsuitable for high-temp. work. For bolts best results were given by a steel containing Cr 1.25, W 2.0, V 0.25, C 0.45%. Many difficulties with joints were encountered, the best service being given by reinforced welded joints. Generally, the use of steam at 550° is quite practicable, but, at present, uneconomical owing to the high cost of the structural materials required. C. I.

Calculation of bubble towers. S. N. OBYADCHIKOV (Nef. Choz., 1933, 24, 129—131).—A new method of calculating the dimensions shows the change in composition at each plate. CH. ABS.

Application of equilibrium curves in the calculation of bubble towers in the distillation of petroleum. V. A. PETERS and S. N. OBYADCHIKOV (Nef. Choz., 1933, 24, 50—55).

Pressure in tube stills. A. I. SKOBLO (Nef. Choz. 1933, 24, 241—244).—Calculation of the fall in pressure is discussed. CH. ABS.

Performance tests of some laboratory emulsifiers. R. I. JOHNSON and J. F. MORSE (Food, 1934, 3, 173—175).—Five commercial emulsifiers (described) were compared at 20°, using a whisked salad cream containing 45 vol.-% of oil with egg yolk as emulsifier and gum tragon as stabiliser. An optimum mixture exists for each machine, the size of the largest globules being reduced from 45 to 12—35 μ . Data and photomicrographs are given. J. G.

Combined vacuum and pressure gauge. N. DEERR (Internat. Sugar J., 1934, 36, 23).—A mercurial gauge is described, which may be used to register vac. up to 16 in. Hg and abs. pressures up to the same limit. It is especially suitable for use with evaporators and vac. pans. J. P. O.

Automatic densimeter (I), automatic gas analyser (II), and universal apparatus for studying the permeability of solid bodies (III). P. WALTER (Bull. Soc. d'Encour., 1934, 133, 31—44).—(I) is a hydrostatic balance with counterpoise. Determination of d may be made in a few sec. and the vol. read off directly on a dial. In (II) the gases pass through chambers into which the pulverised absorbing liquid is injected. Absorption of the gas is rapid and complete. The condensed liquid is run off and the amount of gas absorbed in it determined by the change in electrical conductivity. In (III) pressure is applied to the gas or liquid on one side of a membrane of the material to be studied, and the amount passing through is registered on the other, or may be simply observed. Measurements may be made at different temp. Data are given showing the permeability of leather and rubber to different gases, the effect of ageing, the effect of the S content on the permeability of rubber, and some other measurements. M. S. B.

Organic constituents of [German] bleaching earths. O. ECKART (Allgem. Oel- u. Fett-Ztg., 1934, 31, 9—10).—The org. matter present in 3 samples of German earths (as determined by digesting with aq. NH₃ and titrating with KMnO₄) was equiv. to only 0.0128—0.0272% (as humic acid), and can, therefore, have no appreciable effect on the bleaching action. E. L.

Cooling of solutions by air. T. KUCZYŃSKI and W. OLPÍŃSKI (Przemysł Chem., 1934, 18, 16—22).—The rate of cooling of aq. solutions through which air is passed is a function of the temp. and v.p. of the solution, and of the temp. and R.H. of the air, and, up to a certain limit, of the rate of flow of the air. R. T.

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

Problems of large-scale hydrogenation. C. BOSCH (Chem. Fabr., 1934, 7, 1—10).—The 3 hydrogenation processes, (1) of N_2 to NH_3 , (2) of CO to MeOH and its homologues, (3) of coal, petroleum, and tar to petrol, are compared in respect to H_2 requirements and the thermal balance. The function of the catalyst is not only to accelerate the desired reaction, but to control subsidiary reactions, especially in (2). Prep. of catalysts capable of handling on the large scale was one of the chief problems in development. The economical production of H_2 is of great importance, but the problem is not the same in the 3 cases. Electrolysis is possible for (1) where H_2O power is very cheap. The water-gas process used for all three processes in Germany has disadvantages in (2) owing to the dilution with N_2 during the "blow" period. Trials are now being made with the Fränk-Linde O_2 apparatus, which allows a water-gas plant to run continuously. The use of O_2 has also solved the problem of producing water-gas from lignite, the Winkler generator being used. One having a capacity of 75,000 cu. m. of gas per hr. is installed at Leuna. The hydrogenation of waste gases from (3) is now accomplished by the action of steam at 800° with reduced Ni as catalyst, the gases being previously freed from S. The sensitiveness of the catalysts in the 3 main processes to poisoning is in the order (1), (2), (3). In (3) S is innocuous and CO causes only increased H_2 consumption. Activated C is suitable only for the purification of gases relatively low in S. For lignite water-gas a wet-purification process is used. Energy and raw-material requirements of the processes are tabulated. The catalyst now used in (1) is pure Fe activated with alkali and Al_2O_3 , in (2) ZnO activated with CrO_3 , and in (3) the basic elements are Fe, W, and Mo, as sulphides. In (2), and especially (3), exact temp. control is necessary. A Cu-Mn alloy is employed which resists corrosion by H_2 and CO at high pressures. The Fe apparatus in (3) is coated with Zn by prolonged treatment with Zn vapour, which gives a "diffusion layer" of Zn-Fe mixed crystals. For higher temp. a Cr steel containing Mo, V, and W is used.

C. I.

Repair of chemical manufacturing plant by scientific welding. C. W. BRETT (Chem. & Ind., 1934, 123—125).—Applications of welding for the repair of plant, including that made of monel metal and Al, are discussed and illustrated. D. K. M.

Holley-Mott washery for petroleum products.—See II. **Filtration of sludges.**—See VII. **Soapstone bricks.**—See VIII. **Scale formation in evaporators.** **Drying starch.**—See XVII.

See also A., Feb., 159, **Sedimentation analysis.**

PATENTS.

[Regenerative] open-hearth furnace. W. C. FRANK and F. E. HOWELLS, Assr. to BETHLEHEM STEEL Co. (U.S.P. 1,911,495, 30.5.33. Appl., 8.4.31).—The air only is heated in 3-pass regenerators, the construction of which is described. B. M. V.

Kiln. H. M. ROBERTSON (U.S.P. 1,911,089, 23.5.33. Appl., 17.11.28).—In a tunnel kiln in which the goods do not come in contact with the heating gases (G), the G (or air being heated) are in longitudinal muffles in the

roof, walls, and that part of the bottom that is not occupied by the carriages. B. M. V.

Rotary kiln. A. B. ZAHN, Assr. to F. L. SMIDTH & Co. (U.S.P. 1,910,873, 23.5.33. Appl., 19.4.32).—A kiln having catenary chains at the feed end has the links deformed and provided with projections to increase their surface. B. M. V.

Rotary drying apparatus. F. A. JONES, Assr. to JONES & HARTMAN, INC. (U.S.P. 1,910,607, 23.5.33. Appl., 15.10.30).—Slurry (S) is dried on the outside of a rotary kiln in which it may afterwards be burned. Pockets are formed in the shell plates to cause S to adhere until intentionally removed. B. M. V.

Rotary drums for heating, drying, and the like. W. R. CHAPMAN (B.P. 404,632, 9.6.32).—The treating gases are admitted through a central conduit with a no. of distributed outlets and pass through the material (M) and then out through an inner lining of a drum formed of overlapping slats so that M cannot emerge with the gas. B. M. V.

[Rotary cylindrical] retorts or the like. F. LLOYD and H. LINDARS (B.P. 404,612, 10.6.32).—A method of making gastight joints to a hot, rotating cylinder is described. Tubes attached to the retort (R) extend a considerable distance from the end thereof, and the actual gastight, relatively moving parts are in a position where they can be kept cool or at a const. temp. An inner wall to R consists of sections, to permit expansion. B. M. V.

Pasteurisation of materials of a pasty consistency. RAW PRODUCTS, LTD., and B. DUTTWELER (B.P. 404,850, 9.5.33).—The apparatus comprises a jacketed tube within which is a rotating mandrel on which is a helical worm fitting truly to the tube. B. M. V.

Chemical heating composition. P. F. ZIEGLER and H. E. SIMMONS, Assrs. to KENDALL Co. (U.S.P. 1,910,874, 23.5.33. Appl., 19.9.30).—2—10 pts. of reactive metal (Fe) and 1 pt. of adsorptive accelerating agent are mixed and moistened with H_2O ; the size of the Fe particles determines the rate of evolution of heat. B. M. V.

Heat-insulating coverings for metal flues, smoke pipes, and the like. C. W. C. DAWE, and KITSON'S INSULATIONS, LTD. (B.P. 404,644, 14.5.32).—The actual insulation is sheet or plastic asbestos or the like, and it is spaced from the pipe, the air space preferably being ventilated. B. M. V.

Heat insulator. G. SLAYTER, Assr. to OWENS-ILLINOIS GLASS Co. (U.S.P. 1,912,017, 30.5.33. Appl., 23.9.31).—A foam of glass or slag is formed, the bloating gas being a substance, e.g., Hg or Zn, that will condense at room temp. and leave a vac. in the cells of the foam. B. M. V.

Heat insulation for apparatus working at very low temperatures. J. LE ROUGE, Assr. to L'AIR LIQUIDE SOC. ANON. POUR L'ÉTUDE ET L'EXPLOIT. DES PROC. G. CLAUDE (U.S.P. 1,910,024, 23.5.33. Appl., 30.6.31. Ger., 3.7.30).—Since insulation comprising porous material impregnated with subdivided bubbles of air is useless at temp. $<$ the b.p. of air, and H_2 is

conductive, insulation in two layers is provided, that nearest the cold being impregnated with H_2 or other gas that will not liquefy at the min. temp., and the outer layer impregnated with air. Gastight shells are provided where requisite.

B. M. V.

(A) **Refrigeration.** (B) **Detection of leaks in refrigerating systems.** H. M. WILLIAMS, Assr. to FRIGIDAIRE CORP. (U.S.P. 1,910,077 and 1,909,992, 23.5.33. Appl., [A] 30.6.27, [B] 31.1.30).—(A) The use of a mixture of an odoriferous (I) and an inodorous refrigerant (II) is claimed in which the proportion of (I) is insufficient to vary the v.-p. characteristics of (II), e.g., 9% of SO_2 in MeCl. In (B) approx. 6% of SO_2 in MeCl is claimed, and the escape of SO_2 is tested for by a detector, e.g., NH_3 .

B. M. V.

Non-corrosive anti-freeze liquid. R. J. KEEFER, Assr. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,911,195, 30.5.33. Appl., 15.11.30).—MeOH (15—100%) is mixed with 0.01—3.0% of borax.

B. M. V.

Pulveriser. W. M. HILL, Assr. to J. D. CANARY (U.S.P. 1,911,193, 30.5.33. Appl., 7.10.27).—A disintegrator comprises a no. of superposed discs increasing in diam. downwards, each disc having a ring of hammers and each stationary crushing ring being of smaller diam. than the path of the hammers next below.

B. M. V.

Hammer mill for grinding or pulverising varieties of materials. J. C. SAUNDERS, Assr. to GIANT HAMMER MILL Co. (U.S.P. 1,911,718, 30.5.33. Appl., 21.11.31).—A hammer head with curved teeth is described.

B. M. V.

Ore-reduction mill. J. W. HIGBY (U.S.P. 1,911,568, 30.5.33. Appl., 3.5.32).—Grinding is effected between material in a fixed bowl (B) and in a rotary pan forming the bottom of B. A supply of H_2O upward through the joint between the moving and fixed parts is provided.

B. M. V.

Muller. R. H. McELROY and P. A. MEEHAN, Assrs. to H. S. SIMPSON (U.S.P. 1,910,028, 23.5.33. Appl., 23.7.30).—A mill having a stationary pan and driven vertical mullers with offset axes is described.

B. M. V.

Mixing of materials. F. C. OVERBURY, Assr. to FLINTKOTE CORP. (U.S.P. 1,911,644, 30.5.33. Appl., 14.6.30).—An apparatus similar to that described in U.S.P. 1,789,320 (B., 1931, 867) is operated with a large circulating bulk of end-product (e.g., emulsion paint) to which the constituents are continuously added in separate zones, the final mixture being made in another zone whence a portion is withdrawn as required.

B. M. V.

Separation of component materials comprised in a mixture. BRIT. COTTON INDUSTRY RES. ASSOC., T. C. WILLIAMS, and S. A. SHORTER (B.P. 404,686, 12.7.32).—Mixed materials, e.g., cotton and trash, are subjected to pneumatic or other fluid separation, the fluid being always maintained in a state of stream-line flow.

B. M. V.

Treatment of adsorptive clay. R. B. LEBO, Assr. to STANDARD OIL DEVELOPMENT Co. (U.S.P. 1,911,830, 30.5.33. Appl., 31.5.30).—The clay is regenerated by burning at a moderate temp., cooling to

above the b.p. of H_2O and below the b.p. of lubricating oil, impregnating with a pale oil, and cooling for re-use.

B. M. V.

Separation of mixtures of substances only partly miscible. W. K. LEWIS, Assr. to STANDARD OIL DEVELOPMENT Co. (U.S.P. 1,911,832, 30.5.33. Appl., 25.4.29).—In, e.g., the separation of an alcohol (above C_3) and H_2O , two rectifying stills are fed with gravity-separated constituents, the underflow being the desired product and the condensate in each case being separated into two layers of which one is returned as reflux to the same still and the other layer added to the feed of the other still.

B. M. V.

Filter media. M. W. DUNDORE, Assr. to BELoit IRON WORKS (U.S.P. 1,910,758, 23.5.33. Appl., 7.3.29).—An inert mineral aggregate is impregnated with a heat-plastic rubber isomeride, preferably thinned by a solvent, and the moulded mass is heated, after local application of additional rubber if desired, to remove the solvent and cause hardening. The filter grains may, after use, be cleaned and rendered free-flowing by strong heating.

B. M. V.

Filter manufacture. C. S. KNIGHT, Assr. to I. A. CAMPBELL (U.S.P. 1,910,771, 23.5.33. Appl., 18.8.30).—A method of manufacturing a filter thimble comprising successive strata of coarse, long-fibred asbestos, fine asbestos, activated C, coarse asbestos, and fine asbestos is described.

B. M. V.

(A) **Continuous method of breaking, (B) apparatus for treating, emulsions.** G. H. MEINZER, Assr. to L. BLAKE-SMITH (U.S.P. 1,911,839—40, 30.5.33. Appl., 30.7.30).—The emulsion is agitated by air in presence of two dissimilar, comminuted, solid substances, each having an affinity for one of the constituents of the emulsion, e.g., oxide minerals for H_2O and sulphides for oil. A quiescent zone is baffled off in the agitator (A) containing a filter through which the mixed, but unemulsified, liquids are withdrawn to a settler, the solids being retained in A for continuous use.

B. M. V.

Treating boiler feed-water. S. B. APPLEBAUM, Assr. to PERMUTIT Co. (U.S.P. 1,910,979, 23.5.33. Appl., 14.3.31).—Zeolite-softened H_2O is treated with acid and the CO_2 partly removed by injection of air; de-aeration is effected by heat supplied in the later stages by admixture of blow-down H_2O from the boiler. The pH of the feed is < 9 , Na_2CO_3 being present, and SO_4^{--} may be previously introduced in the form of $Al_2(SO_4)_3$.

B. M. V.

Pressure-transmitting fluid. A. M. SIMPSON, Assr. to VAN KANNEL REVOLVING DOOR Co. (U.S.P. 1,912,314, 30.5.33. Appl., 14.11.31).—For door checks etc. a mixture of mineral oil and Hg in about equal vols. is used.

B. M. V.

Apparatus for carrying out gas reactions. RUHRCHEMIE A.-G. (B.P. 404,790, 10.11.32. Ger., 11.11.31).—Reactions are carried out at pressures which may differ widely from atm. and at temp. up to 1600° in a no. of parallel small tubes of impermeable ceramic material extending through a zone of external heating and a considerable distance beyond, the elastic connexions to headers etc. being at the ends, which are

kept cool by the interposition of cooling baths if necessary. The flow of heating gases may be reversed for regeneration, but the flow of reagents is const. Application to the conversion of CH_4 into benzol and of hydrocarbons into water-gas is claimed. B. M. V.

Effecting catalytic exothermic gas reactions. R. S. RICHARDSON, ASSR. to CHEM. ENG. CORP. (U.S.P. 1,910,365, 23.5.33. Appl., 24.7.31).—The gases are passed, in order: along the inside of the container surrounding the catalyst (*C*), in heat exchange with the products, outside *C*, through *C* but not in contact, in contact with *C*, in heat exchange as above. B. M. V.

Catalytic process. J. W. DAVIS, ASSR. to ATMOSPHERIC NITROGEN CORP. (U.S.P. 1,911,353, 30.5.33. Appl., 20.5.31).—The pressure of the gases is altered to readjust the temp. back to the optimum after change due to the heat of reaction. In, e.g., the synthesis of NH_3 , since the reaction causes a decrease in vol., the former may be controlled merely by varying the rate of addition of compressed feed gases to the circulating system. B. M. V.

Pyrometer and like tubes for protection against furnace gases. TELEGRAPH CONSTRUCTION & MAINTENANCE CO., LTD., WILD-BARFIELD ELECTRIC FURNACES, LTD., and J. P. D. COLEMAN (B.P. 404,670, 19.7.32).—A pyrometer protection tube is constructed of welded metallic strip with a deep fin along the line of the weld to prevent sagging. B. M. V.

Apparatus for washing and purifying gases. ATELIERS J. HANREZ SOC. ANON. (B.P. 404,696, 21.7.32. Belg., 31.5.32. Addn. to B.P. 384,535; B., 1933, 130).—Methods of irrigating the pillars of a Modave washer are described. (Cf. B.P. 380,746; B., 1932, 1062.) B. M. V.

Means for analysis of gases. LONDON POWER CO., LTD., R. L. REES, and W. L. RICHARDSON (B.P. 404,660, 13.6.32).—A single cycle of reciprocation of a body of rising and falling heavy liquid (Hg pump) is caused: to deliver a const. vol. of scrubbing liquid (*S*) to an absorption vessel (*A*); to measure a gas sample in a pipette and draw it through *A*; and to deliver *S* and another reagent (*R*) to a reaction vessel where, preferably, several tests are allowed to accumulate (with agitation) and eventually siphon over to an examination vessel (*E*) where the ppt. or change of colour may be measured visually or by a photo-electric device. Provision is also made for the alternate filling of *E* with a "blank." B. M. V.

Construction of thermal-conductivity cells. [Gas-analysis apparatus.] W. O. HEBLER and W. F. HAMILTON, ASSRS. to C. ENGELHARD, INC. (U.S.P. 1,918,702, 18.7.33. Appl., 2.2.31).—The apparatus consists of two parallel tubes in the shape of a \perp , the vertical portions of the tubes each containing an electric lamp bulb cemented in at the top and perforated at the bottom to allow the gases to circulate around the filaments (*F*). The horizontal portions of the tubes are connected with one another through a scrubber for removing the gas the content of which in the mixture is to be determined. *F* are connected to a Wheatstone bridge in the usual way. A. R. P.

Fire-extinguisher composition. C. A. THOMAS and C. A. HOCHWALT, ASSRS. to FYR-FYTER Co. (U.S.P. 1,910,653, 23.5.33. Appl., 6.8.27).—An aq. solution of K_2CO_3 is mixed with < 10% of a polyhydric alcohol, e.g., $\text{C}_2\text{H}_4(\text{OH})_2$ (I), to depress the f.p., and, if desired, with < 3% of $\text{Na}_2\text{Cr}_2\text{O}_7$ as anticorrosive. For transport (I) may be absorbed into the solid materials to form a dry powder.

Production of an inorganic lubricant. W. A. BOUGHTON (U.S.P. 1,917,089, 4.7.33. Appl., 28.6.30).—Claim is made for the use of non-deliquescent viscous fluids consisting of HPO_3 and H_3BO_3 or their salts. E.g., a solution of 100 g. of NaPO_3 and 20 g. of $\text{Na}_2\text{B}_4\text{O}_7$ is evaporated to 150 c.c., 10 c.c. of 85% H_3PO_4 are added, and the liquid is boiled until the b.p. reaches 108° .

A. R. P.
Power and gas.—See II. **Catalysts.**—See VII. **Drying ceramic materials.**—See VIII. **Caustic embrittlement [of boiler metal].**—See X. **Separator, and precipitator, for gases.**—See XI.

II.—FUEL; GAS; TAR; MINERAL OILS.

Yorkshire, Nottinghamshire, and Derbyshire coalfield. Nottinghamshire and Derbyshire area. Deep Hard seam. ANON. (Dept. Sci. Ind. Res., Fuel Res., Survey Paper No. 30, 1933, 77 pp.).—Nineteen pillar samples of the Deep Hard seam, taken at suitable points between Sheffield and Nottingham, have been examined. The seam varies in thickness from 2 ft. 3 in. to 5 ft. 6 in. The full section of the seam consists of bottom cannel, "bottom brights," "hards," "top brights," and top cannel; the cannel portions, however, are usually not mined. Analysis of the samples shows the following ranges of variation (in %): H_2O 2.3–10.9, ash 2.9–7.8 (average 5.3), volatile matter (dry, ash-free basis) 37.0–43.5, C (ditto) 79.88–83.85, H (ditto) 4.98–5.49, average S (dry basis) 0.83, P 0.007–0.086, Cl 0.18–0.64. The calorific val. rises from 14,250 B.Th.U./lb. in the south to 15,090 in the north. The ash has a relatively high fusion temp., that of half the samples being $> 1400^\circ$ in an oxidising atm. and $> 1300^\circ$ in a reducing atm. There is a gradual increase in the caking power from the south (caking index 2–4) to the north (caking index 10–16) of the coalfield. Other data relating to the properties of the samples are tabulated, and the uses of the coal (general steam-raising, household purposes, gas-making, etc.) are briefly discussed. A. B. M.

Banded constituents of coal. Inter-relationships deduced from analytical data. A. M. WANDLESS and J. C. MACRAE (Fuel, 1934, 13, 4–15).—Samples of dull coal from the Top Beeston seam (W. Yorks) have been found to contain varying proportions of two different constituents, which have been named "black" (I) and "grey" durain (II), respectively. (I) had a high volatile matter content ($> 50\%$), high H content (5.9–6.7%), and low *d* (< 1.24); (II) had a volatile matter content of 35%, H 4.6–5.0%, and *d* > 1.31 (all figures refer to the dry, ash-free basis). (I) formed an ill-defined core in a matrix of (II). Microscopical examination of thin sections showed (I) to have a high spore content (which may account for its high H and volatile matter

contents), the residue consisting of small fragments of vitrain (*V*) with very little fusain (*F*). The spore content of (II) was low, the bulk of the material consisting of *F* fragments and particles in transition between *V* and *F*. (I) was not canneloid. *V* from the same seam was very const. in composition, but the clarain (*C*) showed wide variations. It is suggested that *V* is a fundamental material and that *C* consisted of a varying mixture of *V* with (I). (I) is regarded as approaching a fundamental material of volatile matter content 60% and H 7%. The *d* of the various banded ingredients of the seam was a nearly linear function of the H content. A. B. M.

Constitution of coal. Significance of the problem, and methods of research. L. CRUSSARD (Fuel, 1934, 13, 16—22).—The results of the fractionation of coal by means of solvents are discussed from the viewpoint of colloid chemistry. The results of the oxidation of coal to the "precombustion" stage, *i.e.*, to $H_2C_2O_4$, benzenecarboxylic acids, etc., indicates that the C of coal is approx. 55% aromatic and 45% aliphatic in structural arrangement. The colloid character of the ulmic substances produced by mild oxidation is discussed, attention being directed to the apparent impossibility of controlling the oxidation sufficiently to stop the process between the ulmic and the precombustion stages. The results of the thermal decomp. of coal, in particular those obtained by X-ray examination of the material at different stages of the process, indicate the existence in the coal structure of parts thermally fragile and others much more resistant, without any intermediate fraction. The significance of these results is discussed. A. B. M.

Classification of bituminous coals and the rank ("Inkohlungsgrad") of the humin constituents. D. J. W. KREULEN (Brennstoff-Chem., 1934, 15, 11—12).—Classification of bituminous coals on the basis of their volatile matter content is unsatisfactory, and a method based on their reactivity towards O_2 (measured under specified conditions) is suggested. For this purpose the "humic acid factor" is used; this is defined as the product of the reaction velocity at 240° and the temp. coeff. of the reaction in the region of the max. rate of humic acid formation. Examination of a large no. of coals has shown that a close correlation exists between the humic acid factor and the coking properties, combined H_2O , calorific val., yield of low-temp. tar, and ultimate analysis of the coals. A. B. M.

Concentration of coal of the Kiselov district, Ural. P. I. YARUTIN (Gorny Zhur., 1931, 14, No. 12, 3—12).—By use of aq. $ZnCl_2$ the coal (ash 10—34, S 4—8%) affords 3 fractions: (a) (40—60%) contains ash 7.5—10, S 0.25—0.8%; (b) (20—40%) contains ash 20—40% and the same pyrite-S content (2.5—4.5%) as the raw coal; and (c) is high in ash and S.

CH. ABS.

Occurrence of sulphur in some of the Tertiary coals of India. I. N. N. CHATTERJEE (J. Dept. Sci. Calcutta Univ., 1933, 10, 9 pp.).—Palana lignite, and Makerwal, Mach, Dandot, Jammu anthracite, and Jammu impure coals have been tested. The samples contained total S 1.00—9.08, fixed S 0.61—4.77, volatile S 0.39—4.31, non-combustible S 0.03—0.61, combustible

S 0.49—8.91, pyritic S 0.04—5.46, SO_4 -S 0.03—1.60, and org. S 0.80—3.41%. CH. ABS.

Determination of phosphorus in coal and coke. L. ANTOCHINA, N. E. PESTOVI, and F. V. SHARGORODSKAYA (Zavodskaya Lab., 1933, No. 3, 11—17).—Vals. for various Russian coals and cokes are given. CH. ABS.

Swelling of coal during determination of volatile matter. D. J. W. KREULEN (Chem. Weekblad, 1933, 30, 770—771).—The degree to which the surface of the coal is shaken down in the crucible prior to the determination greatly influences the form of the resulting coke. Excessive consolidation may lead to explosion of the sample, owing to the formation of a hard crust soon after heating commences. H. F. G.

Colloidal solution of coal. J. M. PERTIERRA (Fuel, 1934, 13, 23—26).—By repeated treatment of dry coal with C_5H_5N at 200° in a sealed tube 39.6% was dissolved; with NH_2Ph under similar conditions 72.7% of the coal was obtained in colloidal solution in the solvent. The variation of viscosity with temp. of colloidal solutions of coal in anthracene oil and in C_5H_5N indicated that in the former the particles were in the form of micelles which diminished in size with rising temp., whereas in the latter the particles existed as large mols. which were resistant to changes in temp. On extraction of a coal with $PhOH$, cresol, and α - $C_{10}H_7$ -OH, in sealed tubes at 250° for 1 hr., the proportions dissolved were 34.8, 40.7, and 52%, respectively. Extraction with a fraction of a low-temp. tar (b.p. 250—300°) by refluxing in an inert atm. dissolved up to 17.4% of the coal. On heating the coal with the tar fraction or with anthracene oil to 400° with H_2 under an initial pressure of 100 atm. the proportion of coal dispersed reached 87 and 94.7%, respectively. The greater part of the inorg. constituents was segregated in the residue and could be separated by filtration. By the hydrogenation of these solutions at 400—430°/200 atm. in presence of a MoO_3 catalyst all the colloiddally dissolved org. material was converted into oil. A. B. M.

Relative electrical conductivity of coal as a measure of coking properties. K. Y. KING and K. PING (J. Chinese Chem. Soc., 1933, 1, 208—218).—The formation of graphite during the carbonisation of coal causes the electrical conductivity (I) to increase greatly. (I) and coking properties are roughly parallel, depending on the mode of binding of the particles.

E. S. H.

Carbonisation in semi-intermittent vertical retorts. E. L. WALLIS (Gas World, 1934, 100, 139—141).—The system comprises a vertical retort superimposed over a cooling chamber which is divided into two compartments. The lower constitutes the coke-discharging chamber, whilst the upper is always filled with hot coke, so that continuous steaming for the production of water-gas may take place. Lower throughputs are obtained than with continuous vertical retorts, but an average thermal yield of 89.7 therms, per ton of coal, of gas of 450 B.Th.U. per cu. ft. can be obtained at a carbonising temp. of 1350°. The coke has a better grading and shatter test and gives a hotter fire when used in boilers, but takes longer to ignite. R. N. B.

Carbonisation of bituminous coal in the laboratory and in large-scale operation. F. SLADEK (Brennstoff-Chem., 1934, 15, 1—4; cf. Seelkopf, Glückauf, 1930, 66, 989).—A laboratory carbonisation assay apparatus has been designed in which a tube (20 mm. internal diam.) packed with the coal to a length equal to half the width of the coke oven is gradually introduced into an electrically-heated furnace at a rate corresponding approx. to the rate of heat transfer in the oven. Two coals were investigated. By suitable choice of furnace temp. (900°) the yields of coke, tar, NH₃, benzol, and gas obtained in the laboratory agreed with those obtained in the full-scale oven. A. B. M.

Reactivity of almost ash-free coke. B. NEUMANN and A. VAN AHLEN (Brennstoff-Chem., 1934, 15, 5—10).—A sample of coal, the ash in which had been reduced to 0.78% by a float-and-sink method, was carbonised in an electrically-heated Fe retort of 6 in. diam., and the reactivity of each sample of coke so obtained was determined by passing air through a column (180 mm. high, 18 mm. diam.) of the coke (1.2—1.6 mm. size) heated to the desired temp., the reactivity (*R*) being given by $100(\text{CO})/[(\text{CO}) + 2(\text{CO}_2)]$, where (CO) and (CO₂) are the % of those gases in the efflux gas. The *R* vals. of the cokes prepared at 500° and 600° were high (44—48) at 200°, but fell rapidly with rising temp., passed through a min., and again rose. The high *R* at low temp. is attributed either to further evolution of gas from the coke or to the presence therein of a highly active form of C or of a combustible hydrocarbon. The *R* vals. of the cokes produced at 700—900° rose from 3—5 at 500—600° to about 56 at 1000°; at this temp. all the cokes possessed the same *R*. The *R* vals. at const. reaction temp. (< 1000°) fell with rising temp. of carbonisation. It is concluded that *R* is mainly determined by the size and orientation of the graphite crystals formed. A. B. M.

Gas producers and their application. G. NEKRASOV (Lesokhim. Prom., 1932, 1, No. 1—2, 29—32).—The products of carbonisation of wood in an Izhevski retort are described. CH. ABS.

Influence of sodium carbonate on the producer-gas reaction. C. B. WEISS and A. H. WHITE (Ind. Eng. Chem., 1934, 26, 83—87).—The reaction $\text{Na}_2\text{CO}_3 + 2\text{C} = 2\text{Na} + 3\text{CO}$ is rapidly and completely reversed at 750—900°. When dry air at 900° was passed over Acheson graphite with a contact time of 2 sec. the CO in the exit gas was increased from 6.6 to 33.4% by the addition of < 0.1% of Na₂CO₃ (I) to the graphite; moist air behaves similarly. The (I) is decomposed in the lower (hot) part of the producer and regenerated in the upper part, and its presence greatly lowers the temp. at which satisfactory producer gas can be made. A. G.

Production of carburetted water-gas in [chamber] ovens. SCHUMACHER (Gas- u. Wasserfach, 1934, 77, 65—70).—Carburetted water-gas may be produced by introduction of tar or oil mixed with steam on to the top of the charge during the last few hr. of carbonisation. The relative position of the oil sprays and off-take pipes is discussed in relation to the use of the process in vertical, inclined, and horizontal chamber

ovens. Details of analyses and calorific val. of the gas produced when using gas oil or tar from brown and bituminous coals in each type of oven are given. R. N. B.

Fused cobalt oxide as a water-gas catalyst. E. C. WHITE and J. F. SCHULTZ (Ind. Eng. Chem., 1934, 26, 95—97).—Cobalt oxide fused and then reduced in H₂ produces equilibrium in water-gas at 283° and a space velocity of 1800 vols. of gas per vol. of catalyst per hr. The production of CH₄ is decreased by the addition of Fe (3%) or Cu (38%), but is promoted by Cr₂O₃. A. G.

Analysis of coke-oven gases. P. K. S. SAKMIN (Z. anal. Chem., 1934, 96, 104—108).—Analysis with the Bunte burette for CO₂, olefines, O₂ (by Na₂S₂O₄), and CO is recommended. H₂S may be absorbed in I-KI before absorption of CO₂. H₂ in the residue is burned over CuO at 300°, CH₄ and C₂H₆ subsequently at 800°, permitting both hydrocarbons to be determined. J. S. A.

Combustion characteristics of gas low in carbon monoxide. D. WITT (Gas- u. Wasserfach, 1934, 77, 97—102).—The effect on calorific val., *d*, velocity of flame propagation, and amount of primary air necessary for combustion (as expressed by the Otto and Wobbe nos.) of the addition of CO-free gas to coal gas is discussed. These properties together with gas analyses are tabulated in detail for various mixtures of coal, producer, flue, and CO-free gases. R. N. B.

Removal of carbon dioxide from gas. W. WILSON (Gas World, 1934, 100, 105).—CO₂ can be removed by the NH₃ present in the gas to form NH₄HCO₃. This dissociates at 57° to give (NH₄)₂CO₃ and CO₂, the former being used again to extract more CO₂. The effect of this removal on the *d*, calorific val., and flame temp. of the gas is discussed. The CO₂ removed may be passed through vertical retorts instead of steam to produce CO, or compressed for use as a refrigerant. R. N. B.

Gas services and their protection from corrosion. K. L. CLARK (Gas J., 1934, 205, 256—259).—The relative cost and resistance to corrosion of wrought Fe, steel, Cu, and asbestos-cement pipes are discussed. Internal corrosion of pipes conveying dry gas may be prevented by painting them with a substance of the linseed oil type. External corrosion by H₂O and stray electric currents is delayed by a wrapping of hessian mixed with pitch or bitumen. Pipe joints should be covered with a plastic bandage. R. N. B.

Chemical composition of pitch distillate. II. The highly viscous oils. C. ZERBE and F. ECKERT (Brennstoff-Chem., 1934, 15, 28—31; cf. B., 1933, 210).—By repeated fractionation *in vacuo* of the liquid products from the initial fractionation of a pitch distillate, or by conversion of these products into picrates, it has been shown that these viscous liquids are mixtures of a no. of the solid compounds previously identified in the pitch distillate (*loc. cit.*) together with some resinous compounds, and therefore differ essentially from petroleum lubricating oils. The η and setting points of some of these mixtures have been determined. A. B. M.

Oil deposits on the western shore of the Kamchatka peninsula. D. F. DYAKOV (*Neft. Choz.*, 1933, 24, 15—21).—Small quantities of high-grade oil (characteristics recorded) were found. CH. ABS.

Crude oil from well No. 8 from the Molgabekski district and heavy crude oil from the Terski district. N. BUTORIN, P. LISITZIN, and A. VORONOV (*Grozn. Neft.*, 1933, 3, Nos. 3—4, 31—37).—Characteristics are recorded. CH. ABS.

Koschaguil oil deposit, Emba district. P. Y. AVROV (*Neft. Choz.*, 1933, 24, 213—215).—Characteristic vals. are given. CH. ABS.

Results of prospective drilling of Sredazneft. N. T. LINDTROP (*Neft. Choz.*, 1933, 24, 317—320).—Characteristics of oil from Korganovich (Fergana) are recorded. CH. ABS.

Natural gas from Russian [oil]-fields. S. S. NAMETKIN, A. S. ZABRODINA, A. S. KARKONAS, D. N. KURSANOV, V. A. SOKOLOV, and S. P. USPENSKI (*Rep. Govt. Petroleum Res. Inst.*, Moscow, 1932, 124—137).—Analytical procedure is described, and vals. for many sources are recorded. CH. ABS.

Nitrogen in natural gas and the evaluation of gases. Z. WILK (*Przemysl Naft.*, 1933, 8, 343—348).—The calorific val. of Polish natural gas varies from 3000 to 20,000 g.-cal. per cu. m. CH. ABS.

Cracking of the condensate from the Winkler-Koch cracking unit and of distillates from the cracked residue. B. K. TARASOV (*Neft. Choz.*, 1933, 24, 244—250).

Equilibrium curves in fractionating crude oil. S. N. OBRYADCHIKOV (*Neft. Choz.*, 1933, 24, 45—50).—Results obtained by experimental distillation are compared with calc. equilibria. CH. ABS.

Curves for a single evaporation of a petroleum fraction. S. N. OBRYADCHIKOV (*Neft. Choz.*, 1933, 24, 296—299).

Phase equilibria in hydrocarbon systems. I. Methods and apparatus. B. H. SAGE and W. N. LACEY (*Ind. Eng. Chem.*, 1934, 26, 103—106).—Details are given of apparatus designed for measuring equilibria between systems composed of natural oils and gases under conditions (20—100°/1—100 atm.) similar to those in underground petroleum reservoirs. The apparatus includes means for determining dew points, and the density and vol. of liquid and gaseous phases. A. G.

Evaluation of gas oils for carburation. F. SCHUSTER (*Gas- u. Wasserfach*, 1934, 77, 72—75).—A review of previous work on the relation of the chemical constitution of the oils to their ease of cracking and gas-making properties. R. N. B.

Field of application and flexibility of the Edel-eanu process. O. P. COTTRELL (*Petroleum*, 1934, 30, No. 2, 2—4).—The advantages of refining oils by extraction with liquid SO₂ are discussed. The range of application of the process has been extended by the use of mixtures of C₆H₆ and liquid SO₂ as extraction solvents; the method has proved to be particularly useful in the treatment of lubricating oils to obtain products of high viscosity index. A. B. M.

Purification of aromatic [petroleum] fractions. S. A. ZADOLIN and N. A. BUTKOV (*Neft. Choz.*, 1933, 24, 34—44).—Purification with ZnCl₂ under pressure is advantageous owing to the polymerising effect of pressure on the unsaturated compounds, which are therefore easily separated. H₂SO₄ treatment with injectors gave promising results. CH. ABS.

Influence of air humidity on consumption of reagents in refining kerosene. I. M. ANOSOV and Y. A. PARTNOV (*Neft. Choz.*, 1933, 24, 55—57).—By drying the air about 40% of acid and 15% of NaOH can be saved. CH. ABS.

Sludge-conversion process improves [petroleum] refinery acid recovery. F. J. BARTHOLOMEW (*Chem. Met. Eng.*, 1933, 40, 642—645).—The acid (H₂SO₄) sludge is fed into the cooler end of a rotating horizontal (slight slope) cylindrical kiln through which pass hot combustion gases which enter at 1370°. Coke (volatile matter 48—50%, calorific val. 11,000 B.Th.U. per lb.) is discharged at the hot end at 260°. The gas from the kiln (15—20% SO₂, 120—150°) is cooled and washed with H₂O, the condensed oil vapours being separated and the cooling-H₂O cooled and re-used. A secondary furnace may be necessary to consume any oil vapours not condensed. The cooled gas is dried with H₂SO₄ and, after mixing with air (to give mixed gas containing SO₂ 8, O₂ 11, CO₂ 4, N₂ 77%), is converted into H₂SO₄ or oleum by the contact process. The economics of the process are outlined. By burning waste H₂S from the refinery, or additional S, the heat for decomposing the sludge may be obtained and the refinery requirements of H₂SO₄ and oleum met. D. K. M.

Holley-Mott continuous countercurrent washery as applied to petroleum products. E. THORNTON (*J. Inst. Petroleum Tech.*, 1933, 19, 957—964).—The plant (cf. B.P. 321,200; B., 1930, 40) consists of a no. of pairs of vessels, one a mixer (I) and the other a separator (II). (I) and (II) are connected by three horizontal pipe-lines at different levels. Agitation of the contents of (I) causes a double circulation of liquid between (I) and (II). The quantities of chemicals used are measured by an orifice-meter, except in the case of acid, which is best measured by "dip" in an overhead tank. Output is regulated by a weir. Small quantities of chemicals, e.g., oleum, are introduced by first mixing with spent tar. In the treatment of kerosenes and motor spirits, acids which tend to form soaps (thereby producing emulsions) are washed out in acid or neutral solution before the addition of alkali is complete. D. K. M.

Determination of small quantities of nitrobenzene in [petroleum] oils. C. E. ANDING, JUN., B. ZIEBER, and W. M. MALISOFF (*Ind. Eng. Chem. [Anal.]*, 1934, 6, 41—43).—The sample, dissolved in xylene + MeOH, is reduced by TiSO₄ (I) and H₂SO₄, and the excess of (I) determined by titration with Fe^{III} alum, after removal of the oily layer if necessary. H. A. P.

Cracking Grozni paraffin oils to asphalt tar. L. A. ALEKSANDROV (*Neft. Choz.*, 1933, 25, 46—48).—Yields and characteristics are recorded. CH. ABS.

Dewaxing Grozni bright stocks from paraffinic crude oil by filtration with powders. A. A. KARASEVA, A. V. GANCHIKOVA, and S. LISITZINA (*Neft. Choz.*, 1933, 24, 112–122).—Procedure is described, and characteristics of the products are recorded. CH. ABS.

Oxidation of paraffin with air in presence of catalysts. V. VARLAMOV (*Masloboino-Zhir. Delo*, 1932, No. 6, 47–53).—By oxidation with air of Grozni paraffin at 150–160° for 6–8 hr. in presence of various catalysts higher yields ($\geq 64.4\%$) of acids were obtained, but the product contained a large amount of OH-acids. Mn, Cr, Co, and Ni accelerate, whilst alkali carbonates retard, the reaction. CH. ABS.

Percolation of gasoline through pine-wood chips. I. V. FILIPOVICH, V. I. FILATOV, and S. Y. KOROTOV (*Lesokhim. Prom.*, 1932, 1, No. 1–2, 15–17).—In the extraction of rosin from wood the equation $Q = KH/T$, where Q cu. m. of gasoline flow through 1 sq. m. per hr., T is the thickness of the chips in m., K a factor depending on the size of the chips, and H the loss in pressure in m. during the flow of the gasoline column, was successfully applied. CH. ABS.

Anti-knock properties of gasolines from the principal Russian crude oils. III. P. S. LISITZIN and V. P. GOVANOV (*Grozn. Neft.*, 1933, 3, No. 3–4, 50–53).— C_6H_6 - C_7H_{16} equivs. and C_8H_{18} vals. are recorded. CH. ABS.

Determination of unsaturated and aromatic compounds in cracked gasoline. S. S. NAMETKIN and E. A. ROBINZON (*Neft. Choz.*, 1933, 24, 292–295).—The S_2Cl_2 method is employed, with modifications, Kattwinkel's method (I) being used for determining the aromatic hydrocarbons in the distillate. The results were accurate to 0.3–0.5%. The concn. of unsaturated substances should be $\geq 25\%$. (I) is best for mixtures containing $\geq 40\%$ of aromatic hydrocarbons, whilst the NH_2Ph method is best for those containing 0.5–2%. CH. ABS.

Combustion-control systems. Bubble towers. Bleaching earths. Large-scale hydrogenation.—See I. **Building materials from wood [distillation].**—See IX. **Bitumen in varnishes.**—See XIII. **Humic fertilisers.**—See XVI. **Tar-distillate [spray] emulsions.**—See XVI. **Medicinal carbons.**—See XX.

See also A., Feb., 145, **Water-gas reaction in low-pressure explosions.** 150, **Combustion of hydrocarbons.** 151, **Spontaneous ignition of inflammable gas-air mixtures.** 167, **Pyrolysis of hydrocarbons.**

PATENTS.

Colouring of coal. E. V. COLLINS, JUN., ASSR. to DELAWARE, LACKAWANNA, & WESTERN COAL CO. (U.S.P. 1,911,808, 30.5.33. Appl., 28.11.30).—Two streams of chemicals which will react to produce a colour are combined, just before application to the coal, in the form of a spray which may be spread by electrostatic mutual repulsion of the particles, the same charge producing attraction of the particles to the coal. B. M. V.

Preservation of coal. F. J. WALLACE, ASSR. to ROBESON PROCESS CO. (U.S.P. 1,910,975, 23.5.33. Appl.,

29.9.31).—A dil. solution of residue from sugar manufacture, e.g., black strap, is sprayed on prior to completion of air-drying. B. M. V.

Distilling retort for solid fuels. R. H. CARR and C. B. WATSON, ASSRS. to PURE OIL CO. (U.S.P. 1,910,238, 23.5.33. Appl., 25.2.30).—Coal is forced into the lower part of a vertical vessel and is removed as low-temp. coke tangentially at the upper part, agitators being provided at the level of the outlet. The distillation is effected by passing, countercurrent to the coal, steam and some of the gases made. B. M. V.

Apparatus for generating power, gas, and liquid hydrocarbons. C. E. LUCKE, ASSR. to BABCOCK & WILCOX CO. (U.S.P. 1,911,026, 23.5.33. Appl., 20.9.27).—Coal is distilled with agitation, a portion of the cooled gas made is circulated over the falling coke and back to the main stream, and the whole is cooled in an air heater and the condensate removed; the main portion of gas is sent to market. The coke is mixed with a proportion of "green" coal, to adjust variations in the demand ratio of steam and gas, and burned in a boiler with the heated air. If the coal is first pulverised and the agitation sufficient, the coke will be fine enough for direct use as pulverised fuel. B. M. V.

Carbonising process. K. M. SIMPSON (U.S.P. 1,911,473, 30.5.33. Appl., 15.2.32).—Coal is carbonised at $\leq 600^\circ$ in a tunnel kiln, the charge being spaced on the trucks in the form of thin slabs and the heat maintained by combustion in the goods tunnel of part of the gases evolved. B. M. V.

Carbonisation of solid fuels at low temperatures. BRIT. CARBONISED FUELS, LTD., and H. P. HIRD (B.P. 402,853, 16.6.32).—Coal is carbonised in vertical and slightly tapered metal retorts (R), of flat rectangular cross-section, around which hot gases are circulated at such a temp. and with such velocity that the temp. of the coal approximates to, but is $\geq 420^\circ$ until distillation at that temp. is complete. The greater part of the heating gases is reheated and recirculated. R may be provided with vertical rotatable pokers to form central passages in the charge and thereby to facilitate the escape of the volatile products. A. B. M.

Coke-oven battery. J. W. GREENE, ASSR. to SEMET-SOLVAY ENG. CORP. (U.S.P. 1,915,360, 27.6.33. Appl., 9.10.28).—Valved ducts are provided in the upper wall or roof of the oven connecting each coking chamber to adjacent chambers. The ducts are opened while the chamber is being charged, so that the gases and vapours evolved during this operation are not discharged to air but pass to other chambers of the battery. A. B. M.

Production of coke. H. D. ELKINGTON. From GES. F. TEERVERWERTUNG M.B.H. (B.P. 403,232, 9.1.33).—Petroleum residues, brown-coal tar-distillation residues, or other similar residues which are solid and infusible are coked in coking chambers with the addition of coal-tar pitch, tar oils, or petroleum residues which are liquid at the coking temp. A dense coke is produced suitable for the manufacture of electrode C. A. B. M.

Hydrogenation of coal. ULTRAMAR CO., LTD., and L. T. BATES (B.P. 402,846, 14.6.32).—The coal is

mixed with a liquid hydrocarbon and is simultaneously subjected to attrition, to a temp. $> 300^{\circ}$, and to H_2 at a pressure > 10 atm. A. B. M.

Carrying out catalytic reactions [catalytic hydrogenation of carbonaceous materials]. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 402,938, 12.12.32).—Carbonaceous materials are hydrogenated in presence of a catalyst supported on a carrier, the latter having been treated with H_2 under the reaction conditions, at elevated temp. and preferably under pressure, before being impregnated with the catalyst. A. B. M.

Destructive hydrogenation of distillable carbonaceous materials. J. J. V. ARMSTRONG. From INTERNAT. HYDROGENATION PATENTS Co., LTD. (B.P. 403,481, 8.9.32).—Middle oils, oil residues, coal, etc. are destructively hydrogenated under pressure in presence of a catalyst consisting of or containing a halogen compound (I) of Mo, W, or V, or mixtures thereof. (I) may be used in admixture with the sulphides of metals of groups V and VI, or with the oxides, hydroxides, nitrides, phosphides, etc. of metals of groups II—VIII. Si or compounds thereof may also be present. A. B. M.

Water-gas plant. E. MASTERS, J. W. GIBSON, and J. R. MASTERS & SONS, LTD. (B.P. 402,968, 6.3.33).—A hydraulic main is provided containing two intercommunicating compartments (A, B) into one of which (A) the dip-pipe (P) from the generator off-take and the foul main open, whilst B can be placed in communication with a gas-pressure main when it is desired (during the air-blast period) to raise the H_2O level in A and so close P. A valve-controlled pipe bridges A and B so that the pressure therein can be equalised and the H_2O can regain its normal level for the "run" period. The seal level is controlled by means of a U-tube, one arm of which communicates with the bottom of the pressure compartment and the other with an overflow chamber; an adjustable sleeve is mounted on the latter arm, whereby the upper edge can be suitably adjusted in relation to the opening of P. A. B. M.

Production of water-gas in chamber and retort ovens. C. STILL and A. GOBIET (B.P. 403,595, 1.8.33. Switz., 1.8.32. Addn. to B.P. 389,377).—The process described in the prior patent is modified by connecting two oven chambers (A, B) which are at approx. the same stage in the cycle of operations in such a manner that the steam is introduced into the charge in A and the water-gas produced therein together with the excess steam is then passed through the charge in B and thence to storage. A. B. M.

Vertical gasification chamber. F. RIPPL (U.S.P. 1,911,393, 30.5.33. Appl., 12.2.31. Ger., 25.3.30).—Special bricks, forming filleted vertical corners of a retort, are described, only half of which are combined with the interlocking tiles of which the dividing walls from the heating spaces are formed; the tiles at one end are free to expand into chases in the walls. A. B. M.

Purification of [fuel] gases. A. WHITE and P. K. FROLICH, ASSTS. to STANDARD OIL DEVELOPMENT Co. (U.S.P. 1,911,780, 30.5.33. Appl., 24.3.30).— H_2 alone

is removed from hydrocarbon gases by combustion with the theoretical amount of O_2 in a catalyst containing metals and metal oxides reducible by H_2 at the operating temp. of 200—450°, e.g., Cu and Cu_2O . B. M. V.

Treating hydrogen sulphide-containing gases. J. W. HARRELL, ASSR. to STANDARD OIL DEVELOPMENT Co. (U.S.P. 1,915,364, 27.6.33. Appl., 23.7.32).—Part of the gas is burned with excess of air and the SO_2 produced is absorbed in H_2O . The aq. SO_2 is then brought into contact with a further supply of the original gas in such proportions that an excess of H_2S is maintained and the following reaction occurs: $2H_2S + SO_2 = 3S + 2H_2O$. The S is recovered from the liquor by filtration and the residual gas is returned to the burner. A. B. M.

Elimination of soot. R. A. BLUNT (U.S.P. 1,910,316, 23.5.33. Appl., 31.3.27).—Soot is removed from, e.g., gas-producer mains by progressive combustion in air which is supplied at $> 40,000$ cu. ft./min. and < 2 in. H_2O -gauge. B. M. V.

Distillation of tar. S. P. MILLER, ASSR. to BARRETT Co. (U.S.P. 1,909,978, 23.5.33. Appl., 3.5.27).—A portion (I) of coke-oven gas is passed while still hot through an electrical precipitator and the vapours are subsequently condensed to clean oils. Portion (II) is treated similarly with the addition to it while hot of all the solid and liquid matter from the collector main and both precipitators, it becoming therefore much richer in oil vapour. B. M. V.

Distillation of tar. S. P. MILLER, ASSR. to BARRETT Co. (U.S.P. 1,915,251, 20.6.33. Appl., 7.6.27).—Tar is sprayed into hot coke-oven gases in such a manner that the tar is distilled and the gases are simultaneously freed from entrained particles, the gases being maintained at such a temp. that they retain the major portion of their original condensable oils. A small no. of the ovens of one battery may be equipped with means for distilling the tar produced by the other ovens of the battery. The scrubbed and enriched gases are subsequently fractionally cooled for the recovery of clean oils therefrom. A. B. M.

Dispersion of bitumen. W. R. ROEDERER (B.P. 402,891, 15.8.32. Ger., 13.8.31. Addn. to B.P. 395,384; B., 1933, 775).—The bitumen (I) content of the dispersing agent (finely-divided brown coal or oil shale) used in the process of the prior patent is increased before use, either by direct addition of (I) or by extraction of the inorg. constituents or of the humic acids by suitable solvents; or a fraction richer in (I) may be separated by treatment of the original brown coal or shale in a current of H_2O or air. A. B. M.

Production of montan wax products free from asphalt. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 402,751, 28.5.32).—Crude, or preferably de-resinified, montan wax is saponified by heating with aq. NaOH or other alkali, and the resulting alcohols of high mol. wt. and soaps of the wax acids are separated from the dark-coloured asphaltic impurities by means of solvents, e.g., EtOH, EtOH + $COEt_2$, etc., in which the impurities are insol. A. B. M.

Recovery of the principal constituents of pyro-ligneous acid. C. E. EVERY-CLAYTON. From PROD.

CHIM. PURS (B.P. 403,439, 23.6.31. Cf. B.P. 390,185; B., 1933, 617).—PhOH or a mixture of phenols is added to pyroigneous acid the org. constituents of which combine with the phenols to form mol. compounds. The latter are separated from the H₂O and are heated in stages to temp. corresponding successively to the decomp. temp. of the different mol. compounds, whereby each of the volatile org. constituents is obtained separately, e.g., COMe₂ at 85°, MeOH at 95°, and AcOH at 145°. A. B. M.

Treatment of deep wells. J. J. GREBE, R. H. BOUNDY, and R. T. SANFORD, Assrs. to DOW CHEM. CO. (U.S.P. 1,911,446, 30.5.33. Appl., 17.10.32).—Prior to treatment with HCl as described in U.S.P. 1,877,504 (B., 1933, 609), a mixture of (1) < 30% of an inhibitor comprising mercaptans or thiophenols, (2) an acid capable of removing corrosion products, e.g., H₂SO₄, and, where necessary, (3) a solvent of solid paraffins, is run down the well to increase the yield of oil, brine, etc. B. M. V.

Treatment of crude petroleum. B. T. BROOKS, Assr. to GRAY PROCESSES CORP. (U.S.P. 1,911,795, 30.5.33. Appl., 13.2.28).—H₂S, other fixed gases (*G*), and gasoline (*P*) are stripped from oil by blowing previously obtained *G* in a countercurrent contact device. The H₂S is scrubbed out of the gas mixture, *P* absorbed back into the oil, and *G* partly re-used and partly allowed to escape. B. M. V.

Separating from [petroleum] mixtures materials of different m.p. A. C. HIGGINS (U.S.P. 1,910,920, 23.5.33. Appl., 22.9.31).—"Sweating" of petroleum is carried out in a vertical bucket elevator suitably heated, the feed being at an intermediate level and diluents admitted rather higher up, the drip from one bucket running into the next below. B. M. V.

Treatment of [petroleum] oils refined with recovered acid. A. N. BELCHER and D. B. NUTT, Assrs. to STANDARD OIL CO. OF CALIFORNIA (U.S.P. 1,911,419, 30.5.33. Appl., 13.6.32).—After removal of sludge by the usual methods, suspended C is removed by a filter-bed before the oil is passed to the next stage of purification. B. M. V.

Removal of foul-smelling and sulphur compounds [from petroleum oils]. J. H. HIRT, Assr. to L. J. HIRT (U.S.P. 1,910,288, 23.5.33. Appl., 20.1.30).—Petroleum is treated with the composition described in U.S.P. 1,809,554 (B., 1932, 220) at a temp. low enough to prevent dehydration and consequent loss of activity. B. M. V.

Breaking of petroleum emulsions. M. DE GROOTE and A. F. WIRTEL, Assrs. to TRETOLITE CO. (U.S.P. 1,910,680, 23.5.33. Appl., 25.3.32).—Sulphoabietic acid or the Na salt thereof is used as the breaking agent. B. M. V.

Treatment of distillate petroleum products. J. B. RATHER, L. C. BEARD, JUN., and O. M. REIFF, Assrs. to SOCONY-VAC. CORP. (U.S.P. 1,909,985, 23.5.33. Appl., 26.11.26. Renewed 20.12.30).—A minute amount of an alkaloid, e.g., brucine in BuOH, is added to petrol or kerosene to prevent discoloration and odour on keeping. B. M. V.

Extraction of hydrocarbon oils. E. R. BIRK-HIMER, Assr. to ATLANTIC REFINING CO. (U.S.P. 1,910,422, 23.5.33. Appl., 21.5.31).—The oil is dissolved in an aliphatic aldehyde (I) by heat, and on cooling is separated into two layers, the upper comprising the paraffins and a little (I), and the lower the naphthenes in most of the (I). The treatments may be repeated on the separate fractions. B. M. V.

Refining of hydrocarbon oil. J. C. MORRELL, Assr. to UNIVERSAL OIL PRODUCTS CO. (U.S.P. 1,911,640, 30.5.33. Appl., 22.7.29).—Removal of H₂S and mercaptans is effected by filtering through a mixture of a Cu (or Pb) salt, an alkali hydroxide, an alkaline-earth oxide, and a solid absorbent earth. B. M. V.

Hydrogenating apparatus [for liquid hydrocarbons]. J. MARURN and L. TÜBBEN (U.S.P. 1,911,909, 30.5.33. Appl., 22.9.31. Ger., 25.6.31).—An apparatus as described in U.S.P. 1,807,122 (B., 1932, 137) is provided with a helical worm in the compression chamber, which is rotated by a hollow shaft through which the material is fed. B. M. V.

Liquid fuel. G. MACLEAN and E. G. SISSON, JUN., Assrs. to H. D. GAINES (U.S.P. 1,916,735, 4.7.33. Appl., 10.5.28).—To prevent formation of C deposits, < 50 p.p.m. of Mn oleate, linoleate, or resinate are added to oil fuel, e.g., petrol. The MnO₂ formed is stated to act as a catalyst in the combustion. A. R. P.

Fuel oil. D. A. HOWES, and IMPERIAL CHEM. INDUSTRIES, LTD. (B.P. 403,124, 15.6.32).—1–5% of a diketone, e.g., acetyl- or benzoyl-acetone, is added to a fuel oil for use in a compression ignition engine in order to lower its spontaneous ignition temp. A. B. M.

[Pro-knocks for] fuel oil. D. A. HOWES, and IMPERIAL CHEM. INDUSTRIES, LTD. (B.P. 404,682, 21.6. and 12.7.32).—A mixture of a C₂–C₄ alkyl nitrate (< 2% EtO·NO) and (0·1%) of an org. Br or oxygenated Cu compound (CH₂PhBr, C₆H₁₁Br, BuBr, iso-C₄H₈Br₂, Cu oleate, stearate, or acetyl- or propionyl-acetate) is added to the fuel. The former shortens the delay period and the latter lowers the temp. of ignition. H. A. P.

Processing lubricants. F. A. KORMANN and J. A. MILLIFF, Assrs. to B. VALE (U.S.P. 1,918,403, 18.7.33. Appl., 15.12.28).—Lubricating oil is heated with 8% of C₁₀H₇NO₂ at 150° for 30 min. and 0·1% of a compound obtained by treating a 2·5% solution of caoutchouc in PhMe with 5% of xylydine. The mixture is again heated at 150° under pressure and cooled to obtain a lubricating jelly. A. R. P.

Oil converter. C. R. WAGNER and R. STAHL, Assrs. to GYRO PROCESS CO. (U.S.P. 1,916,450, 4.7.33. Appl., 23.1.30).

Corrosion-resistant lining for cracking apparatus. G. V. SWEARINGEN and E. S. DIXON, Assrs. to TEXAS CO. (U.S.P. 1,920,534, 1.8.33. Appl., 19.5.30).

Cooling and safeguarding oil-cracking apparatus. H. THOMAS, C. H. THAYER, and F. A. THORNGATE, Assrs. to SUN OIL CO. (U.S.P. 1,919,672, 25.7.33. Appl., 20.3.30).

Cracking of oils. B. BRONDO and J. R. LE VALLY, Assrs. to SUPERHEATER CO. (U.S.P. 1,921,603, 8.8.33. Appl., 4.11.26).

Cracking of oil. C. R. EWING and T. MONTGOMERY, Assrs. to STANDARD OIL DEVELOPMENT Co. (U.S.P. 1,919,691, 25.7.33. Appl., 21.3.29).

Heating of oil. B. N. BROIDO, Assr. to SUPERHEATER Co. (U.S.P. 1,921,602, 8.8.33. Appl., 23.10.26).

Apparatus for treatment of hydrocarbon oils. E. C. MARSHALL and M. J. BURKHARD, Assrs. to WHITE EAGLE OIL & REFINING Co. (U.S.P. 1,918,278, 18.7.33. Appl., 3.5.28).

Heat exchanger [for treating hydrocarbon oils]. G. T. JACOBS, S. J. CHUTE, and J. B. FORBES, Assrs. to ALCO PRODUCTS, INC. (U.S.P. 1,918,601, 18.7.33. Appl., 22.4.32).

Treatment of hydrocarbon oils. C. W. MACKAY, Assr. to TEXAS Co. (U.S.P. 1,918,766, 18.7.33. Appl., 19.5.30).

Cracking of hydrocarbon oils. H. L. DOHERTY, Assr. to DOHERTY RESEARCH Co. (U.S.P. 1,917,705, 11.7.33. Appl., 1.10.31).

Cracking of hydrocarbon oil. J. D. SEGUY, Assr. to UNIVERSAL OIL PRODUCTS Co. (U.S.P. 1,921,246, 8.8.33. Appl., 16.3.23. Renewed 14.3.29).

Production of low-b.p. from high-b.p. hydrocarbon oils. H. R. SNOW and F. W. SULLIVAN, JUN., Assrs. to STANDARD OIL Co. (U.S.P. 1,918,991, 18.7.33. Appl., 10.2.30).

[Vacuum] distillation [of high-boiling hydrocarbon oils]. V. VOORHEES, Assr. to STANDARD OIL Co. (INDIANA) (U.S.P. 1,921,850, 8.8.33. Appl., 1.3.30).

Apparatus for distilling hydrocarbon oils. H. G. SCHNETZLER, Assr. to STANDARD OIL Co. (U.S.P. 1,916,690, 4.7.33. Appl., 24.5.30).

Recovery of hydrocarbon oils. J. VAN ACKEREN, Assr. to KOPPERS Co. OF DELAWARE (U.S.P. 1,916,349, 4.7.33. Appl., 22.7.30).

(A) Apparatus for converting petroleum hydrocarbons. (B) Cracking of petroleum hydrocarbons.

(C) Apparatus for treating hydrocarbons. W. M. CROSS, Assr. to GASOLINE PRODUCTS Co., INC. (U.S.P. [A] 1,916,205, [B, C] 1,920,929—30, [A] 4.7.33, [B, C] 1.8.33. Appl., [A] 3.9.25, [B] 9.5.29, [C] 31.3.21).

Apparatus for treating hydrocarbon vapours. W. F. SIMS and V. U. CLOER, Assrs. to PANHANDLE REFINING Co. (U.S.P. 1,918,670, 18.7.33. Appl., 23.11.29).

Apparatus for thermal dissociation of hydrocarbon gases and vapors. W. D. WILCOX (U.S.P. 1,916,545, 4.7.33. Appl., 12.4.30).

Separation of fluids [gas and oil from crude petroleum]. O. G. BOWEN, Assr. to A. W. LEWIS (U.S.P. 1,917,792, 11.7.33. Appl., 27.7.32).

Apparatus for altering the boiling points of hydrocarbons. R. E. BURK and E. B. MCCONNELL, Assrs. to STANDARD OIL Co. (U.S.P. 1,917,357, 11.7.33. Appl., 1.12.30).

Treating adsorptive clay. Breaking emulsions. Carrying-out gas reactions.—See I. S from NH_4 polysulphide etc. H_2 from hydrocarbon gases.—See VII. Road-surfacing. Bituminous

article.—See IX. Coating tanks.—See XIII. Fertilisers.—See XVI.

III.—ORGANIC INTERMEDIATES.

Modern solvents industry. E. W. REID (Ind. Eng. Chem., 1934, 26, 21—23).—A review of their uses. S. M.

By-products in large-scale synthesis of aliphatic compounds from acetylene. G. BENSON and A. F. G. CADENHEAD (J.S.C.I., 1934, 54, 40—43 π).—The following by-products are isolated or detected: $(\text{C}_2\text{H}_2 \rightarrow \text{MeCHO}) \text{Ac}_2$, $\text{OH}\cdot\text{CHMe}\cdot\text{COMe}$ (II), met-, par-, and croton-aldehyde (I); $(\text{MeCHO} \rightarrow \text{AcOH}) \text{CH}_2\text{O}$, HCO_2H , $\text{CHO}\cdot\text{CO}_2\text{H}$, Me, Et, and Pr^s acetates, $\text{CHMe}(\text{OAc})_2$, $(\cdot\text{CH}_2\text{Ac})_2$, and 2 : 5-dimethylfuran; $(\text{MeCHO} \rightarrow \text{EtOAc}) \text{EtOH}$, $\text{OH}\cdot\text{CHMe}\cdot\text{CH}_2\cdot\text{OH}$, and $\text{OH}\cdot\text{CHMe}\cdot\text{CH}_2\cdot\text{CO}_2\text{Et}$; $[\text{MeCHO} \rightarrow \text{OH}\cdot\text{CHMe}\cdot\text{CH}_2\cdot\text{CHO} \rightarrow (\text{I})]$ 1 : 2-dihydro-*o*- and *p*-tolualdehydes, hexadienal, and (?) octatrienal. A quartz ultra-violet irradiation apparatus for prep. of (II) from MeCHO is described. H. A. P.

Effect of catalysts on the reaction between olefines and hydrogen sulphide. H. R. DUFFEY, R. D. SNOW, and D. B. KEYES (Ind. Eng. Chem., 1934, 26, 91—93).—When H_2S mixed with C_2H_4 or C_3H_6 is passed over catalysts at 200—300° mercaptans are formed with negligible amounts of sulphides. The yield of PrSH falls with rising temp., and the best catalysts at 200° are Ni-kieselguhr and $\text{H}_3\text{PO}_4\text{-C}$, whilst for EtSH at 250° they are Ni-kieselguhr and the clays Hydralo and bentonite. A. G.

Extraction of triethanolamine oleate from aqueous solution. F. M. BIFFEN and F. D. SNELL (Ind. Eng. Chem. [Anal.], 1934, 6, 78).—Oleic acid can be completely extracted from aq. triethanolamine oleate by Et_2O . H. A. P.

Determination of minute amounts of aldehydes in ether. M. W. CAREY, L. W. GREEN, and R. E. SCHOETZOW (J. Amer. Pharm. Assoc., 1933, 22, 1237—1240).—The reagent used is decolorised fuchsin solution (of the B.P. 1914) + 0.1% of pyrogallol. It is sp. sensitive to < 1 p.p.m., and can be used quantitatively (± 2 —5 p.p.m.) for amounts of aldehydes in Et_2O up to 50 p.p.m. W. S.

Dehydration of aqueous acetic acid. D. F. OTHMER (Chem. Met. Eng., 1933, 40, 631—633).—A review of known methods. The importance of using an entraining liquid, e.g., $\text{C}_2\text{H}_4\text{Cl}_2$, which gives a high thermal efficiency in distillation methods is indicated. D. K. M.

Properties of light wood oils used as solvents for extracting acetic acid from dilute solutions. A. N. BRIK (Lesokhim. Prom., 1933, 2, No. 1, 14—19).—Properties and compositions of the solvents "EDM" and "LDM" are given. CH. ABS.

Maleic acid and phthalic anhydride. C. R. DOWNS (Ind. Eng. Chem., 1934, 26, 17—20).—Both maleic and phthalic anhydride are now manufactured on the large scale by the direct oxidation of C_6H_6 and C_{10}H_8 vapour respectively. A review is given of their applications for the production of technically important materials

and of their derivatives: maleic, fumaric, and malic acids, succinates, and phthalates. S. M.

Large-scale hydrogenation.—See I. **Purifying aromatic petroleum fractions.**—See II. **Building materials from wood-chemical industry.**—See IX. **Detergents.**—See XII. **Camphor substitutes.**—See XIII. **N fertilisers.**—See XVI. **C₂HCl₃ for anaesthesia.**—See XX.

See also A., Feb., 146, **Equilibrium between CO, H₂, CH₂O, and MeOH.** 168, **Direct prep. of divinyl from EtOH.** 170, **Determination of Ac₂O.** 172, **Prep. of pure SH·CH₂·CO₂H.** 180, **Sulphonation of phenanthrene.** 182, **Prep. of *p*-azoxyanisole.** 190, **Synthesis of aromatic aldehydes.** 191, **Prep. of CH₂Ph·CO·CH₂·OH.** 195, **Synthesis of hexamethyleneimine.** **Quinoline synthesis.** 197, **Prep. of selenophen.** 198, **Determining impurities in Et₂O produced by autoxidation.** **Analysis of CH₂O—MeCHO mixtures.** 199, **Analysis of mixed amines.** **Determination of *o*-toluidine.** **Azo compounds in volumetric analysis.** 219, **Butylene glycol by fermentation.** 220, **Products of fermentation by *Penicillium*.**

PATENTS.

Halogenation of unsaturated hydrocarbons. N. V. DE BATAAFSCHE PETROLEUM MAATS., Assees. of R. N. DEANESLY (B.P. 402,928, 29.10.32. U.S., 11.11.31).—Addition occurs with the substantial exclusion of substitution when olefines are treated with halogen in presence of O₂ or air. C. H.

Manufacture of 3-methylal- and 3-methylol-pentane [α -ethyl-*n*-butaldehyde and α -ethyl-*n*-butyl alcohol]. DR. A. WACKER GES. F. ELEKTROCHEM. IND. G.M.B.H. (B.P. 405,141, 7.4.33. Ger., 26.11.32).—The product of interaction of PrCHO and MeCHO in alkaline solution is dehydrated by distillation in steam and reduced (by H₂ and Ni-kieselguhr at 50—100°/10 atm.) to CHEt₂·CHO (I) or (by H₂ and Ni-pumice at 160° in vapour phase) to CHEt₂·CH₂·OH which is dehydrogenated (Cu—Zn-pumice at 280°) to (I). H. A. P.

Production of ethylene oxide, particularly for preparation of ethylene glycol and of its derivatives. SOC. FRANÇ. DE CATALYSE GÉNÉRALISÉE (B.P. 402,749, 2.5.32. Fr., 19.12.31. Addn. to B.P. 402,438; B., 1934, 232).—C₂H₄, O₂, and steam, with or without 5% of H₂ and/or CO, are passed at 150—400°, preferably at reduced pressure, over Ag containing small amounts of Au, Cu, or Fe. C. H.

Manufacture of dispersing agents and preparations therefrom. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P.404,931, 9.6.32).—Neutral dispersing and emulsifying agents are prepared by converting monomeric aliphatic monohydric alcohols > C₇ into their di- or tri-ethylene glycol ethers, e.g., by condensation with > 3 mols. of C₂H₄O (at 120—160° in presence of NaOH or KOH). H. A. P.

[Production of] diacetone alcohol. BRIT. INDUSTRIAL SOLVENTS, LTD., and E. E. CONNOLLY (B.P. 402,788, 8.6.32).—In the fractionation of crude diacetone alcohol the addition of 10% of H₂O minimises decomp.

After removal of COMe₂, H₂O is distilled off below 105° preferably in vac. COMe₂ may be removed before adding H₂O. C. H.

Production of pentaerythritol. DEUTS. GOLD- U. SILBER-SCHNEIDANSTALT, VORM. ROESSLER (B.P. 404,975, 21.6.32. Ger., 20.4.32).—CH₂O and MeCHO are condensed in presence of 85—90% of the calc. amount of alkali (CaO) at < 60° (< 35°), the reaction being stopped by neutralisation when the min. of reducing substances is present. Apparatus for continuous operation is described. H. A. P.

Production of [iodoalkyl alkenyl] ethers. W. J. BUSH & Co., LTD., H. W. VERNON, and P. C. C. ISHERWOOD (B.P. 404,687, 13.7.32).—The corresponding OH-ethers are treated with PI₃ or red P and I. β -Iodoethyl allyl ether, b.p. 155—165°/1 atm., is thus prepared. H. A. P.

Manufacture of acetic acid. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 404,983, 25.7.32).—COMe₂ or COMeEt is oxidised by air or O₂ at 50—120° (75—105°) in liquid phase in presence of a catalyst (AcOH + a compound of Cu, Co, or Mn, preferably acetate or acetylacetonate). H. A. P.

Flake sodium acetate. C. J. STROSACKER and S. B. HEATH, Assrs. to DOW CHEM. Co. (U.S.P. 1,911,479, 30.5.33. Appl., 23.9.31).—NaOAc solution is conc. to b.p. 110—120° and applied at 100—110° to a mechanical flaker; the resulting flakes are very near in composition to that of the trihydrate, and are of such permanence that fabric bags may be used for storage. B. M. V.

Manufacture of flaked lead acetate. R. E. LAWRENCE, Assr. to GRASELLI CHEM. Co. (U.S.P. 1,911,907, 30.5.33. Appl., 5.2.31).—While being gradually cooled a film of liquid Pb(OAc)₂ is broken up during the pasty stage. On a cooling-roller, the film from a first revolution may be allowed to set, and this with the liquor taken up on a second revolution will form the required paste. B. M. V.

Manufacture of substituted malonic acids. DR. A. WACKER GES. F. ELEKTROCHEM. IND. G.M.B.H. (B.P. 405,173, 8.6.33. Ger., 8.6.32).—The corresponding -CH₂·OH or -CHO compound is oxidised by N oxides (HNO₃ + O₂), e.g., OH·CH₂·CMeEt·CHO → CMeEt(CO₂H)₂, OH·CH₂·CEt₂·CHO → CEt₂(CO₂H)₂. H. A. P.

Manufacture of mixed anhydrides of silicic acid and carboxylic acids. HENKEL & Co., G.M.B.H. (B.P. 402,973, 9.3.33. Ger., 22.4.32).—Org. acids > C₅, or their anhydrides, esters, or salts, are heated with mixed org.-silicic acid anhydrides < C₆, or with a Si halide. Examples are mixed anhydrides of silicic and stearic (m.p. 67—68.5°) and coconut-oil acids, BzOH, naphthenic, and α -bromolauric acids. C. H.

Manufacture of chlorhydrins and their ethers. H. DREYFUS (B.P. 404,938, 15.7.32).—Di- or polyhydric alcohols are heated with HCl generated in their presence, and the chlorohydrins formed dehydrated, if desired, to ethers by heating at a higher temp. Thus 90% H₂SO₄ added to glycerol and NaCl and a little AcOH in an autoclave at 50—60° gives monochlorohydrin; the corresponding ether is formed by addition of further H₂SO₄ and heating at 200—250°. H. A. P.

Preparation of additive compounds of hypochlorous acid or hypobromous acid with unsaturated organic compounds. N. V. DE BATAAFSCHE PETROLEUM MAATS. (B.P. 402,880, 7.7.32. Holl., 25.7.31).—Esters of HOCl or HOBr react smoothly in presence of H₂O with unsaturated org. compounds; the latter may be produced *in situ* from *tert.* alcohols. Examples are: C₂H₄Cl·OH from *tert.*-BuOCl and C₂H₄; isobutylene chlorohydrin from *tert.*-BuOCl and *tert.*-BuOH; isoprene dichlorohydrin (b.p. 136—140°/9 mm.), cyclohexene chloro- and bromo-hydrins (b.p. 75—78°/9 mm., and 91—93°/11 mm., respectively), and chlorohydrins of oleic and cinnamic acids. C. H.

Preparation of ketones. W. W. TRIGGS. From E. I. DU PONT DE NEMOURS & Co. (B.P. 404,643, 16.4.32).—*sec.* Alcohols are dehydrogenated to ketones by heating with a hydrogenating catalyst (Ni, Ni-Cu carbonates) and an unsaturated (cyclic) hydrocarbon (C₆H₆, C₁₀H₈, etc.) at 175—250°/100—300 lb. per sq. in. Examples are: borneol → camphor (at 200°), fenchyl alcohol → fenchone, Pr^oOH → COMe₂, and cyclohexanol → cyclohexanone. H. A. P.

Manufacture of amino-compounds. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 404,744, 4.8.32).—Primary and *sec.* N bases (amines, hydrazines, hydroxylamines) free from hydroxyalkyl groups are caused to interact with CH₂:CH·CN to give additive compounds ($\alpha\beta$ -unsaturated nitriles generally are mentioned in the Provisional Specification). With NH₃, NH₂·CH₂·CN and NH(CH₂·CH₂·CN)₂ are formed. β -*n*-Butylamino-, b.p. 114—116°/20 mm. (hydrolysed to *n*-butylaminopropionic acid, and reduced by H₂-Ni to *n*-butylaminopropylamine, b.p. 60°/1 mm.), *di-n*-butylamino-, b.p. 140—142°/22 mm., *cyclohexylamino*-, b.p. 149—151°/11 mm., *phenylethylamino*-, b.p. 175—177°/17 mm., *hydroxylamino*- (from NH₂OH), and *hydrazinopropionitrile* b.p. 108—112°/4 mm. (from N₂H₄), are similarly prepared. H. A. P.

Production of benzoic acid and benzoates [from liquid toluene and dichromate]. BOZEL-MALÉTRA SOC. INDUSTR. DE PROD. CHIM. (B.P. 402,882, 20.7.32. Ger., 23.6.32).—Aq. crude dichromates or chromates from alkaline fusion of Cr ores etc., preferably after neutralisation of caustic alkali with CO₂ etc., are used for oxidation of PhMe at 250—350°. The impurities remain in the pptd. Cr(OH)₃. C. H.

Manufacture of *o*-aminoarylalkylsulphones, *o*-aminoarylaralkylsulphones, and azo dyes [ice colours] therefrom. I. G. FARBENIND. A.-G. (B.P. 404,794, 24.11.32. Ger., 24.11.31 and 24.8.32).—The Na salts of α -*o*-nitroaryl-sulphonyl or -sulphonylaryl derivatives of aliphatic carboxylic acids are heated (at the b.p.) in feebly alkaline aq. solution. CO₂ is eliminated to give a sulphone which is reduced by a standard method to the corresponding NH₂-compound. These are diazotised and coupled on the fibre with 2:3-hydroxynaphthoic arylamides to give (with "red" arylamides, e.g., 2:3-OH·C₁₀H₆·CO·NHPh) golden-yellow to yellowish-orange or orange dyes. Use of 4-Cl- or 4-CF₃-derivatives of 2-NH₂·C₆H₄·SO₂Me is specifically claimed; these give the yellowest shades. Thus Na 4-chloro-2-nitrobenzenesulphonylacetate (I) gives 4-chloro-2-nitro-

phenylmethylsulphone, m.p. 155—156°; the corresponding NH₂-compound has m.p. 87—88°. If desired (I) etc. is produced *in situ* by oxidation of the corresponding thioglycollic acid with alkaline KMnO₄. The following are similarly prepared: 2-nitro-4-trifluoromethyl-, m.p. 150—151°, 2-amino-4-trifluoromethyl-, m.p. 94—95°, 2-nitro-, m.p. 106—107°, 2-amino-, m.p. 84—85°, 5-chloro-2-amino-, m.p. 121—123°, 2-amino-5-methoxy-, m.p. 135—136°, 4-, m.p. 199—200°, and 5-nitro-2-amino-phenylmethylsulphone, m.p. 203—204°; 4-chloro-2-nitro-, m.p. 112—113°, and 2-amino-, m.p. 132—133°, 2-nitro-, m.p. 127—128°, 2-amino-, m.p. 156°, 2-nitro-4-trifluoromethyl-, m.p. 134—135°, and 2-amino-4-trifluoromethyl-, m.p. 193—195°, *phenylbenzylsulphone*; 2-nitro-*p*-tolyl-methyl-, m.p. 122—124°, -ethyl-, m.p. 88—89°, and -benzyl-sulphone, m.p. 134—136°; 2-amino-*p*-tolyl-methyl-, m.p. 105—106°, -ethyl-, m.p. 102°, *n*-butyl-, m.p. 37—39°; and -benzyl-sulphone, m.p. 135—136°; 2-nitro-, m.p. 44—45°, 2-amino-, m.p. 74—75°, 2-nitro-4-trifluoromethyl-, m.p. 116—118°, and 2-amino-4-trifluoromethyl-, m.p. 42—43°, *phenylethylsulphone*; 4-chloro-2-nitro-, m.p. 133—134°, 4-chloro-2-amino-, m.p. 119—120°, 2-nitro-, m.p. 163—164°, and 2-amino-phenyl-*p*-methylbenzylsulphone, m.p. 163°; 2-nitro-, m.p. 148—149°, and 2-amino-3':4'-dichlorobenzylsulphone, m.p. 150°; 4-chloro-2-nitro-, m.p. 73—74°, and 2-amino-phenyl-*n*-propylsulphone, m.p. 54—55°; 2-aminophenyl-*n*-butyl-, m.p. 45—47°, and *cyclohexyl-sulphone*, m.p. 128—130°; 4-chloro-2-nitro-, m.p. 123—125°, and 2-amino-phenylethylsulphone, m.p. 87—89°; 4-chloro-2-aminophenyl-*n*-butylsulphone, b.p. 225—226°/8 mm.; and 3-nitro-, m.p. 176—177°, and 3-amino-4-methylsulphonylbenzenesulphondimethylamide, m.p. 187—188°. H. A. P.

Manufacture of 2-derivatives of selenazoles. KODAK, LTD. From EASTMAN KODAK Co. (B.P. 405,028, 29.7.32).—Selenoamides are condensed with α -halogeno-aldehydes or -ketones. MeCSe·NH₂ with CH₂Cl·CHO gives 2-methyl-, b.p. 32—34°/20 mm., and with CH₂Br·COPh gives 4-phenyl-2-methyl-selenazole, m.p. 63—64°. CH₂Cl·COMe and EtCSe·NH₂ give 4-methyl-2-ethylselenazole, b.p. 74—76°/20 mm. H. A. P.

Manufacture of solid diazo salts. I. G. FARBENIND. A.-G. (B.P. 403,013, 22.5.33. Ger., 21.5.32).—1 NH₂ group in a halogenated *p*-C₆H₄(NH₂)₂ free from CO₂H and SO₃H is diazotised with 1 mol. of HNO₂ and the solid diazonium salt or stabilised salt is separated. Examples are 2:5- and 2:6-Cl₂- or -Br₂-, 2-Cl-, 2-Br-, 2-Cl-6-Br-, and 4-Cl-1-Me derivatives. C. H.

Dye intermediates. IMPERIAL CHEM. INDUSTRIES, LTD., S. COFFEY, and R. W. EVERATT (B.P. 405,003, 28.6.32).—New pyrazolones from 2:4:6-trichloro- or tribromo-phenylhydrazones and COMe·CH₂·CO₂Et or CO₂Et·CO·CH₂·CO₂Et are claimed. 1-2':4':6'-trichloro- and 1-2':4':6'-tribromophenyl-3-methyl- and 3-carboxy-1-2':4':6'-trichloro-, m.p. 240° (decomp.), and -tribromo-phenyl-5-pyrazolone, m.p. 250°, are described. H. A. P.

Separating partial mixtures.—See I. [Products from] pyroigneous acid.—See II. Catalysts for converting olefines into alcohols.—See VII.

IV.—DYESTUFFS.

See A., Feb., 161, NHPH₂ azo dyes as indicators. 182, Light-sensitivity of aryl-β-naphthylamine-azo dyes.

PATENTS.

Manufacture of azo dyes of the stilbene series.

I. G. FARBENIND. A.-G. (B.P. 403,007, 10.5.33. Ger., 11.5.32).—The azoxy-dyes from 4:4'-dinitrostilbene-2:2'-disulphonic acid and aminoazo compounds are treated with (a) alkaline reducing agents and (b) oxidants, in either order, whereby orange to red direct dyes of improved fastness to Cl₂ are obtained. Suitable aminoazo compounds are aminoazobenzenes carrying: 4-NH₂-4'-SO₃H; 4-NH₂-2-Me-2'-SO₃H; 4-NH₂-2:5-(OMe)₂-4'-SO₃H. C. H.

Manufacture of azo dyes [for leather].

I. G. FARBENIND. A.-G. (B.P. 403,022, 2.6.33. Ger., 7.7.32).—Resorcinol or a resorcylic acid is coupled with 2 mols. of 3-nitro-4-aminodiazobenzene (I) or with 1 mol. of (I) and 1 mol. of another diazo compound; or 2 mols. of (I) are coupled with 1 mol. of an azo coupling of resorcinol or a resorcylic acid. Examples are: (I) → resorcinol-5-carboxylic acid ← *p*-nitroaniline-*o*-sulphonic acid or 4-aminoazobenzene-4'-sulphonic acid; H- or J-acid → resorcinol ← (I) (1 or 2 mols.). C. H.

Manufacture of [azo] dyes. I. G. FARBENIND. A.-G. (B.P. 404,840, 13.4.33. Ger., 24.6.32).—Dyes of the type: sulphonated or carboxylated arylamine → *m*-aminophenol or *N*-substituted derivative having a free *p*-position (to OH), are oxidised (by CuO) in alkaline medium to new (leather) dyes of improved light-fastness. Examples of first components are: sulphanilic acid (I) (greenish-yellow); 1:4:2-NH₂-C₆H₃(NO₂)·SO₃H (golden-yellow), (reduced, yellowish-brown); 4:3:4'-NH₂·C₆H₃(SO₃H)·N₂·C₆H₄·SO₃H (red); 4:4':2'-NH₂·C₆H₄·NH·C₆H₃(NO₂)·SO₃H (brown); 2:4:8-NH₂·C₁₀H₅(SO₃H)₂ (yellowish-brown), and 2:8:6-NH₂·C₁₀H₅(OH)·SO₃H (red-brown). (I) → 3-OH·C₆H₄·NHPH is oxidised to a yellowish-brown dye. H. A. P.

Manufacture of monoazo dyes [pigments and ice colours].

A. CARPMAEL. From I. G. FARBENIND. A.-G. (B.P. 402,849, 14.6.32).—Fast reds are obtained by coupling in substance or on the fibre 2:3-hydroxynaphthoic 3-chloro-4:6-dimethoxyanilide with diazotised *o*-anisidine-4-sulphonamides in which the amide group carries 2 alkyl or aralkyl groups (other than 2 Et₂) totalling < C₃, e.g., 2Bu₂, CH₂Ph and Me, 2CH₂Ph, Me and Et, etc. C. H.

Manufacture of azo dyes [ice colours].

I. G. FARBENIND. A.-G. (B.P. 405,144, 12.4.33. Ger., 12.4.32. Addn. to B.P. 361,097; B., 1932, 254).—Orange-yellow shades of excellent fastness to light and good washing fastness are given by diazotised di(trifluoromethyl)-anilines with the commoner 2:3-hydroxynaphthoic arylamides. Examples are 3:5-di(trifluoromethyl)-aniline → 2:3-hydroxynaphthoic anilide, *m*-nitroanilide, and *o*-toluidide (all orange-yellow), *p*-chloroanilide and 4-chloro-*o*-toluidide (orange), and α-naphthalide (reddish-orange); 2:5-di(trifluoromethyl)aniline → 2:3-hydroxynaphthoic *o*-phenetidine, *p*-anisidine,

and *p*-chloroanilide (orange-yellow), anilide, and *o*-anisidine (orange). H. A. P.

Manufacture of water-insoluble azo dyes [ice colours].

I. G. FARBENIND. A.-G. (B.P. 404,869, 19.6.33. Ger., 17.6.32).—Diazotised (in the 4-position) 2:6-dihalogeno-*p*-phenylenediamines [2:6:1:4-C₆H₂Cl₂(NH₂)₂ (I)] give various shades of brown, fast to acids, with the common arylamides, e.g., (I) → 2:3-hydroxynaphthoic *o*-toluidide, *o*-anisidine (II), or *m*-nitranilide (reddish-brown), α-naphthalide (blue-currant); 2:6:1:4-C₆H₂Br₂(NH₂)₂ → 2:3-hydroxynaphthoic anilide or β-naphthalide (III) (garnet); 2:6:1:4-C₆H₂ClBr(NH₂)₂ → 2:3-hydroxynaphthoic *o*-phenetidine, (II), or (III) (brown). H. A. P.

Manufacture of vat dye preparations [printing pastes].

W. W. GROVES, Assec. of I. G. FARBENIND. A.-G. (B.P. 405,092, 2.12.32. Ger., 2.12.31. Addn. to B.P. 361,350; B., 1932, 302. Cf. B.P. 389,915; B., 1933, 583).—Stable reduction products of 6-halogenothioindigo or its 4-alkyl derivatives (both nuclei may be similarly substituted) are incorporated in an aq. paste containing a derivative of Zn, Fe, or Cu (except CuSO₄), and a H₂O-sol. derivative of benzyl- or dimethylsulphanilic acid or 1-C₁₀H₇·SO₃H (and glycerol). H. A. P.

Manufacture of vat dyes.

I. G. FARBENIND. A.-G. (B.P. 404,867, 14.6.33. Ger., 14.6.32).—Quinoxalines from an aceanthrenequinone and *o*- (or αβ-)diamines are converted by fusion with alkali (KOH-EtOH at 150–170°) into green vat dyes. Examples of diamines used are: *o*-C₆H₄(NH₂)₂, 1:2:4:5-C₆H₂MeCl(NH₂)₂, (·CH₂·NH₂)₂, 1:3:4-C₆H₃Me(NH₂)₂, 1:2-C₁₀H₆(NH₂)₂, and 2:3-diaminofluorenone. H. A. P.

Manufacture of [carbocyanine] dyes [photographic sensitisers].

J. D. KENDALL, and ILFORD, LTD. (B.P. 404,997, 20.6.32).—Imino-ethers derived from acids > HCO₂H (1 mol.) are condensed with a heterocyclic quaternary salt containing a reactive Me group (2 mols.) or the corresponding ψ-base in C₅H₅N, PhNO₂, or a neutral alcoholic solvent. Examples are: NH:CMe·OEt and 1-methylbenzthiazole ethiodide (I), 1-methyl-α-naphthathiazole ethiodide, and 2-methyl-β-naphthathiazole etho-*p*-toluenesulphonate (II); NH:CET·OEt and 1-methylbenzthiazole etho-*p*-toluenesulphonate (III), (II), and the etho-*p*-toluenesulphonates of 1-methyl-4:5-methylenedioxy-, -4:5-dimethoxy-, and -5-methoxy-benzthiazoles; NH:CPh·OEt and (III) and (II); and NH:C(CH₂Ph)·OEt and (III). Use of the products in photographic emulsions is claimed. [Stat. ref.] H. A. P.

Manufacture of sulphur dye.

H. A. LUBS and P. C. BOWERS, Assrs. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,910,441, 23.5.33. Appl., 7.3.28). A brown S dye is formed by heating a mixture of an aromatic (NO₂)₂-compound and an alkali polysulphide to fusion in presence of a sulphite-cellulose compound, e.g., pitch from a pulp digester. B. M. V.

V.—FIBRES; TEXTILES; CELLULOSE; PAPER.

Unit cell of cellulose in cotton stalks and cusps.

J. P. SANDERS and F. K. CAMERON (Ind. Eng. Chem., 1933, 25, 1371–1373).—The source of the cellulose (I),

whether cotton stalk, cusps, or lint, or spruce, poplar, or fine pulps, did not affect the X-ray pattern of the bleached (I), mercerised (I), acetates or nitrate of (I), or (I) regenerated from viscose or from nitrate. A. G.

Determination of sulphite-yielding sulphur [in fibrous materials]. F. L. GOODALL (J. Soc. Dyers and Col., 1934, 50, 10—13).—The S-containing material (5 g., or sufficient to yield 0.001—2 g. of BaSO_4) is distilled with 60 c.c. of $\text{SnCl}_2 + \text{HCl}$ reagent (100 g. of SnCl_2 dissolved in 100 c.c. of conc. $\text{HCl} + 50$ c.c. of H_2O) and 10 c.c. of 10% aq. BaCl_2 (added to render inactive any sulphate which may be present) and the evolved H_2S absorbed in 100 c.c. of cooled 0.1*N*-I having 100 c.c. of 10% aq. KOH added; the H_2SO_4 resulting from oxidation of the H_2S is determined by the usual method as BaSO_4 . An accuracy of 0.001% was obtained with paper and pulp samples, but the method is not generally suitable for all forms of S; low vals. are obtained with S, wool (approx. 0.3 instead of 3.5%), and viscose rayon (0.0031—0.0036 instead of 0.012%). The method is particularly suitable for examining paper wrappings containing S in a form able to discolour wool dyed with certain $\beta\text{-C}_{10}\text{H}_7\text{-OH}$ dyes (cf. B., 1932, 639). A. J. H.

Kinematographic swelling analysis. K. HESS (Papier-Fabr., 1934, 32, 61—67).—The swelling of cotton (I) and wool (II) fibres and starch granules (III) is studied with the aid of a kinematographic film, some pictures from which are reproduced. When (I) swells in cuprammonium oxide (C) solution, the C passes through the outer walls of the fibre, which act as a semi-permeable membrane, causing dispersion of the structure within the fibre. A strong flow of particles in the direction of the axis of the fibre was observed, the particles themselves showing vigorous Brownian movement (B). The outer walls finally burst and a very rapid outflow of liquid from the fibre takes place, indicating that the system is under pressure. (III) show the same behaviour when swelling in H_2O . The particles of the inner suspension, which also show vigorous B, become visible only with the addition of EtOH , MeOH , dioxan, Et_2O , etc. It is indicated that the suspension ejected when the outer skin of the granule is burst has its own inner structure with elastic properties. Similarly, the individual scales split off from the surface of (II) when swollen show B within. D. A. C.

Apparatus for determining the resistance of textiles to wear. G. CESCONI (Boll. R. Staz. Sperim. Ind. Carta, 1933, 5, 157—166).—The sample is subjected to rubbing in all possible directions against another piece of textile or some other suitable surface carrying a definite load. Wear is measured by loss in wt. Details are given. T. H. P.

Cellulose compounds. G. TOCCO (Boll. R. Staz. Sperim. Ind. Carta, 1933, 5, 200—206).—The methods of formation, properties, uses, etc. of cellulose esters are discussed. T. H. P.

Strength of sulphite-cellulose. H. ROSCHIER (Pappers-Träv. Finland, 1933, 270—276; Chem. Zentr., 1933, ii, 1619).

Mechanical properties of cellulose acetate. J. GRARD (Bull. Soc. chim., 1933, [iv], 53, 1308—1312).—A

method for the prep. of cellulose acetate films for use in aviation is described. An examination of acetates of different degrees of acetylation indicates that the viscosity (η), elongating power (A), and resistance to rupture (R) run more or less parallel. Heating at 50—110° causes a marked fall in η , a rather variable diminution of A , and not much change in R . Above 110° there is a loss of AcOH . Ultra-violet light causes a large diminution in η and A , but only a slight diminution in R . M. S. B.

Swelling of cellulose acetate films. D. KRÜGER (Farbe u. Lack, 1934, 3, 15—16, 29).—A review is given of recent work on H_2O , EtOH , and C_6H_6 absorption by cellulose esters and the effect on the mechanical properties of the films. The comparatively high H_2O absorption of cellulose acetate can be reduced by (a) introducing the max. no. of Ac groups without formation of secondary esters by degradation; (b) substituting AcOH partly or completely with a higher homologue; (c) adding suitable plasticisers. The use of HClO_4 instead of H_2SO_4 as esterification catalyst (cf. A., 1931, 1041) avoids loss of Ac groups during subsequent removal of acid. Films of cellulose esters of higher fatty acids are mechanically deficient. Mixed esters are as yet costly. S. M.

Modern developments in applied cellulose chemistry. G. J. ESSELEN (Ind. Eng. Chem., 1934, 26, 26—30).—The latest developments in the application of cellulose and of its nitrate and acetate are discussed. A. G.

Lustre of artificial silk. I. H. SOBUE (J. Cellulose Inst., Tokyo, 1934, 10, 5—11).—Measurements with a Goerz glarimeter are recorded for various rayons; the lustre depends on the twist. A. G.

Sulphur forms in crude viscose-rayon yarn. P. C. SCHERER, JUN. (Ind. Eng. Chem., 1933, 25, 1319—1321).—Part of the S in crude viscose-rayon is readily removed by H_2O and is probably present as compounds of cellulose with the higher oxides of S; the rest is removed only by alkalis and is probably combined with cellulose as sulphides. A. G.

Beater and jordan control [in paper mills]. G. L. BIDWELL, JUN. (Paper Trade J., 1934, 98; T.A.P.P.I. Sect., 52—54).—Methods are outlined whereby instruments may be used to control the freeness and consistency of pulp by mechanical regulation of beater rolls and jordan plugs. H. A. H.

Production of straw half-stuff without pressure. M. RESCH, L. SKULSKAJA, and A. RUBENKINA-GOER (Zellstoff u. Papier, 1934, 14, 56—57).— NaOH gives better results than Ca(OH)_2 or Na_2CO_3 , the yield and mechanical properties being governed by the quantity of the reagent present rather than by its concn. The length of the cook is very greatly shortened by rise in temp. $\text{NaOH-Na}_2\text{S}$ mixture gave the best results with 10—17% (on the dry wt. of straw), a change in the $\text{NaOH}:\text{Na}_2\text{S}$ ratio down to 1:1 having no effect on yield or the properties of the stuff; further addition of Na_2S reduces both yield and strength. D. A. C.

Paper processing for package purposes. T. L. CROSSLEY (Oil & Soap, 1934, 11, 25—29).—Suitable

materials are described and their prep. and specifications are discussed.

De-inking and reprocessing of paper. S. D. WELLS (Chem. Met. Eng., 1933, 40, 634—637).—The removal of C-black printing from groundwood paper is not satisfactory. Paper printed with ink containing an Fe lake of hæmatein is converted into nodules of 20—25% consistency by treatment with H₂O in rod mills. The nodules are heated with aq. SO₂ of different concns. (2—6 g. per litre) and H₂O and filtered on rotary filters, and the pulp is re-used. SO₂ is recovered from the liquors by boiling, and after neutralisation with NaOH the insol. ink pigment is recovered by filter-pressing. D. K. M.

Microscopical and micrographical analysis of paper. A. R. MATTHIS (Ann. Chim. Analyt., 1934, [ii], 16, 1—14).—The technique is described of the prep. of microscope slides and photomicrographs, and the measurement of fibre length. D. A. C.

Significant sheet properties for developing specifications for various papers and paperboards. P. K. BAIRD (Paper Trade J., 1934, 98; T.A.P.P.I. Sect., 24—30).—An analysis is made of the replies to a questionnaire on the use requirements of paper. Some 53 properties are listed in their general order of importance, of which 20 may be considered significant for any particular grade. H. A. H.

Impermeability of transparent papers to water. G. TOCCO and E. CERBARO (Boll. R. Staz. Sperim. Ind. Carta, 1933, 5, 166—170).—An Al cylindrical box of 10 sq. cm. section, containing H₂O, is closed at the top with the paper and placed at a definite temp. in a space containing a dehydrating agent. Loss of H₂O gives the permeability to moisture or, if the box is inverted, the permeability to H₂O. "Impermeable" viscose papers are somewhat more permeable to H₂O vapour than "acetate" films, but the two differ little in their permeability to H₂O; the acetate films are, however, less liable to deformation. Cellulose nitrate and benzoate show marked resistance to H₂O vapour, especially when containing plasticiser and resin. Data are given for many products. T. H. P.

Comparison of natural ageing of paper with accelerated ageing by heating. R. H. RASCH and B. W. SCRIBNER (Bur. Stand. J. Res., 1933, 11, 727—732).—The chemical properties and folding-endurance of 33 papers, ranging in fibre composition from 100% rag to 100% sulphite and including purified wood fibre and sulphite- and soda-pulp papers, showed the same order of stability after 4 years' normal ageing as after 72 hr. at 100°. J. W. S.

Kaolin [for paper].—See VIII. Abs. EtOH from sulphite-liquor mash.—See XVIII. Determination of cellulose. Oiled wrapping papers for apples.—See XIX.

See also A., Feb., 134, Fatty acid esters of cellulose. Micellar orientation in cellulose ester films. 144, Viscosity of cellulose solutions. Swelling of benzylcellulose. Decomp. of cellulose by hot alkalis. 145, Action of alkaline Cu solution on silk fibroin. 229, Carbohydrates of vegetable downs.

PATENTS.

Treatment of fabrics having warp or weft pile of artificial silk, cotton, or such-like. J. DUTTON (B.P. 405,090, 30.11.32).—To straighten out the pile, the fabric is thoroughly wetted and passed over heated revolving cylinders, against which it is simultaneously brushed or combed. F. R. E.

System of wood-pulp digester control. C. D. DE MERS, Assr. to TAYLOR INSTRUMENT COMPANIES (U.S.P. 1,911,145, 23.5.33. Appl., 9.3.32).—The steam inlet and blow-off valves are controlled by a combination of a slowly rotating cam formed to a temp. contour and the pressure in the digester. B. M. V.

Digestion of fibrous material [wood]. T. L. DUNBAR and A. D. MERRILL (U.S.P. 1,918,459, 18.7.33. Appl., 20.11.31).—Claim is made for a heat-exchange system, whereby the acid passing to the digester is heated under progressive increase in pressure during its passage through the system. A. R. P.

Furnace for smelting the residues from evaporated waste cellulose lyes. H. N. UNDÉN (U.S.P. 1,910,724, 23.5.33. Appl., 6.3.30. Swed., 22.10.29).—A vertical tuyère is in the form of a H₂O-cooled bulb having outlets for air in all directions. B. M. V.

Manufacture of cellulose compounds [esters]. COURTAULDS, LTD., and R. L. WORMELL (B.P. 404,759, 9.9.32. Addn. to B.P. 377,795; B., 1932, 929).—Cellulose or a cellulose ester containing a small proportion of org. radical is treated with conc. (< 80%) H₃PO₄ or a mixture of conc. H₃PO₄ and conc. H₂SO₄, in presence of a neutral org. liquid or mixture of liquids miscible with the acid(s) employed (A) (C₅H₁₁OAc, with C₆H₆ if desired); after separation by filtration, the mixed ester product is treated with an org. acid, in presence of a catalyst (H₂SO₄) if desired, until the inorg. acid radical(s) of A is/are completely replaced to form the ester desired. F. R. E.

Purification of cellulose esters. W. WHITEHEAD, Assr. to CELANESE CORP. OF AMERICA (U.S.P. 1,919,002, 18.7.33. Appl., 2.10.29).—The COMe₂ solution of the ester is extracted with CHCl₃, which removes the impurities. Cellulose acetate with Ac val. 54 has an Ac val. 57—60 after this treatment and its solutions in COMe₂ are quite transparent. A. R. P.

Manufacture of artificial filaments, threads, films, etc. BRIT. CELANESE, LTD., H. C. OLPIN, and G. H. ELLIS (B.P. 404,940, 19.7.32).—Fastness to acid fading (of aminoanthraquinone dyes) on cellulose derivatives (acetate) is improved by incorporation of NH₂- (or substituted NH₂-)derivatives of cellulose insol. in dil. alkali and containing > 1 wt.-% (0.1—0.2%) of N; these are preferably added to the spinning solution. H. A. P.

Production or treatment of artificial filaments, threads, etc. BRIT. CELANESE, LTD., G. H. ELLIS, and [in part] C. DREYFUS (B.P. 404,933, 16.6.32).—Delustrated rayon is produced by addition to a cellulose ester (acetate) solution before spinning of (< 10%) of a finely-divided (1—2 μ) incompatible (poly)saccharide (rice or maize starch, fuculose, starch esters) and, if desired, a finely-divided, insol., dark-coloured, inorg. substance (1—2%

of delustring agent). The spun (and woven) material is treated with hot H_2O or is scoured (soap). H. A. P.

[Manufacture of] copying papers. MORLAND & IMPEY, LTD., and A. G. RENDALL (B.P. 404,801, 23.12.32).—A paper sheet is coated on both sides with C and on one side with a layer of wax, so that when the wax receives an impression the C layer behind it makes the impression legible and so enables the sheet to serve as one of the required copies. F. R. E.

Stencil paper. K. W. CARR, Assr. to DITTO, INC. (U.S.P. 1,916,203, 4.7.33. Appl., 7.5.30).—A mixture of Al stearate (2), 45% PhOH- CH_2O resin solution (16), chlorinated $C_{10}H_8$ (halowax) (14), and maize oil (13 pts.) is applied to a fabric backing and the sheet is heated to harden the resin. A. R. P.

Treatment of felts for paper machines. DEUTS. BEKLEIDUNGSIND. G.M.B.H. (B.P. 405,103, 4.1.33. Ger., 6.1. and 28.11.32).—While in use the felts are treated on their paper-carrying side with continual addition of small quantities of solid, liquid, or gaseous substances (oxides, carbonates, or borates of alkaline-earth or heavy metals, NH_3 , or NH_4 salts of weak acids) to neutralise H_2SO_4 formed by hydrolysis of the alum sizing; the treatment may be carried out by wetting rollers, spraying nozzles, or by a current of drying-air loaded with the neutralising substance. F. R. E.

Separating component materials.—See I. Dispersing agents.—See III. S dye.—See IV. Bedding glass.—See VIII. Fibre furniture.—See XIII.

VI.—BLEACHING; DYEING; PRINTING; FINISHING.

Continuous dyeing of loose cotton on a large scale in the United States and Soviet Russia. J. BRANDWOOD (J. Soc. Dyers and Col., 1934, 50, 5—10).—A large machine capable of dyeing 1250 lb. of cotton per hr. while being carried forward on a brattice and there subject to a flow of dye liquor is described.

A. J. H.

Use of glucose in dyeing with the arylamides and substituted arylamides of 2:3-hydroxynaphthoic acid. G. H. FRANK (Sealed Note, 5.3.25. J. Soc. Dyers and Col., 1934, 50, 14).—Glucose may be used instead of CH_2O for stabilising naphthol solutions used in dyeing with ice colours.

A. J. H.

Indigosol dyes for dyeing foulard. L. CABERTI (Boll. R. Staz. Sperim. Ind. Carta, 1933, 5, 190—193).—The various methods of applying Indigosol dyes to foulard are outlined.

T. H. P.

Cross-sectional form and dyeing power of viscose artificial silk. A. JÄGER (Kunstseide, 1933, 15, 122—128, 164—170; Chem. Zentr., 1933, ii, 1619—1620).—Changes due to variations in conditions of pptn. are described.

A. A. E.

Effect of previous starching on ease of washing of cotton fabrics. L. E. STOUT and K. F. SCHIERMEIER (Ind. Eng. Chem., 1933, 25, 1403—1405).—Soiled material is more readily cleansed when it is starched previous to soiling. Boiled wheat and rice starches are superior to sol. wheat and rice starches, and boiled maize starch is inferior.

A. G.

Blueing of cotton textiles by the sprinkling process. R. SANSONE (Boll. R. Staz. Sperim. Ind. Carta, 1933, 5, 193—198).—This process and its advantages are discussed.

T. H. P.

Determining sulphite-S in fibres.—See V. Determinants.—See XII. Dyeing of leather.—See XV. Potato-starch size.—See XVII.

PATENTS.

Stripping of dyes. A. K. SCRIBNER, Assr. to VIRGINIA SMELTING Co. (U.S.P. 1,918,873, 18.7.33. Appl., 11.9.29).—The dyed fabric is immersed in a solution containing $ZnSnO_4$ and $NaHSO_3$.

A. R. P.

Dyeing with azo dyes. [Resist-printing of ice colours.] J. HARDCASTLE & Co., LTD., C. S. PARKER, C. L. WALL, and F. FARRINGTON (B.P. 405,005, 20.7.32).—Use of an Al salt of an (org.) acid that does not cause tendering [$Al(OAc)_3$] as resist prior to application of the passive coupling component enables the padded goods to be stored without depreciation, and allows overprinting with aniline-black, Rapidogen, and Rapid-fast dyes. Other additions to the resist-printing paste claimed are a Mn salt, unswollen starch, and a peptising agent (NH_4CNS).

H. A. P.

Fur dyeing. IMPERIAL CHEM. INDUSTRIES, LTD., C. H. BARLOW, and L. G. LAWRIE (B.P. 404,969, 20.4.32).—Pretreatment of furs with quaternary NH_4 salts containing an alkyl radical $\langle C_8$ (dodecyl- or octadecylpyridinium bromide) and free from OH unless acylamino-groups are also present enables them to be dyed at low temp. ($\geq 40^\circ$) with acid, direct cotton, chrome, or vat dyes.

H. A. P.

Manufacture of coloured regenerated cellulose material. H. DOSNE (B.P. 403,049, 4.8.33. Ger., 19.8.32, 6.6. and 1.7.33).—The cellulose solution (xanthate or cuprammonium) is mixed with a solution of a leuco-ester salt of a vat dye ("Soledon" colours, "Indigosols," or similar compounds), coagulated, and, if desired, spun into threads, and the colour developed by acid oxidation; in the case of cuprammonium solutions the Cu salt produced on acid coagulation may act as oxidant.

C. H.

Improving [obtaining soft-transparent effects on] cellulose-containing fabrics, threads, and the like. HEBERLEIN & Co. A.-G. (B.P. 404,792, 22.11.32. Ger., 23.11.31).—The materials are subjected for a short time (a few sec.) below 0° (about -10°) to the action of H_2SO_4 ($d \leq 1.53$), together with agents for preventing decomp. of the fibres, e.g., C_5H_5N , its homologues and derivatives, amyl alcohol, glycol, glycerin, NH_4 salts, etc.; if desired, the acid treatment may be preceded and/or followed by an alkaline mercerising treatment at $> 0^\circ$.

F. R. E.

Provision of articles [of fabric material or rubber] with surface finishes. INTERNAT. LATEX PROCESSES, LTD., and E. A. MURPHY (B.P. 405,120, 20.2.33).—The surface is treated with a flocculent rubber ppt. obtained from an aq. dispersion of rubber and while wet is contacted or dusted with a powder such as starch or finely-divided cotton or wool.

D. F. T.

[Dry] cleaning of fabrics. W. T. REDDISH (B.P. 401,752, 23.5.32).—See U.S.P. 1,911,289; B., 1934, 235.

Dispersing agents.—See III. Treating artificial filaments.—See V. Zr etc. solutions.—See VII. Preserving fabrics etc.—See IX. Colouring rubber.—See XIV.

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

Single-tower process of sulphuric acid manufacture. P. V. SAMARSKI and E. K. ZEIBERLICH (J. Chem. Ind. Russ., 1933, 10, No. 9, 20—24).—A plant, consisting of one small tower of special construction, lined with fused basalt or acid-resistant concrete, and possessing a capacity of 100 cu. m., produces as much H_2SO_4 as a Petersen plant of 2000 cu. m. capacity, and consisting of 2 Glover and 2—3 Gay-Lussac towers. R. T.

Production of sulphuric acid from flue gases. B. D. SCHNEERSON (J. Chem. Ind. Russ., 1933, 10, No. 9, 24—28).—The flue gases, containing 0.3—0.5% SO_2 , are mixed with air and passed into a tower packed with Fe over which H_2O is percolating, when 60% conversion of SO_2 with production of $FeSO_4$ takes place; the aq. $FeSO_4$ collecting at the bottom of the tower can be used repeatedly. As a result of side-reactions between SO_2 and H_2 , a certain amount of H_2S is formed, and after about a month the pieces of Fe in the tower become coated with FeS, and oxidation of SO_2 ceases. The FeS can be removed by passing 10% HCl through the tower. SO_2 undergoes absorption and oxidation in 0.02—0.06% aq. $MnSO_4$, yielding $> 35\%$ H_2SO_4 ; at higher concns. of H_2SO_4 oxidation ceases. R. T.

Removal of arsenic from sulphuric acid factory gases by absorption in sulphuric acid. V. F. POSTNIKOV, L. L. KUZMIN, and N. K. VOROBYEV (J. Chem. Ind. Russ., 1933, 10, No. 9, 55—59).—The solubility of As_2O_3 in H_2SO_4 (I) increases with the temp., and diminishes with the concn. of (I) to 69%, rises to a max. at 78%, and then falls again. SO_2 from pyrites is best freed from As by passing through a scrubber containing 78% (I) at 100°, and then through a second scrubber with 31% (I). The ppt. separating from the cooled acid contains 66% As_2O_3 . R. T.

Corrosion of andesite in the tower process for sulphuric acid manufacture. I. E. ADADUROV and E. A. BAUMAN (J. Chem. Ind. Russ., 1933, 10, No. 9, 33—35).—Corrosion of andesite (I) is at a max. in 60%, and at a min. in 80% H_2SO_4 ; it is little affected by the presence of 0.7—6% of N_2O_3 , but increases with rising temp. Chiefly the Fe and Al of (I) are dissolved by the acid; the rate of dissolution of the Ca of (I) is much smaller, and varies inversely with the H_2SO_4 concn. R. T.

Obtaining concentrated nitric acid and chrome alum. I. A. MIRKIN and V. Y. VENEROVA (Trans. Sci. Inst. Fertilisers, Moscow, 1932, No. 92, 128—130).— NO_2 is introduced into a mixture of $K_2Cr_2O_7$ and H_2SO_4 , the HNO_3 formed being distilled off. CH. ABS.

Simultaneous oxidation of ammonia and sulphur dioxide. A. A. IONAS and I. A. MIRKIN (Trans. Sci. Inst. Fertilisers, Moscow, 1932, No. 92, 68—77).—The presence of SO_2 in the catalytic oxidation of NH_3 with O_2 does not impede the reaction; SO_3 is formed. CH. ABS.

Volatility of ammonium bicarbonate. I. S. TELETOV, G. I. GORSCHTEIN, and Z. P. TKATSCHENKO (J. Chem. Ind. Russ., 1933, 10, No. 10, 53—55).—The volatility (I) of NH_4HCO_3 increases rapidly with rise in temp. and with fineness of milling. (I) is unaffected by adding NH_4NO_3 , $(NH_4)_2SO_4$, NH_4Cl , or low-b.p. hydrocarbons, is augmented by peat, wood C, black earth, and phosphorite, in the order given, and is considerably diminished by high-b.p. mineral oils. R. T.

Refining of Polish potassium salts. T. KUCZYŃSKI (Przemysł Chem., 1934, 18, 1—4).—The chief difficulty in the refining of Polish sylvinites and langbeinites lies in the difficulty in separating the salts from the finely-divided clay with which they are permeated. R. T.

Laws of filtration of [sylvinites] sludges. L. BAŻYŃSKI (Przemysł Chem., 1934, 18, 9—16).—The resistance to the passage of H_2O through layers of the sludge (I) obtained from solutions of Kałusz sylvinites augments with the vol. of H_2O already passed through (I). The ordinary laws of filtration are not applicable to (I). R. T.

Preparation of double superphosphates from apatite concentrates and phosphoric acid. I. L. E. BERLIN, L. ANTOCHINA, A. VINOKUROVA, L. OSCHEROVITSCH, and A. SALOVA. II. L. E. BERLIN, V. G. MIKEROV, and E. N. SHUKOV (J. Chem. Ind. Russ., 1933, 10, No. 10, 37—45, 45—47).—I. Double superphosphate (I) is obtained according to the reaction $2Ca_5F(PO_4)_3 + 14H_3PO_4 + 10H_2O \rightarrow 10Ca_4H_2P_2O_8 \cdot 10H_2O + 2HF$ by heating apatite concentrates at 40—100° during 3 hr. with a 10—30% excess of 70—80% H_3PO_4 . (I) contains 34—51% of assimilable P_2O_5 , representing 80—95% of the total P_2O_5 content.

II. The above process gives good results when performed on a semi-factory scale. The product is harder and denser than ordinary superphosphate, and does not deteriorate on storing. R. T.

Ammonisation of double superphosphates. L. BERLIN and L. GORITSKAJA (J. Chem. Ind. Russ., 1933, 10, No. 10, 21—27).—Fertilisers (I) containing NH_3 8.5, H_2O -sol. P_2O_5 14, and assimilable P_2O_5 29% are obtained from NH_3 and double superphosphate (II), freshly prepared from phosphorite; analogous products can be prepared from (II) from apatite concentrates. (I) of a higher NH_3 content can be prepared but loses NH_3 on storing. R. T.

Artificial dehydration of hydrated salts by means of solar energy. A. V. NIKOLAEV, V. M. VDOVENKO, and P. F. POCHIL (Compt. rend. Acad. Sci. U.R.S.S., 1934, 1, 26—27).—When tanks of H_2O , covered with kerosene, petroleum, or oleonaphtha to a depth of 3—5 mm., are exposed to bright sunshine, the temp. of the H_2O rises several degrees $>$ that of H_2O not covered by an oil layer, the latter preventing evaporation and consequent loss of energy. By placing such an oil film on a saturated solution of $Na_2SO_4 \cdot 10H_2O$ (I) with solid crystals of (I) on the bottom of the tank, this energy has been utilised to convert the hydrated form into the anhyd. salt at 32.4°. J. W. S.

Production of calcium nitrate from by-product nitrogen [oxide] gases. A. M. DUBOVITZKI and F. G. MARGOLIS (Trans. Sci. Inst. Fertilisers, Moscow, 1932,

No. 92, 131—138).—80—87% of the NO was absorbed in towers by aq. $\text{Ca}(\text{OH})_2$ (50 g. of CaO per litre); addition of $\text{Ca}(\text{NO}_3)_2$ or ground marble had no effect. With CaO the NO_2' was $>$ with CaCO_3 . CH. ABS.

Simultaneous production of calcium carbide and phosphorus. A. S. MIKULINSKI (J. Chem. Ind. Russ., 1933, 10, No. 10, 32—37).— Ca_3P_2 present in CaC_2 (I) prepared from phosphorite (II) is converted into Ca_3N_2 and CaCN_2 during the reaction of nitrification of (I), with liberation of P, which distils off. It is concluded that (I) obtained from (II) is suitable for $\text{CN}\cdot\text{NH}_2$ production. R. T.

Water content of magnesium oxide. J. E. SCHMIDT and J. C. KRANTZ, JUN. (J. Amer. Pharm. Assoc., 1933, 22, 1245—1246).—The heavy variety of MgO conforms with the U.S.P. (< 10% of H_2O), but the light variety contains 18.5% of H_2O ($\text{MgO}\cdot 0.5\text{H}_2\text{O}$), which is re-absorbed after ignition. W. S.

Alumina from Poshan bauxite. E. O. WILSON and Y. L. KAO (J. Chinese Chem. Soc., 1933, 1, 120—138).— Al_2O_3 (98.81%, containing SiO_2 0.21% and Na_2O 1.10%) has been obtained from Poshan bauxite (containing SiO_2 19.78, Fe_2O_3 13.95%) on a laboratory scale by the following process. The ore is ground with Na_2CO_3 and CaO so that $\text{Na}_2\text{CO}_3 : (\text{Al}_2\text{O}_3 + \text{TiO}_2) = 1.4 = \text{CaO} : \text{SiO}_2$, and calcined at 1050° for 4 hr. The product is extracted with hot H_2O , and SiO_2 is removed by boiling the extract with CaO. After filtering, Al_2O_3 is pptd. by passing CO_2 through the solution. E. S. H.

Determination of acid in fuller's earth. L. KALUSKY (Seifensieder-Ztg., 1933, 60, 383—384; Chem. Zentr., 1933, ii, 2075).—12.5 g. are boiled for 30 min. with 70 c.c. of H_2O ; the liquid is diluted to 250 c.c. and aliquot parts are titrated with 0.01N-NaOH, using phenolphthalein and Me-orange. A. A. E.

Action of "poisons" on vanadium contact masses. M. O. CHARMANDARIAN and K. I. BROD-VITSCH (J. Chem. Ind. Russ., 1933, 10, No. 9, 35—38).— H_2O , H_2S , CO_2 , and HCl, alone or together, do not poison V_2O_5 - SiO_2 - PbO catalysts for SO_3 production, whilst CO and As_2O_3 do so, to an extent roughly proportional to their concn.; in presence of CO_2 the action of CO and As_2O_3 is inhibited. R. T.

Regeneration of vanadium catalysts. I. E. ADADUROV and P. P. PERSCHIN (J. Chem. Ind. Russ., 1933, 10, No. 9, 38—40).—Inactivated V_2O_5 - SnO_2 - SiO_2 catalysts for oxidation of SO_2 cannot be regenerated by treatment with aqua regia, which destroys their structure. 76% of the V_2O_5 and 80% of the SnO_2 can be extracted with 22% H_2SO_4 , the remainder being strongly adsorbed by SiO_2 . R. T.

New sources of boron compounds. S. I. VOLFKOVITSCH (J. Chem. Ind. Russ., 1933, 10, No. 10, 56—57).—Caucasian latolite (I), containing 8.5% B_2O_3 , is heated at 800—850°, and extracted with 20% H_2SO_4 at 80° during 30 min., the solution is boiled with CaCO_3 to remove Fe^{+++} , Ca^{++} , Al^{+++} , and SiO_2 , filtered, and concd. The product obtained yields 99.9% H_3BO_3 (II) after one recrystallisation. 80—85% yields of (II) are obtained, with an expenditure of 0.56 kg. of H_2SO_4 per kg. of (I). R. T.

Alkaline absorption of nitrogen oxides. I. A. MIRKIN and T. V. GLAZOVA (Trans. Sci. Inst. Fertilisers, Moscow, 1932, No. 92, 117—127).—With aq. NaOH or KOH (19—20%) 99.9%, and with Na_2CO_3 or K_2CO_3 99.7%, absorption of NO was recorded. In presence of O_2 the proportion of NO_2' is 5—10%. CH. ABS.

Oxidation of sulphur dioxide by nitrosylsulphuric acid in the liquid phase. E. K. LOPATTO and A. M. SAVINAEV (J. Chem. Ind. Russ., 1933, 10, No. 9, 28—33).— H_2SO_4 is obtained in yields of 45 tons *per diem* per cu. m. of reaction space by injecting SO_2 under pressure into $\text{NO}\cdot\text{SO}_2\cdot\text{OH}$ at 20—50°. The processes of absorption and oxidation of SO_2 take place practically instantaneously. Apparatus for continuous production is described. R. T.

Karabugaz and the bromine industry. A. G. BAITSCHIKOV (J. Chem. Ind. Russ., 1933, 10, No. 9, 8—13).—The H_2O of the Gulf of Karabugaz (I) and of a no. of salt lakes in its vicinity contain 0.01—0.07% Br, the Br content being lowest in the spring and highest in the autumn. The Br reserves of (I) amount to about 25×10^6 tons, and the annual increment of Br to approx. 10^5 tons. R. T.

Large-scale hydrogenation.—See I. CO_2 and S from gases. Petroleum refinery acid recovery.—See II. HCl-resistant metals.—See X. Electrolysis of NaCl.—See XI. Cd and Cr pigments.—See XIII. N fertilisers.—See XVI. Detecting CO in O_2 , and in CO_2 .—See XX.

See also A., Feb., 142, Prep. of sols and gels. 148, CaCN_2 . 154, Electrolysis of Na_2S , and of MeOH solution of CuCl_2 . 157, La-Nd separation. 161, Indicators for NO_2' . Determining P in titaniferous material. 220, Reaction of *Aspergillus repens* on NH_2NO_3 . 221, Production of H_2O_2 by *Bacillus bulgaricum*.

PATENTS.

Preparation of phosphoric acid. G. F. MOORE, Assr. to U.S. PHOSPHORIC PRODUCTS CORP. (U.S.P. 1,910,808, 23.5.33. Appl., 15.8.30).—Phosphate rock or other similar material is converted, by means of H_2SO_4 , in turn into $\text{CaH}_4(\text{PO}_4)_2$, $\text{NH}_4\text{H}_2\text{PO}_4$, or other alkaline phosphate, which is crystallised out, redissolved, reconverted into $\text{Ca}(\text{H}_2\text{PO}_4)_2$, and finally treated with H_2SO_4 to yield H_3PO_4 . B. M. V.

Oxidation of ammonia and catalyst therefor. U. B. BRAY, Assr. to ATMOSPHERIC NITROGEN CORP. (U.S.P. 1,919,005, 18.7.33. Appl., 11.6.30).—A solution of $\text{Co}(\text{NO}_3)_2$ is treated with aq. NH_3 to ppt. about 5% of the Co together with the Fe, P, and As, the purified solution is evaporated to dryness, and the residue calcined at 400° to yield pure Co_3O_4 containing < 0.5% Ni, < 0.2% CaO, < 0.1% Si, and < 0.01% (P + As). A. R. P.

Production of [cobalt oxide] catalyst [for ammonia oxidation]. U. B. BRAY, Assr. to ATMOSPHERIC NITROGEN CORP. (U.S.P. 1,918,957, 18.7.33. Appl., 13.11.30).—Commercial Co is dissolved in HNO_3 and the solution treated with an alkali to ppt. all the impurities and about 5% of the Co. The filtered solution is then treated with more alkali to ppt. the remainder of the Co

in a pure form, and the ppt. is heated to obtain an active oxide catalyst. A. R. P.

Production of sodium sesquicarbonate. H. C. BRITTON, Assr. to SOLVAY PROCESS Co. (U.S.P. 1,911,794, 30.5.33. Appl., 25.3.29).—A bulk of solution of the sesquicarbonate is maintained below the decomp. temp. and with solid in suspension, and equiv. amounts of Na_2CO_3 and NaHCO_3 are added accompanied by heat to produce a temp. rise of 30° ; the solution is then drawn off to a cooler in which the temp. fall is 30° , the coarse sesquicarbonate crystals are separated, and the fine crystals and liquor are returned to the process. B. M. V.

Conversion of ferrophosphorus into [tribasic] phosphates. H. ADLER, Assr. to VICTOR CHEM. WORKS (U.S.P. 1,909,996, 23.5.33. Appl., 30.9.31).—After the heating of comminuted Fe-P with alkali carbonate the frit is leached with aq. liquor containing enough NaOH finally to form Na_3PO_4 and 1–2% excess of NaOH. The liquor is centrifugally filtered, crystallised, and re-used. B. M. V.

Preparation, separation, or purification of salts or salt solutions. G. AUSTERWEL and C. JEANPROST B.P. 403,077, 2.6.33. Cf. B.P. 402,770; B., 1934, 237).—For the separation of two bases (*A* and *B*) from one another in a solution (I) containing them combined with a common anion a long tube (*T*) is packed with layers of base-exchanging substance, e.g., zeolite (II), the ratio *A*:*B* in the layers progressively diminishing from the bottom upwards, and (I) is then allowed to trickle through *T*, whereby (II) becomes richer in *B* and a pure solution of *A* is obtained. *T* is then inverted and more of (I) is allowed to trickle through to give a pure solution of *B* and regenerate (II) for the first purification. The method is applied to the separation of NaCl and KCl and of NaCN and KCN. A. R. P.

Manufacture of calcium hypochlorite. F. T. MEEHAN, and IMPERIAL CHEM. INDUSTRIES, LTD. (B.P. 404,627, 15.7.32).—Milk-of-lime is treated with Cl_2 until the solid phase consists entirely of hexagonal plates of basic hypochlorite; after centrifuging to remove mother-liquor the plates are suspended in H_2O and Cl_2 is passed in until the solid phase is normal $\text{Ca}(\text{OCl})_2$ in the form of tetragonal plates. The mother-liquor from the second stage is returned to the first. A. R. P.

Production of hydrated [metal] nitrate double salt. A. L. MOHLER, Assr. to HERCULES POWDER Co. (U.S.P. 1,901,807, 23.5.33. Appl., 4.3.30).— MgO and NH_3 or weak acid salts thereof are caused to react with HNO_3 containing H_2O equiv. to the H_2O of crystallisation in the hydrated salt, and the melt is cooled to effect direct crystallisation of the double salt. B. M. V.

Treatment of aluminous material. L. BRADLEY and E. P. MCKEEFE, Assrs. to BRADLEY-MCKEEFE CORP. (U.S.P. 1,918,735, 18.7.33. Appl., 29.8.29).—Natural silicates or slags (I) containing a high proportion of Al_2O_3 are digested with HCl and steam to obtain a solution (*A*) containing Al, Fe, Cu, and alkalis and a residue of SiO_2 . *A* is boiled with CaCO_3 to yield a ppt. (*B*) of crude Al_2O_3 etc., a solution (*C*) of CaCl_2 , KCl, etc., and CO_2 . *B* is digested with NaOH and the clarified aq. NaAlO_2 is treated with CO_2 to yield pure Al_2O_3 and

aq. Na_2CO_3 , which is causticised with CaO, the CaCO_3 being returned to *A* and the NaOH to *B*. *C* is treated with H_2SO_4 to ppt. $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$ and the HCl is evaporated, the KCl being separated by crystallisation and the acid used for treating further quantities of (I). A. R. P.

Recovery of alumina from silicates. F. M. McCLENAHAN (U.S.P. 1,918,923, 18.7.33. Appl., 31.10.29).—Kaolin (I) is digested with aq. NH_4HF_2 and steam, the sludge is separated from the solution and lightly calcined to expel NH_4F , the residue is heated with NH_4HSO_4 (II) to expel the remainder of the F and leave a residue of $\text{NH}_4\text{Al}(\text{SO}_4)_2$ which is purified by crystallisation, and the alum crystals are calcined to yield Al_2O_3 and regenerate (II). Provision is also made for recovery of SiO_2 and TiO_2 in (I). A. R. P.

Recovery of zinc compounds from technical zinc liquors. E. F. STEINBRING, Assr. to KREBS PIGMENT & COLOR CORP. (U.S.P. 1,912,332, 30.5.33. Appl., 3.11.30).—To a liquor containing SO_4 (≤ 15 mols.-% of the Zn) is added CaO, NaOH, or similar basic material sufficient to ppt. all the Zn; pptn. is effected at $< 51^\circ$ and washing at $> 51^\circ$. B. M. V.

Granulation of zinc chloride. A. W. WAHLGREN, Assr. to GRASSELLI CHEM. Co. (U.S.P. 1,911,860, 30.5.33. Appl., 9.6.32).— ZnCl_2 is granulated and sieved at $> 90^\circ$ in an atm. maintained at $> 90^\circ$, cooling being effected in the closed containers for transport. B. M. V.

(A) Recovery of lead directly from lead ore in the form of an acetate of lead. (B) Converting roasted lead ores and bag-house dust directly into lead salts. L. P. CURTIN (U.S.P. 1,916,302—3, 4.7.33. Appl., [A] 23.10.31, [B] 3.5.32).—(A) Roasted Pb ore is leached with cold aq. $\text{Pb}(\text{OAc})_2$ to remove PbO, then with hot $\text{Ca}(\text{OAc})_2$ which converts PbSO_4 into $\text{Pb}(\text{OAc})_2$ and CaSO_4 . (B) The material is leached with hot 25–35% aq. NH_4OAc containing sufficient $\text{Ca}(\text{OAc})_2$ to ppt. any SO_4^{--} ; the filtered solution is treated with CaO and CO_2 to ppt. basic Pb carbonate and regenerate the leach liquor. A. R. P.

Preparation of catalysts [for conversion of olefines into alcohols]. DISTILLERS Co., LTD., W. P. JOSHUA, H. M. STANLEY, and J. B. DYMCK (B.P. 404,115, 3.11.32).—A mixture of MnCO_3 (1), B_2O_3 (0.5), and H_3PO_4 (3.6 g.-mol.) is digested with H_2O and the solution evaporated to dryness, 18.5 g. of linseed, tung, or other drying oil being added during evaporation. The dry product is baked at 200° , ground to a fine powder, mixed with 3% of linseed oil, and pressed into tablets which are baked at 200° for 1–2 hr. These tablets act as efficient catalysts for conversion of carbonate and steam into EtOH at 270 – 290° under pressure. A. R. P.

Preparation of [oxide] catalysts. A. E. CRAVER, Assr. to BARRETT Co. (U.S.P. 1,914,557—8, 20.6.33. Appl., [A, B] 4.2.29).—A solution of a compound of a metal of groups IV–VI is treated with an aliphatic hydroxycarboxylic acid, e.g., citric, tartaric, or malic, and with aq. NH_3 , then evaporated to a gummy mass which is ignited alone or in presence of an inert carrier to yield a porous oxide of high catalytic activity. The following oxides can be made in this way: (A) Ta_2O_5

CeO₂, ThO₂, ZrO₂, TiO₂, Al₂O₃, or Cr₂O₃, (B) V₂O₅ or MoO₃. A. R. P.

Precipitation of titanium compounds. L. W. RYAN, Assr. to TITANIUM PIGMENT Co., INC. (U.S.P. 1,916,236, 4.7.33. Appl., 13.6.31. Ger., 15.3.29).—A solution containing about 5–7% TiO₂ and 26% SO₄ together with FeO (obtained by treating ilmenite with H₂SO₄) is treated with 1% of H₂C₂O₄ and about 0.1% of H₃PO₄ and poured into H₂O at 95°, with vigorous stirring, to ppt. TiO(OH)₂. A. R. P.

Manufacture of zirconium, silicon, and alkali-metal solutions. C. J. KINZIE, Assr. to TITANIUM ALLOY MANUF. Co. (U.S.P. 1,916,226, 4.7.33. Appl., 23.10.31).—A 1:1 mixture of Na₂CO₃ and finely-ground ZrSiO₄ is roasted at 900°, the product is finely ground in H₂O, the excess of alkali removed by decantation, and the suspension poured into dil. HCl in amount just insufficient to combine with all the Na₂O and ZrO₂ present. The resulting colloidal solution containing NaCl, ZrOCl₂, and H₂SiO₃ is suitable for impregnating fabrics, the ZrO₂ and SiO₂ being subsequently fixed by dipping the fabric in aq. NH₃. A. R. P.

Production of dense blocks of "dry ice" out of liquid carbon dioxide. L. MELLERSH-JACKSON. From MASCHINENFABR. SURTH ZWEIGNIEDERLASSUNG DER GES. F. LINDE'S EISMASCHINEN A.-G. (B.P. 404,833, 31.3.33).—Liquid CO₂ maintained at a pressure above the triple point is allowed to percolate through the walls of a vessel (V) (which is maintained fully charged with liquid) into an outer vessel in which the pressure is maintained at a lower val., with consequent evaporation, the cold being transmitted to the liquid in V, which gradually sets to a solid block. B. M. V.

(A, c) Production of hydrogen from (A) hydrocarbon gases, (c) refinery and other hydrocarbon gases. (B) Reactivation of catalyst used in preparation of hydrogen. (D) Manufacture of hydrogen. (E) Manufacture of gas rich in free hydrogen. (A–D) G. H. FREYERMUTH, (B–E) W. V. HANKS, (C) J. K. SMALL, and (D, E) P. L. YOUNG, Assrs. to STANDARD OIL DEVELOPMENT Co. (U.S.P. 1,904,439–41 and 1,904,542–3, 18.4.33. Appl., [A] 5.3.30, [B] 6.3.30, [C] 7.3.30, [D] 30.8.29, [E] 17.9.32).—(D) A mixture of CH₄ with excess of steam is passed over a Ni–Al₂O₃ catalyst at 535–815°/10–50 atm., and then over a Fe₂O₃ or Fe–Cr catalyst at 260–480° to convert CO into CO₂. The CO₂ is absorbed in a suitable solvent and unchanged hydrocarbon and steam are removed by cooling and compression. (E) The unchanged hydrocarbon is removed from the reaction mixture by scrubbing with oil under high pressure. (A) Normally liquid hydrocarbons are removed from the gas (e.g., natural gas) by scrubbing with oil under pressure prior to passing the gas through the converter as in (D). (B) The catalyst is regenerated by treatment first with steam at 650–980° for 5 hr., then with H₂ at 650° for 2 hr. (C) A combination of the processes described in (D) and (B) is claimed. A. R. P.

Manufacture of sulphur [from ammonium polysulphide, thiosulphate, and polythionate solutions]. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 404,010, 4.7.32).—Gas liquors containing the above

salts are passed downwards through a long column (I) into the bottom of which superheated steam enters so that the S resulting from the thermal decomp. of the poly-salts separates in a liquid form, the b.p. of the liquid at the steam inlet being raised to > 120° by the hydrostatic pressure of the liquid column above it. Means are provided for removing the liquids and the purified solution of (NH₄)₂SO₄ from the bottom of (I) and for breaking up the current of steam in its passage up (I). A. R. P.

Treatment of iron pyrites for recovery of sulphur and formation of iron oxide. S. I. LEVY (B.P. 403,961, 30.6.32).—Finely-divided FeS₂ is allowed to fall freely through a preheated column (I) up which air is passed in amount sufficient to convert the Fe into Fe₃O₄ and > 60% of the S into SO₂. The gases from the top of (I) pass downwards through a reduction chamber (II) into the top of which pulverised coal is sprayed by means of inert gases from the end of the condensation system; since the temp. in (II) does not fall below 1000° complete reduction of SO₂ to S is obtained. The gases from (II) pass through a dust settler and/or electrostatic purifier and then through condensers, the heat of condensation being utilised in raising steam. A. R. P.

Colloidal hydrophilic sulphur. H. C. YOUNG (U.S.P. 1,917,351, 11.7.33. Appl., 22.3.32).—Claim is made for an aq. suspension of colloidal S containing < 50% S. This is made by passing H₂S and a slight excess of SO₂ into H₂O, so that the solution contains < 1.5 millimols. of polythionic acids per g. of S liberated, when a viscous paste is obtained. This paste dissolves readily in H₂O and in EtOH and coagulates with weak alkalis only with difficulty. A. R. P.

Catalytic process. Lubricant.—See I. [H₂ from] gases. [Brine in] wells. S from petroleum oils.—See II. Flaked NaOAc and Pb(OAc)₂.—See III. Pigments.—See XIII. Fertilisers.—See XVI.

VIII.—GLASS; CERAMICS.

Dust-like sand in glass manufacture. I. I. KITAIGORODSKI and I. V. MYAKHLOV (Keram. i Steklo, 1933, 9, No. 6, 14–19).—The sand should contain > 3% H₂O. Reaction is more rapid than with coarse sand. The vitreous state begins to appear at 850–950° (with coarser sand, 1050–1150°). Introduction of sulphate (Na₂O 5% on the glass) eliminates bubbles; with coarser sand this amount of sulphate produces an insufficiently melted glass. CH. ABS.

Viscosity-time-temperature relations in glass at annealing temperatures. H. R. LILLIE (J. Amer. Ceram. Soc., 1933, 16, 619–631).—Previous fibre-elongation measurements (B., 1931, 841) were repeated with an improved apparatus enabling steady and uniform temp. conditions to be attained. The viscosity (η) was found to depend on the previous heat-treatment and to increase with time (due to heat-treatment and not to work-hardening), approaching a steady val. which is determined by the degree of mol. aggregation. The aggregation equilibrium is a function of the temp. The mol. or aggregate wt. of the glass (SiO₂ 69.73, Na₂O 20.96, CaO 9.05, R₂O₃ 0.18%) was calc. (from

the expression of Sheppard and Houck) to be 112,000 at 500°. The change in η with time is discussed in connexion with the calculation of the min. annealing and cooling times. Divergence from the Adams and Williamson law of annealing is probably due to the η -time relationship. η vals. of $> 10^{16}$ were measured, but no plastic or true solid states were found.

J. A. S.

Electrical behaviour of glass at room temperature. E. M. GUYER (J. Amer. Ceram. Soc., 1933, 16, 607—618).—The d.c. conductivity was determined with the aid of a thermionic potentiometer. The time required for the current to reach a steady val. varies, according to the kind of glass, from a few min. to several hr. The anomalous behaviour of the residual (dielectric) current is illustrated. The behaviour of a glass was found to depend on its previous heat-treatment, an annealed glass having a conductivity $\frac{1}{2}$ that of a chilled glass. This was shown not to be due to mechanical strain caused by chilling.

J. A. S.

Effect of heat-treatment on expansivity of a pyrex glass. J. B. SAUNDERS and A. Q. TOOL (Bur. Stand. J. Res., 1933, 11, 799—810; cf. B., 1930, 1152).—Heat treatment at 650—750° increased, and treatment at 450—650° lowered, the mean coeff. of expansion between 20° and 200°. The changes are reversible, and are accompanied by considerable vol. changes, the d being the greater the lower is the temp. of annealing.

J. W. S.

Discovery of a kaolin deposit in New Mexico. L. M. RICHARD (J. Amer. Ceram. Soc., 1933, 16, 632—633).—A white, plastic, fine-grain, residual clay occurs at a depth of 150—200 ft. It is comparable with English china clay and is suitable for all whitewares, refractories, and paper filling.

J. A. S.

Conditioning of clay in the plastic state. F. H. CLEWS (Trans. Ceram. Soc., 1934, 33, 1—14).—The effects of added electrolytes on the "workability," drying behaviour, and strength in the green state of clays, and on the properties of the dried ware, are discussed. With many, but not all, clays, those reagents tending to produce flocculation usually induce increased workability and permit a greater rate of drying. A sedimentation test is described by which the probable response of a clay to chemical treatment in the plastic state may be ascertained. The effect of the de-airing of clay in the plastic state is discussed; the process would seem in some cases to lead to improved working and to the production of better-quality ware. It is suggested that the processes of chemical conditioning and de-airing might be advantageously used in conjunction.

A. L. R.

Classification of florescence [in clayware]. E. LOVEJOY (Bull. Amer. Ceram. Soc., 1934, 13, 22—23; cf. B., 1929, 941).—The nature, cause, and prevention of cryptoflorescence, efflorescence, and inflorescence and of "scumming" in clayware are summarised.

J. A. S.

Discoloration and efflorescence of tiles. E. MOTSCHMANN (Keram. Rundsch., 1933, 41, 352—353; Chem. Zentr., 1933, ii, 2042).—Addition of BaCl_2 or $\text{BaCl}_2 + \text{BaCO}_3$ is preferred to that of BaCO_3 alone as protective agent.

A. A. E.

Mined soapstone bricks for boiler combustion chambers. O. V. NEFEDEVA, P. T. MAKUSHEVICH, and A. I. DVORETZKI (Izvest. Teplotekh. Inst., 1933, No. 4, 36—47).—The material is fired at 1300°. Heating at 800—900° should be prolonged to avoid cracks due to evolution of CO_2 from the MgCO_3 . The bricks, which are resistant to basic slag, withstand 1300°.

CH. ABS.

Permeability of refractory materials to gases. III. Experiments at temperatures up to 850°. F. H. CLEWS and A. T. GREEN (Trans. Ceram. Soc., 1934, 33, 21—32).—An account of work already abstracted (cf. B., 1933, 147).

A. L. R.

Cd pigments for the silicate industry.—See XIII.

PATENTS.

Making glass. SIMPLEX ENG. CO., Assees. of W. O. AMSLER (B.P. 405,012, 27.7.32. U.S., 28.7.31).—"Fining" of the glass is accelerated by a process of continuous circulation over a large area of the tank so that gas bubbles may more easily escape from the surface. The batch is fed into a heating chamber (*C*) where it is melted by a "hot spot" (*I*) (approx. 1450°) at the forward end and is caused to circulate along the surface backwards against the flames. *C* is connected [through a neck (*N*)] with a cooling chamber in which the circulation is in a forward direction towards a "cool spot." The width of *N* should be 10—35% of that of *C* and $\leq 60\%$ of the glass in *C* should lie between (*I*) and the back wall.

J. A. S.

Making of glass and electric furnaces therefor. HARTFORD-EMPIRE CO., Assees. of H. A. WADMAN (B.P. 404,733, 25.7.32. U.S., 25.7.31).—The glass is melted by its conduction of multi- (3-)phase current between graphite electrodes. Fresh batch is fed into the furnace (*F*) continuously at points between the electrodes so that the molten glass is substantially contained within a wall of unmelted batch. The glass is withdrawn from *F* through a vertical duct (provided with auxiliary heating electrodes) communicating with the bottom of *F*. The amount of batch passing through each feed-hole is regulated so that the total input is const. and the loads on the phases are balanced.

J. A. S.

Treatment of laminated glass. F. B. TRACE and R. G. WHITTEMORE, Assis. to DUPLATE CORP. (U.S.P. 1,910,072, 23.5.33. Appl., 2.6.32).—The cellulose plastic sheet is removed from the edges by a corrosive or solvent liquid, e.g., conc. H_2SO_4 , hot and under pressure.

B. M. V.

Bedding of glass for working. F. F. SHETTERLY, Assr. to BLUE RIDGE GLASS CORP. (U.S.P. 1,911,587, 30.5.33. Appl., 13.6.30).—The glass is bedded on neutralised or slightly acidified soda pulp for the manufacture of paper etc.

B. M. V.

Production of enamelled metal [steel] articles. L. R. SMITH (U.S.P. 1,919,136, 18.7.33. Appl., 15.2.33).—Steel pipes are coated with enamel and fired at 860°, then quenched in a NaNO_3 bath at 320—480° (405°) to produce a sorbitic structure in the steel and a strong, firmly adherent enamel coat.

A. R. P.

Kiln for treating earthy materials. W. HATHAWAY, Assr. to AMER. FACE BRICK RES. CORP. (U.S.P. 1,910,433, 23.5.33. Appl., 14.7.30).—A furnace for the continuous production of bloated ceramic material is described, the bloating being effected by evolution of gas at about the m.p. B. M. V.

Apparatus for drying clay and other ceramic materials. W. H. SACHS and R. T. VORIS, Assrs. to MANUFRS. EQUIPMENT Co. (U.S.P. 1,911,533, 30.5.33. Appl., 13.3.31).—Air-cooling means for a motor direct-coupled to a fan driving hot gases are described. B. M. V.

Production and application of refractory blocks and masses resisting destruction by carbon. VEREIN. STAHLWERKE A.-G. (B.P. 404,699, 21.7.32. Ger., 27.7.31).—The deposition of C from hydrocarbon gases is diminished by incorporating up to 0.5 wt.-% of B_2O_3 , Pb, Ni, Hg, As, Zn, Cd, Mn, Cr, Na, etc. (or compounds thereof) with the refractory at any suitable stage of its manufacture. J. A. S.

Manufacture of metal-coated refractory material. H. H. HARRIS (U.S.P. 1,911,189, 30.5.33. Appl., 17.5.30).—A mixture of comminuted refractory material, e.g., carborundum, and powdered refractory metals, e.g., alloys of Cr or Al, is pressed to form tiles or bricks, and these are heated to cause oxidation of the metal and consequent binding together of the particles. B. M. V.

Manufacture of abrasive materials. K. C. NICHOLSON, Assr. to CARBORUNDUM Co. (U.S.P. 1,910,444, 23.5.33. Appl., 13.2.31).—Granular abrasive (*A*) is wetted with a slurry of fusible material (*F*), the slurry being removed from the voids as much as possible and the H_2O from the remaining film; heat is then applied until *F* melts but *A* remains unaffected and substantially uncovered. B. M. V.

[Tunnel] kiln. Heat insulator.—See I. SiC resister rod.—See XI.

IX.—BUILDING MATERIALS.

Possibility of formation of compounds of $CaSO_4$ in cement grinding. P. SCHACHTSCHABEL (Zement, 1933, 22, 45—49; Chem. Zentr., 1933, ii, 2178).—Pptd. $CaSO_4 \cdot 2H_2O$ (H_2O 20.80%) loses in 23 days at 45° over P_2O_5 19.96% H_2O . The X-ray diagram of the dehydrated product corresponds with that of the hemihydrate (I). At 110° and 165° , respectively, in 2 months the residual H_2O was 0.7 and 0.3%. In the cement mill only (I) and sol. anhydrite (II) can be formed. (II) is more or less dehydrated (I). A. A. E.

Building materials from waste products obtained in the wood-chemical industry. TELEZHKIN (Lesokhim. Prom., 1933, 2, No. 1, 41).—"Okshara," obtained in the manufacture of AcOH, and containing $CaSO_4$ 53, tar 10, H_2SO_4 11, mineral substances 1, H_2O 10, and $Ca(OAc)_2$ 1.5%, when heated, with agitation, at 150 – 170° for 6–7 hr., affords "oksharit" ($CaSO_4$ 88.9%), which has the properties of gypsum of fair quality. CH. ABS.

Non-clinkered slag cement. P. P. BUDNIKOV (Zement, 1933, 22, 325–330, 342–344, 359–361;

Chem. Zentr., 1933, ii, 1570).—Basic, semi-dried, granulated blast-furnace slag (CaO 50%) is finely ground and then "activated" by addition of anhydrite, gypsum, anhydrite cement, or ignited dolomite. S present as CaS increases the strength. A. A. E.

Magnesia-rich Portland cement. H. KUHL and E. L. MEYER (Tonind. Ztg., 1934, 53, 6–8, 27–29, 40–42).—The sintering process is facilitated by MgO additions, but cements containing large amounts of MgO may show loss of strength after 3 years although passing the ordinary soundness tests. Presence of MgO does not affect the determination of free CaO by the Emley method. T. W. P.

Simple apparatus for testing cement characteristics. S. C. PIERCE and H. MCC. LARMOUR (Eng. News-Rec., 1934, 112, 114–116).—Methods for the routine determination of heat of hydration and vol. change in cements are described. Test data on cements show no relation between these properties and chemical composition. T. W. P.

Air-hardening lime mortar. I. A. STOIS and F. W. MEIER (Angew. Chem., 1933, 46, 794–796).—On long keeping of slaked CaO , the CaO content increases at the expense of H_2O , and the degree of fineness increases. The fatness of slaked CaO depends on its CaO and $Ca(OH)_2$ contents, but not all CaO slaked for a long period will make mortar stronger under all conditions than will a fresh slaked sample. The standard method of mixing in testing the strength of mortar does not take account of the varying moisture content of different limes (cf. B., 1909, 475). G. H. C.

Corrosion of plastic cement mortar by sulphuric acid and sulphur dioxide. K. AKIYAMA (Waseda Appl. Chem. Soc. Bull., 1933, 20, 1–8).— H_2SO_4 and SO_2 increase the initial strength of cement mortar, but subsequent corrosion is faster. Solubility of CaO is increased during the hardening process in H_2O at high H_2O :cement ratio; a low ratio decreases chemical resistance. Portland cement (I) having a high hydraulic modulus but low activity index and low Fe_2O_3 and Al_2O_3 ratio is rapidly corroded by H_2SO_4 . High-early-strength (I) has not always a smaller chemical resistance than ordinary (I) or mixed puzzuolana-(I). CH. ABS.

Effect of molasses on concrete. M. N. CLAIR and M. A. MORRISSEY (Eng. News-Rec., 1933, 111, 775).—The destructive effect on concrete of light, refined molasses is $>$ that of dark molasses. It can be reduced by longer curing of the concrete before exposure. Protective surface treatments cease to be effective after 1 year. Best protection is obtained by curing the concrete for 3–5 days, followed by the application of 3 coats of Na silicate (water-glass) with subsequent hardening for 28 days before use. T. W. P.

Watertight terra-cotta masonry. F. O. ANDEREGG (J. Amer. Ceram. Soc., 1933, 16, 634–639).—The suitability of jointing cements, as determined by their plasticity, bond strength, watertightness, weather-resistance, shrinkage, strength, efflorescence, and setting rate, is discussed in detail. The choice of raw materials and the correct application of the cement are described. J. A. S.

Terra-cotta cracking. F. B. ORTMAN (J. Amer. Ceram. Soc., 1933, 16, 639—642).—Many cases of cracking were caused by the H_2O -expansion of the mortar, in the brick backing, which contained too much cement and dolomitic CaO . A satisfactory mortar for setting terra-cotta and backing contains Portland cement 1, high- Ca CaO 1, sand \leq 5 pts. by vol. If a dolomitic CaO is tried and found insufficiently plastic the plasticity must be increased by substituting high- Ca CaO , and not by decreasing the sand content. Mixtures for pointing mortar and grout filling contain Portland cement 1, sand 2 pts., fireclay $\frac{1}{4}$ pt., and Portland cement 1, gravel or graded sand 6 pts., respectively.

J. A. S.

Artificial pumice stone. I. KOLOTUCHIN, MUSHKAREV, and EMELYANOV (Malyar. Delo., 1932, No. 4, 39).—Briquettes made by mixing 9.64 pts. of a mixture of clay (6.67), kaolin (16.67), felspar (20), washed chalk (6.66), and H_2O (50) with 64.25 pts. of quartz sand and 26.11 pts. of H_2O are fired.

CH. ABS.

Properties of Australian timbers. I. Eight timbers of the genus *Eucalyptus* (ash group). H. E. DADSWELL (Comm. Australia, Counc. Sci. Ind. Res., Forest Prod. Div., Tech. Paper 13, 28 pp.).—*E. regnans*, *gigantea*, *obliqua*, *siberiana*, *fastigata*, *condensiana*, *oreades*, and *frazinooides* are described.

Softening of hard woody tissues in hydrofluoric acid under pressure. K. A. CHOWDHURY (Ann. Bot., 1934, 48, 308—310).—Softening of wood-block samples with HF may be accelerated by treatment (cold) in Pb-lined containers under pressure ($>$ 80 lb.).

A. G. P.

Physiology of wood-destroying fungi. I. Effect of nitrogen content on rate of decay of timber. W. P. K. FINDLAY (Ann. Bot., 1934, 48, 109—117).—The attack on spruce and beech woods by *Trametes serialis*, Fr., and *Polystictus versicolor* (L), Fr., respectively, is accelerated slightly by the presence of small amounts of $(NH_4)NO_3$, and markedly by that of org. N, e.g., peptone.

A. G. P.

Effect of antiseptics on wood-destroying fungi. B. C. FLEROV and C. A. POPOV (Angew. Bot., 1933, 15, 386—406).—Technique for the examination of treated wood is described and results for a no. of wood preservatives are given.

A. G. P.

Soapstone bricks.—See VIII.

PATENTS.

(A) Production of cement. (B) Manufacture of cement from fluid slag. B. BRUHN (U.S.P. 1,910,675—6, 23.5.33. Appl., [A] 21.6.29, [B] 4.10.29).—Compositions for fused cement are claimed, air being blown through the melt to render it homogeneous. The compounds mentioned are used in such quantities as to maintain the following ratios or proportions: (A) $CaO : (SiO_2 + Al_2O_3 + Fe_2O_3) = 2.2-1.25 : 1$; $SiO_2 : (Fe_2O_3 + Al_2O_3) = 1.8-0.5 : 1$; $Al_2O_3 : Fe_2O_3 = 2.0-0.5 : 1$. (B) SiO_2 12—18, Al_2O_3 5—15, Fe_2O_3 7—15, CaO 57—63%.

B. M. V.

Production of [dark-]coloured concrete. F. H. AMON, ASSR. to G. L. CABOT, INC. (U.S.P. 1,910,419,

23.5.33. Appl., 6.3.31).—3% of C black is added in the form of a colloidal suspension in H_2O .

B. M. V.

Manufacture of highly porous, fireproof insulating and building material. T. URANSCHKE (B.P. 405,166, 31.5.33. Austr., 1.6.32).—A mixture of org. fibrous material (3), powdered mineral filler (5—7.5), and Na silicate solution, d 1.325—1.35 (5—7.5 pts.), is pressed between perforated sheet-metal plates and dried.

C. A. K.

(A) Premoulded expansion joint prepared from bituminous rubber substitutes. (B) Composition of matter. [Expansion joint.] A. C. FISCHER, ASSR. to PHILIP CAREY MANUFG. CO. (U.S.P. 1,911,139—40, 23.5.33. Appl., [A] 26.12.25, [B] 2.2.26. Renewed [B] 7.5.31).—Compositions for joints in masonry comprise: (A) gilsonite 5, blown bituminous matter 70, rubber (with solvent) 10, S 5, and cottonseed pitch 10%, together with fillers if desired; (B) bituminous material reinforced by a tangled mass of long, stiff, vegetable fibres and formed into a board-like strip.

B. M. V.

Preparation of bituminous road-surfacing materials. F. O. W. and D. M. LOOMIS (U.S.P. 1,911,761, 30.5.33. Appl., 3.6.31. Can., 24.4.31).—Fine material is removed from road metal and the coarse sprayed with aq. (or other) bituminous emulsion while being gently tumbled so as not to break the emulsion. The fines are then sprayed on with such violence as to break the emulsion and cause a film of bitumen to form on the coarse particles.

B. M. V.

Bituminous article of manufacture. C. W. HUNT and A. H. McRAE, ASSRS. to JOHNSON-MARCH CORP. (U.S.P. 1,912,142, 30.5.33. Appl., 30.1.29).—A bituminous article capable of resisting sun heat is formed of material of high m.p., e.g., gilsonite, on the outside and of lower m.p., e.g., asphalt, on the interior, the materials being such that if mixed together they would deform in the sun.

B. M. V.

Preservation of timber, fabric, and other cellulosic material. BRIT. INDUSTRIAL SOLVENTS, LTD., H. B. HUTCHINSON, H. LANGWELL, and C. B. MADDOCKS (B.P. 405,027, 29.7.32).—An aq. emulsion or solution in an org. solvent of a non-toxic, non-inflammable derivative, b.p. \leq 200°, of an aliphatic aldehyde and/or monohydric alcohol, e.g., $CHPr(OBu)_2$ or acid-polymerised aldol, is used.

H. A. P.

Rotary kiln.—See I. **Refuse mouldings.**—See XXIII.

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

Construction and operation of open-hearth [steel] furnaces fired with cold coke-oven gas. O. SCHWEITZER (Stahl u. Eisen, 1934, 54, 1—11, 29—36).—The development of 3 types of such furnaces is described with reference to numerous plans and photographs. For economic working intimate admixture of air and gas outside the furnace is necessary; a simple method of construction for effecting this is described and illustrated. With a 30-ton furnace constructed on these principles an output of 180 tons, and with a 100-ton furnace an output of 400 tons, of steel per day has been obtained, the gas

consumption being 280—320 cu. m. per ton when the steel scrap is added cold and 260—290 cu. m. per ton when added molten. The furnaces can be more rapidly heated and more readily repaired than the usual type and can also be constructed for tilting. A. R. P.

Mining and dressing of iron ores at the Ilsede Mines. H. ROHNE (Stahl u. Eisen, 1933, 53, 1325—1330).—The ores of this district of Brunswick fall into 3 classes, viz., (A) Bülten, (B) Lengede, and (C) Salzgitter ores, containing, respectively, Fe 29.3, 32, 34.4; CaO + MgO 21, 17, 5; SiO₂ 4.9, 13.6, 24; and P₂O₅ 2.2, 3, 1%. A and B can be smelted directly after removal and sintering of the fines, and a self-fluxing mixture of A, B, and C can be made for smelting by the Thomas process. Washing of B in the Meixner machine yields 80% of concentrate containing Fe 41.3, CaO + MgO 13, SiO₂ 6, and P₂O₅ 3.9%. A contains 3.5% Mn, whereas B and C contain < 0.5%. A. R. P.

Comparison of various pig iron-ore processes [for making steel]. W. ALBERTS (Stahl u. Eisen, 1933, 53, 1173—1183).—Comparative data on the economics of the Duplex, Talbot, and Hoersch processes of making steel from steel scrap and various types of pig Fe, using Fe ore as refining agent, are tabulated and discussed. From metallurgical considerations there is little to choose between the methods, and the choice of a particular method depends chiefly on local costs and the availability of raw material. A. R. P.

Oxygen in cast iron. Agents for deoxidation. W. F. CHUBB (Metallurgia, 1933, 9, 53—54).—Non-metallic deoxidisers, e.g., fluorspar, soda ash, and spent cyanide, improve the mechanical properties considerably. Al is not so effective as Si in inducing graphitisation, but with Al "white" Fe is rendered grey, and though the castings are clean, honeycombed structures frequently occur. Ti, V, Zr, Ca, and Ce are also of possible use, but have not hitherto found extensive application. C. A. K.

Strength properties of cast iron. J. E. HURST (Metallurgia, 1933, 8, 179—180; 9, 17—18, 43—45).—The stress-strain relationship, the val. of the modulus of elasticity, and its relation to the constitution of cast Fe are discussed. Enhanced resistance to wear is given if a metal possessing a high work-hardening capacity is treated so as to deform the surface to be exposed to wear. Suitable centrifugally cast Fe might thus be expected to give good results. C. A. K.

Effect of internal stress on bending strength [of mild steel]. H. BÜHLER and H. BUCHHOLTZ (Stahl u. Eisen, 1933, 53, 1330—1332).—Compression stresses in the outer layers of steel with 0.3—0.6% C produced by surface-hardening raise the endurance limit under alternate bending stress by 20%, whereas tensile stresses produced by cold-work or by "through hardening" reduce it unless they are small and the metal is sufficiently tough. A. R. P.

Micrography of a plain hard carbon steel after annealing. J. SEIGLE (Chim. et Ind., 1933, 30, 1282—1289).—Micrographical examination of steel with 0.58% C after annealing for various times at temp. up to 925° C has shown that the pearlite constituent (P) persists until

just before the end of the dilatometric change (C_D) between the A1 and A3 points, except when the rate of heating is slow or the metal has been subjected to severe cold-work after a previous anneal. On cooling, P reforms from the temp. of the commencement of C_D. In annealed steels the mean C content of P can be very much < the eutectoid composition (0.85—0.9%). A. R. P.

Indirect rapid determination of the ferrous oxide dissolved in liquid open-hearth steel. A. FISCHER. H. SCHENCK (Stahl u. Eisen, 1933, 53, 1333).—A nomographic method of determining the FeO in liquid steel during refining is illustrated, based on Schenck's equation (B., 1933, 1011). A. R. P.

Determination of manganese in iron and steel or in ores. M. SEKINO (Bull. Inst. Phys. Chem. Res., 1933, 12, 927—934).—In the bismuthate method, boiling with H₂O₂ gives high results if too prolonged and in any case is unnecessary. Titration of the HMnO₄ with Fe(NH₄)₂(SO₄)₂ must be made under certain specified conditions to obtain good results. A. R. P.

Nephelometry. II. Determination of phosphorus in steels and of arsenic in arsenical copper. L. BELLADEN and U. and R. SCAZZOLA (Annali Chim. Appl., 1933, 23, 517—521).—The P of steel is pptd. with H₂MoO₄ and strychnine, and the As of the Cu with the same reagent after removal of the Cu by boiling with aq. KOH. T. H. P.

Behaviour of steel pipes under the action of strongly corrosive substances. F. EISENSTECKEN and E. GEROLD (Gas- u. Wasserfach, 1933, 76, 934).—A reply to a discussion of a paper by Eisenstecken (B., 1933, 550).—As existing pipes cannot be entirely insulated there are 2 available methods for protecting them from stray electric currents, viz., (a) to insert insulating pieces so as to reduce the current, and (b) to prevent the currents occurring, by providing a protective network around the return connexions of tramways etc. Method (a) is not completely reliable and requires regular measurements of e.m.f., and (b) also requires supervision if the current strength varies, otherwise the point of corrosion is simply transferred. The damage reported was independent of the material of the tubes. C. I.

Damage to pipes through stray electric currents in a hospital. W. FRANCKENSTEIN (Gas- u. Wasserfach, 1933, 76, 934—936).—Rapid corrosion of galvanised pipes embedded in CaO or cement was caused by stray currents of dimensions 35 milliamp. and 0.8 volt. They were eliminated by "earthing" both the electric supply cables and the H₂O-pipes etc. C. I.

Electrochemical methods in the study of metallic corrosion. J. CHLOUPEK and V. Z. DANĚŠ (Chem. Obzor, 1932, 7, 141—146; Chem. Zentr., 1933, ii, 2049).—Unpolarisable electrodes are employed, with a salt-bridge of low resistance; the method is described in detail. A. A. E.

Reduction of the endurance limit [of metals] by corrosion and its increase by surface pressure. O. FÖPPL, O. BEHRENS, and T. DUSOLD (Z. Metallk., 1933, 25, 279—282).—Consolidation of the surfaces of test-pieces by pressure raises considerably the endurance

limit (L_E) of steels, Al alloys, and Ni in air, and increases the L_E in H_2O above that of untreated specimens in air. Similar results are obtained by Zn-coating steels, especially if the surface of the Zn is subjected to pressure before testing. These beneficial results are attributed to the effect of pressure in closing pores and hair-cracks and thus preventing penetration of the corrosive medium into the specimen. A. R. P.

Influence of impurities on the corrosion of zinc.

O. BAUER and P. ZUNKER (Z. Metallk., 1933, 25, 282—284).—Corrosion tests with electrolytic Zn (I) and refined Zn (II) containing Pb 1.12, Cd 0.11, and Fe 0.03% have been made in 1% aq. NaCl (A) and in 0.1N-HCl (B). In all cases the ratio of vol. of solution to metal surface was kept small to avoid formation of protective oxide films, and the tests were made over long periods to eliminate the effect of surface characteristics induced by rolling. Both (I) and (II) were attacked by A at approx. the same rate (R), but addition of 0.1% Pb to (I) increased R considerably. Addition of small quantities of Cu, Fe, or Sb to (II) increased R similarly, but larger amounts (0.2—1%) of Cu or Fe had no further effect although > 0.1% Sb decreased R again. The tests in B gave rather erratic results which were not always in agreement with those obtained in A. A. R. P.

Resisting hydrochloric acid corrosion with metals. F. A. ROHRMAN (Chem. Met. Eng., 1933, 40, 646—648).—Curves for the corrosion rates of Ni, monel metal, Hastelloy-A (Ni 58, Mo 20, Fe 20 Mn 2%), and Durichlor (Fe 81, Si 14.5, Mo 3.5, Ni 1%) in aq. HCl are given. In still, O_2 -free solutions the corrosion of Ni and monel metal by 10% HCl is negligible. Hastelloy-A and -C (Ni 58, Mo 17, Fe 6, Cr 14, W 5%) have good mechanical properties and are resistant to HCl; -C is also resistant to HCl containing O_2 and oxidising agents and is only slowly attacked by aqua regia. Durichlor has better mechanical properties than most Si-Fe alloys, and though initially it is appreciably corroded by aq. HCl, after about 30—35 hrs.' attack the corrosion product forms a film protecting the metal from further corrosion. D. K. M.

Characteristics of sprayed metal coatings.

H. REININGER (Z. Metallk., 1933, 25, 42—44, 71—73, 286—288).—Sprayed metal coatings adhere merely by surface tension, no alloying taking place when the object sprayed is a metal; hence to obtain good adherence the surface, if not naturally rough, should be roughened by sand-blasting or etching. In this way peeling of the deposit during heat or mechanical treatment is prevented. The structure of sprayed coatings consists of a non-homogeneous network of irregularly-shaped rounded or elongated particles of the metal held together by mutual adhesion and surface tension and interspersed with pores and oxide inclusions. The coatings can be made denser, less porous, and more protective by mechanical treatment, e.g., pressing, rolling, or hammering, followed by heat-treatment to secure better adherence. Since the sprayed coatings have poorer mechanical properties than has the same metal in its ordinary state, any heat- and mechanical treatment applied to them must be done cautiously to avoid flaking or cracking of the deposit. Examples of this are shown in a series of micrographs. A. R. P.

Chlorine smelting with chloride electrolysis.

E. A. ASHCROFT (Bull. Inst. Min. Met., 1933, No. 350, 65 pp.).—The treatment of Pb and Zn sulphide concentrates with Cl_2 at 600° effects complete conversion of the metals into chlorides with the evolution of S, which is condensed as a liquid in aq. $ZnCl_2$ (d 2.2) at 130°. The conversion is readily carried out in large egg-shaped converters lined with refractory brick and having a SiO_2 or C tube let into the lower (pointed) end for admission of Cl_2 . The presence of Fe in the ore provides $FeCl_3$ in the charge, which acts as a catalyst, as little as 1% of Fe promoting vigorous attack of the Cl_2 on the sulphides; the evolution of brown fumes of $FeCl_3$ serves as an indication of completion of the reaction. Agitation of the molten chlorides with coarse Zn powder at 450—500° effects complete removal of Pb, Fe, Cu, Ni, Co, and Cd, leaving pure $ZnCl_2$ which is decanted off into the electrolyzing tank (I), care being taken to avoid exposure to air, which results in the formation of oxychloride and consequent disturbance of the electrolytic process. Purification of the chlorides can also be effected in the wet way, in which case the pure $ZnCl_2$ solution must be evaporated and the salt fused in Cl_2 or HCl before passing to (I). Electrolysis is best carried out with multiple-couple graphite electrodes (various types described) at 450—490° using 1 kw.-hr. per lb. of Zn against a theoretical 0.83 kw.-hr., the excess current being employed in maintaining the temp. To avoid short-circuiting, efficient circulation of the electrolyte is essential, but in large-scale operation difficulties have always been experienced in preventing breakdown of the electrodes due to silting up with silicates (from the lining), oxides, etc. Pure Pb can be obtained by a similar process using $PbCl_2$ - $ZnCl_2$ electrolytes at 350—400°. Details of plant and running costs are given and suggestions are made for further improvement of the operating technique. A. R. P.

Influence of the mechanical and thermal treatment of the inquarted beads on the retention [of silver by the gold after parting].

A. HACKL (Chem.-Ztg., 1933, 57, 723).—In the cupellation assay of Au the bead after inquartation with Ag is rolled into strip; if this strip is coiled and parted in dil. HNO_3 , first 1:3 then 1:1, without annealing, the Au obtained is slightly < that obtained when the strip is annealed before coiling and its purity is only 99.5—99.6%, whereas that from the annealed strip is 99.96% pure. The presence of Ag in the Au coil obtained from the parting is revealed by the surface appearance after annealing; well-parted Au has a dull yellow matt surface, whereas that containing > 0.2% Ag has a bright yellow lustrous surface. A. R. P.

Aluminium melting losses. W. ASHCROFT (Metallurgia, 1933, 9, 42, 52).—Factors affecting melting losses include slag control, time of melting, and the furnace atm. Practice has followed generally that of brass melting and is in no way standardised. C. A. K.

Arc-welding of aluminium and some properties of the weld metal.

L. ANASTASIADIS (Z. Metallk., 1933, 25, 97—98, 285—286).—Al can be satisfactorily arc-welded by the aid of a suitable flux which acts as a solvent for the Al_2O_3 . Butt-welded joints having a tensile strength equal to that of the remainder of the sheet

can readily be obtained with 8-mm. sheets, but the elongation of the weld metal is only 25% compared with 40% for the sheet. Si-Al alloys can also be arc-welded. Satisfactory welds are just as resistant to corrosion as is the metal welded. Photomicrographs of characteristic welded joints are shown.

A. R. P.

Hardenable aluminium-iron-nickel-copper alloys. E. VADERS (Z. Metallk., 1933, 25, 291).—Addition of Fe to Al-Ni-Cu alloys increases the solubility of Al at high temp. and therefore increases the hardening effect on tempering; e.g., a Cu alloy with 10% Ni and 4% Al has a tensile strength (*S*) of 86.8 kg. per sq. mm. with an elongation (*E*) of 10% in the hardened state, whereas a similar alloy to which 10% Fe has been added has *S* = 99.7 kg. per sq. mm. and *E* = 8.3%. By suitable selection of the composition, alloys having *S* = 50 kg. per sq. mm. with *E* = 60% in the softened state can be obtained. Addition of Mn increases *E* in the quenched state but decreases the hardening action, whereas Si has the converse effect. Al-Fe-Ni-Cu alloys having a resistance to corrosion equal to that of non-rusting steels together with mechanical properties equal to those of the best Be bronzes have been obtained; such alloys are highly resistant to scaling at high temp. and generally acquire only a slight superficial tarnish after prolonged heating at 900°.

A. R. P.

Influence of the cross-section of castings with aluminium alloys. M. (FRH.) VON SCHWARZ [with A. EVERS] (Z. Metallk., 1933, 25, 269–277).—The tensile strength (*S*), yield point (*Y*), and hardness (*H*) of normal and self-hardening 14:2:84 Zn-Cu-Al and 8:92 Cu-Al alloys have been determined in cast rods (square and round cross-section) of various thicknesses (*a*). With increasing *a*, *H* remains almost const., but *S* decreases, especially in the middle of the rod when *a* is > 15 mm., and *Y* tends to rise or remain almost const. It is concluded therefore that determinations of *Y* are more satisfactory criteria of the val. of the castings than are determinations of *S*.

A. R. P.

Light alloys for aeronautical purposes, with special reference to magnesium. L. AITCHISON (Metallurgia, 1933, 9, 49–52).—The chief interest attaching to Mg lies in its low *d* and in its hexagonal form of crystallisation. Al increases the strength but impairs ductility, and, in a general sense, Mg alloys cannot be improved by heat-treatment. The alloys must be forged hot (> 225°) and are capable of being welded under standardised conditions. Resistance to corrosion agents, excepting alkalis, is not as good as for Al alloys, but protective methods, e.g., chromating, are practicable.

C. A. K.

[Alloy steels for] steam boilers. [Alloys for] high-temp. steam [turbines]. Plant welding.—See I. Gas services and corrosion.—See II. Painting of elektron.—See XIII. Corrosion of Zn in H₂O.—See XXIII.

See also A., Feb., 135, Superconductors. 137–8, Alloys and systems (various). 141, Wetting phenomena and flotation processes. 148, Systems liquid Fe-C oxides and liquid Fe-H₂-H₂O vapour. 154, Rh-plate. 157, Chemistry of finely-divided matter (in Zn-blende flotation). 158, Cementite.

PATENTS.

Production of iron and/or steel. J. MAUCLÉT (B.P. 403,978, 27.6.32. Fr., 11.3.32).—Cast Fe is produced by smelting in a cupola scrap steel and foundry scrap with a sulphury coke so that the resulting metal contains < 0.5% Si, about 3% C, and 0.25–0.3% S, i.e., S = 7–10% of C. The castings are then heated at 1000° in a current of CO₂ until the C content of the thick parts is reduced to 0.5% and of the thin parts to 0.2%. The decarburised castings are slowly reheated to 850–900°, quenched, and tempered at 600°, whereby the S content is substantially reduced and the elongation thereby improved.

A. R. P.

Treatment of iron castings to improve their physical characteristics. A. FOLLIET and N. SANDERICHIN (B.P. 404,180, 13.4.33).—Fe castings are converted into malleable Fe by heating them at 800–1150° for 3–5 hr. while embedded in a mixture of Al₂O₃, Al, and SiC or CaC₂ containing 2–5% of CrCl₃ and 1–2% of NH₄Cl, and then cooling slowly during 24–48 hr. out of contact with air.

A. R. P.

Production of pearlitic cast iron. H. A. MITCHELL and J. L. CAWTHON, JUN., Assrs. to BONNEY-FLOYD Co. (U.S.P. 1,910,034, 23.5.33. Appl., 8.1.30).—A cast Fe containing Cr 0.10–2.00, Mo 0.10–2.00, C 1.75–3.75, and, if desired, Si 0.50–3.00, Mn 0.25–2.00%, the remainder being Fe with the usual proportions of P and S, is superheated to 1500–1650° before casting; it has a pearlitic structure with the graphite finely and evenly dispersed.

B. M. V.

Treatment of silicon steel. W. F. DETWILER, Assr. to ALLEGHENY STEEL Co. (U.S.P. 1,912,129, 30.5.33. Appl., 5.12.30).—In the finish-rolling of 4% Si steel the reduction per pass is increased, the no. of passes being only 5 and the temp. of final reduction approx. 700°.

B. M. V.

Preparing silicon-steel sheets for electrical purposes. AMER. ROLLING MILL Co. (B.P. 403,950, 22.4.32. U.S., 18.5.31. Addn. to B.P. 331,511; B., 1930, 823).—The hot-rolled sheets are pickled in dil. H₂SO₄ containing an inhibitor, washed, sprayed with milk-of-lime, scoured, slightly cold-rolled, coated with CaO, and slowly heated in an electric furnace to 1050°, at which temp. they are kept for 3 hr. After very slowly cooling to 530–540° in the furnace, the charge is removed and allowed to cool under a cover.

A. R. P.

Preventing formation of roll scale. J. LLOYD (U.S.P. 1,916,677, 4.7.33. Appl., 28.8.31).—In hot-rolling steel rails the rolls are sprayed with aq. CuSO₄ or K₂Cr₂O₇ to prevent adhesion of the scale to the rolls.

A. R. P.

Heat-treatment of metals [steel]. S. MATSUNAWA, F. NOZAWA, and M. SUZUKI, Assrs. to KABUSHIKI KAISHA SUMITOMO SEIKOSHO (U.S.P. 1,916,931, 4.7.33. Appl., 16.1.33. Jap., 5.2.32).—In the hardening of steel the metal is quenched in an emulsion of 20–30% of H₂O in 80–70% of machine oil or other heavy oil containing 0.5–10 (5)% of petrolene; the method avoids danger of cracking and the necessity of subsequently tempering.

A. R. P.

Heat-treatment of manganese hard steel objects. L. MELLERSH-JACKSON. From F. KRUPP GRUSONWERK

A.-G. (B.P. 404,797, 2.12.32).—The object is heated to 1000° and those parts to be subjected to pressure or heavy wear are cooled to < 920° by means of air or steam blasts to develop an austenitic carbide structure; the whole is then quenched in oil or H₂O. A. R. P.

Working austenitic steels. R. H. ABORN, Assr. to UNITED STATES STEEL CORP. (U.S.P. 1,918,731, 18.7.33. Appl., 17.2.31).—Steels with Cr 18, Ni 8, and C 0.1% are worked at > 100° and below the temp. of recrystallisation, e.g., at 200–400°, to prevent formation of a martensitic structure. A. R. P.

System of heat-treatment [for steel etc.]. J. W. HARSCH and W. R. SCHOFIELD, JUN., Assrs. to LEEDS & NORTHRUP Co. (U.S.P. 1,911,191, 30.5.33. Appl., 26.6.29).—In a recording chart of heat-treatment, the transformation points are shown up distinctly by recording (electrically) the difference in temp. between the goods and the source of const.-heat supply. B. M. V.

Manufacture of [zinc]-coated iron or steel articles. E. J. P. FISHER and C. C. CRANE, Assrs. to KEYSTONE STEEL & WIRE Co. (U.S.P. 1,910,385, 23.5.33. Appl., 5.8.32).—The surface layer of the ferrous article is highly phosphorised before being galvanised by the hot dip process. B. M. V.

Forming oxalate coatings on iron and steel articles. L. P. CURTIN, Assr. to WESTERN UNION TELEGRAPH Co. (U.S.P. 1,910,593, 23.5.33. Appl., 4.5.32).—The formation is accelerated by arranging the articles as anode at 0.5–2.0 volts/0.005–0.05 amp. per sq. cm. in a solution of, e.g., H₂C₂O₄·2H₂O 5 pts., Fe₂(C₂O₄)₃·6H₂O 1–5 pts. B. M. V.

Lead-coating of ferrous alloys containing a relatively high percentage of chromium. L. L. SATLER, Assr. to ALLEGHENY STEEL Co. (U.S.P. 1,910,366, 23.5.33. Appl., 26.2.29).—Tube blanks containing 6–30% Cr are coated with Pb, intended mainly as a lubricant for further drawing, by floating and spinning them in a bath of Pb covered by flux composed of ZnCl₂ and NH₄Cl, the NH₄Cl being constantly replenished. B. M. V.

Magnetic compositions [alloys] containing principally iron and cobalt. ELECTRICAL RESEARCH PRODUCTS, INC., Asses. of J. H. WHITE and C. V. WAHL (B.P. 404,011, 6.7.32. Appl., 14.8.31).—The machining properties and ductility of alloys of 30–70% Fe and 70–30% Co are improved by addition of 0.5–4% of V and/or \geq 3% of Mn. After casting, the alloys are maintained at 1000° for 3 hr. before hot-rolling, and the sheets produced by the rolling are annealed at 850–950° \leq 3 times with intermediate quenchings to develop the magnetic properties. A. R. P.

Improvement of ferro-nickel-chromium alloys. SOC. ANON. DE COMMENTRY, FOURCHAMBAULT ET DECAZEVILLE (B.P. 404,876, 3.7.33. Fr., 5.7.32. Addn. to B.P. 371,334; B., 1932, 609).—Alloys of Fe with C < 1, Ni 6–80, Cr 5–40, Mn 0.3–4, W 0–10, Mo 0–10, and V 0–2% can be hardened by addition of 1–7% of Al and 0.5–5% of Ti. The heat-treatment comprises annealing at \geq 1300°, quenching in H₂O from > 1100°, and tempering at 725°. A. R. P.

[Steel] alloy [resistant to sulphur at high temperatures]. F. M. BECKET, Assr. to ELECTRO METALLURG. Co. (U.S.P. 1,916,780, 4.7.33. Appl., 13.5.30).—The steel contains Cr 16–22, Mn 6–16, Mo 1–10, and C < 0.3%; it retains its strength up to 600°. A. R. P.

Manufacture of [ferrous] metal fastenings. E. BEGLINGER and J. M. GAHAGAN, dedicated to UNITED STATES OF AMERICA (U.S.P. 1,911,421, 30.5.33. Appl., 22.8.31).—Nails or screws are faintly etched, to increase holding power, by immersion in aq. solution containing 2% of FeCl₃ and 2% of HgCl₂ or other salt of a metal falling below Fe in the electrochemical series. After drying in a warm atm., subsequent treatment may be subjected to air at 100° and of R.H. 80% for 60 min., followed by immersion in boiling H₂O. B. M. V.

Prevention of [caustic] embrittlement. S. W. PARR and F. G. STRAUB, Assrs. to UNIVERSITY OF ILLINOIS (U.S.P. 1,910,403, 23.5.33. Appl., 25.5.29).—To boiler-H₂O substantially free from Ca, Mg, and SO₄ is added sol. phosphate equiv. to approx. 2% of the total alkalinity (< 4% of the total and < 20% of the Na alkalinity). B. M. V.

Preventing embrittlement of copper. F. C. KELLEY, Assr. to GEN. ELECTRIC Co. (U.S.P. 1,911,023, 23.5.33. Appl., 1.5.30).—Tough-pitch Cu wire has its Cu₂O completely reduced by H₂ at 600–800° and is then annealed for several hr. in a non-oxidising atm. at 850–1000°, cooled, and cold-drawn to a moderate extent, the annealing and reworking being repeated as often as is desired. The resulting metal is strong and highly conducting, and is not deteriorated by the reducing gases of soldering or welding processes. B. M. V.

Treatment of [copper] ores [by flotation]. F. AYER, A. CROWFOOT, H. T. HÉRIVEL, and P. M. SORESENSEN, Assrs. to PHELPS DODGE CORP. (U.S.P. 1,916,196, 4.7.33. Appl., 6.8.30).—Ores containing Cu at least partly in an oxidised form are ground wet and the pulp is treated with H₂S or Na₂S (the pH being maintained at 4.8–6.5) and subjected to flotation with the usual reagents. A. R. P.

Catalyst. M. E. BARKER (U.S.P. 1,916,249, 4.7.33. Appl., 5.9.28).—Claim is made for metal or sheet grains the surface of which has been oxidised and then reduced to a sponge of high catalytic activity. Alloys of Cu 75, Mn 25%, and of Cu 10, Fe 90% are suitable for catalytic oxidation or reduction processes. A. R. P.

Manufacture of non-reactive lead powder. R. N. CHAMBERLAIN, Assr. to GOULD STORAGE BATTERY CORP. (U.S.P. 1,910,280, 23.5.33. Appl., 26.4.30).—Pieces of Pb are abraded in a ball-mill or other device which is cooled and in which the atm. is maintained low in O₂, to produce a powder containing < 10% of Pb₂O. B. M. V.

Melting of copper-lead. R. D. PIKE, Assr. to KALIF CORP. (U.S.P. 1,910,446, 23.5.33. Appl., 18.8.31. Renewed 18.1.33).—Cu or Cu-Pb scrap is added to molten Pb containing approx. 0.33% of PbO or CuO, covered by a flux of borax and siliceous material, and maintained at a temp. sufficient to melt the Cu. B. M. V.

Manufacture of lead alloys. R. J. SHOEMAKER, Assr. to S. & T. METAL Co. (U.S.P. 1,916,496, 4.7.33. Appl., 24.10.30).—In the manufacture of Pb-base bearing metals containing >1 of the following: Ca (0.5), Sn (1), Al (0.03), Hg (0.25), Mg (0.075), Li (0.04), K (0.04%), the Pb is melted under a layer of CaCl_2 and the Sn, Al, and Mg are added successively at 870° followed by the Hg, Li, and K at $>370^\circ$. A. R. P.

Removal of lead [coatings] from tubes and other articles. C. L. MANTELL, Assr. to DUDZEELE CORP. OF AMERICA (U.S.P. 1,918,817, 18.7.33. Appl., 12.12.28. Renewed 19.1.33).—The articles are immersed at $80\text{--}85^\circ$ in saturated aq. NaCl containing 0.5–10% H_2SO_4 and 1–10% FeCl_3 or 2–10% NaNO_3 . A. R. P.

Separation and recovery of lead from tin or tin alloys. A. HANAK (U.S.P. 1,911,188, 30.5.33. Appl., 15.12.30. Renewed 12.10.32).—The molten metal or alloy is treated with anhyd. vapour of SnCl_4 .

B. M. V.

Manufacture of hard-metal compositions. G. J. COMSTOCK, Assr. to FIRTH-STERLING STEEL Co. (U.S.P. 1,910,884, 23.5.33. Appl., 14.11.31).—WC is bonded with Co, the aggregate being heated to a temp. intermediate the m.p. of the constituents. B. M. V.

Chaplet. L. BROWN, Assr. to DOW CHEM. Co. (U.S.P. 1,910,790, 23.5.33. Appl., 1.7.32).—In the casting of Mg in a cored mould the core is supported by chaplets of Cd, alone or alloyed with Mg, Zn, Pb, or Sn. B. M. V.

Magnesium-base alloys. J. A. GANN and (A) F. L. REYNOLDS, (B) J. B. REID, Assrs. to DOW CHEM. Co. (U.S.P. 1,910,431–2, 23.5.33. Appl., 15.2.32).—The alloys comprise $>80\%$ Mg with (A) $>0.5\%$ Cd and $>0.5\%$ Zn, the Cd + Zn being $<20\%$ of the total, and (B) 0.5–18% Cd and 0.5–2% Mn.

B. M. V.

Magnesium alloys [as getters for thermionic valves]. KEMET LABS., INC., Asses. of H. S. COOPER (B.P. 404,220, 6.7.33. U.S., 25.3.33).—The alloys contain >50 (75)% Mg, >10 (15)% Ba, and >5 (10)% Sr. A. R. P.

Aluminium alloys. F. KELLER and C. M. CRAIG-HEAD, Assrs. (A–G) to ALUMINUM Co. OF AMERICA (U.S.P. [A–G] 1,911,077–83 and [H] 1,910,861, 23.5.33. Appl., [A] 21.9.32, [B] 30.11.32, [C–H] 15.2.33).—The alloys comprise an Al base containing $>0.3\%$ of impurities, 0.5–3.0% of the compound Mg_2Si , and 0.1–1.0% of one of the following, respectively in (A–H): Cr, Mn, Mo, Zr, U, W, Ti, or V. B. M. V.

Fabrication of metal parts of magnesium or magnesium alloys. J. E. HOY, Assr. to DOW CHEM. Co. (U.S.P. 1,918,545, 18.7.33. Appl., 3.6.30).—To reduce the size of fabricated articles to the desired final val. they are immersed in 25% H_2SO_4 until the correct thickness of metal has been removed, then washed, and, if desired, buffed and polished. A. R. P.

Bright-annealing of metals. VEREIN STAHLWERKE A.-G., Asses. of A. SCHMITZ (B.P. 403,170, 3.8.32. Ger., 4.8.31).—The pickled metal sheets are annealed in a closed container (I) at the desired temp., and a protective gas, e.g., producer or coke-oven gas, previously freed from O_2 and S by passage over a hot catalyst, is admitted

to various points of (I) only when the contents have cooled to $>400^\circ$, to prevent the development of tarnish tints. A. R. P.

Cleaning of metal [iron or steel]. A. B. WILSON, Assr. to GEN. MOTORS CORP. (U.S.P. 1,916,503, 4.7.33. Appl., 14.8.30).—The metal is degreased in an alkaline bath, then made the anode for 5 min. in cold HCl (d 1.18) to remove oxides. After washing free from HCl, the black C film is removed by anodic oxidation in 20% aq. CrO_3 containing 2 g. of H_2SO_4 per litre. The metal is then washed, dried, and tinned. A. R. P.

Electrochemical cleaning of metal. T. E. DUNN, Assr. to BULLARD Co. (U.S.P. 1,917,022, 4.7.33. Appl., 28.7.32).—The article is made the anode in a solution containing NaOH (12) and Na_3PO_4 (4 oz. per gal.) together with a salt of Pb, Sn, Zn, or Cd which forms an insol. soap with the oil or grease on the metal. The metal is preferably introduced into the solution by using a sheet of it as an auxiliary anode. A. R. P.

Electrolytic recovery of lead from waste materials [e.g., battery scrap]. J. H. CALBECK (U.S.P. 1,911,604, 30.5.33. Appl., 1.10.28).—A solution of NaOAc is treated in a cyclic process as follows: (1) Pb scrap is leached, whereby PbO_2 is stated to be reduced by Pb so that both dissolve, together with PbSO_4 , CaSO_4 , etc., (2) Sb sludge in suspension is separated and smelted with residues from (1); (3) precious metals are pptd. by Cu and Cu by Pb chips; (4) the resultant solution is electrolysed between insol. electrodes to produce Pb and PbO_2 simultaneously; (5) the major part of the sulphates is removed by CaO; and (6) the mother-liquors and washings are heated and returned to (1). B. M. V.

Electrodeposition of tin. C. J. WERNLUND and F. F. OPLINGER, Assrs. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,919,000, 18.7.33. Appl., 6.2.29).—The bath contains NaOH and Na_2SnO_3 in proportions such that mols. of NaOH = $(1.6 \times \text{mols. of } \text{Na}_2\text{SnO}_3) + 0.3$. This ratio is kept const. by occasional additions of AcOH and an oxidising agent, e.g., H_2O_2 , Na_2O_2 , KMnO_4 , $\text{K}_2\text{S}_2\text{O}_8$, or NaBO_3 . A. R. P.

Production of [an iron] welding electrode. T. C. DAWSON, Assr. to BETHLEHEM STEEL Co. (U.S.P. 1,916,206, 4.7.33. Appl., 8.5.29).—Claim is made for an Fe-wire electrode made by drawing the wire (W) through a die lubricated with oil containing BaCO_3 (I) in suspension, so that the surface of W is impregnated with (I). The resulting arc is stated to be steadier, so that clean welds are more readily obtained. A. R. P.

Electrodes or welding rods for use in electric arc-welding. QUASI-ARC Co., LTD., and A. P. STROHMENGER (B.P. 404,122, 11.11.32 and 31.1.33).—Welding rods covered with a cellulosic material (I) are heated slowly to about 300° for 5–10 min. to decompose about 50% of (I) without destroying its adherent properties; in this way evolution of unpleasant org. fumes during use of the rod in welding is avoided. A. R. P.

Malleable nickel having improved welding quality. N. B. PILLING, Assr. to INTERNAT. NICKEL Co., INC. (U.S.P. 1,916,386, 4.7.33. Appl., 6.9.29).—Ni welding rods consisting essentially of pure Ni with

0.2—0.8 (0.2)% Si and 0.12—0.3 (0.15)% Mg are claimed. A. R. P.

Manufacture of fusible electrodes having a saline coating for electric arc-welding of aluminium and the like. F. DE PAPE, Assr. to SOUDURE ELECTRIQUE AUTOGÈNE, SOC. ANON. (U.S.P. 1,911,886, 30.5.33. Appl., 30.10.31. Fr., 21.11.30).—The welding rod is coated with a mixture of salts which, on acidifying, will ppt. a gelatinous compound, which is then peptised by alkali to form a viscous paste. After drying, the carbonate formed by the alkali and air is converted into a neutral salt. B. M. V.

Electrolytic extraction of light metals contained in alloys. P. L. HULIN, Assr. to COMP. DE PROD. CHIM. ET ELECTROMÉTALLURG. ALAIS, FROGES ET CAMARGUE (U.S.P. 1,910,017, 23.5.33. Appl., 14.12.28. Fr., 21.12.27).—In an apparatus for the electrolytic transfer of a light metal (*L*) from an anode of molten heavy alloy (*A*) through an electrolyte (*E*) to a floating cathode of *L*, short-circuiting from *A* to *L* by the walls of the vessel is prevented by causing *L* to freeze close to the surface, and in the centre, of *E* and continuously retracting it upwards in the form of a solid rod as fast as it is formed. B. M. V.

Electroplating. W. E. BELKE (U.S.P. 1,910,145, 23.5.33. Appl., 11.12.30).—The cathode is formed by the articles pressed against a centrifugal bowl with vertical axis, the bath forming an annulus of comparatively small vol. The articles may be tumbled by varying the speed of the bowl. B. M. V.

Chromium-plating. E. M. JONES, Assr. to PARKER RUST-PROOF Co. (U.S.P. 1,918,605, 18.7.33. Appl., 9.1.28).—The anode (*A*) is of similar outline to the article to be plated and is rotated around it in such a way that a const. separation is maintained between all parts of *A* and the corresponding parts of the cathode. A. R. P.

Electrolytic production of insulating layers on metals [aluminium]. P. R. COURSEY, C. H. MARCUS, and DUBILIER CONDENSER Co. (1925), LTD. (B.P. 398,825, 16.1.32).—Al wire, foil, or strip is coated with an oxide film by electrolytic treatment in aq. borax, using 30—40 volts for the first stage and 750—1000 volts for the second. In both stages a.c. may be used, but preferably a.c. is used in the first and d.c. in the second stage. Automatic apparatus for carrying out the process is described and claimed. A. R. P.

Electrodeposition of aluminium from its compounds. D. B. KEYES, T. E. PHIPPS, and W. KLABUNDE, Assrs. to ELLIS-FOSTER Co. (U.S.P. 1,911,122, 23.5.33. Appl., 13.8.29).—Al is plated on to a dissimilar metal from an anhyd. solution of AlBr₃ in NEt₄Br at 22.6 volts/0.068 amp. per sq. cm. of cathode. B. M. V.

Ore reduction mill.—See I. Phosphates from Fe-P. Treating Pb ores.—See VII. Enamelled steel. Metal-coated refractory.—See VIII. Electric furnace [for heating sheet metal]. Al condenser.—See XI.

XI.—ELECTROTECHNICS.

Voltage balance of a cell for electrolysis of sodium chloride solutions. Distribution of voltage

drop through the cells with vertical filtering diaphragms. W. W. STENDER, P. B. ZIVOTINSKI, and M. M. STROGANOFF (Trans. Electrochem Soc., 1934, 65, 1—24).—Potentials for Cl₂ evolution from NaCl solution (260 g. per litre) at various c.d., temp. (up to 75°), and anode materials are recorded. Anodic polarisation at given c.d. increases in the sequence: platinised Pt (I), Acheson graphite (II), other forms of graphite, arc C, magnetite; the polarisation at (II) falls exceptionally rapidly with rise in temp. and at 75° approaches that of (I). Potentials for H₂ evolution from a solution containing 170 g. of NaCl and 80 g. of NaOH per litre at various types of Fe and steel at 75° and various c.d. are recorded. At 70° increase in the proportion of NaOH in the catholyte causes the cathodic polarisation to rise to a max. and then fall slightly. The electrical conductivity of NaCl solutions is only slightly affected by dissolved Cl₂, OCl', or ClO₃' which are produced in the anolyte. The potential drop through a Vorce cell diaphragm under normal operating conditions was 0.12—0.15 volt over a month's test. The above and other relevant data are used to calculate the distribution of voltage drop through a commercial cell of the Vorce type. H. J. T. E.

Electrical behaviour of glass.—See VIII. Damage to pipes by electric currents. Electrochemistry of corrosion. Cl₂-smelting. Insulating layers on Al.—See X. Characterisation of rubber.—See XIV. Determining soil reaction.—See XVI.

See also A., Feb., 154, Electrolysis of Na₂S, and of MeOH solution of CuCl₂. Rh-plate. 163, Fluorescence [lamp]. 164, Portable vac.-tube voltmeter.

PATENTS.

Induction electric furnace. E. F. NORTHRUP, Assr. to AJAX ELECTROTHERMIC CORP. (U.S.P. 1,912,214, 30.5.33. Appl., 3.9.29).—A continuously moving plate of metal, not necessarily magnetic (*e.g.*, between passes through rolls), is passed between m-shaped a.c. magnets above and below, or between one magnet and a keeper. B. M. V.

Induction furnaces. V. STOBIE (B.P. 405,041, 3.8.32).—An axial ferromagnetic core of cross-sectional area < 1/3 that of the solenoid (*S*) surrounding the crucible (*C*) is arranged within the space surrounded by *S* and terminates below the bottom of the hollow of *C*. J. S. G. T.

Induction furnace. H. W. PARKER, Assr. to ROGERS RADIO TUBES, LTD. (U.S.P. 1,909,982, 23.5.33. Appl., 9.7.30).—An induction heater for, *e.g.*, wireless valves during their manufacture comprises a H₂O-cooled induction coil operating at radio frequency, within which is a slotted, earthed sheath to prevent the potential gradient of the coil reaching the interior of the valve and causing "clean-up." B. M. V.

Manufacture of electric heating elements. K. NOGUCHI, Assr. to MITSUBISHI ZOSEN KABUSHIKI KAISHA (U.S.P. 1,910,041, 23.5.33. Appl., 3.1.29. Jap., 17.8.28).—A spiral of heating wire which is enclosed in a tubular shell is also surrounded by heat-conducting, electrical insulating material which is moulded and set around the wire to a diam. such that the element will slip into the

tube and is then expanded in place by the action of H_2O . Suitable materials are: CaO , gypsum manufactured from the hydroxide, Al_2O_3 from gentle drying of $Al(OH)_3$, MgO , a mixture of Al powder and gently dried $Ca(OH)_2$. B. M. V.

Electrolytic device [aluminium condenser]. P. ROBINSON and J. L. COLLINS (U.S.P. 1,916,586, 4.7.33. Appl., 8.5.31).— Al foil is anodically oxidised in a H_3BO_3 -borate bath of p_H 4–8 (6) which is kept const. by suitable additions during film formation (I). The coated foil is then assembled into a condenser with a similar electrolyte of slightly lower p_H than that used in (I). A. R. P.

Electrolytic condenser. S. RUBEN, Assr. to RUBEN CONDENSER Co. (U.S.P. 1,912,223, 30.5.33. Appl., 15.5.28).—The plates are formed of a light metal from group II or III and the O_2 -providing electrolyte comprises PbO_2 , V_2O_5 , or Fe_3O_4 bound by a compound of B, with an additional reticulated support if desired. B. M. V.

Electrical condensers. S. RUBEN, Assr. to RUBEN CONDENSER Co. (U.S.P. 1,918,716–7, 18.7.33. Appl., [A] 29.4.33, [B] 23.6.32).—The condenser comprises alternating strips of anodically oxidised Al foil and (A) Cellophane impregnated with glycerin and H_3BO_3 or $(NH_4)_2B_4O_7$, or (B) films of a conductive, tacky cellulose derivative plasticised with triacetin, Bu_2 or Et_2 phthalate, or the like and impregnated with a borate electrolyte. A. R. P.

Resister. L. L. HOWARD and A. H. HAROLDSON, Assrs. to CONTINENTAL DIAMOND FIBRE Co. (U.S.P. 1,910,391, 23.5.33. Appl., 13.12.29).—Raw $PHOH-CH_2O$ resin is mixed with a calc. quantity of graphite, and the mixture applied, with impregnation, to a fibrous strip and cured. B. M. V.

[Carborundum] electrical resister rod. R. C. BENNER and H. N. BAUMANN, JUN., Assrs. to GLOBAL CORP. (U.S.P. 1,918,317, 18.7.33. Appl., 24.10.27).—The surface of SiC resister rods is coated with a glaze consisting of TiO_2 30% and Al_2O_3 70% or TiO_2 20% and CaO 80%, which prevents rapid burning of the rod when used at $> 1100^\circ$. A. R. P.

Treatment of impregnated insulating dielectrics. F. L. DAMARIN and D. A. HARPER, Assrs. to BROWN & CAINE (CHICAGO DIV.) OF TUNG-SOL LAMP WORKS, INC. (U.S.P. 1,911,064, 23.5.33. Appl., 16.12.29).—Porous insulating material is impregnated with wax, cooled to solidification, and immersed in heated oil. If halowax ($C_{10}H_2Cl_6$) is used the oil temp. should be 93° . B. M. V.

Electrical separator [for gases]. F. F. STELZ (U.S.P. 1,911,211, 30.5.33. Appl., 20.11.31).—The live electrodes comprise rotating cylinders (C) formed of perforated material and filled with loose rings or spaced discs. Heat-adjusting fluid is passed through the spaces between an outer casing and the inner casings that closely embrace C, and some of this fluid may be mixed with the gas to be cleaned. B. M. V.

Electrical precipitator [for gases]. H. A. WINTERMUTE, Assr. to RESEARCH CORP. (U.S.P. 1,912,053, 30.5.33. Appl., 15.6.31).—Plate electrodes (E) are

formed with flanges (hook-shaped if desired) and are assembled in such a way that the area of the gas passages varies and the flanges form pockets to catch material not definitely held to E. B. M. V.

Electrode for geophysical surveys. M. MORTENSON (U.S.P. 1,910,709, 23.5.33. Appl., 9.1.29. Norw., 12.1.28).—A metal electrode is placed in a solution of a metal salt in a porous container of which the porosity decreases outwards and which is formed of or embodies a solid depolariser. B. M. V.

Thermal-conductivity cells.—See I. Coke [for electrodes].—See II. Electric furnaces for glass.—See VIII. Si-steel for electrical purposes. Heat-treating steel. Oxalate coatings on Fe etc. Magnetic alloys. Mg alloys for valves. Metal-cleaning. Pb from waste. Sn. Welding electrodes. Light metals from alloys. Electroplating. Cr-plate. Insulating layers on Al. Al-plate.—See X. Cleaning moulds.—See XIV.

XII.—FATS; OILS; WAXES.

New detergents. R. A. DUNCAN (Ind. Eng. Chem., 1934, 26, 24–26).—The properties of salts of sulphonated higher alcohols (cf. B., 1933, 259, 383) are compared with those of an ordinary soap. "Igepon-A" (method of prep. described) is neutral, resistant to hard H_2O , and can be used in acids of moderate concn. "Igepon-T" is resistant to acids and alkalis. S. M.

Ultra-violet light absorption of olive oil. G. LUNDE, H. KRINGSTAD, and H. W. WEEDON (Angew. Chem., 1933, 46, 796–798).—The extinction coeff. (I) at λ 2750 Å. of virgin oil is 10–22, for refined pressed oil, 35–55, and for refined extracted oil 54–90. Two unrefined extracted oils gave vals. of 80 and 120, respectively. The fluorescence follows the same trend. (I) is increased by heating or by neutralisation with warm aq. 8% $NaOH$, and decreased by neutralisation in $EtOH-Et_2O$ solution with cold 0.1N- $NaOH$. Fluorescence is increased by each of these treatments, the effect being a max. with warm neutralisation. Complete absorption curves for λ 2500–4000 Å. are mapped for two raw pressed and two refined oils. G. H. C.

Composition of wood oil, and change in its properties on polymerisation. J. VAN LOON (Verfkroneik, 1933, 6, 184–187; Chem. Zentr., 1933, ii, 2074).—The following vals. were found: elaeostearic acids 72.8, oleic acid 13.6, saturated fatty acids 4.9, glycerol residue 4.7, unsaponifiable matter 0.5, volatile and oxidised fatty acids 3.7%. A. A. E.

Chufa oil. ANON. (Giorn. Chim., 1933, 27, 297–298. Chem. Zentr., 1933, ii, 2074).—Tubers of *Cyperus esculentus* from Algiers and Morocco contain, besides 12–14% of sugar and 25–30% of starch, about 20% of a fatty oil (yield by pressing, 12–15%), having Crismer val. 85° , n_D^{25} 1.465, sap. val. 191.30, acid val. 1.70, Ac val. 4.55, Reichert–Meissl val. 0.20, I val. 76.89. The fatty acids consist of oleic (80%), palmitic (12%), and myristic acid. A. A. E.

Change of composition and analytical characteristics of beeswax on prolonged heating at 150–200°. G. BUCHNER (Fettchem. Umschau, 1933,

40, 234).—A pure beeswax showed the following characteristics, (i) before treatment, (ii) after heating for 3 hr. at 150–250°, and (iii) after heating for a few hr. at 150°, then from 150° to 240°, and finally for 1 hr. at 250°, respectively: acid val. 20.0, 12.4, 5.4; sap. val. 95.0, 166.3, 103.3; ratio no. 3.75, 12.5, 18.0; m.p. 63–4°, 60°, —. A mixture (*e.g.*, impregnating material) of beeswax (10%) with paraffin wax (90%) after heating at 150° (2 hr.) and 240° (2 hr.) gave figures (acid val. 2.3, sap. val. 54.4, ratio no. 22.7) simulating the presence of 70% of beeswax. E. L.

Qualitative saponification test with waxes. D. HOLDE. From G. BUCHNER (*Fettochem. Umschau*, 1933, 40, 233).—Waxes do not always give a ppt. in the Holde saponification test (intended to reveal addition of hydrocarbons; cf. "Kohlenwasserstofföle u. Fette," 7th ed., p. 113) if complete saponification has been ensured by refluxing the wax (1 g.) with 0.25*N*-EtOH-KOH (30 c.c.) for 1 hr. Spermaceti (I) and beeswax (II) then give clear solutions, even after dilution with hot H₂O; on cooling (I) becomes turbid (pptn. of cetyl alcohol), but the solution from (II) remains clear, even if the beeswax contained 10–12% of paraffin wax. E. L.

Emulsifiers. Bleaching earths.—See I. **Extraction of triethanolamine oleate.**—See III. **Fatty matter in flour. Butter, lard, etc. Vitamin-A in ghee. "Casein" from castor-oil cakes.**—See XIX.

See also A., Feb., 143, Na petroselate as soap. 148, System K laurate-lauric acid-H₂O. 224–8, Vitamins (various). 229, [Fatty oil from] *Achillea millefolium*.

PATENTS.

Refining of cottonseed oil. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 405,398, 3.10.32).—Mucilage is pptd. and the oil decolorised by heating at 160–280° with about 1% (0.5–5%) of an anhyd. ester of H₃BO₃ and a polyhydric alcohol (*e.g.*, glycerin); the treatment is advantageously combined with deacidification in vac. with, *e.g.*, steam. E. L.

Mixed anhydrides.—See III. **Oil-sol. resins.**—See XIII. **Margarine.**—See XIX. **Org. Bi salts.**—See XX.

XIII.—PAINTS; PIGMENTS; VARNISHES; RESINS.

Turpentine oil from the Dutch Indies. W. SPOON (*Verfkroniek*, 1933, 6, 181–184; *Chem. Zentr.*, 1933, ii, 2064).—The oil had d_4^{20} 0.8628, d_4^{20} 0.8578, n_D^{20} 1.4686; residue on evaporation 1.2%; 90% was volatile at 155–163°. A. A. E.

"Winter" turpentine. F. SOLODKIN and T. VASKOVSKAYA (*Lesokhim. Prom.*, 1932, 1, No. 5–6, 33–34).—Turpentine (pinene approx. 64, carene approx. 28%) from pine trees cut in winter or summer exhibited no chemical difference. CH. ABS.

Cause of turbidity and formation of precipitates in turpentine oil from *Pinus sylvestris* on storage in metallic containers. S. N. MAKSIMOV and I. S. YAROSHINSKI (*Lesokhim. Prom.*, 1932, 1, No. 5–6, 26–32).—The oil should be freed from rosin acids. CH. ABS.

Drying of white-lead paint films. C. P. A. KAPPELMEIER (*Verfkroniek*, 1934, 7, 39–40).—Polemical against Van Hoek (B., 1934, 209).—The drying action of basic Pb pigments is due simply to the formation of ordinary Pb driers by neutralisation of the free acids present in the medium. D. R. D.

Titanium-white paints. ANON. (*Peint. Fig. Ver.*, 1933, 10, 238–241).—The defects, such as "chalking," associated with TiO₂ are largely overcome by incorporating it with a proportion of ZnO and/or white-lead. Such mixtures used in suitable media give paints of high opacity and durability. G. H. C.

Light-fast blue paints. H. RASQUIN (*Farben-Ztg.*, 1934, 39, 60–61).—The colour-retention of light blue pigment mixtures comprising ZnO, white-lead, and lithopone (red seal), tinted in each case with Prussian blue (I), ultramarine blue (II), Indanthrene blue lake 20% (III), "Reinblau-farblack 40%," and a Fanal blue L Bex 10% lake, ground in oil and glue vehicles, was observed. Results after 2 weeks' and 2 months' exposure to light are tabulated and discussed in detail. ZnO-(I) bleached markedly in the glue vehicle, but was unchanged in oil, which is attributed to the protective action of the decomp. products of the oil film. The superiority of (II) for light blue tints is indicated. (III) gives very satisfactory performance for tints unattainable with (II), and the cost of (III) is offset by its relatively good staining power compared with that of (II). S. S. W.

Water-emulsion paints. K. WÜRTH (*Farbe u. Lack*, 1934, 5–6, 17–18).—These consist of homogeneous emulsions of oil or varnish prepared in a suitable machine with the aid of an emulsifying agent. They differ therefore from the casein-H₂O or shellac-aq. borax preps. The smaller and the more uniform are the oil particles, the greater is the quantity of H₂O for equal consistency. The continuous phase must remain liquid until all the H₂O has evaporated from the film, which, otherwise, becomes porous and, hence, less weather-resistant. The pigment present influences the rate of hardening. Ti-white, ZnO, lithopone, ochres, Cr₂O₃-green, and Cd-yellow have been successfully incorporated; chalk, white-Pb, and ultramarine are not recommended. S. M.

Paint coatings on elektron. F. KOLKE (*Farben-Ztg.*, 1933, 38, 1756).—The protection of elektron and other Mg alloys by paints is discussed. The results of 6 and 18 months' weathering of various paint systems on 2 types of elektron, A2M and AM503, with and without pretreatment with dichromate (I) [but with a degreasing process when (I) was not used], are tabulated. Best results were obtained with a stoving undercoat. The advantage of pretreatment with (I) is demonstrated. S. S. W.

Fouling of ships. M. RAGG (*Farben-Ztg.*, 1933, 38, 1757–1758).—Polemical with W. Neu, who had stated that marine growths on ships defy paint treatment and regarded the problem entirely as a biological one. S. S. W.

Determination of the adhesion and elasticity of paints. H. L. MATTHIJSEN (*Verfkroniek*, 1934, 7, 44–46).—SiC is preferable to sand in the ordinary abrasion test. D. R. D.

Action of light on paint films. W. TOELDTE (Farben-Ztg., 1934, 39, 140).—Various systems suggested for observing the fading of pigments are discussed in general terms. It is stressed that under "light-fastness" must be considered not only the colour change of the pigment but its relation to the particular medium used and the colour changes and destructive effects induced by light on the medium alone and on the final paint film. S. S. W.

Cadmium-yellow and -red as pigments in the silicate industries. L. STUCKERT (Farben-Ztg., 1934, 39, 9—10, 36—38, 61—63).—The prep. and properties of CdS—CdSe yellow and red pigments and their use in ceramic glazes, coloured glass, and vitreous enamels etc. are outlined. An apparatus and analytical method for detecting admixed substrates in Cd pigments are described. CdS pigments obtained from CdCO₃ by treatment with alkali sulphides (I) or by the "dry process" (heating with S) are suitable for use in all the above applications, but the products obtained by the action of H₂S on sol. Cd salts have restricted uses only and cannot be used as intermediates for Cd-red (II). The degree of decomp. of CdCO₃ with (I) was found to depend on particle size and experimental conditions. A new direct process for the prep. of brilliant shades of (II) comprises treating CdCO₃ with a solution of Se in (I) or NH₄ sulphide, and heating the resulting thio-selenide, excess of S being eliminated. The normal direct process for manufacture of (II), *i.e.*, heating together a mixture of CdCO₃, S, and Se, is discussed with reference to relative amounts of constituents, and the mechanism of the reaction is studied by means of ternary diagrams and thermochemical considerations. S. S. W.

Manufacture of chrome-yellow and -green with the aid of protective colloids. H. WAGNER and J. GOHM (Farben-Chem., 1934, 5, 5—7).—The transition of the unstable rhombic form (I) of PbCrO₄ into monoclinic crystals (II), with consequent increase in red tone, vol., softness, and oil absorption, is retarded by addition to the pptg. vat of 1% (calc. on wt. of Pb salt used) in 5% aq. solution of a wetting agent of Gardinol type (B., 1932, 303). Since (I) is more finely dispersed than (II), separation from admixture with Prussian-blue, when ground into paints, is also retarded. Baltimore-yellow consists of mixed monoclinic crystals of PbCrO₄—PbSO₄—CaSO₄, and is best prepared by hot pptn., using Pb(OAc)₂, Al₂(SO₄)₃ or alum, chalk, and Na₂Cr₂O₇. S. M.

[By-product] lead sulphate in manufacture of chrome-yellows. G. ZERR (Farbe u. Lack, 1934, 4).—For conversion into Pb-chrome, by-product PbSO₄ must be well washed with H₂O and then digested at boiling temp. with (a) Na₂CO₃ or (b) NaOH. The suspension obtained with (a) is worked up with Na₂Cr₂O₇ (I) which has been acidified or treated with Al₂(SO₄)₃; alternatively, the ppt. is partly or completely dissolved in HNO₃ and neutral or pure (I) added. For conversion into PbO the ppt. is digested and washed until free from sulphate. Addition of (I) to the mixture obtained with (b) gives a bright chrome-orange. S. M.

Analysis of chromate-green. II. C. P. A. KAPPELMEIER (Verfkroniek, 1934, 7, 35—36).—0.4—0.5 g. of

the pigment is evaporated to dryness with 10 c.c. of 4N-HCl and 2 c.c. of 95% EtOH. The product is boiled for 15—20 min. with 125 c.c. of 10% Na₂CO₃. CO₂ may now be passed to ppt. the last traces of Pb. The ppt. contains Cr(OH)₃, Fe(OH)₃, and PbCO₃, which are determined as in the previous method (B., 1934, 209). The filtrate, containing the Fe(CN)₆^{'''} and SO₄^{''} (if present), is boiled with 2—3 g. of HgO for 20—25 min. and filtered. The SO₄^{''} in the filtrate is determined as BaSO₄. The pptd. Fe(OH)₂ is determined iodometrically. The CrO₄^{''} in Cr-green may also be determined approx. by treating 1.25 g. of pigment with 50 c.c. of 10% KI, 12 c.c. of 25% HCl, and 5 g. of Na₂SO₄·10H₂O. An aliquot portion of the solution is titrated with Na₂S₂O₃. A small proportion of the Prussian-blue reacts and the results are about 2% low. D. R. D.

Microscopical study of pigments, using ultra-violet light. G. S. HASLAM and C. H. HALL (J. Opt. Soc. Amer., 1934, 24, 14—18).—Photomicrographs of lithopone, Ti-Ba, and Ti-Ca pigments, in which the ZnS and TiO₂ are pictured as opaque and the BaSO₄ and CaSO₄ as transparent particles, are examined in relation to size of components and degree of coalescence. N. M. B.

Testing of lithographic inks. C. J. OPP (Amer. Ink Maker, 1934, 12, 9—11, 19).—A capillary extrusion plastometer is described, whereby the mobility and yield val. (*p*) of printing inks etc. can be measured accurately. Low *p* is associated with great length in the ordinary threading test. D. R. D.

American and German methods of preparation of albertol-tung oil varnishes. E. FONROBERT, C. P. HOLDT, and F. WILBORN (Farben-Ztg., 1934, 39, 89—90, 113).—Albertol-tung oil varnishes made by the American method (I) (raw oils being cooked with the resin) and the German method (II) (the tung oil being prebodied as a distinct stage) have been compared. Manufacturing details and physical properties of typical varnishes by (I) and (II) are given. Varnishes of type (II) have paler colour, less tendency to skin, better flow, and give the harder films; those of type (I) are more "gas-proof," have less tendency to wrinkle on stoving, and are more resistant to alkali (particularly with the harder grades of Albertol) and to H₂O. Only slight differences are found in drying times and general durability. The differences in behaviour are due, in part, to type (I) varnishes having higher η . The performance of enamels made on the two types of varnish is being studied; those of type (II) appear to be superior. S. S. W.

Bitumen and related materials in the varnish industry. H. HADERT (Farben-Chem., 1934, 5, 12—16).—Bitumens are classified and their use in the manufacture of varnishes and emulsions is discussed. S. M.

Making and using metallic stearates in varnish and lacquer. P. H. FAUCETT (Paint Oil & Chem. Rev., 1934, 96, No. 3, 8—10).—The methods of manufacture, properties, and use in varnishes and lacquers of Ba, Ca, Mg, Al, Zn, Fe, Co, Ni, Pb, Cu, Hg, and Ag stearates are reviewed. The stearate may be added to the varnish in the form of a paste with EtOH or other suitable varnish solvent, prepared either (I) by pptn. of the stearate in aq. solution followed by washing with EtOH

etc.; or (2) (in the case of Ca and Zn), by treating $\text{Ca}(\text{OH})_2$ or ZnO with a solution of stearic acid in the solvent. D. R. D.

Action of foreign matter on wet varnish films. R. MELDAU (Farben-Ztg., 1934, 39, 169—170).—Photomicrographs illustrate the appearance of films on to which cotton threads, shreds of skin, and stray pigment have fallen, and allow conclusions to be drawn as to the stage of drying etc. at which the foreign matter was introduced. The need for dust-proof application rooms is indicated. S. S. W.

Esters of phosphoric acid as camphor substitutes. SCHMIDT (Gummi-Ztg., 1933, 47, 1667—1668).—Nitrocellulose films are plasticised and their inflammability (F) is reduced by Ph_3 , $(\text{C}_6\text{H}_4\text{Me})_3$, and trinaphthyl phosphates (I), the halogenated derivatives and the corresponding thiophosphates, trialkyl and mixed aryl and aryl alkyl phosphates, and their anilides. Commercial samples of (I) may contain free phenols and esters of H_3PO_3 which are deleterious to the film. The N content of the nitrocellulose used should be $\geq 11\%$; with larger proportions the mechanical properties of the film suffer, but this can be corrected by addition of esters of phthalic or glycollic acid and AcOH. $(\text{CH}_2\text{Ph})_3\text{PO}_4$ has the advantage that it does not induce after-yellowing. The use of $n\text{-Bu}_3\text{PO}_4$ (b.p. 225° , or $135\text{—}136^\circ/8\text{ mm.}$) as a plasticiser is mentioned. Several bromo-anilides and -naphthalides are indicated which reduce F without plasticising action. S. M.

Influence of solvent on viscosity of oil varnishes. F. KOLKE (Farben-Chem., 1934, 5, 16—17; cf. B., 1934, 156).—The η at 20° , determined with a Ford cup, of linseed and tung stand oils and extra thick linseed stand oil dispersed in varying proportions of 6 diluents are tabulated. The general decreasing order of effectiveness in reducing η was: "Crystal oil 21," solvent naphtha, "Crystal oil 30," American turpentine, Decalin. S. M.

Analysis of nitrocellulose lacquers. H. ANDERSON (J. Soc. Leather Trades' Chem., 1934, 18, 88—89).—Methods are given for the determination of nitrocellulose and pigment by pptn. with C_6H_6 ; the filtrate is evaporated, and the gums and plasticisers are extracted with cold EtOH. Solvents can be distilled off and fractionated. D. W.

Resins. XII—XVI. E. STOCK (Farben-Ztg., 1934, 39, 141—142; cf. B., 1932, 196).—XII. "Copal esters" and "Molten Congo copals." A range of products marketed in Germany under these names were examined. Acid val., sap. val., sinter point, m.p., ash content, Storch-Morawski and Donath's reactions are tabulated.

XIII. **Genuine larch turpentine.** Capillary analytical details are given for a sample of this oleoresin of acid val. 70.08, sap. val. 99.5.

XIV. **Molten amber.** Acid val., sap. val., sinter point, m.p., ash content, and Kraemer-Sarnow softening points of 6 samples are recorded.

XV. **"Brazil" copal.** A sample (the authenticity of which is under investigation, since it is known that W. African copals are supplied as "S. American" in some cases) has acid val. 90.44, sap. val. 114.8, ash 3.1%, sinter point 131° , and m.p. 182° .

XVI. **Molten and "solvent purified" kaur copals.** The usual physico-chemical constns. are quoted for samples of these materials, as well as solubility data for the "molten kauris." They are considered to be useful varnish raw materials if price is economic. S. S. W.

Oleoresin from individual trees of slash and long-leaf pine. A. P. BLACK and S. M. THRONSON (Ind. Eng. Chem., 1934, 26, 66—69).—The turpentine (I) obtained by the steam-distillation of oleoresin varies somewhat in physical constns., especially in α , even between samples collected from the same tree. The yield of (I) from slash oleoresin is $>$ that from long-leaf oleoresin, and from large trees is $>$ from small trees. The d of slash (I) is $<$ that of long-leaf (I). A. G.

Pentaerythritol resins. S. MALOWAN (Farbe u. Lack, 1934, 30).—Pentaerythritol condenses with mono- and poly-basic acids, alkyl oxides and halides to give solvents, plasticisers, and resins. Relevant patents are reviewed. S. M.

Modern developments in synthetic resins. C. ELLIS (Ind. Eng. Chem., 1934, 26, 37—40).—A review of phenol- CH_2O , urea- CH_2O , vinyl, glyptal, petroleum, and chlorinated rubber resins. S. M.

[Rosin from] pine-wood chips. Gas services and corrosion.—See II. **Swelling of cellulose acetate films. De-inking of paper.**—See V.

See also A., Feb., 172, **Condensation of $\text{SO}(\text{NH}_2)_2$, dimethylsulphamide, and aniline- p -sulphonamide with CH_2O .** 193, **American pine resin.**

PATENTS.

Washable protective coating for oil tanks. T. B. UNGER FABRIKKER A./S. (B.P. 404,874, 1.7.33. Norw., 2.7.32).—A composition consisting of approx. equal wts. of water-glass and finely-divided BaSO_4 is used. S. M.

Manufacture of pigments [e.g., lithopone]. AMER. ZINC, LEAD, & SMELTING Co. (B.P. 404,886, 24.7.33. U.S., 10.8.32).—Zn vapour is conveyed by means of a hot, inert gas into a combustion chamber at approx. 700° into which slight excess of S is fed; the gritty material is removed and the finely-divided ZnS deposited in bags. The Zn may be substituted by Hg or Pb, and the S by Se or Te. S. M.

Shellac-pigment composition. W. H. GARDNER, ASSR. to UNITED STATES SHELLAC IMPORTERS' ASSOC., INC. (U.S.P. 1,918,804, 18.7.33. Appl., 10.10.30).—Pigments (P), e.g., Cu, brass, Pb, ZnO, CuO , or HgO , are incorporated with shellac (S) solution, and 0.03—0.05% of malic acid (based on the wt. of pigment) is added to promote dispersion and prevent reaction of P with S . A. R. P.

Production of a finished surface [on fibre furniture]. C. E. FAWKES, ASSR. to PYROXYLIN PRODUCTS, INC. (U.S.P. 1,918,692, 18.7.33. Appl., 9.7.28).—The fibre is sprayed with a mixture of glue and monoacetin or sulphonated castor oil, with or without a pigment. After drying, at least one coat of a nitrocellulose lacquer is applied. A. R. P.

Manufacture of condensation products [oil-soluble resins]. J. Y. JOHNSON. From I. G. FARBENIND

A.-G. (B.P. 404,664, 13.7.32).—Resins sol. in OH-free solvents (esters, ketones, and oils) are prepared from $\text{CH}_2\text{O}-\text{CO}(\text{NH}_2)_2$ or $-\text{CS}(\text{NH}_2)_2$ condensation products (dimethylolurea) by heating with $> 50\%$ (about 100%) of OH-esters of fatty acids $> \text{C}_9$ (monoglycerides from drying oil acids, ricinoleic acid, etc.) (in > 50 wt.-% of a monohydric alcohol). Condensation is completed by distilling off any excess alcohol, neutralising if necessary, and heating at $80-130^\circ$ until oil-sol. The products may be hardened by further heat-treatment if desired, and used for prep. of abrasive paper or discs. H. A. P.

Manufacture of [resinous] products derived from polyhydric alcohols and polybasic acids. MANTLE LAMP CO. OF AMERICA, Assees. of A. D. WHIPPLE (B.P. 405,054, 18.8.32. U.S., 20.8.31).—A mixture (in mol. proportions) of a liquid polyhydric alcohol (ethylene glycol) and an aromatic polybasic acid (phthalic anhydride) is heated at $110-150^\circ$ until the desired degree of polymerisation is achieved. S. M.

Mixing materials [paint].—See I. **Dispersing agents.**—See III. **Ice colours.**—See IV. **Resister.**—See XI.

XIV.—INDIA-RUBBER; GUTTA-PERCHA.

Swelling of [rubber] latex. F. EVERS (Kautschuk, 1934, 10, 15—17; cf. B., 1930, 432).—Measurement of the rate of swelling shows it to follow a course representable by the equation for a bimol. reaction. Concurrent dispersion occurs of C_6H_6 in serum, and *vice versa*. The Brownian movement in the latex slowly disappears and the globules form thin membranes which gradually merge together. D. F. T.

Characterisation of rubber and latex. B. LANGE (Kautschuk, 1934, 10, 21—22).—Examination of the Tyndall beam in diluted latex with a polarisation photometer indicated that commercial unconc. and conc. specimens were not very different either in the size or shape of the rubber particles. Measurable differences, however, could be distinguished by means of a more sensitive photo-electric colorimeter and might serve as a basis for the characterisation of various commercial latices. D. F. T.

[Rubber] factice. W. ALEXANDER (Kautschuk, 1934, 10, 18—21).—The production, characteristics, and application of white and brown factice (vulcanised oils) are described. The addition of factice to rubber improves its behaviour in processing and imparts a more attractive "feel" to the finished article. D. F. T.

Physical properties of DuPrene compounds. E. R. BRIDGWATER (Ind. Eng. Chem., 1934, 26, 33—36).—DuPrene (I) bears a closer physical resemblance to rubber than any previous synthetic rubber. Properly compounded vulcanised (I) withstands O_2 -ageing better than any vulcanised rubber compound. The stress-strain curve for a (I) compound is less bent than the corresponding rubber curve, and cuts the latter; the abrasion-resistance at room temp. may be slightly inferior to that of rubber, but at 50° it is substantially unaltered, whereas that of rubber declines sharply with rise in temp.; in flexing- and oil-resistance (I) compounds are markedly superior. (I) "compounds" also have a

higher permanent set, lower power loss, better resistance to sun-cracking, lower permeability to gases, and greater fire-resistance than similarly compounded rubber stocks. D. F. T.

Does litharge retard or accelerate the oxidation of rubber? C. DUFRAISSE, N. DRISCH, and D. PRODIER-GIBELLO (Kautschuk, 1934, 10, 22—23).—Contrary to earlier views, PbO accelerates the ageing of rubber; it does not protect rubber against the effects of heat, but by catalytic decomp. of peroxides reduces the risk of attack by O_2 . The advantages associated with the use of PbO arose probably from its ability to cause some sort of pre-vulcanisation. D. F. T.

Fluorescence of rubber and of compounding ingredients. V. N. MORRIS (Ind. Eng. Chem., 1934, 26, 107—111).—Many antioxidants, softeners, and accelerators when exposed to ultra-violet light exhibit fluorescence; ZnO also shows a characteristic effect and the fluorescent colours enable various commercial brands to be distinguished, sometimes even in the ash of compounded rubber. The particle size of the ZnO appears to be an important factor. Well-vulcanised rubber gives a fairly intense yellow fluorescence, but under-vulcanised rubber shows less effect. The capacity for fluorescence disappears almost completely if the rubber is exposed directly to sunlight for 1 hr. D. F. T.

Synthetic rubber problem. W. H. CAROTHERS (Ind. Eng. Chem., 1934, 26, 30—33).—Several unsolved problems in the synthetic rubber field are outlined. The elastic solid obtained by polymerisation of isoprene is deficient in the characteristic physical qualities of rubber and is not correctly synthetic rubber. In this sense the polymeric products from chloroprene and bromoprene are the only true synthetic rubbers yet known. A comparison of 26 butadiene compounds shows that polymerisation at 25° is most rapid for those in which the terminal C atoms are unsubstituted; a halogen, alkyl, or Ph substituent at the β -C atom has an accelerating effect on polymerisation, and a further substituent at the γ -C atom generally reinforces the effect of a β -substituent, but leads to products deficient in extensibility. A high rate of polymerisation is important because it leads to a reduced proportion of undesired dimeride in the product. D. F. T.

Distinction between cured and uncured parts of cold-cured [vulcanised] rubber. H. ENDOH (J. Soc. Chem., Ind., Japan, 1934, 37, 25—26 B).—Sheet rubber which has been vulcanised by immersion in a solution of S_2Cl_2 in C_6H_6 gives a dark brown colour when immersed for 1 hr. in a 1% EtOH solution of I or in 0.1N-I. D. F. T.

Permeability apparatus [for rubber].—See I. **Synthetic resins.**—See XIII.

See also A., Feb., 145, **Viscosity of caoutchouc solutions.**

PATENTS.

Manufacture of rubber compositions [from latex]. DUNLOP RUBBER CO., LTD., ANODE RUBBER CO., LTD., E. A. MURPHY, and A. B. HATTON (B.P. 404,665, 15.7.32).—Granular, fibrous, or divided materials, such as leather fibre, wood flour, or cellulose fibres,

are mixed with aq. flocculent ppts. of rubber containing Al silicate produced *in situ*, the proportion of H₂O present being such that the mixed product is a wet crumb. The dried crumb can be sheeted by passage between rollers. D. F. T.

Colouring of rubber and masses containing rubber. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 402,920, 12.10.32).—Rubber is coloured by incorporating into a rubber mix H₂O-insol. disazo dyes obtainable by coupling a tetrazotised 4 : 4'-diaminodiarlyl oxide, ketone, sulphone, or -urea, or *p*-aminoaroyl- or *p*-aminoarylsulphonyl-*p*-arylenediamine, with a coupling component (2 mols.). Examples are: 4 : 4'-diaminobenzophenone or its 3 : 3-Cl₂- or 3 : 3'-Me₂ derivative, → 2 mols. of 2 : 3-hydroxynaphthoic anilide (red), acetoacetic anilide, *o*-chloroanilide, or *m*-4-xylylide (yellow); 4 : 4'-diaminodiphenylurea → 2 mols. of 2 : 3-hydroxynaphthoic *o*-anisidide (blue). C. H.

Manufacture of vulcanised rubber compositions. DUNLOP RUBBER CO., LTD., D. F. TWISS, A. E. T. NEALE, and J. A. WILSON (B.P. 405,099, 22.12.32).—The action of S₂Cl₂ on rubber compositions is accelerated by certain trivalent N compounds such as Zn diethyl-dithiocarbamate. D. F. T.

Manufacture of vulcanised rubber and other similar compounds for the purpose of rendering them fire-resisting. ST. HELEN'S CABLE & RUBBER CO., LTD., and H. C. HARRISON (B.P. 404,691, 20.7.32).—The proportion of Se necessary for fire-proofing rubber compounds can be reduced if carbonates, *e.g.*, MgCO₃, and softeners, *e.g.*, fatty acids, are also added. The following composition is indicated: rubber 25—40, Se 2—6, carbonates 45—55, softeners 2—6%. D. F. T.

Cleaning of vulcanising moulds. F. K. BEZZENBERGER (U.S.P. 1,910,277, 23.5.33. Appl., 5.7.32).—CrO₃ (approx. 50% solution and hot) is used and may be regenerated electrolytically. B. M. V.

Medium for cleaning and reducing the swelling of rubber, gutta-percha, and articles made therefrom. O. H. STRECKER (U.S.P. 1,910,718, 23.5.33. Appl., 18.12.29. Ger., 20.12.28).—A mixture of castor oil > 50% and paraldehyde < 50% is claimed. B. M. V.

Surfacing rubber articles.—See VI.

XV.—LEATHER; GLUE.

Discrepancies in *p*_H determinations of synthetic tannins. J. A. GILMAN (J. Soc. Leather Trades' Chem., 1934, 18, 90—92).—Lack of concordance was shown in results obtained by different chemists using the glass, bubbling-H₂, and quinhydrone electrodes, respectively, and by the colorimetric method. The *p*_H of any tanning material should be determined on solutions of a dilution used in practice, and not at *d* 1-175. D. W.

Effective acidity and the penetration of acid dyestuffs into leather. R. H. MARRIOTT (J. Soc. Leather Trades' Chem., 1934, 18, 92—95).—The depth of penetration of Acid Green, Croceine Scarlet, Orange G, and Cardinal Red J, respectively, into sumac-tanned goatskin increased as the *p*_H of the leather and the dye solution were increased. D. W.

Permeability apparatus [for leather].—See I.

See also A., Feb., 144, Swelling of gelatin.

PATENTS.

Removal of hair or wool from hides, pelts, or skins. OONAH, LTD., and O. M. HEDBERG (B.P. 404,698, 21.7.32).—A mixture of Na₂S, soap, a thickening agent, *e.g.*, pollard, an oil, C₁₀H₈, and H₂O is claimed. D. W.

Dispersing agents.—See III. **Azo dyes.**—See IV. **Fur dyeing.**—See VI.

XVI.—AGRICULTURE.

Malayan soils. III. R. G. H. WILSHAW (Malayan Agric. J., 1934, 22, 4—24; cf. B., 1934, 32).—The ploughing-in of green cover crops on Malayan soils is followed by rapid decomp. and the immediate formation of NH₃ and NO₃' extending over 6—8 weeks. There is no significant accumulation of humus. Beneficial effects on crop growth which are apparent after the relatively short period of decomp. may be attributable to the formation of Fe humate or to the increased availability of nutrient materials resulting from the decomp. process. A. G. P.

Relationships between the sticky point, moisture equivalent, and mechanical analysis in some Australian soils. J. A. PRESCOTT and H. G. POOLE (J. Agric. Sci., 1934, 24, 1—14).—The additive character of the mechanical equivalent (*M.E.*) and its close correlation with mechanical composition is demonstrated in soils of related types. The contribution of org. matter to the *M.E.* averaged 130%, that of clay being much lower and less consistent. In soils containing much exchangeable Na the *M.E.* is high and difficult to determine. The sticky-point H₂O (*S.P.*) and the *M.E.* are less closely related, probably because org. matter contributes relatively more heavily to the *S.P.*, and exchangeable Na to the *M.E.* Non-colloidal soil fractions affect the *S.P.* to extents which vary with the proportion of sand and silt, the relative effect diminishing with the increasing proportions of clay. When the latter is > 10% the *S.P.* is proportional to the clay content. A. G. P.

Tropical soils. III. Shrinkage behaviour of lateritic and kaolinitic soils. F. HARDY (J. Agric. Sci., 1934, 24, 59—71; cf. A., 1932, 39).—Interrelationships between the sticky-point H₂O, loss on ignition, absorption capacity (I) for H₂O from aq. vapour, and the residual shrinkage (II) are examined. Tropical red soils resemble kaolinitic soils in these respects, but are intermediate between kaolinitic and the grey and yellow soils. The latter are characterised by high total shrinkage, (II), and (I) vals. A. G. P.

Parasitic and other *Fusaria* in tropical soils. O. A. REINKING and M. M. MANNS (Z. Parasitenk., 1933, 6, 23—75).—Inter-relationships exist between the no. of *Fusaria* per g. of soil and the texture and *p*_H in surface layers. Max. nos. of *Fusaria* occur in the top 0.5 in. of soil except in semi-arid types of light texture, in which the greatest nos. are found at 1—3 in. depth. A. G. P.

Soil as a living system. S. A. WAKSMAN (Mezög. Kutat. [Spec. No.], 1933, 6, 419—432).—The activity of soil micro-organisms is discussed with special reference to the influence of added org. matter on the nos. and distribution of bacteria, actinomycetes, and fungi.

A. G. P.

Course of the weathering process in the marine clay deposits of Holland. D. J. HISSINK (Mezög. Kutat. [Spec. No.], 1933, 6, 467—474).—Data showing the nature of the chemical changes involved in the reclamation of Dutch saline soils are recorded.

A. G. P.

Relation of certain soil characteristics to forest growth and composition in the northern hardwood forest of N. Michigan. R. H. WESTVELD (Michigan Agric. Exp. Sta. Tech. Bull., 1933, No. 135, 52 pp.).—Correlations between the distribution of forest species and the type of soil and subsoil are examined.

A. G. P.

Microbiological characteristics of some forest soils. N. I. MALCHEVSKAYA (Pedology, 1933, 28, 225—239).—Of 3 soils studied, viz., (1) typical podsol, (2) peaty gley podsol, (3) peat gley soil, greatest bacterial activity was shown by (3). This appeared to be due to the introduction of drainage, since (2), which was much less active, is undrained and gleying is still proceeding. It is impossible to characterise soil types or even soil horizons by ordinary microbiological investigations.

A. M.

Decomposition of peat under aerobic conditions. I. A. MAKRIKOV (Zentr. Bakt. Par., 1933, II, 89, 201—209).—The activities of various classes of organisms concerned in the N cycle of soil and in the decomp. of cellulose are examined in prepared peats.

A. G. P.

Application of heat of wetting measurements to soil-research problems. H. JANERT (J. Agric. Sci., 1934, 24, 136—150).—The heat of wetting (*H.W.*) of single-base clays is a definite proportion of the heat of hydration of the adsorbed ions in their free state. Wetting with org. liquids produces a heat effect which is proportional to the *H.W.* by H_2O in mineral soils. The dipole moment and the mol. vol. of a liquid are not the sole factors determining the *H.W.* of a soil by the liquid. Continuous manuring on heavy (Rothamsted) soil has induced very little difference in the *H.W.* of the various plots, but in light (Woburn) soil significant differences in *H.W.* due to manuring are apparent.

A. G. P.

Plant physiological examination of soils. E. A. MITSCHERLICH (Mezög. Kutat. [Spec. No.], 1933, 6, 406—419).—Experimental data are recorded showing the efficiency of $(NH_4)_2SO_4$, $NaNO_3$, farmyard manure, and green manures, as determined by the author's pot-culture method.

A. G. P.

Plant nutrient ratios of Finnish soils. B. AARNIO (Mezög. Kutat. [Spec. No.], 1933, 6, 432—438).—Mechanical and chemical analyses are recorded and discussed.

A. G. P.

Inequalities in small areas of soil and their importance in soil investigations. O. LEMMERMANN (Mezög. Kutat. [Spec. No.], 1933, 6, 458—467).—Local variations in the nutrient status of small areas of soil

are shown to be $>$ is commonly supposed. The difficulty of accurate determination of the fertiliser requirement of soils which are neither very rich nor very deficient in nutrients is emphasised.

A. G. P.

Effect of irrigation on soil salts at the Gezira Research Farm, Wad Medani, Sudan. H. GREENE and (the late) R. H. K. PETO (J. Agric. Sci., 1934, 24, 42—58).—The apparent upward movement of salts in soils under normal irrigation and cropping conditions may be ascribed to the swelling and shrinkage of the surface layer with changes in H_2O content. Salts added during irrigation or as soil improvers are washed downward from the surface layers.

A. G. P.

Laws of solution and soil analysis. T. SAIDEL (Mezög. Kutat. [Spec. No.], 1933, 6, 480—500).—Methods of determining soil constituents by repeated extraction methods are examined. The mathematical basis of the calculation of results and their application to sp. problems are explained.

A. G. P.

Salt régime of soils and ground-waters. S. J. SUSKO (Proc. Leningrad Dept. Gedroiz Inst. Fert., 1933, 20, 1—67).—Irrigation experiments on the Terek-Caspian plain are described.

A. M.

Adsorption of anions and calcium by soils. I. N. ANTIPOV-KARATAIEV, A. P. VISHNIAKOV, and V. G. SOCHEVANOV (Proc. Leningrad Dept. Gedroiz Inst. Fert., 1933, 23, 1—34).—The character of the adsorption curves of anions and Ca shows the dependence of this adsorption on the pH of the medium, and the degree to which the adsorbents (I) are ampholytes. The apparent negative adsorption of anions is due to the different degree of hydration of (I), the hygroscopic H_2O not being displaced in equal amounts by all solutions.

A. M.

Fixation and exchange of certain anions by soil colloids. A. DEMOLON (Mezög. Kutat. [Spec. No.], 1933, 6, 474—480).—Determinations of available PO_4''' in soils by extractive methods depend not only on direct dissolution, but also on an exchange mechanism in which SiO_2 is an important factor.

A. G. P.

Mobility of adsorbed cations in soils. S. S. JARUSSOV and O. I. DMITRIENKO (Pedology, 1933, 28, 302—317).—Variations in the mobility of adsorbed cations when the soil is treated with dil. acids are a result of unequal mobility of the cations themselves, and of unequal content of H in the soils.

A. M.

Formation, evolution, reclamation, and the absorbed bases of alkali soils. W. P. KELLEY (J. Agric. Sci., 1934, 24, 72—92).—Chemical changes involved in the formation of alkali and saline soils and their subsequent degradation are discussed. In certain strongly alkaline Na-soils prolonged leaching produces a gradual interaction between $CaCO_3$ and the Na complex with the formation of a Ca-soil. The process is accelerated by treatment with S, $CaSO_4$, $FeSO_4$, alum, or other acid material. Degraded soils are reclaimed by liming.

A. G. P.

Essential nature of alkaline soils and methods for their reclamation. W. P. KELLEY (Mezög. Kutat. [Spec. No.], 1933, 6, 439—458).—The satisfactory

treatment of black alkali soils by S and CaSO_4 and of white alkali soils by simple leaching is described. In considerations of reclamation the important features of alkali soils include not only the nature of the sol. salts and the base-exchange complex, but also the less weathered silicate and carbonate constituents.

A. G. P.

Determining soil reaction, using the glass electrode. A. NAFTEL, C. J. SCHOLLENBERGER, and R. BRADFIELD (Soil Res., 1933, 3, 222—246).—The use of quinhydrone, Sb, and H electrodes, and of colorimetric methods, is compared with that of the glass electrode (I); the satisfactory character of (I) is demonstrated.

A. G. P.

Use of the glass electrode in soil reaction and oxidation-reduction potential measurements. S. G. HEINTZE (J. Agric. Sci., 1934, 24, 28—41).—The glass electrode used in conjunction with an electrometer triode valve amplifier is applicable to p_{H} determinations of soil suspensions and soil crumbs sufficiently moist to wet the glass. It may be used in systems of high oxidising or reducing power and in alkaline soils, but is not superior to quinhydrone under conditions in which this is reliable. Both E_h and p_{H} measurements may be made without alteration to the system. Water-logging of soils resulted in marked fall in E_h vals. which, among various Russian soil types examined, was especially notable in chernozems.

A. G. P.

Determination of the fertiliser requirements of a soil. F. S. SOBOLEV (Udobr. Urozh., 1931, 904—909).—Mitscherlich's sugar-beet method (I) is suitable for P_2O_5 but not for N, for which Waksman's (15-day) method is recommended. (I) and Arrhenius' method are best for P_2O_5 .

CH. ABS.

Fertilising value and nitrifiability of humic materials prepared from coal. E. M. CROWTHER and W. E. BRENCHLEY (J. Agric. Sci., 1934, 24, 156—176).—Samples of NH_4 humate prepared by the action of HNO_3 on coal dust were as effective as $(\text{NH}_4)_2\text{SO}_4$ in nitrification tests and in pot-culture and field trials. Indications of a slow production of available N from the humic acid are recorded, but in the field trials no evidence was obtained of manurial effects other than that due to NH_4 present.

A. G. P.

Recent developments in nitrogen fertilisers. C. L. BURDICK (Chem. Met. Eng., 1933, 40, 638—641).—Liquor from a urea converter contains urea 32.5, NH_3 28.9, $\text{NH}_2\text{-CO}_2\text{NH}_4$ 18.1, H_2O 20.5%; it may be mixed with phosphate fertiliser in suitable proportions so that the increase of citrate-insol. H_3PO_4 is $\geq 0.3\%$. The potential acid-producing vals. of different fertilisers are given, and the use of fertilisers containing limestone or dolomite to neutralise acidity is indicated.

D. K. M.

Decomposition of green manures in soil. J. A. DAJI (J. Agric. Sci., 1934, 24, 15—27).—The rate of decomp. of plant matter in soils is conditioned by its composition in the general order: excessive proportion of N $>$ balanced proportion of carbohydrate (I) and N $>$ excessive proportions of (I). The loss of org. matter during decomp. falls mainly on the sol. (I), hemicellulose, and cellulose. During the decomp. of

young plants of high N content there is a possibility of actual loss of N, and further, since nitrification is rapid, nitrates may be leached unless the soil is cropped soon after the ploughing-in of green manure.

A. G. P.

Effect of phosphates on leached-out chernozem. N. I. MELINKOV (Udobr. Urozh., 1931, 724—728).—For winter rye, 3 pts. of phosphorite (I) were equiv. to 1 pt. of sol. phosphate. The fineness of division of (I) does not influence its assimilation.

CH. ABS.

Influence of cultivation and manuring on the phosphate in a podsolised soil. S. M. DRACHEV (Pedology, 1933, 28, 240—251).—The PO_4''' content (I) decreased after 13 years' fallow, but the application of dung increased (I) even under fallow and the phosphates are rendered more mobile. Phospho-org. compounds of the lecithin type are present in small amount in the soil (< 1 mg. per kg.).

A. M.

Rothamsted experiments on the growth of wheat 1843—1933. Ninety years of continuous wheat on one field. (Sir) E. J. RUSSELL (Mezőg. Kutat. [Spec. No.], 1933, 6, 522—543).—A review and discussion of experimental data.

A. G. P.

Comparison of various harvesting methods in respect to moisture and grade of the grain. (Interim report.) R. K. LARMOUR, W. F. GEDDES, and D. CAMERON (Canad. J. Res., 1933, 9, 486—501).—A detailed examination of the effect of green weeds, uneven ripening, and rain on the quality of samples harvested in 1932—3 is analysed.

J. W. B.

Soil conditions affecting growth of sugar cane in the district of Saran, North Bihar. II. M. N. GHOSH and H. N. MUKHERJEE (Agric. Live Stock India, 1933, 3, 529—548).—The yellowing of canes is associated with a deficiency of N during the rapidly growing season. This is brought about in abnormally wet seasons by downward leaching of soil NO_3' , and in very dry seasons by a sufficient accumulation of alkali salts in the surface soil to inhibit nitrification. Such conditions are improved by application of salts containing N or by cultural treatment reducing alkalinity to an extent which permits nitrification. Diseased plants, in the early stages of growth, contain more and richer juice than healthy ones, but there is no evidence of lowered assimilation of nutrients other than N. Yellowed plants also had higher sugar:N ratios, especially in the upper sections. The ratio declined as plants revived under appropriate treatment. The crit. ratio for healthy plants averaged 7—8:1.

A. G. P.

Windrowing qualities of Co. 281 and other varieties of sugar cane under Louisiana conditions. R. T. BALCH and J. I. LAURITZEN (U.S. Dept. Agric. Circ., 1933, No. 304, 15 pp.).—On the approach of frost severe damage to standing canes is sometimes avoided by felling and closely packing them in furrows, so that their tops afford some protection against cold winds. Of the cane varieties recently introduced into Louisiana, Co. 281 suffers much less deterioration than do the others under these conditions.

J. H. L.

Nitrogen optimum and border effect with sugar cane. C. VAN DILLEWIJN and L. LEVERT (Arch.

Suikerind. Nederl.-Indië, 1933, 41, 569—582).—A field test with addition of 0, 4, 8, 12, and 16 quintals of $(\text{NH}_4)_2\text{SO}_4$ (I) per hectare gave a normal asymptotic curve with the economic optimum at about 4 quintals. Larger quantities gave some increase in cane yield, but not sufficient to counterbalance the decrease in sugar due to the higher doses of (I). One of the plots (P_0) receiving no (I) lay between a plot receiving 4 (P_4) and one receiving 16 quintals (P_{16}). The row of P_0 adjacent to P_4 obviously profited from the (I) applied to the latter, whilst the effect of (I) on P_{16} extended over the two nearest rows of P_0 . The rows were 1.25 m. wide.

J. P. O.

Flood fallowing of [sugar]-cane fields in British Guiana. R. R. FOLLETT-SMITH (Trop. Agric. [Trinidad], 1933, 10, 91—95).—Preliminary experiments indicate that soil improvement following flood-fallowing is due to the flocculation of Na-clay subsoils by Ca, increased ammonification during submergence, and the removal of excessive accumulations of sol. salts in the upper layers.

A. G. P.

Root distribution of sugar cane in different soils in Trinidad. F. HARDY (Trop. Agric. [Trinidad], 1933, 10, 165—172).—Technique for the examination of root distribution by core sampling is described. The vertical distribution is largely controlled by variations of ground- H_2O level. The effect of soil texture is relatively small.

A. G. P.

Chemical stimulation of growth and yield of agricultural plants. P. A. VLASYUK (Nauk. Zapiski Tzuk. Prom., 1933, 10, No. 28, 113—132).—Stimulation by addition to soil of Ba, Mn, Al, Mg, and As compounds, I, acids, and alkalis is reported. MnCl_2 and MgCl_2 increase the yield of sugar beet by 7.6 and of sugar by 1.2 metric tons per hectare.

CH. ABS.

Chemical stimulation for increasing the yield of sugar beets. P. A. VLASYUK (Nauk. Zapiski Tzuk. Prom., 1933, 10, No. 27, 181—198).—Treatment of the seeds with aq. KI, MgCl_2 , and AlCl_3 deepens foliage coloration and prolongs life of the leaves. Use of 10% aq. MgCl_2 increases the sucrose yield by 0.679 metric ton per hectare.

CH. ABS.

Sugar content, root weight, and leaf weight in beets. P. J. H. VAN GINNEKEN and K. DE HAAN (Meded. Inst. Suikerbietenenteelt, 1933, 3, 131—188).—There is a close relationship between the sugar content and the wt. of the roots, taking the form $g^2/w = p$, in which g is the sugar content, w the wt. of the root, and p a const. It is found also that the amount of sugar formed per g. of leaf wt. per day is const. throughout the growing season, so that large leaves produce more sugar than small ones of the same plant.

J. P. O.

Increase of sugars in sorghum, Jerusalem artichoke, and chicory by mineral fertilisers. B. PONOMARENKO (Nauk. Zapiski Tzuk. Prom., 1933, 10, No. 27, 165—180).—Complete mineral fertilisers increase the yields of Jerusalem artichoke (I) and chicory (II), but decrease the sugar content. K increases total sugars and sucrose in sorghum, but only slightly in (I) and (II).

CH. ABS.

Properties of green fodders for ensilage: relationships between the carbon dioxide in the silo and the condition of the silage. L. KUCHLER and H. KULCKE (Die Futterkonserv., 1932, 3, 165—186; Bied. Zentr., 1933, A, 4, 111).—Production of CO_2 in silos is accelerated by a rise in temp. or the addition of material containing sugars, and is associated with the lactic acid (I) content of the product. Addition of 0.5—1.0% of sugar at 20° produces the same increase in (I) as is obtained by raising the temp. to 45—50°.

A. G. P.

Control of smut in wheat by dipping. G. GASSNER and H. KIRCHHOFF (Phytopath. Z., 1933, 6, 453—468; cf. B., 1933, 518).—Addition of EtOH or Pr^2OH to the bath used for hot- H_2O treatment (3—5 hr. at 50°) increases the efficiency of the treatment.

A. G. P.

Results obtained with "polychlorides" and *p*-dichlorobenzene against the larvæ of *Polyphylla fullo*, L., and *Melolontha hippocastani*, F. Z. S. GOLOVYANKO (Bull. Entom. Res., 1933, 24, 531—536).—Effective control was obtained by use of polychlorides (? higher chlorobenzenes) and *p*- $\text{C}_6\text{H}_4\text{Cl}_2$, the latter being slightly the more satisfactory. With applications made at 14 and 28 in. apart, placement at 8 in. below the soil surface gave better results than at 4 in.

A. G. P.

Tar-distillate emulsions for control of the (A) rosy aphid and other fruit insects, (B) black cherry aphid. (A, B) F. Z. HARTZELL and (A) P. J. PARROTT (New York State Agric. Exp. Sta. Bulls., 1933, Nos. 636—7, [A] 29 pp., [B] 23 pp.).—(A) Successful use of tar-oil emulsion (I) as a dormant-season spray against aphids, scale insects, bud moth, etc. is recorded. On completely dormant trees no injury to wood or buds was observed. (B) Applications of 4—6% of (I) in early spring after buds had begun to swell gave effective control of the aphid without injury to buds or twigs.

A. G. P.

Pyrethrum controls cabbage worms. R. HUTSON (Michigan Agric. Exp. Sta. Quart. Bull., 1933, 16, 100—101).—Pyrethrum proved superior to arsenicals in controlling cabbage caterpillars. A dust containing pyrethrum powder (1 pt.) and talc, bentonite, or flour (2 pts.) applied at the rate of 25—30 lb./acre was more effective than were wet sprays containing spreaders, unless the spray was applied with great care. Incorporation of a small proportion of kerosene ($\frac{1}{2}$ gal. per 100 lb.) with the above dust increased its efficiency.

A. G. P.

Spray value of nicotine supplements for aphids. H. C. HUCKETT (New York State Agric. Exp. Sta. Tech. Bull., 1933, No. 210, 20 pp.).—Soaps, mineral and vegetable oils used as activators (I) in nicotine sulphate sprays improved their efficiency against aphids. The effect of (I) was less consistent in mixed nicotine-Bordeaux mixture preps.

A. G. P.

Elm leaf beetle control. D. B. MACRIE and C. HAENGGI (Calif. Dept. Agric. Mo. Bull., 1933, 22, 346—350).—Spraying with Zn arsenite (1.5 lb. per 100 gals.) was as effective as with Pb arsenate (4 lb. per 100 gals.).

A. G. P.

Spraying cantaloupes for control of downy mildew and other diseases. F. VAN HALTERN (Georgia Agric. Exp. Sta. Bull., 1933, No. 175, 53 pp.).—Best results were obtained by use of a 1-2-50 "instant" Bordeaux mixture. Yields from successive pickings show a definite retardation in the period of maturity induced by spraying. A. G. P.

Removal of lead and arsenic spray residues from apples and pears. R. H. ROBINSON and M. B. HATCH (Oregon Agric. Exp. Sta. Bull., 1933, No. 317, 15 pp.).—Satisfactory treatment consists in washing in Na silicate solution followed by HCl. Degumming agents are beneficial for waxy coated fruit or those which have been sprayed with oil preps. late in the season. Temp. and time of washing depend on the waxy or oily material covering the fruit. Addition of NaCl or NaNO₃ (1.6%) to the HCl wash-liquor is beneficial for washing at > 32°. A. G. P.

Adherence of dusts in control of insect pests. P. RECKENDORFER (Z. Pflanzenkr. Pflanzenschutz, 1933, 43, 662-667).—The adherence of dust to leaf surfaces after exposure to strong air currents is examined under laboratory conditions. A. G. P.

Ammonisation of double superphosphates.—See VII.

See also A., Feb., 164, **Portable vac.-tube volt-meter. 229, Determining inorg. PO₃''' in vegetable substances, and of HCN in white clover.**

PATENTS.

Manufacture of fertilisers [from coal and salt]. D. SHIELDS (U.S.P. 1,912,227, 30.5.33. Appl., 22.4.32).—The process described in U.S.P. 1,212,573 (B., 1917, 398) is effected in two stages, fluidity of the mass being restored at an intermediate period by addition of soft H₂O. Clay is finally incorporated. B. M. V.

Preparation of [urea] fertiliser material. G. SINGLETON and R. P. THORNTON (U.S.P. 1,918,233, 11.7.33. Appl., 8.4.30).—Pulp made from waste fruit, especially lemons, is mixed with CaCN₂ and about 200 lb. of dried peat per ton, whereby an exothermic reaction occurs with the formation of urea. The heat evolved causes the mixture to fall to a dry powder within a few days. A. R. P.

Manufacture of a based ammonium sulphate fertiliser. J. W. and J. H. DEAN, ASSRS. to KNOXVILLE FERTILIZER Co. (U.S.P. 1,918,454, 18.7.33. Appl., 30.6.32).—A mixture of (NH₄)₂SO₄ (75), Ca superphosphate (2.5), peanut-hull meal or similar vegetable material (3.75), and dolomite (18.75%) is intimately ground to a dry, free-running powder. A. R. P.

Manufacture of basic phosphatic fertiliser. J. W. and J. H. DEAN, ASSRS. to KNOXVILLE FERTILIZER Co. (U.S.P. 1,918,900, 18.7.33. Appl., 30.6.32).—Superphosphate is intimately mixed with a small amount of dry vegetable matter containing N and K and with sufficient dolomite to neutralise all free acidity; the mixture is allowed to age until chemical reaction ceases and then ground to a fine, free-running powder. A. R. P.

Manures. A. HORTEN (B.P. 404,203, 30.5.33).—Dung and waste vegetable products are allowed to rot in a closed vessel through which fine streams of air are passed to accelerate decomp. The liquid suspension so obtained is cooled in a heat exchanger which serves to preheat a new charge, and the cold liquid is saturated with the NH₃ and CO₂ evolved during the rotting of a further charge. A. R. P.

[Mercurial] seed disinfectant. M. ENGELMANN, ASSR. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,915,054, 20.6.33. Appl., 2.2.28).—Claim is made for dusting powders comprising finely-divided Hg, HgO, HgCl, or basic Hg sulphate pptd. on a carrier, e.g., CaO, clay, kieselguhr, or charcoal. A. R. P.

(A) Manufacture and use of parasiticidal emulsions. (B) Compositions [oils] for stimulating or rejuvenating plants. W. H. VOLCK, ASSR. to CALIFORNIA SPRAY-CHEM. CORP. (U.S.P. 1,914,902-3, 20.6.33. Appl., [A] 25.2.29, [B] 15.11.29).—(A) In making oil-H₂O emulsions CCl₄ is added to the oil in quantity sufficient to make the *d* of the mixture = or slightly > that of the aq. dispersing medium. (B) The plants, e.g., citrus fruit trees, are sprayed with an emulsion, in alkaline soap solution (66-83%), of 1-7 (4)% of a purified, viscous, non-volatile oil, e.g., nujol, and 16-27 (26)% of a volatile, highly penetrating mineral oil, e.g., kerosene. A. R. P.

XVII.—SUGARS; STARCHES; GUMS.

Preliming [of sugar juice]. F. BAERTS, P. WAHL, and P. DELVAUX (Sucr. Belge, 1933, 52, 406-419).—In the Spengler system of prelimiting, the CaO required in the first liming is about 0.25% on the beets, but the exact amount requires rather accurate determination. It forms a distinct improvement compared with the ordinary method of adding the CaO all in one dose, in respect of rate of filtration at the first carbonatation and also of the colour. In the Dédéek and Vašátko method, however, it is unnecessary to make the painstaking preliminary test of the amount of the prelimiting required in the Spengler method, a slight excess of CaO being of no consequence. It has given the best results in rate of filtration and colour of juice, and can be applied continuously. J. P. O.

Practical development of funnel filtration for testing the character of [sugar-beet] juices. O. SPENGLER, F. TÖDT, and S. BÖTTGER (Z. Ver. deut. Zucker-Ind., 1933, 83, 1077-1085).—The authors' recent work on methods of liming (B., 1932, 363, 1131; 1933, 886) has shown that the rate of filtration after completed liming or after first carbonatation is the most sensitive criterion of the suitability of different methods or of the working character of different juices. Useful comparative results may be obtained by simple funnel filtration in the laboratory, but conditions are much better standardised in a filter apparatus now described. A dry filter paper, folded in conical form, is clamped around its upper edge between two metal rings and hangs free from other contacts, above a measuring cylinder. Mounted centrally on the inner of the two rings, above the filter, is a cylindrical vessel having an

outflow valve with cone distributor at the bottom and a stirrer. Into this vessel are poured 300 c.c. of limed juice at 85° or carbonated juice at 95°, and after a few turns of the stirrer to ensure that the ppt. is in suspension the whole of the juice is discharged on to the dry filter. The times required to collect 50, 100, and 150 c.c. of filtrate are measured. Very concordant results can be obtained. J. H. L.

Frothing of syrup from P.O.J. 2878 cane. J. G. DAVIES (Trop. Agric. [Trinidad], 1933, 10, 248).—During the boiling of syrup obtained from the crushing of P.O.J. 2878 cane the frothing was so excessive that the vac. had to be broken and the steam shut off. It was found, however, that, provided the cane be ground within 2–3 days after being cut, little, if any, frothing occurs. Cane ground 5 days after cutting could not be worked to sugar, so much did it froth. J. P. O.

Fractional addition of decolorising carbons [to sugar solutions]. A. S. SIPYAGIN and E. S. SERKIN (Trudi Z.I.N.S., 1933, 39–42).—The procedure adopted was to heat the thick-juice of 65–70° Brix to 85–90° in a tank with agitator, and to add the C (0.25 wt.-% of the sugar) in 10 successive portions at a time at 2-min. intervals, taking 20 min. for the whole operation, then filtering. This fractional use of the C was found to give a decided increase in the decolorising effect, viz., 25.7 as compared with 13.3. J. P. O.

Preserving concentrated [beet-]diffusion juice. M. Z. KHELEMSKI *et al.* (Nauk. Zapiski, 1933, 10, 61–73).—Beet-diffusion juice conc. to a density of 25–30° Brix after liming was found to keep satisfactorily sufficiently long to enable the factory to prolong its usual working campaign, and calculations show that the added expense of the partial concn. is not necessarily prohibitive. J. P. O.

Scale formation in [sugar-juice] evaporators. H. CLAASSEN (Internat. Sugar J., 1934, 36, 17–18).—Among suggestions made for the diminishing of scale in juice evaporators are that CO₃'' or PO₄''' ions should be added previously so that the CaSO₄ and CaC₂O₄, having negative solubility vals., are rendered less liable to deposit. Addition of coarse dispersoids (*e.g.*, decolorising C) should act as "seed" for the scale-forming substances, causing them to ppt. as sludge, rather than build up as incrustation. Much, too, can be done in the direction of evaporator design, especially in ensuring that the juice shall flow past the heating surfaces with the greatest rapidity, rapid circulation therefore being of utmost importance. J. P. O.

Determination of sulphur dioxide in sugar-factory products. E. TROJE (Deut. Zuckerind., 1933, 58, 625–626).—Direct titration with I of the SO₂ present in the thick-juices and other sulphured products of the sugar factory is sufficiently accurate for routine purposes, provided that a deduction be made for the I oxidising the org. non-sugars. In a thick-juice of 60° Brix sulphured to 20–40 mg. SO₂ per litre, this deduction would be 3–4 mg., and is fairly const. J. P. O.

Sugar determination by precipitation. S. ROTHENFUSSE (Centr. Zuckerind., 1933, 41, 687).—The sugar is pptd. by a MeOH solution of Ba(OH)₂ as an easily filterable and stable ppt., which is subsequently decom-

posed by addition of CO₂, H₃PO₄, or H₂SO₄, and the sugar determined gravimetrically or polarimetrically. J. P. O.

Biuret reaction, Trommer sugar test, and a new simple colorimetric sugar determination. E. BERLINER and E. SCHMIDT (Mühlenlab., 1933, 3, 187–192).—The biuret reaction is satisfactory only when directly reducing sugars are absent and the reaction is carried out rapidly in the cold (heating leads to protein hydrolysis), and the Trommer method of determining sugars (the "hot" biuret reaction) only if proteins are absent. Consequently the "hot" biuret test is unsuitable for separating durum and other hard from soft wheats, for determining the age of wheat samples, or the condition of a reduction (*cf.* A., 1930, 799; B., 1930, 262, 738; 1931, 41; 1933, 408). Pure rye-gliadin extracts (I) show no difference from wheat-gliadin extracts (*cf.* B., 1933, 521), the reaction of impure (I) being due to trifructosan, fructose, and mucilage. Lane and Eynon's sugar determination is inaccurate when applied to grain milling products (B., 1933, 810). Sugar is determined colorimetrically by heating aq. flour extracts with *N*-caustic alkali for 5 min. on a boiling H₂O-bath and comparing the yellow to orange coloration so formed with that produced by standard glucose solutions; any yellow colour due to low gradeness must be allowed for. The method can be used for determining the sugar content of loaves. Kühl's "hot" biuret reaction is applied to the determination of rye flour in wheat loaves. E. A. F.

Biuret reaction. H. KÜHL (Mühlenlab., 1933, 3, 205–208).—A reply to Berliner and Schmidt (*cf.* preceding abstract.) E. A. F.

Impurities in raw sugar crystals. I. SORGATO (Ind. Sacc. Ital., 1933, 26, 449–457).—A gravimetric or conductometric determination of the ash of a raw sugar should be supplemented by establishing the curve of an electrometric titration with 0.05*N*-HCl, which gives a val. for the amount of the titratable org. compounds in the non-sugars present. It gives also a ratio between the org. and inorg. electrolytes present independently of the abs. amount of the non-sugars. J. P. O.

Gelation of sugar solutions with calcium lactate. O. SPENGLER and G. DORFMÜLLER (Z. Ver. deut. Zucker-Ind., 1934, 84, 1–14).—Gels having a cryst. micro-structure are formed by crystallisation of mixtures of Ca lactate with sucrose (*S*), maltose (*M*), glucose (*G*), or fructose (*F*). The amount of lactate required is greater for *G* than for *S* or *M* solutions and increases with the amount of H₂O present. *F* solutions yield gels only when highly supersaturated. E. S. H.

Drying of starch. H. KAMP (Z. Spiritusind., 1934, 57, 7–8).—An illustrated description is given of the Büttner vertical turbine dryer, comprising a stack of slowly rotating annular trays of non-conducting material, across which air, warmed by heating elements around the stack, is circulated to and from a central well by means of fans. Moist starch is delivered to the top tray, and by means of radial slots in the trays and stationary scrapers and spreaders the charge on each tray is automatically transferred to the tray below at each revolution. The lowest trays may serve for cooling the dried starch. J. H. L.

Determination of free starch in pressed potato pulp, and its bearing on efficiency of extraction. PARLOW (Z. Spiritusind., 1933, 56, 285—286).—Control of the efficiency of the washing-out of starch (S) from pulped potatoes, by determination of free S in the exhausted pulp, may be misleading if this test is made after the exhausted pulp has been pressed. Pressing liberates some S from partly ruptured cells and thus raises the free S content of the pulp by 2—3% (on pulp dry substance) at the expense of the bound S, *i.e.*, the S enclosed in cells and therefore not recoverable by washing out. J. H. L.

Theory of the titration of starch [acidity]. H. TRYLLER (Z. Spiritusind., 1934, 57, 19).—Traces of SO₂ are of general occurrence in potato starch, and small quantities of PrCO₂H may occur in inferior second products, but the acidity of starch is really due to amylophosphoric acid, present partly as salts which are subject to hydrolytic dissociation. The acidity found therefore depends on the conditions of titration, being lessened by conditions which favour hydrolysis and increased by those which restrict it, *e.g.*, the presence of buffer salts. J. H. L.

Consistency of potato-starch size. W. T. SCHREIBER, M. N. V. GEIB, and O. C. MOORE (Bur. Stand. J. Res., 1933, 11, 765—773).—The decrease in the consistency (C) of potato-starch size of the type used in the textile industry is dependent on the temp. of cooking, speed of agitation, and length of the cooking period. It is attributed to the catalytic action of liquefying enzymes of amylase present in the starch, but treatment calc. to remove such enzymes failed to stabilise C. Addition of traces of lecithin and lanum to sweet potato-starch size retarded the decrease in C. C can be increased by washing with salt solutions. J. W. S.

Combined vac. and pressure gauge.—See I. **Kinematographic swelling analysis.**—See V. **Sugar cane and beet. Sugars in sorghum etc.**—See XVI.

See also A., Feb., 145, **Starch and bread-making.** 147, **System CaO-sugar-H₂O.** 163, **Compensator box for polarimeters.**

PATENTS.

Packing of invert sugar and like sugars. E. A. BERRY, and MANBRÉ & GARTON, LTD. (B.P. 404,407, 22.9.32).

Preserving coal.—See II.

XVIII.—FERMENTATION INDUSTRIES.

Production of pure yeast. B. M. BROWN (J. Inst. Brew., 1934, 40, 9—13).—The production of yeast for brewery fermentations is described starting from a parent mixed laboratory culture derived from 10—15 primary colonies. Attenuative power of the yeast obtained tends to decrease after some 10 brewery generations (gyles), following which the old culture is replaced by a new strain similarly developed. Attenuations of satisfactory regularity are obtained, being, in 94% of the cases quoted, within the limits: desired racking

gravity $\pm 1^\circ$. Conditioning without priming is very quiet. The yeast has been employed for various types of ales, with addition of priming in some cases, control of priming being exact. The process is still regarded as experimental. I. A. P.

Determination of peptic power of malt. L. INOUX (Brass. et Malt., 1933, 23, 122—126; Chem. Zentr., 1933, ii, 1939).—1% aq. hop extract and lactic acid are added to a 10% malt extract to give p_H 4. After boiling and filtering, a known quantity of barley meal is added; the suspension is kept on the H₂O-bath and filtered. N is determined (Kjeldahl), the difference between this val. and a control giving the proteolytic power. A. A. E.

Improvements in the production of absolute alcohol. H. GUINOT (Internat. Sugar J., 1934, 36, 24—27).—Particulars are given of the design and operation of the Melle azeotropic process of producing abs. EtOH (I), in which the steam consumption is 170 kg. per hectolitre of (I), as compared with the 200—270 kg. of steam necessary in making rectified spirit (II) of 96.5%. Pure (I) can now be obtained directly from mash, using the plant usually employed for (II), and at a cost little > that of phlegms of high concn. J. P. O.

Continuous production of absolute alcohol from sulphite-liquor mash by the Drawinol method. K. R. DIETRICH (Z. Spiritusind., 1934, 57, 25—27; cf. B., 1933, 327).—The method is described in detail, specially stabilised C₂HCl₃ (I) (Drawinol) being used as the extracting medium. It is claimed that since (I) is incombustible there is less risk of explosion, and further that the simple apparatus requires relatively small quantities of process steam and H₂O. D. A. C.

Improvement of acetous wines. G. I. MERAN (Bul. Fac. Ştiinţe Cernăuţi, 1933, 6, 295—303; Chem. Zentr., 1933, ii, 1939).—Treatment with CaCO₃ or MgO is unsatisfactory; K tartrate is recommended when the amounts of AcOH and tartaric acid are small. Covering the wine with paraffin oil prevents acidification, but affects taste and aroma. A. A. E.

Removal of water from foodstuffs by freezing. R. HEISS (Biochem. Z., 1933, 267, 438—451).—The amount of H₂O removed from fresh beef by freezing is determined by dilatometric and calorimetric methods. The latter method gave results somewhat > those by the usual calorimetric method but < those by the dilatometric method. No difference was obtained with rapid or slow freezing providing equilibrium was attained in both cases. Curves showing the relationship of H₂O removed and freezing temp. are calc. for various other foodstuffs. P. W. C.

See also A., Feb., 169, **Micro-determination of MeOH [in fermented liquors].** 219, **New cryst. proteolytic enzyme. Prep. of protaminase. Butylene glycol as fermentation product.** 220, **Reaction of *Aspergillus repens* on NH₄NO₃.** 221, **Production of H₂O₂ by *Bacillus bulgaricus*.**

PATENT.

Diabetic foods.—See XIX.

XIX.—FOODS.

"Gummy" gluten wheats. N. P. KOSMIN (Mühlenlab., 1933, 3, 185—188).—Whole-wheat flours from 6 different types of Russian wheat which showed varying degrees of injury (I) by the "wheat bug" (*Eurygaster* and *Aelia* species) and also from normal (II) and 100% injured (III) grains were investigated. It was generally impossible to wash out gluten from (I) and (III). There was little difference in the total and protein-N contents of (I), (II), and (III). 5% of flour from (III) (cf. B., 1931, 1069) will show deterioration of the gluten 3 hr. after making up the dough. Grain containing 3% of (III) will produce flour with poor-quality gluten. 0.1N-HCl (cf. B., 1933, 1078) and, to a smaller extent, 5% aq. NaCl, will inhibit the deterioration of gluten. The injury to the proteins may be due to enzymic hydrolysis or to disaggregation of the mol. E. A. F.

Effect of fats and lipins on the gluten condition and baking quality of flour. M. S. RESNITSCHENKO and K. A. ALAKRINSKAJA (Mühlenlab., 1933, 3, 199—206).—Gluten (I) could be washed out of all samples of defatted flour (except one which had been dried at 105°) even when the flour had been milled from defective wheat (penetrated by the "tortoise" bug) if the washing was effected immediately after doughing. The H₂O absorption of the (I) increases on fat extraction, and an increase in dry (I) occurs, this increase taking place at the expense of its N content. Extraction produces a marked deterioration in the physical properties of the (I) from extracted flours both from normal and defective wheats. Addition of 2 or 4% of sunflower oil decreased the H₂O absorption and coherence of the (I), which could be washed out only with difficulty. The vol. of the loaf was inversely proportional to the fat content of the flour (max. loaf vol. with extracted flour, min. loaf vol. with flour to which fat had been added). The action of lecithin was not comparable with that of fat; it increased the loaf vol. owing to its foam-forming capacity. These results are in agreement with those obtained by Johnson and Whitcomb (B., 1928, 622; 1931, 118) and by Berliner and Koopmann (Z. ges. Mühlenw., 1927, 5, 85), but are in direct opposition to those of Mohs (Z. ges. Mühlenw., 1924, 1).

E. A. F.

Determination and importance of the gluten content of wheat flours. I. K. GREISENEGGER and V. HAFNER (Mühlenlab., 1933, 3, 217—224).—There is little difference between the results obtained from the "sand" and "metal plate" methods of drying moist gluten (*G*). The slightly higher results in the latter case are due to the retention of H₂O by the *G*. The "sand" method is also the more rapid. With too small samples (< 10 g.) the accuracy of the results is affected; with too large samples (> 50 g.) the washing process is prolonged and rendered more difficult. It is immaterial whether H₂O containing gypsum (I) or tap or distilled H₂O (II) is used for the dough-making, but (I) possesses the advantage that the *G* is obtained in a more compact and less sticky form so that washing is facilitated. The dough should be allowed to rest for at least ½ hr. before washing out the *G*. (II) can

be used for the washing process; salt solutions are unsuitable. The temp. of the wash H₂O exerts a very marked effect on the *G* contents and should therefore be kept const. (20° or 22°). The moist *G* should be weighed immediately after washing, to prevent evaporation. The time and amounts of H₂O used for washing do not affect the results. Within limits (105—125°) the temp. of drying does not affect the dry *G* content. The variability of single determinations of the dry *G* content may be ±0.5% and of the moist *G* ±2.5%. If duplicate determinations differ by >, respectively, 1 or 5.0%, then the determination must be repeated.

E. A. F.

Rôle of fatty matter contained in flour. A. KLING, J. FROIDEVAUX, and F. DUBOIS (Compt. rend., 1934, 198, 389—391).—Ligroin (I) is the only solvent which extracts fat from flour without causing other alterations. The extensimetric pressure of the flour is greater the greater is the ratio gluten/fat. The thin layer of fat opposes wetting during kneading. Addition of soap to the kneading liquor (2.5% NaCl) causes considerable increase in the pressure of the dough, similar results being obtained by addition of (I) extracts of fats to the flour. The increase of pressure is least with distilled H₂O and increases with increasing quantities of dissolved salts. J. W. B.

Importance of soya[bean] flour as baking improver for wheat flours. R. DIETZ (Mühlenlab., 1933, 3, 209—214).—Addition of soya-bean flour (I) to wheat flours led to decreased baking quality (e.g., loaf vol.), greater sensitivity in the final fermentation (proof), and lower oven spring. These disadvantages more than outweigh the advantages (viz., higher dough yield, more rapid fermentation, and a better browning of the loaf) of such an addition. When it is necessary to add (I) (e.g., for the production of bread or other bakery products rich in protein) this must be effected at the doughing stage so as to eliminate uncontrollable side-reactions. Owing to its high H₂O-absorption, (I) forms a cheap improver for slack doughs. These results are in agreement with those obtained by Annen (B., 1934, 39).

E. A. F.

Determination of cellulose. M. I. KNYAGINICHEV (Bull. Appl. Bot. Genet. Plant-Breeding, Leningrad, 1933, [iii], No. 1, 103—112).—Ground wheat (2—3 g.) or flour (5—7 g.) is heated with 150 c.c. of 0.5% HCl containing 10 c.c. of saturated aq. KClO₃ for 16—17 hr. at 100—103° with reflux condensation. The residue on filtration through asbestos (Gooch) is washed successively with hot 10% NaOH (50 c.c.), hot H₂O (100 c.c.), hot EtOH (25 c.c.), and Et₂O (25 c.c.), dried at 108—110° for 3—4 hr., weighed, ignited at red heat for 1 hr., and again weighed. CH. ABS.

Determination of amino-acids in wheat flour. L. W. SAMUEL (Biochem. J., 1934, 28, 273—282).—Aq. extraction of NH₂-acids (determined by Sørensen titration to *p*_H 8) is complete in about 1 hr. and no further formation of NH₂-N occurs on keeping. With a low-grade flour an apparent increase in NH₂-N occurred when the titration was carried to *p*_H 9, due, it is suggested, to enzymic formation of simple peptides with very low acid dissociation const. A. E. O.

Shortening requirements for baked products.

C. B. MORISON (Oil and Soap, 1934, 11, 23—24).—A discussion.

Behaviour of suspensions in fresh milk and in heated milk in relation to the Schern-Gorli reaction.

A. KERN (Prager Arch. Tiermed., 1931, 11, 253—259; Chem. Zentr., 1933, ii, 2072).—Addition of *N*-KOH or NaCl diminishes the intensity of the ring reaction. Excess of alkali gave no reaction in 2.5 hr. Fresh milk from a cow suffering from mastitis gave a very weak reaction. Milk heated at 60—61° gives a weak reaction after 2 hr. Cooling to 5° shortens the reaction time. Milk heated at 65—66° gave no reaction. Human milk (0.8% fat) gave no reaction in 2 hr. A. A. E.

The Schern-Gorli reaction in pasteurised milk.

A. KERN (Prager Arch. Tiermed., 1932, 12, 315—317; Chem. Zentr., 1933, ii, 2073).—Milk pasteurised for 30 min. at 74°, 70°, 65°, or 64° gave a negative reaction after 2 hr. In some cases the ring reaction was positive after 1—1.5 hr. when the milk heated at 63—64° for 48 hr. was cooled to 3°. A. A. E.

Theory of the Schern-Gorli reaction in continuous-pasteurised milk. A. KERN (Prager Arch. Tiermed., 1932, 12, 273—274; Chem. Zentr., 1933, ii, 2073).—Addition of gelatin to milk heated at 65° caused the appearance of C particles in the cream layer. A. A. E.

Coagulation of milk by rennin and effect of physical and chemical factors on the quantity of whey. A. KERN (Prager Arch. Tiermed., 1932, 12, 255—260; Chem. Zentr., 1933, ii, 2072—2073).—Addition of 0.05 g. of CaCl₂ to 50 c.c. of fresh milk, or passing CO₂, did not affect the quantity of whey (I). In milk treated with CO₂ after being heated at 65°, (I) was increased. A. A. E.

"Casein" from castor-oil cakes. M. ZHDAN-PUSHKIN and A. SOKOLOVA (Masloboino-Zhir. Delo, 1933, No. 3, 19—22).—By treating the oil-free cake with NaOH (*d* 1.007) at 40—45° for 2 hr. and separating the protein with 3.5% HCl, crude "casein" was obtained (49.5% of wt. of cake). CH. ABS.

Microscopy of food products. II (contd.).

Butter and margarine. III. Lard. C. H. BUTCHER (Food, 1933, 3, 140, 142, 176—178; cf. B., 1934, 119).—II. Difficulty is experienced in detecting < 30% of margarine (I) in butter when (I) is prepared by emulsifying the fat with skim-milk and churning the separated "cream" with genuine cream. In such cases 1 c.c. of hot fat is shaken with 20 c.c. of a mixture of (6 Et₂O + 4 EtOH) and 1 c.c. of glacial AcOH, when pure butter fat gives, after 1 hr., a deposit of symmetrical star-like clusters of narrow pointed or bent crystals, whilst deposits from (I) mixtures appear more rapidly, and are composed of closely-packed sheafs of minute needles. Coconut oil is identified from the clusters of long needles obtained when 1 c.c. of sample is digested for 5 min. at 55° with 30 c.c. of 90% EtOH, and the filtered liquid allowed to evaporate.

III. The Et₂O-extraction method should be used with caution to indicate small amounts of adulteration of hard lards, and is best carried out by allowing 5 c.c. of fat in 20 c.c. of Et₂O—EtOH (9:1) to evaporate from a loosely-

plugged tube at 20°. Beef fat is less sol. than lard and deposits radiating tufts of *f*-shaped needles of β-palmito-distearin, whilst the α-palmito-distearin from lard takes the form of irregular or rosette-shaped groups of flat plates with oblique ends. Staining with Giemsa-Romaowsky stain assists this distinction and facilitates photomicrography. J. G.

Vitamin-A content of ghee. K. S. GREWAL (Quart. J. Pharm., 1933, 6, 650—654).—Ghee (I) prepared from centrifuged butter contains appreciable amounts of vitamin-A (II) a part of which is destroyed during the Indian treatment of milk fat for the prep. of (I). (I) prepared in spring has a (II) content > that of (I) prepared in winter. The content of (II) in (I) remains fairly const. during storage. F. O. H.

Examining dairy products for members of the Escherichia-Aërobacter group. M. H. McCRAIDY and J. ARCHAMBAULT (Amer. J. Publ. Health, 1934, 24, 122—128).—The sampling errors in the determination of small nos. of such organisms are pointed out. Variable results were obtained on submitting apparently typical colonies in bile-salt, eosin-methylene-blue, and Endo agar to confirmation by the A. P. H. A. method. The production of < 10% of gas in brilliant-green-bile-salt broth is stated to be the most reliable presumptive test. E. B. H.

Determination of glycerin in egg yolk. K. HO and T. H. CHENG (J. Chinese Chem. Soc., 1933, 1, 199—207).—Details are given for the determination of glycerin (I), H₂O, oil and fat, and acidity in egg yolk (II). The (I) content was given by extracting (Soxhlet) the dried residue from a sample of (II) with COMe₂ (III), distilling off the (III), drying in a vac. oven, and weighing (*W*₁). This residue was then extracted with light petroleum (IV), separated, washed with H₂O, and the (IV) solution distilled, dried, and weighed (*W*₂). Then *W*₁ - *W*₂ = wt. of (I) in sample. R. S. C.

Frozen fruits for ice cream. J. C. HENING and A. C. DAHLBERG (New York State Agric. Exp. Sta. Bull., 1933, No. 634, 19 pp.).—Storage of strawberries, raspberries, and other fruit at 0° in sugar syrup produced a better flavour, when added to ice-cream mixture, than if stored at higher temp. A. G. P.

Colloidal constituents of honey. Influence on properties and commercial value. H. S. PAINE, S. I. GERTLER, and R. E. LOTHROP (Ind. Eng. Chem., 1934, 26, 73—81; cf. B., 1931, 462).—The colloidal content (*C*) of 37 samples of the commonest floral types of American honey, determined by ultra-filtration through collodion membranes, ranged from 0.07 to 0.80%. The darker honeys, e.g., buckwheat, generally contain larger quantities of *C* than light honeys, e.g., clover, and in any one floral group the colour intensity increases with *C*. Ultra-filtration lightens the colour of dark honeys, but the pigments present in the lighter varieties are too highly dispersed to be thus removed. Flocculation with bentonite similarly has a greater decolorising effect on the dark honeys. The N content of the air-dried *C* varied from 6.63 to 11.64%, which indicates an average protein content of 54.12%. > 50% of the total N remained, however, in the filtrate, partly as NH₂-acids or related compounds which are responsible

for colour development during processing or storing. Beeswax, pentosans, crude fibre, and inorg. matter were also present in *C*, the ash of which from sumac honey contained: SiO_2 42.64, Fe_2O_3 22.66, CaO 14.28, P_2O_5 9.00, K_2O 9.56%, MgO trace. The γ of honey is reduced, and the foaming tendency therefore increased, by an average of 22% by the presence of *C*, which is also the cause of the turbidity (*T*) since ultrafiltered samples were clear. Dilution with H_2O increases *T* (graphs given) in consequence of aggregation of *C*; re-concn. of the honey does not entirely remove *T*. Removal of *C* decreases η , which, however, is always $>$ the η of an invert sugar solution having the same concn. Variation of η with pressure indicates that *C* exerts a small plastic effect. It is concluded that honeys would be improved for commercial purposes by ultrafiltration. S. M.

Tomato storage. C. W. WARDLAW and L. P. MCGUIRE (Trop. Agric. [Trinidad], 1933, 10, 161—163).—Manuring of tomato plants with $(\text{NH}_4)_2\text{SO}_4$ increased, and with superphosphate or KCl decreased, the proportion of diseased fruit appearing during ripening and storage. A. G. P.

Oiled wrapping papers for prevention of storage diseases in apples. J. KOCHS (Angew. Bot., 1933, 15, 540—558).—Data showing the effectiveness of various types of oiled wrappers are recorded. The influence of the temp. of storage is examined. A. G. P.

Effect of inoculation on the quality, chemical composition, and bacterial flora of sauerkraut. C. S. PEDERSON (New York State Agric. Exp. Sta. Tech. Bull., 1933, No. 216, 21).—The effect of a no. of "starter" cultures is recorded. Those of lactic rod-form bacilli were definitely detrimental. In general, when kraut juice contained $<$ 0.3% of acid, "starters" tended to lower the quality of the finished product. A. G. P.

Nutritive value of pasture. X. Utilisation of young grass by swine. H. E. WOODMAN and D. B. NORMAN (J. Agric. Sci., 1934, 24, 93—104).—The digestion coeff. of young grass (26% of crude protein, 16.7% of crude fibre) was 60—62%, as compared with 85% for a maize meal-middlings ration. Vals. for older grass (16.7% of crude protein, 19.4% of crude fibre) were still lower. It is calc. that to replace 1 lb. of the meal ration 6—7 lb. of young grass are necessary. The vol. must be increased if pigs are allowed free grazing range. A. G. P.

Emulsifiers.—See I. Removing spray residues from fruit.—See XVI. Biuret reaction etc.—See XVII.

See also A., Feb., 145, Starch and bread-making, 164, Portable vac.-tube voltmeter, 198, Formalin titration of proteins. Basic NH_2 -acids of casein, 199, Reaction for vitamin-D, 204, Relation between sugar content, Cl content, and serum refraction of milk, 205, Phospholipins of milk. Nutritive val. of proteins for milk production, 224—8, Vitamins (various), 229, Determining inorg. PO_4''' in vegetable substances. Proteins of grasses and their prep.

PATENTS.

Treatment of kaoliang. E. SATAKE (U.S.P. 1,911,534, 30.5.33. Appl., 21.6.32).—Sorghum grain is steeped in lukewarm H_2O until the bran and inner skin are soft; it is then mixed with dried bran and the mixture passed through a deskinning or cleaning machine. B. M. V.

Manufacture of diabetic foods rich in albumin. TRES CHEMISCH-PHARMAZEUT. IND. U. HANDELS A.-G. (B.P. 404,677, 30.5.33. Austr., 21.7.32).—The germinal substance of the seed kernels of the carob tree (or of related plant genera) is freed from sugar (*a*) by lixiviation with H_2O , dil. acid or salt solutions, or by aq. EtOH solutions, (*b*) by fermentation, or (*c*) by a combination of (*a*) and (*b*). After extraction of fat with C_6H_6 the material is dried and ground. E. B. H.

Manufacture of margarine. B. BEHREND (B.P. 405,116, 15.2.33. Ger., 20.2.32).—Conc. malt wort (or extract) and a lipoid substance (*e.g.*, lecithin, phosphatides, sterols) are emulsified and added to the usual ingredients; milk may be replaced by H_2O in the margarine. E. L.

Preservation of meat. J. A. LINLEY (B.P. 404,871, 26.6.33. Belg., 31.8.32).—Sides of beef are cooled in about 20 hr. to 1.7° by cold air, quartered, and dipped in a bath of rectified cottonseed oil at 100° for $1\frac{1}{2}$ — $2\frac{1}{2}$ min. Thereafter the meat is stored at 1.7 — 0° until required for consumption, when it is removed from cold-storage and the protective coating, which then becomes fluid, is wiped off. E. B. H.

XX.—MEDICINAL SUBSTANCES; ESSENTIAL OILS.

Evaluation of medicinal carbons by the antipyrine method. C. and U. ROHMANN (Pharm. Ztg., 1934, 79, 122—124, 149; cf. B., 1932, 785).—The influence of the end-concn. of antipyrine (I) on the degree of adsorption has been examined with different carbons; the adsorption isotherms of a series of carbons for varying end-concs. are not parallel. Adsorptions of (I) and methylene-blue are not in complete agreement. The following simplified adsorption method is given: 0.5 g. of the dry *C* is shaken for 10 min. with 100 c.c. of 0.5% (I) solution and then filtered. The first 20 c.c. of the filtrate are rejected and the next 25 c.c. are treated with 1.5—2.0 g. of NaOAc and 20 c.c. of 0.1*N*-I. After keeping (20 min.), 20 c.c. of EtOH are added and the excess I is titrated with 0.1*N*- $\text{Na}_2\text{S}_2\text{O}_3$ [$<$ 12.7 c.c. must be necessary; *i.e.*, 0.125 g. of *C* should absorb $<$ 0.0564 g. of (I)]. E. H. S.

Detection of small quantities of carbon monoxide in medicinal oxygen. J. E. SCHMIDT and J. C. KRANTZ, JUN. (J. Amer. Pharm. Assoc., 1933, 22, 1222—1225).—0.1 p.p.m. of CO is detected by passing the O_2 over I_2O_5 at 150° and then through KI-starch. The apparatus is illustrated and details of procedure are given. W. S.

Detection of small quantities of carbon monoxide in medicinal carbon dioxide. J. E. SCHMIDT and J. C. KRANTZ, JUN. (Quart. J. Pharm., 1933, 6, 625—627).—The CO_2 is passed over I_2O_5 at 150° , any CO present liberating I, which is detected by aq. KI-starch reagent. The sensitivity of the test is $1:5 \times 10^4$. F. O. H.

Tincture of iodine. N. M. KORNILOV (Bull. Nauch. Issledov. Khim. Farm. Inst., 1931, 221—223).—The titratable I decreases more rapidly at first than after some months. The greatest decrease is shown by a prep. containing 5—10% I in 95% EtOH, and the least by that containing 10% I in 90% EtOH. Tinctures prepared in presence of KI change very little. CH. ABS.

Chemical examination of trichloroethylene for anaesthesia. H. L. TSCHENTKE (Ind. Eng. Chem. [Anal.], 1934, 6, 21—22).—Standards of purity of C_2HCl_3 for medicinal use are proposed. The tests include b.-p. range (95% at 86—88°), no turbidity or darkening with $AgNO_3-NH_4NO_3$ (C_2H_2), and freedom from acidity, free Cl_2 , and ash. H. A. P.

Coloration of a solution of sodium salicylate and sodium bicarbonate in water. M. BEUKEMA-GOUDSMIT (Pharm. Weekblad, 1934, 71, 196—201).—Solutions of Na salicylate and $NaHCO_3$ in distilled H_2O become yellow and finally brown on keeping. This coloration is an oxidation phenomenon occurring only in presence of O_2 . The pH of the solution is not an important factor, but the $[HCO_3^-]$ has some effect. The coloration is prevented by traces of Ca such as are present in town's H_2O . S. C.

Green coloration developed by an injectable camphorated oil. D. PONTE (Boll. Chim. farm., 1933, 72, 953—955).—The green colour developed by preps. of olive oil (I) and synthetic camphor (II) is due to the presence in the (II) of small traces of Cu from the reagents or vessels used in its manufacture, which react in the presence of acids with the chlorophyll contained in the (I). R. N. C.

Identification of some hypnotics of the barbituric acid series. G. W. HARGREAVES and H. W. NIXON (J. Amer. Pharm. Assoc., 1933, 22, 1250—1252).—Various tests are described for 9 common dialkyl derivatives of the acid. W. S.

Determination of vanillin. N. E. ZELIGSON and E. S. BOLDYREVA (Bull. Nauch. Issledov. Khim. Farm. Inst., 1931, 274—277).—1.5 g. of vanillin (I) in 50 g. of H_2O and 2 g. of metanilic acid in 12 c.c. of *N*-NaOH are treated with 13 c.c. of *N*-HCl. The pptd. vanillylidene-metanilic acid (II) contains 49.51% of (I). About 0.81% of (II) remains in solution. CH. ABS.

Evaluation of saffron. K. KAILA (Pharmacia, 1932, No. 10, 3 pp.; Chem. Zentr., 1933, ii, 2032).—Vals. obtained by Stamm and Tomingas' method are tabulated. A. A. E.

Coca leaves. A. CHALMETA and C. CHALMETA (Bull. Sci. pharmacol., 1933, 40, 193—208; Chem. Zentr., 1933, ii, 2032).—Titration determines only the Et_2O -sol. alkaloids, the quantity of which is not proportional to the anaesthetic and toxic effect of the drug. A. A. E.

Analysis of a mixture of cocaine and novocaine hydrochlorides. J. A. LABAT and E. KERGONOU (Bull. Trav. Soc. Pharm. Bordeaux, 1933, 71, 120—125; Chem. Zentr., 1933, ii, 2032).—For identification, cocaine (I) is pptd. with borax solution; the filtrate is made alkaline and novocaine extracted with Et_2O . (I) alone is determined by titrating the liberated H_3BO_3 in presence of glycerol. A. A. E.

Determination of santonin in plant materials. P. S. MASAGETOV (Khim.-Farm. Prom., 1932, 68—71).—The material (5 g.) is triturated with CaO (1 g.), boiled for 10 min. with H_2O (250 c.c.), filtered immediately (suction), and washed (500 c.c. of filtrate). The hot filtrate is acidified immediately with 20 c.c. of HCl (d 1.2) and shaken successively with 50, 30, 20, 20 c.c. of $CHCl_3$ (I). The (I) extract is shaken with 50 c.c. of *N*-NaOH. The (I) solution is treated with animal C, filtered, and evaporated; the residue is dissolved in EtOH (1—2 c.c.), treated with 100 c.c. of boiling H_2O , and conc. to 50—70 c.c. After 24 hr. the santonin is collected, dried at 100—105°, and dissolved in (I), the residue on evaporation being weighed. The filtrate contains about 0.2 g. of santonin per litre. CH. ABS.

Determination of nicotine by titration with silicotungstic acid. B. KAZANSKI (Bull. Plant Protec., U.S.S.R., 1931, 3, No. 1, 147—153).—Nicotine (I) is distilled in steam from finely-ground tobacco and collected in HCl; an aliquot part of the diluted distillate is treated with NH_4Cl and titrated with silicotungstic acid [standardised against (I)] until turbidity is no longer produced. CH. ABS.

Water of crystallisation of quinine sulphate. G. D. BEAL and C. R. SZALKOWSKI (J. Amer. Pharm. Assoc., 1933, 22, 1219—1222).—Freshly cryst. quinine sulphate (I) contains 7— $8H_2O$, becomes anhyd. at 100°, and retains $2H_2O$ at 50°. Of 30 samples of (I), variously stored and ranging from 1.9 to $5.8H_2O$, 20 contained $< 3H_2O$. The behaviour of anhyd. (I) and of 3 of its hydrates on exposure to atm. of varying humidity has been studied: the stable form contains 2— $3H_2O$. W. S.

Qualitative tests for ephedrine and its derivatives. C. T. FENG and B. E. READ (J. Amer. Pharm. Assoc., 1933, 22, 1241—1245).—The following are dealt with: ephedrine (I), ψ -ephedrine, the Me (II), Bu, and CH_2Ph derivatives of (I), and the methiodide of (II). Ppts. with 17 reagents are described, and 12 photographs of characteristic crystals are reproduced. W. S.

Liquorice fern and wild liquorice as substitutes for liquorice. L. FISCHER and E. V. LYNN (J. Amer. Pharm. Assoc., 1933, 22, 1225—1230).—Chemical examination leads to the conclusion that the rhizomes of liquorice (I) fern can be used in medicine in place of (I). W. S.

Micro-sublimate from rest-harrow root. R. JARETZKY and A. SIEVERS (Pharm. Zentr., 1934, 75, 16—17).—Pure onocol (I) is obtained by sublimation at 210° and no coloration is produced on treatment with H_2SO_4 (II). Intense bluish-violet colorations are obtained when a solution of (I) in (II) is treated with vanillin in EtOH or MeOH. If the sublimation is carried out at higher temp. a brown sublimate is formed, which gives colorations with (II). S. C.

Diacolation of cinchona tincture and cinchona extract. H. BREDDIN (Pharm. Ztg., 1934, 79, 148—149; cf. B., 1933, 732).—Diacolation is the best procedure for cinchona preps. Syn-, dys-, solution dys-, pptn. dys-, and salting-out dys-diacolation are described. Tinctures prepared by diacolation, particularly with the addition of lactic acid, are much higher in alkaloid than those prepared by the D.A.B. VI maceration method. E. H. S.

Preparation of cinchona fluid extract by diacolation. H. BREDDIN (Pharm. Ztg., 1934, 79, 163—165; cf. preceding abstract).—The process is discussed in detail. The best solvent is composed of glycerin, H_3PO_4 , EtOH, and urea; the use of HCl produces unstable extracts. E. H. S.

Composition of certain homœopathic tinctures. II. J. S. HEPBURN and R. F. RAPP (J. Amer. Inst. Homœopathy, 1933, 26, 738—739).—Vals. (g. per 100 c.c.) for total solids, ash, total N, and Et_2O extract, respectively, were: *Belladonna* 1.995, 0.445, 0.09203, 0.140; *Cantharis* 2.370, 0.068, 0.04342, 1.360; *Cimicifuga* 1.950, 0.166, 0.03361, 0.338; *Cinchona officinalis* 1.927, 0.326, 0.04202, 0.203; *Gelsemium sempervirens* 2.148, 0.370, 0.03165, 0.250; *Hamamelis* 2.250, 0.123, 0.01779, 0.164; *Ignata amara* 2.214, 0.189, 0.03950, 0.300; *Ipecacuanha* 1.865, 0.135, 0.04244, 0.304; *Nuxvomica* 1.930, 0.125, 0.03782, 0.184. The EtOH contents ranged between 48.16 and 91.72 vol.-%. CH. ABS.

Determination of foreign leaves in powdered drugs. T. E. WALLIS and A. H. SABER (Quart. J. Pharm., 1933, 6, 655—668).—The drug is ground sufficiently fine to pass through a no. 85 sieve (B.P., 1932), admixed with 50% of lycopodium spores (I), cleared by heating with aq. chloral hydrate, suspended in an aq. glycerol-tragacanth medium, and examined microscopically. Using the predetermined (macroscopically) epidermal area (II) per g. of the drug and of its contaminant, the extent of the adulteration can be calc. from the microscopical determination of the (II) of the constituents and of the no. of (I) (94,000 per g.) present. An example of senna adulterated with ailanthus is given. F. O. H.

Preservation and sterilisation of drugs. H. ESCHENBRENNER (Pharm. Zentr., 1934, 75, 17—20).—The addition of small quantities of a mixture of Nipagin (65 pts.) and Nipazol (35 pts.) or of "Nipa-Sterilisor 1" is recommended. S. C.

New numerical characteristics of drugs and galenicals. II. Copper numbers of [151] drugs of the D.A.B. V. J. A. MÜLLER (Pharm. Zentr., 1934, 75, 81—86; cf. B., 1932, 862).—The Cu nos., "inversion Cu nos.," and ash contents of the air-dried and H_2O -free drugs are given. E. H. S.

Yield, constants, and composition of a number of essential oils of commercial importance. ANON. (Cultiv. Ess. Oil Plants, Inst. Plant Ind. Leningrad Acad. Agric. Sci., 1933, 1, 190—223).—Collected data are presented. CH. ABS.

Essential constituents of the leaf oil of *Cryptomeria japonica*, Don. II. H. NODA (Waseda Appl. Chem. Soc. Bull., 1933, 20, 18—23).—The oil contained $d\text{-}\alpha$ -pinene 50, d -camphene 15, sesquiterpene 10, octoic esters 2—3%, AcOH, and $C_{10}H_{16}O_2$, together with small amounts of sesquiterpene alcohols, chiefly $d\text{-}\alpha$ -terpineol. CH. ABS.

Alicyclic terpene alcohols, $C_{10}H_{20}O$, of citronella, geranium, and rose oils. C. LAGNEAU (Compt. rend., 1934, 198, 166—168).—The rotatory dispersion indicates that d -citronellol (from citronella oil) contains some l -isomeride (I) and that commercial rhodinol (from geranium oil) is a compound distinct from (I) or, less probably, contains an impurity of high α . R. S. C.

Et_2O .—See III. Nicotine sprays.—See XVI. See also A., Feb., 162, Detecting Hg. Microdetermination of Au in Au-therapy. 175, Argentometric evaluation of $(CH_2)_6N_4$. 183, 2-Chloro-4- n -alkylphenols as germicides. 187, 22 : 23-Dihydroergosterol derivatives. 190, Synthesis of aromatic aldehydes. 196, N -Phenylpiperazine [derivatives]. Effect of ultra-violet rays on nicotine. 199, Determination of nicotine. Determination and separation of alkaloids from *Peganum harmala*. Analysis of emetine hydrochloride. 215, "Senso," a drug from dried cutaneous secretion of the toad. 222, Standardisation of thyroid preps. and of posterior pituitary extracts, and assay of the latter. 223, Prep. of cryst. insulin. 224, Purification of insulin. 224—8, Vitamins (various). 229, I content of agar.

PATENTS.

Manufacture of therapeutically active substances. W. W. GROVES. From I. G. FARBENIND. A.-G. (B.P. 404,674, 19.7.32. Addn. to B.P. 377,255; B., 1932, 1055).—*sec.*-cycloAlkyl- or -cycloalkylalkyl-amines or nuclear-condensed derivatives (e.g., perhydroacridine) are condensed with $C_2H_4Cl \cdot OH$ (or a similar product is arrived at by other means) and the resulting product is condensed with a tautomeric amino-pyridine or -quinoline. Condensation is stated to occur at the nuclear N except (in one case) where $NaNH_2$ is used as condensing agent. Examples are 1- β -dicyclohexyl-(dihydrochloride, m.p. 230°), 5-ethoxy-1- β -dicyclohexyl-(dihydrochloride, m.p. 208°), 5-hydroxy-1- β -dicyclohexyl-(mono- and di-hydrochloride, m.p. 232°), 1- β -bis-hexahydrobenzyl-(mono- and di-hydrochloride, m.p. 236°), 1- β -di- p -methylcyclohexyl-(dihydrochloride, m.p. 256°), 4'-methyl-1- β -dicyclohexyl-(mono- and di-hydrochloride, m.p. 262°), and 1- β -dodecahydrobenzyl- β' -phenylethylaminoethylpyridone-2-imide (hydrochloride, m.p. 168°); 1- β -dicyclohexylaminoethylquinolone-2-imide (hydrochloride, m.p. 241°); 1- β -perhydroacridylethylpyridone-2-(mono- and di-hydrochloride, m.p. 202°), and 6-ethoxy-2-methyl-1-perhydroacridylethylquinolone-4-imide (mono- and di-hydrochloride, m.p. 237°); 1- ϵ -dicyclohexylamino- β -amylpyridone-2-imide (mono- and di-hydrochloride, m.p. 233°); and 2- β -dicyclohexylaminoethylpyridine, b.p. 190—195°/2 mm. (dihydrobromide, m.p. 198°). The following also appear to be new: β -dicyclohexylamino-ethanol, b.p. 145—150°/4 mm., and -ethyl chloride (I) (hydrochloride) ($SOCl_2$); β -dihexahydrobenzylamino-ethanol, b.p. 153—159°/4 mm., and -ethyl chloride hydrochloride; β -perhydroacridyl-ethanol, m.p. 105°, and -ethyl chloride; β -di- p -methylcyclohexylamino-ethanol, b.p. 105°/5 mm., and -ethyl chloride; 4-methyl- β -dicyclohexylamino-ethanol, b.p. 153—158°/5 mm., and -ethyl chloride; and dodecahydrobenzyl- β -phenylethylamine, b.p. 151—152°/4 mm., its $\cdot C_2H_4 \cdot OH$, b.p. 160—168°/4 mm., and $\cdot C_2H_4Cl$ derivatives. Interaction of (I) with NaOEt and (?) EtOAc in EtOH gives *Me* δ -dicyclohexylaminobutyl ketone, b.p. 158—165°/2 mm., converted by H_2 -Ni into ϵ -dicyclohexylaminopentan- β -ol, b.p. 167—173°/5 mm. H. A. P.

Manufacture of organic salts of bismuth and oleaginous solutions thereof. G. B. ELLIS. From Soc. DES USINES CHIM. RHÔNE-POULENC (B.P. 402,762,

2.5.32).—Salts of the type $R'O\text{-CHR}\cdot\text{CO}\cdot\text{O}\cdot\text{Bi}\cdot\text{O}$ or $R'S\text{-CHR}\cdot\text{CO}\cdot\text{O}\cdot\text{Bi}\cdot\text{O}$ (or the corresponding di- and tri-acid salts), where R is alkyl, aryl, or aralkyl $> C_3$, and R' is alkyl, aryl, or aralkyl (preferably alkyl $> C_{17}$), give solutions in vegetable or animal oils (olive oil) stable at 120°. The salts are made by interaction of Na α -phenoxyhexoate, α -butylthiol-laurate, butoxyphenylacetate, etc. with $\text{Bi}(\text{NO}_3)_3$ in aq. glycerol.

C. H.

Dispersing agents.—See III. Diabetic foods.—See XIX.

XXI.—PHOTOGRAPHIC MATERIALS AND PROCESSES.

Photographic emulsion: sensitisation by sodium sulphite. B. H. CARROLL and D. HUBBARD (Bur. Stand. J. Res., 1933, 11, 743—764).—Sufficient Na_2SO_3 to reduce a few tenths % of the AgBr of a photographic emulsion, after digestion with the latter, can act as a sensitiser only slightly inferior to the natural sensitisers in gelatin. The nuclei formed are of Ag. The rate of change of sensitivity increases with increasing alkalinity, and decreases with increasing $[\text{Br}^-]$. No indication is obtained of panchromatic sensitisation.

J. W. S.

Standard process for determination of the light-sensitivity of photographic negative films. M. BILTZ (Angew. Chem., 1934, 47, 67—71).—A graduated sensitometer scale is recommended, so that each third successive step reduces the intensity of light to one half its former val.

E. S. H.

Physical development [of plates and films]. A. F. ODELL (Brit. J. Phot., 1934, 81, 91—92).—So long as the pretreatment with the KI bath is given, excellent results are obtainable with normal exposures, on development as described previously (B., 1933, 572). Grain sizes with chlorobromide and bromide emulsions are about 2—3 and 20 μ , respectively (cf. grain size with chemical development = about 200 μ). Further details of the method are given.

J. L.

Kinematographic swelling analysis.—See V.

See also A., Feb., 155, Properties of Ag_2S . Summation law and its validity. Action of complex light. Effect of ultra-soft X-rays. 182, Light-sensitivity of aryl- β -naphthylamine-azo dyes.

PATENTS.

Photo-transfer process. W. HEINECKE and F. HUNSPERGER (U.S.P. 1,911,955, 30.5.33. Appl., 24.9.27).—A translucent sheet for making reversed negatives has on one side a non-actinic and ink-penetrable coating for receiving, e.g., the finger-prints, and on the other side a sensitised film protected by a non-actinic coating.

B. M. V.

Photographic printing by phosphorescent plates. E. T. TAL (U.S.P. 1,910,573, 23.5.33. Appl., 4.5.32).—Claim is made for the use of a yellow-sensitive plate and a phosphorescent plate emitting yellow radiation. Formulæ for both are given.

B. M. V.

Toning process particularly for toning the red colour component image for multicolour photography. A. JASMATZI (B.P. 402,619, 31.1.33. Austr., 2.2.32 and 21.1.33).—The Ag image is toned red by

substituting a Ni compound for the Ag and treating with dimethylglyoxime (I) or a homologue. For 3-colour prints the image made through the green filter is bleached with $\text{K}_3\text{Fe}(\text{CN})_6$ and $\text{Pb}(\text{NO}_3)_2$ and treated successively with NiSO_4 and (I). Pure whites are obtained by using K Ni cyanide for NiSO_4 . A yellowish red is produced by (I) (red) and $\text{K}_2\text{Cr}_2\text{O}_7$ (yellow). The red may be weakened by treatment with AcOH.

C. H.

Production of blank film from old film, in particular, used kinematographic film. K. HUBERT (B.P. 405,180, 19.6.33. Ger., 22.6.32).—The film is passed with a regulatable speed over rollers, to give numerous loops of fixed length, through a solution of dil. (5%) alkali lye containing a small amount of hypobromite, and heated to 55—65°. After dissolution of the emulsion etc., the solvent is squeezed off, and the film washed and passed over absorbent rollers covered with soft leather, which are wrung dry with spring-mounted rubber rollers. The film is finally dried in a stream of cold air.

J. L.

Sensitising dyes.—See IV.

XXIII.—SANITATION; WATER PURIFICATION.

Iodinated carbon as a protection against mercury vapour poisoning. A. STOCK (Angew. Chem., 1934, 47, 64).—Activated C containing 5% of I is a good absorbent for Hg vapour.

A. G.

Concentrating activated sludge. R. F. GOUDEY and S. M. BENNETT (Water Works and Sewerage, 1933, 80, 179—180).

Adsorption of copper sulphate by aluminium flock. C. J. BROCKMAN (Ind. Eng. Chem., 1933, 25, 1402—1403).—At $p_H < 6.3$ Cu in H_2O is completely removed by filtration after the addition of alum; at $p_H 6.0$ — 6.3 the removal is 90% and at $p_H 5$ — 6 it is 50%.

A. G.

Corrosion of zinc in various waters. E. A. ANDERSON, C. E. REINHARD, and W. D. HAMMEL (J. Amer. Water Works' Assoc., 1934, 26, 49—60).—The quantity of Zn taken into solution and suspension when galvanised Fe sheet is left in contact with distilled H_2O for 7 days is sufficient to render the H_2O unfit for drinking purposes. The addition of Cl_2 (1—5 p.p.m.) reduces the rate of corrosion and renders the H_2O safe; an upper limit of 40 p.p.m. of Zn is suggested.

C. J.

PATENTS.

Method of fumigation. J. P. HUBBELL (U.S.P. 1,912,141, 30.5.33. Appl., 7.12.21).—Flakey $\text{Ca}(\text{CN})_2$ is exposed to an atm. of ordinary R.H. ($> 30\%$), e.g., 75%, whereby HCN is slowly liberated.

B. M. V.

Working up household refuse for moulding purposes. S. W. ARETZ (B.P. 405,047, 10.8.32).—The refuse, free from metals and material $< \frac{3}{4}$ in., is pulverised and boiled with H_2O and $\text{Ca}(\text{OH})_2$. The pulp is treated either with CH_2O , an acid, or salts of the heavy metals, and is dewatered and pressed into slabs etc. for use as building material. An improved product is obtained by adding 3% of $\text{Al}_2(\text{SO}_4)_3$, and in some cases it is advisable to boil the pulp with a soda or sulphite lye and acidulate before pressing.

C. J.