

B.—APPLIED CHEMISTRY

APRIL 12 and 19, 1935.*

I.—GENERAL; PLANT; MACHINERY.

Technical firing calculations. II. Examples and summarised formulæ. H. SCHWIEDESEN (Arch. Eisenhüttenw., 1934—5, 8, 329—336).—Mathematical.

A. R. P.

Insulation against heat losses. ANON. (Fuel Econ., 1935, 10, 680—682).—The properties of the more important heat-insulating materials, e.g., asbestos, 85% MgO, kieselguhr compositions, Al foil, slag wool, etc., are briefly reviewed. The thermal conductivity (B.Th.U. per sq. ft. per ft. thickness per hr. per 1° F. temp. difference) of 100% asbestos fibre is 0.030 at 100° F., 0.0395 at 500° F., and 0.065 at 1000° F. The material does not deteriorate under any heat, steam, or H₂O conditions.

A. B. M.

Construction of cylindrical pressure containers. E. AUDIBERT and A. RAINEAU (Ann. Off. nat. Comb. liq., 1934, 9, 203—277; Chem. Zentr., 1934, ii, 1985).—A discussion of the choice of material, changes in properties of various materials with temp., and of corrosion by H₂ and H₂S.

H. J. E.

Treatment of soft feed-water: precipitation of residual hardness. G. SPAAK (Suomen Pap. Puutavara, 1934, 457—458, 460—462, 464; Chem. Zentr., 1934, ii, 2115).—The treatment of H₂O of total hardness 0.60—0.70° and with a relatively high humus and SiO₂ content by means of NaOH and Na₃PO₄ at 70—90° is described.

H. J. E.

Varying behaviour of zinc protective plates in the boilers of German railway steamships. R. KÜHNEL (Ber. Korros.-Tag., 1934, No. 1933, 42—46; Chem. Zentr., 1934, ii, 2129).—Tests are recorded with Zn containing Fe 0.01—0.02 and Pb 0.95—1.7%. The best results were obtained with Zn of max. hardness.

H. J. E.

Efficiency of perforated rectifier plates. G. VOLLAND (Chem. Fabr., 1935, 8, 5—8).—Most of the liquid on the plates is in the form of froth; the tendency to form froth depends on the composition of the liquid (H₂O, EtOH mixtures) and on this account the efficiency (*E*) varies from plate to plate. *E* is not greatly affected by the height of the overflow tube, but depends on the diam. (*D*) of the holes and the distance (*L*) between them; *L* should be 3.6*D*.

A. G.

Separation of solids from liquids—thickening. W. CULLEN and H. T. DURANT (Inst. Chem. Eng., Dec., 1934. Advance copy, 6 pp.).—In two types (*A*, *B*) of Blomco thickeners in which filter-cloth (*C*) rests on a layer of fabric which serves as a drainage area, which in turn is supported by a resilient material (*R*), e.g., rubber, the clear filtrate is sucked through *C* by a vac. pump (*P*). The suction compresses *R*, causing *C* to

crimp. Periodically and automatically the filtrate chamber is exposed to atm. pressure. This causes *R* to expand, which in turn stretches *C* to its original tension and the cake falls off. A back-flush of clear filtrate may be passed through *C*. In *A*, the *C* is on the outside of a vertical cylinder immersed in the sludge in a tank (*T*). The cake periodically falls to the cone bottom of *T* and the thick sludge is pumped off. Type *B* resembles a rotary-drum thickener except that the periphery consists of several independent segments each with its own eduction pipe leading through a central valve to a *P* and each forming its own arc of cake. *B* gave satisfactory results (tests given) when used to thicken the sludge obtained in the removal of SO₂ from flue gases.

D. K. M.

Fundamental considerations of viscosity, its determination and significance, with particular reference to solid hydrocarbons and waxes. L. IVANOVSKY (Petroleum, 1935, 31, No. 2, 1—12).—Following a general discussion of viscosity (η), the apparatus used for its determination, and of η -temp. characteristics, a survey is given of published results on the η of solid hydrocarbons and waxes. For the determination, a special model of the Steiner instrument is favoured which requires only 5 g. of material and is rapid in action. A scheme is suggested for expressing η -temp. relationships which is similar to the " η index" system, the reference temp. chosen, however, being 80° and 100°. Results are plotted on a chart the axes of which represent centistokes at 80° and 100°, respectively.

C. C.

Coke for heating purposes.—See II. **Al-foil insulation.**—See X. **Treating sugar-factory boiler feed-H₂O.** **Heat losses in sugar-factory evaporators.**—See XVII.

PATENTS.

Chemical dryer. J. ROBERTS, Assr. to PROCTOR & SCHWARTZ, INC. (U.S.P. 1,960,123, 22.5.34. Appl., 25.3.30).—A loop dryer in which pigments or other pastes are applied to a conveyor or chain mail is described.

B. M. V.

Heat-transfer apparatus. C. E. LUCKE, Assr. to BABCOCK & WILCOX Co. (U.S.P. 1,959,377, 22.5.34. Appl., 28.9.29).—In a Hg-vapour heating system (hermetically sealed under vac.), the temp. and pressure of the Hg are regulated by abstraction of heat at some convenient point (in addition to the point of utilisation) by some easily controllable cooling medium.

B. M. V.

Reduction of solid substances to a finely-divided state. W. A. BRISTOW and P. C. POPE (B.P. 422,628, 13.7.33).—A single layer of balls is placed in the annular space (*A*) between rotating inner and fixed outer, inverted conical surfaces. Preferably *A* has two or more widths

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

containing balls of correspondingly different diam. The material, *e.g.*, low-temp. coke, to be reduced to such fineness that it will remain suspended in oil, filters down through the interstices of the balls. B. M. V.

Mixing machine. A. J. SACKETT, Assr. to A. J. SACKETT & SONS Co. (U.S.P. 1,960,030, 22.5.34. Appl., 15.8.31).—A dry mixer especially suitable for treatment of solids with gases comprises the following zones: (1) feeding, (2) agitation by paddles, (3) agitation by falling among deflectors. B. M. V.

Treatment of liquids. J. N. JACOBSEN, Assr. to PFAUDLER Co. (U.S.P. 1,960,012, 22.5.34. Appl., 10.3.32).—The liquid, *e.g.*, milk while still hot after pasteurisation, is subdivided, or caused to flow in a thin film in vac., and thereby deodorised and initially cooled. B. M. V.

Apparatus for filtering liquids or separating solids from liquids. M. C. SANTIAGO (B.P. 422,748, 12.3.34).—The sponges comprising the filter medium (cf. B.P. 403,849; B., 1934, 225) are cleaned *in situ* by alternate compression and release. Suitable mechanism is described. B. M. V.

Apparatus for filtering and purifying liquids. A. G. LEIGH (B.P. 422,987, 30.1.34).—A plate-and-frame filter-press has the bottoms of the frames open, the apertures serving for inlet of prefilter (*P*) and outlet of sludge (*S*) from and to a closed screw-conveyor chamber; the conveyor is arranged to compress *S* against the resistance of a spring-loaded valve on delivery. Automatic means controlled by the increase of filtering pressure may be provided to operate the scrapers and/or liquid jets which remove *S*. B. M. V.

Production of sterile filters. ENZINGER-UNION-WERKE A.-G. (B.P. 423,140, 28.3.34. Ger., 7.4.33).—Deposited pad filters are sterilised by the methods described in B.P. 396,255 (B., 1933, 817), the filter medium being, if desired, circulated in suspension in the sterilising liquid and redeposited. B. M. V.

Centrifugal bowl provided with sludge valves. AKTIEB. SEPARATOR-NOBEL, Assees. of G. J. STREZYNSKI (B.P. 423,162, 26.9.34. U.S., 27.9., 20.10., 1.12., and 29.12.33).—The sludge-discharge valves (*V*) are in the form of hollow cylinders having conical ends which close the sludge outlets (*S*) and are themselves provided with small leak holes from their interior alined with *S*. In operation, *V* either float open on accumulated fluid heavy material (*e.g.*, wax), or are pulled open by internal tension springs; in either case *V* are closed when desired by admission of any suitable liquid to their interior, the extra wt. causing them to close centrifugally. B. M. V.

Vacuum distillation of liquids. F. X. GOVERS, Assr. to INDIAN REFINING Co. (U.S.P. 1,959,714, 22.5.34. Appl., 13.7.33).—In the distillation of a liquid such as oil in vac. and in presence of CO₂, H₂S, or SO₂ (*A*) to reduce further the partial pressure, *A* is condensed after the oil by a spray of N(C₂H₄·OH)₃ which is subsequently stripped. B. M. V.

Apparatus for mixing liquids and gases. NEW JERSEY ZINC Co., Assees. of A. J. MYHREN and B. MARQUIS (B.P. 423,343, 16.7.34. U.S., 15.12.33).—Liquid is supplied to the first tank of a series (*S*) and

after withdrawal is partly returned to that tank and partly sent forward to the next tank, each transfer being effected through an ejector device which draws in gaseous medium (*G*) from the upper part of the tank concerned and delivers the froth below liquid level. The general direction of flow of *G* is countercurrent through *S* by means of high-level conduits. B. M. V.

Separation of low-boiling gas mixtures. L. MELLERSH-JACKSON. From GES. F. LINDE'S EISMASCHINEN A.-G. (B.P. 422,664 and 422,994, 16.2.34).—In a system for the separation of air (*e.g.*), comprising primary (I) and secondary (II) rectifiers and two pairs of reversible heat regenerators, the main body of air is compressed only to condensation pressure (approx. 4 atm.) and another body of air = the O₂ produced is blown under slight pressure into (II) to provide a large vol. of reflux. The losses of cold are made up: (A) partly by expansion with work of N₂ from (I) or air at a similar pressure, (A, B) partly by a small quantity of highly compressed air (*C*) expanded by throttling, and (B) partly by *C* expanded with work; suitable exchanges of heat are also claimed. B. M. V.

Separating the constituents of gaseous mixtures. C. C. VAN NUYS, Assr. to AIR REDUCTION Co., INC. (U.S.P. 1,959,883—4, 22.5.34. Appl., [A] 16.7.32, [B] 20.12.33).—Methods suitable for the production of cheap, but not very pure, O₂ from air comprise two stages of selective liquefaction with backward return producing a gaseous (*A*) and two liquid products (*B, C*): *B, C* are rectified with addition of unseparated low-pressure air at an intermediate point of the upper rectifier; *A* is passed through a third condenser which is cooled by the boiling of liquid fractions of *B, C* under vac.; *A* is then used as cooler in the rectifier. B. M. V.

Concentrating and separating the components of gaseous mixtures. E. MAZZA (B.P. 423,003, 4.5.34. Ital., 5.5.33).—An apparatus intended for the separation (by stratification) of gaseous mixtures by the combined action of centrifugal force, gravitation, and expansion is described. B. M. V.

Adsorption system. G. T. SHOOSMITH, Assr. to C. F. HOCKLEY (for SILICA GEL CORP.) (U.S.P. 1,959,389, 22.5.34. Appl., 2.7.31).—A liquid is removed from a gaseous medium, *e.g.*, air is dried, by passage through the following course: a steam jacket (*A*) for heating, a used absorber (*P*), an idle liquid trap (*X*), a H₂O-jacket (*B*) for cooling, an active liquid trap (*Y*) where H₂O is separated, a cold active absorber (*Q*); the flow is reversed at intervals, and, if desired, just before reversal *P* may be cooled by passing H₂O through *A*. B. M. V.

Composition for joints. H. L. BROWNBACK (B.P. 423,669, 31.7.33. Fr., 6.8.32).—A non-drying substance of a grease-like consistency, suitable as a jointing material, or as a protective coating for metal surfaces, is prepared by mixing waste mica with castor oil that has been heated for 4 hr. to a syrupy consistency. E. L.

Low-friction composition. W. C. WILHARM, Assr. to WESTINGHOUSE ELECTRIC & MANUFACTURING Co. (U.S.P. 1,959,775, 22.5.34. Appl., 23.4.30).—Self-lubricating blocks or the like are formed of one or more powdered

metals, *e.g.*, Cu with minor proportions of Pb and Zn, mixed together with their soaps and compressed; free fatty acid may also be present. B. M. V.

Viscosimeter. V. A. SCHOENBERG (U.S.P. 1,960,225, 22.5.34. Appl., 24.7.33).—A circular bath (*B*) of the liquid is rotated by a synchronous motor and its temp. adjusted by electrical heating. A paddle dipping into *B* is deflected by the drag and brought back to the vertical position by a moving coil or other electrical device, the power taken by which is a measure of η . B. M. V.

Grinding (etc.) fibrous substances.—See V. **Glass filters.**—See VIII. **Rotary furnaces.** **Foamite corrosion inhibitor.**—See X. **Pptg. suspended particles from gases.**—See XI. **Resin-lined vessels.**—See XIII. **Tunnel oven.**—See XIX.

II.—FUEL; GAS; TAR; MINERAL OILS.

Change in the chemical composition of Karaganda coals due to weathering. E. V. VORTOVA (Brennstoff-Chem., 1935, 16, 21—24).—The coals in the upper layers of the seams of the Karaganda basin have undergone more or less weathering, as is shown by their transformation from caking into non-caking coals, and by the decrease in the yield of bitumen (*I*) obtained from them by extraction with C_6H_6 under pressure (250—260°/50 atm.); to extract (*I*) completely it was necessary first to treat the coal with 10% HCl and to repeat the extraction several times. Extraction of (*I*) with C_6H_6 -EtOH failed because the humic acids formed on weathering were also appreciably sol. in this mixture. A. B. M.

Purification of coal. ANON. (Fuel Res. Bd. Rept., 1933—4, 38—49; Fuel Econ., 1934, 10, 636—638; 1935, 689—690).—Experiments with a laboratory-scale "assay" apparatus have shown that good-quality coal can be recovered from slurries and from coal dusts obtained in dry-cleaning processes etc. by "vac. flotation" (*V*), and the results have been confirmed by large-scale experiments for the second type of material. The quality of the product may be improved in some cases by the addition of a small amount of a flocculating agent (*F*), *e.g.*, glue, for the fine dirt etc. in the raw material. Preliminary small-scale experiments have been carried out on a "pressure-flotation" process in which the dry coal is first subjected to a slight pressure (20—60 lb./sq. in.) of air or other gas, H_2O being then added and the pressure released; the yield of clean coal obtained without the use of a flotation agent is generally considerably greater with this than with other processes. High-rank coals are more readily cleaned by *V* than those of lower rank. The clarification of slurries can in most, if not all, cases be considerably facilitated by the addition of a suitable *F*, and the results of comparative intermediate-scale tests, in which a greatly improved clarification was effected by the continuous addition of a small proportion of a 1% glue solution, are shown graphically. The addition of *F* may also make it practicable to use filters for slurry clarification, the rate of filtration often being thereby increased several times and the filtering medium being less clogged by

fine material. A pneumatic coal-cleaning plant of a type described previously (Fuel Res. Bd. Rept., 1932—3, 47), but with a capacity of $1\frac{1}{2}$ tons of coal per hr., has been erected; no difficulty was experienced in obtaining a clean coal containing 5—7% of "free dirt" from a dry slack passing a $\frac{1}{2}$ -in. screen and containing 27% of "free dirt" which sinks in a liquid of *d* 1.45. When cleaning material $< \frac{1}{2}$ in. in size the presence of dust $< \frac{1}{100}$ in. is advantageous up to about 5%, the efficiency of cleaning decreasing with $>$ or $<$ that amount. The presence of surface moisture reduces the cleaning efficiency, which can, however, be improved in some cases by dedusting. Coal may contain moisture which is in excess of that corresponding to air-dry moisture in equilibrium, but is not present as surface moisture and does not interfere with dry-cleaning and similar processes. A. B. M.

Flocculation of slurries. Continuous clarification of a coal-washery circuit with glue. D. T. DAVIES and E. T. WILKINS (Fuel, 1935, 14, 51—55; cf. preceding abstract).—The addition of glue to a dil. slurry considerably improved its rate of sedimentation. The results of comparative tests in a washery circuit dealing with 5 tons of slurry per hr. to which glue was added at the rate of 40 c.c. of a 1% solution per min. are given; the solid matter contents of the H_2O from the flocculated and the untreated slurries at the ends of the tests (24 hr.) were 1% and 7%, respectively. Sludge having a mean solid matter content of approx. 34% was withdrawn at frequent intervals from the bottom of the conical settling tank. A. B. M.

Propagation of a zone of combustion in powdered coal: composition of the products of oxidation. H. E. NEWALL (Fuel, 1935, 14, 34—42; cf. B., 1931, 185).—A "train" (Δ -shaped, 1 cm. high and 1 cm. wide) of powdered bituminous coal was placed in a tube (2.5 cm. diam.) and ignited at one end; air was passed through the tube in the opposite direction to that of the moving zone of combustion (*Z*). The rate of propagation of *Z* decreased with decreasing rate of flow of the air; the initial oxidation would not proceed throughout the mass at rates of flow < 1 litre/hr. The solid oxidised product had a lower C and H and higher O content than the original coal; the composition of the solid product was independent of the rate of flow of the air. The O_2 content of the effluent gas (11—12%), which was also independent of the rate of air flow, was the min. in which propagation of a *Z* would proceed. With a wider tube (7.5 cm. diam.) the composition of the product and the O_2 content of the effluent gas varied with the rate of flow of the air. When *Z* travelled in the same direction as the air stream the rate of combustion was much slower. A. B. M.

Explosive properties of lignite dust-air mixtures as a function of the physical and chemical nature of the dust, the source of ignition, and the carbon dioxide or oxygen content of the carrying gas. H. RIESS (Braunkohlenarch., 1934, No. 42, 1—45; Chem. Zentr., 1934, ii, 2153).—The explosive range increases with the H_2O content of the dust. Explosion is prevented by $> 3.2\%$ CO_2 , even in very dry and very fine dusts. H. J. E.

Galvanic utilisation of fuels. P. S. TUTUNDZIC (Bull. Soc. Chim. Yougoslav., 1934, 5, 103—117).—The problem of production of electrical energy directly from C is discussed. R. T.

Lowering the sulphur content of coke by admixture of catalysts to the coal. G. I. DESCHALIT (J. Appl. Chem. Russ., 1934, 7, 934—938).—Addition of 0.1% of a mixture of CrO_3 , 90 and MnCl_2 , 10% to coal leads to a diminution of 3.5—17.5% in the S content of the coke obtained; chiefly inorg. S is thus eliminated. The magnitude of the effect obtained diminishes with rising temp. of coking, and is inconsiderable at $> 900^\circ$. R. T.

Desulphuration of metallurgical coke. IV. I. V. SCHMANENKOV and A. N. BLASHENOVA (J. Chem. Ind. Russ., 1934, 10, No. 12, 29—31; cf. B., 1933, 900).—12.5% of the S content of coke is removed by passing 120 cu. m. of coal gas (I) per ton of coke at 800° , and 32.4% when 300 cu. m. of (I) are passed at 1000° . No advantage is gained by adding NaCl, alone or together with MgO or Fe_2O_3 , to the coke. R. T.

Use of coke for heating purposes. R. A. MOTT (Gas World, 1935, 102, Coking Sect., 5—11).—Oven coke (O) as well as gas coke can be used in domestic grates, hot- H_2O boilers, and central-heating boilers. To avoid clinker formation, deep fuel-beds (F) should be used with air supply drastically curtailed, the ash-pit door being kept closed and the control flap in it used as the main control instead of the draught-flue damper. The most important property of the coke is its size; tables and curves are given showing the relationships and optimum conditions. The crit. sizes are $1\frac{1}{2}$ and 3 in., and a proper relationship between the smallest cross-sectional dimension of the boiler and the size of the coke used is essential. $O < 1\frac{1}{2}$ in. is suitable for shallow F burned at low rates; when < 1 in. it is specially suitable for slow-combustion stoves. Use of $O < 1\frac{1}{2}$ in. is not suitable for rapid burning as it increases the liability to clinker formation. Coke > 3 in. size is unsuitable. Provided the size of grate is suitable to allow ready settling, $2\frac{1}{2}$ —3-in. coke would give best service. For open-grate fires 1— $1\frac{1}{2}$ -in. size was used and detailed results of different cokes are given. Lighter coke of 2— $2\frac{1}{2}$ -in. size is suitable for ordinary well-grates, but too large for barred grates. D. M. M.

Quantity and nature of the gases evolved, under the action of heat and reduced pressure, from Rumanian coals. Classification. J. RUDIC (Compt. rend., 1935, 200, 326—328).—Experimental data are given for 8 coals which are then classified as lignite, brown coal, and peranthracite. M. S. B.

Desulphurisation of coke-oven gas. A. THAU (Chem.-Ztg., 1935, 59, 193—195).—A review.

Preparation of hydrogen from gaseous hydrocarbons with brown-coal coke as catalyst. R. SCHMIDT (Braunkohle, 1933, 32, 889—894; Chem. Zentr., 1934, ii, 2154).—The CH_4 (and homologues) produced in the hydrogenation of brown-coal tar (I) were saturated with H_2O at 88° and passed over a brown-coal coke (I) catalyst at 950 — 1025° . The product contained 70% of H_2 . The CO formed simul-

taneously may be decomposed in a second stage with (II) as catalyst to CO_2 and H_2 . The product is suitable for hydrogenating (I). H. J. E.

Application of vapour-sorption theories to recovery of benzene from coal gas by silica gel. A. I. BRODOVITSCH (J. Appl. Chem. Russ., 1934, 7, 1241—1253).—It follows from theoretical grounds that adsorption of C_6H_6 in low concns. (25 g. per cu. m. of gas) by SiO_2 gels (I) takes place chiefly in pores the radius of which is of the order of 10^{-7} cm.; commercial activated (I) contains chiefly pores of greater radius, and is unsuitable for C_6H_6 sorption. Acid (I) are the best sorbents for C_6H_6 . R. T.

Catalysis in hydrocarbon chemistry. I. High-pressure hydrogenation of coal tar. H. HOLLINGS, R. N. B. D. BRUCE, and R. H. GRIFFITH. **II. Decomposition of low-boiling hydrocarbons.** R. H. GRIFFITH and J. H. G. PLANT. **III. Adsorption by hydrogenation catalysts.** R. H. GRIFFITH and S. G. HILL (Proc. Roy. Soc., 1935, A, 148, 186—190, 191—194, 194—206).—I. The effect of adding SiO_2 as a promoter (P) to Mo catalysts in the hydrogenation of a low-temp. coal tar at high pressure in a rotating autoclave has been studied. The curve showing the relation of catalyst activity to [P] has two peaks, between which the addition of P is actually harmful. The treatment of a creosote oil with the same catalysts at 200 atm. in a continuous hydrogenation plant leads to similar results.

II. Measurements of the effect of the same catalysts on the decomp. of C_6H_{14} , cyclohexane, and light petroleum at ordinary pressures shows that there is a crit. [SiO_2] for which the activity of the catalyst is a max.; this coincides with the position of least activity at high pressures.

III. The adsorption of H_2 , C_6H_6 , C_6H_{14} , and cyclohexane on Mo catalysts has been studied up to 450° . That of H_2 increases as the amount of SiO_2 is increased, but no relation is found between catalyst activity and H_2 adsorption. With the hydrocarbons, a point of max. adsorption occurs coinciding with that of max. low-pressure and min. high-pressure activity. All the Mo catalysts are found to be effective in the conversion of para- H_2 , but the influence of SiO_2 on the velocity of change is negligible. L. L. B.

Synthesis of liquid hydrocarbons from natural gas. I, II. K. KOBAYASHI, K. YAMAMOTO, H. ISHIKAWA, and S. HINONISHI (J. Soc. Chem. Ind., Japan, 1934, 37, 785—791 B).—The composition of natural gas (I) from the Nishiyama and Ōmo oil fields is given. After purification, (I) contains mainly CH_4 and N_2 . The purified gas is passed through heated Si tubes and gives light oil (II), tar (III), and C. The effect on these products of varying the temp. and the rate of flow of gas is described. The optimum conditions for the formation of (II) and (III) correspond to heating to 1050 — 1100° for 0.4—0.5 sec. From a single passage of gas the total yield of (II) and (III) is approx. 11% of the CH_4 passed through the tube. H. G. M.

Chemistry of voltol oil formation. A. D. PETROV and T. N. BOGOSLOVSKAJA (Compt. rend. Acad. Sci. U.R.S.S., 1934, 4, 389—397).—Straight-run and cracked

kerosenes and certain pure hydrocarbons (*e.g.*, octylene, hexadecene, cumene, etc.) were subjected to voltolisation (7500 volts, frequency 1000, time 6 hr.). The yield, η , d , and n of the polymerised product (I) are recorded. (I) contains up to 60% of olefines (II), 23–28% of naphthenes (III) and paraffins (IV), and 15% of aromatics (V). (V) give the highest η but lowest η index (I), whilst (II) and (IV) have the lowest n and highest I . The η of (I) from (II) and (IV) may be increased by adding (III) or (V) before treatment, whilst the expenditure of electrical energy is less the greater is the content of (III) and (V). C. C.

Polymerisation of liquid hydrocarbons under the action of electric discharges. G. J. TARASOV (Compt. rend. Acad. Sci. U.R.S.S., 1934, 4, 398–403).—Results are given showing the effect of varying the frequency (F) (350–2000 cycles/sec.), the voltage (4–14 kv.), and the time of application (T) of the current, on η of the product formed by subjecting cracked kerosene to electric discharge in an atm. of H_2 in an apparatus similar to the Siemens ozoniser. Under const. electrical conditions η rose with T , the increase being more rapid after 6 hr. If F and T are kept const., η increases with the electrical power. The optimum F is 500 cycles/sec. C. C.

Isolation of a nonanaphthene from an Oklahoma petroleum. J. D. WHITE and F. W. ROSE, JUN. (J. Res. Nat. Bur. Stand., 1934, 13, 799–810).—By fractional crystallation of a fraction (b.p. 136–137°, and freed from aromatic hydrocarbons) of the above petroleum from solution firstly in liquid CH_4 and C_3H_8 , and then in CCl_2F_2 , a nonanaphthene (I) was isolated (C_9H_{18} , b.p. 136–65°, m.p. –65–80°, n_D^{25} 1.42730, d_4^{20} 0.77883). From its absorption spectrum and chemical behaviour (*e.g.*, on treatment with Pd at 350°, and on nitration), (I), which constitutes \approx 0.1% of the crude petroleum, is considered possibly to be a cyclopentane derivative. A. L. R.

Production of cylinder oils in the Polmin refinery. Z. Z. BILUCHOWSKI and W. FILEPOWICZ (Przemysł Chem., 1934, 18, 313–317).—Good-quality cylinder oil is prepared from the product obtained by high-vac. distillation of de-paraffinised petroleum. R. T.

Determination of neutralisation and saponification values of mineral oils. G. ELTESTE (Chem.-Ztg., 1935, 59, 69).—These vals. are determined on the same sample by first neutralising a 10-c.c. sample + 75 c.c. of “blue solution” with 0.1N-EtOH-KOH, adding further KOH to a total of 25 c.c., and saponifying as usual. J. S. A.

Preparation of benzene from brown-coal tar by cracking in presence of surface catalysts. K. RICHTER (Braunkohlenarch., 1934, No. 42, 47–93; Chem. Zentr., 1934, ii, 2154).—At 450°, with “floridin” (*cf.* B., 1933, 452) as catalyst (I), single and repeated passage over (I) gave yields of 22.7 and 41.6% of benzene (b.p. < 200°), respectively. With brown-coal-distillation coke as (I) the corresponding vals. were 18.4 and 32.6%. H. J. E.

Synthesis of benzene from carbon monoxide and hydrogen under ordinary pressure. XX. Influence

of nitrogen, methane, and carbon dioxide in the initial gas on the process. S. TSUNEOKA and K. FUJIMURA (J. Soc. Chem. Ind., Japan, 1934, 37, 704–711 B; *cf.* B., 1934, 662).—Concns. of < 20% are without influence on the yield; those > 40% are disadvantageous, especially with CO_2 . The product obtained, using such diluted gases, is lighter and more volatile than with undiluted material. An apparatus is described for the removal of S compounds from commercial gas; from such gas benzene is prepared with a yield of 98 c.c. per cu. m. H. N. R.

Miscibility of gasoline and technical alcohol for aero-engine fuel. T. ARAKI and M. NAKABAYASHI (J. Soc. Chem. Ind., Japan, 1934, 37, 685–686 B).—The solubility (I) of H_2O in gasoline-EtOH mixtures \propto [EtOH], and increases with rising temp. The most effective additions to increase (I) are BuOH or hexahydronaphthalene. A. G.

Synthetic fuels and lubricants. M. PIER (Chem.-Ztg., 1935, 59, 9–10, 37–38).—The broad principles underlying the production of motor fuels or lubricating oils from brown (I) or bituminous coal (II) by hydrogenation, cracking, etc. are outlined. Between Sept. and Dec., 1934, 1500 tons of Ruhr (II) were hydrogenated in a comparatively large experimental plant at Oppau belonging to the I. G. Farbenind. A-G. The average throughput per day in Nov. was 20 tons; 65–70% of the coal was converted into liquid products and about 20% into gaseous hydrocarbons of which 30–40% were C_3H_8 and C_4H_{10} . Whilst (II) yielded products relatively low in H content, the products from (I) had a higher H content and yielded lubricating oils and paraffin wax as well as motor fuels. A. B. M.

η of solid hydrocarbons and waxes.—See I. High-pressure hydrogenation.—See III. Drying oils from petroleum products.—See XII. Resins from petroleum hydrocarbons.—See XIII. Brown coal as fertiliser.—See XVI. Ignition of firedamp. See XXII. Purifying gasworks effluent. Removing phenols from waste waters.—See XXIII.

See also A., Mar., 273, ThO_2 -coated surfaces for gas mantles. 296, Formation of emulsions. 307, Explosion of air-hydrocarbon mixtures. 310, Cathodic combustion of H_2 and CO. 334, 1:2- $C_{10}H_8Me_2$ of coal tar. 337, Prep. of benzidine bases. 358, N compounds in petroleum distillates.

PATENTS.

Compound regenerative coke oven. F. TOTZEK, Assr. to KOPPERS CO. OF DELAWARE (U.S.P. 1,957,425, 1.5.34. Appl., 24.9.30. Ger., 27.9.29).—An oven with hairpin heating flues has its regenerators (R), which lie below and parallel to the heating walls, divided into two sets separated by a transverse central partition wall and so arranged that the R under one half of the oven preheat air and gas while those under the other half are being traversed by the waste gases. Every even-no. R in one half of the oven and every odd-no. R in the other half is divided into two sections by means of a partition wall extending centrally parallel to the chambers. The divided R are connected only with flues in the half of the oven lying directly above

them; the undivided *R* are connected directly with flues in the half of the oven above and also to base flues which run below and communicate with the flues in the other half of the oven. A. B. M.

Distillation of solid carbonaceous material mixed with oil. E. W. BROCKLEBANK and W. B. MITFORD (B.P. 421,556, 22.6.33).—A blend of a coking and a non-coking coal is mixed with a mineral or coal oil and is carbonised in an externally-heated, inclined, rotary retort (*R*) (cf. B.P. 393,601—2; B., 1933, 738). By use of a suitable blend a coherent coke is formed which does not adhere to the walls of *R*. A. B. M.

Carbonising process and apparatus. O. F. STAFFORD (U.S.P. 1,957,364, 1.5.34. Appl., 20.9.26).—Solid carbonaceous materials in a relatively fine state, e.g., nutshells, seed hulls, peat, non-coking coal, etc., are carbonised in an inclined rotary kiln (*A*) through which they pass in contact with hot furnace gases still containing enough free O_2 to burn the volatile products evolved in the carbonisation. The gases are introduced into the lower end of *A*, preferably through a central tube (*B*) which projects some distance into *A*. The solid products pass down into the annular space between *A* and *B* to a discharge outlet. A. B. M.

Manufacture of carbon black. E. BILLINGS and H. H. OFFUTT, Assrs. to G. L. CABOT, INC. (U.S.P. 1,957,314, 1.5.34. Appl., 12.8.33).—C black is agglomerated into relatively tenacious spherical granules, consisting of a central core surrounded by concentric shells, by the application of turbulent pressure to flocculent C black. The process may be carried out in an apparatus comprising a drum in which are impelling elements and baffles which can be moved relatively to-and-fro, and also means for giving an up-and-down circulation to the material. Certain other powders, e.g., ZnO, can be similarly agglomerated. A. B. M.

Gas purification. H. A. GOLLMAR, Assr. to KOPPERS Co. OF DELAWARE (U.S.P. 1,957,262, 1.5.34. Appl., 23.2.29).—Gases which contain NH_3 are purified from H_2S etc. by washing with aq. NH_4 thioarsenate formed by treating a solution of an As compound, e.g., As_2O_3 , in H_2O with the gas to be purified. A. B. M.

Treatment of liquids. [Removal of tar acids from tar.] J. A. SHAW, Assr. to KOPPERS Co. OF DELAWARE (U.S.P. 1,956,597, 1.5.34. Appl., 8.10.29).—Tar acids are transferred from tar (*A*) to aq. NaOH (*B*) by means of a gas current which is continuously recirculated through scrubbing towers or similar apparatus wherein it is brought in contact successively with *A* and *B*. The system is maintained at a uniform temp., preferably near to the b.p. of *B*. A. B. M.

Treatment of liquid containing tar acid. J. A. SHAW, Assr. to KOPPERS Co. OF DELAWARE (U.S.P. 1,957,295, 1.5.34. Appl., 2.11.27).—Gas liquor is freed from tar acids, preferably after distillation of the free NH_3 , by heating it to just below the b.p. and blowing air or other inert gas through it. The gas is passed through aq. NaOH, which absorbs the tar acid vapours, and is recirculated. A. B. M.

Refining a benzenoid hydrocarbon oil. G. G. DÉSY, Assr. to KOPPERS Co. OF DELAWARE (U.S.P.

1,961,204, 5.6.34. Appl., 30.6.31).—Solvent naphtha (I) or a xylene is added to hydrocarbon oils deficient in constituents of b.p. 140–200° (e.g., benzenoid hydrocarbons from coal gas) before treatment with H_2SO_4 . The acid-treated mixture is diluted with H_2O , thus redissolving the sludge in the oil. Dil. H_2SO_4 of relatively high purity is recovered; the oil is neutralised and the distilled liquid separated into convenient fractions. The (I) is recovered for use again. C. C.

Production of asphalt. E. B. MCCONNELL, Assr. to STANDARD OIL Co. (U.S.P. 1,950,900, 13.3.34. Appl., 20.7.31).—Residues from the distillation of petroleum are blown at 250–350° with air or O_2 from submerged pipes containing numerous fine jets. A. R. P.

Asphalt emulsion. J. W. SPARKS, Assr. to STANDARD OIL Co. (U.S.P. 1,956,779, 1.5.34. Appl., 24.12.30).—A conc. aq. asphalt emulsion which may be diluted with hard H_2O without separating out is made by emulsifying about 2 pts. of asphalt in 1 pt. of H_2O , using as emulsifying agent a mixture of Na silicate or Na_3PO_4 and "green acid soap." The latter is prepared by neutralising "green acids" obtained by treating petroleum oil with H_2SO_4 (cf. U.S.P. 1,474,933; B., 1924, 47). A. B. M.

Refining of mineral oil. M. A. DIETRICH, Assr. to DE LAVAL SEPARATOR Co. (U.S.P. 1,960,698, 29.5.34. Appl., 8.8.30).—Mineral oils containing low-boiling constituents (I), e.g., used lubricating oil from internal-combustion engines, are treated with a coagulant, e.g., Na_3PO_4 , to ppt. oxidation products. The latter are separated and a bleaching agent (II), e.g., fuller's earth, is mixed with the oil. (I) are removed by a stream of air at 149° and the residue is percolated through a tower containing (II). C. C.

Production of mineral oil sulphonates. W. T. REDDISH and L. D. MYERS, Assrs. to TWICHELL PROCESS Co. (U.S.P. 1,960,828, 29.5.34. Appl., 26.6.29).—The oil-sol. sulphonates (*S*) formed during the refining of mineral oil with H_2SO_4 are extracted with an org. solvent (*L*) in aq. solution (45–70 wt.-%), e.g., EtOH, in such quantity that the [*S*] in *L* is < 20 wt.-%. The properties of *S* are different from those of sulphonates extracted according to U.S.P. 1,493,111 (B., 1924, 565). D. K. M.

Removal of wax from petroleum oils. H. T. BENNETT, Assr. to MID-CONTINENT PETROLEUM CORP. (U.S.P. 1,960,617, 29.5.34. Appl., 31.8.31).—Petroleum oils are diluted with naphtha (I) and the mixture is chilled. To facilitate filtration of the coagulated wax and prevent clogging of the filter, grain hulls (II), e.g., ground rice, are added and the resultant mixture is agitated and filtered. (I) is removed from the oil by distillation and the wax is extracted from (II) by warm (I). C. C.

Treatment of hydrocarbons. D. M. HILLIS (U.S.P. 1,961,493, 5.6.34. Appl., 11.8.30. Renewed 2.11.33).—Liquid fuels similar to gasoline and kerosene are synthesised from aliphatic hydrocarbon gases by treatment with cathode and X-rays and mixing the product with Hg vapour under heat and pressure in a reaction zone containing powdered Ni. The mixture is subjected to an arc discharge under ultra-violet light

while the dissociated fractions are also subjected to a stationary electric field between oppositely charged electrodes. Apparatus is claimed. C. C.

Electric light and wave apparatus and treatment of hydrocarbons. I. W. HENRY, ASSR. to IONIZING CORP. OF AMERICA (U.S.P. 1,961,358, 5.6.34. Appl., 30.7.31. Renewed 19.8.33).—Gasoline (I) of high antiknock val. (C_8H_{18} no. 74) is obtained by subjecting vaporised petroleum, *e.g.*, Pennsylvanian crude, to an electromagnetic light- and wave-field (*W*) at 24–205°. Light vapours from the condensed (I) are recycled through a second electromagnetic *W*. Apparatus is claimed. C. C.

Re-forming of light paraffin hydrocarbons. W. F. FABER, ASSR. to V. N. ROADSTRUM (U.S.P. 1,961,288, 5.6.34. Appl., 1.9.28).—Combustible gas (of calorific val. 250–650 B.Th.U./cu. ft.) and gasoline are prepared from natural gas (I) or natural gasoline (II) by mixing (I) or (II) with preheated air sufficient only for partial combustion (III). The mixture is maintained at 482–982° in a re-forming zone by (III) without the formation of C or lampblack. Heavier gasoline hydrocarbons are separated from the residual combustible gas. C. C.

Treatment [conversion into liquids] of hydrocarbon gases. V. IPATIEFF, ASSR. to UNIVERSAL OIL PRODUCTS Co. (U.S.P. 1,960,631, 29.5.34. Appl., 18.11.32).—The olefines, *e.g.*, C_3H_6 , in the gases from cracking processes are converted into liquids of high antiknock val. and suitable for blending with gasoline, *e.g.*, hexylene, by bubbling at 60–200° through aq. solutions of H_3PO_2 , H_3PO_3 , $H_4P_2O_5$, $H_4P_2O_6$, H_3PO_4 , HPO_3 , or $H_4P_2O_7$. D. K. M.

Decolorisation and desulphurisation of hydrocarbon vapours. J. M. WADSWORTH (U.S.P. 1,960,561, 29.5.34. Appl., 1.10.26).—Vapours of gasoline or other hydrocarbons (I) are treated with a filtering medium, *e.g.*, fuller's earth (II), and then passed upwards through a conduit, whereby mechanically entrained polymerides are detrained and flow back to (II) countercurrent to the vapours. Unsaturated (I) are polymerised and the product combines with S compounds, part of which is adsorbed by (II). C. C.

Production of hydrocarbons [by dehydrogenation]. H. G. GRIMM and J. JANNEK, ASSRS. to STANDARD-I. G. Co. (U.S.P. 1,960,972, 29.5.34. Appl., 18.7.30. Ger., 31.7.29).—Coke formation and overheating are avoided in the destructive hydrogenation of solid or liquid carbonaceous material by dropping the finely-divided material, with or without a catalyst immune from poisoning, through a container in an atm. of H_2 at > 20 (50/1000) atm. and 300–700° (380–550°). The contact time is increased by baffling at intervals in the reaction zone. C. C.

Treatment of hydrocarbons. E. J. GOHR and R. C. CLINE, ASSRS. to STANDARD-I. G. Co. (U.S.P. 1,960,207, 22.5.34. Appl., 2.2.31).—When a change from vapour- to liquid-phase operation (or the reverse) is required during high-pressure hydrogenation at a high temp., *e.g.*, if the production of kerosene is followed by operating for lubricating oil, the quality of the product is maintained by gradually substituting increas-

ing amounts of new stock (I) for the stock being treated until the latter has been entirely replaced by (I). Reaction conditions are continuously maintained. C. C.

Treatment of hydrocarbon oils. G. EGLOFF, ASSR. to UNIVERSAL OIL PRODUCTS Co. (U.S.P. 1,960,624, 29.5.34. Appl., 10.8.31).—Hydrocarbon oils are desulphurised by hydrogenation at 260/538° in presence of $COCl_2$ and activated C. C. C.

Refining of hydrocarbon oils. H. H. GROSS, ASSR. to TEXAS Co. (U.S.P. 1,962,103, 5.6.34. Appl., 16.9.32).—Unsaturated compounds, gum-forming constituents, S compounds, and other undesirable components are removed from hydrocarbon oils, *e.g.*, naphtha, kerosene, or lubricating oils (I), by solvent extraction with 3-furfuraldehyde. (I) are separated into fractions of low and high η index. C. C.

Production of motor fuels. W. J. EDMONDS, ASSR. to STANDARD-I. G. Co. (U.S.P. 1,960, 206, 22.5.34. Appl., 17.1.31).—High-quality gasoline is obtained from heavy naphtha, kerosene, or light gas oil in 2 stages: (1) hydrogenation at 455–496° and > 20 (200) atm. with a catalyst (C), *e.g.*, sulphides, oxides, or nitrides of metals of group VI; (2) cracking and hydrogenation at 510–593° with oxides of alkaline- or rare-earth metals as C. The oil feed in stage (2) (1–3 vols./hr. per vol. of C space) is slightly $>$ in stage (1). C. C.

Manufacture of lubricating oil. G. EGLOFF, ASSR. to UNIVERSAL OIL PRODUCTS Co. (U.S.P. 1,960,625, 29.5.34. Appl., 18.12.31).—Unvaporised oil is separated after cracking heavy hydrocarbon oil and flash-distilled. The flash vapours are polymerised with $AlCl_3$ vapour, lubricating oil being obtained from the resultant condensate. C. C.

Treatment of hydrocarbons [petroleum]. R. E. BURK, ASSR. to STANDARD OIL Co. (U.S.P. 1,950,878, 13.3.34. Appl., 6.6.32).—Lubricating oil is stirred with 8–12 wt.-% of $ClSO_3H$ for 1–3 hr., the sludge separated, and the oil agitated at 100–150° with adsorbent clay and filtered to remove acid. A. R. P.

Improvement of illuminating oils. E. M. CLARK, ASSR. to STANDARD-I. G. Co. (U.S.P. 1,960,203, 22.5.34. Appl., 31.8.29).—Illuminating oils have their burning qualities and their S content lowered by passing in admixture with H_2 , at 404–465°/20–200 atm., through a reaction vessel containing oxides or sulphides of elements of group VI, either alone or mixed with alkali or alkaline-earth oxide as catalysts. D. K. M.

Production of emulsions or dispersions. L. KIRSCHBRAUN and H. L. LEVIN, ASSRS. to PATENT & LICENSING CORP. (U.S.P. 1,960,112, 22.5.34. Appl., 20.10.28).—An emulsion is made by mixing together H_2O , a pitchy base, and one or more clays, with or without addition of acid or alkali so that the resulting liquid has pH 6–9. D. K. M.

Oil tester using radio-frequency. V. A. SCHOENBERG, ASSR. to LIGHT SENSITIVE APPARATUS CORP. (U.S.P. 1,960,168, 22.5.34. Appl., 28.3.33).—A circuit embodying (1) a current indicator, (2) a secondary coil loose-coupled to a primary coil which is excited from an oscillator at fixed wave-length (*e.g.*, 3–3.5 m.), and

(3) a condenser comprising plates (*P*) in a sample of the oil, is tuned to resonance by varying the distance between *P* by means of a micrometer screw the reading of which is a measure of the contamination of the oil.

B. M. V.

Heating and cracking of oil. A. G. PAGE, Assr. to UNION OIL CO. OF CALIFORNIA (U.S.P. 1,965,945, 10.7.34. Appl., 17.9.27).

Apparatus for cracking [hydrocarbon] oil. G. EGLOFF, Assr. to UNIVERSAL OIL PRODUCTS CO. (U.S.P. 1,965,334, 3.7.34. Appl., 2.6.27. Renewed 3.5.32).

Cracking of hydrocarbon oils. (A) G. EGLOFF, [B] J. C. MORRELL, Assrs. to UNIVERSAL OIL PRODUCTS CO. (U.S.P. 1,965,335 and 1,966,640, [A] 3.7.34, [B] 17.7.34. Appl., [A] 26.8.29, [B] 15.11.29).

Cracking of heavy hydrocarbon oils. J. G. ALTHER, Assr. to UNIVERSAL OIL PRODUCTS CO. (U.S.P. 1,965,168, 3.7.34. Appl., 4.11.29).

Reduction of residuum from cracking operation by distillation. L. C. HUFF, Assr. to UNIVERSAL OIL PRODUCTS CO. (U.S.P. 1,965,189, 3.7.34. Appl., 30.6.28. Renewed 11.2.32).

Hydrocarbon oil conversion. J. C. MORRELL, Assr. to UNIVERSAL OIL PRODUCTS CO. (U.S.P. 1,966,639, 17.7.34. Appl., 4.8.28).

Treatment of hydrocarbons. H. M. SMITH and H. T. RALL (U.S.P. 1,967,269, 24.7.34. Appl., 19.8.32).

Treatment of hydrocarbon oils. (A, B) J. W. GRAY, (C) C. C. TOWNE, Assrs. to TEXAS CO. (U.S.P. 1,965,074—5 and 1,967,636, [A, B] 3.7.34, [C] 24.7.34. Appl., [A] 14.5.28, [B] 7.6.28, [C] 30.10.30).

Dewaxing of hydrocarbon oils. C. E. ADAMS, Assr. to STANDARD OIL CO. (U.S.P. 1,968,239, 31.7.34. Appl., 2.5.31).

Apparatus for distilling hydrocarbon oil. R. E. WILSON, Assr. to STANDARD OIL CO. (U.S.P. 1,966,746, 17.7.34. Appl., 2.12.29).

Apparatus for fractionating hydrocarbon oils. W. K. HOLMES and A. T. DUDLEY, Assrs. to TEXAS CO. (U.S.P. 1,966,549, 3.7.34. Appl., 23.12.30).

Gasoline recovery apparatus. J. C. SWAN (U.S.P. 1,965,011, 3.7.34. Appl., 24.8.33).

Reduction [grinding] of solids [coke]. Centrifugal bowl [for removing wax from oil]. **Vac-distillation of liquids.**—See I. **Treating H₂SO₄ from petroleum refining.** (NH₄)₂SO₄.—See VII. **Waterproof composition.**—See IX. **Preventing corrosion of pipes etc.**—See X. **Electrical separation of emulsions.**—See XI. **Coloured extruded plastics.**—See XIII.

III.—ORGANIC INTERMEDIATES.

"Schlieren" test [for solvents]. R. BOXLER (Chem.-Ztg., 1935, 59, 68).—Data are given for the min. % of common impurities in 20 technical solvents etc., detectable by the formation of striations on admixture with the pure solvent.
J. S. A.

Industrial applications of colloidal electrolytes. A. STEWART and H. M. BUNBURY (Trans. Faraday Soc.,

1935, 31, 208—215).—The application of a no. of new types of surface-active compounds, such as long-chain sulphonates and quaternary NH₄ compounds, as detergents, swelling, dispersing, and emulsifying agents, and for other industrial purposes, is briefly described.

M. S. B.

High-pressure hydrogenation of aromatics. IV. Inhibitory action of saturated chain compounds on high-pressure hydrogenation of benzene. V. Inhibitory action of inert gases on high-pressure hydrogenation of benzene. Y. TANAKA and R. KOBAYASHI (J. Soc. Chem. Ind., Japan., 1934, 37, 669—670 B, 670—672 B; cf. B., 1935, 261).—IV. Saturated compounds [soya-bean oil (I), petroleum, paraffin] exert a marked inhibitory action on the hydrogenation of C₆H₆ (II) with Ni at 150°/70 atm. The same compounds and also tetralin, cyclohexane, and (II) exert no inhibitory action on the hydrogenation of (I) at 70°/90 atm. The effect is ascribed to preferential adsorption by the catalyst in the order: ethylenic compounds (III) > saturated compounds > (II).

V. CO₂ and H₂O exert an inhibitory effect on the hydrogenation of (II), but not of (III); this is also ascribed to preferential adsorption. Co-pptd. mixed Ni-Cu hydroxides or carbonates may be reduced *in situ* at 120—180° to yield a catalyst very active for the hydrogenation of (III), but not of (II).
H. N. R.

Analysis of isomerides of dinitrobenzene. V. KRASOVA (Anilinokras. Prom., 1934, 4, 619—620).—4.5 g. of mixture are dissolved in 300 c.c. of EtOH, 300 c.c. of 30% HCl and 35 g. of Zn are added during 2 hr., followed by 25 c.c. of conc. HCl and 10 g. of Zn, the solution is heated at 50° to complete decolorisation, filtered, and diluted to 1 litre, and 50 c.c. of solution (I) are titrated at 0—3° with 0.1N-PhN₂Cl [1 c.c. ≡ 16.805 mg. of *m*-C₆H₄(NO₂)₂]. 100 c.c. of (I) are made neutral to Congo-red with NaOAc, 10 c.c. of AcOH and 20 c.c. of 30% aq. NaHSO₃ are added, the solution is boiled, 50 c.c. of a solution of 6 g. of NaHSO₃ and 5 g. of phenanthraquinone in 1 litre of H₂O are added, and the ppt. of phenanthro-9:10-phenazine is collected and weighed [1 g. ≡ 0.6042 g. *o*-C₆H₄(NO₂)₂]. Total C₆H₄(NH₂)₂ is determined by titration with 0.1N-nitrobenzenediazonium chloride (indicator, H-acid).
R. T.

Analysis of dinitrohydroxydiphenylamine. G. S. TSIPIN and L. A. SCHTSCHETININA (Anilinokras. Prom., 1934, 4, 620—624).—2':4'-Dinitro-4-hydroxydiphenylamine (I) is determined by dissolving 2 g. of crude (I) in 150 c.c. of 1% aq. NaOH, filtering the solution, acidifying with HCl, and weighing the ppt. of (I). *p*-Aminophenol is determined by digesting 10 g. of the sample with 10% HCl and titrating the filtrate with 0.1N-NaNO₂, and 1:2:4-C₆H₄Cl·NO₂ by dissolving 10 g. of crude (I) in EtOH and determining Cl⁻ before and after hydrolysis with NaOH.
R. T.

Reduction of 3-nitro- to 3-amino-*p*-cresol. J. B. ASCHKINAZI and M. S. RABINOVITSCH (J. Appl. Chem. Russ., 1934, 7, 939—943).—Max. (91.2%) yields of 3-amino-*p*-cresol (I) are obtained by gradual addition of molten 3-nitro-*p*-cresol to boiling 9.5% aq. Na₂S; the solution is cooled to 55—60° on disappearance of the red coloration, and NaHSO₃ added to ppt. (I).
R. T.

Analysis of technical 1-nitronaphthalene. B. P. FEDOROV and A. A. SPRISKOV (Anilinokras. Prom., 1934, 4, 627—633).—A procedure for the complete analysis of crude 1-C₁₀H₇NO₂ is outlined. R. T.

Separation of α -naphthylamine-4-, -5-, and -2-sulphonic acids. V. A. LENCHOLD (Anilinokras. Prom., 1934, 4, 637—640).—1.5 g. of the mixture of Na salts is extracted with abs. EtOH, which dissolves chiefly the 2-sulphonate, the residue of Na 4- and 5-sulphonate is weighed, 1 g. of it is dissolved in 150 c.c. of H₂O, 20 c.c. of dil. HCl are added, and the amount of ppt. of 4-sulphonic acid formed is compared with that obtained with a series of solutions of known concn. of the isomeric salts. R. T.

Nonanaphthene from petroleum.—See II. **Textile chemicals.**—See VI. **Dulcin.**—See XVIII. **Removing phenols from waste waters.**—See XXIII.

See also A., Mar., 304, **Purification of solvents.** 324, **Prep. of butadiene.** 325, **Prep. of Al(OAlk)₃, and of propylene glycol.** 327, **Prep. of trihydroxyglutaric acid from xylose.** 332, **Prep. of nitroguanidine nitrate.** 334, **Catalytic hydrogenation of PhMe.** **Prep. of mesitylene.** 1:2-C₁₀H₆Me₂ of coal tar. 338, **Electro-reduction of phenols.** 339, **Purification of 2:4-dinitrophenol.** 341, **Prep. of acid chlorides.** 343, **Prep. of tetraiodophthalic anhydride.** 364, **Prep. of 2-thiolbenzthiazole.**

PATENTS.

Polymerisation of unsaturated hydrocarbons [vinylacetylene derivatives]. W. S. CALCOTT, A. S. CARTER, and F. B. DOWNING, Assrs. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,959,343, 22.5.34. Appl., 23.4.30).—Non-aromatic polymerides of C₂H₂ are partly hydrogenated and the product is further polymerised by heating at 25—200° (120—150°). *E.g.*, a material consisting largely of (:C·CH:CH₂)₂ is reduced [H₂ (2.6%)—Ni at 85°/150 lb./sq. in.], fractionally distilled, and the fraction of b.p. 72—76° heated at 120—150° for 3 hr. to give a colourless oil (20 wt.-%) with air-drying properties. H. A. P.

Production of compounds [methyl alcohol] containing carbon, hydrogen, and oxygen. F. C. REED (U.S.P. 1,959,219, 15.5.34. Appl., 8.9.32).—In the synthesis of org. compounds from CO + H₂ (and CH₄), the economical removal of inert gases (*e.g.*, N₂, A, CH₄) is effected by use of two converter systems, the former working at high and the latter at low space-velocities, the products formed being separated by condensation before passing to the next stage. H. A. P.

Manufacture of halogenated ethers. E. I. DU PONT DE NEMOURS & Co. (B.P. 423,520, 4.8.33. U.S., 4.8.32).—Additive interaction occurs between α -halogenodialkyl ethers and olefines in presence of a sol. hydrolysable metal halide (BiCl₃, BiBr₃, SbCl₅, SnCl₄, ZnCl₂, FeCl₃, AlCl₃). Thus CH₂Cl·OMe (I) and CHMe·CH₂ (II) in presence of BiCl₃ at 50—70°/150 lb. per sq. in. give Me γ -chlorobutyl, b.p. 121—131°, and Me ϵ -chloro- γ -methylhexyl ether, b.p. 205°; (I), C₂H₄, and BiCl₃ at 80°/700—800 lb. per sq. in. give Me γ -chloropropyl ether; (I), amylene, and ZnCl₂ or CaCl₂ at > 50° give

a Me chlorohexyl ether, b.p. 150° (decomp.); and (CH₂Cl)₂O and (II) (ZnCl₂) give $\gamma\gamma'$ -dichlorodibutylether, b.p. 130—135°/10 mm. H. A. P.

Preparation of adipic acids. R. P. PERKINS and A. J. DIETZLER, Assrs. to DOW CHEM. Co. (U.S.P. 1,960,211, 22.5.34. Appl., 3.11.32).—In the oxidation of cyclohexanol, cyclohexanone, or their 3- or 4-alkyl derivatives, the starting material (I) is added slowly to HNO₃ (*d* 1.28—1.42) containing the usual catalysts (Cu salts) at 35—70° (60—70°), H₂SO₄ being added with (I) towards the end of the reaction. β -tert.-Butyladipic acid, m.p. 115.2—115.9°, is described. H. A. P.

Preparation of phenylphenols [hydroxydiphenyls]. E. C. BRITTON, Assr. to DOW CHEM. Co. (U.S.P. 1,959,283, 15.5.34. Appl., 2.3.31).—Chloro-are converted into hydroxy-diphenyls by hydrolysis with an aq. base (NaOH, Na₂CO₃, Na₄B₂O₇, etc.) at 250—360° in presence of Cu, which inhibits isomerisation. *E.g.*, *o*-C₆H₄PhCl is heated with aq. Na₂CO₃ (2 mols.) in a Cu-lined autoclave at 300°; 75% of theory of *o*-C₆H₄Ph·OH, m.p. 56.4°, is isolated from the product. H. A. P.

Production of monocarboxylic acids and derivatives [aldehydes]. A. O. JAEGER, Assr. to SELDEN Co. (U.S.P. 1,961,150, 5.6.34. Appl., 1.5.29).—Polycarboxylic acids [*o*-C₆H₄(CO₂H)₂] or their salts are converted into monocarboxylic acids and/or their aldehydes by heating with steam and/or reducing gases. *E.g.*, Ca phthalate with H₂ at 435° gives BzOH (63) and PhCHO (10.6% of theory); Zn phthalate + quartz and H₂ at 325—410° gives mainly PhCHO, and with steam alone at 360—400° gives mainly BzOH; Ni phthalate with H₂ and steam at 350° gives BzOH (78% of theory). H. A. P.

Production of dye intermediates of the anthraquinone series. E. I. DU PONT DE NEMOURS & Co. (B.P. 423,446, 1.8.33. U.S., 1.8.32).—Interaction of a 1-halogeno- (chloro)-2-aminoanthraquinone with aq. Na₂Se or with Se and an alkaline reducing agent at the b.p. gives 2-amino-1-hydro-selenoanthraquinone (I) (Na salt), which is converted into the corresponding di-selenide (II) by mild oxidation [K₂Fe(CN)₆] in aq. suspension. The 3-Cl- and 3-Br-derivatives of (I) and (II) are similarly prepared. H. A. P.

Manufacture of furfuraldehyde]. B. S. GROTH and G. H. BLOMQVIST (U.S.P. 1,960,812, 29.5.34. Appl., 30.4.32. Swed., 22.10.31).—Pentosan-containing materials (I) are digested with acid of *p*_H 0—4 (0.5—2.0) (< 2 pts.) at 130—180° (150°) until the content of furfuraldehyde (II) reaches 0.5—15% (13—14%), some pentoses remaining unchanged. The bulk of the (II) (80%) present is then distilled off (by releasing the pressure, the temp. falling to 105—110°), fresh (I) are added, and the process is repeated. H. A. P.

Preparation of [mercaptoaryl]thiazoles. R. F. DUNBROOK, Assr. to FIRESTONE TIRE & RUBBER Co. (U.S.P. 1,960,205, 22.5.34. Appl., 25.8.30).—An *o*-halogenonitrobenzene (*o*-C₆H₄Cl·NO₂) is heated under reflux with aq. Na polysulphide and CS₂ at 50—100°, the product is acidified, and the mixture of S and mercaptobenzthiazole pptd. is used direct as a vulcanisation accelerator. H. A. P.

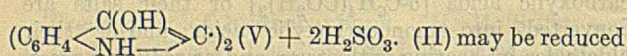
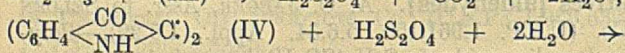
Mineral oil sulphonates.—See II. Recovering CS_2 from viscose silk.—See V. Washing preps. for textiles.—See VI. Components of pine oil.—See XX.

IV.—DYESTUFFS.

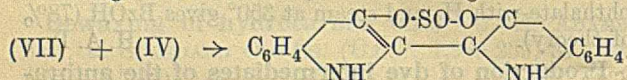
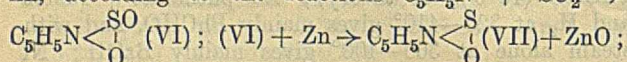
Desensitising dyes. I. Synthesis of pinacryptol-yellow. M. A. ATABEKOVA, I. N. GORBATSCHEVA, and I. I. LEVKOEV (Anilinokras. Prom., 1934, 4, 609—612).—6-Ethoxyquinoline methylmethosulphate and $m\text{-NO}_2\cdot\text{C}_6\text{H}_4\cdot\text{CHO}$ afford 6-ethoxy-2-*m*-nitrostyrylquinoline methylmethosulphate (I), identical with pinacryptol-yellow. (I) is converted by boiling with the appropriate K salt in EtOH into the corresponding *methiodide*, m.p. 213—214°, *methobromide*, m.p. 231—232°, *methochloride*, m.p. 220—221°, *methonitrate*, m.p. 218—219°, and *methotoluene-p-sulphonate*, m.p. 260—261°.

R. T.

Solutions of vat dyes. N. N. ORLOV, L. S. SOLODAR, and M. A. ROZENMAN (Ukrain. Chem. J., 1934, 9, 221—261).—Indigo-blue (I) and indigo 4B (II) are not reduced by HCO_2H (III) in aq. solution; (II), but not (I), is reduced by SO_2 , whilst both (I) and (II) are reduced by (III) in presence of SO_2 , according to the reactions $2\text{H}_2\text{SO}_3 + \text{(III)} \rightarrow \text{H}_2\text{S}_2\text{O}_4 + \text{CO}_2 + 2\text{H}_2\text{O}$;



also by saturating $\text{C}_5\text{H}_5\text{N}$ with SO_2 , and adding (II) and Zn, according to the reactions $\text{C}_5\text{H}_5\text{N} + \text{SO}_2 \rightarrow$



(VIII) + $\text{C}_5\text{H}_5\text{N}$; (VIII) + $2\text{H}_2\text{O} \rightarrow \text{(V)} + \text{H}_2\text{SO}_3$; (III) may replace Zn in the above reactions. Directions are given for preparing indigosols from the leucobases by adding $\text{C}_5\text{H}_5\text{N}$ and (VI), gradually raising the temp. to 55° (during 4 days), adding H_2O to ppt. the $\text{C}_5\text{H}_5\text{N}$ sulphites, and warming the latter with 3*N*-NaOH.

R. T.

Determination of basic dyes by precipitation with phosphotungstic acid. R. W. PAYNE (J. Soc. Dyers and Col., 1934, 50, 320).—Exact conditions for the evaluation of Methylene-Blue, Auramine, Rosaniline, Diamond Fuchsine, Chrysoidine R, and Malachite-Green are established, it being found that a ppt. of the dye base with the acid is obtained in a state which allows rapid filtration when pptn. is effected at 100° in presence of HCl (Auramine at $\geq 60^\circ$). A residue of $\text{P}_4(\text{W}_2\text{O}_7)_{12}$ (I) is obtained by igniting the ppt., and factors are given for calculating the wt. of dye combined with (I).

A. J. H.

Are synthetic dyes toxic? L. BONNET (Rev. Gén. Mat. Col., 1934, 38, 417—419).—Numerous dyes (mainly basic, acid, and direct) are classified in respect of their effect on the optic nerves, bacteria, digestive juices, human skin, and the nervous system. Vat dyes, owing to their high mol. wt., insolubility, and chemical inertness, are harmless. Dust containing Crystal-Violet,

Malachite-Green, Victoria-Blue, Safranin, Auramine, Methylene-Blue, or Rhodamine causes ophthalmia, but some of these and other dyes may be used beneficially in medicine. Acridine-Red and Orolin-Yellow retard digestion. Bismarck-Brown, Chrysoidine, Magenta, Malachite-Green, Fast-Blue, Spirit- and Water-Blues may cause dermatitis. It is concluded that whilst dyes are generally harmful, dust containing those now being sold is not harmful to the respiratory organs.

A. J. H.

See also A., Mar., 315, Dinitroaniline azo dyes as indicators. 338, Separation of chromophores in symmetrical bisazo dyes. 347, Dicinnamoylmethane derivatives as dyes. 359, Synthesis of "ancient purple."

PATENTS.

Manufacture of cyanine dyes. I. G. FARBEININD. A.-G. (B.P. 423,792, 7.7.33. Ger., 13.7.32).—Cyanines, ψ - and *iso*-cyanines are prepared by using a thiazole or quinoline compound with, α - to the N and attached by an atom other than C, a reactive bivalent at. group. Examples are 2-methylthiobenzthiazolone methiodide (I), 1-ethyl-2-thioquinolone ethiodide and its 6-Me derivative, 1-ethyl-2-selenoquinolone ethiodide, and 2-ethyl-1-nitrosoimidobenzthiazoline. Such a compound is condensed with a quaternary salt of a heterocyclic base containing alkyl, α - or γ - to N; e.g., (I) + 1-methylbenzthiazole ethiodide boiled in $\text{C}_5\text{H}_5\text{N}$ yield 2-methyl-2'-ethylthiacyanine iodide. The 10 examples include also thia- ψ -, oxa- ψ - (cf. B.P. 423,827; B., 1935, 334), seleno- ψ -, and *iso*-cyanine dyes.

F. M. H.

Photographic sensitisers.—See XXI.

V.—FIBRES; TEXTILES; CELLULOSE; PAPER.

Microscopy problems: transverse sections [of fibres]. E. CERBARO (Boll. Staz. Sperim. Ind. Carta Fibre Tess., 1934, 29, 786—801).—A modification of Wöllhaf's method is used to obtain transverse sections of fibres for microscopical examination. Stainless-metal plates, either 0.5 or 1 mm. thick, are pierced with two parallel series of holes 0.25—1.5 mm. wide, so that two fibres may be compared. Sections cut from a bundle of the fibres protruding from one of the holes are mounted in glycerin or kerosene. Highly coloured fibres should first be decolorised. A single fibre to be cut is mixed with a bundle of coloured fibres before cutting and the section afterwards separated.

T. H. P.

Determination of degree of purity of cotton wool. A. P. ZAKOSCHTSCHIKOV (J. Appl. Chem. Russ., 1934, 7, 997—1003).—The content of non-cellulosic impurities is determined by treating the sample with damp HCl for 2 min., with NH_3 for 0.5 min., washing with H_2O , dissolving in Schweitzer's reagent, filtering, and weighing the residue.

R. T.

Testing cotton wool for maturity of fibre, and calculating the yield of cellulose on boiling. A. P. ZAKOSCHTSCHIKOV (J. Appl. Chem. Russ., 1934, 7, 1197—1205).—The sample is washed with EtOH and soaked in 18% aq. NaOH for 5 min. at room temp., the mercerised fibres are washed free of NaOH, and excess

of H_2O is squeezed out. The cotton is then immersed in boiling 1% aq. Congo-red for 10 min., washed, and the fibres are examined microscopically, when 4 groups may be distinguished: *A*, deep red cylindrical fibres (mature); *B*, the same, eroded in places (semi-mature); *C*, pale red, eroded fibres (immature); *D*, colourless ribbons (dead fibres). The yield of cellulose, $x = Aa + Bb + Cc + Dd$, where *A*, *B*, *C*, and *D* are % of fibres of each group, and $a = 0.97$, $b = 0.65$, $c = 0.53$, and $d = 0.20$. The appropriate correction should be made for mechanical impurities. R. T.

Theory of cellulose; mercerised and hydrate-cellulose. R. KLAUS (Kunstseide, 1934, 16, 218—222; Chem. Zentr., 1934, ii, 2067).—Different varieties of cellulose differ only in physical, not chemical, properties. Intracellular reaction causes a change in the position of the principal valency chains, which accounts for the altered properties. H. N. R.

Evaporation of water from cellulose. W. H. BONE (J. Soc. Dyers and Col., 1934, 50, 307—309).—The H_2O -line (*W*) portion (the boundary region between the wet and dry parts) of a strip of cotton fabric suspended vertically with the lower end dipping into pure neutral H_2O and kept in the dark for about 4 days was degraded by oxidation so that it had marked reducing properties, an increased affinity for Methylene-Blue, and a high fluidity in cuprammonium solution. These changes are more influenced by the amount of H_2O evaporated through the fabric than by the prevailing temp. The *W* becomes stained blue in each case when Indigosol (I.G.), Fe^{III} ferricyanide, and V salts are added to the H_2O . The exposed fabric had the same pH immediately below and above *W*. A. J. H.

Fluorescence-microscopical study of lignification and of lignin. O. EICHLER (Cellulosechem., 1934, 15, 114—124; 1935, 16, 1—7).—The phloroglucinol-HCl reaction (I) is given most strongly by the middle lamella of wood and bast fibres, and Mäule's reaction (II) by the secondary lamella. In monocotyledons the intermediate formation of amyloid and collose is shown by fluorescence-microscopical observations and by colour reactions; this is less clear with dicotyledons, and is not seen in gymnosperms. Pure lignin can be prepared from wood by the action of 100% HF, and the fluorescence and the (I) are due to this; (II) gives a brown or reddish-brown colour, and the typical red colour is probably due to xylins. As lignification progresses, the fluorescence at first increases, but may subsequently diminish owing to self-extinction. A. G.

Nitration of cellulose. III. Influence of oxides of nitrogen in the nitric acid. S. ROGOVIN and K. TICHONOV (Cellulosechem., 1935, 16, 11—12; cf. B., 1934, 1053).—When cellulose is nitrated by HNO_3 in absence of H_2SO_4 the addition of N_2O_3 or N_2O_4 increases the % N slightly, but diminishes η and the stability. N_2O_5 raises the % N (to 13.8%), η , and the stability, and its favourable effect (compared with that of P_2O_5 or Ac_2O) is ascribed to rapid diffusion into the fibre. A. G.

Acetylation of alkali-cellulose with acetic anhydride. I. SAKURADA and T. HURUKAWA (J. Soc. Chem.

Ind., Japan, 1934, 37, 679—682B).—The Ac content of ramie after steeping in aq. NaOH and acetylating by a standard process increases with [NaOH] approx. proportionally to the absorption of NaOH. The X-ray diagrams of the products show cellulose hydrate at [NaOH] $> 7.9\%$ and a new diagram at 47.2% (0.6 mol. Ac per $C_6H_{10}O_5$) A. G.

Cellulose ethers. VI. Cellulose material for benzylcellulose and materials for benzylating apparatus. K. ATSUKI, I. KAGAWA, and K. TAKATA (J. Cellulose Inst., Tokyo, 1935, 11, 6—9).—Increasing degradation of the initial cellulose material results in diminished strength, elongation, and folding no. of the benzylcellulose film. Suitable metals for the construction of benzylating apparatus are monel metal, everite, and Ag. A. G.

Decomposition of cellulose xanthate. I. SCETTLE and N. KLIUTSCHKIN (J. Appl. Chem. Russ., 1934, 7, 972—975).—In the manufacture of artificial leather from viscose, better results are given by treatment with H_2O at 70—85° than with 0.5% H_2SO_4 . R. T.

Influence of temperature on the maturation of viscose. P. I. VOSKRESENSKI (J. Appl. Chem. Russ., 1934, 7, 967—971).—The time, *A*, required for maturation at temp. *T* is given by $A = at^x/T^x$, where *a* is the time in days at temp. *t*, and *x* is a const. (approx. 2.4). The η -maturity curves exhibit a definite min. at a given temp., corresponding with transition from lyophilic to lyophobic colloids. R. T.

Peculiarity in the preparation of cellulose stearate. I. SCETTLE, N. KLIUTSCHKIN, and S. KOGAN (J. Appl. Chem. Russ., 1934, 7, 976—979).—Cellulose (I) stearate cannot be prepared by Grün and Wittka's method (B., 1922, 94 A) from (I) hydrate (from viscose or mercerised cotton), probably owing to its higher acidity. R. T.

Digestion of sulphite pulp with recovered liquor. E. HÄGGLUND and E. GEIJER (Zellstoff u. Papier, 1934, 14, 490—492).—The effect of using recovered sulphite liquor on pulp quality (*P*) and cooking time is to produce practically the same results as fresh liquor. The presence, however, of $\frac{2}{3}$ vol.-% of turpentine is sufficient to decrease the strength slightly, whereas 3.3 vol.-% causes charring and a sharp fall in yield. 3.3 vol.-% of cymene has only a slightly deleterious effect on *P*. D. A. C.

Beater sizing [or paper]. G. H. LAFONTAINE (Pulp and Paper Canada, 1935, 36, 25—27).—Mainly a survey. From observations on the different physical condition of neutral rosin soap (*a*), rosin size containing 30% of free rosin (*b*), and a rosin-wax (81:19) emulsion (*c*), after pptn. with excess of 1% Al sulphate (I) solution and drying at 93°, it is concluded that Al rosinate resulting from (*a*) acts in paper so sized merely as a H_2O -repellent filler, that the free rosin in (*b*) acts as a flux for the Al rosinate and should give superior sizing, and that the wax in (*c*) is ideal for this purpose. Excess of (I) does not affect the fluxing of the size. Provided that during the later stages of drying the paper is heated above the m.p. of rosin and wax, the extent of the fluxing depends entirely on the proportion of free rosin and/or

wax present in the sheet. The "electrostatic" theory of sizing cannot apply to paraffin wax emulsions, which are chemically and physically inert. The optimum average particle size of such emulsions is about 5 μ .

H. A. H.

Imbibition of water by Cellophane. A. A. MOROZOV (J. Appl. Chem. Russ., 1934, 7, 1230—1240).—The % imbibition of H₂O by Cellophane (I) increases with the time allowed for maturation of the viscose, from 50% for 2 days to 70% for 12 days; this effect is not obtained when the experiment is repeated with the same (I) after drying. The % imbibition-time curves exhibit two maxima, viz., after 2—3 and 6—12 days, respectively. Data for heat of absorption indicate that $\frac{1}{3}$ of the H₂O is chemically combined. The above effects are ascribed to the greater content of decomp. products of cellulose in (I) prepared from more mature viscose. R. T.

Permeability to H₂ of film-forming materials.—See VI. **Wood for paper-making.**—See IX. **Saccharification of cellulose.**—See XVII.

See also A., Mar., 331, **Cellulose acetate (cellite)**. 344, **Determination of lignin**. 421, **Hemicellulose-A of oak wood**. **Sphagnum cellulose**.

PATENTS.

Production of artificial [silk] threads. H. H. PARKER, Assr. to DU PONT RAYON CO. (U.S.P. 1,949,919, 6.3.34. Appl., 10.12.30).—Viscose solution containing 8% of NaOH and cellulose xanthated with 10—25 (17)% of CS₂ is spun into 40—50 (47)% H₂SO₄. A. R. P.

Manufacture of artificial staple fibres. E. BLASCHKE (B.P. 423,211, 20.12.33. Ger., 29.12.32).—Filaments coming continuously from the jets are combined into a thick rope, cut, wet-treated, and dried. F. R. E.

Apparatus for making yarns. C. DREYFUS and W. WHITEHEAD, Assrs. to CELANESE CORP. OF AMERICA (U.S.P. 1,959,414, 22.5.34. Appl., 14.11.29).—A multi-orifice, dry-spinning jet is surrounded by a foraminous skirt to maintain the adjacent atm. const., the flow of drying medium being countercurrent to the extrusion in the main casing. B. M. V.

Spinning of artificial silk threads, filaments, and the like. NORTH BRIT. RAYON, LTD., R. W. ALLETSON, and W. HARTLEY (B.P. 423,251, 25.8.33).—To obtain increased tenacity with normal extensibility, the thread on its way from the spinneret to the godet is passed over a guide system comprising ≤ 2 Ta wires of diam. ≥ 2 mm. F. R. E.

Manufacture of artificial threads, filaments, and the like. COURTAULDS, LTD., and S. COURTAULD (B.P. 423,374, 4.9.33).—To obtain a cake of uniform dyeing properties, the thread drawn from the spinning nozzle through the coagulating bath at a const. rate by means of a constantly rotating godet is passed over or around one or more further godets, of which at least the last, from which the thread descends into the spinning box, rotates at an increasing speed either before spinning or during the formation of the whole or at least the latter part of the cake. F. R. E.

Wet treatment and drying of freshly spun artificial silk threads. VEREIN. GLANZSTOFF-FABR.

A.-G. (B.P. 423,152, 14.6.34. Ger., 14.6.33).—Freshly spun filaments are continuously guided in helical turns over a rotating cylinder or adjacent co-acting cylinders (C) where, at the initial zones, they are subjected to known wet-treatment processes, and are then dried in the further zones by means of hot gases acting either on the inside of C, which in this case is composed of a fireproof conducting material (monel metal, steel, etc.), or at a point on the outside of C where the threads are not at the time resting, this portion of C being composed of material of low thermal conductivity (porcelain). F. R. E.

(B) Manufacture or (A, B) treatment [stretching] of artificial filaments, threads, yarns, ribbons, and like materials. H. DREYFUS (B.P. 423,096 and 423,168, 23.6.33).—The materials, e.g., of cellulose acetate (I), are treated (A) to remove H₂O either by heating or by means of a volatile liquid which is a non-solvent for (I), and then softened with suitable liquids (aq. COME₂, dioxan), or (B) with a mixture of ≤ 2 volatile liquids of different solvent powers for (I) but of substantially the same volatility at the operating temp. (EtOAc-C₆H₆, EtOAc-cyclohexane), together with a small proportion of EtOH if desired, and are finally stretched. F. R. E.

Preparation and treatment of textile materials. BRIT. CELANESE, LTD. (B.P. 423,065, 27.12.33. U.S., 28.12.32).—Yarns, threads, or filaments of org. derivatives of cellulose are coated continuously with their production with a H₂O-resistant wax (W) (paraffin) containing, if desired, a fireproofing substance (2-C₁₀H₇Cl, Ph₃PO₄), in such a way that W has a rough surface, e.g., by rapidly cooling the material applied in the molten state or by treatment of the coating with a warm liquid (C₅H₁₁·OAc) which is a solvent in the warm but not in the cold, and afterwards cooling. The products are suitable as insulation for wires. F. R. E.

Manufacture of threads, strings, bands, films, and the like from (A, B) elastin- and collagen-containing materials, (c) animal fibres. N. V. KONINKLIJKE PHARMACEUT. FABRIEKEN VOORHEEN BROCADES-STHEEMAN & PHARMACIA (B.P. 422,990 and Addn. B.P. 423,015 and 423,017, [A, B] 2.2.34, [C] 23.7.34. Holl., [A] 11.2. and 13.9.33, [C] 24.5.34. Cf. B.P. 419,180; B., 1935, 58).—After swelling with dil. acid solutions, e.g., lactic acid of p_H 1.3—2.5, so that the fibrous structure is retained, and mechanically teasing out, the materials are suspended in a suitable liquid, e.g., H₂O or dil. solution of Rivanol, and extruded through nozzles (A) into a shrinking bath (aq. NH₃ or NaHCO₃) or (c) into the shrinking agent in the form of a spray and/or gas or vapour, whilst (B) textile fibres are incorporated with the suspension prior to extrusion or in the form of a fleece between successive extruded layers. The fibrous mass is finally worked up into the desired form. F. R. E.

Production of cellulose derivatives and regenerated cellulose in sheet form. W. POWNALL and E. L. SILVERSTONE (B.P. 423,365, 29.7.33).—Viscose is extruded through a no. of slits and the sheets are passed simultaneously along different paths through the coagulating, washing, desulphurising, and other

treatment baths, in which they are all maintained for equal times. F. R. E.

Apparatus for recovery of carbon disulphide from freshly-spun viscose artificial silk. RUTH-ALDO Co., INC., and G. B. REGALIA (B.P. 423,275, 12.12.33).—Viscose is washed with H_2O heated above the b.p. of CS_2 in a tank provided with a heat-insulated cover (C) to prevent condensation thereon, and the CS_2 vapours are drawn off through collecting devices above the surface of the H_2O and near the underside of C to an exterior condenser. F. R. E.

Production of cellulose acetate soluble in acetone. A. H. STEVENS. From E. BERL (B.P. 423,062, 5.12.33).—Fibrous or pptd. cellulose triacetate is treated with aq. C_6H_5N (20—75%) at room temp. up to 150° (25— 100°), and the retro-acetylated product is separated, washed with H_2O , stabilised, and dried. F. R. E.

Manufacture of paper pulp. E. & M. LAMORT FILS (B.P. 422,875, 17.1.34. Fr., 17.1.33).—In a continuous hollander the pulp is flung upwards by the milling cylinder in conjunction with adjustable guides, the finest pulp taking a higher trajectory than the coarse and being collected in a by-pass channel (B) above the main circuit (A); the pulp screens (S) are situated in B and the raw material is fed into A at a point just before the oversize from S rejoins A. The material which passes through all the screens in series is considered finished. B. M. V.

Apparatus for grinding, refining, and hydrating fibrous substances. ATELIERS NEYRET BEYLIER (B.P. 422,680, 9.6.34. Fr., 9.6.33).—Material for the manufacture of paper, cardboard, or the like is continually passed in the form of a thick pulp between pairs of rolls (R) which are strongly pressed together, the lifting of the pulp back to the nip being effected by a rotary drum surrounding R and provided with internal lifting blades. B. M. V.

[Apparatus for] treatment of centrifugally spun artificial silk cakes [with liquids]. NORTH BRIT. RAYON, LTD., E. WALLS, and W. HARTLEY (B.P. 424,056, 14.7.33).

Treatment of paper [to render it more pliable etc.]. L. TAYLOR (B.P. 423,828 and 423,834, [A] 31.1.34, [B] 15.4.34).

Dehydrating nitrocellulose.—See XIII. **Swelling of cellulosic (etc.) substances.**—See XIX.

VI.—BLEACHING; DYEING; PRINTING; FINISHING.

The dry-cleaning bath. II—IV. C. L. BIRD (J. Soc. Dyers and Col., 1934, 50, 389—392; cf. B., 1933, 1006).—II. By tumbling samples of white worsted cloth having various known H_2O contents in white spirit solutions of 3 dry-cleaning soaps (I) at 20— 25° and then analysing the residual liquors it was found that neutral wool adsorbs undissociated K oleate in amount \propto the solubility of the soap and that there is no preferential sorption of alkali unless the wool is wet initially (cf. B., 1922, 626 A). Contrary to a previous conclusion (cf. B., 1931, 1018), wool removes an amount of H_2O from (I) inversely \propto the initial H_2O content of the wool; when

this H_2O content is $> 22\%$ (I) removes H_2O from the wool.

III. Dirt (from the cleaning of dark suits with clean white spirit without soap), finely-divided C (Bonnite FF), and the filter-aid Hyflo Supercel (to a much less degree) absorb neutral or slightly acid soap and H_2O when tumbled with (I) at 19— 24° .

IV. Miscellaneous facts concerning the stability of (I) when exposed to air, the effects of dirt, Bonnite FF, and Hyflo Supercel on the rate of filtration of used (I), and the loss of soap from (I) in large-scale dry-cleaning are recorded. A. J. H.

(A) **Oxidising activity of sodium hypochlorite.** J. D. BLAKELY. (B) **Influence of vat dyes on hypochlorite oxidation.** G. M. NABAR (J. Soc. Dyers and Col., 1934, 50, 306—307).—(A) Measurement of the "oxidation potentials" (I) of hypochlorite solutions (II) having p_H 2—13 indicates a max. (I) at p_H 7.0. Evidence was obtained to show that (I) is a real measure of the oxidation intensity of (II) towards reducing substances.

(B) Acceleration of the oxidation of cellulose by (II) as produced by the presence of a leuco-vat dye (cf. B., 1929, 595) is influenced by the p_H of (II). For many dyes, particularly Cibanone Orange R, the curves connecting fluidity of the oxidised cellulose in cuprammonium solution with the p_H of (II) agree closely with those connecting (I) with (II). A. J. H.

Aluminium [vessels] in bleaching processes with hydrogen peroxide. R. W. MÜLLER (Deuts. Färbertztg., 1934, 70, 327—328; Chem. Zentr., 1934, ii, 2148).—In Al vessels aq. H_2O_2 lost only 4—5% of its O in 24 hr. (approx. the same as in porcelain or glass). H. J. E.

Modern developments in textile chemicals for dyeing and finishing. C. DUNBAR (J. Soc. Dyers and Col., 1934, 50, 309—316).—Highly sulphonated products obtained from castor oil (e.g., Prestabit Oil V and Avirol KM extra) and aromatic hydrocarbons (e.g., Perminol W, Nekal BX, and Oranit) are stable in hard H_2O (Turkey-red oil is pptd. in hard H_2O), but have very much less detergent power than sulphonated fatty alcohols [e.g., Gardinol, Lissapol A (I), and Ocenol]; the last-named products are also unaffected by acids and alkalis, and their aq. solutions withstand prolonged boiling without appreciable decomp. The scouring efficiency of detergent liquors containing (I) when used for wool artificially soiled with an emulsion of lampblack in lanoline and C_6H_6 is a max. at p_H 7—10, less at p_H 2—5, and a min. at p_H 12; the optimum temp. of scouring is 40— 60° . The optimum concn. of (I) for removing oleine and olive oils from wool is 0.2—0.3% (on the wt. of liquor). The properties and uses of Fixanol (a product which increases the fastness to H_2O of certain direct dyes), Perminol MERC (a wetting agent for use with mercerising liquors), Lissolamine-A and -V (stripping agents for azoic and vat dyes, respectively), and Perminol NF (an anti-felting agent for wool) are reviewed. A. J. H.

Action of aliphatic cation-active substances on vegetable fibres. H. BERTSCH (Angew. Chem., 1935, 48, 52—53).—These substances contain an aliphatic chain in the cation and are exemplified by

$\text{NRR}'\text{R}''\text{Cl}[\text{CH}_2]_2\text{NH}\cdot\text{CR}$ (where R is the oleic acid radical) and laurylpyridinium sulphate; triethylcetyl-ammonium cetyl sulphate ($\text{C}_{16}\text{H}_3\cdot\text{NEt}_3\cdot\text{SO}_3\cdot\text{O}\cdot\text{C}_{16}\text{H}_{33}$), laurylpyridinium laurate, and laurylpyridinium lauryl sulphate contain aliphatic chains in both anion and cation. Cation-active substances do not act as soaps, but concentrate on the surface of vegetable fibres and give these an affinity for negatively-charged particles. Thus rayon may be dyed with pigments such as $\text{Fe}(\text{OH})_3$, cotton may be dyed with acid colours, and the padding process for vat dyes is improved. A. G.

Dyeing of cellulose with direct dyestuffs; importance of the colloidal constitution of the dye solution and of the fine structure of the fibre. T. H. MORTON (Trans. Faraday Soc., 1935, 31, 262—276).—By ultrafiltration methods it is shown that the fine structure of viscose cellulose has a pore diam. of $< 5 \text{ \AA}$. in the unswollen state and 20—30 \AA . in the normal swollen state. This val. may be increased 5-fold by swelling in aq. NaOH. Mols. of direct dyes can penetrate the capillaries only in the swollen state of the fibre. The rate of diffusion of the most rapid dyeing of the direct dyes, e.g., Chlorazol Fast Orange GS, within the cellulose capillaries approaches that for diffusion in H_2O ; that for the slowest dyes, e.g., Chlorazol Fast Orange AGS or Benzo Fast Blue 8GL, is 10^{-4} of this val. Ultrafiltration experiments with cellulose membranes indicate that the degree of aggregation in slow dyes is $>$ in rapid ones, the order of increasing dyeing speed being the order of decreasing colloidality. A solution of a direct dye probably contains mol. aggregates of all sizes. The large temp. coeff. of the rate of dyeing is undoubtedly connected with the decrease in aggregation with rise in temp. Curves showing the probable distribution of particle size in solutions of different concn. are given. The facts of the kinetics of dyeing may be explained, in general, on the basis of these curves. M. S. B.

Treatment of cellulose acetate [rayon] and fabrics containing it [in mercerising and dyeing]. J. ROLLAND (Rev. Gén. Mat. Col., 1934, 38, 431—438).—Optimum conditions for mercerising cotton fabrics containing cellulose acetate rayon (I) so that this is not hydrolysed (cf. B.P. 210,484; B., 1924, 290) are: immersion for 2 min. in aq. NaOH (d 1.265) at 10° followed by washing for 1 min. in H_2O at 10° and souring with 1% H_2SO_4 at 18° . Mercerisation accompanied by hydrolysis of (I) so that the fabric may be afterwards dyed solid with direct dyes is attained by immersion for 3 min. in aq. NaOH (d 1.21) at 25° followed by successive washings of 1 min. each in aq. NaOH (d 1.022 and 1.007, respectively) at 40° and souring with aq. H_2SO_4 (d 1.007). Dyeing of the cotton in cotton-acetate rayon materials with vat dyes so that the (I) is left white and non-hydrolysed can be effected at 25 — 30° in a dye liquor containing (per litre) either NaOH (4 c.c., d 1.265), $\text{Na}_2\text{S}_2\text{O}_4$ (2 g.), and waste sulphite-cellulose liquor (II) (10 g.), or NaOH (6 c.c., d 1.265), starch (1 g.), $\text{Na}_2\text{S}_2\text{O}_4$ (2 g.), and (II) (4 c.c.); alternatively, the NaOH may be partly replaced by Na_3PO_4 . The presence of (II) in S-dye liquors at 40 — 55° similarly protects (I). A tentative method for dyeing (I) with NH_2Ph -black is described. A. J. H.

Mordanting and dyeing processes. XXII. Reaction between protein fibres and substantive dyestuffs. E. ELÖD (Trans. Faraday Soc., 1935, 31, 305—317).—The behaviour of substantive dyes (S) towards loaded and unloaded silk, wool, and hides has been investigated. The loaded and unloaded silks behave differently, owing to the possibility of the formation of insol. lakes by the action of S on the loading material. This does not take place with acid dyes. Stretched wool takes up more S than does unstretched wool, but there is no marked difference in the behaviour of stretched and unstretched silk. Swelling causes increase in dyeing properties owing to increase in the spaces between the micelles and, therefore, a readier penetration by large mol. aggregates of dye. Hence, since swelling is in the order hides $>$ silk $>$ wool, the influence on the amount of dye taken up follows the same order. The dyeing affinity of wool, like silk, depends on $[\text{H}^+]$, but the affinity of silk for dyes is $>$ that of wool. Wool is scarcely dyed at low temp. Addition of salts to the dye bath does not affect the dyeing affinity of silk, but lowers that of wool initially. The rate of dyeing of the different materials is in the order silk $>$ hides $>$ wool. M. S. B.

Action of sulphur dioxide on the strength of cotton yarn dyed with sulphur-black. D. N. GRIBOEDOV (J. Appl. Chem. Russ., 1934, 7, 980—988).—Cotton yarns dyed with S-black, blue-black, or brilliant-green are weakened by SO_2 treatment, as a result of oxidation by atm. O_2 of adsorbed SO_2 to SO_3 , which with H_2O yields H_2SO_4 , exerting a destructive action on the cellulose. R. T.

Indigosol dyes: reserves obtained with compounds of Naphthol AS on bases foularded with indigosol. L. CABERTI (Boll. Staz. Sperim. Ind. Carta Fibre Tess., 1934, 29, 776—777).—Fast vivid colour reserves ranging from orange to bright red may be attained on backgrounds obtained with indigosol dyes by means of certain Naphthol AS compounds. The fabric is steeped in a suitable bath of indigosol dye (steaming process), dried at not too high a temp., and then printed with the reserve. For this, either Naphthol AS compounds or any reserve not attacked subsequently in the diazo bath may be used. After printing and dyeing, the procedure is as usual. Means of obtaining various effects are described. T. H. P.

Classification of direct dyes with respect to the production of level dyeings on viscose rayon. J. BOULTON and (MISS) B. READING (J. Soc. Dyers and Col., 1934, 50, 381—389; cf. B., 1932, 417).—Measurement was made of the rates of dyeing (I) of 71 direct dyes by determining the degrees of exhaustion of the bath and interpolating the time required for 50% exhaustion. (I) vary from 0.072 min. for Chlorazol Fast Orange GS to 159.2 min. for Diphenyl Fast Blue Green BL. It is suggested that (I) is a property of direct dyes which should be investigated [in preference to Whittaker's temp.-range test (*loc. cit.*)] before recommending any new dye for use with viscose rayon. A. J. H.

Measurement of the degree of fading [of vat dyes on cotton]. (MISS) M. M. FITZSIMMONS (J. Soc.

Dyers and Col., 1934, 50, 305).—The influence of "light-active" yellow vat dyes (I) (cf. Scholefield and Goodyear, B., 1930, 505) on the fading of blue vat dyes (II) when present together on cotton was determined by measuring the progressive loss of (II) during exposure in a Fadeometer. The measurement was effected with a specially designed photoelectric photometer calibrated by means of cold conc. H_2SO_4 extracts of (II) from dyeings produced with known amounts of (II). It is confirmed that (I) accelerates fading only when $>$ a certain min. is present in the dye mixture.

A. J. H.

Swelling of cellulose in alkali. VII. Change in cross-sectional area of ramie and cuprammonium rayon during dilution and concentration of alkali.

VIII. Discussion. G. SAITŌ (J. Soc. Chem. Ind., Japan, 1934, 37, 639—642 B, 642—645 B; cf. B., 1935, 267).—VII. When ramie or cuprammonium rayon is transferred from conc. (130—300 g. per litre) to successively more dil. aq. NaOH the swelling increases to a max. at a lower concn. than when the fibres are steeped in successively more conc. solutions starting with H_2O .

VIII. With increasing concn. the max. swelling occurs at the same concn. as the first flat in the concn.-absorption of NaOH curve. The swelling cannot be related to the Na-cellulose compound present as indicated by X-ray diagrams.

A. G.

Iodometric control of mercerisation. P. V. ROGOVINA and O. A. MEBUS (J. Appl. Chem. Russ., 1934, 7, 989—996).—Schwertassek's I-adsorption method (B., 1931, 800) is preferred. The significance of the results obtained thereby is discussed.

R. T.

Permeability of synthetic film-forming materials [on cotton fabric] to hydrogen. T. P. SAGER (J. Res. Nat. Bur. Stand., 1934, 13, 879—885).—The permeability (P) to H_2 of a no. of materials applied to closely woven cotton fabric was measured. Those with mols. rich in OH groups (e.g., regenerated cellulose sheet and polyvinyl alcohol) showed very low P (e.g., 0.1 litre of H_2 /sq. m. of fabric/24 hr./1 atm. pressure); low vals. were also found for polyvinyl acetal and polyhydric alcohol-polybasic acid resins, and are attributed to the presence of residual OH groups in the mol. High vals. obtained with the polyvinyl and cellulose esters (e.g., 4.7—21) showed that increased P followed the introduction of the ester group into the mol. The P of continuous films appeared to be roughly parallel to the solubility of H_2 in corresponding types of compounds of simple structure. Polyethylene sulphide (Thiokol-A) showed low P (0.2—0.5), and the claim of lower P for polychloroprene (Duprene) than for natural rubber was substantiated. The measurements of P indicate why hydrophilic colloidal materials have found extensive use as coatings for gas-cell fabrics, but suggest that other less hygroscopic materials are available for this purpose.

A. L. R.

Applications of colloidal electrolytes.—See III. **Mercerised cellulose. Evaporation of H_2O from cellulose.**—See V. **Oilskins.**—See XIII.

See also A., Mar., 301, **Mordanting and dyeing processes.**

PATENTS.

Preparations and liquors for washing textiles.

I. G. FARBENIND. A.-G. (B.P. 423,238, 4.7.33. Ger., 5.7.32).—The addition to detergents and detergent solutions of 3—25% (10—15%) of hard paraffin wax, rendered dispersible by incorporation of 5—50% (10—25%) of a reaction product of a higher fatty OH- or NH_2 -compound with $(CH_2)_2O$ or a higher fatty amide of a (poly)hydroxyalkylamine, is claimed.

H. A. P.

Stripping [of coloured cellulose ester and ether rays]. K. C. LOUGHLIN, Assr. to CELANESE CORP. OF AMERICA (U.S.P. 1,958,483, 15.5.34. Appl., 21.11.30).—Cellulose acetate (etc.) rayon is treated successively with reducing (e.g., Zn or Na formaldehydesulphoxylate) and oxidising (e.g., NaOCl) agents, preferably in presence of an acid.

A. J. H.

Apparatus for developing fabrics printed with vat dyes. I. G. FARBENIND. A.-G. (B.P. 421,237, 12.6.33. Ger., 11.6.32).—A steaming chamber is provided with a controlled humidifier and a heating element disposed so that the fabric is heated to a relatively high temp. for a short period for reduction of the printed dyes and then maintained at a lower temp. for their fixation.

A. J. H.

[Pre-shrinking] treatment of [cotton] textile [fabrics]. E. BROOKS (U.S.P. 1,959,406, 22.5.34. Appl., 12.11.32).—Cotton fabric is shrunk by immersion for 1—10 hr. in an aq. liquor at 65—100° (83—88°) containing 1—4 oz. of NH_4 alum and 0.25—3 oz. of $NaHSO_3$ per 10—50 oz. of H_2O , followed by hydro-extraction (without intermediate washing) and drying.

A. J. H.

Continuous treatment of lengths of material with volatile solvents and apparatus therefor. DR. A. WACKER GES. F. ELEKTROCHEM. IND. G.M.B.H. (B.P. 423,484, 8.8.34. Ger., 9.8.33).—The strip of material enters and leaves the treatment chamber (T) through slots in a wall in front of which is an antechamber, common to both runs, in which a considerable proportion of the vapour dragged out by the leaving strip may be returned to T by the entering strip.

B. M. V.

Manufacture of rubberised fabric. E. I. DU PONT DE NEMOURS & Co. (B.P. 423,519, 4.8.33. U.S., 6.8.32).—Material suitable for motor-car tops is obtained by applying successively to one side of a single sheet of "balanced fabric" an impregnating rubber cement (R) and a thin layer of R (followed, if desired, by a varnish, e.g., of shellac), and to the other side a relatively thick layer of vulcanising rubber composition, a film of "long oil-length varnish," and a film of asphalt varnish. The material is then dry-heated to vulcanise the rubber and bake the varnish.

D. F. T.

Waterproof textile products. INTERNAT. LATEX PROCESSES, LTD., Assees. OF MAGYAR RUGGYANTÁRUGYÁR RÉSZVÉNYTÁRSASÁG (B.P. 421,854, 21.11.33. Hung., 3.3.33).—Fabrics etc. are woven and/or knitted wholly or in part with cotton- (or other fibre-) covered rubber threads and then coated wholly or in part with a waterproofing composition which may contain rubber.

A. J. H.

Manufacture of moistureproof materials and compositions therefor. CARBIDE & CARBON CHEMICALS CORP., and EASTMAN KODAK Co., Assees. of C. R. FORDYCE and H. F. ROBERTSON (B.P. 423,236, 24.4.33. U.S., 24.5.32).—A cellulose ester (I) (acetate) is coated with a vinyl resin (II) dissolved in a non-solvent for (I) containing a plasticiser for (I) of low volatility. The preferred coating composition is: (II) (80% of $\text{CH}_2:\text{CHCl} + 20\%$ of $\text{CH}_2:\text{CH}\cdot\text{OAc}$) 55—85, paraffin wax (m.p. $> 50^\circ$) 2—10, oxidised ester gum 5—20, and bis- β -butoxyethyl phthalate $\geq 15\%$ ($+\text{OH}\cdot\text{CH}_2\cdot\text{CH}_2\cdot\text{OBu}$), dissolved in $\text{PhMe}-\text{C}_2\text{H}_4\text{Cl}_2$. H. A. P.

Production of white or coloured matt effects on artificial silk made from regenerated or acylated cellulose. SOC. CHEM. IND. IN BASLE (B.P. 421,360, 25.9.33. Switz., 24.9.32).—Insol. colourless salts of $\text{H}_4\text{Fe}(\text{CN})_6$ or $\text{H}_3\text{Fe}(\text{CN})_6$ [especially $\text{Zn}_2\text{Fe}(\text{CN})_6$] are pptd. locally on viscose and cellulose acetate rayon materials, with or without a basic dye. A. J. H.

Fireproofing of cellulosic materials. M. LEATHERMAN, DED. TO U.S.A. (U.S.P. 1,961,108, 29.5.34. Appl., 5.1.34).—The fabric is soaked until saturated in a 1% aq. solution of a salt of a sulphate of an aliphatic alcohol (having $\leq \text{C}_{12}$), wrung out, impregnated with Na stannate, dried, and immersed in an aq. salt of a weak H_2O -insol. metallic base and a strong inorg. acid (FeCl_3). It is then washed, dried, impregnated with chlorinated rubber, and (optionally) dyed. H. A. P.

Treatment of [cellulose ester and ether] textile materials [for reducing electrostatic difficulties in processing]. BRIT. CELANESE, LTD. (B.P. 421,405, 17.5.33. U.S., 17.5.32).—Results similar to those described in B.P. 390,176 (B., 1933, 503) are obtained by coating or impregnating cellulose acetate (etc.) fibres with a composition consisting of a mixture of a non-hygroscopic inorg. electrolyte (e.g., LiCl , Na_2SO_4 , BaBr_2) and a liquid of b.p. $> 100^\circ$ (e.g., glycerol, polyhydric alcohols), also containing a hygroscopic electrolyte (e.g., CaCl_2) and/or a hygroscopic liquid of b.p. $> 100^\circ$ (e.g., glycols). A. J. H.

Retarding the decay of fishing twine, nets, and allied equipment. A. FINLAYSON and P. R. ANDREWS, ASSTS. to SEALTH CORP. (U.S.P. 1,960,627, 29.5.34. Appl., 28.10.32).—Cu or other suitable metal is introduced into the textile material, during manufacture or subsequently, by spraying, so that by its reaction with the salts usually present in sea- H_2O there is a continuous generation of basic compounds which are poisonous towards decay-promoting organisms. A. J. H.

Production of rot-proof fishing nets or tackle. J. Y. JOHNSON. FROM I. G. FARRENIND. A.-G. (B.P. 423,499, 28.6.33).—The tackle is dyed with azo dyes of good fastness to light and H_2O , having $\leq 2 \text{NO}_2$ in the mol. Examples are $1:4:2\text{-NH}_2\cdot\text{C}_6\text{H}_3\text{Cl}\cdot\text{NO}_2 \rightarrow 2'':4''\text{-dinitro-4'-2:3-hydroxynaphthoylaminodiphenylamine}$ or $\rightarrow 2:3\text{-hydroxynaphthoic } 3':5'\text{-dinitro-2'-hydroxylanilide}$, and picramic acid $\rightarrow 1:6\text{-NH}_2\cdot\text{C}_{10}\text{H}_6\cdot\text{SO}_3\text{H} \rightarrow 2:5:7\text{-NH}_2\cdot\text{C}_{10}\text{H}_5(\text{OH})\cdot\text{SO}_3\text{H}$. H. A. P.

Waterproofing solution.—See XIV. **Photographic printing fabric.**—See XXI.

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

Sources of error in determining phosphoric acid by the citrate method. P. LEDERLE (Z. anal. Chem., 1935, 100, 81—87).—Old NH_4 citrate solutions, unless kept in waxed bottles, may dissolve sufficient SiO_2 to ppt. appreciable amounts of CaSiF_6 from superphosphate (I) extracts. By removing any ppt. forming on mixing the solutions, correct vals. are obtained. The use of solutions more dil. [10 g. of (I) in 1 litre] than those usually specified enables the ppts. to be washed more readily. J. S. A.

Determination of nitrite, especially in preserving salts. K. REIN (Angew. Chem., 1935, 48, 139—140).—Strecker and Schartow's method (cf. A., 1924, ii, 565), depending on the reaction $\text{CO}(\text{NH}_2)_2 + 2\text{HNO}_2 = \text{CO}_2 + 3\text{H}_2\text{O} + 2\text{N}_2$, is simplified. A mixture of 30% aq. urea and 30% aq. H_2SO_4 is dropped on to 1—15 g. of substance (10 g. of nitrite pickling salt containing 0.5—0.6% NaNO_2). Air is swept out by CO_2 and the N_2 measured in the nitrometer. R. S. B.

Physico-chemical study of thermo-phosphate production. I. Nature of thermo-phosphates. A. G. BERGMAN. II. Application of illumination to visual observations at high temperatures. K. KUMANIN. III. Reaction between apatite and soda. A. P. PALKIN and M. P. GOLOVKOV. IV. Preparation of trisodium phosphate. A. P. PALKIN (J. Appl. Chem. Russ., 1934, 7, 1125—1127, 1127—1129, 1130—1143, 1144—1146).—I. Introductory.

II. Observation of substances heated at $\geq 1500^\circ$ is facilitated by intense illumination.

III. The reaction $\text{Ca}_3(\text{PO}_4)_2\cdot\text{CaF}_2 + 12\text{Na}_2\text{CO}_3 \rightarrow 6\text{Na}_3\text{PO}_4 (\text{I}) + 9\text{CaO} + 6\text{NaF} + 12\text{CO}_2$ takes place at 1100° . The reaction is most conveniently studied crystallographically.

IV. The melt is extracted with hot H_2O , when $\text{Ca}(\text{OH})_2$ and apatite remain undissolved; (I) and NaF in the filtrate are separated by fractional crystallisation. The yields of (I) are approx. 60%; the unchanged residue, containing about 20% P_2O_5 , can be used as a fertiliser. R. T.

Flotation processing of limestone. B. L. MILLER and C. H. BREERWOOD (Amer. Inst. Min. Met. Eng., 1935, Tech. Publ. No. 606, 22 pp.).—An account is given of the methods of beneficiation of a metamorphosed micaceous limestone used by an American cement company. The stone as quarried contains SiO_2 13.84, Fe_2O_3 1.66, Al_2O_3 (as muscovite) 5.34, and CaCO_3 72.2%; it is ground to 85% through 200-mesh in wet ball mills and the slurry is separated into sand (+ 325-mesh) and slime by means of a Dorr hydro-separator and rake classifier, the slimes passing forward to be mixed with the flotation concentrate. The sand is floated with oleic acid and cresol in rougher and cleaner cells, and the concentrates (containing CaCO_3 87, SiO_2 4.5, Fe_2O_3 1.71, and Al_2O_3 1.76%) are dewatered, reground, and added to the classifier slimes to give a product containing CaCO_3 75.8, SiO_2 11.25, Fe_2O_3 1.58, and Al_2O_3 4.48% ready for the cement kiln or blending tanks. The flotation tailings can be separated into an Fe-rich product (60% Fe_2O_3) and a SiO_2 -rich product ($\text{SiO}_2:\text{Al}_2\text{O}_3$

= 8:1) by table treatment; these products can be blended with the limestone for the production of special cements. The process is extremely flexible and can be adapted to many types of limestone to produce cement mixes of any of the usual compositions. A. R. P.

Material and energy balance of the [calcium] carbide process. G. J. TARASOV (J. Appl. Chem. Russ., 1934, 7, 906—915).—The production of > 80% CaC_2 (I) is not economical. Of the electrical energy supplied, > 86% is converted into heat, 13% is dissipated owing to heat losses, 4% is used for side-reactions, and 69% is actually utilised for (I) production.

R. T.

[Preparation of alumina and zirconium at high temperatures.] W. DAWIHL (Tonind.-Ztg., 1934, 58, 449—451, 463—465, 477—478, 485—487; Chem. Zentr., 1934, ii, 1975).—Cryst. $\text{Al}(\text{OH})_3$ was dehydrated at 1000° to Al_2O_3 ($\text{Fe}_2\text{O}_3 < 0.01$, $\text{SiO}_2 < 0.1\%$). Vitriification occurs at 1850° , small additions of MgO (approx. 1%) and Fe_2O_3 facilitating sintering. For moulds a mixture of Al_2O_3 (500 g.), H_2O (350 c.c.), $\text{MgCl}_2 \cdot 6\text{H}_2\text{O}$ (50 g. in 80 c.c. of solution), and aq. ZrOCl_2 (2 c.c.) was used. Zr was prepared in an arc from Fe- and Ti-free ZrO_2 , using C for reduction. The product contained ZrC 71, Zr 20, and ZrO_2 9%. Refining in a CaO crucible gave a product with 70% Zr. A Zr-Fe alloy was also produced.

H. J. E.

Extraction of alumina from Poshan bauxite by soda-ash fusion. C. L. CHANG and J. CHOW (J. Chinese Chem. Soc., 1934, 2, 354—364; cf. B., 1934, 273).—Optimum conditions are: ore ground to 60-mesh or finer; fusion of 2 g. of ore with 1.6 g. of Na_2CO_3 and 0.47 g. of $\text{Ca}(\text{OH})_2$ at 1100 — 1200° for 5 min.; concn. of the extract to d 1.260 and desiccation with 2—2.5 g. of Na_2CO_3 per 1 g. of Al_2O_3 at 100 lb. pressure for 3 hr. Yields of 89.4—91.2% of Al_2O_3 are thus obtained, including about 0.33% of SiO_2 and 0.1% of Fe_2O_3 .

R. S. C.

[The rare gases.] F. J. METZGER (Chem. & Ind., 1935, 209—213).—A brief account of separation and uses.

H_2 from hydrocarbons. Benzene from CO and H_2 .—See II. Oxidising action of NaOCl.—See VI. Refractory oxides.—See VIII. H_2SO_4 -resistant cement. Plaster for H_2SO_4 towers.—See IX. Smelter gas for H_2SO_4 . Extracting Pb compounds from ores.—See X. Alkali- Cl_2 electrolytic cells.—See XI. Flotation reagents.—See XII. Humic fertilisers.—See XVI. Determining atm. CO_2 and SO_2 .—See XXIII.

See also A., Mar., 296, Se sol. Colloidal SiO_2 . WO_3 sol. 304, [Prep. of] AlCl_3 . 306, Electrolysis of NaCl in liquid NH_3 . 311, Prep. of H_2O . 313, Prep. of phosphorescent substances. 314, Metal carbonyls. Prep. of anhyd. chlorides. 366, Prep. of NH_4 and Ca aurothiosulphates.

PATENTS.

Treatment of waste sulphuric acid [from petroleum refining] and manufacture of sulphates and of absorptive carbon therefrom. N. A. SARGENT (B.P. 422,022, 22.3.34. U.S., 10.5.33).—The acid

sludge is conc. to 70% H_2SO_4 and autoclaved at 175 — 180° to carbonise the org. matter and ppt. a highly active adsorbent C. The acid can then be used directly for the prep. of alum from bauxite, the C serving as a decolorising agent. A. R. P.

Manufacture of boric acid from sodium tetraborate. E. FRANKE, Assr. to CHEM. FABR. GRÜNAD, LANDSHOFF & MEYER A.-G. (U.S.P. 1,950,106, 6.3.34. Appl., 22.10.29. Ger., 22.10.29).—Borax and conc. H_2SO_4 in equiv. amounts are added to hot mother-liquor (L) from the final stage, the anhyd. Na_2SO_4 which is pptd. is removed, and the solution cooled to 30 — 35° to recover H_3BO_3 , the L being returned to the first stage. A. R. P.

Manufacture of hydrocyanic acid. C. J. MARVIN and M. WALKER, Assrs. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,950,899, 13.3.34. Appl., 14.5.31).—In the prep. of HCN by treating aq. NaCN (I) with H_2SO_4 , addition of a small quantity of Na_2SO_3 to (I) prevents the formation of polymerides or decomp. products of HCN and yields a perfectly colourless HCN after distillation etc. A. R. P.

Manufacture of alkali hydroxide solutions. I. G. FARBENIND. A.-G. (B.P. 415,466, 25.2.33. Ger., 25.2.32).—K or Na amalgam from the electrolysis of chloride solutions is passed through a perforated plate over small pieces of graphite packed in a vertical tower up which a slow current of H_2O is passed to maintain a temp. of 30 — 100° (60°) and to produce 60% aq. KOH or NaOH. A. R. P.

Salt mixtures [for preserving hides]. K. M. SEIFERT, Assr. to GRIFFITH LABS. (U.S.P. 1,950,459, 13.3.34. Appl., 26.1.31. Ger., 21.2.30).—Saturated aq. NaCl containing small quantities of disinfecting salts, e.g., NaF, ZnCl_2 , or phosphates, is spray-dried or passed in a thin film over heated rollers to produce a fine powder which is homogeneous throughout. A. R. P.

Simultaneous manufacture of primary sodium phosphate and boric acid. CHEM. FABR. BUDENHEIM A.-G. (B.P. 423,295, 30.8.34. Ger., 2.11.33).—An aq. solution of $\text{Na}_2\text{B}_4\text{O}_7$ is treated with H_3PO_4 at elevated temp., the H_3BO_3 crystallised out and separated, and the mother-liquor treated with steam under reduced pressure to give NaH_2PO_4 . W. J. W.

Manufacture of high-percentage per-compounds. J. MÜLLER (U.S.P. 1,950,320, 6.3.34. Appl., 10.12.32. Austr., 10.5.32).— Na_2CO_3 , MgO, CaO, $\text{Na}_2\text{P}_4\text{O}_7$, or urea as dry powder is mixed or sprayed with 40% aq. H_2O_2 and a small quantity of a catalyst, e.g., aq. Na_2SiO_3 , H_2BO_3 , H_3PO_4 , MgCl_2 , or the like, so that at no time does the mixture become damp. Drying the product in air at 100° increases the available O content of the per-compound obtained. A. R. P.

Plant for production and treatment of ammonium sulphate. T. O. WILTON, and CHEM. ENG. & WILTON'S PATENT FURNACE Co., LTD. (B.P. 423,432, 25.7.33).— $(\text{NH}_4)_2\text{SO}_4$ or the like is withdrawn from the base (B) of a saturator by means of an elevator having a submerged lower sprocket (S) and a casing making a fluid-tight upward continuation of B. The journals of S

are kept clean and/or lubricated with a minute quantity of steam and/or oil continuously injected. B. M. V.

Production of ammonium sulphate. DIRECTIE VAN DE STAATSMIJNEN IN LIMBURG (B.P. 423,397, 15.2.34. Holl., 16.10.33).—In the interaction of H_2SO_4 and NH_3 , coarse crystals are obtained by adding HPO_3 or a phosphate to the mixture so as to ppt. impurities. An acidity $\geq 1.5\%$ (calc. as H_2SO_4) should be maintained.

W. J. W.

Production of calcium nitrate. E. POTTER. From MONTECATINI SOC. GEN. PER L'IND. MINERARIA ED AGRICOLA (B.P. 420,793, 16.5.34).—Aq. $\text{Ca}(\text{NO}_3)_2$ from the neutralisation of HNO_3 (d 1.33) with limestone is passed down a tower (I) packed with porcelain rings, and then in series through two horizontal cylinders (II) containing rotating drums fitted with paddles and scrapers, and a stream of hot gases, *e.g.*, from coke ovens, is passed countercurrently through (II) and (I). A dry, granular product with 15.5% N is thus obtained from the second (II).

A. R. P.

Purifying calcium chlorate. S. B. HEATH, Assr. to DOW CHEM. CO. (U.S.P. 1,949,204, 27.2.34. Appl., 26.5.32).—Crude $\text{Ca}(\text{ClO}_3)_2$ is dissolved in the min. of hot H_2O and cooled to $< 60^\circ$ to crystallise pure $\text{Ca}(\text{ClO}_3)_2 \cdot 2\text{H}_2\text{O}$.

A. R. P.

Preparation of calcium cyanide. P. J. CARLISLE and C. DANGELMAJER, Assrs. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,950,879, 13.3.34. Appl., 15.10.28).—Powdered CaO is suspended in Et_2O , the requisite amount of liquid HCN added, and the reaction promoted by the gradual addition of 1–3% of H_2O , whereby $\text{Ca}(\text{CN})_2$ is pptd. as a sandy powder.

A. R. P.

Manufacture of (A) the sulphates of copper and zinc, (B) copper sulphate from metallic copper and its alloys. H. P. CORSON, Assr. to GRASSELLI CHEM. CO. (U.S.P. 1,949,927—8, 6.3.34. Appl., 8.11.32).—(A) Brass is dissolved in dil. H_2SO_4 at $> 100^\circ$ in a vessel into which air is pumped to a pressure of 30 lb. per sq. in. (B) The metal is heated with H_2O at $> 100^\circ$ in a vessel into which SO_2 and air are passed at > 30 lb. per sq. in.

A. R. P.

Manufacture of magnesium chloride. R. B. MACMULLIN, Assr. to MATHIESON ALKALI WORKS, INC. (U.S.P. 1,951,160, 13.3.34. Appl., 16.5.32).—Dolomite is calcined at 750 – 1000° , the oxides are slaked and treated with flue gases until no more CO_2 is absorbed, $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$ (I) is added, and the gas treatment continued until all the Mg is converted into MgSO_4 and the Ca into CaCO_3 ; the filtered solution is then mixed with aq. CaCl_2 derived from the NH_3 -soda process to produce aq. MgCl_2 and (I) for re-use.

A. R. P.

Treatment of aluminium hydroxide. W. H. GITZEN, Assr. to ALUMINUM CO. OF AMERICA (U.S.P. 1,950,883, 13.3.34. Appl., 31.5.32).—The small Na_2O content of Al_2O_3 pptd. by the Bayer process may be removed by heating the material at 425 – 950° (800 – 900°) and leaching with dil. H_2SO_4 or other acid.

A. R. P.

Manufacture of aluminium fluoride. J. WILKINSON & SON, LTD., and C. J. SAURIN (B.P. 422,080, 3.11.33).

— $\text{Al}(\text{OH})_3$ is dissolved in H_2SiF_6 (I) and the solution treated with HF to ppt. $\text{Al}_2\text{F}_6 \cdot 7\text{H}_2\text{O}$, which is collected and dried to the anhyd. salt. in Al pans at 500° , the liberated (I) being used again if necessary after a preliminary purification to remove Pb, Fe, etc.

A. R. P.

Manufacture of artificial zeolites. A. W. SCHORGER, Assr. to C. F. BURGESS LABS., INC. (U.S.P. 1,949,360, 27.2.34. Appl., 29.12.28).—The gel produced by addition of a solution of an Al salt to aq. Na_2SiO_3 is frozen and then allowed to thaw, the excess of H_2O removed by decantation, and the coagulated gel washed free from sol. salts.

A. R. P.

Treatment of vermiculite. G. M. THOMSON (U.S.P. 1,950,829, 13.3.34. Appl., 10.8.31).—The material is soaked in H_2O after rough breaking, screened to remove most of the H_2O , and heated suddenly to 1000° so that the absorbed H_2O bursts the scales apart and produces a micaceous powder or scale.

A. R. P.

Manufacture of a solid carbon dioxide product. C. L. JONES and J. D. SMALL, Assrs. to AMER. DRYICE CORP. (U.S.P. 1,950,180, 6.3.34. Appl., 4.8.33).—Liquid CO_2 is expanded in a chamber (C) against a pressure $<$ the triple point (T) to produce CO_2 snow; the pressure in C is then raised above T and a second portion of liquid CO_2 added and allowed to evaporate slowly at T to produce large CO_2 crystals.

A. R. P.

Utilisation of nitrogen oxide gases [for production of nitrates]. M. F. FOGLE, Assr. to ATMOSPHERIC NITROGEN CORP. (U.S.P. 1,949,462, 6.3.34. Appl., 14.5.30).—Gases (G) from the catalytic oxidation of NH_3 are passed through a succession of absorbers (A) containing Na_2CO_3 to form a mixture of NaNO_3 and NaNO_2 , which is treated with more G in stages, whereby the NaNO_2 is converted into NaNO_3 and HNO_2 is liberated. The solution is periodically removed from A and maintained warm for some time, during which NO is evolved; when this reaction ceases, the liquid is returned to A and the treatment repeated until all the NaNO_2 is converted into NaNO_3 . The conc. NO recovered is mixed with air or O_2 to form N_2O_4 , which is condensed and mixed with H_2O to form HNO_3 and NO; the latter is returned to the circuit.

A. R. P.

(A) **Sulphur condenser.** (B) **Recovery of elemental sulphur [from smelter gases].** H. G. C. FAIRWEATHER. From M., S. R., and S. GUGGENHEIM, E. A. C. SMITH, S. W. HOWLAND, and M. G. B. WHELPLEY (GUGGENHEIM BROS.) (B.P. 419,787—8, 24.2.34).—(A) The gases containing S are passed up a packed tower down which S at 250 – 450° is trickled to absorb tarry and solid impurities, and then to a condenser (I) maintained at 114 – 150° by a steam jacket or the like. (I) consists of a no. of chambers with a pool of liquid S sealing the openings between them so that the S vapour is caused to bubble through and be absorbed by the liquid. (B) The SO_2 is extracted from smelter gases by passing them up a tower down which is trickled a solution containing $(\text{NH}_4)_2\text{SO}_3$ 100–200 and NH_4HSO_3 700–800 g./litre, and the resulting liquor is boiled by means of the hot gases to expel SO_2 in a conc. form. After drying, the gas is passed through coke at 800° to

reduce it to S, which is recovered by the method claimed in (A). A. R. P.

(A) Treatment of sulphur dioxide-containing gases. (B) Reduction of sulphur dioxide to elemental sulphur. S. B. McCLUSKEY (B.P. 421,289—90, 21.6.33).—(A) The SO₂ is removed from roaster gases by countercurrent scrubbing with cold H₂O, and the resulting solution is treated similarly with warm reducing gases to produce a SO₂-CO gas mixture, which is (B) passed through a bed of hot coke on a mechanically operated chain-grate to reduce the SO₂ to S. A. R. P.

Separating gases.—See I. Flux for Al-melting.—See X. Lithopone.—See XIII. Silicate adhesives.—See XV. Fertilisers. Insecticides etc.—See XVI. Indicator for HCN.—See XXIII.

VIII.—GLASS; CERAMICS.

Problems of the glass bottle industry. W. A. MOORSHEAD (Inst. Chem. Eng., Jan., 1935. Advance copy, 13 pp.).—The raw materials, their storage, melting, and forming in automatic machines are briefly described. Attempts to devise glass-melting systems with higher thermal efficiency (cyclone, cascade, and rotating-cylinder furnaces), better furnace refractories (sillimanite and fusion-cast blocks), more flexible automatic machines, and more efficient lehrs are described. J. A. S.

Anisotropy and structure of sheet glass. P. GAUBERT (Compt. rend., 1934, 199, 1402—1404).—Glass sheets are not always isotropic, but may show birefringence; this may vary from one edge of the sheet to the other or from face to face, and may change sign between, these characteristics being unchanged at temp. up to 500°. The optical axis is generally perpendicular to the surface of the sheet. The same observations apply to glass bulbs and tubes. J. W. S.

Mechanical properties of glass. L. LONGCHAMBOIN (Compt. rend., 1934, 199, 1381—1383).—When a steel ball (diam. 1 cm.) is dropped on the horizontal surface of a massive sample of glass, elastic rebound occurs up to a certain height of fall. For slightly greater heights the glass cracks sharply around the circular line of contact with the ball, whilst for still greater heights the crack extends parabolically into the mass of the glass. With small cracks this compressed glass resumes its original position and the crack may disappear. The total pressure exerted by such a ball during an impact which just cracks the glass is normally about 50 kg./sq. mm., and is comparable with the normally measured resistance to compression. The method described is applicable practically to the measurement of the shock-resistance of glasses. J. W. S.

Refractory oxide ceramic substances. E. RYSCHKEWITSCH (Elektrowärme, 1934, 4, 30—31; Chem. Zentr., 1934, ii, 1975—1976).—A review of the properties of Al₂O₃, BeO, ZrO₂, MgO, and ThO₂ (m.p. > 3000°). H. J. E.

Relation between refractoriness under load of grog fireclay bricks and the size of the grains of grog in the mass. J. KONARZEWSKI and S. RUSIECKI (Przemysł Chem., 1934, 18, 441—444).—The softening point of the bricks rises with the fineness of milling of the grog particles. R. T.

Production of high quality "semi-acid" refractory brick. P. P. BUDNIKOV (J. Appl. Chem. Russ., 1934, 7, 1153—1161).—Directions are given. R. T.

Young's modulus of elasticity at several temperatures for some refractories of varying silica content. R. A. HEINDL and W. L. PENDERGAST (J. Res. Nat. Bur. Stand., 1934, 13, 851—862; cf. B., 1934, 19).—Measurements of the reversible thermal expansion (I) to 1000° and Young's modulus (E) (between 20° and 900°) were made on a series of fireclay (48—82% SiO₂) and SiO₂ bricks, and an Al₂O₃ (80%) brick, and also after reheating the specimens at 1400° for 5 hr. At temp. up to about 600° marked increases in E were found, the relation between % increase in E from 20° to 600° and (1) SiO₂ content, (2) total (I) to 600°, being approx. linear for firebricks of about the same refractoriness provided they had not been heated sufficiently to dissolve the SiO₂. Further tests at narrower temp. intervals on highly siliceous and SiO₂ bricks showed that E decreased at the approx. temp. of the tridymite inversion, and increased at those of the cristobalite and quartz inversions. Specimens cooled slowly from 800° showed a decreased E on retesting, but after air-quenching from 800° and 1000°, fireclay specimens exhibited a decrease in E, SiO₂ an increase, and the Al₂O₃ brick a practically negligible change. A. L. R.

Al₂O₃.—See VII. Refractory cements.—See IX. See also A., Mar., 282, Coloration of Na₂O, 2SiO₂ and Mn-free glasses.

PATENTS.

Manufacture of filter devices of glass. JENAER GLASWERK SCHOTT & GEN. (B.P. 423,307, 3.8.33. Ger., 5.8.32).—Before being fused into its funnel a filter plate is perforated with slots or other apertures which increase in size downwards. B. M. V.

Treatment of glass. H. R. MOULTON, Assr. to AMER. OPTICAL Co. (U.S.P. 1,960,121, 22.5.34. Appl., 10.2.30. Renewed 10.11.32).—Clear-vision, strengthened glass is formed of 2 (or 3) sheets having the same n but different coeffs. of expansion, which are heated to weld together and then cooled so that one (the middle of 3) is in tension. B. M. V.

Manufacture of vitreous enamel frit. C. J. KINZIE, Assr. to TITANIUM ALLOY MANUF. Co. (U.S.P. 1,959,678, 22.5.34. Appl., 2.7.31).—Pulverised Ti compounds (Ti being 6—8% of the whole) are mixed with a portion of the ordinary constituents of the mix before making the final mixture. B. M. V.

Ceramic insulators.—See XI.

IX.—BUILDING MATERIALS.

Clay of Portland cement. XIX. Preparation of Portland cement from volcanic ash and limestone. Y. SANADA (J. Soc. Chem. Ind., Japan, 1934, 37, 690—692 B; cf. B., 1934, 962).—A good-quality cement was made (wet process) from volcanic ash, limestone, and pyritic cinder. The ash is especially suitable for high-SiO₂ cement. J. A. S.

Special Portland cements. II. Chemical resistance of manganese-chrome Portland cement to

corrosion by sulphuric acid. K. AKIYAMA (J. Soc. Chem. Ind., Japan, 1934, 37, 646—649 B; cf. B., 1933, 867).—The resistance of Portland cement to corrosion by dil. H_2SO_4 is unaffected by the addition of Cr_2O_3 to the raw clinker meal, but incorporation of 0.8% of Mn_2O_3 and 2.4% each of Mn_2O_3 and Cr_2O_3 reduces the degree of corrosion to $\frac{1}{2}$ and $\frac{1}{3}$, respectively. J. A. S.

Commercial masonry cements. J. S. ROGERS and R. L. BLAINE (J. Res. Nat. Bur. Stand., 1934, 13, 811—849).—Details are given of the properties (*e.g.*, chemical composition, fineness, and *d*); rate of flow through an orifice, spread, and bulk *d* of cement- H_2O pastes) of 41 masonry cements (I), which could be grouped thus: (1) hydrated or hydraulic CaO, (2) natural (I), (3) Portland (I), (4) (3)-CaO mixtures, (5) (3)-(2) mixtures, (6) mixtures of (3) with various unidentified materials, and (7) blast-furnace slag with various additions. About half the (I) contained small amounts of H_2O -repellent substances (II) (*e.g.*, petroleum products or fatty acids). The rate of flow and bulk *d* of H_2O -(I) pastes were, in general, less for (I) containing (II). The "workability" (*W*), as indicated by the resistance to stirring (*R*) (apparatus described), H_2O -retaining capacity, and vol. yield (*V*) of fresh sand-(I) mortars (III), and the shrinkage, compressive strength and modulus of rupture, resistance to freezing and thawing, H_2O -absorption, and tendency to efflorescence of set (III) was measured. The properties of (III) varied over a wide range (*e.g.*, shrinkage during the first 24 hr. 0.087—0.585%, 28-day compressive strength and modulus of rupture 50—3650 and 25—590 lb./sq. in.). During mixing, more air was entrained in (III) containing (II), giving generally greater *V* and *W*. Tests required in specifications for (I) are discussed; instead of lengthy freezing and thawing tests, the H_2O -absorption of a 28-day mortar is suggested as a reasonable measure of the durability. Crushing strength and modulus of rupture are sufficiently related to allow the measurement of only one of these properties; *W* should be assessed by studying the properties, *R*, and H_2O -retaining capacity together, and a specified max. limit for *V* may be desirable. A. L. R.

Refractory hydraulic cements. R. DUBRISAY and H. LAFUMA (Céramique, 1934, 37, 185—188; Chem. Zentr., 1934, ii, 2120).—Mixtures of aluminate cements with calcined bauxite are used as refractory mortars. The chief constituent of the hardened cement, Ca_2 aluminate hydrate, does not lose its structure or cohesion on heating. H. J. E.

Glinite cement containing unslaked lime. A. V. FILOSOV (J. Appl. Chem. Russ., 1934, 7, 1087—1088).—CaO, burnt clay, and gypsum are finely ground together to pass 4900-meshes/sq. cm.; the cement so obtained behaves similarly to that obtained with slaked CaO. R. T.

Action of N-hydrochloric acid on set glinite cement. A. V. FILOSOV (J. Appl. Chem. Russ., 1934, 7, 1089—1071).—The content of substances sol. in N-HCl in set cement rises from 28 to 40% after keeping for 6 months under H_2O . R. T.

Acid-resistant plaster for sulphuric acid towers. E. K. LOPATTO, A. I. SENGER, and M. M. MISCHNAEVSKAJA

(J. Chem. Ind. Russ., 1934, 10, No. 11, 58—59).—A plaster containing andesite 50—75, SiO_2 25—50, Na_2SiF_6 3 pts., and aq. Na silicate (28 c.c. per 100 g. of powder) is resistant to H_2SO_4 alone and with NO_2 ; it does not afford protection against corrosion of Pb, with which it does not bind satisfactorily. R. T.

Wood for paper-making. A. S. KLEIN (Zellstoff u. Papier, 1934, 14, 433—435, 486—488).—A survey of the physical properties of wood. Conditions affecting its growth and hence its suitability for conversion into pulp are described. D. A. C.

Chemical fireproofing of wooden building material. F. MOLL (Gasschutz u. Luftschutz, 1933, 3, 293—296; 1934, 4, 23; Chem. Zentr., 1934, ii, 2149).—A comprehensive discussion and review. H. J. E.

Chemical aspect of timber research. W. G. CAMPBELL (S.C.I. Chem. Eng. Group, Dec., 1934. Advance copy, 7 pp.).—Rudge's theory that the first stage in wood decay is interaction of Ca salts with cellulose is criticised. Durability of timber such as teak is due to (1) minor toxic constituents, (2) density. Corrosion of Fe by oakwood is due to AcOH, and this wood may also corrode Pb. It has recently been shown that hydrolysis can take place in wood at $< 100^\circ$, and the question of the mechanical properties of kiln-dried wood is being studied. Hydrolysis at 100 — 200° is accelerated by H_2O vapour. Wood constituents which are resistant to H_2SO_4 and HCl are lignin and α -cellulose. Hardwoods, except teak, are, from this point of view, less acid-resistant than soft woods, and it is on this account that the choice of woods for acid vats is so limited. C. I.

Repair of gas retorts.—See II. **Flotation of limestone.**—See VII. **Refractory brick.**—See VIII.

PATENTS.

Manufacture of Portland cement. M. and V. K. NEWCOMER (U.S.P. 1,959,796, 22.5.34. Appl., 7.6.33).—Rings of clinker which may form on the lining of the calcining zone are broken off by firing from a gun shells without fuses containing an explosive which explodes by heat. B. M. V.

Kiln plants for burning cement. M. VOGEL-JØRGENSEN (B.P. 423,108, 25.7.33).—In a louver-shaft kiln for preheating the charge of a rotary kiln and intended for moist nodulised material (*M*), sticking of *M* on the first few louvres is prevented by heating them by means other than the waste gases. B. M. V.

Colouring sheeted asbestos-cement composition material. "ETERNITAS" AKCIOVÉ TOVÁRNÝ DEPOVÝCH VYROKBU A KRYCÍCH HMOT (B.P. 423,417, 19.6.34. Czech., 22.6.33).—Colouring material is incorporated during mixing and a second treatment is given by spraying the layers before pressing together. T. W. P.

Manufacture of a waterproof composition. L. KIRSCHBRAUN, Assr. to PATENT & LICENSING CORP. (U.S.P. 1,959,586, 22.5.34. Appl., 19.7.29).—A mixture is made of an aq. emulsion of bitumen, preferably having a dispersing agent of the clay type, and $\frac{1}{4}$ — $\frac{1}{2}$ of its vol. of hydraulic cement; on setting, a tough but plastic film is produced. B. M. V.

Manufacture of non-inflammable wooden building product. P. ROBINSON (U.S.P. 1,959,966, 22.5.34. Appl., 15.7.30).—Shingles or the like are impregnated in turn with Na silicate and $(\text{NH}_4)_2\text{SO}_4$ solutions, the former being applied until the colour changes to a natural-looking weathered grey. B. M. V.

Preservative and vermin-destroying compositions [for timber]. R. F. BROWN (B.P. 423,743, 3.8.33).—A mixture of wood, empyreumatic oil, borax, and AcOH is heated in a closed chamber with CO_2 , and the cooled product is powdered. E. H. S.

Manufacture of a substitute for wood. E. C. LOETSCHER (U.S.P. 1,959,375, 22.5.34. Appl., 22.6.31).—Rigid moulded products are formed from a mixture of (I) sawdust or the like containing natural resin (*R*) and (II) a pulverised synthetic resin uniformly distributed by dusting practically every particle of (I), in amount sufficient to give only a spotted covering. The mixture is compressed and then heated to cause (II) to react and *R* to flow. B. M. V.

Manufacture of agglomerate [from cork]. R.É (B.P. 423,282, 6.3.34. Fr., 9.6.33 and 31.1.34).—Methods for compacting cork and S into an agglomerate are claimed; materials for colouring the mass or rendering it fireproof or pliable may be added. T. W. P.

Manufacture of shingles. BAKELITE BUILDING PRODUCTS Co., INC. (B.P. 423,694, 21.12.33. U.S., 4.2.33).

Coatings for building elements.—See XIII.

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

Most suitable form of Bessemer converter. T. HEYDEN (Stahl u. Eisen, 1934, 54, 1225—1230, 1256—1259).—The operation of two Bessemer converters of 18—20 tons capacity with oval and cylindrical sections, respectively, has provided comparative data over a period of 3 years. The relationships between initial charge, blowing time, and blast consumption indicate that the oval form has certain advantages. Wear of the refractory lining is in neither case uniform around the circumference, and the initial internal contour is lost. This alteration has a greater effect on the working of cylindrical-type converters, but in both types the wear of the lining affects the ratio of the reacting surfaces to the effective capacity. The ratio of the depth of the metal to the surface is an important factor in the economy of working, and for both types the sp. depth should be 0.25 m. per ton for the most economical length of the blow. W. P. R.

Heskamp process for injection of dust charges into blast furnaces. O. WEHRHEIM (Stahl u. Eisen, 1934, 54, 1253—1256).—The process, which consists in charging the dust reclaimed from blast-furnace gas into the furnace a second time, is especially suitable for furnaces producing high-quality special cast irons. The chemical and physical composition of the dust is of secondary importance, but briquetting and sintering avoids the usual difficulties associated with handling large quantities of fine dust. The charging hole should be placed higher than the air tuyères so that the dust

can be readily absorbed in semi-molten constituents of the furnace charge. W. P. R.

Physico-chemical principles of fluxing iron ores. I, II. J. J. KLÄRDING (Arch. Eisenhüttenw., 1934—5, 8, 277—280, 325—328).—The complete reduction of Fe_2O_3 to Fe during smelting is conditional on the charge being so adjusted that the acid and basic constituents are mutually satisfied, leaving the Fe oxides free; this condition is fulfilled with a $\text{CaO}:\text{SiO}_2$ mol. ratio of 2:1 and a $\text{CaO}:\text{Al}_2\text{O}_3$ ratio of 1:1. Excess of CaO in the charge results in the formation of $2\text{CaO}\cdot\text{Fe}_2\text{O}_3$, and excess of Al_2O_3 or SiO_2 in the formation of Fe spinel or silicate, all of which compounds are difficultly reducible. A. R. P.

Electric-furnace practice for cast iron. H. H. WALTHER (Rev. Mét., 1934, 31, 540—541).—Suitable compositions for electric-furnace cast Fe are: (a) for simple castings, C 2.70—2.80, Si 2.40—2.80, Mn 0.7—0.8, P 0.10 (max.), S 0.05 (max.), Mo 0.50%; (b) for complicated castings, C 3.11, Si 2.37, Mn 0.85, P 0.01, S 0.039, Mo 0.52%. W. P. R.

Properties of cast iron produced in electric furnaces. A. LE THOMAS (Rev. Mét., 1934, 31, 538—539).—The superior properties and uniform composition of the product are discussed. W. P. R.

Surface phenomena on the surface of molten cast iron. M. SARRA (Rev. Mét., 1935, 31, 547).—The formation of films on the surface of molten cast Fe may indicate, under certain conditions, the chemical composition of the metal. W. P. R.

Physical properties of cast iron. E. SÖHNCHEN (Rev. Mét., 1934, 31, 542—545).—Magnetic saturation is increased with increase of combined C. A Ni content > 12% results in non-magnetic cast Fe of high electrical resistance (*R*). Si also greatly decreases *R*. Ni decreases and Al increases the coeff. of expansion. W. P. R.

Coefficient of expansion of cast iron. E. SÖHNCHEN and O. BORNHOFEN (Arch. Eisenhüttenw., 1934—5, 8, 357—359).—The coeff. of expansion (*C*) of white cast Fe decreases linearly with increase in the C content; carbide decomp., however, increases the val. of *C*. The effects of large additions of Ni on the *C* of cast Fe and of steel are similar. Addition of Cr increases *C* rapidly to a max. at 0.5% Cr for Fe with 3.5—3.8% C, but with more Cr *C* decreases rapidly at first and then more slowly. Al and Cu increase *C* linearly. A. R. P.

Position of cast iron on the scale of tensile strengths. G. MEYERSBERG (Rev. Mét., 1934, 31, 545—546).—The true strength of a metal is not obtained in the tensile test since plastic deformation alters the dimension of the test-piece before fracture occurs. By breaking test-pieces with notches of gradually increasing depth, increasing tensile strengths are obtained. Extrapolation then gives the stress at which the metal would break if 100% reduction of area occurred at the point of fracture. W. P. R.

Self-annealing of quenched iron castings. G. HÉNON (Rev. Mét., 1934, 31, 539—540).—The usual effect of a chill insert in a sand mould may be reversed if the heat capacity of the chill is such that during cooling of the casting the heat stored in the insert

decreases the rate of cooling at the surface to produce annealing graphite. The Si content of the Fe is an important factor in producing the necessary softening of the surface. W. P. R.

Nitrogen-hardened cast iron. A. N. DOBROVIDOV and N. SCHUBIN (Arch. Eisenhüttenw., 1934—5, 8, 361—363).—For the production of a nitrided layer (*L*) of uniform thickness and hardness cast Fe must be free from coarse graphite and large ferrite (*F*) areas, and the additions of Cr and Al necessary to produce a good *L* must be such that the cementite structure of the cast metal is rapidly broken down on annealing into pearlite (*P*) and temper C. Cooling must be regulated so that any *F* formed is rapidly converted into sorbite. For an Fe with C 2.75, Si 0.25, Al 0.8, and Cr 1% the best heat-treatment comprises annealing for 8 hr. at 1000° and quenching in oil from 900°. On nitriding after this treatment a surface layer having a Herbert pendulum hardness of 75—85 is obtained. A. R. P.

Viscous deformation [creep] of iron and nickel wires. P. CHEVENARD (Rev. Mét., 1934, 31, 473—486, 517—535).—The limiting creep stress of metals is defined as the stress which produces a given rate of creep after a specified time. It should always be determined by a long-time method, several of which are described. The mechanism of creep at temp. up to 900° of Fe and Ni wires (0.5 mm. diam.) has been investigated by four different methods. The results emphasise that creep at elevated temp. is a very complex phenomenon and that simple laws cannot be formulated. A no. of approximations are suggested, but they apply only at temp. well below the recrystallisation temp. and for very small deformations. If at the temp. of test the metal undergoes any physical or chemical change, the approx. laws derived for pure metals no longer hold. W. P. R.

Changes in the properties of steel wire on storage at room temperature or below. W. PÜNGEL, K. LIEBERKNECHT, and E. H. SCHULZ (Arch. Eisenhüttenw., 1934—5, 8, 365—369).—The tensile strength (*S*) of cold-drawn steel wire increases and the elongation (*E*) and reduction in area (*R*) decrease during storage at room temp. Storage at 0° to —20° increases both *S* and *E*, but *R* remains unchanged. Annealing at 250° increases *S* and *E* and slightly decreases *R* for wire which has been reduced > 80% by cold-drawing. The rate of dissolution of cold-drawn wire in HCl increases with increasing degree of reduction; annealing reduces this rate considerably. A. R. P.

Alloy-steel wire. R. SAXTON (Iron and Steel Ind., 1934—5, 8, 5—6).—During the heat-treatment of alloy-steel wires very slow heating to the required temp. is essential owing to their lower heat conductivity and liability to crack on rapid heating. Si-steel wire should be annealed at 800° between drawing operations, but max. magnetic properties are induced by heating at 1000° for several hr., quickly cooling, and reheating slowly to 800°. Cr steel is annealed at 700—750° between drawing stages. Ni-Fe (70% Ni) wire for loading electric cables is heat-treated at 1000°, cooled slowly to 600°, and then quickly cooled. Mn steel is an austenitic steel and is quenched from 1000—1050°

before being drawn into wire. None of the alloy steels is able to withstand as large a reduction per pass as are ordinary C steels. W. P. R.

Quality of steel and magnetic research. T. F. WALL (Engineer, 1934, 158, 564—565).—Two magnetic methods for ascertaining the progress of work-hardening which occurs in wire ropes during service have been developed. The first, a ballistic method, determines the increase in permeability when a wire is loaded after being placed in a magnetic field. The second determines Young's modulus by measuring the rate at which an applied pulse travels along the wire, and is applicable to a twisted wire rope as well as to a single wire. W. P. R.

Detection of faulty welds by X-rays and their effect on the mechanical properties [of steels]. W. TOFAUTE (Arch. Eisenhüttenw., 1934—5, 8, 303—306).—The macrostructure, X-ray photograph, and appearance of the fracture in the tensile test of good arc welds in steel and of welds which are porous, contain fissures, or in which there is an unsatisfactory union between the parts are shown in a series of photographs. Porosity reduces the elongation, bending angle, and notched-impact val. considerably, but has a relatively small effect on the tensile strength. The yield point is usually that of the base metal and has no relation to the quality of the weld metal. The quality of welds is deleteriously affected mostly by failure to obtain good union along the sides of the V and by incomplete filling of the point of the V. A. R. P.

Photographically-registering micro-machine for mechanically testing metals. P. CHEVENARD (Compt. rend., 1935, 200, 212—214).—The machine is described.

Micro-mechanical study of metallic joints. A. PORTEVIN and P. CHEVENARD (Compt. rend., 1935, 200, 319—321).—The use of a micro-machine described previously (cf. preceding abstract), for examining autogenous weldings, is described. M. S. B.

Properties of nickel-aluminium magnet steel. V. S. MESSKIN and B. E. SOMIN (Arch. Eisenhüttenw., 1934—5, 8, 315—318).—The magnetic properties of cast rods of alloys of Fe with Ni 20—26 and Al 12—20% and the effect thereon of heat-treatment are shown graphically. The vals. for coercivity (H_c) and remanence (B_r) for the alloy with Ni 23.25, Al 13.75, and C 0.04, cast in rods 18.5 mm. thick, are as follows (first figure gives H_c and second B_r): sand-cast, 415, 4900; quenched from 1100° in H₂O, 25, 3900; cooled in air from 1100°, 475, 6000; annealed for 1 hr. at 700°, 375, 5400; quenched in H₂O from 1100° and annealed at 700° for 1 hr., 255, 7950. Complete magnetisation requires a field strength of 8—10 × 10³ oersted, using d.c. alone, but better results are obtained with a d.c. of 1500—2000 oersted on which is superimposed an a.c. with a max. amplitude of 800—1000 oersted. A. R. P.

Determination of aluminium in steel. I. As phosphate. P. KLINGER (Arch. Eisenhüttenw., 1934—5, 8, 337—347).—Modifications of the phosphate pptn. of Al for various steels are described in detail and results obtained by several operators are tabulated.

Contrary to previous statements, the method gives accurate results for Al if $(\text{NH}_4)_2\text{S}_2\text{O}_8$ is used and the pptn. made in presence of much AcOH ; purification of the ppt. by fusion with Na_2CO_3 and repptn. with $(\text{NH}_4)_2\text{HPO}_4$ is essential. Ti and V are pptd. with the Al and subsequently removed with cupferron.

A. R. P.

Determination of sulphur in ferro-alloys. C. HOLTHAUS (Arch. Eisenhüttenw., 1934—5, 8, 349—355).—The combustion method gives good results for all alloys except high-C ferrochromium, ferrosilicon-aluminium and Ca-Si alloys, for which only the alkali-fusion method is satisfactory. The evolution (as H_2S) method can be used only for spiegeliron and ferromanganese; S can be completely removed from ferromolybdenum by heating in H_2 . The Et_2O process gives good results only with those ferro-alloys which are readily sol. in acids.

A. R. P.

Cementation of ferrous alloys with beryllium. J. LAISSUS (Compt. rend., 1934, 199, 1408—1410; cf. B., 1925, 635; 1926, 278, 545).—Be is sol. in Fe, the solubility-temp. curve being convex to the side of pure Fe. Eutectic formation occurs between solid solution and FeBe_2 . The presence of C does not affect the general behaviour. Cementation of Fe or C steel with Be or ferro-beryllium (80%) yields successively the solid solution, the eutectic mixture, and FeBe_2 . Cemented layers 0.6—0.7 mm. deep are obtained, which increase the surface hardness, diminish the readiness of oxidation at high temp., and increase the resistance to ordinary or sea- H_2O . If the cemented layer is homogeneous it protects steel against corrosion and reduces attack by Cl_2 - H_2O or hypochlorite, but facilitates attack by HCl , AcOH , $\text{H}_2\text{C}_2\text{O}_4$, citric acid, and tartaric acid. J. W. S.

Corrosion [of iron] R. L. DORRANCE (Canad. Chem. Met., 1934, 18, 163—164).—When Fe wire is placed in contact with one of the metals Zn, Cd, Ni, Cu, and Pt in a gel containing $\text{K}_4\text{Fe}(\text{CN})_6$, corrosion of the Fe is greatest in contact with Ni and not nearly so pronounced in contact with Cu. In contact with Zn only the Zn is corroded, but in contact with Cd both metals are attacked. Consideration of the electrochemical relations of the metals indicates that dissolution of the Fe is the driving force of the reaction and the overvoltage of H_2 on the metal a retarding influence; thus the resultant e.m.f. is 0.28 volt with Ni-Fe, 0.34 volt with Pt-Fe, and 0.06 volt with Cu-Fe, and hence more H_2 is liberated in the first case than in the third. Tests on Fe wire in a gel containing phenolphthalein show that at the most heavily worked parts H_2 is evolved while the metals rusts at the least-worked parts.

A. R. P.

Intercrystalline corrosion in various metals and alloys, especially rust-free steels. A. FRY and P. SCHAFMEISTER (Ber. Korr.-Tag., 1934, No. 1933, 12—22; Chem. Zentr., 1934, ii, 2128).—The conditions under which intercryst. corrosion occurs are discussed. It is prevented in austenitic Cr-Ni steels by lowering the C content, by addition of materials forming carbides, by cold- or hot-rolling or heat-treatment, or by changing the austenite structure by the addition of alloys.

H. J. E.

Accelerated corrosion tests of iron and duralumin in aerated salt solutions. E. HERZOG and G. CHAUDRON (Rev. Mét., 1934, 31, 560—566; cf. B., 1934, 763).—Corrosion (*C*) by sea- H_2O is entirely different from *C* by NaCl solutions, and the latter should not be used unless the correct proportion of MgCl_2 or MgSO_4 is added. Accelerated *C* tests are usually carried out by increasing the O_2 content of the corroding solution by (1) adding H_2O_2 , (2) increasing the O_2 pressure over the solution, (3) alternate wetting and drying of the metal, (4) agitating the solution. Method (2) gives results very similar to (3). The duration of the tests should be 1—2 days for ferrous and 2—5 days for non-ferrous alloys. The extent of *C* is measured by the decrease in tensile strength and ductility, and by loss in wt. in g./sq. m.

W. P. R.

Influence of the method of immersion of samples in corrosion tests. J. COURNOT and M. CHAUSSAIN (Compt. rend., 1934, 199, 1410—1411).—The speed of corrosion of Al, duralumin, Fe, and soft steel by sea- H_2O has been tested by (a) alternate immersion and removal of the sample; (b) immersion of the sample, but permitting evaporation to proceed until part of the sample is uncovered; (c) shallow immersion, but replacing H_2O as it evaporates; and (d) deep immersion (50 cm.). The order of attack for Al and duralumin is (b) > (c) > (d) > (a), and for Fe and steel (a) > (b) > (c) > (d). It is concluded that method (b) may be used for testing the corrosion of Al, Mg, and their alloys.

J. W. S.

Constitution of rust. A. GIRARD and G. CHAUDRON (Compt. rend., 1935, 200, 127—129).—When Fe is suspended in H_2O vapour, in absence of air, over a layer of rust, the latter becomes covered after a few days with a black layer of Fe_3O_4 . The decomp. of H_2O vapour by Fe at room temp. is increased by presence of rust in contact with the vapour, and the reaction continues so long as any Fe_2O_3 remains. It is suggested that the attack of the Fe by H_2O is limited by the $[\text{Fe}^{2+}]$, the equilibrium being destroyed when the $\text{Fe}(\text{OH})_2$ combines with the Fe_2O_3 . The observations account for the catalytic effect of rust on the oxidation of Fe, and for the passage of rust from its initial Fe_2O_3 -gel state into stratified deposits of Fe_3O_4 and $\text{Fe}_2\text{O}_3 \cdot \text{H}_2\text{O}$ (cf. A., 1929, 1369).

J. W. S.

Mode of action of etching inhibitors. G. LEJEUNE (Compt. rend., 1934, 199, 1396—1397).—The dissolution of metallic oxides in strong acids is unaffected, but the simultaneous attack on the metal is greatly reduced, by the addition of gelatin (I). A little (I) only is required to retard dissolution of Fe in dil. H_2SO_4 , and variation of the (I) concn. between 0.5 and 2% has little effect, but the relative influence of the (I) addition is greatest at the higher temp. The effect is attributed to the production of an over-potential at the metal surface, opposing the discharge of H^+ .

J. W. S.

Atmospheric action in fatigue [of metals]. H. J. GOUGH and D. G. SOPWITH (J. Inst. Metals, 1935, 56. Advance copy, 477—506; cf. B., 1932, 941).—Determinations of the fatigue limit (*L*) of Fe, steels, duralumin, Al-Mg alloys, Cu, brass, cupronickel, and Pb in air (dry and damp) and vac. have shown that acid and

alkaline impurities in the air have little or no influence on corrosion fatigue (F) and that L is entirely unaffected by dissolved gases in the metals. Atm. F appears to be primarily due to O_2 in presence of moisture. A. R. P.

Smelter gas purification for contact process [sulphuric acid]. E. E. DAGGETT (Canad. Chem. Met., 1934, 18, 196—200).—The plant at Copper Cliff, Ontario, for purifying gases from the Ni-Cu matte converters is described. The gas, cooled from 400—450° to 200° by passage through a pipe 850 ft. long, passes through two scrubbers in which it is washed with sprays of H_2SO_4 of d 1.36 and 1.06, respectively, to remove the greater part of the suspended impurities. Final purification is effected in electrical precipitators (I) of the pipe type, each (I) consisting of a brick-lined steel cylinder containing 43 pipes in which are suspended Pb-covered Fe-wire electrodes. Conditioning chambers are provided between successive (I) to permit moistening the gases if necessary. The efficiency of the 2-stage precipitator is $> 99.5\%$ and the purified gases contain 4×10^{-5} mg. As per cu. ft. Methods of sampling and analysing the gases are described. A. R. P.

Electrochemical extraction of lead compounds from ores. A. V. PAMFILOV and G. N. KIPARISOV (J. Appl. Chem. Russ., 1934, 7, 916—920).—Spongy Pb is deposited on the cathode (yield $> 55\%$, calc. on the current) by electrolysis a suspension of ore in 10% aq. $NaClO_3$ (I) containing 3% of HCl; when NaCl is substituted for (I), $PbCl_2$ is deposited in the catholyte. The process is commercially realisable. R. T.

Drosses from the lead blast furnace. G. U. GREENE (Amer. Inst. Min. Met. Eng., 1935, Contrib. No. 75, 20 pp.).—The speiss formed in the blast-furnace smelting of Pb ores may contain any or all of the following compounds: Fe_2As , $NiAs$, Cu_3As , Cu_3Sb , but no other arsenides or antimonides of Fe, Ni, or Cu. Fe_2As separates fairly cleanly from Pb, but the others cause high Pb losses since they readily form emulsions which are not effectively broken down by addition of scrap Fe, common Fe speiss, or PbS. It is suggested that the speiss should be tapped separately from the softeners into a small reverberatory and there treated with PbS at a high temp. to volatilise As_2S_3 and convert the Cu into matte from which most of the Pb will liquate. Data for the solubility of Pb in synthetic arsenides and antimonides and in commercial drosses are tabulated, and photographs of characteristic microstructures of speisses reproduced. A. R. P.

New flotation reagents. R. S. DEAN and A. B. HERSBERGER (Amer. Inst. Min. Met. Eng., 1935, Tech. Publ., No. 605, 10 pp.).—An ideal frothing agent must form a copious but not too persistent froth, be insensitive to p_H variations and to the presence of salts in the pulp, be absolutely non-collective, and be unaffected by collecting agents and readily emulsify such as are insol. Recently numerous compounds, derived chiefly from cetyl alcohol, have been prepared which fulfil these conditions almost perfectly; these substances contain a relatively heavy H_2O -avid group which promotes ready dispersion or dissolution in H_2O of substances containing C_{+16} . Emulsol reagent X-1 (E) is one of the new frothers, and many examples of its

use are given; using oleic acid (O) as collector and 0.25 lb. of E per ton of ore in an acid circuit, apatite (0.4), scheelite (0.6), calcite (3), and rhodochrosite (4) can be floated when the H_2SO_4 used (in lb. per ton of pulp) does not exceed the val. in (). Hematite can be separated from quartz, using O and E in a pulp containing 0.2 lb. of H_2SO_4 per ton, and phosphate rock from quartz in a pulp containing 0.2 lb. of Na_2CO_3 and 1 lb. of Na_2SiO_3 per ton. Sulphonated oleic acid may also be used as collector with E as frother in separating limestone from pyrolusite. A. R. P.

Investigations in ore dressing and metallurgy. ANON. (Canada Dept. Mines, Publ. No. 743, 1934, 156 pp.).—The results obtained in laboratory and semi-large-scale tests on the recovery of Au from 23 Canadian ores of various types, and on the treatment of 2 Ni-Cu ores, 2 Pb ores, and 1 MoS_2 ore, using gravity, amalgamation, cyanidation, and flotation methods, are recorded. A. R. P.

Precipitation-hardening [in metals and alloys]. P. D. MERICA (Metal Progress, 1935, 27, 31—60).—Hardness is due to resistance to slip along the glide planes of the crystal. Age-hardening (H) may be explained by considering that the pptd. constituent occurs along the slip planes and so increases slip resistance. A second explanation is that the finely-dispersed hardening constituent distorts the lattice structure and the distortion results in increased hardness. Several examples of H alloys are given and attention is drawn to the possibility of H occurring in alloys in which the β -phase may transform into a eutectoid containing α and γ or α and δ phases. A comparatively rare type of H is found in the Au-Cu, Pd-Cu, and Pt-Cu alloys, in which a lattice, stable at high temp., transforms completely into another lattice at lower temp. W. P. R.

Analysis of fused platinum. B. G. KARPOV and A. N. FEDOROVA (Ann. Inst. Platine, 1935, 12, 163—167).—A procedure for the analysis of Pt containing traces of Ir, Rh, and Fe is described. R. T.

Analysis of refined osmium. B. G. KARPOV, S. E. KRASIKOV, and A. N. FEDOROVA (Ann. Inst. Platine, 1935, 12, 159—162).—Os is determined by heating in a stream of O_2 at 750°, and absorbing the OsO_4 in 20% aq. alcoholic KOH; volatile RuO_4 is not formed under these conditions. R. T.

Annealing of pure aluminium and its possible use as a criterion of its purity. J. CALVET (Compt. rend., 1935, 200, 66—68).—The time required to anneal Al sheet hardened by rolling increases with the impurity content. Annealing of 99.9986% Al is complete in 6—10 min. at 100°; 99.996% Al requires 48 hr. at 175°; at 225° 99.99% Al is not completely annealed after 1 hr., 99.98% after 24 hr., or 99.96% after 100 hr. It is suggested that the annealing time furnishes a very sensitive test for the purity of high-grade Al. J. W. S.

Test of aluminium-foil [heat] insulation. H. INOKUTY, T. NAGANO, Z. NAGAOKA, and E. NOMURA (Bull. Inst. Phys. Chem. Res., Japan, 1935, 14, 5—19).—The heat-conductivity of Al foil has been investigated. R. S.

Corrosion-fatigue properties of duralumin with and without protective coatings. I. J. GERARD and

H. SUTTON (J. Inst. Metals, 1935, 56. Advance copy, 507—525).—Comparative, rotating-cantilever endurance tests in air and in a salt spray have been made on duralumin 3LI (Cu 4.1—4.4, Mn 0.64, Mg 0.62—0.67, Fe 0.81—0.84, Si 0.22%) after various surface treatments. In air the uncoated metal had a fatigue limit (L , in tons/sq. in.) of ± 9.1 (10^7 cycles); after anodic oxidation L was ± 11.1 . Practically no protection against corrosion fatigue was afforded by Cd-plating or by coating the untreated metal with lanolin, varnish, or enamel, but spraying with pure Al and, to a somewhat greater extent, Zn-plating considerably improved L in the salt-spray test. Complete protection against the salt spray was afforded, however, by a synthetic resin varnish applied to an anodically oxidised surface and stoved for 2 hr. at 150° ; after this treatment L in the spray was ± 12.2 , *i.e.*, $>$ that of the unvarnished oxidised metal in air.

A. R. P.

Heat-treatment of cast aluminium alloys. M. P. BARRAND (Rev. Mét., 1934, 31, 551).—Cast alloys with Cu 4.5, Ti 0.4% are heat-treated for 4 hr. at 525° , quenched in H_2O , and tempered for 8 hr. at 150° . An alloy containing Si 4, Mg 1, and Mn 1% may be similarly heat-treated, but its ductility is not so high.

W. P. R.

Determination of silicon in aluminium alloys. H. SHEHYN (Natural. Canad., 1935, 62, 13—32).—The following method avoids losses due to hydride formation and to repeated evaporations and filtrations: the alloy (0.5 g.) is treated in a covered Cu dish with 1 g. of Na_2O_2 and 2 c.c. of H_2O , further H_2O is added, and the solution is heated to complete the reaction, transferred to a glass dish containing HCl (7 c.c.), and evaporated with 70% $HClO_4$ (17 c.c.) until fumes of the latter are evolved and then for 15 min. more. When cold the sol. salts are extracted with hot 10% HCl, the SiO_2 is collected, washed, ignited, and weighed, and its purity tested with HF and H_2SO_4 as usual.

A. R. P.

Zn plates of steamship boilers. Pressure containers.—See I. [Metals for] benzylating apparatus.—See V. Al vessels for bleaching processes.—See VI. Zr.—See VII. Protecting steelwork.—See XIII.

See also A., Mar., 285, System In—Ag. 287, Magnetic Fe—Ni alloys. 291, Systems Cu—Au, Cu—Zn, Cu—Al, Al—Ga, Al—Ti, Co—Pd. Transformations in eutectoid alloys. Properties of alloys of Be, Mg, Zn, Cd, Hg, Al, and Sn. Fe—cementite eutectoid diagram. Superconductivity of Pb—Bi alloy. 292, Miscibility of Mg_3Sb_2 and Zn_3Sb_2 , and of sulphides of Cu, Pb, and Fe with liquid Pb. 294, Structure of electro-deposits. 303, System Fe—Fe oxide—Ca orthoferrite. Equilibrium between molten metals and slags. 305, Electrodeposition of Zn. 306, Corrosion of Fe. 310, Electrolysis of $ZnSO_4$. 315, Quant. spectroscopic analysis. 317, Determining Mg, Mn, Si, and Fe in duralumin. 319, Induction melting furnace.

PATENTS.

Rotary furnaces. A. G. MCGREGOR (B.P. 422,793, 18.7.33).—A rotary, inclined drum furnace is formed

in two zones of different diam., the upper (longer and smaller) zone comprising a single tube (d) lined with refractory material. In the lower (shorter) zone the outer casing (D) is of much greater diam. than d and is constructed of lined cheap metal (steel); within it are a no. of muffle tubes (M) of unlined, heat-resisting metal, *e.g.*, Ni—Cr, arranged in a circle, within which is the heating flame (F). In d the ore mixture is in contact with the hot gases from F and it is passed from d to M and from M to atm. by means of annular chambers (A) containing lifting pockets provided with mushroom valves to control the transfer and keep out gases from F , the valves extending outwards through D and being operated by fixed cams. In the event of $SnCl_2$ or the like being made, H_2O -spraying chambers are placed in the gas vents at the final outlet at the lower end.

B. M. V.

Heat-treatment [of metals]. J. W. HARSCH, Assr. to LEEDS & NORTHRUP Co. (U.S.P. 1,949,719, 6.3.34. Appl., 10.3.32).—The furnace (F) is divided into a series of zones provided with sources of radiant heat and with fans for circulating the atm. in the zones to supply the max. amount of heat by convection; the articles to be treated are passed through F on a perforated conveyor through which the hot gases are circulated.

A. R. P.

Manufacture of metal articles from iron—carbon alloys [white cast iron]. STELLUM, INC., Asses. of N. H. SCHERMER (B.P. 422,114, 31.3.33. U.S., 28.6.32, 24.9.32, and 17.2.33).—White Fe containing C 1.5—4, Si 0.45—1.75, Mn $<$ 1, P $<$ 0.225, S $<$ 0.05, Mo $<$ 1, and Cu $<$ 0.6% is cast into slabs (etc.) which are soaked at 1000° without previous cooling and rolled with intermediate annealing at $>$ 800° to sheets which may be fabricated into pipes, brake drums, etc.

A. R. P.

Introduction of steel-forming additions into the aluminogenetic iron in aluminothermic welding. T. GOLDSCHMIDT A.-G. (B.P. 420,494, 26.6.34. Ger., 6.7.33).—The taphole of the crucible in which the reaction is carried out is sealed with a mixture of SiC and crushed slag from a previous reaction, and other alloying elements in a finely-divided form are strewn over the top of the seal before placing the Fe_2O_3 —Al charge in the crucible.

A. R. P.

(A) Production of molten steel. (B) Vertical shaft furnace. (c) Manufacture of metals. (A—C) H. A. BRASSERT and (B) P. ZIMMERMANN, Assrs. to H. A. BRASSERT & Co. (U.S.P. 1,948,695—7, 27.2.34. Appl., [A] 15.6.31, [B] 9.7.31, [C] 27.7.31).—(A) Steel scrap is passed down through a shaft furnace (S) the walls of which taper outwards towards the bottom and terminate there in a broader melting chamber (C) into which are injected from downwardly directed tuyères (T) non-reducing flames from preheated air and oil or powdered coal. The charge is thus preheated in S and melted in a non-carburising atm. in C . (B) The S terminates in a C having a dome-shaped, H_2O -cooled, cast-Fe roof through the lower part of which the T are introduced. (c) The centre of the hearth of C is raised towards S so as to form an annular collecting hearth around it for the metal, and the charge of ore and fluxes is fed into the top of S while a powdered-coal flame with a hot air blast (1000°) is blown through T towards the

raised portion of *C*; the metal formed by reduction of the ore in *S* by the hot gases rising from *C* is thus melted only when it reaches *C*. A. R. P.

[Heat-treatment of steel. A. R. STARGARDTER, Assr. to GILLETTE SAFETY RAZOR CO. (U.S.P. 1,948,192, 20.2.34. Appl., 10.3.32).—Steel strip is hardened and blued by heating it at $> 760^\circ$ in air containing CO, then cooling it rapidly by passing it between cooled steel plates. A. R. P.

[Iron or steel] metal-working. N. BREGGER (U.S.P. 1,949,599, 6.3.34. Appl., 30.9.31. Austr., 17.10.30).—After annealing, the metal is descaled in the usual pickling bath, then etched deeply in HCl and/or H_2SO_4 , washed, and "tinned" in a bath of molten Sn-Pb alloy which fills the pores produced by the etching and facilitates subsequent cold-work. A. R. P.

[Surface] carbonisation of ferrous metal. J. H. KYTE, Assr. to SWEDISH IRON & STEEL CORP. (U.S.P. 1,950,116, 6.3.34. Appl., 8.11.32).—Strip Fe is etched in 15% HNO_3 , washed, dried, and heated at 900° in hydrocarbon vapour, whereby it becomes coated with a tenacious film of C without undergoing carburisation to any appreciable extent. A. R. P.

Case-hardening [of iron and steel]. E. HANUS (B.P. 416,179, 23.8.33).—The articles are coated with, or enclosed in a mould made of, a mixture (I) of case-hardening materials, refractory materials, e.g., chamotte, metal turnings, or asbestos, and a binder before being heated to carburising temp. E.g., (I) may consist of C powder 40, $BaCO_3$ 20, 20% Ni-steel turnings 15, asbestos fibre 12, and water-glass (*d* 1.33) 13%. A. R. P.

(A—C) **Manufacture of chilled [iron] roll.** (D) **Metal roll.** W. H. SEAMAN (U.S.P. 1,948,243—6, 20.2.34. Appl., [A—C] 3.5.30, [D] 2.10.30. Renewed [B, C] 11.12.33).—The Fe used contains (A) Si 0.15—0.65, Mn 0.15—0.27, Cr 0.20—0.50, and Ni 2.5—5%, (B) Si 0.25—0.35, Cr 0.25—0.35, Mn 0.18—0.22, C 3.15—3.2, and Ni 3.5—4%, (C) Si 0.15—0.25, Cr 0.25—0.35, Mn 0.15—0.2, C 3.25—3.35, and Ni 4.75—5%, (D) C 2.6—3.35, Mn 0.1—0.4, Cr 0.15—0.65, Ni 1.25—5%, and Mo = Cr%. A. R. P.

[Hardenable] iron alloys. F. KRUPP A.-G. (B.P. 422,167, 31.5.34. Ger., 15.7.33).—The alloys consist of Fe with W 10—35, C 0.1—0.4, and ≤ 1 of the following (I): Ti, Zr, Hf, Th, V, Ta, U ($\geq 10\%$), the amount of (I) being sufficient to combine with all the C. Heat-treatment comprises quenching from $> 950^\circ$ and reheating at 400—850°. A. R. P.

Production of ferrocobalt. F. L. BOSQUI, and RHOKANA CORP., LTD. (B.P. 416,158, 22.6.33).—Slag from smelting Cu ores containing Co is reduced to produce an Fe-Co-Cu alloy (I) with $\geq 15\%$ Cu, and anodes of (I) are refined electrolytically in a solution containing < 3 (1—2) g. of H_2SO_4 per litre, whereby pure ferrocobalt is obtained at the cathode and sponge Cu at the anode. A. R. P.

[Nickel-iron alloy] turbine blade. W. ROHN (U.S.P. 1,948,448, 20.2.34. Appl., 7.10.30. Ger., 2.6.28).—The alloy contains Fe 46—98.5, Ni 39—0.5, W 14—0.5, Mo 7—0.5 (W + Mo ≥ 15), and C $< 0.04\%$. A. R. P.

Mould for intimately uniting steel and bronze. A. MONZER and G. SKRIPT (B.P. 416,371, 13.11.33).—A bearing shell (I) to be provided with a bronze lining is coated internally with Cu and placed in a cylindrical mould provided with a central core (II) in the shape of a truncated cone surmounted by short cylindrical portion on to which the bronze is cast through a feeder so that it flows radially in a horizontal direction into the annular space between (I) and (II). A. R. P.

Coating [ferrous] metals with lead. D. D. JACKSON, Assr. to AMER. MACHINE & FOUNDRY CO. (U.S.P. 1,950,612, 13.3.34. Appl., 3.5.32).—The metal is immersed in molten Pb containing about 0.5% of Sn and maintained at 350° . To promote adhesion of the Pb to the Fe a quantity of red P in a perforated container is kept at the bottom of the Pb bath. A. R. P.

Differential flotation of sulphide copper and zinc ores. E. M. C. BARTHÉLEMY (U.S.P. 1,950,537, 13.3.34. Appl., 11.8.32).—An alkaline pulp of the ore is agitated with a little $K_4Fe(CN)_6$ and the blende floated with an Aerofloat reagent in presence of $CuSO_4$. The tailings are floated with xanthate as a collector for the Cu minerals. A. R. P.

Refining of copper. J. W. SCOTT, Assr. to WESTERN ELECTRIC CO., INC. (U.S.P. 1,948,316, 20.2.34. Appl., 10.10.31).—Cu after poling is transferred to an induction furnace in which it is maintained at $1100^\circ/4$ mm. while a current of H_2 is passed through it to remove O_2 and adsorbed gases. A. R. P.

Production of metal [copper] powders. J. H. LUCAS, Assr. to NICHOLS COPPER CO. (U.S.P. 1,959,376, 22.5.34. Appl., 26.9.30).—Cu is electrolysed from stationary anodes of impure Cu on to rotating disc cathodes in an acid $CuSO_4$ bath at 47° . The spongy Cu is continuously scraped off and flushed at intervals from the bottom of the vat with electrolyte out of contact with air. B. M. V.

Colouring of copper and its alloys. J. R. FREEMAN, JUN., and P. H. KIRBY, Assrs. to COPPER & BRASS RESEARCH ASSOC. (U.S.P. 1,951,304, 13.3.34. Appl., 20.1.32).—The surface is sprayed with aq. $(NH_4)_2SO_4$ and exposed to weathering for a few days; several repetitions of the treatment develop a green patina similar to that produced by prolonged natural weathering. A. R. P.

Bimetallic element. H. D. MATTHEWS, Assr. to W. M. CHACE VALVE CO. (U.S.P. 1,948,121, 20.2.34. Appl., 23.3.32).—The element comprises strips of a 36—42% Ni-Fe alloy and a Cu alloy containing Sn 2 and Si 2% or Si 2, Sn 1.5, and Cd 0.5%, both strips before joining having been heated at a temp. $>$ that at which the element is to be used, to remove internal stress. A. R. P.

Treating [bearing] metal. W. H. KELLY, Assr. to M. E. KELLY (U.S.P. 1,949,051, 27.2.34. Appl., 19.8.29).—A perforated cage containing wet asbestos is plunged beneath the surface of molten bearing metal, whereby the H_2O is claimed to dissociate into H_2 and O_2 and thereby deoxidise the metal. A. R. P.

Igneous concentration of zinc ores. R. G. HALL (U.S.P. 1,949,905, 6.3.34. Appl., 18.5.31).—The ore

mixed with Cu-Fe matte is blown first with air in a converter under a high FeO-CaO slag to oxidise most of the Zn and remove S, and then with a reducing gas to reduce and volatilise the Zn, which is subsequently burned to ZnO. A. R. P.

Condensation of zinc vapour. NEW JERSEY ZINC Co., Asses. of E. C. HANDWERK and G. T. MAHLER (B.P. 421,026, 23.3.34. U.S., 17.4.33).—The gases from the retorts are passed up a vertical tower provided with a series of downwardly inclined and overlapping baffles vertically spaced from one another so that the ascending gas stream meets a descending stream of condensed Zn. A. R. P.

Coating and cleaning metal [zinc, magnesium, or iron]. R. R. TANNER and H. J. LODEESEN, Assrs. to METAL FINISHING RES. CORP. (U.S.P. 1,949,090, 27.2.34. Appl., 17.11.30. Renewed 21.7.33).—The metal is immersed in a solution containing 5 pts. of $Zn(H_2PO_4)_2$, $Fe(H_2PO_4)_2$, or $Mg(H_2PO_4)_2$ and 1 pt. of $Cu(NO_3)_2$ at room temp. A. R. P.

Riveted plated-aluminium article. G. SCHREIBER, Assr. to I. G. FARBENIND. A.-G. (U.S.P. 1,949,112, 27.2.34. Appl., 8.7.31. Ger., 18.7.30).—The use of rivets of an alloy of Al with Mg 4–7 and Mn 0.3–1% for joining alclad sheet is claimed to prevent local corrosion, since the alloy has the same potential as the sheet. A. R. P.

Cast aluminium rotor winding. C. S. TAYLOR, Assr. to ALUMINUM Co. OF AMERICA (U.S.P. 1,950,197, 6.3.34. Appl., 26.9.31).—An alloy of Al with 1–3% Si is cast around a slotted Fe core to give a winding with a resistance of < 4 microhms per cm. cube. A. R. P.

[Flux for the] preparation of aluminium alloys. W. BONSAK, Assr. to NAT. SMELTING Co. (U.S.P. 1,950,967, 13.3.34. Appl., 20.5.31).—Claim is made for a mixture of KCl 10–65, NaCl 15–75, and cryolite 5–65% for use in remelting secondary Al and its alloys. A. R. P.

Cleaning and protecting [ferrous] metals against rusting. W. K. SCHWEITZER, Assr. to GRASELLI CHEM. Co. (U.S.P. 1,949,921, 6.3.34. Appl., 1.7.32).—The cleaning solution consists of a 2 : 2 : 3 vol. mixture of 85% H_3PO_4 , EtOH, and H_2O , to which is added 1–5% of Pr_2O_3 . A. R. P.

Preventing corrosion of metallic objects [wire or pipes]. J. F. PUTNAM, Assr. to STANDARD OIL Co. OF CALIFORNIA (U.S.P. 1,948,007, 20.2.34. Appl., 30.6.31).—The wire or pipe is coated successively with (a) an asphalt primer, (b) a thick layer of bitumen mastic containing 15–25% of asphalt, (c) a layer of paper impregnated with asphalt, (d) a thin layer of bitumen, (e) an outer film of an inert powder. A. R. P.

Foamite corrosion inhibitor. G. M. FISHER (U.S.P. 1,948,029, 20.2.34. Appl., 20.2.33).—The acid portion of a foamite fire extinguisher consists of aq. $Al_2(SO_4)_3$ containing 1–10 vol.-% of molasses to prevent corrosion of the Fe container and 0.1–0.2% of CH_2O to prevent fermentation. A. R. P.

Soldering flux [for soft solders]. H. S. MCQUAID, Assr. to GRASELLI CHEM. Co. (U.S.P. 1,949,916, 6.3.34. Appl., 26.12.29).—Claim is made for mixtures of $ZnCl_2$,

resin, or colophony with the hydrochloride of an org. amine, e.g., NH_2Ph , o-toluidine, or ethanalamine.

A. R. P.
[Coated] welding rod. J. B. AUSTIN, Assr. to UNA WELDING, INC. (U.S.P. 1,949,398, 27.2.34. Appl., 19.5.30).—The use of a nitrocellulose lacquer as a binder for the coating of welding rods is claimed. A. R. P.

Refining of metals. A. J. WAKELIN and C. E. DENNEY (B.P. 419,560, 1.5.33).—The metal is melted in a closed container into which a hydrocarbon is injected, before or during melting, to cause deposition of C on the walls and thus deoxidise the melt. A. R. P.

Electro-pickling of metal [steel]. J. S. NACHTMAN and C. G. THOMAS (U.S.P. 1,950,689, 13.3.34. Appl., 9.5.30).—Steel strip is passed through corrugated rolls to bend it sharply backwards and forwards and thus loosen the scale; the strip is then passed as cathode through a dil. H_2SO_4 bath to produce a bright finish. A. R. P.

Electrodeposition of metals [copper foil or strip]. A. I. WYNNE-WILLIAMS (B.P. 419,391, 4.7. and 28.9.33).—The Cu is deposited on a slowly rotating stainless-steel mandrel (I) against which is pressed a skimming member comprising a perforated rectangular plate the lower side of which is provided with glass bristles to scour the surface of (I) after stripping. A. R. P.

Production of nickel by electrodeposition from nickel salt solutions. FALCONBRIDGE NIKKELVERK A./S. (B.P. 420,248, 18.8.33. Norw., 3.9.32).—The anolyte in the electrolytic refining of Ni is purified by cementation of the Cu and aeration to ppt. the Fe, and then electrolysed with a sol. Ni anode to obtain an impure cathode deposit containing most of the Cu, As, Pb, and Fe not removed in the chemical treatment. The purified electrolyte is subsequently electrolysed for the deposition of pure Ni, or, if it contain much Co, subjected to a second preliminary electrolysis to remove the Co as Co-Ni alloy. A. R. P.

Rhodium-plating [bath]. T. P. SHIELDS (U.S.P. 1,949,131, 27.2.34. Appl., 14.11.32).—The bath contains $Rh_2(SO_4)_3 \cdot 12H_2O$ (20), $KAl(SO_4)_2 \cdot 12H_2O$ (20) or $Al_2(SO_4)_3 \cdot 18H_2O$, and H_2SO_4 (50 g./litre). A. R. P.

Applying inorganic insulation to electrical [steel] sheets. C. A. SCHARSCHU, Assr. to ALLEGHENY STEEL Co. (U.S.P. 1,951,039, 13.3.34. Appl., 22.1.32).—The sheets are evenly coated with a mixture of CaO 15, Fe_2O_3 28, and water-glass 70 g. in 200 c.c. of H_2O , then baked at 240°, and finally annealed at 800°. A. R. P.

Heat-transfer apparatus. Jointing composition.—See I. Alkali hydroxide solutions. $CuSO_4$ from Cu etc. S from smelter gases. Treating gases containing SO_2 .—See VII. Resin-lined vessels.—See XIII.

XI.—ELECTROTECHNICS.

Calculation of the capacity of the lead accumulator. M. RABL (Z. Elektrochem., 1935, 41, 80–83).—The relation $c_{10}^2 = c_1 c_{max}$. (I), where c_1 and c_{10} are the capacities (charging current \times time) at 1- and 10-hr. charging has been found for the Pb accumulator. From

this it is deduced that $\log c = k_1 - k_2 \times 0.5 \log t$, where c is the capacity at time t , and k_1 and k_2 are consts. The general relation corresponding with (I) is $c_{\max} c_t / 10 = c_t^2$. These formulæ are shown to fit experiment for accumulators with 3- and 6-mm. plates at 15°. Curves are given whereby c can be calc. R. S. B.

Fuel cells of working temperature below 600°. S. TAMARU and M. KAMADA (Z. Elektrochem., 1935, 41, 93—96).—The electrolyte consists of eutectic mixtures of Na_2CO_3 , K_2CO_3 , and an alkali halide (550—600°), and eutectic mixtures of K_2CO_3 , Na_2CO_3 , and Li_2CO_3 (400—550°); the anode consists of charcoal and the cathode is an air-metal electrode, the cell reaction being $\text{C} + \text{O}_2 = \text{CO}_2$. The e.m.f. is dependent on the metal, the polarisation at 550—600° being mainly due to the air-metal electrode, and that at 400—500° to both electrodes. A manganate depolarises the cells (Pt, Pd, Au, Ag, or Ni) O_2 |eutectic mixture|C, and $\text{Na}_2\text{B}_4\text{O}_7 + \text{CuO}$ depolarises the cell $\text{Cu}(\text{O}_2)$ |eutectic mixture|C, the current yielded increasing with the addition of $\text{Na}_2\text{B}_4\text{O}_7 + \text{CuO}$, up to 8% of each, and with the addition of manganate up to 6%, and then remaining const. with further additions. In the Cu cell the reaction at the cathode is $2\text{B}_4\text{O}_7'' + \text{O}_2 = 4\text{B}_2\text{O}_4'' - 4e$, and at the anode $4\text{B}_2\text{O}_4'' + \text{C} = 2\text{B}_4\text{O}_7'' + \text{CO}_2 + 4e$, the total reaction being $4\text{CuB}_2\text{O}_4 + \text{C} = 2\text{Cu}_2\text{B}_4\text{O}_7 + \text{CO}_2$. The observed e.m.f. (0.79 volt at 600°) corresponds with the free energy of the reaction $4\text{CuO} + \text{C} = 2\text{Cu}_2\text{O} + \text{CO}_2$. Suitable types of electrodes are described. R. S. B.

Cells for the electrolytic chlorine-alkali process. R. STRAUSS (Chem.-Ztg., 1934, 58, 1039—1040).—The Hooker (cf. B.P. 381,183 and 381,190; B., 1932, 1089) and Pestalozza (cf. B.P. 324,689; B., 1930, 335) types of cell are described. C. I.

Galvanic utilisation of fuels. Voltol oil formation. Polymerisation of liquid hydrocarbons.—See II. **CaC₂ process.**—See VII. **Cast Fe. Alloy-steel wire. Detecting faulty welds. Magnet steel. Purifying smelter gas. Resistance of non-ferrous wires. Extracting Pb from ores.**—See X. **Determining aldehydes in wine.**—See XVIII. **Control of mineral waters.**—See XIX.

See also A., Mar., 287, **Magnetic properties of Fe-Ni alloys.** 294, **Structure of electro-deposits.** 296, **Electrochemical behaviour of WO₃ sol. Formation of emulsions.** 304, [Prep. of] AlCl_3 . 305, **Electro-deposition of Zn.** 306, **Electrolysis of NaCl in liquid NH₃.** 310, **Electrolysis of ZnSO₄.** 311, **Prep. of H₂O.** 319, **Induction furnace for metals. Temp. regulator.** 327, **Electrolysis of crotonic acid.** 338, **Electro-reduction of phenols.**

PATENTS.

Electrical eddy-current furnace. ALLMÄNNA SVENSKA ELEKTRISKA AKTIEB. (B.P. 423,326, 19.1.34. Swed., 4, 11., and 19.12.33).—A furnace comprising a high-frequency, preferably single-phase, winding for heating, and employing polyphase low-frequency current for stirring the charge, is claimed. J. S. G. T.

Operation of electric furnaces. SIEMENS-PLANIWERKE A.-G. F. KOHLEFABRIKATE (B.P. 423,022, 3.9.34.

Ger., 15.12.33).—An inert gas is passed into the interior of tubular heating resistances of SiC at such pressure that it penetrates through the resistances into the furnace heating space. J. S. G. T.

[Electrical] apparatus for sterilising. F. S. SMITH (U.S.P. 1,960,173—4, 22.5.34. Appl., [A] 1.10.31, [B] 27.11.31. Renewed [A] 23.8.33).—Apparatus for destroying insects in food comprises, in order downwards: (1) rotating electrodes with downwardly extending tapered fingers, (2) a conveyor belt and supporting plate of insulating material, (3) devices for partly bridging the gap between (1) and (4), (4) a capacity plate, (5) the earthed frame of the machine. A high voltage at high frequency is applied across (1)—(5), and the presence of the goods is sufficient to cause local rupture between (1) and (3). Devices (1)—(4) comprise several units in parallel and (3) are composed, in A, of masses of dielectric of high permittivity, and, in B, of rings of vac. tubes inclined to the vertical. B. M. V.

Electric-discharge tube. K. M. VAN GESSEL and J. H. DE BOER, Assrs. to RADIO CORP. OF AMERICA (U.S.P. 1,949,849, 6.3.34. Appl., 10.12.29. Holl., 12.1.29).—Claim is made for a grid of Zr wire surrounding the W cathode and heated thereby to cause it to act as a getter. A. R. P.

Luminescence tube. F. R. BALCAR, Assr. to ATR REDUCTION CO., INC. (U.S.P. 1,951,006, 13.3.34. Appl., 29.3.30).—Claim is made for tubes containing Ne 90 and Br 10% together with a small amount of MgCO_3 or CaCO_3 which slowly evolves CO_2 when the tube is energised and thus produces a white light. A. R. P.

[Unidirectional] electrolytic condenser. E. W. ENGLE and H. L. COBB, Assrs. to FANSTEEL PRODUCTS CO., INC. (U.S.P. 1,959,415, 22.5.34. Appl., 16.3.28).—The condenser is provided with a mica washer at a spot subject to stress, to prevent simultaneous contact of Al electrode, phenolic insulation, and non-aq. electrolyte. B. M. V.

[Electrical] condenser. J. T. CURTIS, Assr. to CURTIS CONTINENTAL CORP. (U.S.P. 1,950,352, 6.3.34. Appl., 27.1.30).—Claim is made for a condenser with Al, Ta, or Mg plates separated from one another by a layer of cloth or paper impregnated with a sugar syrup containing $(\text{NH}_4)_2\text{CO}_3$ (I), H_3BO_3 , and glycerin (II), in the ratio 1 : 1 : 2. Alkali carbonates and glycols may replace (I) and (II), respectively. A. R. P.

Increasing the electric-insulating property of ceramics such as porcelain. I. KITSEE, Assr. to MINERALITE CORP. (U.S.P. 1,949,311, 27.2.34. Appl., 28.3.30. Renewed 26.8.33).—Mineral wool (20—30%) is added to the clay and the moulded mixture fired at > the m.p. of the wool. A. R. P.

Electrical separation of emulsions. C. H. M. ROBERTS, Assr. to PETROLEUM RECTIFYING CO. OF CALIFORNIA (U.S.P. 1,959,385, 22.5.34. Appl., 18.2.29. Renewed 22.5.33).—For the breaking of H_2O -in-oil emulsions claim is made for the use of a.c. of high potential and variable frequency [60—10,000 (500) ~], but non-oscillating. B. M. V.

Apparatus for electrical precipitation of suspended particles from gases. LODGE-COTTRELL, LTD.

FROM RESEARCH CORP. OF NEW YORK (B.P. 422,777, 20.9.34).—Members forming the roof of the pptg. chamber (C) are supported on corrosion-resisting, collecting-electrode members supported outside C.

J. S. G. T.

Viscosimeter.—See I. Treating hydrocarbons. Oil tester.—See II. Alkali hydroxide solutions.—See VII. Ferrocobalt. Cu powder. Drawing Mo wire. Al rotor winding. Pickling steel. Electrodeposition. Ni. Rh-plate. Insulated sheet steel.—See X. Coloured extruded plastics. Composite material.—See XIII. Treating sugar-containing liquids.—See XVII. Bactericide.—See XX.

XII.—FATS; OILS; WAXES.

The fats. T. P. HILDITCH (Chem. & Ind., 1935, 139—145, 163—167, 184—189).—Jubilee Memorial Lecture.

Rapid refractometric macro- and micro-determination of fat in oil seeds. W. LEITHE (Angew. Chem., 1934, 47, 734—736).—A sample (wt. g g.) of the seed is triturated with sea-sand and anhyd. Na_2SO_4 and then shaken for 2 min. with benzine, b.p. 90—100°, $n_D^{17.5}$ 1.3967. The mixture is centrifuged and $n_D^{17.5}$ of the solution is observed. The calculation is based on the formula: $g_{\text{oil}} = g_{\text{benzine}} (n_{\text{solution}} - n_{\text{benzine}}) / (n_{\text{oil}} - n_{\text{solution}})$, whereby n_{oil} must be determined in benzene at differing concns. Alternatively, a graph is constructed empirically.

H. W.

Ucuhuba fat. A. STEGER and J. VAN LOON (Rec. trav. chim., 1935, 54, 149—157).—True ucuhuba fat is obtained only from *Viola surinamensis*, Warb., and *V. sebifera*, Aubl. The usual physical consts. and data are recorded for the crude fat (I) (I val. 17.0; acid val. 26.5) (61.5% by extraction of the kernels with ligroin, and 6.25% of resin extracted with Et_2O), the ligroin-sol. fat (II), m.p. 51° (I val. 10.9; acid val. 8.4) [90.8% of (I)], and the alkali-refined fat, m.p. 47° (I val. 12.3; acid val. 8.4), the differences depending mainly on the resin content, since this is highly acid (100) and more unsaturated (I val. 40.0). (II) contains ligroin-sol. total fatty acids (III) 88.7%, ligroin-insol. unsaponifiable matter 2.2%. Fractional distillation, in a high vac., of the Me esters of (III) and determination of the various consts. of the fractions indicates the composition lauric 12.6, myristic 63.2 (both isolated), palmitic 8.4, oleic 6.3, stearic 1.5, and linoleic acid 2.8%; resin 5.2%.

J. W. B.

Report on the soap industry in Ceylon. R. CHILD (Coconut Res. Scheme, Ceylon, Nov., 1934, Bull. No. 1, 45 pp.).—Characteristics of various grades of coconut oil and of other native oils are described. Soap manufacture is discussed and analyses of 28 locally-made soaps are detailed, suggestions being made for the improvement and standardisation of the local product. A table of sp. gr. (degrees Tw. and Bé.) of NaOH solutions at 30° has been compiled from laboratory determinations.

E. L.

Properties of solid soaps. J. L. BOWEN and R. THOMAS (Trans. Faraday Soc., 1935, 31, 164—182).—The effect of the method of cooling commercial soaps on their structure and the differences in relative rate of contraction for different rates of cooling have been

studied. An apparatus for determining the hardness of soap is described. The force required to cut the soap by a fine wire is measured and variations of hardness with variations in structure through a single bar of soap may be determined. The hardness of a soap of any particular combined fatty acid content will increase with the titre of the fatty acids for the same mixture of acids. On adding a salt to soap the hardness diminishes initially with increasing concn. of salt and then increases. The min. is observed at practically the same g.-mol. concn. for all the salts examined. A study of the migration of salts in solid soaps indicates that NaCl migrates from the surface to the centre, Na_2CO_3 behaves similarly but to a smaller extent, and Na_2SiO_3 migrates in the opposite direction. Addition of NaCl reduces the rate of diffusion of Na_2CO_3 . The relation of the movements of salts to the "efflorescence" on soaps is discussed.

M. S. B.

Pre-estimating [predicting] the browning of soaps. S. UENO and S. KOMORI (J. Soc. Chem. Ind., Japan, 1934, 37, 650—654 B).—The temp. rise shown by various oils in the Mackey test is a practical guide to the extent of the discoloration that may be expected when soaps made from the respective oils are stored; soaps from oils which do not show temp. rising > about 100° do not darken on storage. Oleic and erucic acids show fairly high Mackey vals. although their soaps do not discolour.

E. L.

Differentiation of cacao butters extracted by pressure from those extracted by solvents. A. CASTIGLIONI (Ann. Falsif., 1935, 28, 24—27).—(a) When shaken with AcOH and examined in ultra-violet light, cacao butter extracted with solvents (I) shows a vivid yellow-green fluorescence, not shown by butter extracted by pressure (II). (b) When heated to boiling with HCl and antipyrine in EtOH, (I) gives a rose colour on cooling, which is not given by (II).

E. C. S.

Twitchell reagents. XV. Relation between the kind of fatty acids used and their darkening on heating with Twitchell reagent. K. NISHIZAWA and T. INOUE (J. Soc. Chem. Ind., Japan, 1934, 37, 695—699 B; cf. B., 1935, 276).—The discoloration of fatty acids from 11 oils (refined with H_2SO_4 , d 1.70) after heating with or without fat-splitting reagents was studied by the methods described previously (B., 1931, 499; 1932, 269). Soya-bean and hydrogenated fish oil acids darken when heated alone in vac. The nature of the fatty acids is an important factor in the discoloration, as curves relating the amount of darkening to the nature of the acids are similar in form (except for a few isolated cases) for each type of reagent, whether heating was conducted in air or in vac. [in all cases Twitchell (C_{10}H_8) and Kontakt reagents cause less darkening than Divulson-D, Idrapid, and Pfeilring]. With the exception of linseed, castor, and cottonseed oils, the more unsaturated is the acid the more it darkens; the presence of air or impurities (e.g., in certain hardened fish oil acids) increases discoloration. On the whole, a better colour is retained when oils are hydrolysed after hydrogenation.

E. L.

Autoclave process of oil splitting. III. Zinc white as catalyst. D. NAKAE, K. NAKAMURA, and

H. NOBORI (J. Soc. Chem. Ind., Japan, 1934, 37, 645—646 B).—Of the various qualities made by the Sakai Chem. Works, the "raw" grade of ZnO, as used for paint-making was most satisfactory; the activity of the ZnO increases with its freshness. Addition of metallic Zn improved the colour of the fatty acids obtained, but did not increase the catalytic activity of the ZnO. E. L.

Testing the purity of China-wood oil. F. W. CHENG (J. Chinese Chem. Soc., 1934, 2, 351—353).— n for China-wood oil (I) is decreased by adulteration with Chinese vegetable tallow (II). 10^4D , where D is the difference between n for (I) and n for its unpolymerisable portion, is 156 for (I), but rises to 174 if 10% of (II) is added; similar effects are produced by rape and poppyseed oils, but rosin (III) decreases D . (III) may, however, be also detected by increase in the acid val. from about 2 for (I) (alone or mixed with other oils) to about 18 for an addition of 10% of (III). The technique of the polymerisation test is simplified. R. S. C.

Formation of isooleic acid in the sulphonation of oils. C. RIESS (Collegium, 1934, 566—568).—*iso*Oleic acid (I) was formed during the sulphonation (S) of oleic acid (II) or oils containing combined (II), e.g., neatsfoot (III) or olive oil. Max. amount of (I) (12.9%) was produced at 0° when (III) was sulphonated with 20% H_2SO_4 , and the amount formed increased with temp. of S . 27% of (I) was present in the solid fatty acids and 9.3% on the total oil when (III) was sulphonated with 20% H_2SO_4 at 25°. D. W.

Polymerisation of perilla oil. A. M. CHOMUTOV (J. Appl. Chem. Russ., 1934, 7, 960—966).—The physical consts. of perilla oil (I) vary during refining; the η of refined oil rises more rapidly on polymerisation (P) than in the case of crude (I). P is best effected in closed vessels, and the discontinuous process gives better results than the continuous one. Polymerised (I) may be stored in sealed vessels without deterioration. R. T.

Preparation of drying oils from synthetic acids and petroleum-cracking polymerides. A. J. DRINBERG (J. Appl. Chem. Russ., 1934, 7, 1046—1054, 1206—1222).—The acids (I) obtained by oxidation of solar oil, of acid val. ≤ 87 , sap. val. ≤ 123 , and free from hydrocarbons, are converted into Na salts by heating at 50° for 2 hr. with 10% aq. NaOH; the most important side-reactions are those of decarboxylation and dehydration of OH-acids (II) to yield hydrocarbons and unsaturated acids. The velocity of drying of drying oils (III) based on esters (IV) of (I) rises, and the elasticity and stability to H_2O and aq. alkalis of the films obtained from (III) fall, with increasing content of (II) in (I). The mixture of unsaturated polymerides (I val. 135—140) obtained by cracking petroleum, and thoroughly dried, is chlorinated to a content of 3—3.5% Cl, and the product (V) is heated at 120—170° with the dry Na salts obtained above; the (IV) so obtained are, after washing to eliminate NaCl and HCl, suitable for the prep. of (III). The drying properties of (III), containing various plasticisers, antioxidants, and vegetable oils, and the protective properties of the films given by it, are inferior to those obtained

without admixtures. The esters obtained from (V) and the Na salts of resin acids yield (III) similar to those from (IV). The synthetic (III) are unsuitable for outdoor work. R. T.

Alcohol extraction of fatty oils. I. Mutual solubilities of some vegetable oils. II. Extraction of peanut oil. M. SATO, T. INABA, and K. KITAGAWA (J. Soc. Chem. Ind., Japan, 1934, 37, 718—719 B, 720—721 B; cf. B., 1930, 1118).—I. The solubility curves of peanut, cottonseed, and sesame oil with EtOH are all similar and conform to the Caillet-Mathias law of rectilinear diam.; the crit. temp. rises with the dilution of the EtOH.

II. The EtOH-extraction process (special circulating system described) can be applied to separate the oil from the above seeds as well as in the case of soya beans; for technical purposes, extraction with 92 wt.-% EtOH at 78° is recommended. Pale oil of low acidity and a superior residue (meal) are obtained. E. L.

Composition of Tamari soy oil. T. TAKEI and S. TOMIYAMA (J. Soc. Chem. Ind., Japan, 1934, 37, 650 B).—The dark, odorous, viscous "oil" obtained as a by-product of Tamari soy brewing is prepared from soya bean only. A sample, consisting of glycerides, Et esters of fatty acids, and free fatty acids (50%) yielded (approx.) 2.13% of crude glycerin and 2.46% of EtOH, and had (vals. for ordinary soy oil in parentheses) acid val. 105.9 (41.9), sap. val. 185.6 (186.3), I val. 149.4 (102.1), n_{20}^{20} 1.4749 (1.4630), d_{15}^{15} 0.9172 (0.8926), flash point 218° (76.5°), Redwood η (50 c.c. at 20°) 5' 57" (1' 17.6"). E. L.

High-pressure hydrogenation of soya-bean oil. I. Products by copper catalyst. II. Properties of the sodium salt of the sulphuric ester of the higher fatty alcohol. Y. SHINOZAKI and H. KUBO (J. Soc. Chem. Ind., Japan, 1934, 37, 677—678 B, 678—679 B).—(I) The I, sap., acid, and Ac vals. have been determined for the products obtained by reduction (under 125 kg./sq. cm. pressure) of soya-bean oil at various temp., using $CuCO_3$ on infusorial earth as catalyst. At $< 250^\circ$ hydrogenation of unsaturated linkings is the chief reaction; at 300—325° the acid val. increases sharply, indicating the formation of free fatty acids. Alcohol formation predominates at 300—350°, but above 375° alcohols are reduced to hydrocarbons.

II. Comparison of aq. solutions of the crude Na salts of the sulphuric esters of the higher alcohols produced from soya-bean oil (S) and of the Na salt of pure octadecyl sulphuric ester indicate that impurities in S reduce the colloidal properties of the solutions (e.g., surface tension against kerosene or air), but such effect is negligible in solutions more dil. than 0.025%. E. L.

High-pressure hydrogenation of soya-bean oil. III. Formation of wax-ester. Y. SHINOZAKI and H. KUBO (J. Soc. Chem. Ind., Japan, 1934, 37, 780—781 B).—High-pressure hydrogenation of soya-bean oil at $> 300^\circ$ (350°) with a Cu-Cr catalyst gives octadecyl stearate. Above 350° an unsaponifiable substance is the chief product. H. G. M.

Determining sap. val. of mineral oils.—See II. **High-pressure hydrogenation. Applications of colloidal electrolytes.**—See III. **Textile chemicals.**

Action of aliphatic substances on fibres.—See VI. **Flotation reagents.**—See X. **Analysis of oils and fats.**—See XV. **Yoghurt. Analysis of meat of domestic fowl. Linseed.**—See XIX.

See also A., Mar., 297, **Determining stability and type of emulsions.**

PATENTS.

Treatment of herring and other fish of the Clupeidae family for manufacture of oil and food-stuffs poor in fat and having good keeping properties. A. GODAL and A. ØVSTHUS (B.P. 423,603, 5.8.33).—Fresh filleted or pulped herring etc. is dried in vac. at $< 70^\circ$ to reduce the H_2O content to $< 20\%$ (calc. on the finished press-cake) and then pressed in an ordinary oil press at 50–250 kg./sq. cm. to yield oil, and a food cake for human or animal consumption containing $< 6\%$ of fat. E. L.

Moulding of beeswax candles. L. W. GELLER, Assr. to WILL & BAUMER CANDLE CO., INC. (U.S.P. 1,960,994, 29.5.34. Appl., 7.12.29).—Org. solvents (glycols) are added to the wax mixture. The preferred composition is beeswax (70), stearic acid (20), paraffin (10 pts.), and $C_2H_4(OH)_2$ (1 pt.). H. A. P.

Manufacture of soap. H. G. C. FAIRWEATHER. From COLGATE-PALMOLIVE-PEET Co. (B.P. 423,279, 10.2.34).—See U.S.P. 1,951,511; B., 1935, 109.

Jointing composition.—See I. **Vinylacetylene derivatives.**—See III. **Bactericide.**—See XX.

XIII.—PAINTS; PIGMENTS; VARNISHES; RESINS.

Ships' paints and compositions. A. JONES (Paint Manuf., 1934, 4, 363–365).—The composition of anti-corrosive and anti-fouling paints is discussed. D. R. D.

Technology of ship-bottom paints. N. E. ADAMSON (Drugs, Oils, and Paints, 1934, 49, 454–463; cf. B., 1935, 160).—The causes and prevention by painting of the various types of corrosion and fouling observed are discussed. D. R. D.

Organic toxic compounds as antifouling agents in ship-bottom paint. I. S. OSHIMA (J. Soc. Chem. Ind., Japan, 1934, 37, 687 B).—Compositions containing tobacco powder, pyrethrum, $C_{10}H_8$, camphor, rotenone, $PhOH$, $NHPh_2$, C_2Cl_6 , dinitrocresol, or nicotine sulphate gave poor results in 6-month exposure tests; fairly good results were obtained when Cu_2O was admixed with these paints. E. L.

Protection of steelwork by paint. W. E. HIGHFIELD (Engineering, 1935, 139, 177–178, 205–206).—The necessity of care in the choice, manufacture, and application of paint and prep. of the surface in engineering work is emphasised. G. H. C.

Diatomite [in paints]. J. S. REMINGTON (Paint Manuf., 1934, 4, 366–367).—Diatomite is a suitable addendum to paints for application to damp surfaces. It absorbs the H_2O and prevents peeling, blistering, etc. Formulæ for such paints are given. D. R. D.

Study of paint durability based on some physical properties of the pigments used. H. A. NELSON (Official Digest, 1935, No. 142, 7–14).—A lecture, in

which the influence of particle size, n , opacity to visible and ultra-violet light, chemical reactivity, etc. of the pigment on the durability and hiding power of the resultant paint is traced. D. R. D.

Viscosity relations of oil paints as indicator of the properties of the paint films. H. WOLFF (Paint Var. Prod. Man., 1934, 11, No. 4, 5–12).—The properties of paints depend, not on the abs. oil content, but on the ratio of this to the crit. oil content. The H_2O -permeability, durability, etc. of a no. of paints containing ochre and heavy spar were predicted from η determinations; the vals. were confirmed experimentally. D. R. D.

Oilskins. ANON. (Paint Var. Prod. Man., 1934, 11, No. 4, 30–38).—Methods of manufacture are described and the defects liable to arise on storage are discussed. D. R. D.

Systematic microchemical recognition of mineral pigments. I. White pigments. S. AUGUSTI (Mikrochem., 1935, 17, 1–10).—Observation of the behaviour of microsamples with dil. HCl , followed by the usual microscopical or drop reactions for Pb , Ca , etc., enables distinction to be made between white- Pb , $CaCO_3$, ZnO , $CaSO_4$, lithopone, $PbSO_4$, and $BaSO_4$. J. W. S.

Lacquer formulation. P. S. SYMONS (Paint Manuf., 1934, 4, 376–381).—A review. D. R. D.

Determining the strength of lacquer and oil films. N. V. SMIRNOV (J. Appl. Chem. Russ., 1934, 7, 1104–1107).—Automatic apparatus is described. R. T.

Ester gum colour; its vital dependence on packaging. J. SAPHIER (Paint Var. Prod. Man., 1934, 11, No. 4, 18–19).—Ester gum, if stored in broken pieces, suffers discoloration owing to surface oxidation. During manufacture, the molten product should be run straight into metal drums and stored thus. D. R. D.

Factors which control the durability of nitrocellulose lacquer films. P. H. FAUCETT (Drugs, Oils, and Paints, 1934, 49, 453–454).—The use of natural and synthetic resins, bodied linseed oil, and castor oil to improve the durability of lacquers is discussed. Addition of a trace of ZnO is beneficial. The modification of lacquer formulæ to allow for differences in climatic conditions, purposes for which the lacquer is to be used, etc. is considered. D. R. D.

Lac resins obtained by nitration of petroleum hydrocarbons. A. J. DRINBERG, A. A. BLAGONRAVOVA, and E. M. PRIK (J. Appl. Chem. Russ., 1934, 7, 1223–1229).—Artificial resins are obtained by nitrating the naphtha fractions and the highly unsaturated cracking polymerides, and colophony, with conc. HNO_3 at 60 – 65° . R. T.

Constitution of phenol-formaldehyde resins. H. TATU (Rev. gén. Mat. Plast., 1934, 10, 449–452).—A crit. survey of views held on the chemical constitution of $PhOH-CH_2O$ resins prepared in presence of both acids and alkalis is made. E. L. H.

Vinyl acetate resins. R. ELLIOT (Canad. Chem. Met., 1934, 18, 173–176).—Resins obtained by polymerisation of vinyl acetate, and by partial hydrolysis of these and replacement of the OAc groups by $MeCHO$

or CH_2O , are described and compared. By varying the amount and characteristics of the replacing agents such properties as solubility, hardness, η , etc. can be varied within wide limits. The general properties of the products are detailed and their possible industrial uses outlined. S. S. W.

Practical and theoretical viewpoints on synthetics [resins]. W. KRUMBHAAR (Official Digest, 1935, No. 142, 15—28).—The manufacture of various synthetic resins is described and practical hints concerning their use are given. A synthetic drying oil which is a mixed glyceride of unsaturated fatty acids (I) and a dibasic acid (II), such as phthalic acid, is described. (II) serves to link together different glyceryl radicals, forming a high-mol. product resembling polymerised natural drying oils (e.g., linseed stand oil) in η , but differing from them in having all the ethylenic linkings of (I) free to combine with O_2 during drying. D. R. D.

Permeability to H_2 of film-forming materials.—See VI. **Drying oils from petroleum products.**—See XII. **Ester gum.**—See XVII. **Removing phenols from waste waters.**—See XXIII.

See also A., Mar., 291, η of nitrocotton solutions. 292, Solubility of cellulose nitrate.

Do not report to PATENTS. See also 291.

Manufacture of a [lithopone] pigment. F. G. BREYER and J. P. KOLLER, Assrs. to KREBS PIGMENT & COLOR CORP. (U.S.P. 1,949,925, 6.3.34. Appl., 19.9.28).—Lithopone (L) pptd. in the usual way is heated in a muffle, quenched in H_2O , and ground wet in a colloid mill until the particle size approximates to that of a good French-process ZnO ; 0.3—0.5% (based on the wt. of L) of Na_2SiO_3 is ground intimately with the slurry until adsorption is complete and the pigment is then filtered and dried. Preferably a small amount of NaOH is added during the grinding so that the product has an alkalinity \equiv 3—5 c.c. of 0.02N- H_2SO_4 per g. on titration to Me-orange. A. R. P.

Coating composition [from acetylene polymerides]. W. S. CALCOTT, A. S. CARTER, and F. B. DOWNING, Assrs. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,959,408, 22.5.34. Appl., 10.7.30).—The unsaturated hydrocarbon mixtures, containing divinyl-acetylene, obtained by passing C_2H_2 into a mixture of H_2O , NH_4Cl , Cu_2Cl_2 , and Cu powder, is hydrogenated to \gt 10% wt.-increase and partly polymerised by heating. The products can be used as the medium for paints and varnishes. S. M.

Coating composition. I. W. HUMPHREY, Assr. to HERCULES POWDER CO. (U.S.P. 1,961,931, 5.6.34. Appl., 2.1.29).—Compositions comprising a nitrated carbohydrate, e.g., nitrocellulose, a hydrogenated abietic ester, e.g., the Et, glycol, or glycerol esters, and solvents are claimed. O. HO-ROU.

Coating compositions. SYLVANIA INDUSTRIAL CORP. (B.P. 419,688, 1.11.33. U.S., 2.11.32).—A composition adapted to be dissolved in suitable solvents and applied as a lacquer, or cast to form moisture-proof, transparent, non-tacky, and non-greasy coatings, films,

sheets, etc., comprises a compatible mixture of a cellulose derivative, e.g., nitrocellulose, plasticisers, e.g., Bu phthalate, 0.5—5 wt.-% of a solid wax, e.g., paraffin, and a non-volatile wax solvent, e.g., 0.5—5 wt.-% of blown rapeseed or other oil, together with a resinous wax solvent, e.g., ester gum, dewaxed dammar, if desired. Autogenous heat-sealing of such coated surfaces at relatively low temp. is also claimed. S. S. W.

Production of coatings on building elements. A.-G. F. INTERNAT. PATENTVERWERTUNG, and W. LAMPFERHOFF (B.P. 423,277, 25.1.34).—Cement, concrete, plywood, etc. are first rendered impermeable to moisture by impregnation with a solution containing Ca salts of Turkey-red oil etc., and CaCO_3 intimately mixed with tung oil-copal varnish. A cold glaze comprising quartz, magnesite cement, MgSO_4 or MgCl_2 solution, nitrocellulose, softeners, and solvents, an elastic intermediate layer comprising nitrocellulose, glyptal resins, softeners, and solvents, and a final hard coating containing substantial proportions of acetylcellulose are then successively applied. S. S. W.

(A, B) **Coated material [e.g., linoleum].** H. H. HOPKINS, Assr. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,959,363 and 1,960,220, 22.5.34. Appl., [A] 14.8.28, [B] 12.6.30).—A flexible, alkali-resistant surface on linoleum, saturated felt, etc. is obtained with a coating of the print paint made by grinding a pigment into a solution of an alkyd resin which has been modified with (A) 40—70% of the fatty acids obtained by hydrolysis of oil glycerides, (B) 40—85% of drying-oil glycerides. S. M.

Dehydration of nitrocellulose and production of lacquers containing the same. C. A. HOCHWALT and P. E. MARLING, Assrs. to SHARPLES SOLVENTS CORP. (U.S.P. 1,961,120, 29.5.34. Appl., 19.8.33).—Nitrocellulose (I) which is wet with EtOH is pressed and washed free from H_2O with an alcohol above C_3 , e.g., BuOH. The "orange-peel" effect produced when the untreated (I) is used in lacquers is thus avoided. S. M.

Cellulose derivative plastic compositions. BRIT. CELANESE, LTD. (B.P. 423,644, 22.5.34. U.S., 19.5.33).—A cellulose ester or ether is stabilised by admixture of 0.01—0.3 wt.-% of a metallic salt of a hexahydrobenzoic acid, e.g., Ca naphthenate. S. S. W.

Manufacture of coloured extruded products of rubber, bitumen, or like plastic. LIVERPOOL ELECTRIC CABLE CO., LTD., and J. W. EDGE (B.P. 423,496, 27.10.34; cf. B.P. 401,529, B., 1934, 158).—The body of the product, e.g., a rubber-sheathed electric conductor, is extruded (in continuous lengths) from an uncoloured mixing with a surface layer of coloured plastic. Apparatus is claimed. D. F. T.

Moulding preparation [from Congo copal resin]. C. A. HOUCK and F. J. MOORE (U.S.P. 1,959,718, 22.5.34. Appl., 3.8.31).—The ground resin (6—4) is mixed with an adsorbent filler which possesses capillary properties (4—6 pts.), e.g., wood flour, linters, and a small quantity of a volatile non-solvent liquid, e.g., EtOH. H_2O , dyes, and plasticisers may also be incorporated. S. M.

Manufacture of plastic compositions containing organic sulphides. DUNLOP RUBBER CO., LTD., D. F. TWISS, and A. E. T. NEALE (B.P. 423,444, 1.8.33).—An alkaline solution of an alkali or alkaline-earth polysulphide is caused to react with CH_2O (I) or a compound of (I) with an alkali H sulphite, (I) being in sufficient excess to react further with a phenol, amine, or casein, a composite plastic of two types, intimately mixed *in situ*, being thus formed. S. S. W.

Production of plastic products [from vegetable waste]. L. R. JONES (U.S.P. 1,961,588, 5.6.34. Appl., 24.5.29).—Products obtained by the process of U.S.P. 1,917,038 (B., 1934, 371) are improved by neutralising the cooked mass with an alkali salt, *e.g.*, BaCO_3 , and cooking again after addition of $(\text{CH}_2)_6\text{N}_4$. S. M.

Moulded compositions from asbestos. D. WOLOCHOW (B.P. 423,639, 3.4.34).—Waste chrysotile asbestos fibre is mixed with an aq. solution of H_2SO_4 , H_3PO_4 , HCl , HNO_3 , HClO_3 , $\text{H}_2\text{C}_2\text{O}_4$, or HBr to form a plastic mass which is pressure-moulded and dried at $> 100^\circ$. S. S. W.

Composite material. R. H. CUNNINGHAM, ASST. to BRYANT ELECTRIC CO. (U.S.P. 1,960,180, 22.5.34. Appl., 11.2.32).—Arc shields or the like are formed of a laminated combination of heat-resisting and plastic moulded materials. B. M. V.

Refining of rosin. J. H. BORGLIN, ASST. to HERCULES POWDER CO. (U.S.P. 1,959,564, 22.5.34. Appl., 11.11.30).—A solution of rosin in, *e.g.*, gasoline is agitated with a solution of $\text{H}_2\text{C}_2\text{O}_4$ in a non-aq. solvent, *e.g.*, EtOH , which is immiscible with the rosin solvent (cf. U.S.P. 1,897,379; B., 1933, 978). S. M.

Water-soluble resins of the phenol-formaldehyde group. E. C. LOETSCHER (U.S.P. 1,959,433, 22.5.34. Appl., 11.2.31).— PhOH and CH_2O are heated in stated proportions with a sugar solution or starch suspension so long as the product remains H_2O -sol. S. M.

Cold resinification of phenol alcohols [made from phenol and formaldehyde]. F. S. GRANGER, ASST. to COMBUSTION UTILITIES CORP. (U.S.P. 1,956,530, 24.4.34. Appl., 27.12.30).— PhOH (1 mol.), technical cresol, or other phenol is condensed with CH_2O (1–3 mols.), $(\text{CH}_2)_6\text{N}_4$, etc. in presence of an alkali. To ppt. a resinous by-product (which retains the colouring matter) the mixture is neutralised and diluted with H_2O ; the residual liquid mixture of phenolic alcohols is treated in the cold with an aq. strong acid, *e.g.*, conc. HCl . A light-coloured, potentially reactive moulding resin is obtained. S. M.

Synthetic resin and composition containing the same. C. DREYFUS and G. SCHNEIDER, ASSRS. to CELANESE CORP. OF AMERICA (U.S.P. 1,960,262, 29.5.34. Appl., 24.8.29).—Condensation products of mercaptans, *e.g.*, PhSH , with aliphatic aldehydes or ketones are claimed. S. S. W.

Manufacture of [artificial resin-lined] vessels. J. K. WIRTH, ASST. to SAÜRESCHUTZ GES.M.B.H. (U.S.P. 1,949,135, 27.2.34. Appl., 3.1.30. Ger., 26.4.29).—A perforated metal foundation (*F*) is covered inside with

paper impregnated with NaHSO_4 which is then coated with a thick layer of $\text{PhOH-CH}_2\text{O}$ resin (*R*), and the whole heated to destroy the paper and harden *R*. More plastic *R* is then forced through the perforations to fill the space between the hardened *R* and the *F* and thus key the *R* layer into *F* when the second lot of *R* is hardened. A. R. P.

Dryer [for pigments etc.].—See I. **Moisture-proofing compositions.** **Rubberised fabric.**—See VI. **Wood substitute.**—See IX.

XIV.—INDIA-RUBBER; GUTTA-PERCHA.

Chemical nature of U.S.S.R. natural caoutchoucs and gutta-perchas. S. REFORMATSKI, V. VISCHNEVSKI, G. JATZUN-VISCHNEVSKAJA, and A. SCHULPEKOVA (J. Appl. Chem. Russ., 1934, 7, 950–959).—No differences are found between the composition and behaviour towards chemical reagents of caoutchouc (I) of tropical origin and (I) derived from Russian-grown plants (*Tau-sagiz*, *Chondrilla*, etc.). R. T.

Visco-elastic properties of rubber. J. C. ECCLES and J. H. C. THOMPSON (Proc. Roy. Soc., 1935, A, 148, 171–185).—Catapult elastic gave τ (normal visco-elastic const.) $28 \cdot 7 \times 10^{-4}$ sec., E' (coeff. of normal viscosity) $3 \cdot 42 \times 10^4$ c.g.s. units. Black rubber gave τ 6×10^{-4} sec., E' $0 \cdot 78 \times 10^4$ c.g.s. units. L. L. B.

Photo-elastic properties of soft, vulcanised rubber. W. E. THIBODEAU and A. T. MCPHERSON (J. Res. Nat. Bur. Stand., 1934, 13, 887–896).—The double refraction at 25° under tensile stress (*T*) was measured, using a Babinet compensator, for three types of transparent rubber compound (*R*), viz., (1) the simplest type, made from rubber hydrocarbon and S, and so vulcanised as to give almost complete combination, (2) crude rubber and S, containing ZnO and stearic acid (1% of each), (3) as (2), but containing accelerators (*A*) (mercaptobenzthiazole or tetramethylthiuram disulphide). The relationships between relative retardation per unit thickness (Δ_n) and the stress-optical coeff. (*C*) are: $\Delta_n = aT + bT^2 + cT^3$ and $C = a + bT + cT^2$, *a*, *b*, and *c* being consts. for any given *R*. For *R* vulcanised with the aid of *A* and containing a min. of S consistent with good physical properties, *b* and *c* = 0, and thus Δ_n is a linear function, and *C* independent, of *T*. For certain *R* (II) vulcanised without *A*, Δ_n is not a linear function of *T*, and *C* decreases markedly with increasing *T*. The properties of other *R* containing *A* and $>$ the min. of S required were intermediate. For (II) an approx. linear relation was found between both *a* and *b* and the content of combined S (*S_c*), from which the following expression, relating Δ_n and *S_c*, and applicable to *R* having *S_c* = 2.85–6.2% and to measurements at $T \geq 65$ bars, is derived: $\Delta_n \times 10^4 = (1.96 + 0.025S_c)T - (0.0054 + 0.00112S_c)T^2$. A. L. R.

Permeability to H_2 of film-forming materials.—See VI.

PATENTS.

Thickening of [rubber] latex. INTERNAT. LATEX PROCESSES, LTD. (B.P. 423,490, 21.9.34. U.S., 10.10.33).—The latex (*L*) is at least partly creamed; a hydrophilic thickening agent is introduced into at least a

portion of the resulting serum and this is then mixed with the creamed portion. Thickening is thus effected without substantial dilution of *L* by additional H_2O .

D. F. T.

Manufacture of rubber goods [from latex]. B. DALES, Assr. to AMER. ANODE, INC. (U.S.P. 1,959,021, 15.5.34. Appl., 16.8.28).—The surface of a foundation member is coated with a substantially anhyd. liquid coagulant, *e.g.*, a mixture of CO_2Me_2 and HCO_2H , and is then brought in contact with an aq. dispersion of rubber; the coagulated layer after attaining the desired thickness may be dried and vulcanised. If a rubber-coated article is required the non-porous, *e.g.*, metal, foundation may first be given an adhesive surface-layer, sol. in org. solvents but insol. in H_2O , capable of effecting firm attachment of the rubber, and the subsequently applied coagulant may be either H_2O -sol. or as above. D. F. T.

Production of rubber articles [from latex]. J. MCGAVACK, Assr. to NAUGATUCK CHEM. CO. (U.S.P. 1,960,445, 29.5.34. Appl., 3.3.32).—An aq. dispersion of rubber formed into the desired shape is coagulated by an anhydride or halide of a lower fatty acid; *e.g.*, the dipping former may be immersed in Ac_2O or $AcCl$ and then into latex, or elastic thread may be produced by streaming latex into the coagulant. D. F. T.

Manufacture of microporous rubber. H. W. GREENUP, Assr. to FIRESTONE TIRE & RUBBER CO. (U.S.P. 1,959,160, 15.5.34. Appl., 29.9.33).—Rubber latex containing $(CH_2 \cdot NH_2)_2$ (I), an arylguanidine (II) such as $NH_2C(NHPh)_2$, and vulcanising agents (*e.g.*, S, mercaptobenzthiazole, and ZnO) is heated to effect coagulation and subsequent vulcanisation while still wet. (I) prevents premature coagulation by (II). D. F. T.

Accelerator for vulcanisation of rubber. M. H. ZIMMERMANN, Assr. to FIRESTONE TIRE & RUBBER CO. (U.S.P. 1,960,197, 22.5.34. Appl., 16.5.31. Can., 30.6.30).—The reaction product of CH_2O and a mercaptarylenethiazole (particularly that of mercaptobenzthiazole, m.p. 130°) is claimed as a "non-scorching" accelerator. D. F. T.

Production and use of accelerators for [rubber] vulcanisation processes. W. J. TENNANT, From RUBBER SERVICE LABS. CO. (B.P. 423,514, 3.8.33).—The mercaptarylenethiazole derivative of the reaction product of an aldehyde and NH_3 , *e.g.*, $(CH_2)_6N_4$ or $C_3H_7 \cdot CHO \cdot NH_3$, is treated with a carboxylic acid halide, such as $C_6H_4(COCl)_2$ or $BzCl$. Vulcanisation is accelerated by the product with or without the addition of a basic accelerator, *e.g.*, $NH_2C(NHPh)_2$. D. F. T.

Manufacture of [vulcanised] rubber. M. W. PHILLPOTT (B.P. 423,308, 3.8.33).—Rubber compositions containing large proportions of cork are vulcanised with the aid of an org. accelerator, *e.g.*, a dithiocarbamate, thiuram disulphide, or mercaptarylenethiazole, in presence of a small proportion (*e.g.*, 0.3—1% of the total wt.) of an org. substance such as piperidine (I) or other org. base, or a salt or condensation product thereof, or particularly the compound comprising (I) (1 mol.) and Zn pentamethylenedithiocarbamate (1 mol.), to counteract the anti-vulcanising tendency of the cork. D. F. T.

Reclaiming of rubber. T. J. FAIRLEY and R. FRYE, Assrs. to W. J. and M. P. HUNTER (U.S.P. 1,959,576, 22.5.34. Appl., 6.7.31. Cf. U.S.P. 1,843,388; B., 1932, 1044).—Vulcanised rubber is dissolved with the aid of heat in a solvent obtained by distilling wood turpentine with a catalytic clay. The solvent is then removed and the residue after treatment with dil. H_2SO_4 and separation therefrom is a soft rubber mass substantially free from stickiness. D. F. T.

Waterproofing composition [containing rubber]. W. L. HOLTER, Assr. to VAN SCHAACK BROS. CHEM. WORKS, INC. (U.S.P. 1,960,209, 22.5.34. Appl., 27.6.31).—A waterproofing composition comprises in solution rubber (1 pt.), a vulcanising agent therefor, and a H_2O -repellent substance, *e.g.*, a metallic salt of a higher fatty acid (2—5 pts.) such as Al stearate. The vulcanising agent may be kept in a separate solution from the accelerator [to which also an org. base, *e.g.*, $NH(CH_2Ph)_2$, may be added] so that a self-vulcanising composition may be formed when they are mixed. D. F. T.

Mercaptarylenethiazoles.—See III. **Waterproof textiles.** **Rubberised fabric.**—See VI. **Coloured extruded plastics.**—See XIII.

XV.—LEATHER; GLUE.

Fur chemists' problems. J. CASPE (J. Amer. Leather Chem. Assoc., 1934, 29, 685—699).—March pelts are the prime and show max. conditions of sheen, colour, texture, fur density, and absence of blue pigmentation on the flesh side. Different areas of the skin surface become prime at different times of the year. A microscopical examination of the root ends of the under-fur hairs is necessary to differentiate prime and unprime skins. Hair from a prime pelt shows a clear hyaline layer devoid of pigmentation. Spotting and staining in the dyeing of fur skins may be caused by improper curing of the raw pelts. The efficiency of the drumming of the pickled or "alumed" pelts depends on their H_2O content. The absorption of the oils and fats in the subsequent greasing can be improved by employing neutral oils and using "kicking" machines. Before the skins can be dyed, the hair must be "killed," *i.e.*, have the film of fat removed from the surface of the hair. Fumigation affords better protection than do mothproofing agents against insect damage. Dermatitis usually arises from the wearing of black furs and can be largely prevented by the complete oxidation of the materials used, the completion of the dyeing process, and a final mordanting with cold aq. $CuSO_4$. The optimum conditions for producing proper stretch and pliability, the physiological properties of different skins under different conditions, and the production of dyes fast to various influences are as yet unknown. D. W.

Report of the Committee of the Austrian section [of the I.V.L.I.C.] on hide curing and the analysis of oils and fats. W. SCHINDLER (Collegium, 1934, 583—584).—The curing of hides and skins has improved in Austria and spoilage by alum spots has almost completely disappeared. Salt stains have not been so prevalent, since fresh, unused $NaCl$, denaturalised with lysol (I), has been used. "Red heat" has been observed, though to a much smaller extent than in

previous years. The (I) prep. consisted of a very dil. solution of cresol soap with small amounts of linseed oil soap or a feebly alkaline soap. D. W.

Nature of the reaction between hide substance and basic chromium [salt] solutions. G. D. McLAUGHLIN, D. H. CAMERON, and R. S. ADAMS (J. Amer. Leather Chem. Assoc., 1934, 29, 657—678).—The fixation of Cr_2O_3 by pelt from basic Cr sulphates and chlorides, respectively, of different basicities follows Freundlich's adsorption law with respect to [Cr]. D. W.

Theory of chrome tannage. E. ELÖD and T. CANTOR (Collegium, 1934, 568—583; cf. B., 1934, 974).—The Cr content (*C*) of pelts which had been treated with different chrome-tanning (*T*) liquors, including formato-, oxalato-, sulphito-, and sulphate liquors, respectively, and subsequently washed with distilled H_2O increased with the pptn. vals. of the liquors. The *C* of freshly tanned pelt was altered by the washing and by the nature of the H_2O used, being much reduced by salts containing the same anion as the *T* compound. *C* is a min. if the pelt is chrome-tanned with liquors containing a large amount of neutral salts because the latter repress hydrolysis in the *T* liquors and membrane action in the protein. The amount of *T* compounds is thereby reduced to a min. and the swollen condition of the pelt is such that a large part of any adsorbed Cr is removed during the washing. These results confirm Elöd's theory of chrome-tannage according to which the individual collagen fibrils must first be completely penetrated by the tanning material. Certain means, e.g., pickles, use of conc. liquors, materials forming complexes, are necessary to maintain the crystalloidal character of the Cr liquor until it has diffused into the pelt, after which the true *T* compounds are formed. They contain OH groups which unite with the active groups in the protein through the medium of the auxiliary valencies. D. W.

Determination of acid in dyed chrome[tanned] leather by Meunier's method. J. JANY (Collegium, 1935, 9—13).—The leather is treated for 5 hr. with 0.2*N*- NaHCO_3 containing Na_2SO_4 (I) (10%), drained, and washed with 10% aq. (I). The extract is decolorised by the (I) and thus the excess NaHCO_3 can readily be titrated with 0.2*N*-HCl and an indicator. D. W.

Action of iron compounds on vegetable[tanned] leather. L. JABLONSKI (Collegium, 1935, 7—9).—Bergmann's inference (B., 1934, 1024), that Fe is not necessarily the cause of the deterioration of leather (*L*) containing it, is criticised. The harmful effects of Fe were first recognised in laundering. Damage to *L* by Fe arises in two ways: thus, small quantities of Fe in *L* may act as O carriers; the fatty acids in *L* belting can dissolve Fe from the pullies and cause accumulation of Fe tannate in the surface layers, with ultimate cracking thereof. D. W.

Comparative testing of leather waterproofness. F. STATHER and H. HERFELD (Collegium, 1935, 13—15).— \sphericalangle 2 pieces of leather are mounted in special holders the lower parts of which are connected to a H_2O container from which the H_2O is forced under pressure (*P*). *P* is gradually increased and the *P* determined at which

H_2O appears on the upper surface of the samples under test. D. W.

Casein in [finishes for] leather manufacture. A. HEVESI (Collegium, 1935, 1—7).—The fat (I), ash, acid (II), N, and protein contents, the solubility, η , and susceptibility to putrefaction of two commercial caseins were inferior to those of a casein (*C*) highly suitable for use in leather finishing. *C* to be suitable should be prepared from pure fresh cows' milk and yield a 10% solution with 1% aq. NH_3 without sediment, which should not putrefy in < 48 hr. It should have $\eta > 4$, (I) $< 0.8\%$, and (II) $\equiv < 10$ c.c. of 0.1*N*-NaOH per g. D. W.

Mordanting and dyeing [of hides].—See VI.

See also A., Mar., 301, Mordanting and dyeing processes.

PATENTS.

Hide preservation. V. CONQUEST, Assr. to ARMOUR & Co. (U.S.P. 1,961,740, 5.6.34. Appl., 25.7.32).—Raw hides are treated with aq. NaCl containing 0.1—0.5% of one or more disinfectant agents, e.g., Na_2SiF_6 , $\text{NaO}\cdot\text{C}_6\text{H}_5\text{Cl}_3$, $\beta\text{-C}_{10}\text{H}_7\cdot\text{OH}$. D. W.

Preservation of raw hides and skins. M. STERN (B.P. 422,821, 17.3.34).—A 1:1 mixture of powdered scrap leather and rock salt, together with tobacco dust or extract and C_{10}H_8 or $\beta\text{-C}_{10}\text{H}_7\cdot\text{OH}$, is applied to the flesh side of the skins. The glue solution produced from hides or skins thus treated is also claimed. D. W.

Treatment of hides and skins. M. M. MERRITT and N. H. POOR, Assrs. to TANNING PROCESS Co. (U.S.P. 1,961,377, 5.6.34. Appl., 2.1.32).—Limed hides or skins are drummed or treated with an insol. powder, e.g., lithopone, pumice powder, to prepare them for the fleshing machine. D. W.

Water-resistant alkaline silicate compositions [adhesives]. L. L. LARSON, Assr. to GRASSELLI CHEM. Co. (U.S.P. 1,949,914, 6.3.34. Appl., 2.1.32).—Aq. Na_2SiO_3 is treated with solutions of ZnSO_4 or CuSO_4 in aq. NH_3 and, if desired, with casein or other org. adhesive, to produce a pasty mass having strong adhesive properties, and drying to a waterproof film. A. R. P.

Preserving hides.—See VII.

XVI.—AGRICULTURE.

Profile diagrams as standards for soil mapping and evaluation. W. LAATSCH (Ernähr. Pflanze, 1935, 31, 41—44).—Charts representing variations, with soil depth, of the base-absorptive capacity of clay and humus, and of the degree of saturation, may serve as soil characteristics. A. G. P.

Methods for microbiological investigation of soils. A. ISAKOVA (Bull. Acad. Sci. U.R.S.S., 1934, 1007—1030).—Vinogradski's methods are applied to the examination of factors influencing N changes in soils. A. G. P.

Sterilisation of biological powders. V. Sterilisation of arable soil. A. J. J. VANDE VELDE (Bull. Acad. roy. Belg., 1934, [v], 20, 816—823).—Arable soil which has been boiled 3 times with CS_2 , followed in each

case by slow evaporation of the solvent, is completely sterile but retains its biological properties, and its dye-absorption capacity is undiminished. Treatment with cold CS_2 is insufficient. F. S. H. H.

Salt selection of bacteria in soil. E. M. PRUSHANSKAJA (Bull. Acad. Sci. U.R.S.S., 1934, 967—992).—The effects are examined of various concns: of Na salts on organisms concerned in the N cycle in soils. Relatively high proportions (4%) of different salts are associated with a marked activity of characteristically sp. species or groups of bacteria. A. G. P.

Potassium and phosphorus content of sandy soils of Hungarian lowlands, with special reference to improving their productivity. D. FEHÉR (Z. Pflanz. Düng., 1935, 37, 26—52).—Analytical data are examined in relation to forest growth. Plant associations are not sufficiently characteristic of soil types to permit their utilisation as indicators in soil classification. A. G. P.

Expressed soil solutions and root-soluble plant nutrients. N. L. GALVEZ (J. Landw. 1934, 82, 257—288).—Successive soil solutions obtained by repeated pressure extraction and remoistening show, at first, an increasing concn. of mineral matter followed in latter samples by a steady decline. The rate of decline in concn. varies considerably with soil type, as also does the ratio of individual nutrients. No relationship exists between the [K] and [P] in the soil solution and the root-assimilable vals. for the extracted soil. The ability of plants to bring soil-K into solution is greater in loams and sands than in clays. There is no correlation between the HCl-sol. nutrient in soil, that in the soil solution, and that which is assimilable by roots. A. G. P.

Influence of filtration on the colorimetrically determined p_{H} of soil extracts. V. K. NEUGEBAUER (Bull. Soc. Chim. Yougoslav., 1934, 5, 73—82).—The p_{H} of aq. KCl is lowered by filtration through filter paper, to the least extent by Schleicher's No. 597. In determining soil acidity, the first 4 filtrates should be rejected, or preferably sedimentation should be applied. R. T.

The place of humic acid in the chemistry of humus. S. A. WAKSMAN (Z. Pflanz. Düng., 1935, 37, 52—55).—A reply to Springer (B., 1935, 36). A. G. P.

Humic fertilisers. II. Influence of ammonia and chlorine on the organic constituents of peat. S. S. DRAGUNOV, A. A. KIPRIANOV, A. I. NATKINA, and P. A. TSCHESALKINA (J. Appl. Chem. Russ., 1934, 7, 1055—1064; cf. B., 1935, 165).—The org. constituents of peat react with NH_3 to yield H_2O -sol. NH_4 humates, with diminution in the lignin content (I). Cl_2 reduces (I), increases the hemicellulose content, and converts humic acids into $\text{EtOH}-\text{C}_6\text{H}_6$ -sol. products. R. T.

Improvement of soils by chemical manuring. G. TOMMASI (Ann. R. Staz. Chim. Agrar. Sperim., 1934, 14, No. 306, 30 pp.).—A lecture. R. N. C.

Influence of cultivation and manuring on the physical condition of Dahlem soils. F. SIEBECKE (Landw. Jahrb., 1934, 80, 611—667).—Effects are recorded of liming, of org. manures and artificial fertilisers, and of ploughing to varying depths on the

structure, compactness, and H_2O relationships of several soil types. A. G. P.

Elimination of the non-homogeneity of soils in field experiments by the "trend" method. H. NIKLAS and M. MILLER (Landw. Jahrb., 1934, 80, 453—457).—Mathematical discussion of the treatment of results of manurial experiments. A. G. P.

Reaction changes in soils following physiologically-acid and -alkaline manuring. R. BALKS and P. RINTELEN (Landw. Jahrb., 1934, 80, 393—399).—The influence of $(\text{NH}_4)_2\text{SO}_4$ and $\text{Ca}(\text{NO}_3)_2$ on soil reaction is most apparent in the neighbourhood of growing roots. A. G. P.

Can drought be counteracted by manuring? W. SCHOLZ (Z. Pflanz. Düng., 1935, 37, 73—83).—The literature is reviewed and the importance of org. manuring in soil- H_2O conservation emphasised. A. G. P.

Nitrification of stall manure in arable soil. X. C. BARTHEL and N. BENGTESSON (Medd. Centralanst. Försöks. Jordbruks., Bakt. Aveld., 442, No. 62, 16 pp.; Kung. Landbruks-Akad. Handl. Tidskr., 1934, 73, 25—40; Chem. Zentr., 1934, ii, 1979—1980; cf. B., 1933, 563).—The N compounds of cattle manure (I) are very resistant to bacterial decomp. The N of fish meal is readily changed to a sol. form. Plants utilise more N from (I) than corresponds to the NH_3 present. A. G. P.

Influence of potassium manuring on the chemical composition of the crop. A. JACOB (Z. Pflanz. Düng., 1935, 37, 1—26).—Generous applications of K fertilisers increased the K content of all plant organs except seed, lowered the N content, and did not affect that of P in a definite manner. The antagonism between K and Ca in plant nutrition operates to varying extents in different species. A. G. P.

Preparation and rotting of stall manure. H. KELLER (J. Landw., 1934, 82, 289—306).—Changes in the C and N constituents of steeped (Kaserer) and compacted manure are recorded. Little difference in the final products is apparent. A. G. P.

Hot-fermentation of stall manure according to H. Krantz. B. NIKLEWSKI (Z. Pflanz. Düng., 1935, 37, 92—112).—The superiority of hot-fermented (I) over ordinary cold-stacked manure (II) depends, not on better N conservation, but on the more rapid rotting of the product and its higher content of H_2O -sol. org. matter. The latter has a marked stimulatory effect on plants. The depth distribution of NaOH-sol. org. matter in the stack was fairly uniform in (I), but increased from top to bottom in (II). A. G. P.

Determination of the fertiliser requirement of soil from soil examination. O. ENGELS (Z. Pflanz. Düng., 1935, 37, 84—92).—Determinations of root-assimilable nutrients in soil (Neubauer method) reflect the addition of fertilisers. Methods for evaluating the available nutrients in soils are discussed in relation to the sp. requirements of individual crops, to soil depth, and to climatic factors. A. G. P.

Potassium requirement of old high-moor meadows. C. HUSEMANN (Ernähr. Pflanze, 1935, 31,

1—3).—On high-moor peat meadows, the omission of K fertilisers resulted in a gradual deterioration of the sward, lower hay yields, and smaller K contents in the hay. Heavy rainfall tended to increase yields, but also to lower the K content of the grasses. Leaching of K was appreciable and increased with application of fertilisers. A. G. P.

Phosphate efficiency of the new complete fertiliser Nitrophoska (with lime) compared with that of other phosphate fertilisers. E. BLANCK and W. HEUKESHOVEN (*J. Landw.*, 1934, **82**, 307—316).—Comparative manurial trials are recorded. Nitrophoska (with CaO) is as effective as are other types of P fertilisers. A. G. P.

Chemistry of soil under long-continued field experiments. H. J. SNIDER (*J. Amer. Soc. Agron.*, 1934, **26**, 946—953).—Prolonged applications of superphosphate (I), basic slag (II), and rock phosphate (III) produced high reserves of PO_4 in surface soils without appreciable penetration into subsoils. After 27 years residual P from (III) had higher solubility than that from (I) or (II). Liming increased the solubility, especially with heavy applications on slagged soils. Neubauer vals. indicated that CaO depressed the availability of (III) and increased that of (I) and (II). CaO also depressed root-sol. K and replaceable K, and increased (slightly) the replaceable Mg. Total N and org. matter were maintained at higher levels by light than by heavy liming. Wheat yields reflected the solubility of P in unmanured plots. The P content of sweet clover was increased by CaO on plots receiving (I) and (II), but decreased on those receiving (III). A. G. P.

Cause of the fertilising action of brown coal. R. LIESKE and K. WINZER (*Brennstoff-Chem.*, 1935, **16**, 24—27).—The growth of *Tradescantia* in nutrient solutions was greatly stimulated by the addition of brown coal (I), or Na humate prepared therefrom, to the solution. Addition of (I) to soil increased the N_2 absorption from the air, presumably by facilitating the assimilation of the N_2 by the N-absorbing bacteria. The advantages of (I) and its preps., e.g., (I) saturated with NH_3 , as fertilisers are briefly discussed. A. B. M.

Absorption of nitrate- and ammonia-nitrogen by higher plants. P. DOPTER and (MLLE.) T. FRÉMONT (*Compt. rend.*, 1935, **200**, 170—172).—Maize plants germinated and grown in sterile soil are equally well nourished by NO_3 - or NH_3 -N, although the roots of the former type of plants are the more bulky. More NO_3 -N is absorbed than NH_3 -N, which contradicts experiments performed *in vitro*. J. L. D.

Effect of dicyanodiamide in calcium cyanamide [fertiliser]. L. SCHMITT (*Landw. Jahrb.*, 1934, **80**, 669—677).—In proportions examined (up to 1.5%) dicyanodiamide did not depress the manurial action of CaCN_2 on various types of soil. A. G. P.

Soil factors which prevent toxicity of calcium cyanamide. D. S. FINK (*J. Amer. Soc. Agron.*, 1934, **26**, 929—939).—Removal of CaCN_2 (I) from soil solutions results from adsorption by org. colloids (II), especially by those of high base capacity. The degree of saturation

of (II) by cations does not influence its adsorptive power for (I). Disappearance of (I) from solution is more rapid in acid soils, but the effect of p_{H} is small compared with that of the (II) content. In mineral soils removal of (I) is effected rapidly by Fe oxide and by activated C (III). (I) cannot be leached from (III) except after transformation into urea. Mixtures (1:1) of (I) and (III) had no injurious effect on seed germination in sand cultures. A. G. P.

Nitrifying power, glucose-decomposing power, and productivity in different soil types. S. E. JACOBS (*J. Roy. Hort. Soc.*, 1934, **59**, 274—278).—Productivity (I) of soils examined was paralleled by their ability to produce CO_2 when treated with 0.5% of glucose. There was no similarity between (I) and nitrifying power. A. G. P.

Carbohydrate metabolism of plants. M. NURMIA (*Suomen Kem.*, 1933, **8**, B, 2—3).—In starch-depleted leaves of grasses and legumes glucose and fructose absorbed from aq. solutions by stems are interconvertible within the plant. The distribution of invertase in stems and leaves indicate that glucose is the primary product of photosynthesis and that sucrose formation begins when the hexoses reach the vascular system of the plant. A. G. P.

Zonation for fertiliser requirements in the northern prairies. J. H. ELLIS (*Sci. Agric.*, 1934, **15**, 96—109).—Particular areas of prairie showed characteristic responses to the principal fertilisers. Drilling fertilisers below the seed was notably beneficial. A. G. P.

Seed yields of Rhode Island colonial bent (*Agrostis tenuis*, Sibth) as influenced by fertiliser applied. H. F. A. NORTH and T. E. ODLAND (*J. Amer. Soc. Agron.*, 1934, **26**, 939—945).—Seed yields were increased by N fertilisers and decreased when proportions of K and P added were relatively high. The period of maturity and wt. per bushel of seed were not appreciably altered by fertiliser treatment. A. G. P.

Relation between total calcium and phosphorus in mature prairie grass and available plant food in the soil. H. A. DANIEL and H. J. HARPER (*J. Amer. Soc. Agron.*, 1934, **26**, 986—992).—The Ca and P content of the crop is not a reliable index of the availability of these nutrients in the soil. The H_2O content of the soil during the actively growing season is an important factor concerned. A. G. P.

Influence of manuring on wheat quality. C. PFAFF (*Angew. Chem.*, 1935, **48**, 89—92).—Results of field trials are recorded showing the effect of manurial applications on the physical properties, chemical composition, and baking val. of wheat. A. G. P.

Effect of some forms of nitrogen on the growth and nitrogen content of wheat and rice plants. G. THELIN and A. B. BEAUMONT (*J. Amer. Soc. Agron.*, 1934, **26**, 1012—1017).—Rice (I) assimilated $(\text{NH}_4)_2\text{SO}_4$ (II) more readily than did wheat (III). Both cereals absorbed (II) more easily in the early than in later stages of growth. Max. yields were obtained with NO_3 -N : NH_3 -N ratios of 3:1 in all stages, except that urea gave best results for (III) in the second stage.

(II) toxicity was more marked in (III) than in (I), and increased with the age of plants. (I) has a higher Fe requirement than (III). A. G. P.

Growth of cereals, especially barley. W. HOFFMANN (*Angew. Bot.*, 1934, **16**, 396—424).—The growth of barley is examined in relation to the rate of ripening of the seed grain. No relationship was apparent between the catalase activity and either the maturity of seed or its germinating power. A. G. P.

Effect of chemical treatments of seed maize on stand and yield in Kansas. L. E. MELCHERS and A. M. BRUNSON (*J. Amer. Soc. Agron.*, 1934, **26**, 909—917).—None of the seed disinfectants examined stimulated germination or improved yield or quality of the crop. A. G. P.

Nature and diagnosis of non-parasitic diseases of agricultural crops, with special reference to symptoms of potash starvation. M. KLINKOWSKI (*Ernähr. Pflanze*, 1935, **31**, 21—29).—Data for a no. of crop plants are recorded and discussed. A. G. P.

Ensilage of lucerne with various phosphoric-hydrochloric acid mixtures. G. RUSCHMANN and L. DUNCKER (*Landw. Jahrb.*, 1934, **80**, 497—520).—Best results were obtained by use of H_3PO_4 (63%)—HCl (37%) mixtures, suitably diluted. A. G. P.

Practicability and after-effects of lucerne cutting. E. KLAPP (*Landw. Jahrb.*, 1934, **80**, 591—610).—The effects of repeated cutting at varying intervals on the total yield, nutrient val., and overwintering growth of lucerne are recorded. A. G. P.

Chemical treatments for shortening the rest period in tubers of Jerusalem artichoke. C. E. STEINBAUER (*Proc. Amer. Soc. Hort. Sci.*, 1933, **30**, 475—479).—Solutions of EtOH, $CS(NH_2)_2$, $CH_2Cl \cdot CH_2 \cdot OH$, and vapour of CS_2 were effective without deleterious effects. CH. ABS. (p)

Fertilisation of beet and soil-phosphate investigations. O. SPENGLER (*Deut. Zuckerind.*, 1934, **59**, 941—942; *Internat. Sugar J.*, 1935, **37**, 70).—Over-fertilising with N and K in the field may increase the yield, but this advantage may be nullified by a poor recovery in the factory. In the case of H_3PO_4 , however, an excess does not involve any factory difficulties. A test is described for showing how much P_2O_5 will be rendered insol. on being added to soils. The amount necessary to add to provide the crop with an available excess may be far in excess of that indicated by the Dirks or Naubauer tests, which should therefore not be relied on unless the soil is known to be free from phosphate-fixing constituents. J. P. O.

Importance of growth conditions on evaluation of beet varieties. J. PÁZLER (*Z. Zuckerind. Czechoslov.*, 1935, **59**, 161—168, 169—172).—As the result of experiments on the growth of five different varieties of beet in four different districts in three different seasons, the sugar content was observed to vary from 20·37 to 20·60% and the sugar yield from 23 to 29 cwt. per acre. J. P. O.

Influence of soil factors on growth of certain vegetables. F. V. DARBISHIRE and M. A. H. TINCKER

(*J. Roy. Hort. Soc.*, 1934, **59**, 251—273).—Data are recorded showing the growth and nutrient intake of different vegetables in, and the H_2O relationships of, various soil types. A. G. P.

Dormancy in *Tilia* seed. J. N. SPAETH (*Cornell Univ. Agric. Exp. Sta. Mem.*, 1934, No. 169, 78 pp.).—Effects of mechanical and acid treatment, of stimulatory substances, and of storage conditions on the germination of *Tilia* seeds are examined. A. G. P.

Nutritional studies with chrysanthemums. H. HILL, M. B. DAVIES, and F. B. JOHNSON (*Sci. Agric.*, 1934, **15**, 110—125).—Effects of nutrients on growth and flowering are examined. A generous K supply with a suitable K : N ratio (I) (approx. 2 : 1) are important for healthy growth and good bloom colour. A correlation exists between (I) and the K, Ca, Mg, and P contents of the plant ash. Antagonistic effects between K and P in nutrition are recorded. High supplies of N result in high accumulations of NO_3^- in stems at the expense of foliage. Narrow (I) in nutrient media is essential for efficient translocation of N. A. G. P.

Storage of gladiolus corms and cormels. E. C. VOLZ (*Rept. Agric. Res. Iowa Agric. Exp. Sta.*, 1932, 96).—Respiratory activity in corms commenced immediately after removal from soil. During storage the sugar content increases and starch decreases. Accumulation of reducing sugars at low temp. is associated with decreased respiration. The N fractions are not appreciably altered by storage. CH. ABS. (p)

Toxicity of normal aliphatic alcohols. I. R. D. GIBBS (*Amer. J. Bot.*, 1934, **21**, 645—650).—When added to H_2O cultures of 4 species of plants the toxicity (I) of the alcohols increased as the series was ascended, up to $C_{11}H_{23} \cdot OH$. Higher members were inactive owing to insolubility. Surface tension and (I) were closely related. Lower members stimulated and higher members depressed the respiration of yeast. A. G. P.

Nicotine kills codling moths. W. S. HOUGH (*J. Econ. Entom.*, 1934, **28**, 1102—1103).—Codling moth is killed by free but not by fixed nicotine (as sulphate or adsorbed on bentonite). A. G. P.

Position of nicotine in codling-moth control. R. L. WEBSTER and J. MARSHALL (*J. Econ. Entom.*, 1934, **28**, 873—878).—In late cover sprays the efficiency of nicotine sulphate was < that of nicotine-oil preps. and < that of Pb arsenate. A. G. P.

Comparison of arsenicals, arsenicals with oil, and several nicotine compounds used against the codling moth. B. F. DRIGGERS and B. B. PEPPER (*J. Econ. Entom.*, 1934, **27**, 249—258).—Nicotine tannate-bentonite-S produced more clean fruit than did any arsenate preps. A. G. P.

Recent developments in oil sprays. I. H. KNIGHT. II. C. R. CLEVELAND (*J. Econ. Entom.*, 1934, **27**, 269—289).—Physical properties of spray oils are modified by incorporation of sol. fatty acid glycerides, OH-acid esters of high mol. wt., and certain salts containing multivalent cations. The influence of these solutes on the amount of oil deposited, on penetration, and on persistence of sprays is examined. Data are given for

field trials in which glyceryl oleate and Al naphthenate improved the efficiency of oil sprays against codling moth and pear psylla. A. G. P.

Control of mealy bugs and other resistant insects on hardy plants with a completely refined petroleum distillate. J. M. GINSBURG (J. Econ. Entom., 1934, 27, 1186—1188).—A no. of greenhouse plants were sprayed with or dipped in a petroleum fraction [b.p. 188—254°, η (Saybolt) 30 at 37.8°, unsulphonatable residue 98%] without injury. Mealy bugs were completely controlled. Contact of oil with roots must be avoided. A. G. P.

Use of oil in grasshopper baits. J. R. PARKER, R. L. SHOTWELL, and F. A. MORTON (J. Econ. Entom., 1934, 27, 89—96).—Incorporation of mineral or vegetable oil with bran poison baits prevents drying out in the field, facilitates distribution, and improves storage qualities. A. G. P.

Kerosene against apple-maggot pupæ. O. H. HAMMER (J. Econ. Entom., 1934, 27, 291—292).—Successful results are recorded of applications to soil of clay emulsions of kerosene alone or containing $C_{10}H_8$ or $p-C_6H_4Cl_2$. A. G. P.

Control of the cherry case-bearer (*Coleophora pruniella*, Clem.) in Wisconsin. J. H. LILLY and C. L. FLUKE (J. Econ. Entom., 1934, 27, 1142—1147).—Autumn applications of CaO-S gave satisfactory control which was not improved by addition to the spray of Pb arsenate or blood-albumin. For cold-mixed oil emulsions oils of low η are preferable. Miscible oils were rather less effective. A. G. P.

Fumigation experiments with California red scale under orchard conditions. W. MOORE (J. Econ. Entom., 1934, 28, 1042—1055).—The % kill (I) by HCN in the summer declines as the temp. rises. In winter fumigation (I) is lowered when R.H. becomes < 50%. Difficulty in killing red scale is not due to an acquired tolerance of HCN. A. G. P.

Temperature and humidity in relation to hydrocyanic acid fumigation for red scale. H. J. QUAYLE and P. W. ROHRBAUGH (J. Econ. Entom., 1934, 28, 1083—1095).—In the range 10—32° the % kill by HCN was not affected by temp. of fumigation (I), but was markedly affected by the temp. range to which the insects were subjected prior to (I). In general, conditioning at low temp. produced a higher kill. Variations in R.H. between 50 and 80% had little influence, but at vals. > 85% (I) was less successful. At R.H. 70%, injury to plants was greater when they were preconditioned and fumigated at low than at high temp. Rooted cuttings suffered greater HCN injury in dry than in moist soils. A. G. P.

Copper analysis of foliage sprayed with cuprous oxide. L. L. ISENHOUR and J. G. HORSFALL (Phytopath., 1934, 24, 1383).— Cu_2O cannot be removed from sprayed foliage with the customary 0.2% HNO_3 . Addition of 1% of H_2O_2 (30%) to the HNO_3 permits removal of all Cu after 30 min. immersion. A. G. P.

Control of onion thrips. F. B. MAUGHAN (J. Econ. Entom., 1934, 27, 109—112).—Undiluted chipped $C_{10}H_8$ or $C_{10}H_8-Ca(OH)_2$ dust is effective. A. G. P.

Life history and control of the potato flea-beetle (*Epitrix cucumeris*, Harris) on the eastern shore of Virginia. L. D. ANDERSON and H. G. WALKER (J. Econ. Entom., 1934, 27, 102—106).—In comparative trials Bordeaux mixture-arsenate preps. were the most successful. Derris also gave good results. A. G. P.

Difference in action of derris and pyrethrum against the imported cabbage worm shown by experiments with gelatin films containing these materials. M. C. SWINGLE (J. Econ. Entom., 1934, 28, 1101—1102).—Larvæ were rapidly killed when fed on derris (I) in gelatin, but were unaffected by pyrethrum (II). By contact (II) killed rapidly, but (I) had little or no action. A. G. P.

Method of evaluation of growth curves applied to the development of three breeds of alpine cattle. F. REINHOLD and R. SCHULZE (Landw. Jahrb., 1934, 80, 459—495).—Mathematical. A. G. P.

Control of the northern fowl mite. W. E. WHITEHEAD and W. A. MAW (Sci. Agric., 1934, 15, 126).—A 2:1 mixture of petroleum jelly and $C_{10}H_8$ is applied to the birds and to perches etc. A. G. P.

Fumigation for European earwig (*Forficula auricularia*, Linn.) in balled nursery stock. J. B. STEINWEDEN (J. Econ. Entom., 1934, 28, 919—923).—Vac. fumigation with HCN was impracticable owing to root injury. Dusting individual roots with $Ca(CN)_2$ gave satisfactory control. A. G. P.

Thermo-phosphates. Determining H_3PO_4 .—See VII. Analysis of pyrethrum products.—See XX.

See also A., Mar., 409, PhOH derivatives as fungicides. 419, Effects of I on tomato plants. 422, Absorption of Ge by plants.

PATENTS.

Fertiliser containing phosphorus, nitrogen, and potassium compounds. C. J. HANSEN, ASSR. to KOPPERS CO. OF DELAWARE (U.S.P. 1,949,715, 6.3.34. Appl., 11.9.31. Ger., 12.9.30).—Claim is made for a mixture of dry $NH_4H_2PO_4$, dry $(NH_4)_2SO_4$, and commercial hygroscopic KCl (containing, e.g., a little $MgCl_2$ or $CaCl_2$); after grinding, a dry, non-hygroscopic powder is obtained. A. R. P.

[Manufacture of] insecticides. IMPERIAL CHEM. INDUSTRIES, LTD., and F. L. SHARP (B.P. 423,504, 4.7.33).— $BaSiF_6$ is milled with a dispersing agent (sulphonated $CH_2O-C_{10}H_8$ condensation products), glue, a quaternary NH_4 salt having a chain of $\leq 10C$ (cetylpyridinium bromide), and H_2O . H. A. P.

Sulphur preparations for use as insecticides, fungicides, and ovides. R. C. MCQUISTON (B.P. 420,068, 24.2.33. U.S., 17.12.32).—Solutions of S in CS_2 , S_2Cl_2 , $C_{10}H_8$, PhMe, or C_2HCl_3 are emulsified with solutions obtained by saponifying a fatty acid or oil with KOH in EtOH or $N(C_2H_4OH)_3$. A. R. P.

Agents for disinfecting seeds. FAHLBERG-LIST A.-G. CHEM. FABRIKEN, and K. MEMMINGER (B.P. 416,364, 8.1.34).—Claim is made for a mixture of an insol. Ph-Hg cyanide and a trialkali phosphate, with or without an alkali *p*-toluenesulphonate and an inert diluent, e.g., Na_2SO_4 or NaCl. A. R. P.

Cyanamide seed disinfectant. V. MIGRDIKHIAN and J. L. HORSFALL, Assrs. to AMER. CYANAMID CO. (U.S.P. 1,949,485, 6.3.34. Appl., 5.9.30).—Claim is made for a mixture of a Pb, Zn, Cd, Hg, Bi, or Fe salt of phenylcyanamide, with or without a small amount of a Pb salt of a dialkyl dithiophosphate, e.g., Zn phenylcyanamide 10, Pb diethyldithiophosphate 5, and talc 85%. A. R. P.

XVII.—SUGARS; STARCHES; GUMS.

Treatment of boiler feed-water for oil elimination in cane-sugar factories. J. F. BÖGTSTRA (Arch. Suikerind. Nederl.-Indië, 1934, Meded. No. 20, 715—788; Internat. Sugar J., 1935, 37, 62—63).—Oily condensate on coming in contact with rust on the heating surfaces of the boiler (*B*) forms a strongly insulating layer capable of causing local superheating. A filter is described for the separation of the oil from such H₂O consisting of 4 compartments, 3 of which are overflow tanks, and the fourth is a bagasse filter. Pure condensate should not be used for feeding. Often the addition to the oily condensate feed-H₂O of only 1% of well H₂O or 2% of clear river H₂O has been found to prevent the formation of harmful smear in *B*. J. P. O.

Spoilage of wet beet pulp. ANON. (Centr. Zuckerind., 1934, 42, 841—842; Internat. Sugar J., 1935, 37, 72).—Wet beet pulp which has been transported a long distance arrived at its destination in a more or less spoiled condition. It was, however, found that too high a temp. in the diffusers had adversely affected the physical structure of the pulp. By lowering this, and avoiding the use of condenser H₂O for flushing the pulp from the battery, using clean H₂O in its place, it was found possible to transport the material a considerable distance without notable spoilage. J. P. O.

Removal of non-sugars in raw cane juice clarification. P. HONIG (Arch. Suikerind. Nederl.-Indië, 1934, Meded. 14, 561—586; Internat. Sugar J., 1935, 37, 63—64).—Raw sugars produced in cane- and beet-sugar factories behave quite differently in the refining process. Though the total ash content of raw beet sugars is higher, it is less troublesome to remove. On the other hand, in raw cane sugars there are present certain non-sugars which cause difficulty in working, as wax, and "gums and pectins" to a hardly less extent. Beet juices demand a thorough clarifying process, such as carbonatation, as they contain a greater proportion of colloidal N than do cane juices (*C*). In *C* the impurities eliminated in clarification are mostly inorg. SiO₂, e.g., may be present in *C* to the extent of 400—700 mg. per litre. J. P. O.

Filtration test for indicating the quality of pre-limed, limed, or carbonated beet juices. ANON. (Internat. Sugar J., 1935, 37, 66).—A simple funnel filtration test is described, which is stated to give results parallel with those obtained in the factory filter-presses. It is particularly useful for controlling the quality of the juice resulting from pre-liming. J. P. O.

Influence of carbonatation scums passing the first presses on the colour of the [sugar] juice. V. STANĚK and P. PAVLAS (Z. Zuckerind. Czechoslov.,

1935, 59, 85—190).—If only 0.1% of carbonatation scums escapes through the first filter-presses it may exert a harmful effect on the colour of the juice during the second carbonatation, though all juices do not behave equally in this respect. Karlik triple saturation, however, provides a means of avoiding discoloration due to this cause during the subsequent evaporation. J. P. O.

Fall of alkalinity of beet juice during processing. J. HAMOUS (Z. Zuckerind. Czechoslov., 1935, 59, 208).—A simple laboratory procedure is described for finding the amount of Na₂CO₃ which should be added to counteract the fall of alkalinity (*A*) occurring during the evaporation of the juice. Often in practice, the addition is made to the mixers, but the juice after the second carbonatation would be a better place, where it is more fully utilised. If the sugar is to be stored for several months, the *A* of the thick-juice should be \leq 0.025—0.030% CaO. J. P. O.

Determination of potash in [sugar] juice and molasses. V. OLIVIER (Internat. Sugar J., 1943, 37, 75—76).—An adaptation of the cobaltinitrite method is described, using a centrifuge for the separation of the ppt., which is well suited to routine work and is stated to give results showing a close agreement with those given by the gravimetric platinichloride process. J. P. O.

Determination of sugar in bagasse. E. HADDON (Rev. agric., 1934, No. 77, 168—169; Internat. Sugar J., 1935, 37, 77).—When bagasse is boiled with H₂O xylan is hydrolysed in the acid medium to xylose, which is dextrorotatory, and therefore increases the polarisation beyond the normal. In an official method, 1 g. of Na₂CO₃ is added to prevent hydrolysis of the cane gum, but the author points out that this precaution is inadequate as the extract soon becomes acid. He recommends that the extraction be done in presence of an excess of Ba(OH)₂, so that throughout an alkaline condition is maintained. J. P. O.

Control of the working of the evaporating plant [of sugar factories]. V. SÁZAVSKÝ and K. ŠANDERA (Z. Zuckerind. Czechoslov., 1935, 59, 233—240).—Data such as the evaporation %, juice concn., heat transmission, steam and vapour temp., and temp. fall were recorded in the case of three factory plants, and the use of such information in assessing the efficiency of evaporation plant was discussed. J. P. O.

Heat losses in sugar-factory evaporators. K. ŠANDERA (Z. Zuckerind., Czechoslov., 1935, 59, 193—198, 201—204).—Heat losses through surfaces of evaporator (*E*) bodies and steam-pipes were measured by means of Schmidt's electrical apparatus, the vals. being found to vary between 66 and 177 kg.-cal. sq. m./hr. from kieselguhr-lagged surfaces. Of the total heat consumed by the *E*, about 0.25% passes through the lagging of the bodies, and about 2% through the vapour lines if fully lagged, or 1% if 5% of the surface remains unlagged. Covering the surfaces with Al paint is capable of reducing the heat losses by 10% for lagged and by 25% for unlagged surfaces. J. P. O.

Detecting small amounts of invert sugar in presence of sucrose. V. MORGENSTEIN (Centr. Zuck-

erind., 1934, 42, 824—825; Internat. Sugar J., 1935, 37, 72).—To detect small amounts of invert sugar in presence of much sucrose, 20 c.c. of the sugar solution containing 0.1—0.15 g. of glycine are mixed with 20 c.c. of Barfoed's reagent (with only 0.5% of AcOH) containing 2 g. of NaOAc. This mixture is warmed for 5 min. in a boiling H₂O-bath. J. P. O.

Table for use in the determination of reducing sugars by Luff's copper-test solution. K. D. DEKKER (Arch. Suikerind. Nederl.-Indië, 1934, I, 42, 629—632; Internat. Sugar J., 1935, 37, 64).—A new table has now been compiled for the calculation of results according to this method, beginning with 0.1 c.c. of Na₂S₂O₃ and proceeding in tenths to 16.0 c.c., with the corresponding amounts of invert sugar in absence of sucrose, as well as in presence of 1.25, 2.5, and 5.0 g. of it.

J. P. O.

Importance of controlling the affining qualities of raw [beet] sugars. A. DOLINEK (Z. Zuckerind. Czechoslov., 1935, 59, 172—176).—Results of the determination of the affination no., by the electrical conductivity method described previously (cf. B., 1934, 855), in 12 different factories show the necessity of greater care in boiling and crystallising as a means of improving the affining quality of raw beet sugar. J. P. O.

Melting point of sucrose. K. ŠANDERA and A. MİRČEV (Z. Zuckerind. Czechoslov., 1935, 59, 204—208).—In amplification of their previous communication on this subject (B., 1934, 421), the authors now estimate the influence on the m.p. of sucrose of the initial temp. and the rate of heating. Differences of 20° may result from the variation of these influences. J. P. O.

Preparation of crystalline xylose from sunflower-seed husks. E. Z. PLIUSCHKIN and N. M. TSCHEPVERIKOV (J. Appl. Chem. Russ., 1934, 7, 1008—1028).—The pentosan of sunflower-seed husks (I) is xylosan. (I) are extracted at 120° for 2 hr. with H₂O containing 0.75 g. of H₂SO₄ per 100 g. of (I), the residue is hydrolysed with 1% H₂SO₄ at 125° for 2 hr., or with 0.5% H₂SO₄ at 150° for 10 min., the solution decolorised with active C, NaOH added to *p*_H 2.8—3.0, and the solution evaporated to a concn. of 70% of xylose, which crystallises out on cooling [yield: 16% of the wt. of (I) taken]. R. T.

Separation of sugar dust from air. Arch. Suikerind. Nederl.-Indië, 1934, Meded. No. 18, 647—672; Internat. Sugar J., 1935, 37, 62).—A simple form of "pipe" filter for dealing with the dust in the air drawn from the sugar dryers is described. Assuming a dryer capacity of 7½ tons/hr. and a cloud density of 3 g./cu. m., then an apparatus having 100 pipes, each 3 m. high and 200 mm. diam., will be required in it.

J. P. O.

Present position of the Scholler (Tornesch) procedure for saccharification of cellulosic substances. O. SCHAAL (Cellulosechem., 1935, 16, 7—10; cf. B., 1932, 745).—A percolator with a capacity of 10 tons of wood has now been built, and the total capacity of the plant is 30 tons per day. It is preferable to add the acid in 10 batches rather than continuously. The yield of sugar is > 50% of theory and that of EtOH

20—24 litres. If oak be used the tannin can be previously extracted in the percolator with hot H₂O.

A. G.

Determination of starch in flour by-products. P. NOTTIN and E. DARTOIS (Ann. Falsif., 1934, 27, 595—600).—Hydrolysis (H) with HCl must be carried out within narrow limits of [HCl] otherwise H is incomplete or glucose is destroyed. H with H₂SO₄ (1 vol.-%) at 115—120° is to be preferred. With this modification, the method of Arpin and Delarouzeé (*ibid.*, 1926, 19, 411) gives satisfactory results.

E. C. S.

Identification reactions of gum arabic. I. C. RITSEMA (Pharm. Weekblad, 1934, 72, 105—106).—5% solutions of gum arabic give the following tests: brown gel with FeCl₃, colourless gel with borax, white ppt. with EtOH, ppt. with basic Pb acetate (sensitive to 1:10,000), peroxidase test with benzidine and H₂O₂.

S. C.

Carbohydrates in plants. Beet.—See XVI. Sugar-beet protopectin.—See XIX.

See also A., Mar., 327, **Prep. of trihydroxyglutaric acid from xylose.** 329, **Determination of sugars.**

PATENTS.

Purification of sugar juices. J. P. FOSTER (U.S.P. 1,954,566, 10.4.34. Appl., 8.7.30).—Raw cane (or beet) juice is limed in the cold (> 50°) to a high alkalinity, e.g., *p*_H 14, and the ppt. formed is separated as a mud in a centrifugal separator, e.g., of the Kopke type, the clear juice from which may then be carbonated once or twice (e.g., first to *p*_H 8.5 and then to neutrality), filtered, decolorised if necessary, and evaporated as usual. The mud from the centrifuge is diluted and partly neutralised, e.g., to *p*_H 10.5, with SO₂ or CO₂ to decompose Ca-sugar compounds without redissolving non-sugars, and is then centrifuged again or filtered, yielding a mud, which is rejected, and a clear juice, which is mixed with that from the first centrifuge.

J. H. L.

Treatment [electrolytic purification] of sugar-containing liquids. A. LIMA, JUN. (U.S.P. 1,953,653, 3.4.34. Appl., 19.5.30).—Sugar liquors containing about 5% of finely-powdered bone char are subjected at < 100° for about 45 min. to electrolytic action by means of multiple pairs of Al electrodes, and the char and pptd. impurities are then separated by subsidence.

J. H. L.

Production of β-lactose. G. C. SUPPLEE and G. E. FLANIGAN, Assrs. to DRY MILK CO., INC. (U.S.P. 1,954,602, 10.4.34. Appl., 11.1.34).—Hot lactose (I) solutions, in which most of the (I) is in the β-form (II) (cf. U.S.P. 1,810,682; B., 1932, 1101), are rapidly concn. on steam-heated rollers (e.g., at 130—140°) and removed therefrom by scrapers, as a stiff syrupy film, the temp. and H₂O content of which are such as to permit almost complete crystallisation of the (I) as (II) during the very short time required for the detached film to become sensibly dry at the expense of its own heat.

J. H. L.

Manufacture of soluble starch. DUINTJER WILKENS MEIUIZEN & Co. N.V., Asses. of J. H. VAN DER MEULEN (B.P. 420,275, 3.5.34. Ger., 5.5.33).—Sol.

starch yielding solutions of any desired fluidity is made by the joint action of hypochlorites (and/or hypobromites) and NH_3 or other bases containing N, on aq. suspensions of raw starch at room temp. J. H. L.

XVIII.—FERMENTATION INDUSTRIES.

Micro-chemical study of synthetic sweetening materials. II. Dulcin. V. STANĚK and P. PAVLAS (Mikrochem., 1935, 17, 22—28).—Dulcin (I) may be detected, *e.g.*, in beer, by extraction with EtOAc under conditions which are detailed, followed by treatment with PbO and then with $\text{Hg}(\text{NO}_3)_2$ and $\text{Ce}(\text{OAc})_2$. In presence of (I) a violet colour is produced which fades in aq. solution but remains fixed on addition of 1—3 drops of $\text{CH}_2\text{Ph}\cdot\text{OH}$. When (I) is warmed with a saturated solution of KNO_3 in AcOH , a very intense yellow colour is produced. Data are given for the solubility of (I) in H_2O and org. solvents. J. W. S.

Determination of the coloration of liquids. Application to wines. A. FAURE and R. PALLU (Ann. Falsif., 1935, 28, 5—9).—The absorption of blue light is determined photometrically. E. C. S.

Determination of volatile acidity of wines. L. FERRÉ and P. ARCHINARD (Ann. Falsif., 1935, 28, 9—15; cf. B., 1933, 729; 1935, 203).—The Cazenave-Ferré method is modified by maintaining const. vol. in the distillation flask and by passing the vapour through traps to remove most of the lactic and salicylic acids. Results must be corr. for both free and combined SO_2 . E. C. S.

Determination of aldehydes in wine with the Pulfrich photometer and with the photo-electric colorimeter. C. TARANTOLA (Annali Chim. Appl., 1934, 24, 615—625).—The colorimetric determination should be made 15—25 min. after the addition of Schiff's reagent (2 c.c.) to 10 c.c. of the wine distillate, which should contain exactly 50% EtOH . Both methods give concordant results, with an accuracy of 0.2—0.3 mg. of aldehyde per litre. O. J. W.

Silicofluorides and wines. H. FABRE and E. BRÉMOND (Ann. Falsif., 1934, 27, 453—466).—Addition of 0.050 g. of BaSiF_6 (I) or of 0.033 g. of Na_2SiF_6 (II) per litre of must gives a positive reaction for F in 20 c.c. of must or wine by the Blarez modification of the glass-etching test. The use of these compounds as insecticides may introduce a max. quantity of 2 g./litre, and a figure in excess of the normal val. for wine (0.005 g. of F/litre) may therefore not necessarily be due to the fraudulent addition of a preservative. EtOH fermentation is noticeably inhibited by addition of > 0.033 g. of (I) per litre and is completely arrested after 20—30 days, or after 7—10 days with an equiv. quantity of (II). J. G.

Loss of alcohol on storing spirits in bottle. C. LUCKOW (Z. Spiritusind., 1935, 58, 10—11, 16, 18—19).—Representative types of potable alcoholic liquors suffered no loss in EtOH when stored for 6 months (at room temp.) in bottles closed with corks and capsules. If the opened bottles (half full) were sealed with a new cork, EtOH losses in 3 months (0.1% EtOH) were within the limits

of experimental error, but the loss was significantly greater (0.3%) if the old bored cork (I) was replaced. With the use of a "pouret" (II), the average loss was 0.65% in 1 month, 2.05% in 3 months. With bottles immersed during the daytime in ice- H_2O , the losses with (I) were reduced appreciably, and with (II) considerably. There was no relationship between EtOH or extract content and EtOH loss. I. A. P.

Vinegar under the quartz lamp. E. J. KRAUS (Deuts. Essigind., 1934, 38, 140; Chem. Zentr., 1934, ii, 2004).—Vinegar (I) samples of different origin show characteristic fluorescence effects in ultra-violet light [table (I) (3.5—7.5%), bright or red brown; triple (I) (12.2%), matt-white; wine (I) (7.5%), strong blue; aromatic (I) (10%), blue-grey]. The differences are more marked on shaking the (I) with EtOH and $\text{C}_5\text{H}_{11}\cdot\text{OH}$. The detection of adulterants is described. H. J. E.

See also A., Mar., 401, Stabilisation of carboxylase solutions.

PATENTS.

Aëration of fermentation liquids in production of bakers' yeast. NORDEUTS. HEFEIND. A.-G. (B.P. 423,331, 26.9.33. Ger., 26.9.32).—A spiral and horizontal streaming motion is given to the liquid by mechanical means, thus lengthening considerably the travel of air introduced by the movement or otherwise (*e.g.*, by air conduit). Air and power consumption are thus decreased, and the necessary apparatus (described and figured) can be readily cleaned. I. A. P.

Swelling of albuminous (etc.) substances.—See XIX.

XIX.—FOODS.

Action of proteolytic enzymes on wheat flour. R. GEOFFREY and G. LABOUR (Bull. Soc. Chim. biol., 1934, 16, 1625—1630).—Determinations of the NH_2 -acids and total N in the filtrates from aq. suspensions of flours which are kept at 35° show that proteolysis (I) occurs to a very small extent, the flour from the centre of the wheat being less active than that from the periphery. (I) is much increased when bakers' yeast, papain, trypsin, and pepsin are added separately to the flour suspensions. A. L.

Determination of the baking value of wheat. P. BARBADE (Ann. Falsif., 1934, 27, 476—485).—The requirements of a mill and method of procedure which gives a flour similar to that obtainable in industrial practice from the same sample of wheat are described. J. G.

Rôle of lactic acid in the conversion of rye proteins. J. RERUP (Z. ges. Getr. Mühlen- u. Bäckereiw., 1933, 20, 256—257; Chem. Zentr., 1934, ii, 2005).—Rye-flour (I) dough stiffens more rapidly on addition of lactic acid (II). The quality of (I) depends in part on its ability to form (II) by fermentation. H. J. E.

Rapid Kjeldahl determination of nitrogen and of total proteins in flour-mill products. R. GUILLEMET and C. SCHELL (Bull. Soc. Chim. biol., 1934, 16, 1631—1636).—The technique of a micro-method is described. A. L.

Calcium carbonate as a weevil control. E. R. DE ONG (*J. Econ. Entom.*, 1934, **27**, 1131—1132).—Small amounts of CaCO_3 used in milling protect rice from weevil injury. A. G. P.

Cheeses incorporating *Penicillium glaucum*. F. CORMINBOEUF (*Canad. Chem. Met.*, 1934, **18**, 180—181).—A method is described for the direct determination of the heat of bromination (I) of the fat of cheese (II) without extraction. I vals. (III) calc. from (I) agree with observed (III). The % of H_2O , protein, fat, ash, acidity (volatile, free, and combined), lactic acid, and NH_3 (free and combined), and (I) and (III) of the fat, of Grove City, Roquefort, Gorgonzola, and Stilton (II) are given. E. C. S.

Utilisation of calcium and phosphorus from varied forms of milk and products. M. M. KRAMER and R. MCCAMMON (*Kansas Agric. Exp. Stat.*, 6th Biennial Rept., 1932, 114—115).—Cheddar cheese contains 10 times the % of Ca and twice the % of P of soft cheeses. The P content varies according to the amount of protein present, and that of Ca with the method of manufacture. The % of Ca and P is similar in rennet and acid-types of cottage cheese. Of the Ca and P in the milk, soft cheeses retain 20 and 37%, and cheddars 80 and 38%, respectively. CH. ABS. (p)

"Rouge des tablards." [Red discoloration of cheese in store.] J. KEILLING (*Ann. Falsif.*, 1934, **27**, 600—602).—The discoloration is due to NO_2 following contamination with NO_3 from H_2O dripping from the ceiling. E. C. S.

Standardisation of yoghurt testing. G. P. ALIVISATOS and D. ARVANITIS (*Praktika*, 1933, **8**, 147—156; *Chem. Zentr.*, 1934, ii, 2005).—Data for the grading of yoghurt from its fat content are discussed. H. J. E.

Analysis and composition of meat of domestic fowl. R. HOLCOMB (*Canad. Chem. Met.*, 1934, **18**, 182).—The % of H_2O , protein, fat, and ash of the combined edible portions (less the viscera) of chickens varied widely in spite of uniformity in age [and breed?]. Digestion with HCl is superior to other methods for the determination of fat. E. C. S.

Effect of meat-curing solutions on anaërobic bacteria. III. Sodium nitrite. F. W. TANNER and F. L. EVANS (*Zentr. Bakt. Par.*, 1934, **91**, II, 1—14; cf. A., 1934, 564).—Concns. of NaNO_2 usually present in cured meat are not, in themselves, sufficient to ensure freedom from spoilage organisms or toxins. Growth of *Clostridium botulinum* (I), *Cl. putrificum*, and *Cl. sporogenes* is inhibited by 0.58% of NaNO_2 and toxin formation in (I) by 0.49—0.58% in broth cultures, but not in egg-meat media or pork infusion. A. G. P.

Heat-resistant organisms in vegetable preserves. II. G. GUITTONNEAU, J. VARGOZ, and (MLLE.) C. DEGUY (*Ann. Falsif.*, 1934, **27**, 467—476; cf. B., 1933, 731).—Samples of preserved peas (p_{H} 6.1—6.2) containing heat-resistant organisms (I) were unchanged and apparently sterile after 6—11 months in a cellar at 12—14°, whilst storage in the laboratory at 17—30° produced deterioration accompanied by growth of (I).

Haricot beans (p_{H} 5.4—5.5) were unaffected in both cases, owing presumably to the protective effect of the medium (e.g., lower p_{H}). A rise of temp. (to 45—50°) after the storage period induced development of (I) in all four cases. J. G.

Cherry processing. I. Sulphur dioxide treatment, with special reference to a useful acid generator. F. E. ATKINSON and C. C. STRACHAN (*Fruit Products J.*, 1935, **14**, 136—137).—Cherries for use in making maraschino and fruit salad were tested for maturity by flotation in brine, and by determining n of the expressed juice. Bleaching was performed by a SO_2 -whiting mixture, the SO_2 being prepared in the specially designed plant described. Royal Ann cherries were used almost exclusively; Centennial, Yellow Spanish, and Oxheart cherries soften if allowed to ripen. Bings and Lamberts were satisfactory when picked while red. E. B. H.

Analysis of black- and red-currant residues of domestic and industrial origin. A. GUILLAUME and (MME.) J. ADNOT (*Ann. Falsif.*, 1935, **28**, 15—23).—The % of H_2O , ash, P_2O_5 , N, fat, glucose, and sucrose and the acidity of the residues after expression of the juice, and of the pips, are recorded. E. C. S.

Modification of the Kjeldahl-Pregl method of determining nitrogen, and its application to conserves. J. C. KOTLIAR (*Z. anal. Chem.*, 1935, **100**, 104—112).—Conserves etc. are rubbed in a mortar to uniform consistency, and 0.2—0.4 g. is weighed out in a glass capsule. The substance is ashed with 3 c.c. of H_2SO_4 , 30% H_2O_2 being added if necessary, the solution is made up to 50 c.c., and NH_3 in an aliquot portion distilled over in a (modified) Pregl apparatus into 0.01N- H_2SO_4 . J. S. A.

Effect of varying conditions of hydrolysis of protopectin on the yield of pectin hydrate. T. K. GAPONENKOV (*J. Appl. Chem. Russ.*, 1934, **7**, 1037—1045).—The yields of sol. pectins from apple and sugar-beet protopectins increase with the temp. and duration of heating with H_2O ; the process is accelerated by tartaric acid. R. T.

Microbiology of frozen food. II. Frozen fruits and vegetables (contd.). G. I. WALLACE and F. W. TANNER (*Fruit Products J.*, 1935, **14**, 145—147, 151; cf. B., 1934, 939).—The bacteriological examination of frozen canned corn and peas etc. is described. Variety (I), quality (II), and texture of the products studied and the effect of storage at different temp. are examined. (I) and (II) of fruit are important, but less so with vegetables, and sealing of the containers under vac. is most satisfactory. E. B. H.

Rapid determination of copper in foodstuffs by deposition on zinc. A. G. KOBLJANSKI (*J. Appl. Chem. Russ.*, 1934, **7**, 1081—1084).—3 ml. of conc. HCl and 0.1 g. of Zn dust are added per litre of product under examination, the Zn is collected 15 min. later, washed, and analysed for Cu according to Elvehjem and Lindow (A., 1929, 614). The method serves for determination of < 0.2 mg. of Cu per kg. R. T.

Control of processing of canned foods in California. J. R. ESTY (*Amer. J. Publ. Health*, 1935,

25, 165—170).—A system of supervision is described in consequence of which under-sterilisation of the products (*P*) becomes rare and only a small proportion of cans are placed under restraint to determine the effect of any errors in processing on the quality of *P*. C. J.

Physical and chemical methods of control of mineral waters. ARMAND and BLANQUET (Ann. Mines, 1934, [xiii], 5, 69—78; Chem. Zentr., 1934, ii, 2115).—Determinations of free CO₂ with Ba(OH)₂, of the alkalinity with 0.1N-H₂SO₄ (erythrosin indicator), and of the electrical conductivity are described. H. J. E.

Vitamin-A content of butter fat produced on maize and wheat rations. W. E. KRAUSS and C. F. MONROE (Ann. Rept. Ohio Agric. Exp. Sta., 1934, 65).—No difference in vitamin-A (I) potency of butter fat resulted from feeding maize or wheat rations. Maize silage was a better carrier of (I) than lucerne. CH. ABS. (p)

Manufacture, composition, and utilisation of dairy by-products for [animal] feed. M. R. COE (U.S. Dept. Agric. Circ., 1934, No. 329, 15 pp.).—Methods of analysis are described and the prep. and feeding vals. of the by-products recorded. A. G. P.

Enzymic destruction of the vitamin-A value of lucerne during the curing process. S. M. HAUGE (J. Biol. Chem., 1935, 108, 331—336).—If the plant enzymes (I) are destroyed, the vitamin-A (II) potency of the dried lucerne is very high. (I) are directly responsible for destruction of (II) during curing. H. G. R.

Determination of powdered linseed. A. H. SABER (Quart. J. Pharm., 1934, 7, 645—653).—The area of sclerenchymatous layer per g. of the defatted and powdered seeds (determined microscopically) is in good agreement with that obtained by direct measurement on unground seeds, and provides a reliable indication of the linseed content of mixed cakes. A. E. O.

Vegetable proteins in laying and breeding rations. C. L. MORGAN (Ann. Rept. S. Carolina Agric. Exp. Sta., 1933, 110—111).—Vegetable proteins (cottonseed, soya-bean, peanut) even when supplemented with minerals were less effective than was meat scrap for egg production. No difference in hatchability was observed. Eggs from hens receiving 20% of cottonseed meal showed discoloration of yolk and white during cold storage. CH. ABS. (p)

Toxicity of dyes.—See IV. **Determining NO₂' in pickling salt.**—See VII. **Cacao butters.**—See XII. **Casein in leather finishes.**—See XV. **Wheat quality.** See XVI. **Determining starch in flour by-products.**—See XVII. **Creamery and packing-house wastes.**—See XXIII.

See also A., Mar., 297, **Determining stability and type of [margarine] emulsions.** 360, **Micro-determination of caffeine.** 379, **Composition of ewe's milk.** 391, **Proteins (etc.) of mottled gram bean.** **Nutritive val. of locusts, quinoa, and Chinese oatmeal.**

PATENTS.

Tunnel oven for cooking products by indirect heating. V. SPINETTE (B.P. 423,102, 21.7.33. Belg., 22.7.32).—A tunnel oven for bread etc. is described. B. M. V.

Production of a preparation for rendering substances containing albumin or cellulose capable of swelling. C. W. HORTER and W. E. O. LEBUS (B.P. 423,532, 13.10.33).—*Saccharomyces* sp. (e.g., beer yeast) is dried in such a way that its enzyme activity is reduced to approx. 5% of the original val., and is mixed with nutrients, e.g., bran with or without mono- or poly-saccharides, diastatic materials, etc. The prep. (I) may be added to wheat or rye flour in the mill or before baking. Overleavening dangers are largely avoided, and flours rich in bran may be used. Dough yield is increased, and the quality of inferior flours and of the products is improved, whilst the baking period is reduced. (I) also accelerates the ripening of cheese, and facilitates malting, especially of hard barleys, if added to the steep. (I) may also be used for the decomp. of cellulosic materials, and in pharmaceutical and culinary albuminous preps. Substances which retard swelling (e.g., NaCl) may be added in some cases. I. A. P.

Treating liquids [milk].—See I. **Sterilisation.**—See XI. **Herring foodstuffs.**—See XII. **Plastics from vegetable waste.**—See XIII.

XX.—MEDICINAL SUBSTANCES; ESSENTIAL OILS.

Differentiation of methyl and benzyl salicylates [in pharmaceutical preparations]. E. ALEXIS (Ann. Falsif., 1934, 27, 486).—The CH₂Ph ester, which has a less unpleasant odour than the Me ester (I), and is used to replace it, dissolves readily on shaking with nutmeg butter (II), or with Rosen's liniment [which contains (II)], producing an amber colour; (I) produces a turbidity. CHCl₃ has no effect on the test. J. G.

Qualitative separation of antipyretics. K. REBER and A. BÜRGIN (Schweiz. Apoth.-Ztg., 1934, 72, 209—210; Chem. Zentr., 1934, ii, 1965).—Methods are given for the separation and identification of the components of mixtures of antipyrine, NHPAc, and caffeine (I), and of phenacetin, NPhMeAc, (I), and pyramidone. H. N. R.

Evaluation of ergot with the nephelometer. S. TUKATS (Pharm. Mh., 1933, 14, 246—247; Chem. Zentr., 1934, ii, 1965).—A nephelometric method, using Mayer's reagent, is described. H. N. R.

Analysis of products containing pyrethrum extract. J. RIPERT (Ann. Falsif., 1934, 27, 580—595; 1935, 28, 27—38; cf. B., 1932, 1048).—Alteration in composition during development and storage necessitates exact specification of the history of any given sample of pyrethrum (I) flowers. Free chrysanthemoid acid (*A*) and saturated and unsaturated fatty acids (*B*) are present. *B* affect analytical methods which are based on the properties of *A* or pyrethrol. A general method, applicable to all products containing (I) is described. The content of pyrethrins I in the plant = that of pyrethrins II. The presence of methylpyrethrolone is confirmed. E. C. S.

Essential oils. SCHIMMEL & Co. (Ber. Schimmel, 1934, 5—61; Chem. Zentr., 1934, ii, 2002).—Physical and chemical properties of the oils of the following plants are described: *Achillea filipendulina*; *Ailanthus glandulosa*; *Artemisia arenaria*, *A. caspia*, var. *citriodora*, and *A. maritima*, var. *Kazakewicz*; *Chenopodium botrys*, *L.*; *Lachnophyllum gossypinum*; *Perovskia scrophulariaefolia*, Bge.; *Prangos uloptera*; and *Pulicaria salvicaefolia*.
H. N. R.

Rapid determination of primary and secondary alcohols in essential oils. S. SABETAY (Compt. rend., 1934, 199, 1419—1421).—The oil is treated for 15 min. with $\text{Ac}_2\text{O}-\text{H}_3\text{PO}_4$ at $< 50^\circ$ and Ac determined in the product.
R. S. C.

Toxicity of dyes.—See IV.

See also A., Mar., 341, **alloPregnandiol**. 343, **Prep. of tetraiodophthalic anhydride and of 3:4-dihydroxycinnamate**. 346, **Prep. of male sexual hormones**. 348, **Prep. of ketonic terpenes**. 360, **Micro-determination of caffeine**. 365—8, **Alkaloids**. 366, **Prep. of aurothiosulphates of quinine**. 370, **Colour reactions of alkaloids**. 396, **Prep. of simaruba bark as an abortive**. 409, **Purification of vaccine virus**. 413, **Androsterone**. 414—8, **Vitamins**. 420, **Chinese perilla**. 422, **Nicotyrine in tobacco**. **Alkaloid of seeds of *Leonurus sibiricus***.

PATENTS.

Separation of components of pine oil. L. T. SMITH, Assr. to HERCULES POWDER Co. (U.S.P. 1,961,398, 5.6.34. Appl., 11.8.28).—Pine oil is fractionated and α -terpineol crystallised from the appropriate fraction (b.p. 214—218°) by refrigeration. From other fractions over the range 195—240°, residual *tert.*-alcohols are removed by dehydration and fractionating the hydrocarbons thus formed; the *sec.*-alcohols are obtained by further fractionation and crystallisation, e.g., fenchyl alcohol (b.p. range 195—205°), borneol (208—214°), anethole (225—244°).
S. S. W.

Bactericidal and therapeutic agent. STANDARD BRANDS, INC. (B.P. 423,354, 22.4.33. U.S., 21.6.32).—The unsaponifiable matter (sterols) extracted from (vegetable) fats is irradiated (in solution) by ultra-violet light until the product shows a bactericidal and fungicidal activity (*A*) such that a solution of 2—7 mg. in 1 c.c. of maize oil is fatal to yeast. Such prep. may be used in oil or ointment media for cosmetic and therapeutic (in skin affections) purposes. *A* is independent of the vitamin-*D* potency of the products.
E. L.

Production of acyloctahydrofollicle hormones. SCHERING-KAHLBAUM A.-G. (B.P. 423,287, 7.5.34. Ger., 5.5.33).—The corresponding H_2 -compound is hydrogenated, e.g., the Bz derivative of dihydrofollicle hormone is heated at 140°/100 atm. with H_2 and Ni-Cu, the corresponding Ac_2 derivative is reduced with H_2 and Ni-Cr in cyclohexanol at 180°/100 atm., or the Ac derivative is treated with H_2 -PtO₂ in AcOH. (Cf. B.P. 421,630 and 421,681; B., 1935, 254.)
H. A. P.

Production of immunising remedies. G., F., and H. MADAUS (DR. MADAUS & Co.) (B.P. 423,883, 21.9.33. Ger., 11. and 28.11.32, and 29.6.33).—Anti-

bodies (I) are recovered from the urine (II) of human beings or animals which have just recovered from infectious diseases, by filtering to remove bacteria, dialysing the filtrate, and treating with either albumin precipitants or adsorbents (III). The (I) are recovered from the ppt. or (III), e.g., by extraction with physiological saline. (II) may be purified by extraction with immiscible org. solvents and (I) separated from the residue.
E. H. S.

Manufacture of organic mercury compounds. E. I. DU PONT DE NEMOURS & Co. (B.P. 423,506, 28.7.33. U.S., 28.7.32).—The prep. by metathesis or otherwise of higher fatty acid salts of unsubstituted alkyl- or aryl-mercuri-hydroxides is claimed. Examples are *ethylmercuric stearate*, m.p. 72°, *-oleate*, m.p. 62°, and *-palmitate* (mixed with talc), and *phenylmercuric palmitate*, m.p. 56°, and *-oleate*.
H. A. P.

Swelling of albuminous (etc.) substances.—See XIX.

XXI.—PHOTOGRAPHIC MATERIALS AND PROCESSES.

Products of oxidation of photographic developers by silver bromide. II. A. SEYEWETZ and S. SZYMSON (Bull. Soc. chim., 1934, [v], 1, 1506—1523; cf. A., 1934, 291).—The reactions have been investigated under well-defined conditions. Pyrogallol (I) in presence of AgBr and excess of Na_2 (or K, NH_4) SO_3 and the corresponding carbonate, or COMe_2 , affords a pyrogallolsulphonate. $p\text{-C}_6\text{H}_4(\text{NH}_2)_2$ with AgBr and excess of Na_2SO_3 (mixture II) in presence of Na_2CO_3 yields a *p*-phenylenediamine-sulphonate and in presence of NaOH a disulphonate, but with Na_3PO_4 a mixture of mono- and di-sulphonates. *o*- and *p*- $\text{C}_6\text{H}_4(\text{OH})\cdot\text{NH}_2$ and *p*- $\text{C}_6\text{H}_4(\text{OH})\cdot\text{NH}\cdot\text{CH}_2\cdot\text{CO}_2\text{H}$ with (II) and NaOH give the corresponding monosulphonates. *p*- $\text{C}_6\text{H}_4(\text{OH})\cdot\text{NHMe}$ with (II) and Na_2CO_3 gives a disulphonate, thus showing the enhanced reactivity induced by substitution of the NH_2 -group. $\text{OH}\cdot\text{C}_6\text{H}_3(\text{NH}_2)_2$ with (I) alone yields a disulphonate whilst 1-amino- β -naphthol-6-sulphonate with (II) and Na_2CO_3 affords 1-amino- β -naphthol-3:6:8-trisulphonate. The reactions probably proceed by way of intermediate quinonoid substances, and the products, in general, have reducing properties.
J. G. A. G.

Preparation and serviceability of developable and fixable bleaching-out dye layers from the silver salts of organic dyes. G. UNGAR (Z. wiss. Phot., 1934, 33, 177—190).—The Ag compounds of 25 dyes have been investigated. The suitable compounds are of 2 types. (*A*) Those only colloiddally suspendable in H_2O , not diffusible in gelatin, and hence not developable by org. developers. The emulsions made from these compounds are only weakly light-sensitive; the primary Ag formed on exposure is removable in a bleaching solution, and the emulsion can then be fixed out. (*B*) Compounds which are diffusible in gelatin, and hence intensifiable by development. The unexposed Ag-dye complex must subsequently be converted into the insol. Cu compound by treatment with CuCl_2 , and the plate can then be fixed in $\text{Na}_2\text{S}_2\text{O}_3$. These emulsions are considerably more light-sensitive. Various methods of preparing the emulsions are described. H_2O_2 is

found to have a considerable sensitising action. For emulsions of type *A*, azo dyes are most suitable; for type *B*, no relation of sensitivity to constitution of the dye has been found. The spectral sensitivities for compounds of type *B* show only one case (Benzoectrotro-*Ag*) where the Grothaus-Draper law (greatest sensitivity coinciding with max. absorption) is obeyed, but the law usually holds for compounds of type *A*. (Cf. *A.*, 1934, 1184.) J. L.

Desensitising dyes.—See IV.

See also *A.*, Mar., 311, Action of H_2O on the latent image. H_2O effect in infra-red plates. Colloidal electrolytes in photography. Blackening of plates by electrons. 320, Direct photography of dust in air.

PATENTS.

Photographic emulsions containing (A) dibenzoxacarbocyanines, (B) 8-substituted oxacarbocyanines, (C) certain disulphides as antifogants.

(A—C) L. G. S. BROOKER and (C) C. J. STAUD, Assrs. to EASTMAN KODAK CO. (U.S.P. 1,962,123—4 and 1,962,133, 12.6.34. Appl., [A] 20.2.32, [B] 6.3.33, [C] 18.5.33).—(A) The dyes of U.S.P. 1,939,201 (*B.*, 1934, 878) are used as sensitisers. (B) The emulsions contain 8-substituted oxacarbocyanines, e.g., 8-methyl-2:2'-diethyl- and 2:2'-dimethyl-8-ethyl-oxacarbocyanine iodide, which act as sensitisers to blue-green light. (C) For decreasing fog in the emulsions, di-*o*-formylalkylaminodiphenyl disulphide is added (1—8 mg. per 100 c.c.). F. M. H.

(A) **Manufacture of photographic sensitisers.** W. W. GROVES. From I. G. FARBENIND. A.-G. (B.P. 421,015, 5.5.33). (B) **Sensitisation of photographic emulsions.** I. G. FARBENIND. A.-G. (B.P. 420,971, 5.5.32. *Ger.*, 6.5.32).—(A) By use of a 1-methylbenzthiazolium salt, in which the C_6 nucleus carries as substituent a thio- (or seleno-)alkyl or -aralkyl group, are prepared the correspondingly substituted thiocarbo- and thia- ψ -cyanines. Examples are: 2:2'-diethyl-5:5'-dimeththio- and 2:2'-diethyl-5:5'-dimethseleno-thiocarbocyanine bromide; 8-methyl-2:2'-diethyl-5:5'-dimethseleno-, 2:2':8-triethyl-5:5'-dimethseleno-, and 2:2'-diethyl-4:4'-dimethoxy-5:5'-dimeththio-thiocarbocyanine iodide; 2:1'-diethyl-4-ethseleno-6'-methylthia- ψ -cyanine iodide. (B) These sensitise further towards the red than do the unsubstituted parent dyes. F. M. H.

Sensitisation of photographic silver halide emulsions. I. G. FARBENIND. A.-G. (B.P. 423,827, 24.1.34. *Ger.*, 24.1.33).—Oxa- ψ -cyanines, unsubstituted at the methine C atom, sensitise photographic emulsions to blue-green light and often increase the contrast. Yellow light is permissible during development. The dyes are prepared from a quaternary salt of a 1-methylbenzoxazole (I) by a ψ -cyanine condensation, or (2) by the method of B.P. 423,792 (*B.*, 1935, 298). Thus, from the appropriate quaternary salt and 6-methyl-1-ethyl-2-thioquinolone ethiodide, with piperidine in C_6H_5N , are prepared 2:6-dimethyl-1'-ethyl-, 5-methoxy-2:6'-dimethyl-1'-ethyl-, 2:6'-dimethyl-1'-ethyl-5:6-benz-, and 2:6'-dimethyl-1'-ethyl-3:4-benz-oxa- ψ -cyanine iodide. Their sensitising maxima are at 490, 500, 500, and 505 μ , respectively. F. M. H.

Manufacture of photographic printing fabric. L. GOETTLER (U.S.P. 1,961,348, 5.6.34. Appl., 1.3.33. *Ger.*, 1.3.32).—A layer of fabric with a leather-like appearance, the surface being grained or shagreened, is coated with a layer of a cellulose ester mixed with powdered metal; a layer of gelatin is applied on top, and when dry the photographic emulsion is coated on to the surface. J. L.

Production of press plates. G. DAUB, Assr. to GUGLER LITHOGRAPHIC CO. (U.S.P. 1,961,476, 5.6.34. Appl., 12.6.31).—For reproduction in colour, colour-separation negatives are prepared and positive reliefs (dichromated gelatin) made from them. These may be stained with toluidine-blue for viewing the image, and are finally stained brown (selectively in the hardened portions) with $KMnO_4$; negatives are printed from these stained images on to dichromated gelatin emulsions, developed, and also stained brown. Positive printing plates are prepared from these negatives. J. L.

Controlled reduction of photographic images. A. MURRAY, Assr. to EASTMAN KODAK CO. (U.S.P. 1,950,903, 13.3.34. Appl., 27.6.29).—The exposed film is impregnated with conc. aq. $Na_2S_2O_3$, covered with glycerol (*G*), and immersed in aq. $K_3Fe(CN)_6$ containing *G* until the desired degree of reduction is obtained. A. R. P.

Lithographic process. D. V. GERKING (U.S.P. 1,961,927, 5.6.34. Appl., 9.11.31).—The required negative is printed on to a sol. gelatin emulsion, sensitised with *Ag*, which has been coated on a celluloid base. The print is developed in a selective tanning solution, dried, and coated with lithographic ink; it is then washed, the ink remaining in the hardened portions. The print can now be used as a printing plate in the usual manner. J. L.

Copying process for zincography. K. DROEGE (U.S.P. 1,959,947, 22.5.34. Appl., 14.1.32).—A Zn plate coated with albumin-dichromate film is exposed through the drawing, rubbed with printers' black in turpentine oil, developed as a negative with aq. NH_3 , and coated with shellac varnish; the high parts of the varnish and the film under them are then removed with kerosene and, after washing with gum arabic solution, the plate is etched with dil. HNO_3 , dil. H_2SO_4 , and acid dichromate in turn. B. M. V.

Cyanine dyes.—See IV.

XXII.—EXPLOSIVES; MATCHES.

Manufacture of lead azide. J. MEISSNER (*Z. ges. Schiess- u. Sprengstoffw.*, 1935, 30, 10). E. VON HERZ (*Ibid.*, 10—11).—A discussion on the merits of the Meissner continuous process. W. J. W.

Properties of pentaerythritol tetranitrate. N. PUSHIN, B. POPOVIĆ, R. NKOLIĆ, and R. ŽIVADINOVIĆ (*Bull. Soc. Chim. Yougoslav.*, 1934, 5, 83—102).—Pentaerythritol (I) undergoes allomorphic transformation at 185°, and melts at 256°. The tetranitrate of (I) is comparatively a chemically stable explosive. R. T.

Determination of diphenylamine and substituted ureas in propellant powders. A. BRESSER (*Z. ges. Schiess- u. Sprengstoffw.*, 1935, 30, 42—43).—The

powder is decomposed with NaOH on a water-bath, the NHPh_2 distilled off in steam and extracted with Et_2O , the ethereal solution decomposed with EtOH-Br , the Et_2O distilled off, the alcoholic solution treated with H_2O , EtOH expelled, and the $\text{NH}(\text{C}_6\text{H}_3\text{Br}_2)_2$ separated, washed, and dried at 100° .
W. J. W.

Determination of the components of a mixture of trinitrotoluene and pentaerythritol tetranitrate by micro-hydrocarbon analysis. M. FURTER and J. L'ORANGE (*Mikrochem.*, 1935, 17, 38—42).—The composition of these mixtures can be determined to $\pm 1\%$ by C determination on 5—9-mg. samples.

J. W. S.

Brisance of explosives. L. WÖHLER and J. F. ROTH (*Z. ges. Schiess- u. Sprengstoffw.*, 1934, 29, 289—292, 331—334, 365—368; 1935, 30, 11—14, 39—42).—Brisance tests with $\text{C}_6\text{HMe}_2(\text{NO}_2)_3$ and NaCl (cf. B., 1934, 429) were carried out with nitro-pentanol and -hexanol, nitro-pentanone and -hexanone, NH_2Me , HClO_4 , guanidine chlorate and perchlorate, NH_4ClO_4 , chlorate mixtures, and liquid and solid explosives (nitroglycerin, blasting gelatin, collodion, pextrinite, nitroglycol). Results are shown graphically.

W. J. W.

Theory of explosive reactions. H. MURAOUR (*Z. ges. Schiess- u. Sprengstoffw.*, 1935, 30, 1—6).—A résumé of the author's theories (cf. A., 1932, 233; 1933, 574), translated by A. SCHMIDT with some explanatory additions.

W. J. W.

Ignition of firedamp by coal-mining explosives.

II. Sheathed explosives. C. A. NAYLOR, W. PAYMAN, and R. V. WHEELER (*Safety in Mines Res. Brd.*, 1935, Paper No. 90, 1935, 33 pp.; cf. B., 1931, 947).—A stone-dust (*D*) cloud was produced in a 9% CH_4 -air mixture in a gallery 5 ft. diam. by firing a detonator in each of two bags of *D* $\frac{1}{2}$ sec. before firing the explosive charge. With Celmonite in $1\frac{1}{8}$ -oz. cartridges, unstemmed, no ignition occurred with a charge limit up to 22 oz. Complete admixture of *D* with the inflammable atm. is more effectively assured by introducing it into the borehole than by the Belgian method of exterior stemming. Na and K halogen salts are better for stemming than is a clay plug. Interior or exterior stemming is of val. only with respect to a blown-out shot and not with over-charged holes or when breaks are present, these last two factors being the most probable causes of ignitions. To prevent ignition under all circumstances, the stemming must surround the explosive as a sheath. Experiments with Tees Powder sheathed with NaCl showed that the salt was slightly less effective as a sheath than when forming part of the explosive itself, but the sheath did not reduce sensitiveness, which is of importance when dealing with permitted explosives already containing cooling salts. The sheath mainly exerts a cooling action, but other effects are appreciable. Of substances used as sheaths, Fe filings were most effective, giving a charge limit with Tees Powder of 12 oz., but a sheath $\frac{5}{8}$ in. thick was required. Next in efficiency were $\text{Na}_2\text{S}_2\text{O}_4$ and NaHCO_3 , each giving a charge limit of 10 oz. With various low-freezing permitted powders, unsheathed and sheathed with NaHCO_3 , respectively, and fired by direct (I) and inverse initiation (II), respectively, the charge limits

(oz.) were: Polar Samsonite No. 3 (I), 8, 24, (II) 6, 20; Polar Saxonite, (I) 20, 28, (II) 8, 28; Polar Dynobel, (I) 16, 28, (II) 8, 28; Eversoft Tees Powder, (I) 14, 28, (II) 10, 26; Celmonite, (I) 16, 26, (II) 10, 24. The low-*d* explosives AI Rounkol gave (I) 18, 18, (II) 8, 16; and Eversoft L.D. Powder, (I) 18, 18, (II) 8, 18. With sheathed permitted explosives ignition of firedamp by a blown-out or an overcharged shot cannot occur at the max. allowable charge, and with shots fired in holes near breaks charges of sheathed explosives up to 8 oz. are safe. Under mining conditions the sheathed explosives were as effective as the unsheathed ones.

W. J. W.

Nitration of cellulose.—See V.

See also A., Mar., 291, η of nitrocotton solutions. 292, Solubility of cellulose nitrate.

PATENT.

Liquid-oxygen explosives. L. MELLERSH-JACKSON. From L'ATR LIQUIDE, Soc. ANON. POUR L'ETUDE ET L'EXPLOIT. DES PROC. G. CLAUDE (B.P. 423,513 and Addn. B.P. 423,557, [A] 3.8.33, [B] 24.5.34).—(A) Starch (I) that has passed a sieve of 400 meshes per linear French in. is added in amount = 10% of the combustible material. (B) The amount of (I) added is 30 wt.-% of the cartridge.

W. J. W.

XXIII.—SANITATION ; WATER PURIFICATION.

Determination of atmospheric carbon dioxide. J. CARLBERG (*Suomen Kem.*, 1935, 8, B, 4).—Solid CO_2 is collected in a suitable cooling apparatus under a measured pressure and weighed.

A. G. P.

Determination of sulphur dioxide in air. J. D. GOLDENBERG (*J. Appl. Chem. Russ.*, 1934, 7, 1099—1102).—A known vol. of air is aspirated through 10—15 ml. of 0.03% aq. MnSO_4 , 0.3 g. of KI and 5 ml. of 0.01N- KIO_3 are added, and the I liberated is titrated with 0.005N- $\text{Na}_2\text{S}_2\text{O}_3$.

R. T.

Confinement of chloropicrin and other gases for fumigation purposes. G. H. GODFREY (*Phytopath.*, 1934, 1366—1373).—Paper coated with casein glue effectively confined CS_2 . Coatings of animal glue were effective for chloropicrin.

A. G. P.

Insecticidal tests of synthetic organic compounds, chiefly tests of sulphur compounds, against culicine mosquito larvæ. F. L. CAMPBELL, W. N. SULLIVAN, L. E. SMITH, and H. L. HALLER (*J. Econ. Entom.*, 1934, 27, 1176—1185).—Of 68 compounds examined, 24 had toxicity \leq that of nicotine. $(\text{C}_6\text{H}_4)_2\text{O}$ and $(\text{C}_6\text{H}_4)_2\text{S}$ were the most effective.

A. G. P.

Synergistic effect of the chlorides and bicarbonates of potassium and sodium on the paralytic action of nicotine in the cockroach. N. D. LEVINE and C. H. RICHARDSON (*J. Econ. Entom.*, 1934, 27, 1170—1175).—The toxicity of nicotine when injected into cockroaches was increased by the salts, the effect of the K salts being the greater.

A. G. P.

Water sterilisation by the oligo-dynamic action of silver (Katadyn process). G. JOACHIMOGLU and N. KLISSIUNIS (*Praktika*, 1933, 8, 197—201; *Chem.*

Zentr., 1934, ii, 1970—1971).—The antiseptic action (I) of Katadyn Ag is considerably reduced by the presence of NaCl, Na_2SO_4 , KNO_2 , or KNO_3 . In H_2O containing 0.01 g. of NH_3 per litre and appreciable H_2S an 80-fold dilution with sterile distilled H_2O was necessary before (I) was observed. The method is of little use for H_2O in Greece. H. J. E.

Determination of oxidisability of waters rich in chlorides. B. A. SKOPINTZEV (J. Appl. Chem. Russ., 1934, 7, 1294—1297).—100 ml. of H_2O under analysis are boiled for 10 min. with 5 ml. of 20% NaOH, then 10 ml. of 0.01N- KMnO_4 , 0.5 g. of KI, and 5 ml. of 25% H_2SO_4 are added to the cooled solution, and I is titrated with 0.01N- $\text{Na}_2\text{S}_2\text{O}_3$. Oxidation in acid solution of H_2O containing NaCl gives results 10% > those given by the above method. R. T.

Coagulation control [of water] with a recording potentiometer. E. S. HOPKINS (J. Amer. Water Works Assoc., 1935, 27, 94—99).—Apparatus is described employing a recording potentiometer and a calomel-W electrode system for the measurement of p_{H} vals. in H_2O containing suspended solids. In H_2O purification the increased accuracy of control makes possible a saving in coagulants and the production of a final H_2O of const. alkalinity concn. C. J.

Limits of pollution loadings for water-purification systems. H. W. STREETER (J. Amer. Water Works Assoc., 1935, 27, 1—7).—The performance records of 31 municipal undertakings show that in order to produce an effluent having a *B. coli* index (*I*) ∇ 1.0 per 100 c.c. an efficient rapid-sand filtration installation with continuous post-chlorination of the effluent should have delivered to it a raw H_2O having *I* ∇ 5000 per 100 c.c. If aided by pre-chlorination, preliminary storage, or prolonged sedimentation, the *I* of the raw H_2O may range as high as 20,000 per 100 c.c. In order to produce a H_2O having *I* ∇ 6.0 per 100 c.c. for > 5% of the time, the safe upper limit of average raw- H_2O pollution should be ∇ 3000 per 100 c.c., pre-chlorination etc. being held in reserve to deal with abnormal conditions. C. J.

Maintaining carrying capacity of cast-iron [water] main by introduction of chloroamines. G. C. HODGES and J. W. ACKERMAN (J. Amer. Water Works Assoc., 1935, 27, 86—90).—The carrying capacity of a 24-in. cast-Fe main, 12 miles long, has been well maintained, following treatment of a soft H_2O by NH_3 - Cl_2 sufficient to maintain a residual of 0.2 p.p.m., whereas previously it would lose 20% in 6 months after each of its numerous mechanical cleanings. C. J.

Purification of the effluent of gasworks working with lignite. S. A. VOSNESSENSKI and Z. A. ARON (J. Appl. Chem. Russ., 1934, 7, 926—933).—The H_2O should be filtered through lignite before mixing with domestic sewage- H_2O . Biological purification can be effected by previous gradual acclimatisation (during 3.5 months), when PhOH concns. of ∇ 0.007% are tolerated. R. T.

Removal of phenols from waste waters. J. I. TSCHULKOV (J. Chem. Ind. Russ., 1934, 10, No. 12, 48—59).—4 g. of NaOH are added per g. of PhOH in

the H_2O and Cl_2 is passed, when about 0.7 g. of resinous products (I) is obtained. The solution is filtered through charcoal before being finally discharged. The (I) may be utilised in the paint, lacquer, and plastics industries. The process is profitable when [PhOH] is > 0.3%, and may be conducted without loss at ∇ 0.2% PhOH. R. T.

Purification of creamery and packing-house wastes. M. LEVINE (Amer. J. Publ. Health, 1935, 25, 171—182).—Small-scale tests indicate that creamery wastes may be satisfactorily disposed of on trickling filters provided with adequate bottom ventilation. By the application of settled packing-house wastes (*P*) to an aerated granite filter at a rate of 7×10^6 gals./acre/day and giving secondary treatment to the settled effluent on a cinder or gravel filter at a rate of 3×10^6 gals./acre/day, the biochemical O_2 demand is reduced by 97% and the org. N by 95%. *P* may also be satisfactorily dealt with by the activated-sludge process, the presence of 2000 p.p.m. of NaCl having no ill-effect. C. J.

See also A., Mar., 312, **Hydrotimetric method.** 316, **Determining F in drinking- H_2O .** 317, **Analysis of dust samples.** 320, **Direct photography of dust in air.** 394, **[Toxicity of] sulphite-cellulose effluent.**

PATENTS.

Rotary furnaces for combustion of town refuse and the like. WOODALL-DUCKHAM (1920), LTD., and J. W. REBER (B.P. 423,273, 2.12.33).—In a kiln comprising (*A*) a fixed drying grate, (*B*) a fixed precombustion grate, and (*C*) a rotary cylinder for final combustion (cf. B.P. 388,970; B., 1933 414), part of the waste gases which have been cooled by useful heat exchange are returned in two streams to points respectively above and below *B*, and also, if desired, to above *A*, the lower stream mixing with the combustion air. B. M. V.

Indicating the presence of toxic substances [hydrogen cyanide]. L. GASSNER, Assr. to DEUTS. GES. F. SCHÄDLINGS-BEKÄMPFUNG, M.B.H. (U.S.P. 1,949,466, 6.3.34. Appl., 12.1.29. Ger., 16.1.28).—Rapidly volatile substances, e.g., CNCl or CNBr, and less volatile but more persistent odorous indicators, e.g., $\text{COPh-CH}_2\text{Br}$, are added to the HCN gas used for fumigation to provide an indicator for the presence of HCN throughout its period of use. A. R. P.

Disinfectant composition. G. LOCKEMANN, O. GERNGROSS, K. RÜLKE, and W. ULRICH (U.S.P. 1,950,315, 6.3.34. Appl., 22.9.31. Ger., 3.6.30).—Claim is made for a solution of a thiocyanate (org. or inorg.) acidified with dil. HCl, AcOH, tartaric or citric acid. A. R. P.

Treatment of waters. B. PLANTIN (Assee.) and P. DUMONT (B.P. 423,795, 3.8.33. Belg., 3.8. and 12.10.32).—Potable H_2O for alimentary purposes is prepared from H_2O containing CaHCO_3 (I) by contact with Mg or Li compounds, e.g., MgO; basic carbonates, e.g., $4\text{MgCO}_3 \cdot \text{Mg(OH)}_2 \cdot x\text{H}_2\text{O}$, are formed and converted into easily assimilable salts, e.g., MgCl_2 , by addition of acid. If the (I) content is insufficient the H_2O may be acidified before contact. C. J.

Sterile filters.—See I.