

BRITISH CHEMICAL ABSTRACTS

B.—APPLIED CHEMISTRY

JULY 6 and 13, 1934.*

I.—GENERAL; PLANT; MACHINERY.

Heat transmission in rotary kilns. VIII. W. GILBERT (Cement, 1934, 7, 123—134).—A diagram showing the temp. of the material, the lining, and of the gas throughout the length of kiln is given. Other applications of the heat-transmission figures are worked out, including a method by which the stage lengths of any kiln could be calc. approx. C. A. K.

Comparative life, fire, and explosion hazards of common refrigerants. A. H. NUCKOLLS *et al.* (Underwriters' Labs. Miscellaneous Hazards, 1933, No. 2375, 118 pp.).—Data for NH_3 , C_2H_6 , C_3H_8 , C_4H_{10} , MeCl , MeBr , $\text{C}_2\text{H}_2\text{O}_2$, EtCl , EtBr , CHCl_3 , CCl_4 , $\text{C}_2\text{H}_2\text{Cl}_2$, COCl_2 , CCl_2F , CCl_2F_2 , $\text{C}_2\text{Cl}_2\text{F}_4$, petrol, and coal gas are reported. CCl_2F_2 and $\text{C}_2\text{Cl}_2\text{F}_4$ are practically non-toxic, but yield toxic irritants in presence of flame or very hot surfaces; they are non-combustible. CH. ABS.

Pressure drop in bubble-cap columns. M. C. ROGERS and E. W. THIELE (Ind. Eng. Chem., 1934, 26, 524—528).—The rate of flow of vapour and the pressure drop per section are related by a simple theory to the size and form of the slots in the caps. Experiments with models confirm the equations so derived. D. R. D.

Rapid-cooling crystallisers. I. A. TROMP (Internat. Sugar J., 1934, 36, 154—158).—Descriptions are given (with drawings) of the Bosquin, Huch, Ragot, Kopke, Schneider, Lafeuille, Werkspoor, and Pitcairn crystallisers, among which the Lafeuille is shown to have the highest proportion between capacity (contents) and cooling surface; the Werkspoor (continuous) crystalliser comes next in order. The theories of countercurrent and of intermittent cooling are discussed. J. P. O.

Tower absorption coefficients. V. Determination and effect of free volume. C. W. SIMMONS and H. B. OSBORN, JUN. (Ind. Eng. Chem., 1934, 26, 529—531; cf. B., 1932, 451).—The actual free vol. of a tower, measured as the drained free vol. minus the instantaneous liquid content, is an inverse function of the rate of flow of liquid, which is independent of the type of filler, size of tower, or gas speed. The use of this actual free vol. simplifies equations for absorption coeffs. D. R. D.

Determination of the density of gas mixtures. J. SCHMIDT (Brennstoff-Chem., 1934, 15, 146—147).—The effusion method of Bunsen and Schilling is liable to relatively large errors. Examples are given of the calculation of the d of a gas mixture from its composition. The procedure is sufficiently accurate for application to many technical gases, but is not recommended for low-temp. carbonisation gases. A. B. M.

Nomograph for percentage versus relative humidity of gases. S. HATTA (J. Soc. Chem. Ind., Japan, 1934, 37, 65—67B).—The chart converts % humidity, $100p(B-p)/p_w(B-p_w)$, into relative humidity, $100p/p_w$, in which p_w is the v.p. of H_2O , and p the partial pressure of H_2O vapour in a gas at a pressure B . A. G.

Considerations in colour standardisation. M. R. PAUL (Paper Trade J., 1934, 98; T.A.P.P.I. Sect., 241—244).—The physical and psychological concepts of colour and methods of measurement are discussed in general terms, with more particular attention to paper requirements. H. A. H.

[Beating] wood pulp.—See V. Kieselguhrs [as adsorbents].—See VII. Drying clays.—See VIII. Stoneware coatings.—See XI. Electrical heating.—See IX. Sugar-juice filtration.—See XVII.

PATENTS.

Gas-heated furnaces. A. W. OGILVY-WEBB (B.P. 409,042, 3.11.32).—Inside the arch of a reverberatory furnace cellular members are provided, a layer of gas being formed in a lower series of cells and air for combustion being supplied from an upper series of cells through ports into the gas. B. M. V.

[Tunnel] furnaces for heat treatment of cement and other materials. N. KYRIACOU (B.P. 409,139, 9.5.33).—The traverse of the material (M) through the furnace is obtained by imparting a vibratory motion to the hearths on which it lies. The movement of M is counter to that of the products of combustion, which latter are drawn through M from above. The use of a trommel in conjunction with these vibrating hearths is also claimed. A. WE.

Furnace apparatus for heat-treatment of metallic or other bodies. A. W. OGILVY-WEBB (B.P. 409,034, 27.10.32).—Plates or the like are conveyed in a layer only one (or a few) deep through a normalising furnace by a walking-beam mechanism, at the end of which they are lowered by an escapement device on to a pile which, when deep enough, is moved through a cooling or annealing chamber by another walking beam which finally delivers the piles on to bogies or the like. B. M. V.

Heat-treating apparatus. F. BRIEGER, ASSR. to GEN. ELECTRIC Co. (U.S.P. 1,925,028, 29.8.33. Appl., 28.7.32. Ger., 3.8.31).—The apparatus comprises a quenching chamber (I) provided with numerous H_2O -sprays, and a heating chamber (II) inclined at 45° to (I) and provided with an external induction coil and means for supplying H_2 . For the heat-treatment of high-C steels and alloy

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

steels without oxidation the metal is heated in (II) to $>A_3$, and then drawn down into (I) for quenching.

A. R. P.

Catalytic apparatus. A. O. JAEGER (A) and J. A. BERTSCH, (A) Assr. to SELDEN Co. (U.S.P. 1,927,286, 19.9.33. Appl., 9.4.26).—Before entering the catalyst the gases are passed through co-axial return tubes embedded in it.

B. M. V.

Converter. I. HECHENBLEIKNER, Assr. to CHEM. CONSTRUCTION CORP. (U.S.P. 1,927,493, 19.9.33. Appl., 8.8.28).—A primary (major) catalytic mass is cooled by the gases prior to the reaction, and a finishing (minor) mass is cooled by separate air currents thermostatically controlled by the temp. of that mass.

B. M. V.

Dehydrating apparatus [for fruit etc.]. B. G. FREUND and C. W. THOMAS, Assrs. to N. LYONS (U.S.P. 1,927,396, 19.9.33. Appl., 16.3.32).—The drying air follows a const. course through a circular casing; a no. of racks bearing the fruit etc. are placed in compartments on a platform, which is rotated to give the correct cycle of drying.

B. M. V.

Drying and cooling apparatus. A. D. BULLERJAHN (U.S.P. 1,928,004, 26.9.33. Appl., 16.12.29).—A drum and a heating coil therein are rotated independently, the material being showered over the coil.

B. M. V.

Straining device for vacuum drying apparatus. A. E. JONSSON (B.P. 409,535, 19.7.33. Swed., 31.8.32).—A rotary drying drum is provided with outlet strainers attached to the drum, and to them are attached gravity-operated brushes or fingers that clean the slots of the strainers.

B. M. V.

Preventing the formation of scale in boilers and the like. W. C. FOULDS, Assr. to DISSOCIATORS, INC., and W. H. and L. D. BETZ (W. H. & L. D. BETZ) (U.S.P. 1,927,027, 19.9.33. Appl., 13.2.29).—The boiler feed- H_2O is treated with a solution of colloidal Fe (6 g. of Fe in 20,000 gals.) prepared by striking an arc between Fe electrodes under H_2O .

A. R. P.

Water treatment. A. S. BEHRMAN, Assr. to GEN. ZEOLITE Co. (U.S.P. 1,927,148, 19.9.33. Appl., 21.7.31).—A H_2O that has been softened with CaO is treated with a mixture of $NaHSO_4$ and $NaHCO_3$, or other substance that will liberate CO_2 on wetting.

B. M. V.

Production of fire-extinguishing foam. MERRY-WEATHER & SONS, LTD., J. H. OSBORNE, and L. C. MILLER (B.P. 409,494, 15.3.33).—An injector device worked by H_2O from a fire-hydrant or engine draws in exhaust gases from an internal-combustion engine, and, at the smallest part of the Venturi throat, a foam-producing solution which is supplied by a separate small pump and regulator. A non-return valve is placed in the exhaust-gas supply pipe.

B. M. V.

Crushing or breaking machines. W. H. BAXTER, LTD., and W. H. BAXTER (B.P. 408,901, 10.11.33).—In a jaw crusher of the type in which the rotating parts—eccentric shaft (S), flywheels, etc.—are mounted on brackets attached to the swing jaw; the adjustment of the jaws is effected by altering the packing of the stationary pivot at the bottom of an approx. vertical connecting rod the other end of which embraces the centre of S.

B. M. V.

Crushing machines. F. KRUPP GRUSONWERK A.-G. (B.P. 409,644, 14.2.34. Ger., 20.3.33).—A jaw crusher of the type in which the swing jaw moves downwards at the same time as it closes is arranged with the jaws at a considerable angle to the vertical, the fixed jaw being uppermost. Four methods of obtaining the motion are described.

B. M. V.

Pulverising and crushing machines. W. BREALEY (B.P. 408,582, 10.10.32).—In a ball mill provided with peripheral screens, the deflectors which are placed adjacent the gaps between the sections of grinding plate are of such form that part only of the material is returned to the grinding space, the remainder, rather finer than the average, being spread out and allowed to run around in the annular space within the screens, at least as far as the next deflector, at which point another fraction will be returned, and so on.

B. M. V.

Pulverising or crushing machine. E. E. ELZEMEYER and H. C. GRIESEDECK, Assrs. to AMER. PULVERIZER Co. (U.S.P. 1,927,207, 19.9.33. Appl., 10.11.30).—A method of supporting the breaker plate in a swing-hammer crusher is described.

B. M. V.

Mixing and pulverising apparatus. R. H. D. CHALLACOMBE (B.P. 408,684, 15.10.32).—A pan is provided with edge runners having a planetary motion, and screens are provided both at the circumference and on a conical piece at the centre; alternatively, for pneumatic discharge, air is supplied at the centre and exhausted outwardly. For amalgamation purposes in the case of Au and similar ores, gutters to trap Hg would be provided within the screens. The apparatus is also suitable for use in the production of colloidal fuel.

B. M. V.

Grinding mills for volatile materials. ATELIERS J. HANREZ SOC. ANON. (B.P. 409,611, 20.11.33. Belg., 22.11.32).—In a completely enclosed roller mill the finished material is scraped off at a point just after the lowest point of a roll, and drops into an enclosed cupboard; the grinding block is adjustable from outside.

B. M. V.

Grinding mill. J. D. CANARY (U.S.P. 1,927,277, 19.9.33. Appl., 15.12.30).—A method of securing wear and breaker plates in an impact pulveriser is described.

B. M. V.

Colloid mill. C. P. TOLMAN, Assr. to NOBLE & WOOD MACHINE Co. (U.S.P. 1,927,620, 19.9.33. Appl., 8.11.30).—The contour of the co-operating shearing surfaces is that followed by the rotation of the Schiele tractrix curve.

B. M. V.

Centrifugal separator. C. F. UEBELACKER (U.S.P. 1,928,080, 26.9.33. Appl., 14.11.32).—The apparatus comprises an outer, inverted-conical bowl (A) and an inner, co-axial basket (B), preferably rather more obtuse. The feed is to the apex of A and the heavier solid matter is extruded through the space between the rims of A and B, which space is adjustable by axial movement of either cone, the lighter liquid passing inwards through the perforations of B.

B. M. V.

Centrifugal apparatus. H. S. COE, Assr. to MERCOR CENTRIFUGAL SEPARATOR Co., LTD. (U.S.P. 1,927,882, 26.9.33. Appl., 16.2.26).—A centrifuge having outlets

at different radii is provided with a lower extension for pumping up and drawing in previously separated heavy liquid. B. M. V.

Centrifugal machine. G. TER MEER, Assr. to A. T. OTTO & SONS (U.S.P. 1,928,341, 26.9.33. Appl., 16.7.31. Ger., 17.7.30).—In a centrifuge of the basket type, after draining the collected solids, the basket is moved axially and the solids are discharged into a collecting chamber separate from that receiving the liquor. B. M. V.

Cellular drum filters. J. WIEBE (B.P. 409,640, 9.1.34. Ger., 11.1.33).—The cake is removed from a vac. drum by an endless band that comes in contact with the upper arc only of the drum and is formed with projections and recesses to form a key. B. M. V.

Filters. HALL & KAY, LTD., P. KAY, and J. H. HALL (B.P. 409,450, 23.12.32).—A method of construction and assembling air-filter frames is described. B. M. V.

Separation of liquids containing easily atomised fat particles. BERGEDORFER EISENWERK A.-G. ASTRA-WERKE (B.P. 409,196, 14.9.33. Ger., 20.2.33).—A centrifuge for cream separation and the like is fed and maintained under pressure so that no free surface of liquid is formed, thus preventing atomisation by impact at the point of acceleration of the feed. B. M. V.

Distillation [of froth-forming liquids]. A. E. FLOWERS, Assr. to DE LAVAL SEPARATOR Co. (U.S.P. 1,924,919, 29.8.33. Appl., 5.2.32).—Jets of steam, or hot gases, directed at an angle, are caused to impinge on the surface of the liquid in the still, thus breaking the froth. The jets are fixed to a tube which is outside the still body and concentric with it. Entrained H_2O is then separated by settling or centrifuging. A. WE.

Fractionation [of liquids]. A. KREMSEK, Assr. to STANDARD OIL Co. OF CALIFORNIA (U.S.P. 1,928,225, 26.9.33. Appl., 18.4.28).—A float-operated valve which maintains the reflux const. by adjustment of the cooling- H_2O is described. B. M. V.

Production of fine-grained precipitates. I. G. FARBENIND. A.-G. (B.P. 408,891, 26.10.33. Ger., 29.10.32).—The reacting solutions are mixed in a spraying nozzle from which they are immediately ejected by compressed air or inert gas so that the pptn. reaction occurs in the individual droplets of the spray. A. R. P.

Mixing of fluids. J. N. CORDEBAS (B.P. 408,876, 21.9.33. Fr., 25.10.32).—Two of the fluids are passed in the same direction through co-axial conduits and are then mixed and pass with reduction of pressure into an enlarged zone in which whirling is produced by tangential jets of another or one of the previous fluids. B. M. V.

Gas-washing apparatus. H. A. BRASSERT, F. W. BARRETT, and J. P. GRILLI, Assrs. to H. A. BRASSERT & Co. (U.S.P. 1,927,486, 19.9.33. Appl., 20.11.31).—In a tower the gas passes upwards and the H_2O downwards, being distributed by rotating devices in the upper part and fixed hurdles in the lower. B. M. V.

Treating CaO . **Salt-dissolving apparatus.**—See VII. **Heat-insulating materials.**—See IX. **Heat-treating furnace.** **Porous bearings.** **Prevent-**

ing corrosion of metals.—See X. **Heat-treating granular substances.** **Controlling the moisture content of solids.** **Pptn. apparatus for gases.**—See XI. **Heat-indicating paint.**—See XIII.

II.—FUEL; GAS; TAR; MINERAL OILS.

Washing, blending, and carbonisation of coal, with particular reference to Transvaal coal. J. MENDELSON (Fuel, 1934, 13, 140—154; cf. B., 1932, 1014). A. B. M.

Dissolution of coal by extraction under pressure. Hydrogenation of the extract. A. POTT and H. BROCHE [with H. NEDELMANN, H. SCHMITZ, and W. SCHEER] (Glückauf, 1933, 69, 903—912; Fuel, 1934, 13, 91—95, 125—128, 154—157).—By carrying out the pressure-extraction of coal with Tetralin (I) in stages at successively higher temp., corresponding to the rising temp. of decomp. of the residues, increased yields of extract were obtained and the time required for complete extraction was shortened; thus three successive extractions at 320° of a gas flame coal (volatile matter 29.5%; temp. of decomp. 330°) yielded 25.0, 8.5, and 6.3% of extract, whereas when carried out at 320° , 380° , and 380 — 390° the yields were 20.3, 25.8, and 18.2%, respectively. The process may be carried out in one operation by progressively raising the temp. at a suitable rate. The yield of extract so obtained [using as solvent a mixture of $C_{10}H_8$, (I), and low-temp. tar phenols] increased at first as the final max. temp. employed was raised, passed through a max. at the temp. of decomp. of the ultimate residue, and then fell again at higher temp. The max. yields of extract amounted to 74—80.6% for a series of gas flame coals, 78.1% for an Upper Silesian coal, and 94.2% for a brown coal. By the use of the above mixed solvent, or preferably a 1:1 mixture of (I) and low-temp. tar phenols, solutions were obtained which could be filtered easily from the insol. residue. The use of PhOH alone as solvent proved unsatisfactory. The extracts can readily be converted into oils by hydrogenation under pressure in presence of a Mo catalyst. A. B. M.

Utilisation of coal. W. R. GORDON (J. Soc. Arts, 1934, 82, 755—780).—A lecture.

Iodometric determination of sulphur in fuel. E. S. GAVRILENKO and O. B. RABINOVICH (Nauk. Zapiski Tzuk. Prom., 1933, 19, No. 32, 25—36).—12—15 c.c. of 10% aq. NaOH or KOH are placed in the calorimetric bomb. After ignition of the sample the contents are removed, boiled for 10 min. with 7—8 c.c. of 3% H_2O_2 , acidified with HCl, and treated with aq. NH_3 to ppt. Fe, Al, and P_2O_5 . The filtrate is acidified with HCl, boiled with $BaCrO_4$ mixture ($K_2CrO_4 + BaCl_2$), neutralised with aq. NH_3 , cooled, diluted, and filtered, an aliquot part being treated with KI and then titrated with $Na_2S_2O_3$. CH. ABS.

Simplified formulæ for fuel analysis. A. F. BEZSONOV (Ukrain. Chem. J., 1933, 8, 267—269).—Formulæ connecting the contents of S, H_2O , volatile matter, and ash with calorific val. are given. R. T.

Steaming of the free space in horizontal retorts. H. D. MADDEN (Gas J., 1934, 100, 565—566).—A review.

Steaming of the free space is entirely different from steaming the charge to produce water-gas and results in an increased no. of therms per ton of coal carbonised.

R. N. B.

Steaming of the free space in horizontal retorts.

F. BOARDMAN, J. H. WILLIAMS, and L. L. KLEIST (Gas J., 1934, 100, 566—569).—Steam was introduced through a hole in the discharge-end mouthpiece at a rate of 2 wt.-% per hr. of the charge at 25 lb./sq. in. at 103°; this led to a lowering of temp. of 50—60° of the last 2 ft. of the retort and affected carbonisation, similar experiments were therefore carried out with steam superheated to 280° for the last 2 hr. of carbonisation, the free space in the retort being 45%. The tar obtained had a higher *d* and pitch and free C content, and a large vol. of gas of lower calorific val. was produced. No change in the S and C₂N₂ contents was noticeable. C deposition was greater at the charging end but less at the discharge end. Comparative results were then obtained on a test-plant of stop-ended retorts steaming for the last 1.5 hr. An increase of 1400 cu. ft. of gas per ton of coal carbonised with a drop in calorific val. of 25 B.Th.U. was obtained. The tar yield decreased, but the therms obtained per ton of coal increased by 5.6 therms.

R. N. B.

Selection of coal charge and determination of its coking properties.

L. M. SAPOZHNIKOV and N. A. BAKUN (Coke and Chem., U.S.S.R., 1932, No. 11, 73—78).—Coal is heated (electrically) in a steel cylinder, the pressure of the generated gases being transmitted through a plunger and hydraulic compensator to a manometer. The registered pressure depends on the speed of evolution of gas and the permeability of the plastic layer formed around the sample. The recorded pressures correspond closely with the results of drum tests for the mechanical properties of the cokes.

CH. ABS.

Saar coke. O. GOERGEN (Brennstoff-Chem., 1934, 15, 144—145).—By blending the high-volatile Saar coals with a semi-coke obtained by carbonising a similar coal in a Salerni retort a coke of improved strength has been produced. The blend at present used contains 13—14% of semi-coke and has H₂O 8.6, ash 8.54, and volatile matter content 30.1%. The cost of the process is dependent on the cost of the low-temp. carbonisation process, which in turn depends on the possibility of disposing of the low-temp. tar.

A. B. M.

Determining the reactivity of coke. D. J. W. KREULEN (Fuel, 1934, 13, 137—139).—A Pt boat filled to within ½ mm. of the top with the coke (20/80-mesh size) is placed in an electrically-heated tube, preferably at 600°, through which a current of air (20 litres/hr.) is passed, and after a preliminary period of 2 min. the issuing gas is passed through a CO₂-absorption tower for 5 min. and the amount of CO₂ absorbed is weighed; this wt., expressed as mg. per sq. cm. of coke surface, is used as the desired measure of reactivity (*R*). For technical purposes a boat 5 mm. long is used; if it is desired to correct for the change in composition of the gas as it passes over the coke surface, the results obtained with boats 20, 15, 10, and 5 mm. long are extrapolated to zero length. The variation of *R* with temp. of a no. of cokes is shown graphically. The method may be

used to give the ignition points of the cokes if these are taken to be the temp. at which 10 mg. of CO₂ per sq. cm. are formed in 5 min.; the following vals. were thus obtained: brown-coal coke 338°, wood charcoal 380°, gas coke 455°, high-temp. coke 550°, graphite 730°.

A. B. M.

Softening behaviour of coals and coal blends and its influence on the properties, especially the strength, of the coke. K. BUNTE and H. LÖHR (Gas-u. Wasserfach, 1934, 77, 242—247, 261—269).—The behaviour of a no. of German coals, and blends thereof, on being heated through the plastic zone, has been studied by Layng and Hathorne's modification of Foxwell's method (cf. B., 1925, 195). There is no definite relation between the form of the plastic curve, obtained by plotting the resistance to gas flow (*p*) against temp. (*t*), and the volatile matter content of the coals. The behaviour of a blend cannot be deduced from that of the separate constituents; in one case the max. val. of *p* exhibited by a highly plastic coal was increased by admixture with a coal of less marked caking properties. The plastic properties of the coals are better represented by the curve obtained by plotting *dp/dt* against *t* (cf. Coffmann and Layng, B., 1928, 217). The interpretation of the curves is discussed with reference to the theory and practice of coking.

A. B. M.

Fusibility of coal ash. I. Method for determination in an oxidising atmosphere. Y. KŌSAKA and H. TODA (J. Soc. Chem. Ind., Japan, 1934, 37, 98—101 B; cf. Bunte and Baum, B., 1928, 322).—A compressed pellet (*P*) of the powdered ash (1 cm. high and 1 cm. in diam.) is heated in a carborundum resistance furnace at a rate of 5°/min., and the motion of a Pt rod (diam. at lower end 3 mm.) which rests on *P* is observed; the rod is weighted to give a load of 30 g. on *P*. Three points are distinguished on the fusion curve obtained by plotting the movement of the rod against temp., viz., the "sintering point," where the rod commences to fall, the "softening point" (*S*), where a rapid fall begins, and the "fusion point" (*F*), where fusion may be considered to be complete. The fall between *S* and *F*, divided by the corresponding temp. rise, gives an indication of the η of the slag over that range.

A. B. M.

Regeneration of activated carbon. N. N. KUDEL'YA (Nauk. Zapiski Tzuk. Prom., 1933, 10, No. 32, 37—45).—The C is boiled for 1 hr. in H₂O, then as a suspension (*d* 1.11—1.16) in 0.5—1% NaOH for 1 hr., washed, boiled for 1 hr. in 1—1.5% HCl, and heated in a muffle at 600°.

CH. ABS.

Utilisation of coke-oven gas. M. KOOPMAN (Gas J., 1934, 206, 457—465).—The grid system of distribution and use of coke-oven gas in various Continental countries is reviewed. It is suggested that by co-operation of the Fe, steel, coal, and gas industries similar grids should be set up in this country, and should be supplied by surplus coke-oven gas. A larger vol. of this would be available if all coke ovens were heated with producer or blast-furnace gas. A description of several plants working on this principle is given.

R. N. B.

Alberta bitumen. I. Composition of blown Alberta bitumen. M. KATZ (Canad. J. Res., 1934, 10,

435—451).—The blowing of Alberta bitumen with air results in decreases in the amounts of asphaltous acids and anhydrides, oily constituents, and resins (I) and a rise in m.p. The mol. wt. of the (I) rises from 733 to 1012 and of asphaltenes (II) from 2219 to 4690. The essential process is removal of H as H₂O followed by polymerisation assisted by the S content. After prolonged blowing the bitumen contains only 1.9% O, and the O, S, and N are mainly in (I) and partly in (II). Products similar to mineral rubber can be obtained.

A. G.

Humic substances. V. Humification of certain natural bitumens. N. A. ORLOV and O. A. RADTSCHENKO (J. Appl. Chem. Russ., 1934, 7, 113—121; cf. B., 1933, 613).—The products of action of atm. O₂ at 135—200° on coal, boghead coal, asphaltite, and balchaschite (a natural mixture of unsaturated fatty acids) consist chiefly of highly condensed ring systems of a OH and CO₂H content similar to that of natural humic acids (I), together with small quantities of carbohydrate-like substances, probably originating from CH₂O and constituting an intermediate stage in the formation of (I).

R. T.

Sulphur compounds of Ural (Perm) petroleum, and its desulphuration. S. S. NAMETKIN and A. S. SOSNINA (J. Appl. Chem. Russ., 1934, 7, 123—126).—The S content (I) of Perm petroleum is reduced from 2—2.8 to 0.22% by treatment with H₂SO₄, indicating that (I) is represented chiefly by thiophens.

R. T.

Petroleum refining by means of selective solvents. S. W. FERRIS (J. Franklin Inst., 1934, 217, 591—615).—A discussion, illustrated by graphs, on the production of lubricating oil by extraction of petroleum with immiscible solvents. The advantage of the use countercurrently of PhNO₂ are indicated.

D. K. M.

Synthesis of benzene from carbon monoxide and hydrogen at atmospheric pressure. XVII. General properties and chemical composition of the reaction products. S. TSUNEOKA and K. FUJIMURA (J. Soc. Chem. Ind., Japan, 1934, 37, 49—51 B; cf. B., 1933, 773).—Analysis of a benzene obtained by using a Ni-Mn catalyst gave: paraffins 92%, olefines 8%, aromatic and naphthene hydrocarbons nil. On fractionation the greater part distilled over within the ranges 30—40°, 90—100°, and 120—130°, the *d* and *n* of these fractions showing them to consist principally of *n*-C₅H₁₂, *n*-C₆H₁₄, *n*-C₇H₁₆, and *n*-C₈H₁₈, respectively. The benzene was stable on storage. The kerosene obtained in the reaction gave on fractionation: 31.7% to 140°, 31.0% at 140—200°, and 36.4% above 200°, and contained 97% of paraffins and 3% of olefines. With a Co catalyst the products had a much higher olefine content than with a Ni catalyst. The reaction liquor contained small quantities of acids, alcohols, aldehydes, and ketones.

A. B. M.

Behaviour of mercaptans towards copper and mercury. E. DITTRICH (Brennstoff-Chem., 1934, 15, 148—149).—Neither Cu nor Hg is attacked when exposed, in absence of air, to the action of benzene containing mercaptans. Cu, however, under the influence of light catalyses the condensation of the

mercaptans to a product which separates as a lacquer-like deposit on the metal. Although, therefore, there is no objection to the use of Hg for the determination of active (corrosive) S in benzines, the use of Cu for this purpose may lead to error.

A. B. M.

Natural gas as a source of benzol. K. KAFUKU (J. Fuel Soc. Japan, 1934, 13, 38—40).—Natural gas (containing 94% of CH₄) was passed through heated tubes after removal of heavier hydrocarbons. The yield of liquid products increased with tube diam., and for each diam. there was an optimum gas velocity. At 1000—1050° 3.5 kg. of oil can be obtained per 1000 cu. ft. of gas.

T. H. B.

Production of benzol from natural gas. S. FUJIO (J. Fuel Soc. Japan, 1934, 13, 31—35).—Benzol can be produced from natural gas by (a) decomp. of CH₄ by passage through a quartz or porcelain tube heated to 1000—1150°, (b) production of C₂H₂ by spark discharge, followed by polymerisation of C₂H₂ at 600—700°. Method (a) gives up to 12% of tar containing 23% of benzol and 19% of C₁₀H₈; (b) gives 30% of tar, containing 12% of benzol and 18—20% of heavy oil. (a) compares unfavourably with (b) in yield and ease of operation.

T. H. B.

Production of [motor] benzol from high-temperature tar. T. SHIMMURA and H. NOMURA (J. Fuel Soc. Japan, 1934, 13, 29—31).—The hydrogenation of coke-oven tar in presence of a catalyst showed that about 70% of the tar can be converted into motor benzol at 480—500°/200—250 atm. The max. temp. attained should be < 480°, and with lower pressures more free C is formed. Mo is the best catalyst.

T. H. B.

Standard method for exact fractional distillation of benzol hydrocarbons. H. BRÜCKNER (Chem.-Ztg., 1934, 58, 413—414).—By means of the apparatus described the various constituents of commercial C₆H₆ may be determined within a few % in the time required for a normal distillation.

A. G.

Spontaneous ignition temperature of liquid hydrocarbons at atmospheric pressure. Effect of concentration of fuel vapour and oxygen: fuel ratio. F. J. DYKSTRA and G. EDGAR (Ind. Eng. Chem., 1934, 26, 509—510).—*n*-C₈H₁₈ and commercial petrol when mixed with air show a range of non-inflammability above the min. ignition temp. ββδ-Trimethylpentane does not show this behaviour.

D. R. D.

Substances causing thickening of benzol wash oil. R. KATTWINKEL (Brennstoff-Chem., 1934, 15, 141—143).—“Wash-oil asphalt” and “wash-oil pitch,” separated from a used wash oil by pptn. with excess of light petroleum and C₆H₆, respectively (in the former case the wash oil was first dissolved in CHCl₃), had the following characteristics: *d* 0.45, 1.19; volatile matter 44.6, 39.0; ash 1.8, 3.3; and S 11.12, 10.21%, respectively. The amounts formed in the oil after 29 days' use were 12.19 and 7.74%, respectively. The “micron no.” (cf. Nellensteyn and Kuipers, Teer u. Bitumen, 1933, 31, 309) increased in the same time to 1.13 × 10⁶/sq. mm. The asphalt on heating began to evolve benzol vapour at 150°; at higher temp. it was converted into a highly swollen, silvery-grey coke. From

the pitch a yellowish oil separated at 268°; at higher temp. it sintered without swelling. The mechanism of the formation of these substances is briefly discussed. The rate of formation can be correlated with other changes, *e.g.*, the increase in η and mol. wt., which also occur in the oil. A. B. M.

Measurement of flame temperatures in a petrol engine by the spectral line-reversal method. S. S. WATTS and B. J. LLOYD-EVANS (Proc. Physical Soc., 1934, 46, 444—449).—A modification of the method of Griffiths (*cf.* A., 1929, 534) for non-luminous flames is applied to various points in the working cycle of a petrol engine for the range 1200—2200°. The max. temp. in the engine cylinder persists for a longer period than the max. pressure. N. M. B.

Preparation of synthetic liquid fuel in Siberia. N. M. KARAVAEV and I. Y. FELBERBAUM ("Sapromyxites from Barzass," Goskhim.-Petrograd, 1933, 4—18).—Sapromyxites (I) are discussed. Average yields of low-temp. products are: tar 20—40%, gas 100 cu. m. per ton, semi-coke 38—55%, liquid products, H₂O, and distillation losses 14—25%, gasoline absorbed from gas 0.5—1.0%. Catalytic hydrogenation of primary tar produced [per ton of (I)]: gasoline 6, kerosene 4.5, oily residue 3%. The total yield from (I) was: low-temp. carbonisation coke 250, gasoline 103, kerosene 45, paraffinic and oily residues 30, acidic substances 9 kg. CH. ABS.

Determining *d* of gas mixtures.—See I. **Thermal properties of naphtha.**—See III. **[I from] distillation of phyllophora.**—See VII. **Corrosion of metals by phenols.**—See X. **Coal-tar solvents [for paint etc. finishes].**—See XIII.

PATENTS.

Manufacture of briquettes. C. W. SEWELL (U.S.P. 1,920,327, 1.8.33, Appl., 6.5.25).—Anthracite culm, bituminous coal slack, etc. is briquetted with 8—10% of a suitable binder, *e.g.*, coal tar and Na silicate or dextrin emulsion, and the briquettes (B) are conveyed through a furnace (F) wherein they are heated to a temp. (480—510°) at which the gases evolved ignite. F comprises a series of chambers, of successively lower temp., through which B are conveyed. They are finally passed through a cooling chamber. A. B. M.

Rendering fuel briquettes hard and smokeless. F. B. DEHN. From MAUREL INVESTMENT CORP. (B.P. 407,797, 30.12.32).—The briquettes are heated to about 260° to drive off the H₂O and light oils and are then cooled, within the furnace, to about 150° in presence of a small % of O₂ or air in such a manner that the cooling causes the oxidising gases to penetrate the briquettes. A. B. M.

Apparatus for carbonisation of briquettes. E. L. WILLSON, Assr. to LEHIGH COAL & NAVIGATION CO. (U.S.P. 1,927,968, 26.9.33, Appl., 8.1.30).—To a chain grate a layer of fuel (F) is charged outside a combustion chamber (A); after ignition of F in a limited updraught of air the briquettes are charged at a point within A, additional secondary air being mixed with the rising gases and the whole mixture finally burned under a boiler. (*Cf.* U.S.P. 1,918,162; B., 1934, 488.) B. M. V.

Fuel-treating apparatus. P. D'H. DRESSLER, Assr. to SWINDELL-DRESSLER CORP. (U.S.P. 1,928,415, 26.9.33, Appl., 22.5.28).—Plastic briquettes, as described in U.S.P. 1,812,432 (B., 1933, 8), are heated in two or more stages on the upper run of a conveyor (C), an elongated combustion chamber forming the division between the upper and unused lower runs of C. The heating in the earlier stage is at low temp. and oxidising; in the later stage an inert atm. of expelled volatile matter is maintained and positively recirculated. B. M. V.

Vertical retorts for carbonisation of coal and the like. F. J. and E. WEST, and WEST'S GAS IMPROVEMENT CO., LTD. (B.P. 408,738, 8.12.32).—A vertical retort is formed, in horizontal section, like a wheel, a smooth-walled annular coking chamber (A) occupying the place of the rim and combustion spaces occupying the spaces between the spokes so that A is heated only on the inside. A increases in width downwards and is continued as cooling (B) and discharging (C) zones, B and C being separated by removable slides and provision for steaming being made to both. B. M. V.

Apparatus for low-temperature carbonisation. J. D. McQUADE (U.S.P. 1,921,993, 8.8.33, Appl., 16.11.29).—Coal etc. is carbonised in an externally-heated, horizontal, rotary retort, through which it is impelled by means of a conveyor screw which is simultaneously rotated and given a longitudinal reciprocating motion. A. B. M.

Coke-oven apparatus. (A) F. J. PFLUKE and L. B. BOWMAN, (B) L. S. HERRMANN, Assrs. to KOPPERS CO. OF DELAWARE (U.S.P. 1,920,913 and 1,920,949, 1.8.33, Appl., [A] 26.2.29, [B] 28.1.30).—(A) The reversing mechanism of a coke-oven battery is provided with interlocking means for preventing the fuel-gas valve from being opened before the waste-gas valve is closed, or *vice versa*; the possible formation of explosive mixtures is thereby avoided. (B) The valve mechanism of the battery is so designed that the flow of the gases through the reversing boxes can be reversed by the actuation of their levers in the same direction by means of a single cable or controlling device. A. B. M.

Coking apparatus. N. A. OLSSON and C. P. FULLER, Assrs. to KOPPERS CO. OF DELAWARE (U.S.P. 1,920,911, 1.8.33, Appl., 20.11.29).—The valve mechanism of a coke-oven battery using producer gas is so designed that the valves can be controlled by a single reciprocating member extending along the side of the battery, by means of which they are operated smoothly in proper sequence to reverse the direction of flow of the gases throughout the battery. A. B. M.

Coke-oven battery. H. KOPPERS, Assr. to KOPPERS CO. OF DELAWARE (U.S.P. 1,928,595, 26.9.33, Appl., 14.5.31, Ger., 14.5.30).—A setting in which the regenerators are parallel and underneath the ovens is described. The whole is supported on a flat raft permitting free horizontal movement under expansion; planar, vertical, uncemented expansion joints, the full height of the setting, are inserted at intervals. B. M. V.

Coking retort oven. J. VAN ACKEREN, Assr. to KOPPERS CO. OF DELAWARE (U.S.P. 1,928,607, 26.9.33.

Appl., 12.3.30).—In a setting of horizontal ovens divided by heating walls (*W*), part of the rising combustion gases are recirculated from an intermediate level of *W* to the bottom, to reduce the max. temp. of the flames.

B. M. V.

Coke ovens. W. H. PAVITT (B.P. 407,716, 20.9.32. U.S., 26.10.31. Cf. B.P. 399,975; B., 1934, 7).—The supporting sub-structure of the oven is designed to form an air-supply reservoir, from which air at > 1 atm. is supplied to the regenerators.

A. B. M.

Coke[colouring] treatment. F. W. SPERR, JUN., Assr. to KOPPERS Co. (U.S.P. 1,928,214, 26.9.33. Appl., 25.9.25).—The hot coke is quenched in H_2O containing a suitable substance.

B. M. V.

Manufacture of activated carbon. F. E. KERN (U.S.P. 1,921,297, 8.8.33. Appl., 18.6.30).—Finely-divided vegetable material is heated with aq. mineral acid, e.g., HCl , in order to destroy the cellular structure, without, however, bringing about any substantial charring. After evaporation of the acid the product is activated by heating with H_3PO_4 and is subsequently carbonised.

A. B. M.

Production and re-activation of active charcoal. F. KROZIL (U.S.P. 1,927,459, 19.9.33. Appl., 1.2.33. Czechoslov., 4.1.32).—Carbonaceous material is activated or re-activated by countercurrent contact with gases containing an excess of steam in an externally heated chamber (*A*); the gases are then passed through glowing fuel and finally burned to provide the heat for *A*.

B. M. V.

Gas producers. (A) J. VAN ACKEREN, (B) P. VAN ACKEREN, Assrs. to KOPPERS Co. OF DELAWARE (U.S.P. 1,928,608—9, 26.9.33. Appl., [A] 11.9.30, [B] 30.3.31. Ger., [B] 15.5.30).—(A) A H_2O -sealed rotary grate is formed in four concentric sections: (1) centre circle or cone, a grate, (2) annulus for removal of ash, (3) annular grate, (4) as (2). (B) A rotary grate is formed with receding-projecting surfaces forming crushing elements which co-operate with other elements on the fixed shell, the clearance between them being $<$ the clearances in the H_2O -seal.

B. M. V.

Gas generator. H. C. HEATON (U.S.P. 1,921,465, 8.8.33. Appl., 9.3.28).—The generator consists of a vertical, rotary, cylindrical retort (*R*), divided longitudinally into two compartments (*A*) by a hollow stationary baffle. Narrow radial metal plates are attached to the outside of *R*, extending the greater part of the length thereof; these rotate in an annular space (*B*) formed between *R* and an outer casing. Air and fuel are introduced, through conduits extending into the upper part of the central baffle, into one of the *A*, which is thereby heated. The hot combustion gases pass from the bottom of *A* to the annular space surrounding *R* and thence to the stack. Pulverised coal is introduced into the top of the other *A* and is distilled therein; superheated steam may be introduced into the bottom of this *A*. Provision is made for withdrawing the gases from the top of *R* and solid residue from the bottom thereof. The air for combustion may be preheated by passing it through a section of *B*.

A. B. M.

Wash box [for gas generators]. C. O. PRATT, Assr. to SEMET-SOLVAY ENG. CORP. (U.S.P. 1,927,529,

19.9.33. Appl., 18.1.29).—The tar is maintained at a const. level by a tar seal and overflow, provision being made for addition of solvent to thin out, or remove congealed, tar.

B. M. V.

Production of water-gas. P. WANGEMANN (U.S.P. 1,921,711, 8.8.33. Appl., 29.3.29. Ger., 14.3.29).—Water-gas is produced continuously by introducing carbonaceous fuel and steam into a bath of molten $NaCl$ maintained at $900-1000^\circ$ by external heating.

A. B. M.

Carburetted water-gas method. E. L. HALL, Assr. to UNITED GAS IMPROVEMENT Co. (U.S.P. 1,922,018, 8.8.33. Appl., 28.11.30).—Water-gas is carburetted by spraying a heavy oil or residuum on to the surface of the fuel bed in the generator during the steam up-run. During the following air-blasting operation additional air is supplied marginally to the top of the fuel bed and also is injected under pressure on to the central portion of the fuel-bed surface. Oil residues deposited thereon are thereby consumed and clogging of the surface is avoided; at the same time the upper part of the fuel bed is heated to incandescence in readiness for the following up-run and carburetted operation.

A. B. M.

Gas-purification process. F. W. SPERR, JUN., Assr. to KOPPERS Co. OF DELAWARE (U.S.P. 1,928,509, 26.9.33. Appl., 19.5.27).—Fuel gas is scrubbed free from H_2S with ammoniacal absorbent liquid containing a metallic oxide catalyst as described in U.S.P. 1,841,419 (B., 1932, 1067), and the liquid (with catalyst) is regenerated by spraying into an oxidising gas without formation of free NH_3 , H_2S , or S , fixed NH_4 thio-compounds being formed.

B. M. V.

Revivification of fouled gas-purifying material. F. W. SPERR, JUN., Assr. to KOPPERS Co. OF DELAWARE (U.S.P. 1,920,603, 1.8.33. Appl., 23.10.28).—Spent Fe_2O_3 gas-purifying material is treated *in situ* with a mixture of combustion gases, e.g., stack gases and air, the proportions of which are so chosen as to prevent the temp. of the material from rising to the ignition temp. of S , or preferably $\geq 100^\circ$. The stack gases are cooled and freed from SO_2 , e.g., by washing with milk-of-lime, before use.

A. B. M.

Conversion of gases rich in methane into more valuable products. H. HARTER (U.S.P. 1,920,858, 1.8.33. Appl., 14.2.29. Ger., 16.2.28).—A portion of the initial gas (CH_4) is mixed with steam and passed over a suitable catalyst, e.g., oxides of Fe , Cu , etc. admixed with difficultly reducible oxides and/or active C , whereby it is converted into H_2 and CO_2 ; another portion of the gas is mixed with O_2 , or a gas rich in O_2 , and the mixture is heated in presence of a Ni , Co , or Mn etc. catalyst to produce CO and H_2 . The latter products are utilised for reducing (revivifying) and heating the catalyst used in the first process, thereby being converted into a mixture of CO_2 and H_2 . The resulting gases are freed from CO_2 in known manner and are utilised for the synthesis of NH_3 or $MeOH$, or for other processes.

A. B. M.

Combustion of fuel gas for heat-treatment of materials such as steel. BRIT. FURNACES, LTD., and P. HOPKINSON (B.P. 407,744, 1.10.32).—A form of

burner designed to supply air-gas mixture in streamline motion is described, combustion being dependent on the interdiffusion of the air and gas, and resulting in a luminous flame. A non-turbulent stream of the gaseous fuel, air, or a neutral gas is also so directed as to form a blanket between the flame and the material undergoing heat-treatment, which is thereby carried out in any desired type of atm. A. B. M.

Distillation of tar etc. S. P. MILLER, Assr. to BARRETT Co. (U.S.P. 1,920,267, 1.8.33. Appl., 2.3.27).—A large body of the tar or oil to be distilled is maintained in a still having a relatively large vapour space through which hot coke-oven gases are passed. The tar is circulated through the vapour space in the form of spray and is thereby distilled by the hot gases. The gases and vapours leaving the still are freed from suspended particles of tar by means of an electrostatic precipitator (the pptd. tar being returned to the still) and are passed thence to a condensing system. Apparatus is described. A. B. M.

Distillation of tar. S. P. MILLER, Assr. to BARRETT Co. (U.S.P. 1,921,300, 8.8.33. Appl., 3.11.28).—The tar from a coal-distillation plant is fractionally condensed, *e.g.*, into a heavy tar (*H*) and a light tar (*L*) fraction. The *L* is distilled to produce light oils and residue, and the latter is then combined with the *H* and the mixture is separately distilled to give heavy distillate oils and pitch. Distillation is preferably effected by spraying the tar into the hot gases from the plant, as described in preceding patents. A. B. M.

Treatment of liquids containing tar acids. F. W. SPERR, JUN., and J. A. SHAW, Assrs. to KOPPERS Co. OF DELAWARE (U.S.P. 1,920,604, 1.8.33. Appl., 9.1.31).—Gas liquor etc. is steam-distilled to remove free NH_3 and is then subjected while hot to the action of a current of an inert gas, preferably coke-oven gas, which removes the tar acids from the liquor. The dephenolised liquor is treated with CaO and distilled to recover the fixed NH_3 . The current of gas carrying the tar-acid vapours is scrubbed with aq. NaOH to remove the tar acids and is recirculated. The gas used is first freed from CO_2 and other acid impurities, *e.g.*, by treatment with CaO . The liquor may also be treated with CaO or clarified still waste etc. in order to convert any CO_2 therein into insol. compounds and so prevent its being carried over into the aq. NaOH . The stripping and absorbing stages of the dephenoliser are conveniently combined into a single tower. A. B. M.

Treatment of ammoniacal liquor. W. C. HOLMES & Co., LTD., and C. COOPER (B.P. 407,801, 10.1.33).—The liquor is first extracted with a solvent for PhOH and is then subjected to the action of adsorbent charcoal to remove the residual PhOH (cf. B.P. 372,399; B., 1932, 668); the extracted liquor is steam-distilled to remove free NH_3 and is finally conc. by heating, the steam thereby produced being utilised in a low-pressure turbine. A. B. M.

Cracking of hydrocarbon oils. H. A. GILL. From STANDARD OIL Co. (INDIANA) (B.P. 407,193, 9.3.33).—A mixture of re-cycle stock and a substantially completely vaporisable oil heavier than gasoline is passed

through a coil the outlet of which is maintained under 175–180 lb./sq. in. and at a temp. sufficient to vaporise the oil rapidly and bring the vapours to 454–524°. These then pass to an enlarged chamber in which they are maintained at the same temp. and under 175–250 lb./sq. in. for sufficient time to convert 13–33% of the oil into the desired motor fuel product, < 85% of the total conversion taking place at > 454°.

H. S. G.
Re-formation of natural gas. W. F. FABER, Assr. to V. N. ROADSTRUM (U.S.P. 1,918,254–5, 18.7.33. Appl., [A] 29.11.27, [B] 3.8.29. Can., [B] 20.8.28).—(A) Natural gas, casing-head gas, or other material consisting mainly of a paraffin hydrocarbon substance lighter than C_5H_{12} is mixed with a combustion-supporting gas containing free O_2 sufficient to produce therein only partial combustion. The mixture is passed to a hot re-forming zone (*R*) maintained at 788–815° by the resulting partial combustion, which is sufficient to effect in *R*, without supplying additional heat from an external source, the re-forming of much of the original material, without the production of C black, into fluid products that include a substantial vol.-% of CH_4 , and also CO and H_2 in approx. equal parts, these being withdrawn from *R*. (B) A system comprising pipe-lines, pumping means, gas-re-forming means, etc. for carrying out the above process is described. H. S. G.

Stabilisation of naphtha. C. C. MILLER, Assr. to STANDARD OIL Co. (U.S.P. 1,924,196, 29.8.33. Appl., 31.12.31).—Light naphtha is stripped in a counter-current system with C_4H_{10} (*I*) substantially free from lighter hydrocarbons. The gases from the stripping stage are absorbed in a scrubbing oil, which is then subjected to a pressure of 200 lb. per sq. in., the C_3H_8 and (*I*) are removed and fractionated, and the (*I*) is returned to strip further amounts of naphtha. H. S. G.

Neutralisation and sweetening of gasoline. H. H. CANNON, Assr. to CANNON-PRUTZMAN TREATING PROCESSES, LTD. (U.S.P. 1,924,911, 29.8.33. Appl., 2.10.29).—Oil containing mercaptans is continuously treated with H_2SO_4 and the major portion of the acid sludge is separated and withdrawn. Finely-comminuted NaOH in quantity sufficient to effect over-neutralisation is added to the acid oil together with *S* sufficient to sweeten. The liquid mixture is then brought into contact with a dry powdered mass comprising PbO , NaOH , and a porous earthy material, and is finally filtered. All operations are performed substantially out of contact with air, and the addition of H_2O is avoided throughout. H. S. G.

Separation of wax from oil. STANDARD OIL Co. (B.P. 409,110, 23.2.33. U.S., 18.3.32. Addn. to B.P. 390,222; B., 1933, 456).—The mixture of oil and wax is dissolved in a liquefied gaseous diluent. The solution is cooled at a rate of approx. 0.2–4° per min. in a cooling chamber that has been brought to the same temp. as that of the wax-oil solution, thereby avoiding shock-chilling. H. S. G.

Production of liquid fuels. ANGLO-PERSIAN OIL Co., LTD., F. B. THOLE, and W. H. THOMAS (B.P. 408,229, 29.8.33).—A raw cracked spirit is separated into light

and heavy fractions which are subjected to different refining treatments, the light fraction being stabilised by the addition thereto of 0.005—0.1 wt.-% of a di- or tri-hydric phenol as gum inhibitor, *e.g.*, pyrocatechol, quinol, or pyrogallol as a conc. solution in cresol (cresylic acid). The products of refining of the two fractions are subsequently blended for the production of a gum-stabilised motor fuel. H. S. G.

Treatment of motor fuel. C. D. LOWRY, JUN., and C. G. DRYER, Assrs. to UNIVERSAL OIL PRODUCTS CO. (U.S.P. 1,924,870, 29.8.33. Appl., 5.10.31).—Petrol containing di- and tri-olefines tends to gum and discolour on storage and its anti-knock properties deteriorate; these defects disappear if < 0.1% of aldol- α -naphthylamine is added as stabiliser. A. R. P.

Treatment of benzine or gasoline. HANSEATISCHE MÜHLENWERKE A.-G. (B.P. 409,353, 28.10.32. U.S., 28.10.31).—Phosphatides (0.01—0.25%) of animal and/or vegetable origin, wholly or partly freed from oil, in partly saturated form or with their unsaturated portions associated with halogens, are added to hydrocarbon material to prevent resinification. The oil component can be replaced by equiv. materials such, *e.g.*, as higher alcohols. H. S. G.

Lubricant. H. H. DOW, Assr. to DOW CHEM. CO. (U.S.P. 1,918,593, 18.7.33. Appl., 24.12.28).—A high-temp. lubricant comprises a petroleum lubricating oil, *e.g.*, cylinder oil (8 pts.), and Ph₂O (< 1 pt.) to which has been added at least one of the compounds Ph₂C₁₀H₈, pyrene, picene, or phenanthrene. H. S. G.

Relative freeing and lubrication of engaging surfaces. R. R. VALLEE, Assr. to SHARPLES SOLVENTS CORP. (U.S.P. 1,926,961, 12.9.33. Appl., 27.11.31).—A mixture of amylene dichloride and lubricating oil is claimed. A. R. P.

Preparation of purified lubricating and electrical resistance oil from used or waste oils. C. VAN GRONDELLE (B.P. 409,522, 12.6.33).—Used or waste oils, after removal of coarse impurities, are centrifuged at 10—25° to remove oxidation products, then treated with alkaline liquids (aq. Na₂CO₃ or Na₂PO₄), and, after settling, separating the oily layer, and washing, the oil is heated under vac. at about 40° to remove volatile substances. H. S. G.

Production of lubricating oil. UNION OIL CO. OF CALIFORNIA (B.P. 408,947—8, 11.7.32. U.S., 4.8.31).—(A) A lubricating oil fraction is treated with a liquefied, normally gaseous, solvent, *e.g.*, C₃H₈, and chilled by vaporising a portion of the solvent under reduced pressure to ppt. wax. The wax and the solvent are removed from the oil, and this is then treated with a selective solvent, *e.g.*, SO₂, NH₂Ph, or HCO₂Me, for the non-paraffinoid oils, thereby leaving a residual paraffinoid oil fraction which is treated with acid and/or clay. (B) The treatment with non-paraffinoid solvent, acid, and/or clay is conducted in presence of the hydrocarbon solvent. H. S. G.

Purification of used lubricating oil. F. J. F. KARTHAUS (B.P. 409,121, 15.3.33).—The oil to be purified is heated at 80—100° with 5—10% of an emulsion obtained by adding to a colloidal system (I)

distilled H₂O or a solution of a volatile inorg. base in distilled H₂O, the (I) being previously obtained by adding to a mineral, vegetable, or animal oil, or to a mixture thereof, 0.5—1% of an anhyd., H₂O-sol. soap, and heating at > 100°. The emulsion may be prepared from the mineral oil to be treated, or from a vegetable oil which is insol. in all mineral oils (*e.g.*, castor or grape-seed oil). H. S. G.

Treatment of lubricating oil stocks. L. L. DAVIS and G. L. ATKINSON, Assrs. to CONTINENTAL OIL CO. (U.S.P. 1,927,823, 26.9.33. Appl., 23.11.28).—A continuous process comprises removal of the detectable H₂O, atm. oxidation (at > 93°) of the unsaturated hydrocarbons to a predetermined point, treatment with H₂SO₄, and neutralisation; the resulting liquid is a pale lubricating oil. B. M. V.

Treatment of motor fuel. UNIVERSAL OIL PRODUCTS CO., Asses. of C. D. LOWRY, JUN., and C. G. DRYER (B.P. 410,115, 9.11.32. U.S., 18.12.31 and 11.3.32).—See U.S.P. 1,889,835—6; B., 1933, 821.

Mixing etc. apparatus.—See I. Pure NH₃.—See VII. Paving composition.—See IX. Treating petroleum emulsions.—See XI. [Solvents for] varnishes.—See XIII.

III.—ORGANIC INTERMEDIATES.

Methane and methane homologues as raw materials for chemical synthesis. A. D. PETROV (Coke and Chem., U.S.S.R., 1932, No. 9, 28—35).—In the oxidation of gas (CH₄ 52—56, C₂H₆ 10—12, C₃H₈ 7—20, higher hydrocarbons 10—12%), N oxides have no catalytic action on oxidation by pure O₂. 32% yields of alcohols, aldehydes, and acids were obtained in absence of a catalyst; max. yields were obtained at 400—500°. At 600—700° partial decomp. with formation of CO, CO₂, and H₂O occurs. CH. ABS.

Catalytic conversion of acetylene and acetaldehyde into acetone. N. D. ZELINSKI, M. I. USCHAKOV, B. M. MICHAÏLOV, and J. A. ARBUZOV (J. Appl. Chem. Russ., 1934, 7, 83—90).—MeCHO affords 96%, and C₂H₂ 88%, yields of COMe₂ (I) on passing together with H₂O vapour over 7:3 Fe₂O₃—MnO₂ catalyst (II) at 400°; the yields of (I) from C₂H₂ may be raised to 98% by passing the reaction gases (containing 4% C₂H₂) a second time over (II). (II) does not undergo inactivation on repeated use. R. T.

Thermal properties of hydrocarbons under pressure. I. Pentane and a paraffinic naphtha. E. C. PATTEE and G. G. BROWN (Ind. Eng. Chem., 1934, 26, 511—515).—Joule-Thomson coeffs. and total heat content of commercial pentane (94% *n*-, 6% *iso*-) and white spirit were determined. D. R. D.

Preparation of ethylene chlorohydrin by means of monochlorocarbamide. M. V. LICHOSCHERSTOV and S. V. ALEXEEV (J. Appl. Chem. Russ., 1934, 7, 127—133).—60—70% yields of CH₂Cl·CH₂·OH with 2—2.5% of [CH₂Cl]₂ are obtained by passing C₂H₄ through aq. NH₂·CO·NHCl in presence of CuCl₂ and H₂SO₄ at 0°. R. T.

Catalytic preparation of butaldehyde and butyl alcohol from acetaldehyde. Preparation and

hydrogenation of crotonaldehyde. M. J. KAGAN, G. D. LJUBARSKI, and S. F. FEDOROV (J. Appl. Chem. Russ., 1934, 7, 135—144).—Aq. MeCHO is converted into aldol, and this into CHMe:CH·CHO (I) (93% yields), by adding 2% NaOH at 20—30°. (I) affords 60% yields of BuOH with H₂ at 240° (Cu catalyst), and 60% yields of BuOH with 25% of PrCHO at 200° (Cu catalyst containing 3% of NiO). R. T.

Explosive properties of divinyl ether. G. W. JONES and B. B. BEATTIE (Ind. Eng. Chem., 1934, 26, 557—560).—The following data are recorded for divinyl ether (I) alone and with 3·5% of EtOH respectively: (a) inflammable limits by vol. in air, (lower) 1·7, 1·7, and (upper) 27·0, 27·5; in O₂, (lower) 1·85, 1·85, and (upper) 85·5, 80·5%; (b) min. ignition temp. in air, 360°, 378° (by the quartz bulb), and 399°, 403° (drop method); in O₂, 327°, 324° (drop method). The hazard in the use of (I) is thus about the same as that in the use of Et₂O. R. S. C.

Vapour-phase synthesis of vinyl acetate. S. N. USHAKOV and J. M. FEINSTEIN (Ind. Eng. Chem., 1934, 26, 561—564).—The effect of varying conditions on the laboratory-scale production of vinyl acetate from AcOH and C₂H₂ (best in the proportions 1:9) in presence of Zn or Cd acetate or phosphate on active C at 170—280° (best at 180—250°) is recorded. R. S. C.

Preparation of *m*-nitroaniline. V. G. GULNOV and A. F. PORT (Ukrain. Chem. J., 1933, 8, 203—211).—95—96% yields of *m*-NH₂·C₆H₄·NO₂ are obtained by reducing *m*-C₆H₄(NO₂)₂ with aq. NaS₃. R. T.

Destructive hydrogenation of naphthalene. I. I. ERU (J. Appl. Chem. Russ., 1934, 7, 145—158).—C₁₀H₈ on heating at 415—525° with H₂ (100 atm.), in presence of MoS₃ or WO₃ catalyst containing 3% of S, affords 70—75% of liquid hydrocarbons (chiefly PhMe, PhEt, and PhPr), b.p. < 180°; the content of lower homologues of C₆H₆ varies with the temp. The reaction gases contain O₂, H₂, CH₄, C₂H₆, and N₂; CO, CO₂, and unsaturated hydrocarbons are absent. Analogous products are obtained when tetrahydronaphthalene is used in place of C₁₀H₈. R. T.

Mechanism of hydrogenation of naphthalene at high temperatures and pressures. E. I. PROKOPETZ (J. Appl. Chem. Russ., 1934, 7, 159—169).—The products of hydrogenation of C₁₀H₈ at 320—370°/200 atm. in presence of MoS₃ catalyst (I) consists chiefly of tetra- (II) and deca- (III) hydronaphthalene. At > 400° (II) is converted into C₆H₆ derivatives. (III) is formed as the *cis*-isomeride, which undergoes transformation into the *trans*-form at 360—370°; this transformation, as well as that into dimethyldicyclooctane, taking place at > 400°, are catalysed by (I). R. T.

Determination of impurities in commercial 1-nitronaphthalene. B. P. FEDOROV and A. A. SPRISKOV (Anilinokras. Prom., 1934, 4, 103—114).—H₂O is determined by dissolving 20 g. of 1-C₁₀H₇·NO₂ in xylene and measuring the vol. of H₂O settling after 24 hr., nitronaphthols by shaking with 1% Na₂CO₃ solution at 70°, filtering, acidifying the filtrate + washings, and weighing the ppt., and dinitronaphthalenes (I) + C₁₀H₈

by dissolving mononitronaphthalenes in light petroleum (II) and weighing the residue; the (I) content is calc. from the N content of the latter. Satisfactory results were not obtained by applying spectrophotometric methods to the determination of 2-C₁₀H₇·NO₂, the content of which can roughly be derived by comparing the m.p. of the product recryst. from (II) with those on the fusion diagram of the system 1—2-C₁₀H₇·NO₂. R. T.

Analysis of β-naphtholsulphonic acids. I. K. D. SCHTSCHERBATSCHEV and A. J. BASCHKIROVA (Anilinokras. Prom., 1934, 4, 114—120).—2:1-OH·C₁₀H₆·SO₃H and 2:1:6- and 2:1:7-OH·C₁₀H₅(SO₃H)₂ eliminate the 1-SO₃H on boiling for 1 hr. with 30% H₂SO₄, after which the solution is made alkaline with NaOH, acidified with AcOH, excess of NaHCO₃ is added, and β-C₁₀H₇·OH is titrated with 0·05*N*-*p*-NO₂·C₆H₄·N₂Cl (I). 2:8-OH·C₁₀H₆·SO₃H (II) is determined by titration of its solutions in saturated aq. NaHCO₃ with (I), whilst 0·05*N*-*m*-NO₂·C₆H₄·N₂Cl is preferred for the determination of 2:6:8-OH·C₁₀H₅(SO₃H)₂ and 2:3:6:8-OH·C₁₀H₄(SO₃H)₃ (III). These acids may be separated by adding excess of EtOH to the solution of Na salts, when that of (III) is pptd., whilst from a corresponding solution of K salts only that of (II) remains in solution. R. T.

Benzene synthesis. Behaviour of mercaptans towards Cu and Hg.—See II. **Distillation [products] of phyllophora.**—See VII. **Corrosion of metals by phenols.**—See X. **Testing solvents.**—See XIII. **Determining MeOH and EtOH vapour in air.** **Anticryptogamies.**—See XXIII.

PATENTS.

Production of ethylene from ethyl alcohol and ethyl alcohol from ethylene. G. F. HORSLEY, and IMPERIAL CHEM. INDUSTRIES, LTD. (B.P. 407,944, 26.9.32).—A Sr(PO₃)₂ (I) catalyst is used; e.g., EtOH vapour is repeatedly passed over (I) at 250°, or with steam over the catalyst at 290°/100 atm. C. H.

Manufacture of ethyl alcohol [from ethylene]. H. G. C. FAIRWEATHER. FROM AIR REDUCTION CO., INC. (B.P. 408,006, 25.6.32. Cf. B.P. 408,203; B., 1934, 492).—C₂H₄ and steam are heated at 170—300°/ < 66—130 atm. in contact with 15—60% H₂SO₄ or H₃PO₄ in free liquid phase or on carriers. C. H.

Manufacture and recovery of sulphonation products [wetting etc. agents]. J. Y. JOHNSON. FROM I. G. FARBENIND. A.-G. (B.P. 407,990, 17.9.32).—Alcohols of C₁₀—C₂₅ are sulphonated and the aq. alkali sulphonates, mixed with alcohols or ketones of C₁—C₃, are extracted with liquid hydrocarbons or chloro-hydrocarbons, b.p. < 200°, to remove non-sulphonated substances. Suitable extractants are petrol, b.p. 65—95°, or light petroleum, b.p. 30—50°. C. H.

Producing fine ppts.—See I. **Treating tar-acid liquor. [PhOH from] ammoniacal liquor.**—See II. **Aluminates from org. syntheses. Treating ZnO residues from reduced NO₂-compounds.**—See VII. **Insulating materials.**—See XI. **Condensation products from C₂H₂.**—See XIII. **Alcohol.**—See XVIII. **Disinfectants.**—See XXIII.

IV.—DYESTUFFS.

[Formation of] triphenylmethane dyes. E. MATHÉ and A. FEDER (Sealed Notes Nos. [A] 1260 and [B] 1265, [A] 1.6.01, and [B] 15.6.01. Bull. Soc. Ind. Mulhouse, 1934, 50, 113—114). Report by R. SPEITEL (*Ibid.*, 114).—(A) Red to violet, cryst., H_2O -sol., basic dyes having excellent fastness to soap and dil. alkalis are obtained by condensing magenta with 1, 2, or 3 mols. of 1:2:4- $C_6H_3Cl(NO_2)_2$ (I) in presence of K_2CO_3 . (B) A violet basic dye very fast to light and soap is obtained by condensing rosaniline with 2 mols. of (I) and reducing the product ($SnCl_2$ or Fe filings). SPEITEL confirms the novelty of the processes and products.

A. J. H.

PATENT.

Producing fine ppts.—See I.

V.—FIBRES; TEXTILES; CELLULOSE; PAPER.

Linensing of cotton. T. BAUMANN (Sealed Note No. 2392, 21.8.20. Bull. Soc. Ind. Mulhouse, 1934, 50, 112). Report by R. SPEITEL (*Ibid.*, 112—113).—Cotton is treated for 10—15 sec. at 15° with a mixture of H_2SO_4 (d 1.84, 64 g.) and CH_2O (40%, 36 g.), then washed with H_2O , neutralised with aq. Na_2CO_3 , washed, and dried. SPEITEL notes the resemblance of this process to a later one of the Tootal Broadhurst Lee Co. (B.P. 200,881; B., 1924, 924).

A. J. H.

Effect of heat on the solution viscosity of cotton. J. R. SCOTT [with F. D. FARROW] (J. Res. Assoc. Brit. Rubber Manufs., 1934, 3, 45—49).—When heated at vulcanising temp., e.g., at 110 — 150° , cotton yarn is adversely affected, at first rapidly and afterwards more slowly, as revealed by alteration of the η of its solutions in ammoniacal $Cu(OH)_2$. The change is accelerated by O_2 . The heating gives rise to volatile decomp. products which, if they are not removed, considerably hasten the degradation. Scoured or bleached cotton is more susceptible than raw cotton to the action of heat.

D. F. T.

Preparation of fibrous cellulose acetate. I. SAKURADA and R. INOUE (J. Soc. Chem. Ind., Japan, 1934, 37, 53—55 b).—The rate of acetylation is greatly (e.g., 50-fold) increased by pretreatment with an intermicellar swelling agent such as H_2O or $AcOH$; the latter is preferred. Mercerising and treating with H_2O and $AcOH$ increases the rate 100-fold.

A. G.

Nitrocellulose. P. MAYFIELD (Paint, Oil, and Chem. Rev., 1934, 96, No. 10, 16—17).—Recent improvements in manufacturing processes are described.

D. R. D.

Pulp wood for viscose manufacture. II. Two kinds of Manchurian spruces. M. SHIKATA, S. BA, and K. AKAGI (J. Cellulose Inst., Tokyo, 1934, 10, 92—97).—Complete analyses are given of two samples of Gyorinsyo spruce (*Picea ajanensis*, Fisch.) and one of Sansyo spruce (*P. Schrenkiana*, Rufr.). The α -cellulose (I) contents are 33.9, 36.9, and 32.1%, respectively, and the $EtOH-C_6H_6$ extracts 1.9, 2.9, and 5.4%; both are inferior in (I) content to Karafuto spruce. When cooked, Gyorinsyo spruce yields a high-quality pulp [86—87% of (I)], but Sansyo an inferior pulp [72—73% of (I)] unless after-cooked with 1% $NaOH$

[86% of (I)]. Spun viscose from the pulps is of normal strength.

A. G.

Pulp Specifications Committee progress report. H. U. KIELY and H. C. SCHWALBE (Paper Trade J., 1934, 98; T.A.P.P.I. Sect., 238—241).—As a result of the reports of 24 American paper mills on four types of sulphite pulp, it is proposed that pulp specifications should be drawn up on a % basis. For this purpose, two widely different pulps are to be chosen as standards, and strength tests on all other pulps will then be reported by comparison. It is pointed out that this procedure will eliminate difficulties due to differences in evaluation methods and in systems of reporting results adopted by various mills. It is also suggested that chemical and other tests on pulp should be dealt with similarly.

H. A. H.

Processing variables in evaluating [wood] pulps by the pebble and rubber-covered ball methods. F. A. SIMMONDS and P. K. BAIRD (Paper Trade J., 1934, 98; T.A.P.P.I. Sect., 249—258).—The two methods of beating pulp experimentally are compared, a no. of variables in each being investigated. The new mill (described) is similar in general design to the Abbé pebble mill; the cylinder ends, however, are of glass, and the inside and the lead balls (the latter, of two sizes) are covered with rubber. The outstanding features of pulps beaten in it are very high strength and an unusual degree of opacity, both properties being ascribed to a particular type of fibrillation and a relatively small decrease in the average fibre length. Numerous data are given.

H. A. H.

Pulp and paper mill pollutional studies. L. F. WARRICK and J. M. HOLDERBY (Paper Trade J., 1934, 98; T.A.P.P.I. Sect., 235—237).—A general report on effluent wastes in the pulp and paper mills of Wisconsin during 1933 shows that there has been a progressive decrease by comparison with the two previous years. The waste-flow data for 26 paper mills and 12 sulphite-pulp mills are plotted. In general, the decrease in stream pollution is satisfactory.

H. A. H.

Colour standardisation.—See I.

PATENTS.

Opening of [cut] staple fibres. BRIT. CELANESE, LTD. (B.P. 409,519, 1.6.33).—The fibres are subjected to a blast of air as they are led away in a conduit from the cutter.

D. A. C.

Refinement of cellulose fibre. G. A. RICHTER, ASSR. to BROWN CO. (U.S.P. 1,924,623, 29.8.33. Appl. 6.9.30).—Pre-liberated cellulose fibre of high α -cellulose content (I) (sulphite or kraft pulp) is digested at $> 175^\circ$ with H_2O , containing 0.1—0.2% of alkali (Na_2CO_3 or $NaOH$) to neutralise acidity developed in the H_2O , until the (I) is increased and the η of the solution is considerably lowered.

F. R. E.

Preparation of cellulose for nitration. W. C. WILSON, ASSR. to CELLOVIS, INC. (U.S.P. 1,925,162, 5.9.33. Appl. 16.4.27).—A dry, felted mass of cellulose fibres (wood pulp) is mechanically disintegrated and, after removal of particles not completely broken up, the individual fibres are assembled into a fluffy, amorphous, incoherent mass which is nitrated.

F. R. E.

Manufacture of cellulose nitrate [of reduced viscosity]. E. I. DU PONT DE NEMOURS & Co. (B.P. 409,008, 21.10.32. U.S., 22.10.31).—Cellulose nitrate (I) in the undissolved state is heated for 2–24 hr. at 70–140° with aq. NH_3 [0.5–11.2 wt.-% of the dry (I)], washed with H_2O , bleached with available Cl [≥ 15 and preferably ≥ 3 wt.-% of the dry (I)], and boiled with H_2O , with or without an antichlor, the bleaching and boiling being repeated if necessary until a product of satisfactory colour is obtained. F. R. E.

Increasing the tensile properties of viscose rayon. VISCOSE Co. (B.P. 409,247, 9.12.33. U.S., 18.2.33).—15–30% (calc. on the cellulose content) of a Ph derivative of a primary aliphatic alcohol (anisyl alcohol, $\text{CH}_2\text{Ph}\cdot\text{OH}$, or $\text{CH}_2\text{Ph}\cdot\text{CH}_2\cdot\text{OH}$) is added to the viscose before spinning. F. R. E.

Manufacture of delustred rayon. VISCOSE Co. (B.P. 409,521 and 409,625, (A) 9.6.33, (B) 9.12.33. U.S., (A) 20.9.32, (B) 11.3.33).—The spinning solution is mixed with an emulsion of (A) 0.1–5% of TiO_2 and 0.5–15% of chlorinated Ph_2 , (B) 0.2–10% of chlorinated Ph_2 and 0.5–15% of an inert org. material (petroleum oil, jelly, or paraffin wax), calc. on the wt. of dry yarn. F. R. E.

Manufacture [purification] of artificial threads and other products from cellulose compounds. L. LILIENFELD (B.P. 408,932 and 408,950, 15.7.32).—Materials made from cellulose xanthate derivatives in accordance with B.P. 335,906, 335,993, 341,930, 357,527, 357,595, 368,288, 385,979, and 390,518—9 (B., 1931, 153, 388; 1932, 60; 1933, 664, 224, 667) are treated with a solution of (A, B) Na_2S ($\leq 30\%$ of $\text{Na}_2\text{S}\cdot 10\text{H}_2\text{O}$) and (A) caustic alkali ($\leq 5\%$ of NaOH), (A) below 100°, (B) below 25° and afterwards above 40° ($> 50^\circ$), and are afterwards washed with H_2O and dried. F. R. E.

Decopperising rayon or artificial silk thread. C. C. JESSEN, Assr. to NAPON RAYON CORP. (U.S.P. 1,925,097, 5.9.33. Appl., 15.5.29).—The thread is wound in skein form on to a rubber band (I) mounted on a drum of large diam. which rotates through the decopperising solution (dil. H_2SO_4). The (I) is then removed with the skeined thread, which is slipped off from (I), washed, and dried. F. R. E.

[Degumming and desizing] treatment of natural and artificial silk and agents therefor. H. L. BUENO (U.S.P. 1,927,022, 19.9.33. Appl., 17.12.31).—The silk is treated with aq. Na_2CO_3 , Na_2HPO_4 , or $\text{Na}_2\text{B}_4\text{O}_7$, which has been pretreated with O_3 . A. R. P.

[Rubber] filter-candles for the artificial silk industry. M. WILDERMAN (B.P. 409,023, 26.10.32).—A filtering element of micro- or macro-porous, soft to hard rubber is fixed within an outer cylinder so that filtration can be effected in either direction. D. F. T.

Production of wood pulp. FORESTAL LAND, TIMBER & RAILWAYS Co., LTD., A. FONTANA, R. O. PHILLIPS, and E. H. W. ROTTSIEPER (B.P. 409,081, 31.12.32).—Hard woods (wattle, maple, etc.) are impregnated with aq. NaOH (up to 10% solution) at 10–30°, the vessel being alternately evacuated and opened to atm. pressure to obtain complete penetration of liquor.

The wood is subsequently heated with H_2SO_3 at 120–150°, sufficient being added to convert the alkali into a mixture containing SO_3'' and HSO_3' (1 : 1) and having p_{H} 5.5–7. D. A. C.

Manufacture of wood pulp. F. C. HAHN and R. E. FOTHERGILL, Assrs. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,926,002, 5.9.33. Appl., 2.5.31).—Highly resinous woods (jack, pitch, or scrub pines) are digested with $(\text{NH}_4)_2\text{HSO}_3$ liquor of p_{H} 1.35 and NH_3 content 0.65% for about 9 hr. at 115°. It is claimed that a strong, light-coloured, and easily bleached pulp is obtained. D. A. C.

Manufacture of (A) [straw] pulp, (B) felt paper pulp. M. SKOLNIK, Assr. to SKOLNIK PATENTS CORP. (U.S.P. 1,924,660 and 1,924,815, 29.8.33. Appl., [A] 30.11.31, [B] 29.2.32).—(A) Straw bales are placed in mesh containers and passed through a bath of caustic alkali for a sufficient time to remove resinous material and only the min. amount of glutinous material. They are then sprayed with warm H_2O to remove the alkali and loosen the fibres. The bales are removed from their containers, excess H_2O is pressed out, and the pulp gently agitated with fresh H_2O . (B) Straw bales contained in perforated baskets are passed first through a tank containing hot caustic alkali, and then through a washing tank. They are then (still contained in baskets) treated with a 2% Na_2CO_3 solution, washed, and neutralised with a 2% AcOH solution, the material finally containing 65% of the original straw. It is claimed that with a min. of mechanical treatment a very high tensile strength is produced. D. A. C.

Treatment of [wood-]pulp stock. G. KNOPP, Assr. to CENTRIFUGAL ENG. & PATENTS CORP. (U.S.P. 1,925,722, 5.9.33. Appl., 4.6.30. Ger., 11.7.29).—Fibre bundles in pulp stock are disintegrated by passing through a rapidly rotating drum the inner surface of which consists of a series of annular steps of increasing diam., with which the pulp is brought into sharp contact by means of centrifugal force. D. A. C.

Apparatus for bleaching pulp. H. J. APPLETON, C. C. LE FEBVRE, and H. DU BOIS, Assrs. to PAPER PATENTS Co. (U.S.P. 1,924,860, 29.8.33. Appl., 22.12.31).—The pulp is bleached with Cl_2 gas in a dome-shaped tank (T), being introduced continuously through a tower containing a series of triangular revolving grates, placed on top of T. The pulp lies on the grates, forming a gas seal, from which it drops into T and is thence discharged by means of rotating scrapers, through the ends of which H_2O or aq. $\text{Ca}(\text{OH})_2$ is projected on to the stock, washing it into a well at the bottom of T. The stock is made to flow out sufficiently rapidly to maintain the desired level in T. D. A. C.

Treatment of waste sulphite [pulp] liquor. G. C. HOWARD (U.S.P. 1,924,361, 29.8.33. Appl., 28.10.30).—The liquor is treated with solid CaO at $\geq 100^\circ/1$ atm. and, after separation of the inorg. and org. lignin ppts., the liquor (p_{H} 12.0) is subjected to a steam pressure cook, while maintaining the CaO alkalinity, to separate S combined with org. matter and any additional inorg. material. (Cf. U.S.P. 1,856,558; B., 1933, 265.) F. R. E.

Manufacture of paper. TITANIUM PIGMENT CO., INC. (B.P. 409,354, 28.10.32. U.S., 31.10.31).—TiO₂ may be used either alone or in combination with other inorg. fillers as a filling or coating agent. D. A. C.

Manufacture of sheet packing material. R. ROBERTS, Assr. to H. GIESE (U.S.P. 1,925,206, 5.9.33. Appl., 29.9.30).—The moist, newly-formed web of asbestos fibres is wound spirally around a large cylinder to form a laminated board which is rendered non-porous and heat-resisting by impregnating one side of each layer with latex. It is then removed from the cylinder, pressed, dried, and again pressed. D. A. C.

Drying of printed sheets. P. AITCHISON, F. T. WOOD, and A. A. WITTEBEL, Assrs. to AMER. BANK NOTE CO. (U.S.P. 1,925,429, 5.9.33. Appl., 19.12.30).—The sheets are stacked in a chamber which is then evacuated. O₃ is introduced and the sheets are dried for the required time, the O₃ being withdrawn prior to removing the sheets. It is claimed that the ink is thereby dried overnight. D. A. C.

De-inking of printed paper. E. R. DARLING, Assr. to MARINER & HOSKINS, INC. (U.S.P. 1,925,372, 5.9.33. Appl., 14.11.31).—Printed paper (including coated papers) is beaten for 1 hr. in aq. NaOH and either aq. NaSiO₃ or aq. Na₃PO₄ at p_H 9.0—12.6. 2% of soap or sulphonated hydrocarbon oil is added and the beating continued for 20 min., whereby separation of the pigment (I) and fillers (II) from the fibres is effected. The mixture is then screened so as to retain the fibres and pass the (I) and (II). D. A. C.

Fibrous web for artificial leathers or the like. M. O. SCHUR, Assr. to BROWN CO. (U.S.P. 1,924,573, 29.8.33. Appl., 19.1.32).—A base consisting of a water-laid web, of which the surface portion is composed of much shorter fibres (pulped birch and gelatinised cellulose) than the more absorbent main body portion (pulped spruce), is impregnated with rubber. F. R. E.

Spooling of freshly spun artificial silk. VEREIN. GLANZSTOFF-FABR. A.-G. (B.P. 410,432, 11.12.32. Ger., 9.12.32).

Printed cellulose.—See VI. Controlling moisture content [of fabrics].—See XI. Articles from cellulose derivatives. Pulp. —See XIII. Joining leather etc. Cellophane adhesive.—See XV.

VI.—BLEACHING; DYEING; PRINTING; FINISHING.

Dyeing of textiles. IV. Dyeing of silk by substantive dyes in presence of ammonium chloride, and the limits of saturation of the silk by them. V. Interaction between animal fibres and aqueous ammonium chloride. VI. Dyeing of wool and cotton by basic substantive dyes. A. E. PORAI-KOSCHITZ (J. Appl. Chem. Russ., 1934, 7, 91—97, 99—102, 103—112).—IV. In the dyeing of silk (I) by Benzopurpurin YB or Benzoviolet O in presence of NH₄Cl only the anion of the dye is absorbed by (I), liberating an equiv. amount of NH₃. > 0.23 mg.-equiv. of dye combines with 1 g. of (I).

V. On boiling wool (II) or (I) with aq. NH₄Cl a max. of 0.83 mg.-equiv. of NH₃ is liberated by (II) and of 0.3 mg.-equiv. of NH₃ by (I); the former val. is identical

with that of combination with acid dyes, whilst the latter is 50% higher, probably owing to hydrolysis of CO·NH-groups.

VI. The quantity of HCO₂H liberated on treating (II) or cotton (III) with boiling solutions of hydrochlorides of tetrakisazo dyes (IV) in presence of HCO₂Na serves as a measure of combination of (II) with the dye. In the case of (II) chiefly the cations are absorbed, whilst in that of (III) both the cations and the anions of (IV) are absorbed. The (IV) used were prepared by coupling *m*-C₆H₄(NH₂)₂ with tetrazotised dianisidine, or with *p*-diaminodibenzylideneacetone, m.p. > 360°, prepared by reducing the corresponding (NO₂)₂-derivative, obtained from *p*-NO₂-C₆H₄·CHO and COMe₂. R. T.

Dyeing of cellulose ether films and lacquers. N. J. SOLETSCHNIK and N. D. NOVOSILTZEVA (J. Appl. Chem. Russ., 1934, 7, 187—192).—The application of a no. of dyes in the prep. of coloured benzyl-, ethyl-, and acetyl-cellulose films and lacquers is investigated. R. T.

Production of oxidation brown shades [on the fibre] with *p*-nitro-*o*-aminophenol. M. HIRSCH-POMERANZ (Sealed Note No. 2210, 31.10.12. Bull. Soc. Ind. Mulhouse, 1934, 50, 115). Report by R. SPEITEL (*Ibid.*, 116).—A yellowish-brown shade is obtained by oxidising *p*-nitro-*o*-aminophenol (I) on the fibre, using NaClO₃ (oxidant) and a vanadate (catalyst). (I) is obtained as a brown powder by passing SO₂ into a hot mixture of H₂O, 2:4-(NO₂)₂C₆H₃·OH (II), and Fe turnings until (II) is completely dissolved, and then blowing in air. SPEITEL confirms the novelty of the processes and refers to the analogous method of dyeing Paramine Brown with *p*-C₆H₄(NH₂)₂. A. J. H.

Changes of cellulose when mercerised, and the ageing of alkali-cellulose. Y. SHINODA (J. Soc. Chem. Ind., Japan, 1934, 37, 55—58 B).—Measurements of solubility in cuprammonium solutions of various [Cu] show that mercerisation of cellulose board from cotton linters increases the [Cu] necessary for dissolution; this is ascribed to removal of β- and γ-cellulose. Subsequent ageing increases the solubility and uniformity. A. G.

Action of concentrated sulphuric acid on cellulose in presence of formaldehyde. R. SPEITEL and M. SCHENK (Bull. Soc. Ind. Mulhouse, 1934, 50, 109—111).—The main facts relating to the protective influence of CH₂O in the parchmentisation of cotton by conc. H₂SO₄, as described by Wood (A., 1931, 1401) and in B.P. 200,881 (B., 1923, 924 A), are confirmed. A. J. H.

Rubberising fabrics. W. ESCH (Gummi-Ztg., 1934, 48, 517—518).—Processes and formulæ are given for application of rubber without inflammable solvents in the calendaring process or by means of a coating machine. The uses of anti-agers, synthetic rubber, and varnishes for rubberised fabric are described. G. H. C.

PATENTS.

Production of printed regenerated cellulose. J. VOSS, Assr. to VISKING CORP. (U.S.P. 1,929,394, 3.10.33. Appl., 31.3.33. Ger., 12.3.31).—The material is printed with a design or letters in an oil-base ink,

and then baked in a moist atm. at 100° or at 60° under reduced pressure. A. R. P.

(A, C) Reducing the lustre of cellulose ester and ether materials. (B) Treatment of cellulose ester or other textile materials. BRIT. CELANESE, LTD., and (A, C) G. H. ELLIS and E. W. KIRK, (B) G. H. ELLIS (B.P. 409,275—7, 19.10.32).—The materials are subjected to the action of a hot or boiling aq. medium, or moist steam, in presence of (A) $C_{10}H_8$ or its alkyl or ether derivatives, (B) a solvent or solute for the cellulose ester or ether insol. or difficultly sol. in H_2O , e.g., naphthols, Ph_2 , camphor, (C) a sulphonamide or an amide of a carboxylic acid, e.g., *p*-toluenesulphonamide, acetanilide. F. R. E.

Imparting a matt finish to artificial [viscose] silk. J. Y. JOHNSON. FROM I. G. FARBENIND. A.-G. (B.P. 408,240, 30.9.32).—A delustred finish free from "dusting-out" and with a silky touch is obtained by pptg. a colourless insol. stannate (e.g., Pb, Ba, Sr, Ca, Zn, Cd, and Al) within the rayon. Preferably, the rayon is steeped in warm aq. $Ba(OH)_2$, rinsed, and treated with Na, NH_4 , or K stannate. Alternatively, the rayon may be delustred in a one-bath process, using a solution containing $Ba(OH)_2$ and Na_2SnO_2 , excess of glucose or glycerin being present as protective colloid. A. J. H.

Compound for treatment of silk and rayon [for hosiery fabric]. F. P. MILLER (U.S.P. 1,929,705, 10.10.33. Appl., 8.9.31).—The material is soaked for 30 min. in a dil. aq. solution of a mixture containing alum 70.25, H_3BO_3 27, NaCl 0.5, gum arabic 2, and casein 0.25%, and is then washed in a dil. soap solution. A. R. P.

Impregnation with rubber of textile yarns and fibres. J. BRANDWOOD (B.P. 408,931, 13.7.32).—Textile materials in a loosely wound condition on a foraminous holder are impregnated with a rubber-containing liquid, e.g., latex, a compressed gas, e.g., air, being subsequently passed between the windings before drying and vulcanisation so that the threads are kept separate. Apparatus is described. D. F. T.

Applying rubber and obtaining the latter in a spongy state on fabrics and other materials. J. PENNEL and J. FLIPO (SOC. J. PENNEL & J. FLIPO) (B.P. 409,520, 2.6.33. Fr., 4.6.32).—A rubber mixture is prepared without the use of rubber solvents but adapted to vulcanise between 70° and 140° and containing agents capable of generating gaseous products between these temp. The composition is such that slight swelling will occur before vulcanisation. The mixture is calendered on the fabric or other foundation and vulcanised in hot air. D. F. T.

Manufacture of sizes [for textile fibres]. ETABL. GAMMA (B.P. 409,669, 21.1.33. Fr., 17.12.32).—Stable, conc. emulsions in the form of pastes or jellies (to be diluted before use) are obtained by adding substances which are liquid when hot but gel on cooling (e.g., agar-agar, gelatin, ethanalamine soaps) during the manufacture of emulsions of drying oils of the type described in, e.g., B.P. 364,902 (B., 1932, 304). E. L.

Dyeing oxidised Al.—See X.

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

Precipitation of phosphoric acid by means of chalk. L. M. GURÉVICH (Min. Udobr., 1932, 1, 36—40).—Consumption of CaO is reduced to 6% by previous addition of a fine $CaCO_3$ suspension. The dry product contains about 36% of citric acid-sol. P_2O_5 . CH. ABS.

Detection of phosphoric acid in hydrogen peroxide solutions. J. DALIÉTOIS (Z. anorg. Chem., 1934, 217, 346).— MoO_4'' is oxidised by H_2O_2 to MoO_4' , the yellow colour of which may mask the reaction with PO_4''' . The H_2O_2 is therefore first destroyed by evaporation on a H_2O -bath. F. L. U.

Preparation of the original extract for the determination of phosphoric acid in phosphate rock and superphosphate with a dilute hydrochloric acid solution. A. I. SENGER and N. A. DEMIDENKO (Trans. Sci. Inst. Fertilisers, Moscow, 1933, No. 113, 125—127).—Extraction with boiling, but not cold, 10% HCl is satisfactory. CH. ABS.

Total and water-soluble phosphoric acid in "diamnophos." V. P. MIKHALOV (Trans. Sci. Inst. Fertilisers, Moscow, 1933, No. 113, 129—131).— H_2O -sol. P_2O_5 is not always identical with total P_2O_5 . CH. ABS.

Regeneration of exhausted sodium carbonate cementation mixture. K. M. AKHNAZARIAN (Vestn. Metalloprom., 1933, 13, 55—57).—To produce CO_2 for the reaction $CO_2 + C = 2CO$, 15—30% of Na_2CO_3 is added to the cementation mixture, which is regenerated by exposure to air after addition of a small quantity of H_2O . The regenerated mixture is then dried and mixed with 10—15% of sawdust or charcoal. CH. ABS.

Manufacture of sodium sulphide. P. LEY (Oesterr. Chem.-Ztg., 1934, 37, 82—85).—A modern hand-worked Na_2S (I) plant is described. As raw material either salt-cake or Na_2SO_4 obtained as by-product in $Na_2Cr_2O_7$ manufacture is used, with anthracite dust or the like having < 6% of ash. The furnace described has a capacity of 200 tons of (I) per month. A suitable refractory for the hearth contains Al_2O_3 40, SiO_2 55%. Conditions in the rest of the lining are less severe. With powdered-coal firing, which is more economical than producer gas, 22% of fuel (on the Na_2SO_4 treated) is required. The ash in the coal is a drawback, and coal gas, though dearer, may be preferred. Practical details of furnace operation are described. The favourable influence of added (I) is probably due to lowering of the m.p. The temp. should be 1000° and a hand furnace can hardly be made too hot. The crude melt, which is highly corrosive, is treated with cold H_2O while still hot. The extract is settled, not filtered. H_2O -cooled crystallising pans are used, and for crystals of good colour the liquor should contain > 28% of (I). White crystals are obtained if 0.5% of NaCN is added to combine with Fe. The mother-liquor is used for the prep. of $Na_2S_2O_3$, or purified by addition of BaS. If 60/62% (I) is desired the liquor is heated in cast-Fe vessels heated by the furnace flue gases and with slow agitation. C. I.

Production of potassium sulphate from potassium chloride and sulphuric acid. E. J. FOX and J. W. TURRENTINE (Ind. Eng. Chem., 1934, 26, 493—496).—Under American conditions it seems economical to convert KCl into K_2SO_4 by treatment with H_2SO_4 and use the HCl produced for phosphate-rock extraction. A procedure such as with NaCl results in a low-m.p. mixture which evolves HCl only slowly at low temp. and froths excessively at higher temp. In the first stage (production of $KHSO_4$), which is exothermic, a granular state favourable to HCl evolution is maintained if the H_2SO_4 is added with stirring to the KCl. Conversion of $KHSO_4$ into K_2SO_4 requires a temp. of 260°, and is more rapid at 500°, without fusion occurring.

C. I.

Oxidisability of ammonium nitrate, and its prevention. D. V. BEZUGLIJ and F. A. IGNATENKO (Ukrain. Chem. J., 1933, 8, 242—259).—The oxidisability of technical NH_4NO_3 (I) is due to org. substances (II) present in the NH_3 liquor used for neutralisation of HNO_3 . (II) cannot be removed by the action of O_3 or air, or by adsorption on coke or wood-C (III); activated (III), however, gives good results, 0.5 g. being taken per 100 c.c. of aq. (I). Spent (III) contains 40% of (I); it can be regenerated by heating at 700—800° during 1.25 hr., combined with the action of superheated steam.

R. T.

Obtaining lime-ammonium nitrate. K. ZEIDENBERG (Trans. Sci. Inst. Fertilisers, Moscow, 1933, No. 113, 78—79).—By the use of CO_2 and liquid NH_3 in which $Ca(NO_3)_2 \cdot 4H_2O$ was dissolved [$Ca(NO_3)_2 \cdot 4H_2O + CO_2 + 2NH_3 = CaCO_3 + 2NH_4NO_3 + 3H_2O$] a product containing N 20, $CaCO_3$ 40% was obtained.

CH. ABS.

Obtaining ammoniated superphosphate. L. E. BERLIN (Trans. Sci. Inst. Fertilisers, Moscow, 1933, No. 113, 64—74).—Data concerning the treatment of rock phosphate with acids and passing gaseous NH_3 into the mixture are discussed.

CH. ABS.

Enriching superphosphate with ammonia. K. ZEIDENBERG (Trans. Sci. Inst. Fertilisers, Moscow, 1933, No. 113, 74—78).—The use of liquid NH_3 and dissolved $Ca(NO_3)_2$ gives a higher NH_3 content than when gaseous NH_3 is used. The higher is the N content of the mixture the better are the physical condition and keeping qualities.

CH. ABS.

[Determination of] hygroscopic water in superphosphate. (A) G. WICHERN (Chem.-Ztg., 1934, 58, 383; cf. B., 1934, 400). (B) STEVENIUS-NIELSEN, and (C) G. WICHERN (*Ibid.*, 422).—(A) In reply to the criticism that the Wichern procedure (B., 1933, 384) ignores the impurities present, it is stated that the necessary corrections for these were determined by the use of a saturated solution of reverted phosphate and shown to be much < 1%.

(B) WICHERN'S correction for other substances in solution in a superphosphate solution in hygroscopic equilibrium with a pure H_3PO_4 solution is considered unsound and must be based on experimental errors.

(C) WICHERN replies that he is confident of the accuracy of his figures.

C. I.

Determination of fluorine in Khibin apatite and superphosphate. S. N. ROZANOV and V. A. KAZAR-

INOVA (Trans. Sci. Inst. Fertilisers, Moscow, 1933, No. 113, 96—103).—For determining F in presence of Cl and colloidal SiO_2 Penfield's method is suitable providing a trap containing 10% Ag_2SO_4 in H_2SO_4 is introduced in the absorption train. For samples containing org. matter a trap containing $K_2Cr_2O_7$ in H_2SO_4 is also employed. In presence of colloidal SiO_2 the yield of F is low. For determining F in superphosphate the sample should be dried in a desiccator over $CaCl_2$ or H_2SO_4 , or heated at $\geq 50^\circ$.

CH. ABS.

Treating phosphates with nitric acid. A. N. LOGINOV (Trans. Sci. Inst. Fertilisers, Moscow, 1933, No. 113, 132—137).—A review.

CH. ABS.

Determination of excess alkalinity in baking powders. J. BULIŘ (Chem. Listy, 1933, 27, 241—245).—Stollenwerk and Bäurle's procedure (A., 1929, 667) is not applicable to the analysis of baking powders (I) for $P_2O_7^{''''}$ in presence of $PO_4^{''''}$. A modification of Grünhut's method for analysis of (I) is proposed.

R. T.

Preparation of aluminium fluoride from aluminium hydroxide and hydrogen fluoride. V. S. JATLOV, M. M. KOVALENKO, and Z. P. VINOGRADOVA (J. Appl. Chem. Russ., 1934, 7, 39—46).—88—92% of $Al(OH)_3$ (I) is converted into AlF_3 (II) by the action of HF at 400—700° during 15 min.; the remaining 8—12% of (I) is protected from the further action of HF by the layer of (II) formed. The yields of (II) are unaffected by varying the method of prep. of (I), or by using Al_2O_3 in place of (I). The velocity of formation of (II) from SiF_4 and (I) is considerably < that from HF and (I).

R. T.

Determination of alumina and ferric oxide in clay. K. ZIMMERMANN (Chem. Weekblad, 1934, 31, 317—319).— Al_2O_3 (I) is hygroscopic unless ignited at $> 1200^\circ$. Fe_2O_3 (II) is converted partly into Fe_3O_4 above 1000°. A compromise can be reached with mixtures of (I) and (II) by employing an optimum ignition temp., usually about 1100°, at which the gain in wt. due to absorption of H_2O equals the loss due to decomp. of (II), depending on the composition of the clay.

S. C.

Adsorptive properties of kieselguhrs from the central black-earth zone. V. N. ALFEROVA and T. V. MIRONENKO (J. Appl. Chem. Russ., 1934, 7, 73—81).—The kieselguhrs are good adsorbents of strong electrolytes and are suitable for softening H_2O and for decolorising vegetable oils.

R. T.

Artificial magnetite [anodes]. A. G. ELITZUR (J. Appl. Chem. Russ., 1934, 7, 235—237).—Anodes made of artificial magnetite are distinguished by their resistance to corrosion in the electrolysis of 0.5% NaCl or Na_2SO_4 .

R. T.

Extraction of rhenium from molybdenites. E. S. KRONMAN, V. I. BIBIKOVA, and M. A. AXENOVA (J. Appl. Chem. Russ., 1934, 7, 47—50).—10 mg. of hydroxyquinoline nitroperrhenate were obtained from 2.5 kg. of Mo glance, by a method based on that of Kronman (A., 1932, 1224).

R. T.

Regeneration of vanadium catalysts poisoned by arsenic, without removal from the contact apparatus. I. E. ADADUROV, D. V. GERNET, and

A. M. CHATUN (J. Appl. Chem. Russ., 1934, 7, 17—28).—Inactivation of V catalysts (I) for oxidation of SO_2 from pyrites is due to adsorption of As_2O_3 , which is then oxidised to As_2O_5 ; this acts mechanically, together with Fe_2O_3 dust present in the reaction gases, by occluding the active surface of (I). As_2O_5 can be removed by reduction to As_2O_3 and sublimation of the latter in a stream of water-gas at 550° during 30 min., whilst Fe_2O_3 is removed by converting it into FeCl_3 and subliming it in a stream of $\text{CO} + \text{Cl}_2$ at 550° . The two processes may be conducted simultaneously with complete reactivation of (I) by passing COCl_2 during 30 min. at 550° . R. T.

Preparation of iodine from Black Sea phyllophora. V. F. OPOTSKI and G. B. FISCHER (Ukrain. Chem. J., 1933, 8, 212—225).—Of a no. of Black Sea algae only phyllophora (I) contained any considerable (up to 0.52% of dry wt.) quantities of I, specimens from the open sea being richer in I than coastal ones. On the whole, the ash content varies inversely with the I content. Directions are given for the drying and calcination of (I), and for production of I from the ash. R. T.

Dry distillation of Black Sea phyllophora. V. F. OPOTSKI, G. B. FISCHER, and A. F. TJULPINA (Ukrain. Chem. J., 1933, 8, 237—241).—The % recovery of I from the residue from the dry distillation (I) of dried algae (II) varies from 80% when (I) is conducted at 300° to 53% at 700° . At 500° (II) yield 47% of tarry products, 30% of aq. distillate (containing NH_3 , MeOH, and COMe_2 , I, and other solutes), and 30% of coke and gaseous products (CO , CO_2 , N_2 , H_2 , CH_4 , and higher hydrocarbons). R. T.

Extraction of radium from Great Bear Lake pitchblende. R. J. TRALL (Trans. Canad. Inst. Min. Met., 1934, 36, 448—467).—Two types of ore are produced, viz., (A) pitchblende with a high SiO_2 content associated with small amounts of sulphides, but free from carbonates and BaSO_4 , and (B) pitchblende low in SiO_2 , but containing carbonates and barytes. A yields about 70% of its U and Ra content to hot HCl at 95° , but addition of NaNO_3 is necessary to dissolve the remainder; the insol. material from this treatment is practically free from Ra. The hot solution from the filters is treated with BaCl_2 and Na_2SO_4 and cooled to produce a ppt. of PbCl_2 , BaSO_4 , and RaSO_4 . B must be roasted at $700\text{--}800^\circ$ before extraction with HCl to remove the U; no NaNO_3 is necessary to dissolve the U, and all the Ra remains in the insol., from which it is recovered by successive digestions with aq. Na_2CO_3 and dil. HCl. Pptn. of the resulting chloride solution with H_2SO_4 yields Ra-Ba sulphate. Most ores of the B type contain Ag, part of which is recovered from the insol. by leaching with NaCN and part from the PbCl_2 ppt. from the HCl leach. A. R. P.

Acid-resisting coatings.—See IX. **Electrical heating.**—See XI. **PbCrO₄.**—See XIII. **Fertilisers and manures.**—See XVI.

PATENTS.

Concentration of nitric acid. (A) C. W. DAVIS, (A, B) S. L. HANDFORTH, (A) W. E. KIRST, and (C) F. C.

ZEISBERG, Assrs. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,922,278, 1,922,289, and 1,928,749, [A, B] 15.8.33, [C] 3.10.33. Appl., [A] 8.10.29, [B] 18.2.30, [C] 6.12.30).—(A) A mixture containing $> 20\%$ of HNO_3 and $< 21\text{--}22\%$ of H_2O , the remainder being H_2SO_4 , is passed down through a heated tower (I) packed with refractory material, whereby the greater part of the HNO_3 is removed and condensed as conc. acid. The effluent from (I) flows through a series of heated, superimposed, horizontal tubes (II) in which the remaining HNO_3 is vaporised, the vapour flowing countercurrent to the liquid through (II) and then up (I), whereby it becomes progressively richer in HNO_3 . (B) (II) are replaced by two steam-jacketed pans in series, the effluent from the second (HNO_3 0.2, H_2SO_4 66, H_2O 33.8%) passing down a second tower (III) similar to (I), and the vapours from this passing back through the whole system. (C) The vapours from (III), in process (B), pass up through a dephlegmating column (IV) down which is passed waste steam, whereby a condensate containing 28% of HNO_3 is obtained from the bottom of (IV) and passed directly to the top of (I). A. R. P.

Obtaining (A, B) orthophosphoric acid and/or conversion products thereof, (C) alkali phosphates, and (D) acid metal phosphates [from phosphate rock]. (A—C) C. H. MILLIGAN and (D) R. L. SEBASTIAN, Assrs. to AMER. AGRICULTURAL CHEM. CO. (U.S.P. 1,929,441—3 and 1,929,452, 10.10.33. Appl., 26.8.30).—The rock is mixed with slightly less H_2SO_4 than that required to combine with all the bases present and the mixture is heated at 75° to expel HF and HCl. After cooling, the H_3PO_4 is extracted with (A) BuOH or (B) $\text{C}_5\text{H}_{11}\text{OH}$ or higher homologue ($\geq \text{C}_8$) and the extract (I) is agitated with H_2O or the alcohol removed by addition of C_6H_6 . Alternatively, (I) is treated with (C) an alkali hydroxide or carbonate to produce a mono-, di-, or tri-alkali phosphate, or (D) with a di- or tri-phosphate of a metal to produce the corresponding monophosphate. A. R. P.

Production of boric anhydride as boric acid from (A) colemanite or the like, (B) minerals containing both alkali and alkaline-earth metals. T. M. CRAMER and G. A. CONNELL, Assrs. to PACIFIC COAST BORAX Co. (U.S.P. 1,927,013—4, 19.9.33. Appl., 12.8.26).—(A) Ground colemanite is treated with mother-liquor (I) containing B_2O_3 , Na_2O , and SO_2 in the mol. ratio 3 : 1 : 2, whereby CaSO_3 (II) is pptd. and a solution containing $\text{Na}_2\text{O}:\text{B}_2\text{O}_3$ (mol. ratio 1 : 6) is obtained which on treatment with 2 mols. of SO_2 yields 3 mols. of B_2O_3 as H_3BO_3 and regenerates (I). (B) Ulexite is treated with mother-liquor (III) containing $\text{B}_2\text{O}_3:\text{Na}_2\text{O}:\text{SO}_2$ (mol. ratio 7 : 1 : 2) to ppt. (II) and yield a solution in which Na_2O and B_2O_3 exist in the mol. ratio 1 : 12, treatment of which with 3 mols. of SO_2 and air yields 5 mols. of B_2O_3 as H_3BO_3 crystals and regenerates (III) with, in addition, 1 mol. of Na_2SO_4 . A. R. P.

Production of pure ammonia [from ammoniacal liquor]. F. W. SPERR, JUN., Assr. to KOPPERS Co. OF DELAWARE (U.S.P. 1,928,510, 26.9.33. Appl., 14.11.30).— NH_3 liquor is steamed to drive off free NH_3 and volatile

acids, alkali is added, and steam is again injected, yielding pure vapours of NH_3 and H_2O , the latter being partly condensed; the conc. vapour is then scrubbed with $\text{Ca}(\text{OH})_2$ before lowering the temp. and finally condensed to conc. NH_3 liquor. B. M. V.

[Platinum-rhodium] catalyst for ammonia oxidation. E. A. TAYLOR, ASSR. to GRASSELLI CHEM. CO. (U.S.P. 1,927,963, 26.9.33. Appl., 18.8.32).—The catalyst (gauze) is formed of two elements: (a) of essentially pure Pt, having high mechanical strength and low efficiency of conversion, *e.g.*, the warp wires; and (b) of Pt-Rh alloy, having low strength and high efficiency, *e.g.*, the woof. B. M. V.

Treatment of lime. W. J. KUNTZ (U.S.P. 1,929,591, 10.10.33. Appl., 26.9.31).—Claim is made for a combination of a hydrating tank, air separators for removing the lighter portion, a beater mill for breaking up the heavier portion, and a series of storage bins. A. R. P.

Salt-dissolving apparatus. T. F. COURTHOPE, ASSR. to RETSOF MINING CO. (U.S.P. 1,928,008, 26.9.33. Appl., 21.12.31).—A vat is provided with a double, inverted-conical bottom, the bases of the cones being joined in a fluid-tight manner but openings left in both apices. H_2O is sprinkled in at the top and a clear saturated brine drawn off at the upper part of the space between the cones; at intervals the mud is sluiced out of the bottom outlet. B. M. V.

Recovery of lithium contained in silicious lithium-bearing minerals [mica]. METALLGES. A.-G., and HANS HEINRICH HÜTTE G.M.B.H. (B.P. 409,636, 29.12.33. Ger., 29.12.32 and 21.9.33).—The mineral (I) is heated at 830° with a mixture of Na_2SO_4 , K_2SO_4 , and CaSO_4 or MgSO_4 , the product is leached with H_2O , and the Li recovered by pptn. with Na_2CO_3 . When K is present in (I) the mother-liquor (II) is evaporated to remove part of the K_2SO_4 and the remaining (II) is evaporated to dryness and the salt mixture used again. A. R. P.

Manufacture of borax. H. L. ROBSON, ASSR. to BURNHAM CHEM. CO. (U.S.P. 1,929,902, 10.10.33. Appl., 21.1.30).—Searles Lake brine is evaporated to remove trona, then diluted to prevent separation of Na_2CO_3 , and treated with SO_2 until the alkalinity is the equiv. of 2–4 g. of NaOH per litre; borax crystallises out on cooling. A. R. P.

Preparation of ammonium perborate. R. SENG, ASSR. to E. I. DU PONT DE NEMOURS & CO. (U.S.P. 1,929,121, 3.10.33. Appl., 12.8.30. Ger., 20.8.29).— H_3BO_3 crystals (300 g.) are stirred into 30% H_2O_2 (570 g.) at 5° and NH_3 (85 g.) is passed into the solution, which is kept at $< 10^\circ$. After thorough agitation the liquid is cooled to 0° and more NH_3 (30–50 g.) passed in until $\text{NH}_4\text{BO}_3 \cdot \frac{1}{2}\text{H}_2\text{O}$ separates. A. R. P.

Production of ammonium sulphate. L. ROSENSTEIN, ASSR. to SHELL DEVELOPMENT CO. (U.S.P. 1,928,266, 26.9.33. Appl., 2.4.30).— SO_2 is oxidised in an aq. solution of a metal salt which acts as a catalyst, the metal hydroxide being insol., *e.g.*, $< 0.3\%$ of combined Fe^{II} and Fe^{III} salts. The $[\text{H}_2\text{SO}_4]$ is maintained at $< 17\%$ by suitable additions of NH_3 , and $(\text{NH}_4)_2\text{SO}_4$ is

pptd. free from either single or double salts of the metal. B. M. V.

Production of pure [alkali or ammonium] phosphates. C. F. BOOTH, ASSR. to SWANN RESEARCH, INC. (U.S.P. 1,929,476, 10.10.33. Appl., 16.12.31).—The solution (*d* 1.18) is made just acid to Me-orange and treated first with a small amount of aq. MnSO_4 and then with sufficient KMnO_4 to convert the whole of the Mn into Mn^{III} , which is pptd. together with Al and Fe impurities. A. R. P.

[Phosphate] ore concentration [by flotation]. F. F. JOHNSTON, ASSR. to PHOSPHATE RECOVERY CORP. (U.S.P. 1,927,939, 26.9.33. Appl., 2.6.32).—Phosphate rock (I) is floated in an alkaline pulp (0.5 lb. of NaOH) containing fuel oil 2 lb. and naphthenic acid (II) 3 lb. per ton of (I). (II) is that fraction of the acids recovered from crude petroleum which boils at $230\text{--}288^\circ/20$ mm. A. R. P.

Reduction of phosphates. H. W. EASTERWOOD, ASSR. to VICTOR CHEM. WORKS (U.S.P. 1,927,604, 19.9.33. Appl., 4.2.32).—In the blast-furnace reduction of phosphate rock a small quantity of CaSO_4 is added to the charge, preferably by addition of 1–3% H_2SO_4 to the material being briquetted, so as to lower the stack temp. by $10\text{--}30^\circ$ during the decomp. A. R. P.

Simultaneous manufacture of dicalcium phosphate and of ammonium chloride. L. DUREPAIRE and B. QUANQUIN (U.S.P. 1,930,744, 17.10.33. Appl., 28.6.32. Fr., 6.7.31).—Natural $\text{Ca}_3\text{P}_2\text{O}_8$ is treated with aq. CaCl_2 and HCl to give a solution of $\text{Ca}(\text{H}_2\text{PO}_4)_2$, which is then treated with $\text{Ca}(\text{OH})_2$ to ppt. CaHPO_4 and leave aq. CaCl_2 , part of which is returned to the circuit and part treated with CO_2 and NH_3 to give aq. NH_4Cl and a ppt. of CaCO_3 . A. R. P.

Recovery of calcium hypochlorite. H. REITZ and H. EHLERS, ASSRS. to PEN-CHLOR, INC. (U.S.P. 1,931,622, 24.10.33. Appl., 21.10.30. Ger., 28.10.29).—A small amount of NaOH is added to moist $\text{Ca}(\text{OCl})_2$ and the mixture is sprayed into air at $130\text{--}140^\circ$ to obtain a dry product in which 75% of the Cl is "available." A. R. P.

Preparation of porous silicious [base-exchange] material. A. S. BEHRMAN, ASSR. to GEN. ZEOLITE CO. (U.S.P. 1,930,503, 17.10.33. Appl., 21.2.29).—A solution (7.5 gals.) containing Na_2SiO_3 (9.7% Na_2O , 29.6% SiO_2 , 1.81 lb./gal.) and NaOH (0.314 lb./gal.) is treated slowly, with stirring, with a solution (7.5 gals.) containing $\text{Al}_2(\text{SO}_4)_3$ (0.716 lb./gal.) and 94% H_2SO_4 (0.196 lb./gal.) and the resulting gel is washed and dried as usual. A. R. P.

Manufacture of silicate gel. W. MCA. BRUCE, ASSR. to PERMUTIT CO. (U.S.P. 1,928,123, 26.9.33. Appl., 23.11.31).—Solutions of Na silicate, $\text{Al}_2(\text{SO}_4)_3$, and Na aluminate are mixed to form a gel, then more of the solutions of greater concn. are added, and the uniform pulp so obtained is pressed, washed, and dried. B. M. V.

Purification of technical sodium pyrosilicate hydrates. M. C. WADDELL, ASSR. to GRASSELLI CHEM. CO. (U.S.P. 1,931,364, 17.10.33. Appl., 25.10.32).—Crude Na pyrosilicate (I) contaminated with NaOH is

agitated with sufficient of a more acid silicate solution to convert the NaOH into (I). A. R. P.

Preparation of aluminium oxide gel. E. H. BARCLAY, ASSR. to SILICA GEL CORP. (U.S.P. 1,929,942, 10.10.33. Appl., 6.7.29).—A 5–10% $Al_2(SO_4)_3$ solution is treated with a slight excess of *N*-NaOH at 0–5° with agitation to produce $Al(OH)_3$ gel (I), which is washed by decantation and dried at 150°; (I) will absorb 21 wt.-% of H_2O from air at 30° containing moisture at a partial pressure of 22 mm. Hg. A. R. P.

Production of alkali aluminates [from waste sludges from organic syntheses]. R. O. WOOD, ASSR. to NAT. ANILINE & CHEM. Co., INC. (U.S.P. 1,929,619, 10.10.33. Appl., 3.11.30).—Sludge containing Al_2O_3 from a Friedel-Crafts reaction is mixed with sludge containing Fe_2O_3 from the reduction of NO_2 -compounds to give a 1:1.5–2 mol. ratio of $Al_2O_3:Fe_2O_3$; this mixture is then calcined with 2–3 mols. of Na_2CO_3 at 700–750° to obtain a product from which $NaAlO_2$ is recovered by leaching. A. R. P.

Production of compounds of aluminium and the rarer elements from bauxite. E. L. RINMAN (B.P. 408,710, 29.10.32).—Bauxite is autoclaved with aq. NaOH and $Ca(OH)_2$ at 175°, the red mud is separated from the aq. $NaAlO_2$ and digested with aq. Na_2CO_3 to remove the remaining Al_2O_3 , and the residue is digested with aq. $(NH_4)_2CO_3$ (*d* 1.1) to remove ZrO_2 and TiO_2 , which are pptd. as hydroxides by boiling the filtered solution. A. R. P.

Treating materials [dehydrating magnesium chloride] with hydrochloric acid gas at elevated temperatures. S. B. HEATH and O. E. BARSTOW, ASSRS. to DOW CHEM. Co. (U.S.P. 1,927,660, 19.9.33. Appl., 10.12.30).—In the dehydration of $MgCl_2 \cdot H_2O$ with HCl in an Fe vessel (I) the reaction proceeds much more rapidly at 400–450° than at the usual temp. (300°), but (I) is rapidly corroded and the $MgCl_2$ contaminated with $FeCl_3$. This may be prevented by passing the HCl through red-hot coke to remove O_2 before passing it into (I); in this way a protective film of $FeCl_2$ is formed which is not converted into $FeCl_3$ at 500°. A. R. P.

Recovery of metallic oxides [e.g., beryllia] from ores. H. C. CLAFLIN, ASSR. to BERYLLIUM DEVELOPMENT CORP. (U.S.P. 1,929,014, 3.10.33. Appl., 17.9.30).—In the decomp. of beryl (I) by fusion with Na_2SiF_6 (II) part of the latter is replaced by NaF to prevent volatilisation of SiF_4 , e.g., the charge may consist of (I) 30, (II) 19, and NaF 4 pts. A. R. P.

Manufacture of zinc oxide. A. O. MASON (U.S.P. 1,924,872, 29.8.33. Appl., 28.3.32).—Scrap from Zn-base die-casting is melted in a deep furnace (I) by top heat, so that the Zn is volatilised and burned to ZnO in a special combustion chamber outside (I), while the impurities in the Zn tend to settle to the cooler, bottom, part of (I). A. R. P.

Treatment of zinc oxide residues [from reduction of organic nitro-compounds]. R. V. BROWN and R. O. WOOD, ASSRS. to NAT. ANILINE & CHEM. Co., INC. (U.S.P. 1,931,220, 17.10.33. Appl., 6.9.29).—The ZnO residues are treated with a slight excess of H_2SO_4 , and

to the solution are added an excess of ZnO and a little CH_2O to ppt. the org. compounds. A. R. P.

Manufacture of finely-divided metal oxides [e.g., red lead]. CHEM. WERKE SCHUSTER & WILHELMY PATENT VERWERTUNGS-GES.M.B.H. (B.P. 409,534, 14.7.33, Ger., 21.7. and 29.10.32).—Pb is stirred at 400–500° with an equal wt. of sand or similar granular material (I) until the particles of the latter are coated with Pb; air or O_2 , preferably under pressure, is passed into the agitated mixture to produce Pb_3O_4 , which is separated from (I) by sieving or centrifuging. Naples-yellow can be obtained similarly, using a 12:31 Sb-Pb alloy with molten $NaNO_3$ as oxidising agent. Other examples are given. A. R. P.

Production of titanium dioxide. H. L. RHODES, ASSR. to GLIDDEN CO (U.S.P. 1,931,682, 24.10.33. Appl., 24.2.32).—Pptd. TiO_2 is calcined at 750° with 2.5% of Na_2TiO_3 or its equiv., or at 1000° with 1% of a white titanate. A. R. P.

Production of titanium dioxide from titanium tetrachloride. H. HABER and P. KUBELKA, ASSRS. to KREBS PIGMENT & COLOR CORP. (U.S.P. 1,931,380–1, 17.10.33. Appl., 3.9.31).—(A) Dry air is passed through $TiCl_4$ and the vapours are mixed with air and steam preheated at 300–400° to produce by hydrolysis a non-cryst., finely-divided TiO_2 . (B) N_2 is passed through $TiCl_4$ to produce a 1:1 mixture which is preheated to 1000° and mixed with air, also preheated to 1000°, whereby TiO_2 in a finely-divided form and Cl_2 are obtained. A. R. P.

Manufacture of polymorphous substances in a distinct crystal form. I. G. FARBERIND, A.-G. (B.P. 408,212, 30.9.32. Ger., 1.10.31).—To accelerate transformations in a polymorphous substance (I) on heating, a small quantity of a substance which has the desired crystal structure is added before heating or is produced in (I) by decomp. of a compound during heating; e.g., addition of SnO_2 to TiO_2 accelerates conversion of anatase into rutile, and addition of CoS to ZnS assists in the conversion of the latter into wurtzite on heating. A. R. P.

Manufacture of silver thiosulphate. J. J. BAJDA (U.S.P. 1,929,466, 10.10.33. Appl., 27.3.29).—The calc. amount of AgCl is stirred into $Na_2S_2O_3 \cdot 5H_2O$ melted in its H_2O of crystallisation. A. R. P.

Antiseptic ice and its application [in preserving fish, fruit, and vegetables]. E. I. DU PONT DE NEMOURS & Co. (B.P. 408,696, 19.10.32. U.S., 22.10.31).— H_2O of p_H 7 is treated with 6 p.p.m. of NH_3 , then with 8 p.p.m. of Cl_2 to form a 1:1 mixture of NH_2Cl and $NHCl_2$, and then frozen. A. R. P.

Manufacture of hydrogen peroxide. J. B. PIERCE, JUN., ASSR. to BARIUM REDUCTION CORP. (U.S.P. 1,919,036, 18.7.33. Appl., 16.5.28).—Finely-ground celestite is boiled with an excess of 25% aq. Na_2CO_3 to give $SrCO_3$ (I) and Na_2SO_4 , the (I) is briquetted with coke and tar and heated at 1200°, and the product leached with H_2O to extract $Sr(OH)_2$. The filtered solution is treated with CO_2 to ppt. pure (I), which is mixed with C black and heated at 1200° to yield pure SrO, and this is roasted at 400–500° in O_2 at 1300 lb. per sq. in. to produce

SrO_2 (85—95% conversion). Treatment of the product with dil. H_2SO_4 yields SrSO_4 , which is returned to the first stage, and aq. H_2O_2 . A. R. P.

Stabilisation of aqueous solutions containing hydrogen peroxide. ROESSLER & HASSLACHER CHEM. Co. (B.P. 409,361, 31.10.32. U.S., 2.11.31).—Aq. H_2O_2 (30%) is treated with 5—100 mg. of Na_2SnO_3 per litre and a small quantity of a peptising agent, e.g., $\text{H}_4\text{P}_2\text{O}_7$. A. R. P.

Recovery of sulphur [from pyrites]. R. F. BACON (Assee.) and W. JUDSON (B.P. 408,669, 13.10.32. U.S., 7.12.31).—A mixture of FeS_2 (45% S) with 15—18% of fine coke is allowed to fall down a shaft (I) preheated at 850°, against a regulated rising current of preheated air. In the upper zone of (I) the FeS_2 is converted into FeS with liberation of S, and in the lower zones the FeS is roasted to Fe_2O_3 and SO_2 , the latter being reduced to S as it meets the coke. A. R. P.

Recovery of sulphur [from pyrites]. R. F. BACON (Assee.) and I. BENCOWITZ (U.S.P. 1,928,406, 26.9.33. Appl., 25.2.30).— FeS_2 is heated at 300—450° in S_2Cl_2 (I) to form chlorides (II), e.g., FeCl_2 , CuCl_2 , etc., and S which is condensed and part reconverted into (I) for re-use. The (II) are heated in Cl_2 to volatilise FeCl_3 (III), which is then hydrolysed with steam and the HCl converted into Cl_2 and H_2O by passage over hot (500°) firebrick impregnated with NiCl_2 or CuCl_2 . The Cl_2 is dried and used for making (I) and (III). A. R. P.

Purification of sulphur. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 409,055, 21.11.32).—Org. impurities, that volatilise with difficulty, are removed by treating the fused S for 1½ hr. with superheated steam at 150°/110 mm. W. J. W.

Manufacture of pure sulphur. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 409,098, 23.1.33. Addn. to B.P. 385,352; B., 1933, 189).—Residual SO_2 in the S solution after treatment with the purifying agents is removed by passing the solution through a layer of slightly moistened CaO . W. J. W.

Sulphur burner. L. GILLET, Assr. to GEN. CHEM. Co. (U.S.P. 1,928,099, 26.9.33. Appl., 28.6.29).—A reservoir (A) of molten raw S is maintained above a combustion chamber (C), or series of chambers, which in turn is above a molten pool of comparatively pure S in a sublimation chamber (B). A is heated by heat from C and the molten S runs into B, where it is sublimed by the combustion of a limited amount of air bubbled into it; the S vapour passes into C, to the lower part of which the major portion of air is admitted at a lower pressure than in B. B. M. V.

Recovery of free chlorine from chlorides. L. ROSENSTEIN, Assr. to SHELL DEVELOPMENT Co. (U.S.P. 1,930,664, 17.10.33. Appl., 4.9.31).— KCl is treated with an excess of N_2O_4 or HNO_3 to produce KNO_3 and NOCl ; the latter on being passed into conc. H_2SO_4 reacts thus: $2\text{NOCl} + 4\text{H}_2\text{SO}_4 + 2\text{NO}_2 = 4\text{HSO}_4\cdot\text{NO} + \text{Cl}_2 + 2\text{H}_2\text{O}$. On heating the acid solution H_2SO_4 is regenerated, and the N_2O_3 evolved is reconverted into N_2O_4 by admixture with air. A. R. P.

Drying of chlorine. C. S. LYKES, Assr. to SOLVAY PROCESS Co. (U.S.P. 1,930,526, 17.10.33. Appl., 21.5.29).

— Cl_2 saturated with H_2O at 40—70° is cooled to 20° by passing it up a packed tower down which H_2O is sprayed, and the effluent gas is passed through conc. H_2SO_4 . A. R. P.

Recovery of bromine and iodine [from mineral waters and the like] conjointly. C. W. JONES, Assr. to JONES CHEM. Co., Inc. (U.S.P. 1,927,663, 19.9.33. Appl., 23.11.31).—The solution is treated with an excess of aq. Ag_2SO_4 to ppt. AgI - AgBr mixture (I), from which the I and Br are recovered by distillation with H_2SO_4 , whereby the Ag_2SO_4 is regenerated. The filtrate from (I) is treated with H_2S to recover Ag_2S , which is heated with H_2SO_4 for re-use. A. R. P.

Preparation of radioactive substances [radium and mesothorium]. K. WEIL and K. PETERS (U.S.P. 1,927,726, 19.9.33. Appl., 17.12.30. Ger., 20.12.29).—Mixed Ba-Ra carbonates are heated at 800° for several hr. in vac. and the residue is leached with H_2O , which removes BaO and leaves RaCO_3 insol. A. R. P.

Producing fine ppts.—See I. Products from gases containing CH_4 . Treating tar-acid liquor. Treating ammoniacal liquor.—See II. MgCO_3 for heat-insulation.—See IX. Steel for H_2 -reaction chambers. NH_3 -oxidation catalyst.—See X. Electrodes for alkali hydroxide manufacture. Bauxite insulating material.—See XI. Pigments. Fe colours. Paris-green.—See XIII. Fertilisers. Insecticides.—See XVI.

VIII.—GLASS; CERAMICS.

Effect of the anion of the raw material on properties of glass. III. K. NAKANISHI (J. Soc. Chem. Ind., Japan, 1934, 37, 64—65 B; cf. B., 1932, 641).—A more durable glass is made by replacing the Na_2CO_3 of the batch by Na_2SO_4 or by adding a small amount of S (5 pts./1000 pts. of sand). The increase in durability is due to presence of SO_3 in the glass. J. A. S.

Application of Stokes' law in the determination of the absolute viscosity of glass. R. G. HUNTER (J. Amer. Ceram. Soc., 1934, 17, 121—127).—A modified form of Ladenburg's wall-correction factor has been applied to the velocity of fall (V) of a Pt sphere. The apparatus (described in detail) utilised 2 radio-frequency heterodyne "search coils" to measure V . Reproducible results were obtained with 4 different glasses. J. A. S.

Armoured safety glass. F. OHL (Z. ges. Schiess- u. Sprengstoffw., 1934, 29, 109—111).—In contrast to ordinary safety glass, the armoured type comprises five or more sheets of glass varying in thickness from 18—24 mm., interleaved with the usual cellulose derivatives or synthetic resins. Its uses and the method of testing it are described. W. J. W.

Manufacture and application of enamels. L. VIELHABER (Chem.-Ztg., 1934, 58, 444—445).—A review of recent progress.

Drying of solids. III, IV. Clays. S. KAMEI and T. SEDOHARA (J. Soc. Chem. Ind., Japan, 1934, 37, 68—77 B).—Blocks of clay, previously kneaded with H_2O , were dried with two faces exposed to a current of air, and measurements made of wet- and dry-bulb temp. of the air, temp. of the clay, contraction, H_2O

content, and rate of drying (I). (I) is const. if the excess H_2O over the equilibrium amount is not too low (< 10 – 20%). During this time (I) increases with rising temp., increasing air velocity, and decreasing humidity, but when the clay is nearly dry (I) is less affected by external conditions. Initially the linear dimensions decrease proportionally as the H_2O content decreases. A. G.

Spalling [of clay]. F. W. PRESTON and H. E. WHITE (J. Amer. Ceram. Soc., 1934, 17, 137–144).—When a clay sphere is placed suddenly in a red-hot furnace, spalls (in the form of circular discs) fly off after definite and consistent intervals of time (t). The thickness of the spall is proportional to \sqrt{t} and $1/T_{\text{abs}}$.⁴ The probable controlling factors are the thermal diffusivity and radiation, respectively. The mechanism of spalling is theoretically examined in detail. Tests on a series of spheres containing varying amounts of finely-ground SiC showed that thermal diffusivity is an important factor. A modified formula for resistance to thermal shock is given. J. A. S.

Alkaline casting slip. I. H. W. WEBB [with H. SANDLAND, R. LOCKETT, J. E. BROUGH, and S. B. JOHNSON] (Trans. Ceram. Soc., 1934, 33, 129–167).—The mechanism of the deflocculation (I) and the flocculation (II) of clays, the action of protective colloids (III) present in, or added to, clays (*e.g.*, lignin, humus, colloidal SiO_2) in preventing (II), and the nature, action, and changes during storage of the common deflocculants (D) soda ash (IV) and Na silicate (V), are discussed. Experiments with slips of commercial pint wt. (*i.e.*, < 33 oz. per pint) are described which show that the (I) of earthenware and bone-china bodies appears to be markedly influenced by (III), which may be either present in the clay or added with the D . The presence or absence of such (III) may determine the type of (V), or, alternatively, the proportion of (IV) to (V) to be used. The deflocculating action of a (V) ($SiO_2:Na_2O = 4.0$), of Na_2SiO_3 , and of Na tannate (from tan-bark liquor) was compared; the last was very effective for bone china. The effect of alkaline scrap in the clay used for casting slip is described and discussed. The sp. differences in casting rate, tensile strength, and hardness of cast, found on comparing the effect of (IV) and (V) as D for earthenware bodies, and the variation in casting rate and tensile strength of the cast with the fluidity of the slip, are described. A. L. R.

Effect of mechanical pressure on the drying and firing properties of typical ceramic bodies. A. E. R. WESTMAN (J. Amer. Ceram. Soc., 1934, 17, 128–134).—Discs ($2\frac{3}{4}$ in. diam. \times $1\frac{1}{2}$ in.) of sanitary and semi-vitreous ware, electrical porcelain, glass-pot, sewer-pipe, and chemical stoneware bodies were studied after "permeable pressing" at 8280 lb./sq. in. Drying shrinkage was eliminated, firing shrinkage halved, and the total shrinkage reduced by $\frac{1}{2}$ – $\frac{3}{8}$. Most discs were fired successfully, but some cracked during drying, probably due to thermal shock. A longer firing schedule was necessary owing to the denser structure. The pressing time (t) varied from body to body, and t for any one body depended roughly on the square of the initial thickness. J. A. S.

Acid-resistant earthenware and high-quality refractory products from Drushkovka clays. P. P. BUDNIKOV (Ukrain. Chem. J., 1933, 8, 260–266).—Products from Drushkovka clays are superior in quality to those from Tschasov Jar clays. R. T.

Relation between uncombined quartz and thermal expansion of ceramic bodies. W. R. MORGAN (J. Amer. Ceram. Soc., 1934, 17, 117–121).—Bodies of 15 shales and low-grade fireclays fired at cones 06–7 were examined for thermal expansion and, petrographically, for free quartz (Q) content. The expansion at 260° (0.1%) was practically independent of the firing temp. from cones 06–5 and no cristobalite (C) was present. Above cone 5 C began to be formed by dissociation of the clay. No inversion of the Q was found below cones 10–12. The body containing a small amount of Q had a high C expansion and *vice versa*. The expansion from 565° to 620° was roughly proportional to the Q content. J. A. S.

Rapid analysis of siliceous refractories. S. S. COLE and S. R. SCHOLES (J. Amer. Ceram. Soc., 1934, 17, 134–136).—The SiO_2 is removed by treatment with $HF + H_2SO_4$ and the residue is ignited at 800 – 900° and weighed as ($R_2O_3 +$ sulphates). R_2O_3 , CaO, and MgO are determined by standard methods and the alkali is calc. from the wt. of the ignited residue. SiO_2 is found by difference. J. A. S.

Clay of Portland cement.—See IX. **Electrical heating.**—See XI.

PATENTS.

Rotary glass-melting furnace. W. A. MORTON and P. L. GEER, Assrs. to AMCO, INC. (U.S.P. 1,928,598, 26.9.33. Appl., 15.1.30).—A circular bath is rotated about a vertical axis, the raw material being charged at one point in the circumference and the molten glass discharged through a downwardly directed central orifice. B. M. V.

Glass furnaces. E. FÉCHOZ (B.P. 409,038, 17.11.31. Fr., 17.11.31).—An attachment to a furnace (F) from which the glass (I) can be drawn for working is described. The (I) in the reservoir (R) is kept in circulation by mechanical means, and R can be externally heated. Flow of (I) is always from under the surface of F , and the surplus is returned on to the surface of the (I) in F . Freedom from bubbles etc. is claimed. A. WE.

Tempering of glass. PILKINGTON BROS., LTD., and J. MEKLE (B.P. 408,648, 13.10.32).—During the tempering operation a glass plate is held stationary in a vertical position and a furnace and cooling jacket are raised into position in turn. B. M. V.

Optical glasses. JENAER GLASWERK SCHOTT & GEN. (B.P. 408,993, 22.7.32. Ger., 29.7.31).—The durability of glasses containing $> 55\%$ of SiO_2 , $> 25\%$ of ZnO, PbO, etc., and $< 10\%$ of CaO etc. (*i.e.*, lying on the high- n_D side of the line passing through the points $n_D = 1.54$, $v = 62$ and $n_D = 1.64$, $v = 35$) is greatly increased by the addition of 0.5 – 20% of TiO_2 . *E.g.*, Na_2O 0.5, K_2O 1.0, PbO 62.0, As_2O_3 0.3, SiO_2 31.2, TiO_2 5.0%. J. A. S.

Laminated [safety] glass. J. G. DAVIDSON, Assr. to CARBIDE & CARBON CHEMICALS CORP. (U.S.P. 1,929,352,

3.10.33. Appl., 28.7.28).—The laminations are joined together with a film of a polymerisation product of vinyl acetate, formate, propionate, or butyrate, with or without other polymerised products. A. R. P.

Production of white clouded enamel and glazes. I. KREIDL (B.P. 409,597, 31.10.33. Austr., 28.11.32).—The lustre of gas-clouded enamels is enhanced by adding to the mill 0.05–0.2% of NH_4Cl or other substances yielding HCl . J. A. S.

Heat treatment of ceramic materials. J. HARRINGTON, Assr. to J. HARRINGTON Co. (U.S.P. 1,927,830, 26.9.33. Appl., 6.10.30).—A beehive kiln is provided with a separate forced-draught furnace the thickness of the bed of fuel in which is varied to vary the conditions in the kiln. B. M. V.

Manufacture of refractory materials. G. E. SEIL (B.P. 409,130, 10.4.33. U.S., 28.10.32).—A mixture of $>12\frac{1}{2}\%$ (17–25 wt.%) of chromite and dead-burnt MgO is pre-fired at approx. 1650° , ground, tempered, shaped, and fired. The product is neutral, highly refractory, non-spalling, and has a low thermal expansion and conductivity. J. A. S.

Manufacture of abrasive materials. CARBORUNDUM Co., LTD. (B.P. 409,315, 21.10.32. U.S., 23.10.31).—A mixture of Al_2O_3 and a flux (e.g., bauxite 70, CaO 10, SiO_2 20 pts.) is melted and allowed to cool so that a mass containing a preponderance of $\alpha\text{-Al}_2\text{O}_3$ is formed. The article may be shaped by casting the fused mass or by pressing and firing the crushed and graded material. The flux may consist of SiO_2 , CaO , MgO , Na_2O , K_2O , etc. J. A. S.

Manufacture of abrasive articles. CARBORUNDUM Co., LTD. (B.P. 408,971, 18.10.32. U.S., 19.10.31).—The support, e.g., a steel spindle, to which an abrasive wheel is cemented is coated with Cu or Cd to secure better adhesion. C. A. K.

Electric furnace [for glass].—See XI.

IX.—BUILDING MATERIALS.

Clay of Portland cement. V. Technical burning of tuff. VI. Effect of degree of burning of tuff on burning and quality of cement. Y. SANADA (J. Soc. Chem. Ind., Japan, 1934, 37, 62B, 62–64B; cf. B., 1934, 322).—V. In a shaft kiln (80×280 cm., output 120 kg./hr.) the optimum proportion of coal shale to tuff was 1 : 4.

VI. Tests were made with over-burnt, well-burnt (I), and under-burnt tuff. The quality and output of the cement were optimal with (I). J. A. S.

Hydration of Portland cement. XI, XII. Hydration of calcium silicate in Portland cement. K. KOYANAGI (J. Soc. Chem. Ind., Japan, 1934, 37, 101–107B; cf. B., 1932, 147).—Chemical analysis showed that $\text{Ca}(\text{OH})_2$ and CaO , SiO_2 , $2\text{H}_2\text{O}$ are formed by the hydrolysis of 3CaO , SiO_2 . J. A. S.

Alkalinity in the system Portland cement-water. T. MAEDA and R. SYŌZI (Sci. Papers Inst. Phys. Chem. Res., Tokyo, 1934, 24, 49–55).—The $[\text{Na}^+]$, $[\text{K}^+]$, and $[\text{SO}_4^{2-}]$ of the liquid phase of Portland cement 2 hr. after mixing vary directly, and the $[\text{Ca}^{2+}]$ varies inversely, with the $[\text{OH}^-]$. The fall in $[\text{SO}_4^{2-}]$ takes place in two

stages, corresponding with formation of $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$ and of Ca sulphoaluminates. R. T.

Acid-resisting stoneware coatings. L. KÖGEL (Chem. Fabr., 1934, 7, 77–82).—The selection of materials for, and the manufacture, testing, and applications of, stoneware (particularly in the form of plates 20–65 mm. thick) for use in chemical plant are discussed, and a description is given of a complete HNO_3 absorption plant constructed almost entirely of this material. H. F. G.

Effect of inorganic salts on the swelling and shrinking of wood. A. J. STAMM (J. Amer. Chem. Soc., 1934, 56, 1195–1204).—Sections of wood (Sitka spruce; white pine), previously swollen in H_2O , undergo further swelling in saturated salt solutions (18 studied). The increase in tangential and volumetric swelling is of the same order as the solubility (mol.-equivs. per kg. of solvent) of the salt, the fractional vol. of the salt solution, the increasing surface tension of the solutions, and the decreasing v.p. The p_{H} of the solution has practically no effect except at >10 . When dry wood is used, swelling occurs to about the same extent but at a much slower rate. Immersion of the salt-swollen material in H_2O gives the original material (provided the salts are not hydrolysed). The effect of the adsorbed salt on the subsequent shrinking when the specimens are dried at room temp. over P_2O_5 and then at 115° (oven) is investigated. In general, the more sol. salts retard shrinking to the greatest extent; an equation is developed for calculation of the shrinkage. The amount of shrinking of the salt-swollen wood at different R.H. is also determined. H. B.

Erratum.—On p. 453, col. 2, line 29, for O. MAASS read G. R. LUSBY and O. MAASS.

Rotary kilns.—See I. Al paint [for plaster etc.]. Paint failures on new plaster. Wood stain.—See XIII.

PATENTS.

Manufacture of cement. SOC. ANON. DES CIMENTS FRANÇ. ET DES PORTLAND DE BOULOGNE-SUR-MER ET COMP. DES PORTLAND DE DESVRES (B.P. 409,166, 10.7.33. Fr., 8.7.32).—Dark-coloured Portland cements are produced by raising the MgO content to 0.85–2% by adding, e.g., dolomite. Metallic salts or oxides may also be added to the raw materials. C. A. K.

Manufacture of cement or like hydraulic binders. C. J. CHOREMI (B.P. 409,511, 10.5.33. Switz., 20.9.32).—4–18% of CaO is mixed with puzzuolanic material preferably calcined to $<600^\circ$ and pulverised to pass a 30-mesh/cm. sieve. Additive materials may include 2% of $\text{CaO}(\text{OH})\text{Cl}$, $>0.5\%$ of H_2O to <1 of the compounds MnO , K_2CO_3 , CuSO_4 , KMnO_4 , or CaF_2 , and $<5\%$ of gypsum. C. A. K.

Production of hydraulic cement. G. O. CASE, and CARBO-LIME & CEMENT Co., LTD. (B.P. 409,120, 14.3.33).— CaCO_3 is crushed to pass through a 1-in. sieve, heated until it contains only 0.5% of moisture, ground (to pass 8-mesh), added to Portland cement (to pass 76-mesh), and the mixture ground to pass 50-mesh, the proportion of dry CaCO_3 to ground clinker in the

mixture being approx. 8 pts. of CaCO_3 to 1 pt. of "free" CaO in the clinker. C. A. K.

Composition for waterproofing cement or plaster materials. J. MACN. WILSON and D. G. GOW (B.P. 409,147, 10.6.33).—A mixture of size (1 pt.), soap (4 pts.), and H_2O (20 pts.), alone or with aq. NH_3 or KMnO_4 , is used. C. A. K.

Manufacture of light-weight concrete of high strength. E. B. BJORKMAN (B.P. 409,530, 8.7.33. Can., 15.7.32).—Molten blast-furnace slag is disintegrated mechanically to < 0.5 in. size, and part of the fraction < 0.125 in. is pulverised. Portland cement is mixed with the combined grades of slag, with or without other fillers. C. A. K.

Production of artificial stone compositions. SYNTHOGEL GES.M.B.H. (B.P. 409,592, 16.10.33. Ger., 17.10.32).—A dil. solution of H_2SiF_6 which has been rendered alkaline by means of NaOH is used for mixing the cement materials. A colloidal gel of $\text{Si}(\text{OH})_4$ is thus formed. C. A. K.

Manufacture of heat-insulating product. E. R. POWELL, Assr. to BANNER ROCK CORP. (U.S.P. 1,928,264, 26.9.33. Appl., 16.1.28. Renewed 10.10.32).—Mineral wool is blown, together with an adhesive, in such a way that the fibres lie mostly in horizontal planes, and the felted mass is compacted to form a block or sheet, preferably while travelling on a conveyor and by rollers in stages so as to form successive strata. B. M. V.

Utilisation of the trimmings obtained from the manufacture of basic magnesium carbonate heat-insulating materials. R. B. CROWELL and S. R. EBE, Assrs. to AMER. SOLVENTS & CHEM. CORP. (U.S.P. 1,927,602, 19.9.33. Appl., 10.11.28).—The powdered trimmings [asbestos (I) and basic MgCO_3 (II)] are mixed with H_2O (24 lb. per gal.) and the suspension is treated with CO_2 at 80–85 lb. per sq. in. to form aq. $\text{Mg}(\text{HCO}_3)_2$. (II) is then regenerated by addition of excess of MgO and passage of more CO_2 , or simply by blowing air through the solution with or without prefiltration of (I). A. R. P.

Paving composition. G. H. ALVEY, Assr. to UVALDE ROCK ASPHALT Co. (U.S.P. 1,928,303, 26.9.33. Appl., 9.3.32).—A composition, compressible when cold, is formed from mineral aggregate (preheated to 370° and cooled), a bitumen-in- H_2O emulsion, and additional pulverised bitumen filler, the mixing being effected with, if desired, additional H_2O and slight heating. B. M. V.

[Lacquered] wood article. C. ELLIS, Assr. to ELLIS-FOSTER Co. (U.S.P. 1,927,086, 19.9.33. Appl., 13.3.26).—The articles are coated with a mixture of nitrocellulose lacquer and a glycerol-phthalic anhydride resin. A. R. P.

Tunnel furnaces for cement.—See I.

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

Mineralogical and geochemical prognoses. P. MURZAJEV (Compt. rend. Acad. Sci. U.R.S.S., 1934, 2, 56–60).—The industrial val. of a mineral deposit can be predicted if the processes attending its formation, and its subsequent history, are accurately diagnosed. A. J. M.

Behaviour of sulphur in open-hearth furnace gases. E. MAURER and W. BISCHOF (Iron & Steel Inst., May, 1934. Advance copy, 21 pp.).—The physico-chemical equilibria for the reactions (I) $\text{FeS} + \text{H}_2 \rightleftharpoons \text{Fe} + \text{H}_2\text{S}$ and (II) $\text{FeS} + \text{O}_2 \rightleftharpoons \text{Fe} + \text{SO}_2$ have been determined for liquid steel with a high S content, and the distribution of S between gas and metal for low S contents has been determined under manufacturing conditions for steel in the open-hearth furnace; the results show that reaction (II) governs the distribution of the S. An expression is derived for determining the influence of the gas composition at the furnace ports in the course of desulphurisation, and its utility in practice is illustrated. A. R. P.

Experimental enquiry into the interactions of gases and ore in the blast furnace. III. Comparative testing of iron ores. IV. Equilibria and velocities in ore reduction. W. A. BONE, H. L. SAUNDERS, and (III) N. CALVERT, (IV) J. E. RUSHBROOKE (Iron & Steel Inst., May, 1934. Advance copies, [III] 14 pp., [IV] 26 pp.; cf. B., 1931, 115).—III. The comparative reducibility of Fe ores by blast-furnace gas may be determined (i) by measuring the rate of C deposition at 450° in an atm. of CO_2 , i.e., the fall in pressure due to the reaction $2\text{CO} \rightleftharpoons \text{C} + \text{CO}_2$, and (ii) by measuring the rate of reduction of (a) a standard vol. of ore, or (b) a quantity of ore containing a standard wt. of Fe_2O_3 , by CO at 750° . Apparatus for and methods of making the tests are described and characteristic curves for 5 types of ore are shown.

IV. Determination of the equilibria in the system $\text{Fe}_x\text{O}_y + \text{CO} \rightleftharpoons \text{Fe}_x\text{O}_{y-1} + \text{CO}_2$ at 1150° shows that reduction proceeds in three stages: $\text{Fe}_2\text{O}_3 \rightarrow \text{Fe}_3\text{O}_4 \rightarrow \text{FeO} \rightarrow \text{Fe}$; similar results are obtained for H_2 reduction of Fe ore. In both cases the first stage is irreversible and the other two stages are reversible. At a given temp. the rate (R) of reduction diminishes with an increase in the CO_2 content of the gas and in the % of ore reduced. With const. gas speeds, % CO_2 in the gas, and degree of ore reduction, R is smaller at 750° than at 650° or 850° ; the bearing of this fact on the operation of the blast furnace is discussed. A. R. P.

Recrystallisation of soft iron containing silicon. A. WIMMER and P. WERTHEBACH (Stahl u. Eisen, 1934, 54, 385–392).—Sheets of soft Fe with 0.02% C and 1–4% Si were cold-rolled to 0–20% reduction and the temp. of recrystallisation (T) was determined. T is lower the greater is R ; in the alloy with 1.9% Si the max. grain size (G) is obtained at 850 – 900° with $R = 3$ –4%. With increasing Si, G_{max} is obtained with smaller R and with 4% Si a second grain growth occurs at $> 1000^\circ$. Recrystallisation diagrams are given from which the conditions necessary for max. grain growth for any Si steel within the above range can be ascertained; under the correct conditions crystals of several sq. cm. in area can be obtained in transformer steels, whereby the watt losses are considerably reduced. A. R. P.

Present position of malleable cast iron. K. ROESCH (Stahl u. Eisen, 1934, 54, 305–310).—Recent advances in the manufacture of malleable Fe castings are reviewed and the properties of modern

grey and white malleable Fe are summarised. Improvements in melting and annealing technique have resulted in greater strength and toughness being obtained. A. R. P.

Change of properties of die steels due to heat treatment. T. MURAKAMI and A. HATTA (Sci. Rep. Tôhoku, 1934, 23, 1—44).—The change of transformation points (T) due to cooling rate and heating temp. has been determined by magnetic analysis and differential dilatometry in the following commercial die steels: (1) non-alloying high-C, (2) low-Cr, high-C, (3—5) high-Cr, high-C, (6) W—Cr. Hardness (H) and abrasion-resistance (A) have been measured after several heat-treatments; impact and impact-hardness tests carried out at high temp.; and the change of structure due to heat-treatment has been observed microscopically. Marked changes with cooling rate take place in the T of (3—6), but not in the others. Differences in H between the different specimens is considerable when air-cooled, but not when furnace-cooled. (3—6) are readily hardened by air-cooling from above 900°, and (3—5) after oil-quenching, especially if heated to 1000°. The H of (1) after oil-quenching is < that of the other steels. The H of (2) and (6) decreases considerably as the temp. at which quenching takes place rises from 900° to 1100°, owing to increase in the residual austenite. Steels with a low H val. show a secondary hardening on tempering. (3—5) show marked secondary hardening by tempering of specimens oil-quenched from 1150°. Steels furnace-cooled from 900° show a min. H when annealed at 750° and furnace-cooled. A is greatest in oil-quenched steels and (6) is most resistant. The H of (3—5) is generally high. (6) oil-quenched gives a high val. in the impact test, having a max. at 400°. The vals. are low for (3—5), but increase with rise in temp. In all air-cooled specimens the vals. increase rapidly with rise in temp. M. S. B.

Effects of cold-rolling on intergranular corrosion of the 18 : 8 stainless steels. E. C. ROLLASON (Iron & Steel Inst., May, 1934. Advance copy, 8 pp.).—Intergranular corrosion (I) of 18 : 8 Cr—Ni steels containing > 0.02% C can be prevented by cold-working to 30—50% reduction and annealing at 700—850° to produce a fine-grained structure in which the excess C is pptd. in a spheroidised state uniformly throughout the matrix; much of the corrosion-resistance is lost when steel treated in this way is subsequently welded, especially when the C exceeds 0.15%. (I) can also be prevented by addition of Si and Mo, which cause the carbides to ppt. in the ferrite as isolated particles. Addition of Ti, W, Mo, and Nb and annealing at 900—1000° results in the production of stable carbides which do not promote (I). A. R. P.

Effect of steel composition on work consumption and resistance to deformation in rolling [steel] ingots. H. HOFF and T. DAHL (Stahl u. Eisen, 1934, 54, 277—281).—Tests were made on the following steels (A) with C 0.11, Si 0.11, and Mn 0.47%, (B) C 0.14, Si 0.47, Mn 0.38, Cr 0.84, and Mo 0.51%, and (C) C 0.1, Si 0.5, Mn 0.46, Cr 17.6, Ni 8.8, and Ti

0.59%. The total work expended in rolling B was 10%, and in rolling C 23%, > in rolling A . The resistance to deformation of B was 10%, and of C 45%, > that of A . A. R. P.

Energy consumption in rolling mild-steel sheets and its dependence on the thickness and silicon content. A. WEYEL (Stahl u. Eisen, 1934, 54, 281—287).—The energy consumption in hot-rolling mild-steel plates rises with the Si content to 1.2%, then remains const. to about 2.4% Si, and finally falls again to about 4% Si, at which composition it is slightly < that for soft Fe. A. R. P.

Ageing changes in nitrided steel. E. G. HERBERT (Iron & Steel Inst., May, 1934. Advance copy, 4 pp.).—When nitrided steel is heated at 150° periodic fluctuations occur in the diamond time hardness and, on cooling, these fluctuations tend to persist, but gradually slow down and eventually damp out. Similar fluctuations can be induced by violent magnetic disturbance or by cold-work; in all cases they are susceptible to the influence of magnetism and can be stabilised by the application of a const. magnetic field applied at a max. or min. phase. A. R. P.

Dendritic segregation in steel ingots. L. NORTHCOTT (Iron & Steel Inst., May, 1934. Advance copy, 7 pp.).—Chemical and microscopical evidence indicates that the dendritic structure found in steel ingots is due to segregation of P; it persists after decarburisation of the steel in H_2 at 1000—1100°, but disappears after treatment of the steel with fused KOH, which has a powerful dephosphorising action on steel at 850—1100°. A. R. P.

Effect of rate of cooling in quenching on the mechanical properties of special steels. B. LIVSHITZ (Stal, 1933, 3, No. 6, 51—63).—With Cr and Ni—Cr steels, for the same final hardness rapid quenching followed by drawing gives greater ductility than slow quenching, the difference increasing as the free ferrite in the annealed specimen increases. CH. ABS.

Fracture of the tyre of a locomotive wheel. E. JIMENO and J. MEHREN (Anal. Fis. Quím., 1933, 31, 537—544).—Incorrect thermal treatment having been found to be the cause of the fracture, it is suggested that certain of the Cr and Cr—Ni steels should not be used for locomotive tyres, owing to their sensitivity to variations of heat-treatment. H. F. G.

Inhibitors for use in the acid pickling [of steel]. E. JIMENO and I. GRIFOLL (Anal. Fis. Quím., 1933, 31, 582—593).—The influence of a no. of inhibitors on the rate of attack of a steel surface by $N-H_2SO_4$ has been studied. Stable substances which readily form colloidal solutions are the most useful for adding to acid pickling baths, but oily substances which in themselves are effective do not, in general, form stable dispersions in aq. solutions. Steel treated in a bath containing an inhibitor presents a uniform appearance, without pitting. H. F. G.

Tin-iron alloy in tinplate, with notes on some imperfections. W. E. HOARE (Iron & Steel Inst., May, 1934. Advance copy, 12 pp.).—Micrographic

examination of Sn plate (I) after various methods of polishing and etching has shown that the only compound present is FeSn_2 if the plate has been made at $< 496^\circ$. Annealing increases the size of the FeSn_2 crystals and the tendency of the plate to crack on bending. Characteristic faults in (I) are illustrated and suggestions are made as to their causes. The hot- H_2O test is preferred to the $\text{K}_3\text{Fe}(\text{CN})_6$ test for porosity. A. R. P.

Periodic structures in metals and alloys. L. NORRHOFF (Iron & Steel Inst., May, 1934. Advance copy, 9 pp.).—Evidence is adduced which indicates that the banded structure which occurs in many ingots of steel and of certain Cu alloys is due to periodic crystallisation which proceeds as follows. The melt adjacent to the primary crystals (I) undergoes a rise in temp. due to the latent heat of solidification of (I), and the proportion of low-melting constituents in it increases, thereby lowering the f.p.; meanwhile metal further away from (I) starts to crystallise spontaneously and the crystals grow, causing a repetition of the above effect. Hence on plotting the composition of the layers against the distance from the cooling surface a step-like curve is obtained with periodic sharp peaks followed by gradual slopes to minima. Supercooling of the melt is essential to obtain this effect since it permits crystallisation to occur with rising temp. of the still fluid portion. A. R. P.

Wear of metals by fractional oxidation. M. FINK and U. HOFMANN (Chem. Fabr., 1934, 7, 96).—A brief account is given of the influence of O_2 on the rate of abrasive wear of Fe, Cu, Ni, etc.; lubricating oil does not obviate the effect entirely, but the use of colloidal graphite in the oil is advantageous. Failure under sustained loading may be due to deformation of the crystals and the subsequent progress of oxidation along the crystal faces and into the body of the metal. H. F. G.

Corrosion of metals by phenols. F. H. RHODES, P. A. RIEDEL, and V. K. HENDRICKS (Ind. Eng. Chem., 1934, 26, 533—534).—Quant. tests of corrosion of metals by PhOH and *o*- and *m*-cresols showed low corrosion rates at 25° (except with Pb), but in most cases discoloration of the liquid occurred. H_2O reduces the corrosion. Dry vapours of tar acids react rapidly with Al and also corrode Pb and Zn quickly. H_2O vapour greatly decreases the attack on these three metals, in the case of Al by formation of a coating of Al_2O_3 . Ni- or Cr-Ni steel is likely to be suitable for dry-distillation of tar acids, but Pb and Cu are not suitable. C. I.

Usefulness of corrosion tests. II. Assessment of corrosion damage. A. S. WHITE (Ind. Chem., 1934, 10, 170—172; cf. B., 1934, 407).—Corrosion-time curves can give useful information on the formation of protective coatings and the general behaviour of a metal, but may give a false idea of the measure of damage due to local action. There is no possibility of obtaining a universal "corrosion factor," and the most satisfactory inferences are drawn from a correlation of measurements of the change in physical properties as well as loss of wt. C. A. K.

Rapid determination of tin, copper, and antimony in babbitt metal. I. V. TANANAEV (J. Appl.

Chem. Russ., 1934, 7, 223—228).—1 g. of metal is dissolved in 40 ml. of conc. HCl in presence of KClO_3 , and the vol. is brought to 100 ml. by adding HCl and H_2O , so that the final solution (I) contains 8N-HCl. Bi amalgam (II) is added to 20 ml. of (I) at 50° in an atm. of CO_2 , the solution is shaken until it becomes colourless, when it is rapidly separated from (II), and Cu^I is titrated with $M/60\text{-K}_2\text{Cr}_2\text{O}_7$ (NHPb₂ indicator). A second 20 ml. of (I) are heated with (II) at $60\text{--}80^\circ$ for 25—30 min., separated from excess of (II), and Cu^I and Sn^{II} are titrated as before. Sb is determined by dissolving 0.5 g. of metal in 15 ml. of boiling conc. H_2SO_4 , diluting to 30 ml., adding 10—15 ml. of conc. HCl, and boiling for 5 min. to eliminate SO_2 ; 25—30 ml. of H_2O are then added to the hot solution, which is titrated at $50\text{--}60^\circ$ with $M/60\text{-KBrO}_3$ (Me-orange indicator). R. T.

Recovery of zinc and lead from blast-furnace slag at Trail, B.C. G. E. MURRAY (Trans. Canad. Inst. Min. Met., 1934, 36, 75—103).—The Pb concentrates smelted in the blast furnace (I) average Pb 71, Zn 4.6, and Fe 5.2% and yield a slag (S) containing Pb 3.6, Zn 17.6, SiO_2 19.4, Fe 29.3, CaO 8.4, and Al_2O_3 3.9%. Hot S from (I) is tapped into two coal dust-fired storage reverberatories (II) in which a reducing flame is maintained to prevent separation of Fe_3O_4 ; from (II) S is intermittently tapped into the fuming furnace (III), 20 ft. long, 10 ft. wide, and 8 ft. high with an uptake flue (8 × 10 ft.) at the end opposite the intake, which delivers the gases and fume through brick flues to waste-heat boilers (IV), and thence through an economiser (V) to the bag-house (VI). (III) is fired through 35 tuyères in each side with an air-coal dust (C) mixture and the clean S from (III) (Zn 3.5, Pb 0.05%) is either discharged at the end of a blow to a granulating device or can be utilised for the production of a low-S pig Fe by smelting in a blast furnace. For a charge of 60 tons of S the blowing period is 135 min., the C consumption 15 tons, and the steam raised 7—8 lb. per lb. of C. With a daily tonnage of 570 about 120 tons of fume are collected, that in (IV) assaying Pb 19.3 and Zn 50.6%, that in (V) Pb 14.8 and Zn 61.4%, and that in (VI) Pb 10.4 and Zn 67.3%. The process has several advantages over the Waelz process, being much more economical in fuel and effecting more rapid elimination of Pb and Zn; it also effects important economies in the blast-furnace treatment of the Pb ore, since a much dirtier slag may be made, the CaO consumption is materially reduced, less coke is required, the furnaces run faster and more smoothly, and the combined recovery of values is considerably higher. A. R. P.

Rapid determination of silver in argentiferous galena. J. RANEDO and J. B. GONZALEZ (Anal. Fis. Quím., 1933, 31, 524—530).—The sample (3—5 g.) is treated with 15 c.c. of acid (200 c.c. of conc. HNO_3 , 55 c.c. of conc. H_2SO_4 , and 200 c.c. of H_2O) and when the reaction is apparently ended the mixture is heated until red fumes are no longer evolved. 40 c.c. of a 16.86% solution of KOH are added, and after dilution and filtration the Ag is determined colorimetrically. The determination requires < 1 hr. H. F. G.

Some [gold-]mill products under the microscope: determinative mineralogy. H. E. T. HAULTAIN and W. E. JOHNSTON (Trans. Canad. Inst. Min. Met., 1934, 36, 221—222).—On heating certain minerals on a quartz plate characteristic colours develop by which the minerals may be recognised under the microscope; thus Au tellurides yield "lakes" containing "islands" of Au, chalcopyrite becomes grey, pyrite develops a beautiful red colour, and Pb and Bi tellurides become grey when the plate is inverted over the flame, whilst pentlandite shows hair-like sprouts and globules.

A. R. P.

Is the gold in tellurides soluble in cyanide? H. E. T. HAULTAIN and W. E. JOHNSTON (Trans. Canad. Inst. Min. Met., 1934, 36, 217—220). **Gold tellurides are soluble in cyanide.** W. E. JOHNSTON (*Ibid.*, 224—225).—Au tellurides found in the Kirkland Lake district are fairly readily sol. in dil. aq. KCN. A. R. P.

Production of aluminium at Arvida, Quebec. A. W. WHITAKER, JUN. (Trans. Canad. Inst. Min. Met., 1934, 36, 408—427).—A brief account is given of the development of, and procedure adopted at, these works, with especial reference to the prep. of electrodes and of the electrolytic cells, the reduction of the Al_2O_3 , and the power supply.

A. R. P.

The "single-crystal" state of metals. (SIR) H. C. H. CARPENTER (Bull. Inst. Min. Met., 1934, No. 357, 13—34).—An address.

Use of single metal crystals for gramophone records. A. E. VAN ARKEL and A. T. VAN URK (Physica, 1934, 1, 425—426).—Gramophone records made from a single metal crystal, or a small no. of such crystals (*e.g.*, of Al), have the sound properties of an amorphous plate. Distortion effects due to crystal boundaries are eliminated.

H. J. E.

Manufacture of castings for the electroplating industry. G. C. PIERCE (J. Electrodep. Tech. Soc., 1934, 97—100).—Notes are given on the production of sound and clean brass and Fe castings for plating.

A. R. P.

Plating of castings. B. CAPLAN (J. Electrodep. Tech. Soc., 1934, 93—96).—Methods of cleaning cast and malleable Fe, bronze, and brass castings by grinding, polishing, and chemical and electrolytic processes are briefly described and a few notes on Ni- and Cr-plating are given.

A. R. P.

Nickel-chromium-plating technique. M. COOK and B. J. R. EVANS (J. Electrodep. Tech. Soc., 1934, 125—135).—Details are given of the procedure adopted in a large works for cleaning Fe and Cu alloy articles and plating them first with Ni and then with Cr. A. R. P.

Throwing power of zinc-plating solutions. I. Relation between current density and current efficiency of zinc sulphate solutions. M. NAKAJIMA (J. Electrochem. Assoc. Japan, 1934, 2, 19—25).—The effect of p_H on the conductivity becomes greater with decreasing $[ZnSO_4]$. At p_H 5.4 and 4.4 the deposit contains a basic salt. In 0.5*N* solution much basic salt was found at higher p_H and lower c.d., and the current efficiency was rapidly decreased with falling p_H ; in 1.5*N* and 2.5*N* solutions the amount of basic salt

was less and the fall in p_H did not greatly affect current efficiency. 1.5—2.5*N*- $ZnSO_4$ at p_H 3.4 and 1—3.5 amp. per sq. dm. is recommended. CH. ABS.

Electrodeposition of tin from sodium stannate solutions with the use of insoluble anodes. A. W. HOTHERSALL, S. G. CLARKE, and D. J. MACNAUGHTON (J. Electrodep. Tech. Soc., 1934, 101—124).—Smooth matt deposits of Sn up to 0.1 in. thick can be obtained from alkaline Na_2SnO_3 solutions in absence of Sn^{++} compounds, and, since Sn dissolves anodically chiefly in the Sn^{+} condition, insol. anodes must be used, sheet Ni or Fe being best. The best electrolyte contains 85 g. of Sn as Na_2SnO_3 and 15—20 g. of NaOH per litre; it is operated at 70—75° with 15—20 amp. per sq. ft. As the Sn is removed from the bath the current efficiency decreases, but the bath may be regenerated by anodic dissolution of Sn followed by anodic oxidation of the Sn^{+} to Sn^{++} by means of an insol. anode and a cathode in a porous cell. The free NaOH content of the bath can be determined by pptn. of the Sn as $BaSnO_3$ followed by acidimetric titration. Non-porous coatings on steel should be < 0.00075 in. thick. A. R. P.

Protection and decoration of aluminium and its alloys by anodic treatment. S. WERNICK (Ind. Chem., 1934, 10, 179—183).—An adequate protective finish on Al can be produced only by electrolytic or chemical methods. The thin oxide layer to which Al owes such immunity from corrosion is thickened by an anodic treatment of the metal in a suitable electrolyte, *e.g.*, chromates, sulphates, oxalates, and phosphates.

C. A. K.

Measuring the adherence of electrolytic deposits. P. JACQUET (Compt. rend., 1934, 198, 1313—1315).—The method described consists in measuring the wt. required to detach a strip of the plated metal of known size and thickness from the backing metal. Results are tabulated for deposits of Cu on Ni. (Cf. A., 1933, 458.)

W. R. A.

Na_2CO_3 cementation mixture. Re from molybdenites. [Products from] pitchblende.—See VII. **Electrical heating.**—See XI. **Basic Pb chromate [as anti-rust].**—See XIII.

PATENTS.

Metal-melting furnaces. D. TIMMINS (B.P. 408,960, 17.10.32).—A coke-fired crucible furnace (*F*), in which the height, but not the diam., can be increased at will by the addition of annular sections lined with refractory material, is claimed. Both the top cover of *F* and *F* itself are movable along a track. A. WE.

Sulphating the non-ferrous metals contained in ferruginous sulphide ores or sulphidic roasts. METALLGES. A.-G., and C. P. DEBUCH (B.P. 408,140, 29.8.33).—The ore is passed through a multiple-hearth roasting furnace and in the later stages of the roast flotation pyrites is blown on to the charge to maintain the temp. at sulphating point and to provide a catalyst (Fe_2O_3) for the formation of SO_3 from the roaster gases in this zone. A. R. P.

Continuous annealing of strip metal. J. R. COE, Assr. to AMER. BRASS CO. (U.S.P. 1,928,409, 26.9.33. Appl., 28.9.32).—Metal strip is passed at a const. rate

through an annealing furnace and at each end loops are formed in the strip to permit the slight delay necessary to detach and attach other strips. B. M. V.

Refining of iron. W. KLEPSCH (B.P. 408,237, 29.9.32).—Refining agents, e.g., Na_2CO_3 , KNO_3 , NaCl , CaF_2 , are blown into the blast furnace or cupola with the air during melting of the charge, and the slag is continuously and rapidly expelled through permanently open apertures above the tuyères. A. R. P.

Manufacture of cast [iron] products. D. S. CONNELLY and T. J. HAHN, Assrs. to WOOSTER PRODUCTS, INC. (U.S.P. 1,920,244, 1.8.33. Appl., 3.6.32).—The surface of the mould is sprinkled with a powdered, fusible, inorg. substance (I), then with a layer of abrasive (II) or wear-resisting substance, and the molten metal is allowed to flow across the mould from a feeder at one side. For the manufacture of stair treads of cast Fe (I) may be AlCl_3 , borax, or an alum, and (II) SiC or corundum. A. R. P.

Heat- and shock-resisting cast iron. S. W. EWING and H. A. SCHWARTZ, Assrs. to LINK-BELT CO. (U.S.P. 1,931,109, 17.10.33. Appl., 31.1.25).—Grate bars of malleable cast Fe are heated at $815\text{--}925^\circ$ until the Fe_3C is decomposed, cooled slowly to 705° , kept at this temp. for 10 hr., and then air-cooled to produce a structure consisting of nodular graphite in a ferrite-pearlite matrix. A. R. P.

[Copper]-iron alloys [with a high-resistance to corrosion]. AMER. ROLLING MILL CO. (B.P. 409,380, 31.10.32. U.S., 14.3.32).—The alloys are made from Fe low in C, P, and S by addition of $\geq 1 (0.5)\%$ Cu and $\text{Si} + \text{Ti} \geq 0.4 (0.2)\%$, the latter being $>$ that required to deoxidise the metal completely but $< 0.4 \times \%$ Cu. A. R. P.

Treatment of iron-silicon alloys and metal [transformer sheet] resulting therefrom. E. M. FREELAND (B.P. 408,949, 11.7.32).—Fe alloys with 1–6% Si and free from gas and non-metallic inclusions are hot-rolled at 815° , annealed, cold-rolled to $< 1 (5)\%$ reduction, and then re-annealed at 870° , whereby the magnetic permeability is increased by 10–30% and the watt loss appreciably reduced. A. R. P.

[Iron] welding electrode. D. L. MATHIAS, Assr. to WESTINGHOUSE ELECTRIC & MANUFACTURING CO. (U.S.P. 1,930,530, 17.10.33. Appl., 2.4.31).—Fe rod ($< 0.35\%$ C) is pickled in H_2SO_4 containing an inhibitor to remove scale and cause the Fe to occlude H_2 , then washed, coated with CaO , drawn to finished size, and again pickled to cause a further occlusion of H_2 . A. R. P.

Steel for hydrogen-reaction chambers. H. J. SCHIFFLER (B.P. 408,632, 12.10.32. Ger., 21.10.31).—Claim is made for steel containing $\text{Cr} \geq 18$, $\text{Mo} \geq 1.2$, $\text{V} \geq 0.6$, $\text{Ti} \geq 0.4$, $\text{Cu} \geq 3$, $\text{Be} \geq 0.3$, $\text{Ni} \geq 10$, $\text{Mn} \geq 2$, $\text{Si} \geq 3$, and $\text{W} \geq 1\%$, the sum of the C, O, S, and P being $< 0.12\%$ to prevent intercryst. breakdown when the metal is in contact with NH_3 at $400\text{--}500^\circ$ under pressure. A. R. P.

[Cobalt-molybdenum steel] alloys for manufacture of tools and tool parts. C. E. EVERY-CLAYTON. From STAHLWERKE RÖCHLING-BUDERUS A.-G. (B.P. 408,866, 4.9.33).—Claim is made for steels with $\text{Cr} 2.5\text{--}$

$9 (5)$, $\text{Mo} 6\text{--}20 (10)$, $\text{W} 3\text{--}10 (5)$, $\text{Co} 10\text{--}36 (20)$, $\text{V} 2\text{--}5 (3)$, $\text{Ta} 0.5\text{--}5 (2)$, and $\text{C} 0.73\text{--}2.33 (1.2)\%$.

A. R. P.

Steel alloys. F. KRUPP A.-G. (B.P. 409,411, 7.11.32. Ger., 11.11.31).—Steels capable of being pptn.-hardened contain $\text{C} 0.1\text{--}0.4$, $\text{Ti} 0.1\text{--}10$, $\text{Co} + \text{V} 1\text{--}25$, $\text{Si} 0\text{--}5\%$, and Mo , W , Cu , or B . A preferred alloy contains $\text{C} 0.22$, $\text{Si} 0.27$, $\text{Mn} 0.58$, $\text{W} 17.7$, $\text{Co} 24$, $\text{V} 1.7$, and $\text{Ti} 1.4\%$ cooled rapidly from 1250° and reheated at 600° .

A. R. P.

Steel and articles [rivets] made therefrom. A. B. KINZEL, Assr. to ELECTRO METALLURGY CO. (U.S.P. 1,929,554, 10.10.33. Appl., 9.6.31).—The steel contains $\text{Cr} 0.2\text{--}0.75 (0.5)$, $\text{Mn} 0.6\text{--}2.5 (1.1)$, $\text{Si} 0.2\text{--}2.5 (0.75)$, and $\text{C} < 0.1 (0.05)\%$.

A. R. P.

Production of magnetic materials [cobalt steels]. A. F. BANDUR and H. M. E. HEINICKE, Assrs. to WESTERN ELECTRIC CO., INC. (U.S.P. 1,930,919, 17.10.33. Appl., 10.9.30).—Magnet steel with 9–36% Co is heated for 1 hr. at 1150° and rolled hot, and this procedure repeated twice more; the steel is finally annealed at 930° and quenched in oil. A. R. P.

[Chromium-nickel steel] torsion spring for clocks, watches, etc. T. H. CHAMBERLAIN, Assr. to NEW HAVEN CLOCK CO. (U.S.P. 1,931,251, 17.10.33. Appl., 17.3.30).—A spring with a high elastic limit and ductility and a substantially uniform modulus of elasticity is made from a steel containing $\text{Ni} 34.5\text{--}37.5$, $\text{Cr} 11\text{--}13$, $\text{Mn} 0.6\text{--}1$, $\text{Si} 0.25\text{--}0.9$, $\text{C} 0.07\text{--}0.35\%$.

A. R. P.

Treatment of metals [e.g., steel or lead with sodium]. H. N. GILBERT, Assr. to E. I. DU PONT DE NEMOURS & CO. (U.S.P. 1,931,144, 17.10.33. Appl., 10.10.30).—S may be removed from molten steel by passing through it a current of N_2 which has been bubbled through Na at $750\text{--}850^\circ$. Na-Pb alloys can be made in a similar way.

A. R. P.

(A) **Deoxidation, (B) dephosphorisation, of steel.** SOC. D'ÉLECTROCHIM., D'ÉLECTROMÉTALL., ET DES ACIÉRIES ÉLECTR. D'UGINE (B.P. 408,253–4, [A] 30.6.32, [B] 29.7.32. It., [A] 20.7.31, [B] 31.8.31).—(A) O is removed from molten steel in an induction furnace by treating it with a fluid, acidic slag which dissolves oxides, e.g., $\text{SiO}_2 45\text{--}65 (55)$, $\text{Al}_2\text{O}_3 5\text{--}15 (15)$, $\text{CaO} 5\text{--}30 (10)$, and $\text{MgO} 4\text{--}25 (20)\%$ (cf. B.P. 404,300; B., 1934, 365). (B) P is removed by means of a fluid, basic slag, e.g., $\text{SiO}_2 2$, $\text{CaO} 65$, $\text{FeO} 20$, and $\text{CaF}_2 12\%$ (cf. B.P. 405,633; B., 1934, 457).

A. R. P.

Conversion of copper matte, crude copper, or copper alloys into fine copper. K. GOTTSCHALK (B.P. 408,850, 1.8.33).—The molten material is blown alternately with air and finely-divided coal or anthracite in an internally-heated, rotatable, horizontal drum furnace provided with tuyères arranged tangentially to the periphery. A. R. P.

Metallic material [for porous bearings]. W. G. CALKINS, Assr. to CHRYSLER CORP. (U.S.P. 1,927,626, 19.9.33. Appl., 9.11.29).—A porous bearing is formed by sintering pressed briquettes of, e.g., $\text{Cu} 80\text{--}85$, $\text{Fe} 5\text{--}10$, $\text{Sn} 10\%$ in a bath of cryolite at $>$ the m.p. of Cu and $<$ the m.p. of Fe. Stearic acid in a volatile

solvent may be used as a temporary binder and lubricant for briquetting purposes. B. M. V.

Treatment of copper alloys. Y. SHIRAIISHI, ASSR. to GEN. ELECTRIC Co. (U.S.P. 1,927,671, 19.9.33. Appl., 10.11.31. Jap., 30.12.30).—Brass or bronze is pickled in dil. H_2SO_4 , then washed with 0.5% aq. CrO_3 , and finally immersed in dil. aq. KCN containing soap until a bright surface is produced. A. R. P.

Acid-resisting [copper] alloy. R. HAZELTINE (U.S.P. 1,930,956, 17.10.33. Appl., 18.1.33).—Claim is made for an alloy of Cu with Si 1.5—5 (3) and Cr 0.1—1 (0.25)%; it has tensile strength 55,000—60,000 lb./sq. in., elongation 55%. A. R. P.

Non-ferrous [copper-nickel-tin] alloy. E. M. WISE, ASSR. to INTERNAT. NICKEL Co., INC. (U.S.P. 1,928,747, 3.10.33. Appl., 11.10.28).—The alloy contains Cu 60—90, Sn 2.5—12, and Ni 3.5—33%, the % Sn being = $4.9 + 0.00578(\% Ni - 13)^2$. Heat-treatment comprises homogenisation at 600—800°, quenching, and ageing at 200—500° to ppt. finely-dispersed Ni-Sn compound. A. R. P.

[Beryllium-copper-silver] alloy. R. H. LEACH, ASSR. to HANDY & HARMAN (U.S.P. 1,928,429, 26.9.33. Appl., 2.8.32).—Hardenable Ag alloys for contacts or electrode tips consist of Ag 50—90 (75), Be 0.1—2.5 (0.6—0.8), and Cu 49—7.5%. The heat-treatment comprises annealing for 2 hr. at 750—770°, quenching, and tempering for 2 hr. at 300—360°. A. R. P.

Soldering flux [for soft solder]. F. D. MCBRIDE, ASSR. to BERRY SOLDER Co., INC. (U.S.P. 1,929,895, 10.10.33. Appl., 24.2.32. Renewed 18.8.33).—Claim is made for a mixture of $(CH_2)_6N_4$ 1—25 (5)% and a monohydric alcohol (EtOH) ester of abietic acid 99—75 (95)%, with or without the addition of rosin. A. R. P.

Recovery of non-volatile metals from volatilisation furnace residues. A. PEARSON (B.P. 408,020, 10.10.32).—The material is mixed with C and passed through (a) a rotary volatilising furnace in which Zn and other volatile metals are removed at 1100°, (b) a sloping zone in which reducing conditions are maintained by means of oil burners, and (c) a rotary-drum furnace heated at $> 1400^\circ$ in which the non-volatile metals, e.g., Fe, Cu, Ni, are liquated from the sintered gangue as an alloy or matte. A. R. P.

Die-cast zinc-base alloy products. J. R. FREEMAN, JUN., ASSR. to AMER. BRASS Co. (U.S.P. 1,928,053—4, 26.9.33. Appl., 17.12.31).—The product is made from Zn containing $< 0.02\%$ of impurities by addition of (A) Ni 0.1—10 (0.5—1.5), or (B) Mn 0.05—10 (0.5—2)%. A. R. P.

[Copper-]zinc alloys [for cold-working]. H. A. GILL. From SOC. ANON. DE LA VIEILLE MONTAGNE (B.P. 409,588, 12.10.33).—The alloys contain Cu 0.03—2 (1.75) and Si 0.01—0.1 (0.05)%. A. R. P.

Refining of impure lead bullion. J. O. JOHNSTONE, ASSR. to GLIDDEN Co. (U.S.P. 1,927,662, 19.9.33. Appl., 14.2.31).—The Pb is atomised into an oxidising atm., whereby most is converted into PbO , leaving a relatively small amount unoxidised to retain the impurities. The product is leached with hot aq. $Pb(OAc)_2$ (I) and the

filtered solution of basic acetate is treated with scrubbed flue gas to ppt. basic $PbCO_3$ and regenerate (I) for re-use. A. R. P.

Treatment of [metal] drosses. F. F. COLCORD and J. J. MULLIGAN, ASSRS. to UNITED STATES SMELTING, REFINING & MINING Co. (U.S.P. 1,931,285, 17.10.33. Appl., 7.10.30).—Molten Pb, Zn, Sn, Bi, or Cd is vigorously agitated until the dross which first rises as a thick scum is converted into a dry powder which does not entrain globules of metal. A. R. P.

Preventing aqueous liquids which come into contact with metals from causing corrosion and/or incrustation or precipitation. N. V. DE BATAAFSCHE PETROLEUM MAATS. (B.P. 408,896, 1.11.33. Ger., 28.11.32).— H_2O for cooling the cylinders of internal-combustion engines, and for use in hydraulic machinery, is treated with 0.5—5 (1.6)% of an emulsion of a mineral oil in a sulphonated fatty oil soap. A. R. P.

[Platinum gauze] catalyst [for ammonia oxidation]. N. TITLESTAD and S. F. SPANGLER, ASSRS. to CHEM. CONSTRUCTION CORP. (U.S.P. 1,927,508, 19.9.33. Appl., 13.1.30).—In a multiple-layer, gauze-cylinder catalyst, the inner gauzes (I) of fine mesh are made of Pt or Rh-Pt alloy having a high catalytic activity and the outside gauze (15—50-mesh) is of Ir-Pt alloy having a high strength to prevent distortion of (I). A. R. P.

Manufacture of hard [e.g., cobalt-tungsten-platinum] metal alloys. A. R. POWELL, E. R. BOX, and JOHNSON, MATTHEY & Co., LTD. (B.P. 408,642 and 408,662, 11.10.32).—Alloys for tipping Au nibs consist of (A) $> 40\%$ Os, Ru, or osmiridium with < 1 metal from each of the groups (a) Fe, Co, Ni, and (b) Cr, Mo, W, and < 1 hardening agent from the group (c) C, Si, Ti, B, Al ($\geq 5\%$), e.g., Os—Ir 80, Co 19.5, and B 0.5%, or Os—Ir 50, Co 12, W 36, and B 2%; (B) W or Mo 45—75, < 1 of the Pt metals 2—40, a hardening element of group (c) < 5 , and a metal of group (a) 5—30%, e.g., Ru 20, W 67, Co 12, B 1%, or Pt 10, Ru 15, W 65, Co 9, and B 1%. Up to 15% Sn may be added to (B) alloys to reduce the hardness slightly and to impart a silvery-white colour. A. R. P.

Aluminium-base alloys. ALUMINIUM, LTD., ASSEES. of J. A. NOCK, JUN. (B.P. 408,779, 6.2.33. U.S., 21.4.32).—Claim is made for Al alloys with 2—14% Cu and 0.005—0.1 (0.05)% Sn, containing also Ni ($< 7\%$), Zn, and Si together $\geq 14\%$, and small amounts ($\geq 3\%$ in all) of Mn, Cr, B, Mo, Zr, Be, and Ti. The alloy may be hardened by quenching from $> 400^\circ$ and ageing at 100—200°. A. R. P.

Production of pure aluminium-silicon alloys. METALLGES. A.-G. (B.P. 409,572, 14.9.33. Ger., 7.10.32).—Al-Si alloys prepared electrothermally are purified by fusion with Na_3AlF_6 with or without additions of AlF_3 or alkali chlorides, and the purified alloy is melted with pure Al to obtain the desired Si-Al alloy. The purification slag is electrolysed to remove impurities and used again in the process. A. R. P.

Protection of ferrous metals [from corrosion by plating]. S. C. MOORE and F. E. BOWKER, ASSRS. to DURA Co. (U.S.P. 1,931,704, 24.10.33. Appl., 2.3.31).—Claim is made for a composite plate on Fe consisting of

a thin Cd or Zn layer directly on the Fe, \ll 1 intermediate layer (I), and a final coating of Cr; (I) consists preferably of a series of films of Ni and Cu plated alternately.

A. R. P.

Electrochemical process [for pickling of ferrous articles]. C. G. FINK and T. H. WILBER, Assrs. to BULLARD Co. (U.S.P. 1,927,116, 19.9.33. Appl., 25.1.33).—To prevent anodic oxidation of FeSO_4 in H_2SO_4 pickles used for the cathodic cleaning of Fe and steel, duriron anodes are used; the anode (A) surface becomes covered with a film of SiO_2 , aq. which restrains diffusion of Fe^{++} into A.

A. R. P.

Production of a [plated-bronze] metal finish on steel. CITY AUTO STAMPING Co. (B.P. 409,001, 18.10.32. U.S., 19.10.31).—The steel is plated with bronze (2–30% Sn) in a bath containing $\text{Cu}(\text{CN})_2$ 40, Na_2SnO_3 20, NaCN 70, and NaOH 2.5 g. per litre, the deposit is buffed to give a bright finish, and the article is plated with Cr.

A. R. P.

Electrodeposition of chromium. C. G. FINK and H. D. McLEESE (U.S.P. 1,928,284, 26.9.33. Appl., 14.1.32).— HBF_4 (I) is used instead of H_2SO_4 in the usual Cr-plating bath; preferably 3 g. of (I) are added per litre of aq. CrO_3 (250 g.).

A. R. P.

Refining of chromium and chromium alloys. E. LIEBREICH (U.S.P. 1,928,294, 26.9.33. Appl., 24.11.31. Ger., 25.11.30).—The metal or alloy is electrolysed in aq. succinic acid (250 g. per litre), containing NH_4 succinate (if Fe is present in the alloy) to ppt. the Fe as basic Fe^{III} succinate. A small quantity of H_2SO_4 or HClO_4 improves the conductivity of the bath.

A. R. P.

Electroplating (A) aluminium etc. on copper etc., (B) chromium etc. on iron etc. J. F. CHITTUM, Assr. to PURDUE RESEARCH FOUNDATION (U.S.P. 1,927,772—3, 19.9.33. Appl., 2.6.31).—(A) Cu is plated with Al from a bath consisting of a 40:60 mol. mixture of LiCl and AlCl_3 (m.p. 130°) and heated by means of superheated steam coils. The anode consists of 99.8% Al and current is supplied at 2 volts (10 amp. per sq. dm. of cathode). (B) The electrolyte consists of a fused 70:15:15 mol. mixture of NaOH , NaCl , and Cr_2O_3 at 450° ; a Cr anode is used, the c.d. is 5 amp. per sq. dm., and the voltage 10.

A. R. P.

Heat-treating apparatus. Mixing etc. apparatus.—See I. Heat-treating steel.—See II. Pt-Rh catalyst.—See VII. Rubber-coated wire.—See XI. Sulphurised terpene oil [as flotation agent]. Protecting Fe etc. Rust-proof coating.—See XIII.

XI.—ELECTROTECHNICS.

Electrical heating in the chemical and metallurgical industries. H. KIRCHRATH (Chem.-Ztg., 1934, 58, 381–383).—For resistance furnaces the usual materials are an alloy of 80% Ni, 20% Cr for use to 1150° and "Silit" (SiC) to 1400° . Drying ovens, lacquer kettles, etc. are described. In the Haber-Bosch process the N_2 and H_2 are now heated electrically to 400° before entering the catalyst vessels. Applications to ceramics, glass, and enamel, and to metallurgy are described.

C. I.

Electrical p_H control in [sugar-]factory routine. II. V. KHAINOVSKY (Arch. Suikerind. Nederl.-Indië, 1934, III, meded. 24, 1157–1288; cf. B., 1934, 420).—An apparatus for the potentiometric measurement of the p_H val. making use of triode lamps for magnifying the weak current set up by an Sb-calomel cell is described. It is adapted for the use of stabilised a.c., and gives a good zero constancy. It has been applied in seven factories in Java for the control of defecation, settling, raw juice sulphitation, double carbonatation, and continuous carbonatation, with satisfactory results.

J. P. O.

Development of gas-discharge lamps in Europe. G. B. VAN DE WERFHORST (Trans. Electrochem. Soc., 1934, 65, 335–353).

Liquid insulators. J. B. WHITEHEAD (Trans. Electrochem. Soc., 1934, 65, 83–94).—Recently published work on the electrical properties of liquid insulators is reviewed and critically discussed.

H. J. T. E.

Artificial magnetite anodes.—See VII. Determining abs. η of glass.—See VIII. Ageing nitrated steels. Al. Plating castings. Ni-Cr-, Zn-, and Sn-plate. Protecting Al. Adherence of deposits.—See X. Rubber insulation.—See XIV. Determining ash in beet juice.—See XVII. Increasing the sensitivity of photographic plates.—See XXI.

PATENTS.

Electric furnaces. C. E. CORNELIUS (B.P. 409,893, 11.4.33).—Material to be heated, e.g., glass, is supported, e.g., in a crucible, above a melt through which current flows.

J. S. G. T.

Apparatus for the [electrical] heat-treatment of granular [edible] substances. C. E. SEED, C. E. ALLSOPP, F. SMITH, and ENGLISH ELECTRIC Co., LTD. (B.P. 409,137, 8.5.33).—In a tumbling drum, heat is provided by one or more cages of tubes (nearer the circumference than the centre) containing electric heaters. Electrical methods of controlling the heat are described.

B. M. V.

[Electrically] controlling the moisture content of solid materials. CALICO PRINTERS' ASSOC., LTD., and J. F. FIELD (B.P. 409,338, 26.10.32).—Variation in the electrical resistance of the material (e.g., fabrics) due to change of moisture content is caused to operate a relay, which, through a "servo" motor, controls the speed of, or the supply of heat to, the drying machine.

J. S. G. T.

Electrical process [of dehydrating crude petroleum emulsions]. M. E. GARRISON, Assr. to PETROLEUM RECTIFYING Co. of CALIFORNIA (U.S.P. 1,926,013, 5.9.33. Appl., 22.4.29).—Petroleum emulsion is introduced tangentially into a treating space between co-axial conical electrodes arranged so that their apices are directed downwards, and the potential gradient of the field increases, in the direction of travel of the emulsion.

J. S. G. T.

Electrical precipitation apparatus [for gases]. E. ANDERSON, Assr. to INTERNAT. PRECIPITATION Co. (U.S.P. 1,926,025, 12.9.33. Appl., 29.12.30).—The earthed electrodes (E) are formed of meshwork tubes, through which the dust particles pass either by

momentum or electric wind and are collected in the spaces (*S*) outside *E*. Within *S* are transversely inclined baffles and their tops are closed. B. M. V.

Treatment of [graphite] electrodes for [manufacture of alkali hydroxide]. R. M. HUNTER and L. E. WARD, Assrs. to DOW CHEM. CO. (U.S.P. 1,927,661, 19.9.33. Appl., 2.2.31).—The electrode is impregnated with a chlorinated drying oil (e.g., with tung oil which has been treated at 30–70° with Cl₂) and then washed with aq. NaOH. A. R. P.

Manufacture of a battery-paste extender. J. O. JOHNSTONE, Assr. to CHEM. & PIGMENT CO., INC. (U.S.P. 1,929,357, 3.10.33. Appl., 31.10.30).—Cotton waste, sawdust, or wood fibre (250) is digested with BaS (100) in H₂O (500) and the Ba is then pptd. by addition of Na₂SO₄ (100) in H₂O (400 pts.). The pulp is washed, dried, and used for mixing with the PbO paste for coating the negative plate of accumulators. A. R. P.

Electric rectifier. E. PRESSER, Assr. to WESTERN ELECTRIC CO., INC. (U.S.P. 1,926,884, 12.9.33. Appl., 21.5.29. Ger., 8.8.28).—The rectifier is made up of alternate plates of (a) Fe, Co, or Ni, and (b) Pb or Bi, with a thin rectifying layer between consisting of Te or Se containing a small quantity of Zr. A. R. P.

Photo-electric tube. E. E. CHARLTON, Assr. to GEN. ELECTRIC CO. (U.S.P. 1,927,792, 19.9.33. Appl., 1.12.31).—Prior to depositing the light-sensitive material, a first coating of other material is oxidised by admitting O₂ and subjecting the electrode to a d.c. glow discharge. B. M. V.

Photo-electric tube. H. E. THOMSON, Assr. to GEN. ELECTRIC CO. (U.S.P. 1,927,812, 19.9.33. Appl., 27.11.31).—The cathode (I) consists of a curved Ag-plated Cu or Ni sheet which has been oxidised by the glow-discharge method and then coated with a Cs or Rb compound by flashing a mixture of, e.g., Cs₂Cr₂O₇ and Si. After this treatment a small amount of A is admitted into the tube and (I) subjected to a second glow discharge to increase its photosensitivity. A. R. P.

Introduction of active metal [barium] into a vacuum tube. J. H. DE BOER, J. L. H. JONKER, and K. M. VAN GESSEL, Assrs. to RADIO CORP. OF AMERICA (U.S.P. 1,931,647, 24.10.33. Appl., 13.11.31. Holl., 15.10.30).—Into a small receptacle in the anode is placed a 1 : 15 mixture of BaN₆ (I) and MgO or ZrO₂, and, when the tube is sealed, heat is applied to cause dissociation of (I) into Ba and N₂. A. R. P.

Production of white luminous tubes of electrified neon gas. R. DE LAMPRECHT, Assr. to COLD WHITE LIGHT, INC. (U.S.P. 1,931,529, 24.10.33. Appl., 16.6.31).—Addition of ZnSO₄ to Ne tubes is claimed to result in a white light, the ZnSO₄ decomposing into ZnO, SO₂, and O₂. A. R. P.

Gaseous conduction apparatus [rectifying valve]. P. L. SPENCER, Assr. to RAYTHEON, INC. (U.S.P. 1,931,299, 17.10.33. Appl., 24.8.28).—A glow-discharge valve filled with He at 6 mm. has a small Ta, Fe, or C anode with a much larger conical cathode (I) over it; (I) is made of Ta sheet coated internally with an alkaline-earth nitrate, which is then heated to decompose it into the oxide in intimate contact with the Ta. A. R. P.

Device for irradiation of substances with ultra-violet rays. G. ZECHER, Assr. to GEN. ELECTRIC CO. (U.S.P. 1,929,910, 10.10.33. Appl., 25.2.30. Holl., 12.4.29).—The material is passed through a glass cylinder into which is sealed at both ends a spiral discharge tube (I) terminating in enlarged chambers at each end, one containing a cathode filament and the other < 2 anodes separated by insulating material so as to produce ultra-violet discharge in (I). A. R. P.

Improvement of electrical conductors [with rubber-containing insulation]. R. F. MCKAY, From INTERNAT. LATEX PROCESSES, LTD. (B.P. 409,151, 20.6.33).—The H₂O-resisting and electrical properties of rubber insulation deposited directly from aq. dispersions are improved by rendering the normally H₂O-sol. ingredients, such as sol. soaps, insol. by the addition of suitable salts, e.g., of Mg, Al, Cd, etc. A fibre-covered conductor may be treated with a solution of the latter class before coming in contact with the aq. dispersion. D. F. T.

Manufacture of insulated conductors [rubber-coated] wire. C. H. ELLIS, Assr. to GEN. CABLE CORP. (U.S.P. 1,929,812, 10.10.33. Appl., 26.4.30).—The wire is coated with a film of a vulcanisation accelerator (I), e.g., the CS₂ derivative of the reaction product of a sec.-amine and an aldehyde, then with a mixture (II) of rubber and S, and finally with a second film of (I). On heating, vulcanisation proceeds inwards from both sides of (II). A. R. P.

Electric insulating materials. BRIT. THOMSON-HOUSTON CO., LTD., Asses. of C. F. OBERMAIER (B.P. 409,802, 21.11.32. U.S., 20.11.31).—Superposed layers of asbestos and cellulose acetate or regenerated cellulose, e.g., "Cellophane," treated, if desired, with starch, are affixed to one another by a synthetic (alkyd) resin and coated with an insulating varnish. J. S. G. T.

Manufacture of [electrically] insulating materials. I. G. FARBENIND. A.-G. (B.P. 409,774, 10.11.32. Ger., 11.11.31).—A liquid chlorodiphenyl is subjected to disruptive discharge in a high-tension electrical field and the resulting product distilled. J. S. G. T.

Manufacture of insulating material [from bauxite]. R. H. HEILMAN, Assr. to PHILIP CAREY MANUFG. CO. (U.S.P. 1,931,795, 24.10.33. Appl., 23.4.29).—Natural bauxite is treated to convert it into AlO·OH; this is then intimately mixed wet with asbestos 5–10, bentonite 3–10, and CaO 0.5–1% and the mixture is dried. A. R. P.

Manufacture of [electrical] resistor unit. L. E. POWER and L. BRADLEY, Assrs. to ALLEN-BRADLEY CO. (U.S.P. 1,927,185, 19.9.33. Appl., 28.3.30).—C black is partly graphitised at, e.g., 1900°, mixed with asbestos fibre, and bonded with resin, stearic acid, etc. B. M. V.

Preventing boiler-scale formation.—See I. Resistance oil.—See II. Transformer-sheet alloys. Welding electrode. Magnet steel. Be-Cu-Ag alloy. Dyeing oxidised Al. Pure Al-Si alloys. Plating ferrous metals. Pickling ferrous articles. Bronze finish on steel. Refining Cr. Cr- and Al-plate.—See X. Heat-indicating paint. Sealing joint boxes.—See XIII. Insulating compound.—See XIV.

XII.—FATS; OILS; WAXES.

Simplified vacuum ester process for detection of margarine and hardened fats. J. PELTZER (Z. Unters. Lebensm., 1934, 67, 529—534).—The fat (5 g.) is converted into the Et esters (*E*), which are fractionated by distillation (14 mm.), and the difference (*D*) between the sap. vals. of the residue (*R*) and the first fraction (*F*) is determined. The *D* of the *E* fractions from margarine and hardened whale oil is $>$ in the case of lard and beef fat, so that adulteration of the last two with the first two can readily be detected. *R* contains fatty acids of higher, and *F* of lower, mol. wt., and the method may be used to determine the % of these constituents.

E. C. S.

Finkener method for determination of the setting point of fats. J. LUND (Fettchem. Umschau, 1934, 41, 86—88).—The original method (cooling without agitation) is unreliable, especially in the case of hardened fats containing small amounts of free fatty acids. Satisfactory results are obtained if the sample of fat is shaken every 2 min. when the temp. is near the setting point, so that finally the temp. rises 3—5° as freezing occurs.

E. L.

Method for determining hardness of fats. C. O. GRAVENHORST (Oil & Soap, 1934, 11, 86—87).—The Schopper instrument for testing the breaking strength of yarns has been modified for use as a penetrometer, the max. pressure (in kg.) required to push a metal ball through the cold fat being reported; the prep. of the fat sample, and a rougher instrument for the same purpose, are also described.

E. L.

Determination of the oxidising power of available oxygen of the peroxide or ozonide of an oil or fat. T. HARADA (Bull. Chem. Soc. Japan, 1934, 9, 197—198).—1 g. of the ozonised oil is shaken with 20 c.c. of 10% KI and 3 c.c. of 20% H₂SO₄ and the free I titrated with aq. Na₂S₂O₃. The solution is then heated at 100° and retitrated (starch indicator) until no more I is liberated.

P. G. M.

Standard methods for the sampling and analysis of commercial soaps and soap products. M. L. SHEELY (Oil & Soap, 1934, 11, 90—95).—Provisional standard methods adopted by the Soap Analysis Committee of the American Oil Chemists Soc. (cf. *ibid.*, 1933, 10, 208, 230) for sampling and analysis are fully described; determinations of borax, carbonates, SiO₂, glycerol, starch, etc. are included.

E. L.

Synthesis of glycerides by the use of Twitchell's reagent. S. L. IVANOV and P. T. KLOKOV (J. Appl. Chem. Russ., 1934, 7, 171—177).—The reaction of hydrolysis of various oils [triolein, poppyseed, cedar, sunflower-seed, mustard-seed, and coconut oils, and cocoa butter (I)] in presence of Twitchell's reagent (II) is completed in 36—48 hr., as compared with 6—7 hr. necessary for the resynthesis of the respective oils. The products of synthesis are, with the exception of (I), very similar to the original oils. The velocity of synthesis of glycerides of linoleic acid is $>$ that of those of oleic acid. The acid val. of rancid fats can be reduced by treatment with (II).

R. T.

Bear grease. L. F. HOYT (Oil & Soap, 1934, 11, 85—86).—A pale oil depositing a little stearin at room

temp. was obtained in one case, and a soft white fat in another, by rendering from the back and hind-quarters of two black bears (*Ursus americanus*). The two samples had, respectively: m.p. 17°, 26.5°; n_D^{20} 1.4695, 1.4665; acid val. 3.65, 1.4; sap. val. 195.6, 196.6; I val. (Hanus) 90.1, 63.2; unsaponifiable matter 0.08%, 0.10%; saturated fatty acids (% of oil) 15.47, 30.24; unsaturated fatty acids 79.29%, 64.17% (I vals. 98.8 and 82.8, respectively); titer 24.5°, 36.05°.

E. L.

Iodine value of Polish linseed oil. S. BAZAREWSKI and W. ZARNOVSKI (Polish Agric. Forestal Ann., 1932, 27, 315—332).—Oil extracted with Et₂O has the lowest, and that cold-pressed the highest, I val. Oil from seed from non-fertilised and fertilised fields had I val. 189.7 and 188.1, respectively; dense sowing gave 189.9, and thin sowing 187.9. The longer the period of ripening lasts, the higher is the I val. The average I val. of hot-pressed Polish linseed oil was 185.0.

CH. ABS.

Fluid resin (tall oil). R. KLATT (Fettchem. Umschau, 1934, 41, 90—94).—A chemical and technological review is given, including a bibliography and detailed analyses (by the author) of two samples.

E. L.

Colour reactions of olive oil. E. I. BETTER and J. SZIMKIN (Fettchem. Umschau, 1934, 41, 72—73).—Several samples of N. Italian ("Canossa") virgin olive oils gave a transient red colour (*C*) in the Baudouin test, which fade to brown after 2 min. When H₂O was added immediately after the appearance of *C*, this faded immediately, the acid layer turning green, whilst in the case of sesamé oil *C* persisted for a considerable time.

E. L.

Effect of silica gel on colour and nitrogen content of soya[bean] oil. R. NEU (Fettchem. Umschau, 1934, 41, 70—71).—Treatment with SiO₂ gel reduces the N (protein) content and removes coloring matters, the effectiveness of the gel increasing as the acid used to ppt. it is the more dil. A small proportion of the N compounds appears to be in true solution in the oil and is not removable by adsorption.

E. L.

Changes in the composition of vegetable oils after freezing, and after treatment with adsorbents. S. L. IVANOV, L. E. KOMAROVA, and A. M. KOGAN (J. Appl. Chem. Russ., 1934, 7, 179—186).—The *d*, *n*, acid val., I val., and unsaturated acid content (I) of the solid fractions (II) separating from sunflower-seed oil at -12° to -22° are $<$ for the liquid fractions (III); cottonseed and soya-bean oils behave similarly, except that the (I) of (II) is $>$ that of (III). The physical consts. and composition of a no. of oils are affected characteristically by contact with oil-cake, filter paper and cloth, adsorbent C, or mineral adsorbents used for clarification or decoloration of oils.

R. T.

Theory of hydrogenation of vegetable oils. F. BLOEMEN (Fettchem. Umschau, 1934, 41, 95—98).—It is considered that the catalyst causes the local formation of a homogeneous "reaction phase" (I) from the gas-oil system, the intensity of hydrogenation (*H*) being chiefly controlled by the [H₂] in (I), which is a direct function of the working H₂ pressure; catalytic *H* is regarded as a reversible reaction with a

positive heat of H ; poly-unsaturated compounds (fatty acids or glycerides) being saturated in stages, so that definite equilibria between the various stages are established. These postulates are applied to explain the facts that formation of *isoleic* acids and selectivity in the H of poly-unsaturated compounds increase as the temp. is raised, and decrease with increased pressure.

E. L.

Antioxygens of fatty oils. XIII. Inversion of oxidative catalysts due to the species of fatty oil.

IV. Effect of *p*-nitroaniline on oxidation of fatty oils. M. NAKAMURA (J. Soc. Chem. Ind., Japan, 1934, 37, 86—89B; cf. B., 1933, 796).— p -NO₂·C₆H₄·NH₂ accelerates the oxidation (I) of a fatty oil (II) in the first stages of (I); its activity increases with increase in the I val. of (II). "Inversion" occurs with a (II) of low I val.

J. L. D.

Kieselguhrs [as adsorbents].—See VII. **Butter. Determining fat in cacao etc.** See XIX. **Brazilian Ibadanum.**—See XX.

PATENTS.

Vacuum extraction of cod-liver oil. K. C. D. HICKMAN, ASS. to EASTMAN KODAK CO. (U.S.P. 1,925,559, 5.9.33. Appl., 23.12.30).—A therapeutic concentrate is obtained by heating a thin (0.01-in.) film of the oil at 160° (100—200°) in a high vac. (< 0.01 mm. Hg) and collecting the vapours condensed at a point < 1 in. from the film. Apparatus is described.

E. L.

Separating liquids containing atomised fat.—See I. **Lubricating oils.**—See II. **Sizes for textiles.**—See VI.

XIII.—PAINTS; PIGMENTS; VARNISHES; RESINS.

Aluminium paint for exterior and interior use. R. SCHWARZ (Decorator, 1934, 32, No. 383, 67—68).—The properties of Al paints are discussed. Suitable media and primers for various surfaces are enumerated. Na₂SiO₃ is unsatisfactory, since it reacts with Al. Stand-oil media (either pure linseed or linseed-tung mixtures) are most suitable. For plaster and porous cement, an ammoniacal casein emulsion medium may also be used.

D. R. D.

Casein paints. F. C. ATWOOD (Drugs, Oils, and Paints, 1934, 49, 59—60, 104—108; Paint and Varnish Prod. Man., 1934, 10, No. 3, 5—10, 28—29).—The sp. advantages of casein as a paint medium are discussed in detail. The difficulty of poor washability is overcome by adding 1% of CH₂O to the soap solution used.

D. R. D.

Paint failures on new plaster. W. R. FULLER (Decorator, 1934, 32, No. 384, 28—30).—The desirable properties of wall primers and simple tests therefor are enumerated.

D. R. D.

Modifications of lead chromate. H. WAGNER (Paint and Varnish Prod. Man., 1934, 10, No. 5, 10—12).—The different cryst. forms of PbCrO₄ and the conditions under which they are formed are described, with special reference to their occurrence in commercial pigments.

D. R. D.

[Prevention of rusting.] Basic lead chromate. ANON. (Paint and Varnish Prod. Man., 1934, 10, No. 5,

5—8, 19).—A review of the work on non-rusting Fe alloys and anti-rust paints (I). The best (I) contain either basic oxides, especially PbO, or oxidising agents which passivify the Fe. Pb₃O₄ and PbCrO₄, PbO (chrome-red) (II) act in both these functions and are excellent pigments for (I). Details of the manufacture of (II) and recipes for (I) containing (II) are given. D. R. D.

Formation of oil films [on pigment particles]. W. DROSTE (Farben-Ztg., 1934, 39, 469—470, 499—500, 524—525).—The consistency of a paint, with const. oil: pigment ratio, passes through a min. with increasing acid val. of the oil. For practical pigments, this occurs at acid val. 2—4. Higher acid content gives rise to increased yield val. The theory of a unimol. layer of fatty acid around each pigment particle is developed and agrees quantitatively with the foregoing results.

G. H. C.

Damage to pictures by X-rays. S. GÖRTZKY and P. GÜNTHER (Angew. Chem., 1934, 47, 343—345).—Consideration of the energy absorbed by a picture during a normal radiographic exposure confirms the experience that careful X-ray examination causes no damage.

G. H. C.

The ink maker and the screen process. ANON. (Amer. Ink Maker, 1934, 12, No. 5, 23—25).—The silk stencil-screen process for producing posters is described. The inks used must be quick-drying and of short thread, and the pigments finely ground, non-bleeding, and reasonably light-fast. Suitable pigments and mixtures covering a wide range of colours are listed, and the manufacture of Para Red from diazotised p -NO₂·C₆H₄·NH₂, β -C₁₀H₇·OH, and β -naphthol-7-sulphonic acid is described.

D. R. D.

Technical analysis of printing ink. H. J. WOLFE (Amer. Ink Maker, 1934, 12, No. 5, 19—21).—The pigment may frequently be isolated by thinning with C₆H₆-MeOH and centrifuging, the separated pigment being finally washed with Et₂O. A method for the complete quant. analysis of a mixture of all probable white pigments is given.

D. R. D.

Use of raw and treated oils in lacquer. P. H. FAUCETT (Paint, Oil and Chem. Rev., 1934, 96, No. 10, 20—21).—The properties and uses of cellulose nitrate-drying oil combination lacquers are reviewed. A table is appended giving the properties of such lacquers obtained by adding 24 different oils to a standard cellulose nitrate lacquer.

D. R. D.

Better levelling of lacquer solvents. P. E. MARLING (Paint, Oil and Chem. Rev., 1934, 96, No. 10, 14—15).—The use of a considerable proportion of high-boiling solvents (e.g., amyl alcohol or acetate, mixed with an equal quantity of PhMe and petroleum naphtha) in spraying lacquers leads to smooth films of even thickness.

D. R. D.

Solvent-type lacquer plasticisers. J. M. SANDERSON (Paint, Oil and Chem. Rev., 1934, 96, No. 10, 8—11).—The properties and uses of the common plasticisers are described.

D. R. D.

Precision methods for testing solvents and lacquers. H. W. HAINES (Paint Oil and Chem. Rev., 1934, 96, No. 10, 12—14).—Methods for testing the

evaporation rate, blush-resistance, and "viscosity" [i.e., η for a standard solution of cellulose nitrate (I) in the solvent] of lacquer solvents, the volatility, solvent power for (I), and light-resistance of plasticisers, and the hardness, resistance to abrasion, light, and weathering, tensile strength, and elasticity of lacquer films are described. D. R. D.

Coal-tar solvents in the formulation of modern finishes. J. A. KENNEY (Paint, Oil and Chem. Rev., 1934, 96, No. 10, 22—25).—The uses of C_6H_6 , PhMe, xylene, and coal-tar naphtha in the paint and varnish industry are reviewed. A table of specifications for different grades of these solvents is given. D. R. D.

[Analytical] processes in the varnish laboratory. L. KERN (Farbe u. Lack, 1934, 242).—To detect small proportions of MeOH in presence of EtOH, 1 c.c. of the first distillation fraction is diluted considerably with distilled H_2O , oxidised with conc. H_2SO_4 (5 c.c.) and $KMnO_4$ (1 g.), filtered, and then either treated at room temp. with (a) 1 c.c. of a 1:1 mixture of conc. H_2SO_4 and morphine sulphate, or (b) fresh milk (5 c.c.) (I), $FeCl_3$ solution (a few drops) (II), and conc. H_2SO_4 (5 c.c.), or (c) it is boiled with (I), (II), and conc. HCl (10 c.c.). The MeOH is oxidised to CH_2O , which produces (a) a violet ring, (b) a blue-violet ring, or (c) blue-violet flakes consisting of casein. Three reactions for $COMe_2$ are also given. S. M.

Acid-proof stain [for wood]. F. STEFANO (Amer. Painter and Decorator, 1934, 11, No. 5, 38).—Wood may be rendered acid-resistant by applying two coats of an aq. solution containing 10% of $CuSO_4$ and 10% of $KClO_3$ or $KMnO_4$, and then two coats of a solution containing 11% of NH_2Ph and 14% of conc. HCl; when dry, the surface is polished, and finally a 1:1 turpentine-linseed oil mixture is rubbed in. The surface may be re-polished with this mixture when necessary. D. R. D.

Glycol ester of colophony. I. I. BORGMAN (J. Appl. Chem. Russ., 1934, 7, 193—195).—Approx. 5% of ester is formed when colophony is heated at 180—235° with 10% of $[CH_2OH]_2$. The product is sol. in EtOH, and the solution can be used as a polish for wood. R. T.

Chemistry of the metallic abietates. H. WOLFF and J. RABINOWICZ (Fettchem. Umschau, 1934, 41, 66—67; cf. B., 1921, 857A).—The composition of pptd. Pb abietates depends on the relative proportions of the reactants employed, and whether neutral or basic Pb acetate is used as precipitant; the ppts. are definite compounds representing basic, neutral, or acidic Pb abietates. E. L.

Phenol esters of rosin and their application in the preparation of varnishes. A. J. KOGAN, N. N. MAKARENKO, and P. A. SIKAR (Farbe u. Lack, 1934, 207—208, 218—219, 232—233).—PhOH does not react with rosin (I) when heated in varying proportions at 175°. After 4 hr. at 280—290° under a pressure of 10 atm. of CO_2 esterification is partial, but almost complete in presence of 1% [calc. on wt. of (I)] of $ZnCl_2$; finely-divided Mg, Fe, Pb, and Zn, NaCl, and CaO were not so efficient as catalysts under the same conditions. The esters formed were soft and sticky and, in conse-

quence of their alkali-resistance, possessed low sap. vals. In the case of $\beta-C_{10}H_7OH$ the best catalysts were Mg, Fe, and Zn. The effect of these metals, using $\alpha-C_{10}H_7OH$, cresol, pyrocatechol, resorcinol, quinol, and pyrogallol, is also tabulated. Varnishes prepared from these phenol esters and linseed oil required 5 days to dry, and enamels prepared with a Fe_2O_3 pigment were all less weather-resistant than was the corresponding Manila copal enamel. The $\beta-C_{10}H_7OH$ -(I) ester enamels were the most durable. S. M.

Solubility of modern alkyds [phenolic resins, and ester gums]. BECK, KOLLER & Co. (Paint, Oil and Chem. Rev., 96, No. 10, 18—20).—Tables giving the tolerance for denatured EtOH, EtOAc, and mineral spirits of solutions of the resins in PhMe are given and the data discussed. D. R. D.

Processed fossil gums. W. KRUMBHAAR (Paint, Oil and Chem. Rev., 1934, 96, No. 8, 8—10).—Overheating during the "running" of copals results in decomp. of the dibasic acids, forming monobasic acids and CO_2 and destroying the characteristic desirable properties of the copals. The manufacture and advantages in the use of the glycerides of the fossil gums and of mixed glycerides derived from these resins and oil acids are considered. D. R. D.

[Varnishes for] rubberised fabrics. Dyeing cellulose ether lacquers.—See VI. **Safety glass.**—See VIII. **Fluid resin.**—See XII. **Solvent for hop resins.**—See XVIII.

PATENTS.

Production of sulphurised terpene oil. R. C. PALMER and P. O. POWERS, ASSTS. to NEWPORT INDUSTRIES, INC. (U.S.P. 1,926,687, 12.9.33. Appl., 31.5.32).—Pine or other terpene oil is heated with S in presence of small proportions of an alkali; incorporation of S ensues without destruction of free *tert.*-OH groups. Loss of S as H_2S is avoided by bubbling air through the reaction mixture and adding an oxidation catalyst, e.g., $Cu(OH)_2$. The product is useful for cutting oils and as a flotation medium in mineral separations. S. M.

Manufacture of paints for (A) protecting iron, steel, or similar metals against the corrosive influences of the atmosphere, (B) preventing the formation of rust. A. SCHNEIDER (B.P. 343,993 and Addn. B.P. 402,255, [A] 23.10.29, [B] 12.12.32).—(A) Fe, FeO , Fe_3O_4 , or Fe_2O_3 , e.g., Fe scale, is heated at 750—1100° in air and the product is finely ground, with addition of natural magnetite (I) if desired, and mixed with oil. (B) (I) is finely ground wet and separated magnetically from the gangue, dried, and mixed with linseed oil, turpentine, and a drier. [Stat. ref. to (A)]. A. R. P.

Paint for indicating heat. F. LASKE (U.S.P. 1,924,793, 29.8.33. Appl., 29.6.28. Ger., 30.6.27).—A paint consisting of PbO and $CS(NH_2)_2$ in a suitable vehicle changes from yellow to a permanent brownish-black at $> 100^\circ$. PbO may be replaced by Pb, Fe, Hg, Sb, As, Cd, Cu, Ni, Co, or their compounds, giving similar effects. The paint can be used to indicate where bearings have been overheated or where a conduit or cable end has been overloaded. E. S. H.

Production of rust-proofing [coating] composition. L. H. ENGLUND, Assr. to VICTOR CHEM. WORKS (U.S.P. 1,926,766, 12.9.33. Appl., 15.10.31).—Addition of 0.25–17.5 g. of NH_4CNS per litre is claimed to improve the protective properties of paints, lacquers, and varnishes applied to ferrous metals. A. R. P.

Manufacture of varnishes, lacquers, paints, and like surface-coating compositions. STANDARD OIL DEVELOPMENT CO., Asses. of R. T. HASLAM (B.P. 409,423, 14.11.32. U.S., 29.12.31).—The use is claimed as solvents for resins, gums, drying oils, etc. of those fractions, having suitable rates of evaporation, obtained by destructive hydrogenation in the vapour phase at high temp. and pressure of the lighter petroleum distillates. S. M.

Manufacture of colours of iron, or crystallised iron sulphate, or other soluble salts of iron from pyrites cinders. I. DE VECCHIS (B.P. 409,936, 15.6.33. Belg., 29.6.33).—When the pyrites residues from the manufacture of H_2SO_4 are cooled in absence of air, only black Fe oxides are formed, which can be separated electromagnetically and either so used or converted into red Fe_2O_3 by treatment with chamber H_2SO_4 (I) and calcination. Yellow pigments can be obtained by addition of Na_2CO_3 or $\text{Ca}(\text{OH})_2$ to the sulphates obtained with (I). S. M.

Production of red chromate pigments. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 409,349, 28.10.32).—For pptg. mixed crystals of Pb salts in the process of B.P. 369,916 (B., 1932, 650) acidic chromate-sulphate-molybdate solutions are employed which (a) contain $\leq 1 \text{ H}^+$ per pptd. Pb atom and (b) give a ppt. containing $\leq 4 \text{ wt.-%}$ of PbMoO_4 . S. M.

Manufacture of low-density Paris-green. B. P. WEBSTER, Assr. to CHIPMAN CHEM. CO., INC. (U.S.P. 1,928,771, 3.10.33. Appl., 30.8.30).—Aq. CuSO_4 (6 pts.) is treated with a solution of As_2O_3 (4.3 pts.) in aq. Na_2CO_3 (2.875 pts.) at 60° with only moderate agitation, and when the reaction is completed AcOH (1 pt.) is added. The dried ppt. of Paris-green occupies 50–65 cu. in. per lb. A. R. P.

Preparation of artificial masses from vinyl derivatives and applications thereof. SOC. NOBEL FRANÇ. (B.P. 409,507, 19.4.33. Fr., 20.4.32, 23.4.32, and 9.7.32).—Vinyl acetate or other vinyl ester is partly or completely hydrolysed by means of conc. HCl diluted with $< 50 \text{ vol.-%}$ of H_2O and a small quantity of an aliphatic alcohol; an aldehyde is added and the condensation product, which is separated by addition of H_2O , can be used for varnishes, gramophone records, wet or dry spinning, moulding, etc. S. M.

[Coating] compositions and articles containing cellulose derivatives. BRIT. CELANESE, LTD. (B.P. 409,582, 18.4.33. U.S., 16.4.32. Addn. to B.P. 409,132; B., 1934, 534).—Polymerised vinyl derivatives of phenols are used together with cellulose esters in suitable solvents for making lacquers, spinning solutions, films, etc. S. M.

Manufacture of resinous condensation products [from formaldehyde]. A. SPITZER (B.P. 409,490, 13.3.33. Ger., 12.3.32).—Resins which are thermo-

hardening, light-resistant, and sol. in common low-b.p. solvents are produced by causing CH_2O , or a polymeric to react with a phenol, urea, or derivative, and an aromatic monosulphonamide having no other nuclear substituent comprising an NH_2 -group, e.g., *p*-toluenesulphonamide (I); the quantity of (I) is $\leq \frac{1}{2}$ of that of all the CH_2O reactants. S. M.

Manufacture of synthetic resin [from thiourea and formaldehyde]. E. E. NOVOTNY and W. C. WILSON, Assrs. to J. S. STOKES (U.S.P. 1,926,786, 12.9.33. Appl., 22.12.28).—To obtain clear gel-free products 1 mol. of $\text{CS}(\text{NH}_2)_2$ or urea is caused to react with 1.25–2.0 mols. of CH_2O , without being heated, in presence of $\text{Ba}(\text{OH})_2$ or other base; the mixture is set aside for $> 1 \text{ hr.}$, aq. NH_3 added, and CO_2 passed in until the whole is neutral; the pptd. BaCO_3 is filtered off and the product evaporated. S. M.

Manufacture of plastic and resinous compositions. T. S. CARSWELL, Assr. to MONSANTO CHEM. CO. (U.S.P. 1,924,396, 29.8.33. Appl., 27.11.29).—As plasticisers for alkyd resins, consisting of polyhydric alcohol-carboxylic acid reaction products, compounds of the type $\text{R}'\text{SO}_2\text{OR}$, where R' and R are aromatic radicals, are claimed. Examples are *p*- $\text{C}_6\text{H}_4\text{Me}\cdot\text{SO}_3\text{H}$ or derivatives thereof. E. S. H.

[Modified glyptal] synthetic resin. P. ROBINSON, Assr. to E. I. DU PONT DE NEMOURS & CO. (U.S.P. 1,925,935, 5.9.33. Appl., 20.5.31).—Drying-oil glycerides which have been partly hydrolysed by the action of an appropriate enzyme, e.g., lipase, in presence of H_2O are used for incorporation into a glyptal resin. S. M.

Laminated mica. H. C. P. WEBER, Assr. to WESTINGHOUSE ELECTRIC & MANUFG. CO. (U.S.P. 1,928,713, 3.10.33. Appl., 17.11.27).—The flakes are bonded together with a mixture (I) of glycerol-phthalic anhydride resin (II), tritolyl phosphate, and glue, gum arabic, or pitch-pine tar, applied as a powder or solution. The composite article is heated under pressure at 250° to polymerise (II) and convert (I) into a hard, infusible, resinous mass. A. R. P.

Manufacture of condensation products [resins] from hydroxylated cyclic compounds and acetylene. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 407,997, 29.9.32).— C_2H_2 reacts with phenols or hydroxylated heterocyclic compounds in liquid phase at $100\text{--}300^\circ$ (preferably $170\text{--}180^\circ$) in presence of org. Zn or Cd salts, preferably at $> 1 \text{ atm.}$; org. solvents and/or fillers may be present. PhOH gives a hard resin, sol. in COMe_2 , Et_2O , $\text{EtOH}\text{--}\text{C}_6\text{H}_6$, or aq. NaOH , which may be hardened with $(\text{CH}_2)_6\text{N}_4$, or converted into an alkali-sol., soft, resinous foaming agent by esterification with linoleic acid. Other starting materials are cresol, 4-hydroxydiphenyl, *p*- $\text{CMe}_3\cdot\text{C}_6\text{H}_4\cdot\text{OH}$, resorcinol, $\text{CH}_2(\text{C}_6\text{H}_4\cdot\text{OH})_2$, and 8-hydroxyquinoline. C. H.

Production of [potentially-reactive] phenolic condensation product. L. V. REDMAN, A. J. WEITH, and F. P. BROCK, Assrs. to BAKELITE CORP. (U.S.P. 1,924,514, 29.8.33. Appl., 14.7.27).—The resin, formed from PhOH (or homologue) and CH_2O or $(\text{CH}_2)_6\text{N}_4$, is mixed with CaO and heated under substantially

anhyd. conditions for 2—3 hr. at 175° with const. stirring. The amount of CaO should be \geq that equiv. to the total OH content of the resin and the free PhOH. Fillers and plasticisers may be added. E. S. H.

Production of synthetic resins from phenols and aldehydes. DR. K. ALBERT G.M.B.H. CHEM. FABRIKEN (B.P. 409,397, 3.11.32. Ger., 7.11.31 and 16.8.32).—The elasticity and adhesion of thermo-hardening phenol-aldehyde and -alcohol resins are improved and their solubility in benzol and benzine is increased by heating the resin for several hr. at $> 70^\circ$ with a monohydric alcohol having b.p. $> 80^\circ$; a fatty oil, acid, or glyceride is added. 12 examples are given. S. M.

[Phenol-ketone] synthetic resins and compositions and articles containing them. BRIT. CELANESE, LTD. (B.P. 409,896, 13.4.33. U.S., 16.4.32).— COMe_2 (1 mol.), or other acyclic unsubstituted ketone, is heated in admixture with *o*-cresol (2 mols.) in presence of a strong acid, e.g., HCl. The product is used with cellulose esters for making lacquers, spinning solutions, etc. S. M.

Production of pulps containing thermoplastic substances. H. C. FISHER, Assr. to RICHARDSON Co. (U.S.P. 1,925,584, 5.9.33. Appl., 25.6.32).—A molten bitumen, asphalt, or resin is mixed with just enough of a non-fibrous absorbent material (I), e.g., kieselguhr, "Celite," to fill the voids and give a friable mass. (I) may be pre-wetted with H_2O and H_2O may be added to the mixer. The product is useful for incorporation into paper pulp. S. M.

Plastic compound [for sealing electrical joint boxes]. W. T. HENLEY'S TELEGRAPH WORKS Co., LTD., H. A. TUNSTALL, and F. G. RICHARD (B.P. 409,672, 1.11.32).—The use is claimed of a mixture of castor oil 16, a neutral synthetic resin (e.g., albertol) 17, a filler (e.g., French chalk) 66, and a pigment 1%. S. M.

Manufacture of synthetic masses [from rubber]. P. MEYERSBERG and G. WOLF (B.P. 409,542, 29.7.33. Austr., 19.10.32).—A mixture of rubber and an org. filler (I), e.g., leather, paper, is masticated between rollers heated below vulcanisation temp. until a homogeneous mass is formed and (I) has lost preferably all (in any case $< 40\%$ of) its H_2O content; the product is then vulcanised. S. M.

Erratum.—In B., 1933, 880, col. 1, line 27, for GEN. ELECTRIC Co., LTD. read GEN. ELECTRIC Co.

Producing fine ppts.—See I. Printing regenerated cellulose.—See V. Red-Pb. TiO_2 .—See VII. Safety glass.—See VIII. Wood lacquer.—See IX.

XIV.—INDIA-RUBBER; GUTTA-PERCHA.

Rubber latex and the possibilities of its technical application. F. KIRCHHOF (Chem.-Ztg., 1934, 58, 439—444).

Heat of swelling of rubber relative to its pre-history and the nature of the swelling medium. III. L. HOCK and H. SCHMIDT (Kautschuk, 1934, 10, 64—66; cf. B., 1934, 512).—By measuring the heat of swelling of a mixture of rubber (I) and a compounding ingredient (II), as well as that of the uncompounded (I), it is possible,

with a knowledge of the heat of wetting of the (II) by the swelling medium, to calculate the heat of wetting of the (II) by the (I). Experimental results are cited for (I) and ZnO , benzine and C_6H_6 , respectively, being used as swelling or wetting agents. D. F. T.

Chemical questions in the manufacture of electrical rubber insulation. S. REINER (Kautschuk, 1934, 10, 68—70).—A no. of precautionary conditions, mainly of chemical nature, of importance for the production of satisfactory rubber-insulated conductors are indicated. D. F. T.

Natural and synthetic rubber. XII. Reversible vulcanisation by organo-metallic derivatives. T. MIDGLEY, JUN., A. L. HENNE, and A. F. SHEPARD (J. Amer. Chem. Soc., 1934, 56, 1156—1157).—Rubber (I) is vulcanised by $\text{Et}_2\text{O-MgPhBr}$ (II); the resultant product has a much greater tensile strength than (I) and is converted into (I) by treatment with H_2O or AcOH . The formation of a gel when a solution of (I) in C_6H_6 is treated with a Grignard reagent or Zn alkyl is evidence of vulcanisation. Na-(I), prepared in absence of O_2 , does not gel; when prepared in presence of O_2 (or exposed to air), gel formation occurs. Degenerated (I) gels very easily, whilst pure sol rubber (III) (B., 1931, 853) gels only slightly. The gels revert to the original sol condition when treated with H_2O , AcOH , or substances which decompose the Grignard reagent. The gels are peptised by further treatment with (II), ZnEtI , OEt-MgBr , anhyd. AlCl_3 , FeCl_3 , or MgBr_2 , but not by Zn diamyl (IV); subsequent treatment with AcOH re-forms the gel and then the sol. Gel formation does not occur with (IV) unless the solution contains H_2O or EtOH or is exposed to air. Sols containing (IV) are unaffected by Grignard reagents. A gel of (III) incompletely vulcanised with S is peptised by (II); AcOH causes depeptisation but not reversion to a sol. The amount of (II) necessary for gel formation varies from 1 mol. per 500 isoprene units to 1 mol. per 6 units, according to the degree of degradation of the (I). The results indicate that vulcanisation does not cause polymerisation and that the combined O of the mol. of (I) is the point of attack. The theory that the formation of polar groups on the mol. of (I) is essential to produce vulcanisation is supported. H. B.

Preservation of vulcanised rubber by antioxidants. T. R. DAWSON (J. Res. Assoc. Brit. Rubber Manuf., 1933, 2, 67—92, 93—109).—The literature (to 1924) is reviewed and results are given of tests as to tensile strength, permanent set, hardness (by durometer, plastometer, and scleroscope), and sp. gr. on a vulcanised rubber-S mixture and a rubber-S-golden Sb sulphide mixture, with and without quinol, before and after 6 days' ageing at 70°. The quinol, of which 2% is at least as beneficial as 5%, appears to benefit preferentially over-vulcanised samples. As tests for the state of ageing, elongation and permanent set (at const. elongation) seem to be most useful. For gas-mask rubbers tests on hardness and resilience are probably more important than high tensile strength or elasticity. With gas-mask rubbers accelerated ageing may fail to give a representative picture of their behaviour in normal storage. D. F. T.

Causes of discoloration in preserved [rubber] latex. E. RHODES and K. C. SEKAR (J. Rubber Res. Inst. Malaya, 1934, 5, 176—194, and India-Rubber J., 1934, 87, 557—559, 583—586).—The discoloration is attributed to contamination with Fe and presence of H_2S or sol. sulphides. To some extent H_2O_2 and also KCN exert a curative and preventive action. Relative instability is commonly associated with discoloration, probably because unsatisfactory plantation control is likely to lead to both and also because spontaneous coagulation is generally concurrent with a decrease in alkalinity and consequent increased tendency to corrosion of Fe containers and utensils. Furthermore, latex presumably owes its natural stability, at least in part, to the resistance of its proteins to decomp., and it is during such decomp. that the sol. sulphides are formed. D. F. T.

Perchloric [acid] method for determination of sulphur in rubber. E. KAHANE (Caoutchouc et Gutta-Percha, 1934, 31, 16,765—16,768; cf. B., 1926, 639; 1927, 532, 823).—The method is modified by using for the oxidation of the sample of rubber (approx. 1 g.) 0.5 c.c. of a 10% solution of I_2O_5 and 20 c.c. of a 2:1 mixture of $HClO_4$ (d 1.61) and HNO_3 (d 1.39). The oxidation is effected in a Kjeldahl flask (F) fitted with a ground-in, bent bulb-tube (T) containing 0.5 c.c. of the I_2O_5 solution diluted with H_2O so as to prevent free passage of the issuing gases. After the oxidation rotation of T causes the washing liquid to flow into F . The mixture is heated to remove HNO_3 and H_2O until the residual vol. is 2—3 c.c. After dilution and reduction of I_2O_5 , *e.g.*, by $N_2H_4 \cdot H_2O$, pptn. is effected with $BaCl_2$. The results are 10—20% > those given by the customary HNO_3 method. D. F. T.

Blown bitumen.—See II. **Rubberising fabrics.**—See VI. **Rubber trees.**—See XVI.

PATENTS.

Treatment of [latex] rubber compositions [to expedite drying]. A. SZEGVARI, Assr. to AMER. ANODE, Inc. (U.S.P. 1,924,576, 29.8.33. Appl., 9.1.31).—A coagulated layer of rubber deposited from an aq. dispersion, *e.g.*, on to a cylindrical mandrel, has applied to it, with a compacting pressure, a pervious material, *e.g.*, by progressively wrapping a woven fabric about the rubber composition under tension, so that a portion of the H_2O content is removed without substantially changing the shape. D. F. T.

Manufacture of rubber thread [from latex]. W. A. GIBBONS, Assr. to REVERE RUBBER Co. (U.S.P. 1,924,923—4, 29.8.33. Appl., [A] 25.2.32, [B] 28.5.32).—(A) A stream of coagulant, *e.g.*, $AcOH$ or $EtOH$, is passed into latex and the resulting filamentary coagulum is continuously withdrawn; the surface of the thread may be hardened by further coagulating treatment, after which the thread is dried and vulcanised. (B) The filamentary coagulum is produced by streaming latex into another mass of latex of different pH , *e.g.*, an alkaline latex into an acid latex. D. F. T.

Manufacture of rubber products [from latex]. INDIA RUBBER, GUTTA PERCHA & TELEGRAPH WORKS Co., LTD., H. J. STERN, and W. W. PUFFETT (B.P. 408,729, 18.11.32).—A hydrolysable ester of an acid,

which in sufficient quantity would be able to cause coagulation, *e.g.*, triacetin, is added to an aq. dispersion of rubber; subsequent heating, *e.g.*, in moulds or extruding dies, causes coagulation, and eventual vulcanisation with prevention of evaporation yields a microporous product. D. F. T.

Manufacture of aqueous dispersions [containing rubber]. R. A. CRAWFORD and F. K. SCHOENFELD, Assrs. to B. F. GOODRICH Co. (U.S.P. 1,919,775, 25.7.33. Appl., 22.4.29).—Compounding ingredients, *e.g.*, $Ca(OH)_2$ or PbO , which normally coagulate latex can be added to latex without impairing its stability by coating their particles with a H_2O -impermeable material (beeswax, paraffin wax) before dispersing them in H_2O . The wax is best applied to the powder as a solution in a volatile org. solvent, *e.g.*, C_6H_6 . D. F. T.

Manufacture of dispersions of conversion products of rubber. I. G. FARBENIND. A.-G. (B.P. 409,009, 21.10.32. Ger., 24.10.31).—Emulsions for the production of adhesive coatings are made by mixing S-free derivatives of rubber, *e.g.*, chlorinated rubber, with film-forming substances such as drying oils or resinous condensation products of a drying nature and emulsifying the resulting viscous or semi-solid masses in H_2O , with or without the addition of volatile solvents and/or drying agents. D. F. T.

Manufacture of smoked rubber sheets. F. H. FAITHFULL (B.P. 409,641, 17.1.34. Holl., 19.1.33).—Latex containing a somewhat higher % of rubber than is customary is coagulated in tanks with division plates (D) closely spaced, *e.g.*, $\frac{1}{8}$ — $\frac{1}{4}$ in. apart, and bearing the desired pattern. After coagulation, washing, and draining, the sheets are removed and directly subjected to drying and smoking. Alternatively, plain D may be used $\succ \frac{1}{2}$ in. apart, the sheets of coagulum being then passed directly between a pair of marking rolls and thence to the drying and smoking treatment. D. F. T.

Insulating [rubber] compound. A. R. KEMP and J. H. INGMANSON, Assrs. to BELL TELEPHONE LABS., Inc. (U.S.P. 1,930,274, 10.10.33. Appl., 26.11.30).—Claim is made for a mixture of $\leq 80\%$ of rubber ($\leq 40\%$), gutta-percha, and balata with a small amount of $C_2H_4(NHPh)_2$ as accelerator, together with S and the usual fillers. The material is useful for the manufacture of submarine cables. A. R. P.

Accelerator of vulcanisation [of rubber]. J. TEPEMA, Assr. to GOODYEAR TIRE & RUBBER Co. (U.S.P. 1,923,957, 22.8.33. Appl., 9.3.29).—Rubber is vulcanised in presence of a compound of the structure $S:CR'S-C \begin{matrix} \diagup S \\ \diagdown N \end{matrix} R''$, where R' is a piperidyl radical and R'' an arylene group, *e.g.*, the reaction product of 2-chloro-benzthiazole or 6-nitrobenzthiazole and Na piperidinecarbothionolate. (Cf. B.P. 302,142; B., 1930, 113.) D. F. T.

[Accelerator for] vulcanisation of rubber. W. SCOTT, Assr. to RUBBER SERVICE LABS. Co. (U.S.P. 1,924,574, 29.8.33. Appl., 15.4.30).—Rubber is vulcanised with the aid of the reaction product of a mercaptobenzthiazole and a polymethylene heterocyclic sec.-amine, *e.g.*, piperidine or piperazine. D. F. T.

(A) Age-retarders, (B) antioxidant [for rubber]. A. M. CLIFFORD, Assr. to GOODYEAR TIRE & RUBBER CO. (U.S.P. 1,923,706—7, 22.8.33. Appl., [A] 14.9.31, [B] 14.9.32).—Rubber is vulcanised in presence of (A) a primary aminomethylnaphthalene, especially the product, b.p. 150—170°/5 mm., obtained by reducing the NO₂-compounds from the coal-tar fraction of b.p. 265—400°. (B) A naphthylamine of the structure C₁₀H₇-NR'R'', where R' and R'' are cyclic groups, e.g., N(C₁₀H₇)₃, C₁₀H₇-NPh₂, or C₁₀H₇-N(C₆H₁₁)₂. D. F. T.

Filter candles.—See V. Rubbered textiles.—See VI. Rubber-coated wire. Rubber-containing insulation.—See XI. Synthetic masses from rubber.—See XIII. Joining leather.—See XV.

XV.—LEATHER; GLUE.

PATENTS.

Joining of leather etc. [using rubber latex]. O. P. KROGH (U.S.P. 1,923,215, 22.8.33. Appl., 2.10.29. Ger., 30.8.27).—Fibrous material, e.g., leather, is joined by applying a latex mixture containing vulcanising agents, and possibly also textile fibres, but free from active vulcanisation accelerators. When the treated surfaces are dry, a solution of an accelerator, with or without rubber, in a volatile solvent is applied; the surfaces are then pressed together and vulcanisation occurs spontaneously. D. F. T.

Production of carrierless films from gelatin or other film-forming colloids. E. ELÖD and H. BERCZÉLY (B.P. 409,537, 21.7.33. Ger., 23.7.32).—The gelatin etc. is cast on metal foil (e.g., Al) which is supported on a rigid smooth support from which the foil is easily removable. The foil can then be stripped from the gelatin film without causing damage. Films of 0.1—0.6 mm. can thus be made. J. L.

Adhesive [for moisture-proof cellophane]. W. H. CHARCH and J. E. SNYDER, Assrs. to DU PONT CELLOPHANE CO., INC. (U.S.P. 1,929,013, 3.10.33. Appl., 31.12.29).—An emulsion of gum thus 16.5, glyptal resin 17.9, COMe₂ 16.6, EtOAc 9, castor oil 8.3, 30% aq. gelatin 14.5, and 20% aq. casein 17.2% is claimed. A. R. P.

Artificial leather.—See V. [Adhesive] conversion products of rubber.—See XIV.

XVI.—AGRICULTURE.

Oxidation of organic matter in arable soils. D. LEROUX (Compt. rend. Acad. Agric. France, 1934, 20, 122—125).—Bacterial decomp. of org. matter in soils occurs at < 0° and is largely controlled by the soil-H₂O content. No relationship exists between the rate of oxidation and the quantity of CO₂ produced. Factors affecting the oxidation are analogous to those influencing the activity of nitrifying organisms. A. G. P.

Solubility of humic acids and the nature of the nitrogen compounds in various peats. II. S. S. DRAGUNOV and E. F. BACHTINA (Z. Pflanz. Düng., 1934, A, 34, 89—100; cf. B., 1933, 760).—Humic acid extracted from peat by 1% NaOH and repptd. by HCl contains up to 40% of matter sol. in hot H₂O. The solubility is increased by repetition of the 1% NaOH

treatment, made complete by warming with 20% NaOH, and diminished by heating with 25% HCl. The H₂O-solubility of humic acid is much affected by the conditions under which it is dried. Heating with H₂O results in partial hydrolysis of the protein constituents, and the proportion of NH₂-acids so produced varies with the source of the material. A. G. P.

Nature and intensity of the colour of humus extracts in relation to alkali concentration and humus types. U. SPRINGER (Z. Pflanz. Düng., 1934, A, 34, 1—14).—Two types of humus are distinguished by the colour of the alkali extract of the fraction insol. in AcBr. Brown colours result from Cassel-brown types, characterised by small lignin residues, produced under acid conditions (low-moor peats, certain podsoles, and also more alkaline soils in which the degree of humification is small). In black-earth soils, rendzinas, and calcareous moorland soils extracts are brown-grey. Such humus is formed under neutral or alkaline conditions, is highly humified, and contains humate-silicate complexes. Alkali extracts of the two humus types are further differentiated by varying degrees of sensitivity to colour change by altered alkali concn., and by ease of flocculation by electrolytes. A. G. P.

Ferric-ion sorption by soils. L. SMOLÍK (Věstn. Českoslov. Akad. Zeměd., 1933, 9, 409—413; Chem. Zentr., 1933, ii, 2878).—CO₃-free soils absorb, in general, 30—80% of the available Fe⁺⁺⁺ (5 g. of soil, 50 c.c. of FeCl₃ solution containing 0.026021 g. of Fe₂O₃), but the sorption can exceed this limiting val. The higher is the p_H the greater is the sorption of Fe⁺⁺⁺. L. S. T.

Soil colloids. L. SMOLÍK (Sborn. Českoslov. Akad. Zeměd., 1933, 8, 175—226; Chem. Zentr., 1933, ii, 2878).—Colloids approximating to 0.1—1 μμ have been isolated by ultrafiltration from many types of soil originating from different parent rocks, and investigated with respect to (i) abs. colloid content, (ii) chemical composition of the soil colloid, (iii) colloids and soil buffering, (iv) solubility ratio of the soil colloids, (v) replacement of bases by H, (vi) base-exchange and adsorptive power of the colloid for H₂O, and (vii) the colloids and soil-H₂O available for bases. L. S. T.

Base exchange and water absorption in soils. H. JANERT (Z. Pflanz. Düng., 1934, A, 34, 100—108; cf. B., 1931, 494).—Relationships between the heat of wetting, the heat of hydration of absorbed cations, and the hygroscopicity of soils are further examined. A. G. P.

Exchangeable cations in the soil and the plant. K. K. GEDROIZ (Trans. Sci. Inst. Fertilisers, Moscow, 1933, No. 113, 3—13).—A chernozem soil was saturated with Li, NH₄, Na, K, Mg, Ca, and H chlorides, excess being removed with EtOH. The soils were dispersed in H₂O and the solutions analysed. Sol. humus and R₂O₃ were highest in soils saturated with Li, Na, K, NH₄, Mg, Ca, and H, in that order; the order as regards SiO₂ content was the same, except that for K it was < for any other univalent cation. Addition of CaCO₃ to the suspension decreased the yield of humus and other constituents. Soils saturated with Cd and Ni did not produce a crop of flax or oats. In the soil

examined, adsorbed NH_4 was an excellent source of N for oats. CH. ABS.

Fixation of phosphates by soil colloids. G. D. SCARSETH and J. W. TIDMORE (J. Amer. Soc. Agron., 1934, 26, 138—151).—The $\text{PO}_4^{''}$ -fixing capacity of soil colloids (I) varies inversely, and the available $\text{PO}_4^{''}$ directly, with the SiO_2 :sesquioxide ratio (II) of the colloid. The solubility in 0.05N- H_2SO_4 of native $\text{PO}_4^{''}$ of (I) was approx. the same for H- as for Ca-saturated colloids, but was higher in those supersaturated with Ca. The $[\text{PO}_4^{''}]$ in such extracts (p_{H} 3.0) decreased on keeping, but no change occurred when 0.1N- H_2SO_4 was used for extraction. Fixation of $\text{PO}_4^{''}$ from H_3PO_4 (III), $\text{Ca}_2(\text{HPO}_4)_2$ (IV), and Na_2PO_4 (V) was approx. equal for colloids of high (II) when the degree of saturation with Ca was $< 100\%$. In colloids of low (II) the fixed $\text{PO}_4^{''}$ from (IV) and (V) was slightly more available than that from (III). Fixation of $\text{Ca}(\text{H}_2\text{PO}_4)_2$ (VI) was slightly $>$ that of (IV) in all colloids. $\text{Ca}_3(\text{PO}_4)_2$ was less available than (VI) in grey, and about equal to it in red, colloids. Rock phosphate was less available than (VI) in grey, and slightly more available in, red colloids. In colloids having p_{H} 5.4, 76% of the $\text{PO}_4^{''}$ added in a heavy dressing of (VI) was insol. in buffered 0.05N- H_2SO_4 . In colloids of $< 100\%$ saturation with Ca the degree of saturation affects fixation less in soils of lower (II). A. G. P.

Phosphate fixation in Hawaiian soils. F. E. HANCE (Hawaiian Planters' Rec., 1933, 37, 182—196).—Certain soils in Hawaii are characterised by a tendency to fix phosphates, transforming them into an insol. condition unavailable to the plant roots. This property is especially likely to occur when the ratio of SiO_2 to Al_2O_3 and Fe_2O_3 in the soil is low. It is suggested that the phosphatic fertiliser be applied to such soils in granulated form, so that the P_2O_5 can be appropriated before it can leach away and become fixed throughout the soil. Reverted phosphate, which can be absorbed by the roots, might also be used to supply the needs of the plant before the soil has had time to render it unavailable. Application of molasses improved the effectiveness of phosphatic fertilisers in the soils under discussion. J. P. O.

Aspergillus method of soil testing. A. H. ERDENBRECHER (Deut. Zuckerind., 1934, 59, 131—133, 152—154).—Long experience shows this method to give results correlating well with the more laborious and expensive methods of Neubauer, König, or Dirks-Scheffer. Its results have relative val. only, but serve to distinguish soils the K and $\text{PO}_4^{''}$ contents of which are poor, fair, medium, good, and very good. J. P. O.

Nitrogen balance in black cotton soils in the Malwa Plateau. I. Y. D. WAD and V. G. PANSE (Indian J. Agric. Sci., 1934, 3, 820—832).—Improved yields of cotton following applications of safflower cake result from the more suitable supply of N rather than from physical improvement of the soil. The $[\text{NO}_3^-]$ in these soils is normally low. Algae conserve soil-N, apparently by utilising NO_3^- when the accumulation attains $>$ a certain limiting concn. A. G. P.

Fertiliser requirements of the fundamental soil types in the Soviet Union. A. N. LEBEDIANTZEV

and D. N. BORODICH (Trans. Sci. Inst. Fertilisers, Moscow, 1933, No. 113, 107—118).—A summary. Podsoils respond most effectively to a complete fertiliser; degraded chernozem follows. Normal and deep chernozems respond only to high applications, and to large applications of N. CH. ABS.

Determination of the fertiliser requirements of the soil. A. SOKOLOV (Trans. Sci. Inst. Fertilisers, Moscow, 1933, No. 113, 57—64).—A discussion. CH. ABS.

Leaf diagnosis. H. LAGATU and L. MAUME (Compt. rend. Acad. Agric. France, 1934, 20, 246—257; cf. A., 1933, 1092).—The system of leaf diagnosis is discussed in relation to the fertiliser requirement of soils and the mineral nutrition of plants. A. G. P.

Potassium fertilisers. F. TERLIKOWSKI, A. BYCZKOWSKI, and S. SOZAŃSKI (Polish Agric. Forestal Ann., 1932, 28, 45—119).—The uptake of K by wheat and barley proceeds in the first period of vegetation (1 month) independently of the anion (KCl , K_2SO_4). The production of dry substance and the seed: straw ratio are the same for both if $[\text{Cl}^-]$ and $[\text{SO}_4^{''}]$ are not too high. KCl fertilisers are compared; low-% kainit is preferred. Of K_2SO_4 fertilisers the best was a K Mg fertiliser containing 18.3% K_2O . Experiments on admixture of other salts with pure K salts did not give concordant results. Addition of K fertilisers to the soil increases the H_2O retention, particularly at 30% H_2O . Plants with a low H_2O requirement are improved by fertilisation at a low soil- H_2O val., whilst plants with a high H_2O requirement exhibit an opposite effect. CH. ABS.

Potash fertilisers containing magnesium salts. H. KAPPEN (Zuckerrübenbau, 1934, 16, No. 1, 1—7).—Better results on sour soils are obtained with K salts containing MgSO_4 than with the same K salts alone. A physiologically alkaline K fertiliser might be prepared by subjecting carnallite to the action of steam at 400—500°, which expels the HCl , leaving MgO . J. P. O.

Effect of different potassium fertilisers in pot experiments. M. GÓRSKI and J. KRÓWICZGÓWNA (Polish Agric. Forestal Ann., 1932, 28, 121—134).—Barley gives higher yields with low-% K salts than with conc. K salts. For horse beans a K Mg salt (40% K) and low-% K salts were equally effective. CH. ABS.

Influence of potassium on development of plants in various stages of growth. M. KORCZEWSKI and F. MAJEWSKI (Polish Agric. Forestal Ann., 1932, 28, 1—26).—Maize grown on a nutrient aq. solution of P_2O_5 14.2, N 39.7 K 2.5—31.8 mg. per litre shows growth optima at 4 and 32 mg., and a min. at 12—20 mg. K. K is indispensable in all stages. In the region 12—20 mg. K, however, removal of K in the blooming period increases the growth rate. Addition of Na in these conditions increases the growth still more. CH. ABS.

Significance of calcium and magnesium in fertilising and liming of soils. D. V. DRUZHININ and V. G. SHVUIDENKOV (Trans. Sci. Inst. Fertilisers, Moscow, 1933, No. 113, 28—44).—In pot experiments, oats, barley, and peas give normal yields even when the sol. and mobile Ca is much $>$ Mg as required by Loew.

The yield is decreased when mobile Ca : Mg is $< 1 : 2 - 2 : 9$. For neutralising acidity Mg limestone is superior to Ca limestone without fertiliser. A complete fertiliser reacts more efficiently with CaCO_3 . MgO and CaO equally stimulate nitrification. CaO alone added to an unsaturated soil does not increase H_2O -sol. Mg.

CH. ABS.

Magnesium ammonium phosphate in vegetation tests. Z. G. ILKOYSKAYA, M. Z. PODOLSKAYA, and K. Z. DMITRIEV (Trans. Sci. Inst. Fertilisers, Moscow, 1933, No. 113, 44—49).—Pot experiments with flax on a podsolch soil and with oats on a degraded chernozem show that MgNH_4PO_4 is a good source of N and P. The Mg is favourable for flax and mustard.

CH. ABS.

Manurial trials with organic phosphorus compounds. W. SAUERLANDT (Z. Pflanz. Düng., 1934, A, 34, 110—125).—In pot cultures of oats and barley, Na and Ca glyceryl phosphates produced crop increases similar to those obtained by the use of $\text{Ca}(\text{H}_2\text{PO}_4)_2$. The action of phytin was less satisfactory and depended largely on the microbiological status of the soil.

A. G. P.

Ratio of the components in a complete fertiliser. A. SOKOLOV (Trans. Sci. Inst. Fertilisers, Moscow, 1933, No. 113, 13—18).—Experiments with potatoes show that optimal ratios depend on the soil type, crop rotation, etc.

CH. ABS.

Fertilising value of Polish kainits. M. GÓRSKI (Polish Agric. Forestal Ann., 1931, 26, 259—296).—For barley and sugar beet Polish kainits + 25% of K salt are better than pure K salt.

CH. ABS.

Quantity of acid used in decomposing fertilisers. V. P. MIKHAILOV (Trans. Sci. Inst. Fertilisers, Moscow, 1933, No. 113, 127—129).—5 g. of rock phosphate or 10 g. of Thomas slag require < 30 c.c. of H_2SO_4 ($d 1.84$).

CH. ABS.

Technology of organic-mineral fertilisers: humates of ammonia. S. S. DRAGUNOV and E. F. BAKHTINA (Trans. Sci. Inst. Fertilisers, Moscow, 1933, No. 113, 79—86).—Peat was saturated with NH_3 at 125—200° and treated with HCl; the hydrolysable and total NH_3 were determined. Low-moor peat contained 6—7% N. Peat containing 30—50% H_2O was the most efficient absorbent. The temp. should be $> 100^\circ$.

CH. ABS.

Rôle of the mineral nitrogen of manure. I. P. MAMCHENKOV and I. F. ROMASHEVICH (Trans. Sci. Inst. Fertilisers, Moscow, 1933, No. 113, 18—27).—The utilised N of manure (I) is $> \text{NH}_3\text{-N}$; in straw-(I) 75% and in peat-(I) 95% is utilised. (I) containing little NH_3 sometimes depresses the plant yield owing to microbial fixation of the N.

CH. ABS.

Economic control of agriculture, a fundamental problem in the maintenance and improvement of soil productivity. L. HELLER (Z. Pflanz. Düng., 1934, B, 13, 162—173).—A discussion of the economic use of fertilisers.

A. G. P.

Effect of zinc and cadmium ions [on plants] in sand and water cultures. K. SCHARER and W. SCHROPP (Z. Pflanz. Düng., 1934, A, 34, 14—29).—The susceptibility to Cd and Zn injury varies considerably

among cereals. In some instances stimulatory effects are recorded. At equiv. concns. Cd is the more toxic.

A. G. P.

Effect of accessory elements on plant growth. C. BRIOUX and E. JOUIS (Compt. rend. Acad. Agric. France, 1934, 20, 257—264).—Small amounts of CaF_2 added to soils increased, and larger amounts decreased, the growth of maize. Cu, Mn, and B produced only slightly heavier crops, but the % of N and P in the dry matter was significantly increased. In field trials Cu, Mn, and B had no influence on the gross yield of potatoes (I) or sugar beet (II), but increased the % of starch in (I) and of sugar in (II).

A. G. P.

Influence of the ratios lime : potash in the nutrient medium on the development and composition of maize. DEMOUSSY and G. BARBIER (Compt. rend. Acad. Agric. France, 1934, 20, 385—390).—In sand cultures, increasing ratios of K/Ca or Mg/Ca (total base const.) in the nutrient resulted in increased crop yields up to a max. which remained fairly const. over the range examined. The optimum K/Ca ratio was 0.05 and Mg/Ca 0.025 approx. With rising K/Ca in the nutrient the % of K increased and of Ca and Mg decreased in the dry matter of the plant. Similarly, increasing Mg/Ca in the nutrient resulted in increasing Mg and decreasing K and Ca in the crop. The ratios K/Ca and Mg/Ca in the plant were uniformly much $>$ those in the nutrient. With rising K/Ca and Mg/Ca in the nutrient the sum of the bases K + Mg + Ca in the plant declined to a min. and subsequently rose. The min. val. corresponds to optimum utilisation of bases in the production of org. matter. With other proportions there is an accumulation of bases in the plant surplus to growth requirements.

A. G. P.

Effect of frost on wheat at successive stages of maturity. I. Physical characteristics of the kernels. R. NEWTON and A. G. MCCALLA (Canad. J. Res., 1934, 10, 414—429).—Wheat is susceptible to frost injury over the whole period of maturation. Grading based on external appearance is more influenced by frost than are chemical composition and baking quality.

A. G. P.

Influence of nutrient ratios in the manuring of oats and barley. E. BLANCK and W. HEUKESHOVEN (J. Landw., 1934, 82, 61—75).—The effect of increasing proportions of K fertiliser in conjunction with two levels of basal P-N manuring is recorded. The K fertiliser affects straw yield much $>$ that of grain. The K content of the straw increases in accordance with the amount supplied, but the proportion of the other mineral constituents is not appreciably affected.

A. G. P.

Course of nutrient intake of oats. II. E. BLANCK and F. GIESECKE (J. Landw., 1934, 82, 33—59; cf. B., 1933, 680).—Earlier work is extended and data concerning the intake of N, P, and K with three levels of N supply are recorded.

A. G. P.

Effect of addition of magnesium on yield and composition of oats. K. KORCZEWSKI and F. MAJEWSKI (Polish Agric. Forestal Ann., 1932, 28, 145—153).—Mg (K : Mg $< 1 : 2.5$) when added to fertilisers has no inhibiting effect on the yield of oat seed or on the total dry substance of the plant. Plant-Mg increases as soil-Mg

increases. The assimilation of K and N is independent of the amount of Mg added. Plant-CaO is diminished, being replaced by MgO (0.87% per 1% MgO).

CH. ABS.

Influence of boron compounds on development of plants. M. GÓRSKI (Polish Agric. Forestal Ann., 1932, 28, 27—44).— $\text{Na}_2\text{B}_4\text{O}_7$ (0.05—0.1 g. per 8 kg. of sand) doubles the yield of beans, which do not seed at all without B. B increases the growth of potatoes, but not of barley.

CH. ABS.

Effect of boron on development of flax in water and soil cultures. M. ŠKOLNIK (Compt. rend. Acad. Sci. U.R.S.S., 1934, 2, 104—109).—B (as H_3BO_3) is necessary for the full growth of flax in H_2O and hastens and improves the development of flax in soil.

R. S. C.

Boron content of some soils, plants, and potassium fertilisers. F. TERLIKOWSKI and B. NOWICKI (Polish Agric. Forestal Ann., 1932, 28, 135—144).—Different types of soil contain 0.1—14 mg. B per kg. and 0—6.8% of org. C. Barley, rye, and wheat contain 0.1—0.3, tomato fruit 1 and stalks 14, tobacco 10, potatoes 14, beans 8, and peas 18 mg. B per kg. Vals. (% B) for fertilisers were 0.0005—0.0035.

H. ABS.

Pasture investigations. II. Penetration of surface-applied lime and phosphates in the soil of permanent pastures. B. A. BROWN and R. I. MUNSSELL.

III. Effect of fertilisers on the botanical and chemical composition of the vegetation in permanent pastures. IV. Effects of fertilisers on the total and seasonal production. V. Résumé of thirteen years of research. B. A. BROWN (Connecticut [Storrs] Agric. Exp. Sta. Bulls., 1933, Nos. 186, 14 pp.; 187, 54 pp.; 189, 33 pp.; 190, 15 pp.).—II. On a light sandy loam (p_{H} 5.2, CaO requirement 4000 lb./acre), deficient in available $\text{PO}_4^{''}$, surface applications of superphosphate (I) remained within the top 1-in. layer for at least 2 years, and after 6 years increased available $\text{PO}_4^{''}$ was not found below a 2-in. depth. Limestone (II) applied simultaneously decreased the efficiency of (I) in proportion to the amount of (II) added. When (I) was applied several months prior to (II) somewhat higher availability of $\text{PO}_4^{''}$ (A.P.) was apparent in the surface 1 in., but penetration was rather greater when the order of application was reversed. Treatment with $(\text{NH}_4)_2\text{SO}_4$ or NaNO_3 had no effect on the A.P. Plots receiving P fertilisers having least solubility in H_2O showed the greatest A.P. by Truog's test. When bone meal or rock phosphate was used there was little relationship between the A.P. and crop growth. Reduction in soil acidity due to liming (1 ton/acre) was restricted to the upper 2 in., and applications of 8—16 tons were necessary appreciably to affect the 3—5-in. layer.

III. Neither (II) nor K or N fertilisers used alone had any appreciable effect on the botanical composition of herbage, but marked changes followed applications of (I) and were intensified (notably clover increases) by supplementary use of (II). Variations in composition and nutrient val. with fertiliser treatment are recorded (cf. B., 1932, 522). Seasonal variations in and climatic effects on chemical and nutritive composition are shown.

IV. Fertiliser effects as measured by live-wt. increases in steers were in the order N, P, K > (I) + (II) > (I).

Basic slag was less effective than (I). Manurial treatment improved the total yield of feed, but had little influence on equalising the seasonal supply. Application of the N dressing half in spring and half in midsummer slightly decreased the total yield but increased the late summer grazing. Management is more effective than fertiliser in improving the seasonal distribution of pasturage. (Cf. B., 1933, 201.)

V. The complete investigation is reviewed and its bearings on problems of pasture management are discussed.

A. G. P.

Influence of magnesium, iron, and lime on growth of yellow lupins (*Lupinus luteus*). S. TRIWOSCH (Z. Pflanz. Düng., 1934, B, 13, 155—162).—Chlorosis (I) may be induced by manuring with MgCO_3 . Injury to the plants increases with the Mg content of the soil. With 0.2% Mg plants are dwarfed without being chlorotic, presumably as a result of high soil p_{H} . Mg-induced (I) closely resembles (I) due to Ca and is not corrected by liming. Addition to soil of Fe salts retards the appearance of (I). The quantity of Fe necessary to prevent (I) must bear an appropriate ratio to the Mg and/or Ca contents of the soil. Mg-(I) results from Fe deficiency in the leaves.

A. G. P.

Best form of nitrogen for fertilising sugar beets.

R. DE COSTELET (J. Fabr. Sucre, 1934, 70, No. 7).—Field experiments made at the Experiment Station at Rennes (France) showed that N added as a mixture of NH_4 salt (I) and nitrate (II) gives better results with sugar beets than the equiv. amount of either (I) or (II) alone, when these fertilisers were applied in conjunction with a dressing of 50 tons of manure per hectare (20 tons per acre).

J. P. O.

Phosphate absorption in [sugar] cane. I. H. VAN DEN HONERT (Arch. Suikerind. Nederl.-Indië, 1934, 41, meded. 23, 1119—1156).—Using an apparatus whereby young sugar canes can be fed with soil solutions containing different amounts of nutrients, it appears that the plant is able to absorb considerable quantities of phosphate from solutions of very low concns. Thus, from a soil having a solution of p_{H} 6.0 and 0.03—0.05 mg. P_2O_5 per litre the cane will take up 15—20% of the max. quantity possible in any case. At a concn. of 1.0 mg. per litre the absorption is 100% of the max. possible. By adjusting the p_{H} of the soil from 7.5 to 6.0 the absorption of $\text{PO}_4^{''}$ is increased 8-fold.

J. P. O.

Cause of poor [cane] juice in Demerara and its possible improvement. M. BIRD (Internat. Sugar J., 1934, 36, 189).—Such is the impermeability of certain Demerara clay soils on which sugar cane is cultivated that, about the time of ripening, a slow starvation sets in which causes the plant to rot and die unless harvested prematurely. It would appear that the roots become surrounded by impervious unbroken clay to an extent sufficient to prevent the flow of the plant nutrients to the roots. Early application of fertilisers and the burying of cane trash are suggested as ameliorating measures.

J. P. O.

Variations in mineral content of [sugar] cane with age and season. A. AYRES (Hawaiian Planters' Rec., 1933, 37, 197—206).—Figures are reproduced

showing the mineral matter content of sugar cane to vary greatly according to the variety, and, in the same variety, with the age, weather, climate, and soil. The composition of the stalk in the vicinity of the growing point (6 in. of the top) is very different from that of any other part of the plant, the ash being capable of running as high as 12.5% (dry matter), as compared with 1% elsewhere. Nearly 50% of this is K_2O , the proportion of which decreases down the stalk, while the SiO_2 and P_2O_5 increase. J. P. O.

Value of the sugar-beet crop in relation to its technical processing. V. S. DENISIEVSKI (Trans. Sci. Inst. Fertilisers, Moscow, 1933, No. 113, 49—55).—The effects of fertilisers, soil, and climatic conditions on composition are discussed. CH. ABS.

Fertilising experiments with strawberries. M. GÓRSKI, J. SZLAKIEWICZÓWNA, and K. JEZEWSKA (Polish Agric. Forestal Ann., 1931, 26, 335—356).—Fresh strawberries contain K_2O 0.14—0.20, P_2O_5 0.03—0.06, and N 0.09—0.12%. The annual fertiliser requirement for a crop of 10,000 kg. per hectare and the plants themselves is K_2O 37, P_2O_5 12, and N 32 kg. Nitrates, NH_4 salts, and K salts, but not PO_4''' , in high concn., are detrimental. CH. ABS.

Does the use of fertilisers influence the quality of agricultural and garden produce? H. WEILAND (Chem.-Ztg., 1934, 58, 392—394).—Data are given showing the improvement in quality of a no. of crops resulting from suitably balanced fertiliser applications. A. G. P.

Calculation of the activity of nutrients on the basis of field trials. W. U. BEHRENS (Z. Pflanz. Düng., 1934, B, 13, 145—150).—The necessity of comparison of various combinations of fertilisers rather than of individual nutrients in field trials is emphasised. Graphic methods of expressing results are considered. A. G. P.

Preparation of artificial manures. M. A. EGOROV (Ukrain. Chem. J., 1933, 8, 270—296).—Experiments on fertilisers composed of straw, phosphorite meal, and $(NH_4)_2SO_4$ are described. R. T.

Over-manuring and yield depression. A. MITSCHERLICH and A. KUHNKE (Z. Pflanz. Düng., 1934, B, 13, 151—154).—Experimental data show that decreased yields resulting from over-manuring with P and K are unlikely unless the applications far exceed those in customary use. The decline in yield of potatoes following the use of K in amounts $>$ the optimum is much more rapid in the case of 40% K salts than with K_2SO_4 . Yield depression is associated with decreased starch contents of the tubers. A. G. P.

Lime and potato production. V. VINCENT (Compt. rend. Acad. Agric. France, 1934, 20, 383—385).—In soils containing no free $CaCO_3$ seed potatoes sprouted abnormally and produced a large no. of very small tubers. Insufficient additions of $CaCO_3$ permitted normal development but restricted the no. and wt. of tubers. The optimum supply of $CaCO_3$ in soil is $<$ 0.2% and should produce p_H 6.5 approx. Treatment of soil with $MgSO_4$ does not compensate for a deficiency of Ca. A. G. P.

Variations in the composition of the plant associated with malnutrition of potatoes. R. L. CAROLUS (Amer. Potato J., 1933, 10, 147—165).—The malnutrition condition described is caused by deficiency of available Mg in the soil, continued cropping, use of much $(NH_4)_2SO_4$, and depletion of org. matter in the soil. The p_H is then usually $<$ 5. It is overcome by the use of $MgSO_4$ or Mg limestone. Absorption of Mg by the potato plant is increased by liming the soil. CH. ABS.

Relative responses of potatoes to different fertiliser treatments. T. E. ODLAND (Amer. Potato J., 1933, 10, 27—31).—Kainit, KCl, K_2SO_4 , and K Mg sulphate are almost equally effective sources of K. Superphosphate, basic slag, and triple superphosphate are equally effective sources of P, but bone meal and rock phosphate are less satisfactory. Variations in N or K affected the yields $>$ that of P. CH. ABS.

Control of insects by use of insectifuges. L. MESNIL (Compt. rend. Acad. Agric. France, 1934, 20, 29—33).—A repellent spray is prepared by emulsifying solutions of appropriate materials (C_5H_5N , $C_{10}H_8$, creosote) in vegetable oils (arachis) with aq. solutions of NH_4 oleate. A. G. P.

Treatment of vine mildew with copper sprays. I. J. BRANAS and J. DULAC. II. J. RIBÉREAU-GAYON (Compt. rend. Acad. Agric. France, 1934, 20, 33—39, 184—189).—I. The efficiency of Cu sprays is related not only to the $[Cu']$ in the initial mixture, but also to that which can be maintained over a period by moisture in contact with the spray residue. Vals. indicated are $>$ those usually accepted.

II. The above is discussed. The significance of determinations of "threshold concn." of toxicity is criticised. A. G. P.

Control of the termite pest of young rubber trees. F. BEELEY (J. Rubber Res. Inst. Malaya, 1934, 5, 160—175).—Of various methods for checking termites, the most efficient is to open up the roots and apply insecticidal dusts such as Na_2SiF_6 , Ca arsenate, or Paris Green; placing small pieces of rubber swollen to a jelly with a fumigant liquid, e.g., $o-C_6H_4Cl_2$, C_2HCl_3 , or CS_2 , around the base of the tree about 6 m. below the surface is also efficacious. D. F. T.

Control of the cabbage-root fly. E. E. EDWARDS (J. Min. Agric., 1934, 41, 154—161).—Best results were obtained by application of $\frac{1}{4}$ pint of aq. $HgCl_2$ solution (1 oz. in 8 gals.) to soil around the root of each plant, 4 days after setting out, with two further treatments at 10-day intervals. $C_{10}H_8$ ($\frac{1}{4}$ oz. per root) gave fairly satisfactory control, but its action was influenced by weather conditions. A. G. P.

Control of the common water leech, *Hirudinaria manillensis*. Z. DE JESUS (Philippine J. Sci., 1934, 53, 47—63).—Leeches are killed by $CuSO_4$ (1 in 50,000), NaCl (2—3% solution), tobacco infusion (1 in 400), or *Derris* infusion (1 in 1000). A. G. P.

"Diamnophos." $CaO-NH_4NO_3$.—See VII.

PATENTS.

Treatment of seeds for sowing. J. MÜLLER (U.S.P. 1,927,988, 26.9.33. Appl., 8.9.32. Austr.,

21.9.31).—Seeds, *e.g.*, of cereals, are treated with cold dil. solutions of H_2O_2 or substances which yield H_2O_2 on treatment with dil. H_2SO_4 , *e.g.*, with 1.5% H_2O_2 for 20 hr. A. R. P.

Preparation of fertiliser. S. J. SMITH (U.S.P. 1,930,542, 17.10.33. Appl., 13.4.29).—Moist peat (I) is mixed with sol. fertiliser salts (II) containing N, K, and P and the mixture is heated so that (II) dissolve in the H_2O of the (I) and thoroughly impregnate the whole. The mixture is then dried and ground to a powder. A. R. P.

Manufacture of sodium nitrate and other fertilising substances. F. MITTEAU, Assr. to Soc. d'ÉTUDES SCIENTIF. ET D'ENTREPRISES INDUSTR. (U.S.P. 1,929,002, 3.10.33. Appl., 12.2.31. Ger., 17.2.30).—A 1:1 mol. mixture of $NaNH_4HPO_4 \cdot 4H_2O$ (I) and HNO_3 is boiled until the temp. reaches 145° , then cooled, and the dry product pulverised and extracted with hot HNO_3 to leave a residue of $NaNO_3$; the mother-liquor is cooled to recover $NH_4H_2PO_4$ or may be treated with crude KCl to obtain a $K NH_4$ fertilising salt and a mother-liquor from which (I) can be regenerated. A. R. P.

Fertiliser. C. PETER (U.S.P. 1,931,296, 17.10.33. Appl., 4.10.32).—The following two mixtures are roasted separately for 30 min. at 315 – 425° : (a) rock phosphate 40, CaO 10, and NaCl 2.5 pts., (b) coal 35 and NaCl 2.5 pts., and the resulting products are ground with $(NH_4)_2SO_4$ 10 pts. A. R. P.

Production of phosphatic fertiliser. B. OBER and E. H. WIGHT, Assrs. to OBERPHOS Co. (U.S.P. 1,929,710, 10.10.33. Appl., 6.9.29).—Phosphate rock is digested under pressure with acid sufficient to solubilise the P_2O_5 , other fertilising salts, *e.g.*, K compounds, are added, and after releasing the pressure NH_3 is added with agitation and cooling to produce a distributable powder. A. R. P.

Production of concentrated [nitrogen-phosphorus-potash] fertiliser. H. E. DOD (B.P. 407,988, 22.8.32. U.S., 22.8.31).— NH_3 is passed under pressure into a chamber containing H_3PO_4 and a K salt and the mixture is kneaded by rollers during the reaction to obtain a plastic mass which is extruded into a cooling chamber to dry and harden it. Alternatively, the heat of the reaction is utilised to evaporate the H_2O and the dried salts are ground through 80-mesh in the reaction chamber. A. R. P.

Weed eradicator. M. C. TAYLOR, Assr. to MATHIESON ALKALI WORKS, INC. (U.S.P. 1,930,781, 17.10.33. Appl., 19.12.32).—Claim is made for $NaClO_2$ as a weedicide. A. R. P.

Production of insecticides. E. R. RUSHTON (U.S.P. 1,924,518, 29.8.33. Appl., 18.8.30).— $CaCO_3$ dust (I) and air are blown into a chamber, heated to 800 – 1000° , and thence into a reaction chamber, into which are also conducted the vapours produced by vaporising As_2O_3 in a heat exchanger (H). The $Ca_3(AsO_4)_2$ formed is passed into H and thence to a settling chamber. The heated air from H is utilised for mixing with (I). W. J. W.

Non-corrosive [fluosilicate] insecticidal compositions. E. B. ALVORD, Assr. to GRASSELLI CHEM.

Co. (U.S.P. 1,931,367, 17.10.33. Appl., 24.8.32).—Claim is made for a mixture (I) containing 95–80% of $BaSiF_6$ as the active parasiticide ingredient together with either 5–20% of BaF_2 or NaF or 10–20% of Na_3AlF_6 , to give the aq. suspensions of (I) a p_H of < 4 . A. R. P.

Insecticide material. R. B. ARNOLD, Assr. to TOBACCO BY-PRODUCTS & CHEM. CORP. (U.S.P. 1,925,225, 5.9.33. Appl., 11.8.32).—Compounds of alkaloids from *Chenopodiaceae Anabasis aphylla*, L., *e.g.*, β -pyridyl- α -piperidine, with tannic acid are specified. E. H. S.

XVII.—SUGARS; STARCHES; GUMS.

[Sugar]-cane dryage and deterioration. J. HALDANE (Internat. Sugar J., 1934, 36, 146; cf. B., 1933, 486).—During 14 days' storage, 20,909 maunds of cane left in the factory yard were found to undergo a loss in wt. of 7.9%, the sugar content of the cane falling from 12.60 to 10.85%. The average max. and min. temp. during this period were 68° and 46° , and the R.H. 57%. A greater deterioration would have been expected had not 94% of the cane consisted of Co 213, a variety which resists dryage and deterioration well. Co 215, on the other hand, has been found to deteriorate rapidly. J. P. O.

Testing beets for their "workability" in the factory. O. SPENGLER (Deut. Zuckerind., 1934, 59, 17).—Observations made were: that the beet varieties yielding the largest tonnages are those containing the least harmful (sol.) N; that varieties with the largest albumin content give a good flocculation and a rapid filtration; that a beet variety with a high non-sugar content will give a low-purity thick-juice; and the results obtained with the hot or cold pre-defecation methods are independent of the beet variety. A good parallelism exists between the ash content of the rasped beet pulp and that of the thick-juice, and this forms a safe criterion of the "workability" of the beets. J. P. O.

[Sugar]-juice subsidence observation apparatus. N. DEERR (Internat. Sugar J., 1934, 36, 152).—An apparatus is described for studying the settling quality of defecated or sulphited juices, consisting of a jacketed tube (20×2.5 cm.). It resembles a Liebig condenser, but the top is flared out and the bottom provided with a stopcock. It is intended to be installed permanently on the defecator platform and to be used to observe and to check the effect of defecation, supplementing the results of the application of p_H control in clarification methods. J. P. O.

Clarification of juices from newer varieties of cane in Hawaii. W. L. McCLEERY (Rept. Expt. Sta., Hawaiian Sugar Planters' Assoc., Sept., 1933, 36–38).—POJ 2878 juices in particular had given difficulty in settling after liming, and a study was made of the effect of a no. of reagents including Na pectate, Na aluminate, tannic acid, casein, and Zn hyposulphite, none of which gave definitely improved results. On the other hand, SO_2 and H_3PO_4 used in conjunction with CaO both gave satisfactory results, especially the former. J. P. O.

Colloidal [sugar] juice clarification. H. C. P. GEERLIGS (Arch. Suikerind. Nederl.-Indië, 1934, 42, I,

29—32).—Al(OH)₃ gel dispersed in H₂O is treated with SO₂ until it has passed into the sol state. Juice rendered alkaline with CaO is mixed with a suitable amount of this "Salfosol" and pumped into the carbonators, following which operations are carried on as usual. This method of clarification gave good results in a French beet factory, it being found possible to reduce the usual amount of CaO used. Less labour was required at the filter-presses, and the cloth consumption was reduced. (Cf. B.P. 386,276; B., 1933, 406.) J. P. O.

Magnesia clarification process [for beet diffusion juice]. E. VON HEYDEN (Deut. Zuckerind., 1934, 59, 17—19).—In the original process the juice, after being purified by the usual first and second carbonations, is sulphured almost to neutrality. As such a juice would lose too much alkalinity in the subsequent evaporation, it is filtered through a plate-and-frame filter-press, the cloths of which are coated with a mixture of MgO and wood charcoal. J. P. O.

[Sugar] juice pre-defecation. E. THIELEPAPE (Deut. Zuckerind., 1933, 58, 979).—Diffusion juice is pre-defecated with about 0.2% of CaO, filtered, mixed with about 100% of unfiltered first-carbonation juice at 60—62°, and passed directly into the main liming tank, where it is treated with milk-of-CaO. After heating to 80—84° it is submitted to the first carbonation. Experience with this process has shown it to give clarified juices which do not incrust during concn. in the evaporators. J. P. O.

Filtration of first-carbonation [sugar] juice. P. HONIG and W. THOMSON (Arch. Suikerind. Nederl.-Indië, 1933, 41, meded. 25, 1289—1342).—The mathematics of filtration is discussed and an experimental apparatus intended to express the altering properties of juices in definite figures that admit of comparison is described. A clarification process also is outlined, in which the raw juice is limed, subsided, and the resulting clear juice treated according to the De Haan carbonation method. This procedure is designed to allow factories having limited facilities for carbonation to produce a white sugar economically, or to make a high-grade raw sugar in case it should be decided to refine. The specification of a suitable filtering station for a factory employing this process is stated. J. P. O.

Electrometric determination of ash in [juice of] beets. E. SAILLARD and R. SAUNIER (Suppl. Circ. hebd., 1933, No. 2335).—32.5 g. of beet pulp are digested with 200 c.c. of H₂O at 80° for 20—30 min., cooled, and filtered (asbestos or glass wool), 20 c.c. being then diluted to 100 c.c. with H₂O and the conductivity reading taken. J. P. O.

Clarification of raw [cane] sugars for polarimetric examination. P. HONIG and K. D. DEKKER (Arch. Suikerind. Nederl.-Indië, 1934, 42, I, 116—119; cf. B., 1934, 36).—The average polarisation of 35 molasses cane sugars clarified by (a) the "wet method" (2 c.c. of basic Pb acetate solution, *d* 1.25), and (b) the "dry method" (Horne's dry basic Pb acetate, using 0.67 g. for an ash content of 1.71%) gave (a) 86.81 and (b) 86.62. In 8 of the sugars the result by method (a) was > that by (b) by 0.25—0.35° V. J. P. O.

Determination of the viscosity of pure, concentrated sugar solutions. A. L. VAN SCHERPENBERG (Sucr. Belge, 1934, 52, 201—208, 222—232).—Using a falling-sphere viscosimeter, the η of very conc. sucrose solutions at different temp. was determined, the results being expressed in abs. units. A graphical method consisting in tracing the isopoises or lines of equal η was applied to obtain the relation between the Brix, the temp., and the η of such highly conc. solutions. J. P. O.

Hygroscopic properties of raw [cane] sugars and molasses. J. G. THIEME (Arch. Suikerind. Nederl.-Indië, 1934, 42, I, 157—180).—A method of determining the hygroscopic properties of syrups and molasses placed in films in contact with air of varying humidity, and using the refractometer for the dry-substance determination, has been elaborated by the author, and applied to the determination of the hygroscopicity of a no. of molasses. Assuming the actual crystal of raw sugar to be free from H₂O and from non-sugar, a table has been compiled which gives the H₂O content and the polarisation of raw Java sugars at different R.H. Such a table is recommended for ascertaining the atm. R.H. at which a raw sugar may be in equilibrium, *i.e.*, at which it is unlikely to undergo deterioration changes. J. P. O.

Commercial analysis of molasses for use in the distillery. E. SAILLARD (Suppl. Circ. hebd., 1934, No. 2341).—250 g. of molasses, diluted to about 500 c.c., are acidified with 2.5 g. of H₂SO₄ per litre, boiled for 15 min., cooled to 30—32°, and made up to 1 litre. This liquid is fermented with 5 g. of fresh compressed yeast, and its EtOH content and acidity are determined, the gases evolved during fermentation being passed through H₂O, which is added to the flask before distillation. J. P. O.

New dichromate method of determination of reducing substances. I. Determination of glucose. E. N. TARAN (J. Appl. Chem. Russ., 1934, 7, 213—221).—K₂Cr₂O₇ titration of Fe^{II} by Knop's method (A., 1924, ii, 351) gives good results in the determination of glucose. R. T.

Potato starch. A. E. WILLIAMS (Engineering, 1934, 137, 639—641).—An account of manufacturing procedure and equipment.

Crystallisers.—See I. [Sugar-]factory control.—See XI. Sugar beet and cane.—See XVI. Storing beetroot. Cane molasses as feed. Wood-sugar yeast as fodder. Determining sugar in cacao etc., and starch in spice paprika.—See XIX.

XVIII.—FERMENTATION INDUSTRIES.

Dichloroethylene as solvent for hop resins. H. WILDNER (Woch. Brau., 1934, 51, 145—150).—The dichloroethylene (I) used (b.p. 48.5°) most probably has the *anti*-structure. (I) dissolves soft and hard resins quantitatively at room temp. from fresh hops, old hops, and lupulin, < 3 hr. shaking being necessary for complete extraction. Compared with Et₂O (II), very little extra non-resinous material, in addition to wax, is extracted by (I). Similar results are obtained with

boiling solvents. Analysis of several samples of hops by the methods of Wöllmer and of Stádník, using both (I) and (II) as solvents, gave results for the individual resin fractions which were in very close agreement.

I. A. P.

Composition of barley extract. W. PIRATZKY (Woch. Brau., 1934, 51, 153—157).—Worts were prepared from numerous finely-ground barley samples from a no. of Continental districts (seasons 1932 and 1933), using Diastase "Merck" (cf. B., 1934, 375). Total N (I) and formol-N (II), p_H , titratable acidity (III), buffering val. (IV), and maltose (V) were determined. For the samples investigated, p_H was approx. const. at 5.8—6.0, whilst (IV) varied from 4.3 to 6.5 c.c. of 0.1N-NaOH per 100 c.c. of wort. Barleys with high (I) showed high (IV) and (III), decrease in (I) being accompanied by parallel decrease in (III). Increasing amounts of N in the barley gave decreasing amounts in the wort, whilst high (I) was accompanied by low (II). (V) showed relatively small variations. Barley extracts were compared with the Congress worts from the corresponding malts, the latter giving regularly higher vals. for (III), (IV), and (I), though the figures for (I) are not strictly comparable in the two cases.

I. A. P.

Sparging considered mathematically as a mechanical extraction process. I. G. JAKOB (Woch. Brau., 1934, 51, 121—126, 130—134, 138—144, 150—151).

I. A. P.

Opalescence of Congress wort. C. WIRTH (Woch. Brau., 1934, 51, 113—116).—Barleys giving clear Congress wort (*W*) have appreciably more husk than those yielding an opalescent *W*. Slight changes in the mashing process yielded clear *W* from malts which normally gave opalescent *W*. Thus, with the latter malts, mixing with distilled H₂O at lower temp. than usual, and then proceeding according to the Congress method, gave an increase in acidity, the *W* running clear. The use of brewing liquor gave diminished acidity with increase in turbidity. The characters of typical barleys which normally lead, respectively, to clear, faintly opalescent, and opalescent *W* are discussed.

I. A. P.

Sugar content of wort and final attenuation. W. ROKITA and E. GFUNNDER (Brauer- u. Hopfentz. "Gambrius," 1934, 36; Woch. Brau., 1934, 51, 134).—The attenuation depends on the composition of the wort and not on the type of yeast. The fermented extract bears no const. relation to maltose as determined in the original wort. The proportion of reducing non-sugars at the end of fermentation is not const. when a particular wort is fermented by different yeasts, nor when the same yeast ferments different worts, but the variations are not great.

I. A. P.

Determination of the final attenuation in wort and beer. K. BENGTISSON, B. ELMFELDT, and E. ANDERSSON (Svenska Bryg. Månadsbl., 1934, 2, 52; Woch. Brau., 1934, 51, 116—119, 126—127).—Wort pitched with 4—8% of pressed yeast (I) gives the min. of unfermented residue after 20—24 hr. at 25°. Similar results are obtained at 22°, but a greater residue at 28° points to autolysis. Brewery pitched worts, without

special addition of (I), require at least 5 days for fermentation (*F*) to the end-point (*P*), i.e., the point reached in 20—24 hr. by adding 4—8% of (I). With such worts, *F* is accelerated by adding 0.35% of finely-divided material, e.g., norit, or preferably "Biospane" (II), *P* being reached in 30 hr. Prolonged *F* in presence of (II) goes beyond *P*, the time taken to reach a min. depending on the condition of the (I). There is a subsequent rise due to autolysis. In examination of beers, use of large amounts of (I) may lead to inaccurate results, and there is no advantage in adding (II). Using 0.5% of (I), the limit of *F* is reached in 24—30 hr., autolysis becoming apparent after approx. 50 hr. Frequent determinations of sp. gr. are necessary to obtain accurate results.

I. A. P.

Determination of natural boric acid in Rumanian wines. C. ŞUMULEANU and G. GHIMICESCU (Bul. Soc. Chim. România, 1934, 15, 91—97).—Determination by the authors' method on 90 wines from 20 districts of Rumania showed the H₃BO₃ content to range from 17 to 79 mg. per litre, and to vary considerably in wines from the same district.

H. F. G.

Indirect determination of extractive content of wines and fruit extracts. J. SCHINDLER and V. HULAČ (Chem. Listy, 1934, 28, 18—21, 34—37).—Formulae are given for calculating the extractive contents of wines.

R. T.

Distillery molasses.—See XVII. **Wood-sugar yeast as fodder.**—See XIX.

PATENTS.

Non-corrosive [ethyl] alcohol. F. A. McDERMOTT, Assr. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,927,842, 26.9.33. Appl., 11.9.28).—About 0.03% of Na₂CO₃, or the equiv. of NaOAc, Na₂B₄O₇, Na lactate, or the corresponding K salts, is added to commercial EtOH to give p_H 7, thereby preventing corrosion of the metal containers.

A. R. P.

Manufacture of emulsified alcohol product. D. F. BROWN and H. C. DE HOFF, Assrs. to STANDARD OIL DEVELOPMENT Co. (U.S.P. 1,927,916, 26.9.33. Appl., 15.5.30).—An emulsion containing < 15% of EtOH together with oil and H₂O is prepared by agitating the components in presence of a gum from Leguminosæ. A suitable mixture is EtOH 40, white mineral oil 12, H₂O 43, and gum 1%.

A. R. P.

XIX.—FOODS.

Determination of starch in spice paprika adulterated with flour. D. KÖSZEGI and N. TOMORI (Z. Unters. Lebensm., 1934, 67, 538—541).—The dried material is extracted with Et₂O, washed 6 times with H₂O at 35°, and treated for 30 min. at room temp. with aq. HCl (*d* 1.19). The resulting glucose is determined polarimetrically. A small correction must be applied for optically-active substances produced from the paprika.

E. C. S.

Butter, its commercial aspects and a diagnosis of its defects. F. W. BOUSKA (Oil & Soap, 1934, 11, 88—89).—Defects of appearance and flavour are listed and their diagnosis is briefly discussed.

E. L.

Importance of the catalase number in determining the quality of butter. H. SCHMIDT (Milch. Zentr., 1934, 63, 113—117).—A method of determining a "catalase no." for butter is given and its val. as an indication of bacterial contamination discussed.

E. B. H.

Pyknometric determination of fat in cacao and chocolate, with simultaneous determination of sugar. W. LEITHE (Z. Unters. Lebensm., 1934, 67, 535—538; cf. B., 1934, 522).—Finely-divided chocolate is shaken with CCl_4 (I) and aq. $\text{Pb}(\text{OAc})_2$ (II). The fat in the (I) layer is determined pyknometrically, the sucrose in the (II) layer polarimetrically.

E. C. S.

Microscopical diagnosis of vegetables. III. Salad materials and spinach. H. GOTTSCHALDT (Z. Unters. Lebensm., 1934, 67, 465—510; cf. B., 1934, 378).—Morphological characters are described for the identification of lettuce, chicory, endive, cress, watercress, and other salad vegetables, and of various forms of spinach and substitutes therefor.

E. C. S.

Microbiological examination of fresh and frozen fruits and vegetables. F. W. TANNER (Amer. J. Publ. Health, 1934, 24, 485—492).—A review.

E. C. S.

Cane molasses as a supplement to fattening rations for swine. L. A. HENKE (Hawaii Agric. Exp. Sta. Bull., No. 69, 11 pp.).—Fed to pigs in amounts $\geq 20\%$ of the ration, molasses (I) was as valuable, wt. for wt., as rolled barley. The palatability of the ration was improved by admixture of (I), which also proved a satisfactory source of vitamin-B and -E.

A. G. P.

Metabolism in sugar beetroot at low temperatures. Storage of beetroot in a frozen state. A. OPARIN (Compt. rend. Acad. Sci. U.R.S.S., 1934, 2, 116—121).—Cooling beetroot to $< -2^\circ$ first freezes the free H_2O . The latent heat of fusion causes a rapid rise of temp. in the interior of the root. Further cooling only slowly freezes the H_2O retained in the colloids of the protoplasm. Respiration, with loss of sucrose (I), continues slowly until the second stage of freezing is complete. On subsequent thawing, (I) is converted into glucose and fructose only. By complete freezing by severe natural frost loss of (I) in beetroot is reduced by $> 33\%$.

R. S. C.

Composition and feeding value of lucerne. H. E. WOODMAN (J. Min. Agric., 1934, 41, 137—150).—Changes in % composition of lucerne with advancing growth are recorded, and discussed in comparison with pasture herbage. Digestibility data show a decline in feeding val. at the flowering period. Digestibility coeffs. of lucerne in bud or flower are definitely $<$ those of pasturage cut at 1—5-week intervals, and are more comparable with those of meadow hay.

A. G. P.

Value of wood-sugar yeast as a feeding-stuff. H. CLAASSEN (Z. Spiritusind., 1934, 57, 116).—Conclusions drawn by Fingerling and Honcamp from the results of their feeding experiments with wood-sugar yeast (B., 1934, 426) are criticised. The yeast used was probably not a true fodder yeast (mineral yeast), but was an enzyme-rich culture yeast. Soya-bean meal is at least as good as wood-sugar yeast as regards digestible protein content and far better as regards starch val. Protein

is producible more easily and cheaply by cultivation of rape seed, soya beans, or sweet lupins, and especially by ensilage of green fodder, than by the manufacture of fodder yeast. Moreover, fodder-yeast factories are more vulnerable in wartime.

T. H. P.

Baking powders.—See VII. Detecting margarine. —See XII. Casein paints.—See XIII. Effect of frost on wheat.—See XVI. Treating dairy waste.—See XXIII.

PATENTS.

Preservation of milk and other or similar food products. W. RAFN, and A.-G. F. PATENT U. INDUSTRIERWERTE (B.P. 409,290, 25.8.32).—The milk (etc.) is sterilised as a thin film by heating to 120° for < 1 min., then filled into sterile containers, and there given a further heating for 8 min. at 107° .

E. B. H.

Apparatus for pasteurisation of milk. P. ALBOHR (U.S.P. 1,925,475, 5.9.33. Appl., 25.1.32. Ger., 10.11.30).—Four heat exchangers of the plate type are arranged in two tiers on either side of a support, their functions being to act as: (1) a final cooler for the milk with tap H_2O , alongside (2) a preheater for self-exchange of heat, above (3) a final heater of the milk, by means of hot H_2O produced and reheated in (4), at the same level, by means of steam.

B. M. V.

Cheese pasteurisation. F. M. FREDERIKSEN, Assr. to PREMIER-PABST CORP. (U.S.P. 1,925,093, 5.9.33. Appl., 31.5.32).—The production of a "graining" texture in acid cheeses, when pasteurised, is overcome by a previous addition of sufficient alkali (NaOH) to change the original p_{H} to 5.5—6.5. At the completion of pasteurisation an acid (HCl) is incorporated equiv. to 80% of the alkali added originally.

E. B. H.

Egg preservative. H. W. GREENSMITH (B.P. 409,623, 8.12.33).—A grease for coating the eggs consists of soft yellow paraffin 75, tallow 5, and H_3BO_3 20%.

E. B. H.

Peanut butter. L. C. BROWN, Assr. to E. K. POND Co. (U.S.P. 1,926,369, 12.9.30. Appl., 17.6.32).—In the prep. of peanut (or other nut) butter, $\geq 10\%$ of a glyceryl fatty acid ester, containing ≤ 1 free alcohol group, is added to prevent segregation of solid matter and to eliminate the tendency of the nut butter to adhere to the roof of the mouth; e.g., 1—5% of mono-glyceryl stearate is used.

E. B. H.

Production of stable, water-containing emulsions of vegetable lecithin. F. W. ENGELMANN, M. J. and A. BRINCKMAN, and A. and F. MERGELL (HARBURGER OELWERKE BRINCKMAN U. MERGELL (B.P. 409,540, 26.7.33).—A conc. solution of $\frac{1}{2}$ —1 kg. of NaOH (or Na_2O_2) is well stirred with 100 kg. of aq. soya-bean slime (containing lecithin 40, soya-bean oil 30, and H_2O 30%) to effect emulsification, and the excess H_2O is removed by vac. distillation.

E. B. H.

Curing of ripe olives. B. PREBLE (U.S.P. 1,928,229, 26.9.33. Appl., 3.8.31).—The olives (I) are washed in 0.5—2% aq. NaOH , then in H_2O until neutral, and soaked in 0.5—5% pyrogallol for several hr. Without rinsing, (I) are transferred to 1% aq. NaOH until it penetrates the skin, exposed to the air until they become

black, then washed free from NaOH, and soaked in dil. aq. NaCl to develop the flavour. A. R. P.

Preparation of coffee. W. HOSKINS, Assr. to H. W. CLARK (U.S.P. 1,924,059, 22.8.33. Appl., 7.8.31. Renewed 30.1.33).—Roast coffee beans are mixed with, and chilled to a low temp. by, a solid refrigerant to retain their aromatic constituents after grinding. The ground coffee is then packed in airtight containers in an atm. of refrigerant gas. E. B. H.

Preparation of coffee extract. G. L. WENDT, Assr. to LIQUID COFFEE PRODUCTS CORP. (U.S.P. 1,925,159, 5.9.33. Appl., 15.12.28).—The aromatic and other constituents of fresh coffee are retained in conc. form in the glycerin (I) when a strong infusion of coffee made with hot H₂O is distilled with (I), up to 20 wt.-%, under vac. E. B. H.

Dehydrating fruit. Separating substances containing atomised fat.—See I. Antiseptic ice.—See VII. Heat-treating edible substances.—See XI. Theobromine.—See XX.

XX.—MEDICINAL SUBSTANCES; ESSENTIAL OILS.

Bacteria-proof filter for direct filtration into vaccine bottles. C. H. SYKES (Pharm. J., 1934, 132, 521—522).—The suspension is delivered from a const.-level feed system to the filter by suction obtained by connecting with an evacuated bottle. H. D.

Reactions occurring in the preparation of emplas-trum fuscum camphoratum, D.A.B. VI. P. HÖRRMANN and W. GREVE (Arch. Pharm., 1934, 272, 505—532).—In the formation of the plaster (I) (in which tristearin or triolein may replace peanut oil) no oxidation of the saturated, and very slight oxidation of the unsaturated, acids occurs, since the amount and physical consts. of the acids recovered from (I) by removal of Pb and hydrolysis are identical with those in the original fat. The volatile products formed in the reaction are CO₂, H₂ (ratio 2.5:1), H₂O, CH₂:CH:CHO, and MeCHO. The H₂O-sol. portion of (I) contains glycerol (II) (equiv. to 30% of the esters used), Pb salts of saturated and unsaturated acids, a little Pb glycerate, and the Pb salt of an acid (K salt), equiv. 112.5; 6—7% of unattacked glyceryl esters, and traces of PbCO₃ and PbO are also present. An essentially similar reaction occurs when (II) alone is heated (140°) with Pb₃O₄ (CO₂:H₂ = 10:1; no MeCHO), and thus the mechanism of the formation of (I) involves initial hydrolysis of the esters by traces of H₂O, giving (II), which is oxidised by Pb₃O₄, and free acids which form Pb salts, so liberating more H₂O for further hydrolysis. J. W. B.

Preparation of tincture of strophanthus. G. TONI (Arch. Farm. sperim., 1934, 57, 161—168).—The fat of the seeds is removed by cooling the tincture to —10° and filtering, no loss of strophanthin resulting. R. N. C.

Brazilian labdanum. F. W. FREISE (Perf. Ess. Oil Rec., 1934, 25, 135).—Hot-H₂O extraction of the stalks of a species of *Cistus* gives a dark brown, tough material (*d* 0.955—0.982), containing resin, m.p. 95—105°, 88%, essential oil (*d*₂₅ 0.9045, *n*₂₀ 1.511, acid val. 5.5, sap. val. 45, sol. in 1—3.5 vols. of 90%

EtOH) 4.5%, and impurities and extractive matter (contains a vesicant fatty oil, 2.5—2.8% of raw material) 7.5%. The leaves of the plant yield 0.08—0.11% of essential oil (*d*₃₂ 0.9558, acid val. 38, sap. val. 66). E. H. S.

Determination of pyrethrins. H. A. SEIL (Soap, 1934, 10, 89, 91, 111; cf. B., 1929, 733; 1931, 365).—The powdered flowers (12.5 g.) are extracted with light petroleum (I); the solvent-free extract is saponified with 0.5N-alcoholic NaOH (10—15 c.c.) and then diluted to 200 c.c. The EtOH is removed, and after the addition of Filter-cel (1 g.), 10% BaCl₂ solution (10 c.c.) is added and then H₂O to 250 c.c. To 200 c.c. of the filtered liquid, conc. H₂SO₄ (1 c.c.) is added and the mixture steam-distilled until only 10—15 c.c. are left. The distillate (II) is extracted with (I) and the solvent extract titrated with 0.02N-NaOH (1 c.c. ≡ 0.0066 g. of pyrethrin I) after addition of H₂O (15 c.c.). The filtrate of the residue from (II) is made alkaline (NaHCO₃) and extracted with CHCl₃. It is then acidified (HCl) and extracted with (I). The extract is washed, freed from (I), the residue dried, dissolved in EtOH and H₂O, and titrated with 0.02N-NaOH (1 c.c. ≡ 0.00374 g. of pyrethrin II). The method is adaptable to kerosene extracts also. Reactions of chrysanthemum mono- and di-carboxylic acids are given. E. H. S.

Oxygen number and determination of the fermenting stage in yellow tobacco. A. I. SMIRNOV (State Inst. Tobacco Invest. Krasnodar, 1933, No. 95, 3—18).—A discussion. Data for various varieties of tobacco are recorded. CH. ABS.

Occurrence of citral in Florida Valencia orange oil. E. K. NELSON and H. H. MOTTERN (J. Amer. Chem. Soc., 1934, 56, 1238—1239).—Small amounts of citral and decaldehyde are isolated by Tiemann's method (A., 1899, i, 247). The oil consists largely of limonene. H. B.

Viscosity of essential oils. I. A. MÜLLER (J. pr. Chem., 1934, [ii], 140, 56—58).—With a viscosimeter based on that of Höppler (A., 1933, 367) the η ²⁰ vals. for 20 essential oils have been determined with an accuracy of ±0.1—0.5%. J. W. B.

PATENTS.

Extraction of theobromine. J. H. KELLOGG, G. L. and W. K. TELLER, Assrs. to BATTLE CREEK FOOD CO. (U.S.P. 1,925,326, 5.9.33. Appl., 13.11.33).—Cacao products are heated with a mixture of H₂O and an unstable org. solvent (I) which liberates acid when heated with H₂O, e.g., C₂H₂Cl₄, and after separation from (I) the residue is washed until free from theobromine and dried by means of hot inert gases until free from (I). E. H. S.

Antiseptic ice.—See VII. **Cod-liver oil.**—See XII. **Insecticide.**—See XVI.

XXI.—PHOTOGRAPHIC MATERIALS AND PROCESSES.

Colour filters, with special reference to their use in photography. S. O. RAWLING (Phot. J., 1934, 74, 295—305).—A lecture.

Increase of sensitivity of photographic plates.

K. O. KIEPENHEUER (Naturwiss., 1934, 22, 297).—A combination of photo-electric and photographic methods is described which results in increased sensitivity of the plate. The emulsion side of the plate is rendered conducting by deposition (by sputtering) of a thin, transparent layer of Ag. Close behind the plate, in a vac., a photo-cathode is arranged, the potential between this and the Ag layer on the plate being 5000 volts. This combination renders the plate more sensitive over the whole spectral range, but particularly in the red and ultra-violet.

A. J. M.

History of the diazotype process. J. M. EDER (Z. wiss. Phot., 1934, 33, 1—12).

PATENTS.

Kinematograph films having monochrome or multicolour images. H. D. MURRAY, D. A. SPENCER, and L. W. OLIVER (B.P. 377,706, 23.4.31).—The film is developed, fixed, and hardened as usual, and then coated with a thin layer of hot gelatin solution containing a transparent pigment or dye lake to produce, on cooling, an intimate union of the two gelatin layers. The upper layer is then treated with a solution containing CrO_3 0.1, KBr 1—2, and $\text{K}_3\text{Fe}(\text{CN})_6$ 1—2% to convert the Ag into a salt; the gelatin other than that hardened by this treatment is removed by washing in H_2O at 42° , and the film fixed in aq. $\text{Na}_2\text{S}_2\text{O}_3$, washed, and dried.

A. R. P.

Manufacture of coloured, transparent films for the photographic and kinematographic arts. H. D. MURRAY and D. A. SPENCER (B.P. 406,743, 8.4.33. Cf. B.P. 377,706; preceding abstract).—The top, coloured gelatin layer described in the prior patent contains a H_2O -insol. org. dye (or its basic derivative or metallic salt) in a colloidal state. Methods of preparing dyes in the colloidal state in gelatin are described.

J. L.

Non-halation [kinematograph] film. A. NARATH, Assr. to GEN. ELECTRIC Co. (U.S.P. 1,929,254, 3.10.33. Appl., 12.11.30. Ger., 16.11.29).—The rear face of the film is roughened and covered with powdered C.

A. R. P.

Projecting screen. T. SUZUKI, Assr. to ZAIDAN HOJIN RIKAGAKU KENKYUJO (U.S.P. 1,926,923, 12.9.33. Appl., 6.2.28. Jap., 31.3.27).—An opaque or dark-coloured base is coated with a layer of gelatin, and a layer of crystals of Co^{II} or Mn^{II} NH_4 phosphate, preferably by settling from an aq. suspension. The screen may be protected by varnishing. The lamellar crystals give a small cone of diffusion when reflecting light, and hence pictures may be shown on the screen quite clearly, even in presence of other lights, if these are not near the projecting light. Layers of 3—4 and 20 g. of the Mn^{II} salt per sq. m. give angles of diffuse reflexion of about 10° and 30° , respectively.

J. L.

Manufacture of negatives [for photo-printing]. W. HEINECKE (U.S.P. 1,913,881, 13.6.33. Appl., 12.12.28).—A lithographic or typographic design (I) is printed in ink on a paper or film (II) coated with gelatin containing pyrogallol (III), the (II) is treated with a reagent which oxidises (III) in those parts not

covered with (I), and the ink is then removed, leaving a negative impression of (I) on (II).

A. R. P.

Subtractive colour photography. J. A. BALL, Assr. to TECHNICOLOR, INC. (U.S.P. 1,926,255, 12.9.33. Appl., 3.3.31).—Starting with the usual colour-separation negatives with blue, green, and red filters, positives are printed in yellow, magenta, and "cyan," respectively, and are combined with an under-exposed black-and-white key print ($\gamma = 1$) made from the "green" negative. For sound films, the sound track is printed with the key print. Improved definition and rendering of the middle colours of the spectrum are claimed.

J. L.

Gelatin films.—See XV.

XXII.—EXPLOSIVES; MATCHES.

Detonation of explosives. A. SCHMIDT (Z. ges. Schiess- u. Sprengstoffw., 1934, 29, 130—133).—Pol- emical. Equations in terms of density and detonation velocity, proposed by Schweikert and by Friederich (B., 1934, 350), are criticised.

W. J. W.

High brisance of nitroglycerin. K. K. ANDREEV (Z. ges. Schiess- u. Sprengstoffw., 1934, 29, 95—98, 137—140).—In general, rise of temp. increases the brisance (B) of nitroglycerin (I), but this cannot be ascribed to differences in viscosity, for after reaching a min. at -10° the B of liquid (I) increases as the temp. falls to -70° . Definite differences in B are not always accompanied by differences in viscosity. B may be reduced by vac. treatment, but the presence or absence of enclosed air is not necessarily a controlling factor. Rapid freezing has a marked effect in increasing the B of (I), especially the labile form, and slow freezing lowers the B of the stable form. It is uncertain whether the influence of freezing is related to altered air content and cubic d , the size of the crystals, or their combined surface. Addition to nitroglycerin of EtOH , MeOH , COME_2 , NH_2Ph , NHPh_2 , camphor, PhNO_2 , $\text{C}_6\text{H}_4\text{Me}\cdot\text{NO}_2$, xylene, nitroglycol, and EtNO_3 gives it high B ; N_2O_4 , Et_2O , and powdered Al have a negative effect. Under certain conditions of manufacture and stabilising, (I) may acquire high B , but the factors are obscure) Naoum's and Nauckhoff's theories have not been confirmed. Experiments tend to indicate complicated changes in (I), but whether these changes are associated with an altered equilibrium between the labile and stable forms, as suggested by Dserschkovitsch and Andreev, remains uncertain.

W. J. W.

Explosive power and its determination. A. HAID and H. KOENEN (Z. ges. Schiess- u. Sprengstoffw., 1934, 29, 102—107).—The dimensions of the Trauzl Pb block are given, and the method of casting it is described. Details of the test include the size and wt. of the charge, method of tamping and initiation, temp. of the block, and measurement of the cavity after explosion. The effect of the explosion on the block is discussed.

W. J. W.

Explosive properties of divinyl ether.—See III. Nitrocellulose.—See V. Armoured safety glass.—See VIII.

PATENTS.

Priming mixture [for ammunition]. J. E. BURNS, Assr. to REMINGTON ARMS Co., INC. (U.S.P. 1,928,780,

3.10.33. Appl., 26.5.31).—The mixture consists of (a) Hg fulminate 25—40 (25), Pb styphnate (I) 5—10 (8), Ba(NO₃)₂ 24—44 (44), Sb₂S₃ 0—16 (16), Pb dinitrosalicylate (II) 4—10 (7), and powdered glass 0—30 (0)%, or (b) (I) 30, "guanylnitrosamineguanyltetracene" 2, basic Pb nitrate 30, basic (II) 13, and glass 25%. A. R. P.

Explosive composition. W. C. HOLMES, Assr. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,927,832, 26.9.33. Appl., 8.7.31).—Claim is made for mixtures of org. esters of HNO₃ and H₃PO₄, e.g., nitroglycerin 34, nitrocellulose 1, NaNO₃ 52, wood pulp 8, starch 3, S 1·6, and Ph₃PO₄ [or (C₆H₄Me)₃PO₄] 0·4%. A. R. P.

Manufacture of explosive. H. H. CHAMPNEY, Assr. to HERCULES POWDER Co. (U.S.P. 1,924,912, 29.8.33. Appl., 5.10.29).—In addition to a liquid high explosive, a carbonaceous material, and an oxidising agent, a low-*d* permissible explosive contains cryst. NH₄NO₃, the gravimetric *d* of which is 0·5—0·8 g. per c.c., this being determined by dividing the wt. in g. of 1 cu. in. by the vol. after compression in a closed cylinder (1 sq. in. cross-section) under a wt. of 10 lb. The cartridge count of the explosive is > 425 cartridges (1½ in. × 8 in.) per 100 lb. W. J. W.

Production of propellant powder. O. J. TEEPLE, JUN., Assr. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,924,465, 29.8.33. Appl., 27.10.32).—Granular nitrocellulose powder is agitated with warm H₂O, > 15% of a liquid nitric ester of a polyhydric alcohol, e.g., nitroglycerin (I), being added during the agitation, until impregnation is complete, the grains being subsequently air-dried and glazed. A deterrent and nitrates may be added either before or after impregnation. Instead of (I), nitroglycol or nitrated lactic esters of glycol may be used. W. J. W.

Manufacture of propellant powder. W. E. WAGNER, Assr. to WESTERN CARTRIDGE Co. (U.S.P. 1,924,967, 29.8.33. Appl., 8.12.30).—For the treatment of nitroglycerin-nitrocellulose powders with a deterrent (*D*), e.g., amyl phthalate, the latter is added in just sufficient of a mild solvent, e.g., MeOH or EtOH, to wet the surface of the powder grains. The solvent is evaporated at a temp. as low as 15°, using a large amount of air, evaporation being controlled so that the *D* is prevented from entering the grains further than is required to secure the desired ballistics. W. J. W.

Manufacture of smokeless powder. J. M. SKILLING and O. J. TEEPLE, JUN., Assrs. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,924,464, 29.8.33. Appl., 10.2.32).—Nitrocellulose is agitated with H₂O, in presence of deterrents and stabilisers, if desired, a solvent (*S*) being added during the agitation to cause partial colloidisation. Excess H₂O is removed, and the mixture is further colloidised by passing it through rollers, after which the *S* is removed and the mixture granulated. W. J. W.

(A—D) **Detonator compositions.** (E) **Safety detonator.** S. B. LARGE, Assr. to ATLAS POWDER Co. (U.S.P. 1,928,204—8, 26.9.33. Appl., [A, B] 15.12.30, [C, D] 18.11.31, [E] 29.8.32).—Claim is made for a compound detonator (A) in which the primary detonating substance (I) is a solid explosive of the general formula C_nH_{n+2}(NO₃)_n, e.g., mannitol hexanitrate (II); (B)

with (I) similar to that of (A) and a fuse head of Hg fulminate and KClO₃; (c) with (I) composed of a copptd. mixture of (II), another nitro-sugar, e.g., lactose dinitrate (III), and tetryl (IV); (d) with (I) composed of a solid disaccharide nitrate, e.g., (III); and (E) in which the primary charge is an 85:15 mixture of (II) and (IV) with an ignition medium of a 40:20:20 mixture of smokeless powder, KClO₃, and Pb(SCN)₂ (0·04—0·08 g.), followed by a 74:26 mixture of Se and BaO₂ (0·4 g. compressed at 1300 lb. per sq. in.), and then by a 40:10:25:25 mixture of Ba(NO₃)₂, Mg powder, (IV), and Pb hypophosphite (0·25 g. compressed at 2600 lb. per sq. in.). A. R. P.

Cellulose nitrate.—See V.

XXIII.—SANITATION; WATER PURIFICATION.

Determination of methyl and ethyl alcohol vapour in air. I. J. SCHAFERSCHTEIN (J. Appl. Chem. Russ., 1934, 7, 239—250).—1 ml. of 5*N*-HCl and 2 ml. of 25% NaNO₂ are added to 20 ml. of solution containing < 0·1 mg. of EtOH or MeOH, and the mixture is shaken in a special apparatus with 30 ml. of CCl₄ during 0·5 min., the CCl₄ layer is then shaken for 0·5 min. with 20 ml. of 0·1*N*-NaOH to remove oxides of N, and then with 10 ml. of a solution of 100 g. of tartaric acid and 10 g. of sulphanic acid in 500 ml. of H₂O. 10 ml. of 3·5% α-C₁₀H₇-NH₂·HCl are then added to the aq. layer, and, after shaking for 2 min., 25 ml. of 5% NaOH are introduced, and the resultant coloration is compared with that given by standard NaNO₂ (1 mg. of NaNO₂ ≡ 0·648 mg. of MeOH or 0·814 mg. of EtOH). EtOAc, COMe₂, CH₂O, C₆H₆, PhOH, and C₅H₁₁-OH do not interfere. MeOH in air can be determined by leaving the air in contact with 20 ml. of H₂O during 24 hr., and applying the above procedure to the resultant solution. R. T.

Use of salts of dinitrophenol and dinitrocresol as anticryptogamics and parasiticides. A. MEYER (Compt. rend. Acad. Agric. France, 1934, 20, 43—46).—The high toxicity of dinitrophenols to man and domestic animals is emphasised. Small amounts of these materials are detected by the red coloration obtained by reduction with Zn and HCl, and subsequent oxidation by K₂Cr₂O₇. A. G. P.

Determination of the p_H of sewage sludges. W. D. HATFIELD and K. MORKERT (Sewage Works J., 1934, 6, 246—249).—Precautions are indicated which if adopted render the colorimetric method quite satisfactory. C. J.

Hydrogen-ion concentration and bicarbonate equilibrium in digesting [sewage] sludge. A. P. BANTA and R. POMEROY (Sewage Works J., 1934, 6, 234—245).—The p_H of digesting sludge is determined by the equilibrium between dissolved CO₂ and HCO₃'. The concn. of the former depends on the composition of the gas being evolved and of the latter on the excess of alkaline substances over fixed and org. acids. Vals. are given from which the p_H of sludge in equilibrium with its gas can be calc. if the composition of the gas, the HCO₃' content, and the temp. are known. The results obtained agree with colorimetric determinations made on sludge liquor in the same condition. C. J.

Digestion of garbage. G. M. FAIR (Sewage Works J., 1934, 6, 259—261).—The ratio of production of garbage (I) and fresh and digested sewage solids in an average North American municipality is estimated to be 3.6:1.5:1 on the basis of their dry org. matter content. The proportion of sewage solids is considered to be inadequate for good digestion of all the (I) unless the final product from the digesting mixture can be used as seeding material. C. J.

Quantity of garbage that can be digested with sewage sludge. C. E. KEEFER and H. KRATZ (Sewage Works J., 1934, 6, 250—258).—Laboratory-scale experiments at Baltimore indicate that a 1:1 mixture of garbage and raw sludge on a dry org. matter (I) basis digests rapidly at 28° when properly seeded, and produces an inoffensive, easily dewatered end-product. Daily additions up to 5% of the initial (I) in the seeding sludge can be dealt with and produce 750—800 c.c. of gas containing 62—67% of CH₄ per g. of (I) added. C. J.

Activated sludge for [treatment of] dairy waste. H. KESSENER and W. RUDOLFS (Sewage Works J., 1934, 6, 318—327).—A surface aëration (brush) activated-sludge plant at Hamoir (Belgium) is successfully treating 37,000 gals. of dairy waste per day with a power consumption of 60 kw.-hr. C. J.

Coagulation as applied to sewage treatment. I. E. F. ELDRIDGE and F. R. THEROUX (Mich. Eng. Exp. Sta. Bull., 1934, No. 55, 3—22).—There is a definite *p_H* zone in which FeCl₃ coagulation of sewage is most effective. The zone of low removal may be due to coagulation of sewage colloids at their isoelectric point without the aid of FeCl₃. KMnO₄ in small amounts permits flocculation at *p_H* 7.8 instead of 4.5—5.5. The amount of solids removed by FeCl₃ increases with dosage up to 1.25 grains per gal. The biological O₂ demand is greatly decreased. CH. ABS.

Biological purification of effluent waters. DIÉNERT and VILLEMALINE (Compt. rend. Acad. Agric. France, 1934, 20, 243—246).—In a sterilised sewage effluent mixed with chopped (sterile) straw and aërated (unsterilised air) for some hr., org. colloids coagulated and were pptd. The bearing of this on the activated-sludge process is discussed. A. G. P.

Development of the automatic zeolite water softener. S. B. APPLEBAUM (J. Amer. Water Works Assoc., 1934, 26, 607—617).

Progress in municipal zeolite water softening. A. S. BEHRMAN (J. Amer. Water Works Assoc., 1934, 26, 618—628).

Purification of silvered sand from impurities accumulated during filtration of drinking water, and methods of enhancing its oligodynamic action. S. V. MOISEEV and N. S. GILLER (J. Appl. Chem. Russ., 1934, 7, 205—212).—Silvered sand (I) can be reactivated by heating during 1 hr. at 100—180°; the oligodynamic action and stability of the product obtained by heating (I) with 0.01N-HCl are > those of the original product. R. T.

Formulation of bacterial changes occurring in polluted water. H. W. STREETER (Sewage Works J.,

1934, 6, 208—233).—The rates of bacterial decline in a river under summer low-H₂O conditions are > those observed in stored samples of the H₂O. This is due to the progressive reduction in suspended matter due to sedimentation. When the river results are corrected for this effect the rates become very similar, as they were likewise found to be under winter high-H₂O conditions when sedimentation did not occur. The rates of bacterial decline in the stored samples probably represent a fair approximation to the true bacterial death rates at a particular temp. and under conditions of natural purification of the stream. Empirical equations have been developed to express the trend of the bacterial curves and consts. derived which bear a definite relation to temp. and are influenced by the relative *d* and age of pollution. C. J.

Determination of traces of phenols in surface water. T. FOLPMERS (Chem. Weekblad, 1934, 31, 330—333).—Details are given for carrying out the determination of traces of phenols (I) in a standardised apparatus by coupling with *p*-NO₂·C₆H₄·N₂Cl. A connexion is traced between (I) and the protein-NH₃ content of river-H₂O. S. C.

Paper-mill pollution.—See V.

PATENTS.

Manufacture of water-soluble disinfectants. P. GÖDRICH, ASSR. to GOEDRICH CHEM. CO. (U.S.P. 1,930,474, 17.10.33. Appl., 7.7.27. Ger., 12.7.26).—Aromatic compounds (with bactericidal properties) sol. in oils but insol. in H₂O are dissolved in a fatty oil, H₂SO₄ is added, and the mixture kept at room temp. till sulphonation is complete. *E.g.*, a 1:1 mixture (200 g.) of chlorothymol and olive oil is treated with H₂SO₄ (60 g.) at 20° for 2 days, and then washed free from acid with saturated aq. Na₂SO₄; the product is readily dispersed in H₂O. A. R. P.

(A) Removal of all forms of polluting substances from liquids. (B) Treatment of water solutions.

(c) Water purification. O. M. URBAIN, ASSR. to C. H. LEWIS (U.S.P. 1,928,398—1,928,400, 26.9.33. Appl., [A] 20.6.33, [B] 24.10.31, [C] 26.2.32).—(A) H₂O containing putrescent org. colloids (I) is treated with FeCl₃, then with sufficient Ca(OH)₂ to ppt. and flocculate the Fe(OH)₃ with (I), and finally with an activated adsorbent carbonaceous shale to remove bacteria. (B) Alcohols, amines, and phosphoric esters derived from decomp. of org. matter (II) are removed from H₂O by addition of an acyl halide, *e.g.*, BzCl, in presence of a catalyst, *e.g.*, FeCl₃ or CuCl₂. (c) Suspended and colloidal (II) is removed from H₂O by addition of a polycyclic compound, *e.g.*, naphthalenesulphonic acid, diphenic acid, or carminic acid, to impart a max. charge and max. cataphoretic velocity to the (I), followed by Fe₂(SO₄)₃ or Al₂(SO₄)₃ and Ca(OH)₂ to *p_H* 8.5 to flocculate (I). A. R. P.

Removal of emulsoids from water solutions. O. M. URBAIN, ASSR. to C. H. LEWIS (U.S.P. 1,922,464, 15.8.33. Appl., 11.5.31).—A phenolic ester and salt which on dissociation yield a cation of low and an anion of high valency, *e.g.*, pentadialloylglucose and Na₃PO₄, are added to the aq. solution. B. M. V.

Waste sulphite liquor.—See V.