

BRITISH CHEMICAL ABSTRACTS

B.—APPLIED CHEMISTRY

DEC. 9 and 16, 1932.*

I.—GENERAL; PLANT; MACHINERY.

Materials for chemical plant construction. W. S. CALCOTT and T. R. OLIVE (Chem. Met. Eng., 1932, 39, 476—478).—In selecting suitable metals for the purpose, it is advisable to carry out tests using sheets or filings of several likely metals immersed in the reaction mixture in glass and to measure the rate of corrosion. The reagents should be of the same degree of purity as those to be used on the large scale, so as to eliminate the effect of inhibiting agents, or to include the effect of accelerating agents which may be present. The microstructure of the metal or alloy and the effect of possible impurities should also be studied. A. R. P.

Materials of plant construction. III. Lead. A. H. LOVELESS (Ind. Chem., 1932, 8, 289—290, 310—312, 352—353; cf. B., 1932, 627).—Most impurities in Pb, other than Bi, are removed by oxidation previous to Ag separation. The Pattinson and Betts processes effect separation of Bi; the Parkes process does not, but with suitable ores is not inapplicable in the production of chemical Pb. The "flash" test for chemical Pb is not a very reliable criterion for resistance to dil. H_2SO_4 at lower temp. Data on the influence of impurities on the flashing temp. of Pb are summarised. Curves are given showing the rate of attack of H_2SO_4 on Pb at 50° with varying concn. and the variation with temp. using 90% and 96.5% H_2SO_4 . A protective film of $PbSO_4$ is formed which is less adherent with more conc. acid. At 200° it is reduced to PbS . The rate of attack is increased by the presence of N_2O_3 and by a tensile stress above 100 lb./sq. in. HNO_3 above 80% concn. can be handled in Pb plant. HNO_2 if present promotes corrosion. The action of HCl is also summarised in curves. Pb is corroded by CaO mortar, which may be due to the presence of CaO_2 . Construction of Pb chambers for H_2SO_4 manufacture and methods of Pb lining are described. In regulus metal both Pb and Sb should be pure, As and Zn being very detrimental. C. I.

Pumps. C. W. CUNO (Ind. Eng. Chem., 1932, 24, 1109—1115).—A general survey of apparatus for moving liquids and gases from the viewpoint of the requirements of the chemical industry. C. I.

Studies in agitation. Suspension of sand in water. A. McL. WHITE, S. D. SUMERFORD, E. O. BRYANT, and B. E. LUKENS (Ind. Eng. Chem., 1932, 24, 1160—1162).—Suspensions of sand in H_2O were stirred in a tank with a movable paddle on an axial shaft, and the distribution of the sand was determined. In all cases mixing was rapid, but the concn. of sand was always less above the paddle than below it. Most uniform results were obtained with the paddle close to the H_2O surface. Particle sizing of the sand occurs. C. I.

Corrosion of the water-jacket of gas-fired water-heaters. JUNKERS FORSCHUNGSANSTALT (Gas- u. Wasserfach, 1932, 75, 753—758).—One case studied was that of a Cu water heater, coated with Sn on the wet side, which failed through the development of pinholes. The H_2O was high in Ca and in CO_2 , which might well have caused corrosion. The true source of the trouble was indicated by separating the water-pipe from the heater, when an e.m.f. of 1.0—2.5 volts between them was observed. Electrolytic damage to cast-Fe gas pipes in the house was found and the cause of the whole was stray electric currents from outside. In another case the corrosion of Cu was caused by CO_2 in the H_2O , as evidenced by the presence of $CuCO_3$ on the corroded metal. Whether the presence of Cu_2O inclusions in the metal was a contributory cause could not be established. C. I.

Determination of residual hardness in boiler feed-water. W. WESLY (Z. anal. Chem., 1932, 90, 23—31).—The Blacher method (B., 1913, 158) has been modified to render it sensitive for very low hardness vals. J. W. S.

Shell-still batteries. P. VUIRUBOV (Azerbaid. Neft. Choz., 1932, No. 4, 50—53).—The battery is preferably divided into three groups, the arrangement of which is described. Ch. Abs.

Improving the performance of stills. V. KRUILOV (Groz. Neft., 1931, 1, No. 6—7, 71—73).—By leading the vapours from the preliminary evaporator of the Bormann still into the main evaporator, an 8—15% increase in efficiency is anticipated. Ch. Abs.

Kerosene batteries.—See II. **Ca salts.**—See VII. **Heat balance of "Manchester" kiln.**—See VIII. **Rotary kilns.**—See IX. **Modern metals. Alloys in chemical construction. Corrosion-resistant materials.**—See X. **Heat penetration.**—See XIX.

See also A., Nov., 1085, **Dispersion of gases in liquids.** 1106, **Lubricant insol. in org. solvents.**

PATENTS

Furnaces. INTERNAT. CHROMIUM PROCESS CORP. (B.P. 380,502, 17.6.31. U.S., 24.2.31).—The furnace is operated in a manner similar to a reverberatory but the flames are projected directly downwards from burners through the roof, each burner having its own regulable supplies of fuel and primary and secondary air which are adjusted so that the max. temp. is produced evenly above the hearth at about the level of the goods thereon. B. M. V.

Spiral rotary oven. K. B. FISKE, ASSR. TO UNION STEEL PRODUCTS CO. (U.S.P. 1,844,150, 9.2.32. Appl., 27.2.31).—The goods are placed on sector-shaped shelves which are arranged in a spiral manner around a rotatable

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

vertical shaft. An external conduit is provided for the removal of hot gases from the upper part of the oven and returning them to the lower part by convection.

B. M. V.

Heating of apparatus, especially such forming parts of chemical plants. E. KOENEMANN (U.S.P. 1,845,289, 16.2.32. Appl., 24.6.30. Ger., 1.7.29).—A plant utilising a heat-transmitting agent which is solid at room temp. is arranged so that all the agent drains back to a storage tank on shutting down. On starting up, the storage tank is heated by auxiliary means and the agent when fluid is pumped through the main heater and a direct return pipe until it is hot enough to be diverted to the more distant place where the heat is required.

B. M. V.

Apparatus for extraction of heat. [Mercury boiler.] J. F. WAIT, Assr. to SUN OIL Co. (U.S.P. 1,845,690, 16.2.32. Appl., 16.8.27).—In the heating of a metal, the heat-transmitting wall is caused to be wetted by the metal; in the case of Fe and Hg this may be effected by Cu-plating the Fe wall. Baffles are provided to cause effective circulation.

B. M. V.

[Water treatment for] boiler operation. H. KRIEGSHEIM, Assr. to PERMUTIT Co. (U.S.P. 1,841,825, 19.1.32. Appl., 16.12.29).—Softened boiler feed-H₂O containing Na₂CO₃ is treated with H₃PO₃ sufficient to convert the Na₂CO₃ into Na₂HPO₃, which absorbs O₂ in the H₂O and is converted into Na₂HPO₄ in the boiler.

A. R. P.

Heat-insulating lagging for boilers, tanks, and the like. E. KREWS (B.P. 380,240, 28.8.31).—Metallic envelopes are described for the attachment of insulating material to vessels.

B. M. V.

[Boiler-]furnace linings. G. KARREBERG and H. RÖMER (B.P. 380,330, 9.1.32. Ger., 9.1.31).—A method of attaching refractory linings to the H₂O-walls of a furnace is described.

B. M. V.

Evaporators and the like heat exchangers. SOC. DES CONDENSEURS DELAS (B.P. 380,358 and Addn. B.P. 380,726, [A] 23.2.32, [B] 14.3.32. Fr., [A] 23.2.31, [B] 28.9.31).—A bundle of tubes on the outside of which scale is liable to deposit is rotatable and the tubes are provided with scrapers in the form of pieces of perforated tube, or cages, threaded over the heating tubes. In (B) the scrapers are C-shaped, the base being weighted so that the opening remains at the side, and the opening is of such a size that the scrapers may be forced on and off but will not drop off.

B. M. V.

Progressive drying kiln. J. F. COBB, Assr. to MOORE DRY KILN Co. (U.S.P. 1,845,398, 16.2.32. Appl., 5.12.25).—Both longitudinal and transverse circulations of air are caused to take place, the former very slowly and the latter in opposite directions at opposite ends of the kiln.

B. M. V.

[Spray] drying of liquids and semi-liquid materials. J. C. MACLACHLAN (U.S.P. 1,845,163, 16.2.32. Appl., 6.3.26).—The liquid is sprayed only at the top, but the drying gas enters downwardly from the top and upwardly from the lower part of the casing. The coarser powder falls into hoppers below the lower air

inlet and the finer leaves with the gases at an intermediate height and is separated by V-shaped screens.

B. M. V.

Apparatus for cooling loose material. C. MITTAG, Assr. to F. KRUPP GRUSONWERK A.-G. (U.S.P. 1,844,782, 9.2.32. Appl., 30.10.26).—The material (*e.g.*, clinker from a cement kiln) is spread on a conical rotating table by rakes, or pushed along a scraper-conveyor, and subjected to cooling gases above and below.

B. M. V.

Ball mills. A. LARSEN (B.P. 380,298, 23.11.31).—The material and grinding bodies are kept in motion in a stationary, trough-like container by means of rotating perforated discs which may alternate, if desired, with stationary partitions. To facilitate starting, the trough may be mounted on rollers so that it may be rocked; the discs may be started one at a time by means of clutches on the common shaft.

B. M. V.

Dressing of grinding or crushing stones. H. SIMON, LTD. From A. T. HUGHES (B.P. 380,583, 1.9.31).—A tool for attachment alternately to the fixed and moving stone and serving to dress them by mere rotation of the mill is described.

B. M. V.

Feeding of subdivided solids into an enclosed reaction mixture. J. F. WAIT and C. FIELD, Assrs. to NAT. ANILINE & CHEM. Co., INC. (U.S.P. 1,844,195, 9.2.32. Appl., 17.1.25).—The material is fed by a worm or other device which is kept immersed in a liquid, some of which enters the reaction chamber with the solid. Preferably the liquid is provided by condensing a volatile constituent of the reaction mixture.

B. M. V.

Bends and diffusers for conveying gases, liquids, or granulated or pulverised materials. M. ADAMCIKAS (ADAMTCHIK) and G. MASSERA (B.P. 380,068, 7.4.31).—The stream of fluid is divided by partitions of stream-line form, the spacing between them increasing proportionately to the distance from the centre of the bend.

B. M. V.

Mixer. F. B. TOTMAN, Assr. to G. J. KUHRTS, JUN. (U.S.P. 1,845,367, 16.2.32. Appl., 11.6.29).—A pug mill is provided with gearing and clutch so that the container may be rotated at a slow speed to empty it without stopping the mixers.

B. M. V.

[Dry] separator. G. ROBERTSON (U.S.P. 1,845,441, 16.2.32. Appl., 18.9.26).—Air is drawn up through a rotating inclined cylinder which is perforated to various meshes at its lower end and is more or less closed at the upper end by a baffle. The material is fed to an intermediate point of the cylinder by means of a worm conveyor or other device that will not permit air to pass through it.

B. M. V.

Separators. AMER. AIR FILTER Co., Asses. of S. G. S. SYLVAN (B.P. 380,614, 2.10.31. U.S., 2.10.30).—Claim is made for special forms of smooth passage and rotating blades in a separator for centrifugally removing particles from fluids.

B. M. V.

Centrifugal machine. SIEMENS-SCHUCKERTWERKE A.-G. (B.P. 380,410, 2.6.32. Ger., 2.6.31. Addn. to B.P. 359,369; B., 1932, 132).—The casing of the centrifuge is constructed of artificial resin to prevent crystallisation of filtrate on it.

B. M. V.

Centrifugal treatment of liquids. AKTIEB. SEPARATOR (B.P. 380,415, 16.6.32. Swed., 19.6.31).—In a bowl-type separator for one or more liquids containing solids which are discharged by a carrier fluid at a smaller radius than the wall of the bowl, perforated walls are provided between the separating zone and the bowl wall through which the carrier fluid is supplied inwardly and the solid matter passes outwardly, to mingle and be discharged together upwardly and then inwardly along the conical top of the bowl. B. M. V.

Filtration. E. J. DE PREE and G. J. VAN ZOEREN (U.S.P. 1,843,212, 2.2.32. Appl., 13.8.27. Renewed 27.6.31).—A suction filter comprising a horizontal diaphragm, to the upper surface of which the prefilter is supplied, is provided with an imperforate, flexible, and extensible cover which is pressed upon the filter-cake by the atm. at completion of filtration, the prefilter entering through a flexible pipe attached to an aperture in the cover. B. M. V.

[Ultra-]filter. N. M. MICHAILOVSKY, Assr. to SHARIT CHEM. Co., INC. (U.S.P. 1,845,316, 16.2.32. Appl., 2.10.29).—Vertical filter diaphragms are situated near the ends of a horizontal rotatable shell. One face of each diaphragm is provided with a grid electrode, the other with a filter medium. B. M. V.

Apparatus for heat-treating liquids. E. C. D'YARMETT, Assr. to FRACTIONATOR Co. (U.S.P. 1,844,643, 9.2.32. Appl., 3.9.29).—An externally heated vertical cylinder is provided with centrifugal paddles causing the liquid flowing up inside the cylinder to form a vortex with consequent high heat transmission and thin film in the upper portion. Gases may be blown in through the hollow shaft of the paddles. The receiver for vapours above is provided with baffles to separate remaining liquid. B. M. V.

Apparatus for dephlegmation. N. S. OLSEN, Assr. to UNIVERSAL OIL PRODUCTS Co. (U.S.P. 1,844,477, 9.2.32. Appl., 11.7.27).—The apparatus comprises a horizontal cylindrical shell with a single horizontal diaphragm (*A*) and a no. of vertical partitions staggered above and below *A*. Swan-necks or other suitable upflows and downflows are formed in *A* and the flow of vapours is generally horizontal, zigzagging through pools on *A*. B. M. V.

Distillation system. H. I. LEA (U.S.P. 1,845,159, 16.2.32. Appl., 5.5.28).—An apparatus is described in which the sensible heat taken up by the ingoing H₂O (or other liquid) is supposed to condense the vapour without additional cooling. B. M. V.

[Laboratory] apparatus for analytical distillation. W. J. PODBIELNIAK (B.P. 380,220, 7.8.31. U.S., 15.8.30).—An apparatus for the precision distillation of, e.g., petroleum is described. The rectification zone comprises a slender vertical tube lined with a spiral of wire and surrounded by a dead air space and a vac. jacket containing also a reflecting surface. Enlargements of the vac. jacket preferably extend also over the heating and cooling zones at the bottom and top of the tube; at the latter the flow of heat is steadied by metallic powder or some other partial conductor. B. M. V.

[Laboratory] apparatus for vaporising or distilling liquids. P. HARRIS & Co. (1913), LTD., and A. H. COOPER (B.P. 380,228, 17.8.31).—The apparatus comprises a pair of bulbs one within the other. An electric heater is placed in the inner one and a draw-off for condensate taken from the bottom of the outer one; the vapour passes from the inner bulb to the jacket space (or outer bulb) through a collar device shaped to prevent return of condensate to the inner bulb. B. M. V.

Apparatus for evaporating liquids. R. N. EHRHART, Assr. to ELLIOTT Co. (U.S.P. 1,845,045, 16.2.32. Appl., 2.6.27).—From the large condenser of a steam power plant, a portion of the warmed circulating H₂O is re-passed through a special group of tubes adjacent the steam inlet; the resultant hot H₂O is subjected to a very high vac. in a spray evaporator and the vapour produced condensed to form distilled H₂O. B. M. V.

Pasteurisation of liquids. K. FEHRMANN (B.P. 380,342, 27.1.32).—A pasteurising plant is sterilised by cutting out the cooling means and circulating some of the liquid to be treated through the heater and the whole plant until it is all raised to a temp. < that needed for pasteurising. B. M. V.

Apparatus for extracting chemicals from liquids. Extractor column having a liquid-level regulator. J. M. COAHN (U.S.P. 1,845,128—9, 16.2.32. Appl., [A] 21.1.25, [B] 12.7.27).—In (A), a dissolved substance is transferred to a new solvent of different density by passing the liquids countercurrent in a tower, the heavier liquid being admitted at the top and withdrawn from the bottom and vice versa. The tower is preferably divided into 3 stages, the middle one being of smaller diam. Disc-like agitators, alternating with stationary annular shelves, the combination forming a tortuous passage, are provided throughout, except in the settling pools at top and bottom. In (B) a float regulator, to hold the level of lighter liquid superposed on the heavier at the bottom of the tower at a const. level, is described. B. M. V.

Conducting exothermic gaseous reactions under pressure. H. LANTZ and P. SCHIDELER, Assrs. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,845,050, 16.2.32. Appl., 29.3.27. Fr., 31.3.26).—The ingoing gases are first passed between the catalyst container and the pressure-resisting wall; they then emerge from the vessel and are cooled outside. After admixture, if desired, of a proportion of fresh gases they are passed in heat-conducting relation with but out of contact with the catalyst (this stage may be omitted), and finally in contact with the catalyst. B. M. V.

Effecting [exothermic] syntheses [of gases]. R. WILLIAMS, Assr. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,845,068, 16.2.32. Appl., 2.2.26).—Three schemes of heat exchange between the ingoing gases, the catalyst, the outgoing gases, and, if desired, an external source are described. In every case, while the gases are in heat-conducting relation with the main body of catalyst they are simultaneously in actual contact with a smaller body of catalyst, with the object of rendering the main body immediately effective. B. M. V.

Dust collector for cement mills. L. W. OLSON and M. A. KOLB (U.S.P. 1,844,591, 9.2.32. Appl., 9.8.29).—The gases are caused to pass upwardly outside a no. of groups of nesting funnels. The floor surrounding the lower stems of the funnels is provided with dampers so that dust settling on it can be discharged into the hopper, which collects the dust falling down inside the funnels. B. M. V.

Separator for treating material-laden air. A. H. STEBBINS (U.S.P. 1,845,358, 16.2.32. Appl., 29.10.29).—A cyclone separator is surmounted by a volute passage which puts the outgoing air again into tangential flow. Very clean air may be removed by a small axial pipe. Several units may be connected in series, and the flow in alternate ones may be either normal or reversed. B. M. V.

Cleaning of [dust-laden] gas. Apparatus for cleaning blast-furnace gas. Removing suspended solids and liquids from gases and vapours. R. R. HARMON, Assr. to PEABODY ENG. CORP. (U.S.P. 1,844,849—51, 9.2.32. Appl., [A, B] 27.2.29, [C] 7.9.29).—(A, B) At the base of a tower the gases are treated with water sprays; rising therefrom they pass through vertical pipes surrounded by cooling medium. Dew is thus formed without the aid of liquid nuclei, therefore it deposits on the finest dust and effectively wets it. The sludge is removed by passing the gases through roses at the upper ends of the pipes beneath a pool of water. The cooling etc. may be repeated after passing through a moisture eliminator. In (c) the apparatus is subdivided, several stages being at the same level. B. M. V.

Dust-extracting apparatus. O. SCHREIBER (B.P. 380,747, 21.4.32. Ger., 23.4.31).—An ejector for dust extracting, operated by a liquid, is provided with vanes and scrapers causing the nozzle to rotate and keep itself clear of sludge. A pocket into which heavy particles fly straight on before reaching the ejector is also provided. B. M. V.

Apparatus for removing dust from gases and/or purifying the same by washing. ATELIERS J. HANREZ SOC. ANON., and A. MODAVE (B.P. 380,746, 20.4.32. Belg., 17.3.32).—Vertical irrigated elements are of polygonal cross-section with flutings at the corners. B. M. V.

Dust separator [for gases]. L. P. ROSS (U.S.P. 1,844,369, 9.2.32. Appl., 12.2.29).—A cyclone separator lined with brick for hot gases is described. The axial outlet pipe is adjustable and constructed of heat-resisting metal; a removable dust outlet at the bottom is described. B. M. V.

Separation of solid or liquid particles from gases by washing. W. E. GIBBS (B.P. 380,099, 27.3.31).—The apparatus is of the type in which the gases are caused to pass in sinuous paths through baffles. Sprays of H₂O or other liquid may be provided, prior to the baffles. B. M. V.

Apparatus for treating gases with liquids for removal of dust and smoke. E. LAURENT (B.P. 380,764, 24.5.32. Fr., 28.5.31).—An apparatus comprising a no. of rotating foraminous discs dipping into

liquid is provided at the entry with an expansion chamber containing obstacles, *e.g.*, chains, to trap coarse dust, and at the outlet with a moisture eliminator. B. M. V.

Extinguishing fires. MATHER & PLATT, LTD., and S. F. BARCLAY (B.P. 380,102, 10.4.31).—Jets of non-inflammable liquid, *e.g.*, a mixture of steam and H₂O, are sprayed upon, or upwards through the surface of, an ignited inflammable liquid with such force that an emulsion of the two liquids is formed over the whole surface. B. M. V.

Making friction material. COLT'S PATENT FIRE ARMS MANUFG. CO., and H. WHITWORTH (B.P. 380,310, 8.12.31. U.S., 19.12.30).—An unwoven mass of fibrous material is mixed with a binder and a solvent for the latter in such a way that the fibres are roughly parallel; the mixture is then pressed into sheet form with very deep indentations to permit the escape of solvent during drying, which is effected at a temp. below that of final curing, the indentations remaining in the final sheet. B. M. V.

Making friction-equalising materials. R. F. NOWALK, Assr. to J. W. WATSON CO. (U.S.P. 1,845,056, 16.2.32. Appl., 6.10.25. Renewed 20.6.31).—The objective is a material having static friction equal to the sliding friction. Ceramic material is mixed with a volatile substance which renders it porous after firing; while still hot it is impregnated with an insol. inorg. soap of a fatty acid, *e.g.*, Ca stearate, dissolved by the heat in stearic acid. B. M. V.

Furnace walls, arches, and the like. H. J. GREEN (B.P. 381,692, 15.9.31).

Dehydrated Na₂S.—See VII. **Protecting Al.**—See X. **[Dust] precipitator for gases.**—See XI.

II.—FUEL; GAS; TAR; MINERAL OILS.

Utilisation of coal. G. KNOX (Proc. S. Wales Inst. Eng., 1932, 48, 359—380).—The hydrogenation process of Synthetic Ammonia and Nitrates, Ltd., as carried out at Billingham, is described.

Classification of British coals. E. S. GRUMELL (Proc. III Int. Conf. Bit. Coal, 1932, 2, 850—877).—Analyses are given of 230 coals and of vitrain and durain in 26 coals. Vitrain contains more C and less H than clarain from the same seam; generally the volatile matter, S, and N are lower in durain. By plotting C against calorific val., 241 British coals fall in a narrow continuous belt which is linear up to 85% C, and then bends and flattens. With C 76—86% iso-calorific lines contain coals differing by < 1.2% C; above 86%, 4—5%. Volatile matter—C belts are similar. The durain belt intersects the bright-coal belt at about 88% C. The Dulong formula agrees better for lower-rank, but not for higher-rank, coals with the observed calorific val. than the Vondracek formula. CH. ABS.

Relation of chemical and physical tests of coal to coking properties and by-product yields. A. C. FIELDNER and J. D. DAVIS (Proc. III Int. Conf. Bit. Coal, 1932, 1, 540—586).—Data are given for Edenborn and other coals for various temp. The yield of coke at 900° is 103—110% of the fixed C + ash of coal as

carbonised; for each 1% S in the coal 175—325 grains of H_2S are formed per 100 cu. ft. of gas in high-temp. carbonisation. The liquid in high-temp. carbonisation is proportional to the O in the coal and is 66—100% of the total O by wt. in the coal as carbonised. The results of extraction with C_6H_6 , C_5H_5N , or $CHCl_3$ and of rational analysis showed no significant relationship to the physical properties of the cokes. The Marshall-Bird agglutinating index was related to the (tumbler) stability of the coke. Softening-temp. tests were not correlated with coke properties, except that the stability of the coke increased with the (Layng-Hathorne) hardening temp. of the plastic coal. The Fischer assay agreed in coke and gas yields with the 500° Bureau of Mines test.

CH. ABS.

Calculation of composition of solid fuels from proximate analysis and calorific value. H. A. LUNDBERG (Tekn. Tidskr., 1932, 62, No. 2, Kemi, 1—6; Chem. Zentr., 1932, i, 2121).—For solid natural fuels $C = 35.2 + (0.67K_b/100) - 0.2G_b$, and $H = (0.069K_b/100) + 0.061G_b - 2.5$, where G_b is the content of volatile matter and K_b the max. calorific val. (both calc. on combustible matter, C and H content). $S + N + O = 100 - (C + H)$, individual vals. being calc. from mean vals. of S and N for the coal. For bituminous coals with G_b 19—45, $C = bW/100$, where W is the min. calorific val. and b is a const. determined for each coal. The accuracy is $C \pm 1 - 1.5$, $H \pm 0.6 - 0.8\%$. The flue gas loss $F = 0.63(T - t)/CO_2\%$.

A. A. E.

Remmy oxy-acetylene test furnace for coal ash fusion-point determination. F. H. FISH, F. M. TAYLOR, and J. L. PORTER (Ind. Eng. Chem. [Anal.], 1932, 4, 442—445).—The Remmy furnace (B., 1931, 745) is considered satisfactory for such determinations.

E. S. H.

Degasification process of coking coals. B. HOFMEISTER (Glückauf, 1932, 68, 405—411; Chem. Zentr., 1932, ii, 150).—The process was followed by weighing the coal during distillation up to 900°, and the results are expressed by curves. The curves at 400—450° show the point of greatest evolution of gas. The effect of the degasification behaviour on the properties of the coke is discussed.

A. A. E.

Behaviour of the most finely-ground bituminous coals and their banded constituents on extraction and low-temperature carbonisation. I. μ -Coals. F. FISCHER, K. PETERS, and W. CREMER (Brennstoff-Chem., 1932, 13, 364—370).—The coals were ground in a vac. ball mill (cf. B., 1932, 664). The amount of bitumen obtained on extraction of a Ruhr coal with $CHCl_2:CCl_2$, at the b.p. of the solvent under atm. pressure, increased from 1.8% after grinding for 1 hr. to 9.5% after 16 hrs. grinding. The coal had then an average particle size of about 0.001 mm., and is referred to as μ -coal. Its behaviour towards solvents indicated that only when this degree of fineness had been reached was the coal fully accessible to the solvent, and consequently the whole of the bitumen extracted. The separate banded constituents of a coal which yielded 10.6% of bitumen on extraction with $CHCl_2:CCl_2$ gave bright coal 12.1, dull coal 7.5, and fusain 2.9% of bitumen, respectively. Similar results were obtained

with other solvents. On carbonisation in the Fischer Al assay apparatus the μ -coal gave a non-swollen, hard coke in contrast to the swollen coke given by the same coal when of normal fineness; the μ -coal also gave a higher yield of tar. The banded constituents behaved differently on carbonisation; the bright coal did not lose its swelling power nor exhibit any change in tar yield on reduction to μ fineness; the dull coal of μ fineness gave 80% more tar than the coarser coal; both sizes of dull coal gave non-swelling cokes, but that from the finer coal was much the harder and brighter.

A. B. M.

Artificial formation of substances similar to bituminous coal and petroleum. E. BERL (Proc. III Int. Conf. Bit. Coal, 1932, 2, 820—830).—Artificial coal having the properties of typical gas and coking coals can be formed from cellulose, but not from lignin. The properties of cellulose and lignin coals and of their distillation products are recorded. Coalification of cellulose in an alkaline medium leads on carbonisation to a coke similar to foundry coke; the coalified products of cellulose give fluorescent extract solutions typical of bituminous coals. As the alkali content of the medium increases, the products become more fluid; NH_3 adds N, Na_2S adds S, and $(NH_4)_2S$ adds N and S to the coal. Hydrogenation (100 atm., 450—460°, 1 hr.) of the mass obtained from cellulose and $N-NaOH$ at 350° produces hydrocarbons similar to C_6H_6 . Hydrocarbons similar to petroleum can be formed similarly, but at lower alkali concn. and temp.

CH. ABS.

Relation between the products of carbonisation and the ignition point of coal dust. W. HACK (Brennstoff-Chem., 1932, 13, 361—364).—A close parallelism has been observed between the yields of tar and combustible gases on low-temp. carbonisation in the Fischer-Schrader Al retort, the decomp. point (Steinbrecher, Braunkohlenarchiv, 1926, 173), and the ignition point (Jentzsch, B., 1925, 196), respectively, of 53 samples of coal, ranging from brown coal to anthracite. The ignition points of the bright and dull fractions, respectively, lay generally lower, and that of the fusain higher, than the ignition point of the corresponding coal itself.

A. B. M.

Testing gas-carbon black. E. P. W. KEARSLEY (Farben-Chem., 1932, 3, 343—346).—The determination of the (a) colour, (b) staining power, (c) oil absorption, and (d) fluidity of gas-carbon blacks is described and discussed. For a and b small roller mills are used. (Cf. B., 1931, 817.)

S. M.

Pressure hydrogenation of solid and liquid hydrocarbons in the laboratory. III. Course of the reaction and its dependence on the experimental conditions. F. LAUFICHLER (Chem. Fabr., 1932, 5, 345—348. Cf. A., 1932, 1108; B., 1932, 967).—The interrelation of the hydrogenation and decomp. reactions is discussed. Light is thrown on the course of the hydrogenation reactions by a study of the rate of thermal decomp. of the original material, and of the hydrogenation products, as a function of the temp.; the rate of thermal decomp. at any temp. is conveniently measured by the rate of gas formation. The optimum temp. of hydrogenation usually corresponds approx.

with the temp. on the decomp. curve of the original material at which the sharp rise in the curve begins, but is higher if it is desired to obtain the optimal yields of light oil in the shortest time. The importance of a knowledge of the heats of reaction involved is emphasised.

A. B. M.

Chemical utilisation of methane. C. PADOVANI (Proc. III Int. Conf. Bit. Coal, 1932, 1, 910—927).—Pyrolysis of CH_4 at 1000—1300° without pressure or catalysts gives finely-divided C (yields > 50%), light liquid hydrocarbons (chiefly C_6H_6 with small quantities of naphthenes), and H_2 . Quant. results from natural gas (98% CH_4) and a coke-oven gas are recorded. The importance of catalytic action is secondary to the effect of increasing the heating surface. CH. ABS.

Conversion of wood waste into fuel gas. M. SCHOFIELD (Ind. Chem., 1932, 8, 354—356).—Several designs of suction-gas producer intended for the gasification of wood waste are described. It is essential to pay attention to the removal of tar and acid vapours, and a deeper fuel bed is required than with anthracite. The average composition of the gas is 8% CO_2 , 25% CO , 12% H_2 , 3% CH_4 . Producer tar is the only by-product. The producer body is usually of mild-steel plate lined with firebrick to the top. A scrubbing tower packed with wooden grids, tar extractor, and final filter packed with wood-wool or sawdust are supplied. Several large plants exist abroad; in one the gas is used in the treatment of Ag ores.

C. I.

Calorific values [of gas] and their relation to working results and costs. J. JAMIESON (Gas J., 1932, 199, 573—586).—A detailed analysis has shown that the majority of works supply 490—510 B.Th.U. gas, although the lowest net cost per therm into holder (1.98d.) is from a works supplying gas of declared val. 475 B.Th.U., whilst the highest make per ton (94.3 therms) is from 425 B.Th.U. gas. Detailed yields of coke, breeze, and tar are given for each group of declared val., and consideration of all the data indicates that low-grade gas is not necessarily the cheapest. Variation of the quality of gas produced in vertical retorts during different parts of the day was found to be due to sorting out into sizes of the mixture of broken coal and fines used when withdrawing from the hoppers. Tests on two sets of vertical retorts show that better results are obtained when using external producers and non-recuperating settings. Tests on coke screens gave optimum results with a two-deck flat screen contained in a common frame vibrated by an eccentric connecting rod. A test vertical setting has been used for making gases of 400—500 B.Th.U. at intervals of 25 B.Th.U. from the same coal under standard conditions. As the calorific val. falls, so also do the coke and breeze yields and the throughput, whereas the tar and liquor yields rise. The tar has a lower sp. gr. and free C content, but a higher % of tar acids (b.p. 200—270°). On the basis of detailed results, using the present average val. for residuals, the cheapest gas to manufacture is that of 475 B.Th.U.; there seems to be no justification for producing low-grade gas.

R. N. B.

Concentrated gas liquor—its manufacture by modern methods and its utilisation. R. J. PHILP

(Gas World, 1932, 97, 245—248).—The Thorncliffe-Balduric process is described, in which a predetermined still-head temp. is kept const. by automatic regulation of liquor and steam supplies. Increase of pressure due to NH_4HCO_3 formation automatically stops the liquor feed, whereby the temp. of the condenser gases rises, causing the dissociation of the crystals. Labour and steam requirements are low; the concn. costs about 10s. per ton, which is > saved by reduced transport charges. The liquor contains NH_3 18.9, CO_2 24.4, H_2S 0.9%, and is suitable for carbonating with acid-free producer gas. The uses of the NH_4HCO_3 formed are discussed.

R. N. B.

Distilling and cracking. E. GINZBURG (Azerbaij. Neft. Choz., 1931, No. 11—12, 68—76).—The operation of Winkler-Koch plant is described. CH. ABS.

Non-residuum distillation (cracking). M. VOLF and V. SHEVLIKOV (Azerbaij. Neft. Choz., 1931, No. 11—12, 80—87).—The effect of the charge, size of still, and velocity of distillation on the composition of the distillate, and the possibility of simultaneous distillation and cracking, of various oils was studied.

CH. ABS.

Kerosene batteries. E. SUSANOV (Azerbaij. Neft. Choz., 1932, No. 4, 53—55).—By using mud separators, preheating at 140—150°, and reconstructing the gasoline bubble towers 90—92% of the gasoline and 1.5% of naphtha, together with kerosene, were obtained from a crude oil.

CH. ABS.

Reconstruction of kerosene batteries. A. GURVICH and V. DENISEVICH (Azerbaij. Neft. Choz., 1931, No. 11—12, 65—67).—In the first set, crude oil preheated at about 160° is used; gasoline (vapour), kerosene, and naphtha are obtained from the bubble tower. In the second set gas oil and kerosene are produced, kerosene being used as reflux for the tower.

CH. ABS.

Reconstruction of old crude-oil batteries. S. VOLOKH (Azerbaij. Neft. Choz., 1931, No. 11—12, 59—64).—Division into 5 units is recommended. CH. ABS.

Stabilisation and reclamation plant in [oil]-refinery practice. N. MAYER (Petroleum, 1932, 28, No. 30, 3—6; cf. B., 1932, 825).—The application of typical plant for reclamation of gasoline from refinery gases and the stabilisation (removal of C_2H_6 , C_3H_8 , and isobutane) of cracking distillates is described and the calculation of optimum stabilisor pressures is discussed.

H. E. B.

Mineral oil and the construction of plant in Germany. H. SIEBENECK (Petroleum, 1932, 28, No. 30, 1—3).—The German development of original continuous-tube distillation methods is discussed and typical results are described.

H. E. B.

Crude oil from the Benoi district. L. SELSKI and A. GANCHIKOV (Neft. Choz., 1931, 21, 147—150).—The paraffin-base oil, containing practically no light gasoline and machine oil fraction, is described.

CH. ABS.

Sulphuric acid treatment of long residuum from Emba crude oil. MATUSEVICH (Neft. Choz., 1932, 22, 176—178).—Treatment with 10—11% of 96—98% H_2SO_4 at 30—35°, settling for 6—8 hr., and filtration

through clay when 1% of acid sludge is left in the distillate, are recommended. CH. ABS.

Treatment of oils and preparation of "kontakt" by using sulphur trioxide. V. RAZDERISHIN and E. DENNEMARK (Nef't. Choz., 1931, 20, 95—101).—The distillate is charged into an airtight agitator and contacted with SO_3 diluted with air. A second agitator is provided for the "kontakt" extract, and the third is a caustic agitator. The results of sulphonation of various petrolatum distillates are described. The amount of reagent (\equiv oleum of 80% SO_3) consumed by the oil was 3.6% (Sarkisov method 9.3, ordinary method 18%); 6 consecutive treatments at 75° gave 24.4—29.6% of "kontakt." Characteristics of the products, of the usual quality, are described. CH. ABS.

Causes of the changes in insulation oil in the transformer boiling-process. E. PECHMANN (Arch. Elektrotech., 1932, 26, 6—17; Chem. Zentr., 1932, i, 3368).—Darkening is accompanied by increases in the acid, sap., and tar vals. All except the darkening approach a limiting val. The changes are attributed to the linseed oil lacquer films. A. A. E.

Possibilities of preparing automobile oil "T" and bright stocks from Grozni mixed-base crude oil. KOLUBELNIKOV (Grozni Nef't., 1931, 1, No. 11—12, 54—59).—Yields were 9.20 and 6.07% of the crude oil, respectively. The cost at the refinery of 1 metric ton is 56.70, 68.20, and (petrolatum) 3.00 roubles, respectively. CH. ABS.

Acids (hydroxy-acids) insoluble in naphtha. A. DOVANKOV (Masloboino Zhir. Delo, 1932, No. 1, 54—60).—The oxidation products of hydrocarbons used in soap manufacture contain much hydroxy-acid. For its separation (1) conc. H_2SO_4 is added in small portions with stirring to the solution of the acids in naphtha (3:1), the hydroxy-acids are pptd., and the carboxylic acids are regaimed from the H_2SO_4 solution by dilution with H_2O ; (2) gaseous HCl is passed into the naphtha solution (5:1) of the acids until the increase in wt. is 0.3—0.8%. The hydroxy-acids separate completely in 12 hr. CH. ABS.

Acid sludge from refining aromatic hydrocarbons. S. POPOV and T. PROKOFEVA (Azerbaid. Nef't. Choz., 1932, No. 5, 83—86).—Part of the H_2SO_4 can be replaced by acid sludge. Steaming the acid sludge yields approx. 45% acid containing up to 15% C. CH. ABS.

Asphalts from cracked residues. A. N. SAKHANOV and N. I. LOGVINOVA (Grozni Nef't., 1931, 1, No. 6—7, 69—71).—Cracked residues (characteristics recorded) were conc. by vac.-distillation, steam-distillation, or blowing with air at 300°. CH. ABS.

Appraisalment of Diesel fuels. E. PYHÄLÄ (Petroleum, 1932, 28, No. 38; Motorenbetr., 5, 4—8).—Fractional distillation is of great val. for evaluation purposes. The "ignition fraction" distilling below 250° also should be fairly large (e.g., about 50% for dark Diesel oils, for which the total vol. boiling below 300° would be about 80%). E. L.

Recent views on the evaluation of motor spirits. L. JACQUÉ (Chim. et Ind., 1932, 28, 524—537).—The

relationship of various characteristics of a motor spirit, e.g., calorific val., antiknock val., boiling range, volatility, stability, and gum content, to its performance in the engine is discussed in the light of recent research. A. B. M.

Determination of gum in gasoline. High-temperature modification of air-jet method. M. J. MULLIGAN, W. G. LOVELL, and T. A. BOYD (Ind. Eng. Chem. [Anal.], 1932, 4, 351—356).—The procedure is devised to simulate the conditions of deposition of gum in the internal-combustion engine. The gasoline is contained in a glass beaker kept in a const.-temp. vessel at 200°, and is evaporated in a stream of preheated air (at a speed of 1000 c.c. per sec.). The residual gum is weighed. Oxidation does not cause any serious error. E. S. H.

Determination of benzene in solvent mixtures. W. A. COOK (Ind. Eng. Chem. [Anal.], 1932, 4, 406—408).—The brown coloration or black ppt. produced by reaction of 0.5% FeSO_4 and 1% H_2O_2 with C_6H_6 has been adapted to determine as little as 0.01 c.c. of C_6H_6 . The ppt. is dissolved in dil. HNO_3 and compared colorimetrically with a standard. E. S. H.

Detection and determination of free sulphur in petroleum distillates. Colorimetric method. M. K. THORNTON, JUN., and J. E. LATTI (Ind. Eng. Chem. [Anal.], 1932, 4, 441—442).—The oil is treated with a mixture of refined, unbleached cottonseed oil (80 c.c.), CS_2 (80 c.c.), and $\text{C}_5\text{H}_5\text{N}$ (8 c.c.) at 100° for 30 min. The colour developed is compared with standards prepared from known solutions of S in purified naphtha. Combined S gives no reaction. E. S. H.

Stills.—See I. Corrosion and petroleum.—See X. Lubricating greases. Fluorescence of wax.—See XII.

See also A., Nov., 1085, Adsorption of C_2H_4 by H_2SO_4 . 1095, Cr_2O_3 as catalyst. 1099, Prep. of C from gaseous C_6H_6 . 1106, Polish natural gases. 1121, Fractions of higher b.p. of coal-tar heavy oil.

PATENTS.

Apparatus for carbonisation of fuels. C. PAMART, Assee. of COMP. DES MINES DE BRUAY (B.P. 380,074, 8.4.31. Fr., 23.4.30. Addn. to B.P. 268,613; B., 1927, 468. Cf. B.P. 331,497; B., 1930, 977).—The oxidising tube (A) is arranged to lie within and co-axially with the preheating retort to which it is rigidly attached so that both rotate together. The coal is preheated to a temp. below its softening point, e.g., 350°, as it passes through the annular space, and is then subjected in A to a countercurrent of air before it is passed to the lower carbonising retort. Centrifugal apparatus (B) is provided for recovering the dust in the gases leaving A and returning it to the retort; valves are provided for preventing gases and vapours from the retort passing to A or B, and various other minor improvements in design are described. A. B. M.

Coke-oven apparatus. F. PUENING, Assr. to KOPPERS Co. (U.S.P. 1,842,199, 19.1.32. Appl., 30.4.27).—A charging truck for coke ovens carries one or more hoppers provided with gastight covers and with means for connecting the hoppers to the openings in the coking

chamber. Steam is supplied to the hoppers before discharging them in order to place them under pressure and so prevent smoke and gas from the chamber passing into them. A. B. M.

Vertical coking retort oven. J. VAN ACKEREN, Assr. to KOPPERS Co. (U.S.P. 1,846,410, 23.2.32. Appl., 13.12.26).—Two sets of vertical heating flues are superimposed on one another, whilst regenerators are placed under the heating wall to avoid the use of expansion joints. A lower set of horizontal flues carries the fuel and air from the regenerators to the heating flues, and an upper set collects the products of combustion and conveys them back to the regenerators. R. N. B.

Coal-distillation apparatus. E. H. RECORDS (U.S.P. 1,843,174, 2.2.32. Appl., 22.10.27).—The coal is carbonised in a vertical retort having a superposed steam-jacketed preheating chamber. The retort itself is steam-jacketed and its walls are perforated so that carbonisation is effected in a current of superheated steam passing from the jacket through the charge. The coke is discharged intermittently into a water-jacketed cooling chamber. A. B. M.

Converting [high- into low-volatile] coals. L. I. YEOMANS, Assr. to L. I. YEOMANS, INC. (U.S.P. 1,846,982, 23.2.32. Appl., 23.3.27).—Coal is forced up a retort of small diam. by means of an internal screw conveyor of decreasing pitch. A rotating rod forming a prolongation of the conveyor allows passage of the volatile gases, which together with the solid product are withdrawn at the top. The retort is heated to such a temp. as to initiate an exothermic reaction in the coal. R. N. B.

Production of coking coals. R. HOLROYD, and IMPERIAL CHEM. INDUSTRIES, LTD. (B.P. 379,755, 5.6.31. Cf. B.P. 301,720; B., 1929, 119).—Coking coal is produced by the partial hydrogenation of non-coking coal by treatment with H_2 at raised temp., e.g., 350–420°, under pressures of < 50 atm., the conditions being regulated to give no substantial amount of liquid or easily fusible products. The process is preferably carried out in the presence of a catalyst, e.g., oxides or sulphides of Mo or W, Sn oxalate, etc. A. B. M.

Regeneration of granular active charcoal. A. MACKERT (U.S.P. 1,843,616, 2.2.32. Appl., 21.12.28. Ger., 24.12.27).—The spent charcoal is treated without agitation or external heating with a preheated gas mixture, e.g., steam and air, containing 2–8% O_2 , at a temp. at which the impurities are destroyed without substantial oxidation of the charcoal. The gases may be preheated to 120–250°; when oxidation commences a high-temp. reaction zone, e.g., at 500–600°, travels through the charcoal layer and effects the desired revivification. A. B. M.

Manufacture of [solid alcohol] fuel. W. W. TRIGGS. From STERNO CORP. (B.P. 380,467, 12.3.31).—Nitrocellulose having a N content (e.g., 11.5–11.8%) which renders it sol. in EtOH is dissolved therein, with or without the addition of other solvents and denaturants, e.g., MeOH, C_5H_5N , etc., and the solution is converted into a gel by the addition of H_2O . A. B. M.

Conversion by destructive hydrogenation of solid carbonaceous materials into liquid pro-

ducts, especially benzenes. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 380,615, 5.10.31).—The material is hydrogenated in stages (A, B); in A it is treated with excess of H_2 under pressure and at raised temp., preferably in the presence of catalysts, e.g., compounds of Zn, Mg, W, Mo, etc.; in B the partly hydrogenated products are further hydrogenated in the liquid phase, also preferably in the presence of catalysts, but with a smaller amount of free H_2 relative to the amount of carbonaceous material in the reaction chamber than in A. If desired, a third stage may be employed in which the products from B are further hydrogenated in the liquid or vapour phase and with a still smaller ratio of free H_2 to material being treated. A. B. M.

Manufacture of combustible gas. W. W. ODELL, Assr. to COLUMBIA ENG. & MANAGEMENT CORP. (U.S.P. 1,841,201, 12.1.32. Appl., 8.5.30. Cf. U.S.P. 1,762,100; B., 1931, 287).—A generator packed with chequerbrick or similar contact material is alternately heated by the combustion therein of hydrocarbon gases with air, and used to bring about interaction of the hydrocarbon gases and steam to form a mixture of H_2 and CO in the proportion 2:1 to 3:1. The product may be used for the synthesis of MeOH or may be carburetted to give town's gas. A. B. M.

Manufacture of combustible gas and carbonised fuel. H. O. LOEBELL, Assr. to H. L. DOHERTY (U.S.P. 1,840,403, 12.1.32. Appl., 17.6.24).—A water-gas generator and a carbonising retort are run in conjunction in such a manner that carbonisation of the fuel in the latter is effected by passing through it water-gas which has been superheated in regenerators raised to the requisite temp. by the combustion of the blast gases therein. Suitable plant is described. A. B. M.

Production of carburetted gas and hydrocarbon motor fuel. C. J. RAMSBURG, Assr. to KOPPERS Co. (U.S.P. 1,846,403, 23.2.32. Appl., 12.2.27).—Coke-oven gas is passed through the hot fuel bed of a water-gas generator at such a rate as to produce a gas containing 60% H_2 . This gas is carburetted with excess of oil and any motor fuel formed is condensed out in a wash-box. The conditions are regulated to obtain a gas of similar d and thermal val. to the original. Means are provided for blasting the carburettor and generator. R. N. B.

Carburetted gases under pressure. METALLGES. A.-G. (B.P. 380,386, 4.4.32. Ger., 1.5.31).—A portion of the gas is burned with O_2 under pressure, the carburetted agent is sprayed into the gases so heated, and the rich gas formed, after removal of the steam, CO_2 , and SO_2 by condensation or washing with H_2O under pressure, is added to the remainder of the gas. A. B. M.

Production of oil gas. H. C. WADE (U.S.P. 1,846,235, 23.2.32. Appl., 2.5.28).—Oil and H_2O preheated to 93° by heat exchange are vaporised in a heated coil in contact with a nichrome catalyst. Any liquid is condensed out in an expansion chamber and the vapours are gasified by heating to 438°. R. N. B.

Production of rich gas from bituminous fuels and distillation residues, by gasification with oxygen under elevated pressure. METALLGES. A.-G.

(B.P. 380,158, 17.6.31. Ger., 5.7.30. Addn. to B.P. 364,407; B., 1932, 248).—A gas consisting principally of H_2 and CO_2 and containing $> 25\%$ of $CH_4 + CO$ is produced by using the process of the prior patent and increasing the rate of gasification in the producer by increasing the speed of travel of the gasifying medium through the fuel bed. H_2 is separated from the other constituents by supercooling the mixture. A. B. M.

Production of carbon monoxide and hydrogen mixtures [from hydrocarbons]. S. P. BURKE, Assr. to COMBUSTION UTILITIES CORP. (U.S.P. 1,843,063, 26.1.32. Appl., 13.5.26).—A hydrocarbon gas, *e.g.*, natural gas, and air or O_2 are preheated and mixed in suitable proportions, *e.g.*, those corresponding with the reaction $2CH_4 + O_2 = 2CO + 4H_2$, the mixture is passed through an externally-heated reaction tube at about 1000° , and the products are rapidly cooled.

A. B. M.

Apparatus for separation of hydrocarbons from gases containing the same together with hydrogen.

J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 380,164, 20.6.31).—Hydrocarbons are separated from gases containing different proportions of H_2 by removing part of the hydrocarbons from the gases richer therein by washing them with a suitable solvent, combining the washed gases with the gases poorer in hydrocarbons, and then washing the combined gases. Thus in the treatment of gases from the destructive hydrogenation of tar etc., the gases obtained on releasing the pressure on the liquid products down to 25 atm. may be compressed, washed, mixed with the circulating hydrogenating gas, and the mixture then again washed and returned to the reaction chamber.

A. B. M.

Gas-purification process. F. W. SPERR, JUN., Assr. to KOPPERS Co. (U.S.P. 1,841,419 and 1,841,421, 19.1.32. Appl., [A] 24.7.26, [B] 19.2.27).—(A) Gases containing H_2S and HCN are purified therefrom by washing with a 2–2.5% aq. solution of Na_2CO_3 containing $< 0.1\%$ of an Fe, Ni, or Co compound. The solution is reinvigorated by aeration. The proportions of alkali and catalyst are such that the H_2S and HCN are fixed as thiosulphate and thiocyanate, respectively, without the liberation of free S. (B) Generator gas, water-gas, etc. are purified by circulating the solution through the wash-box, passing the foul solution to a settling tank wherein the tar is separated, and thence to an aëerator wherein it is regenerated. Part of the circulating liquor is replaced by fresh solution as required.

A. B. M.

Preparation of gaseous enveloping atmospheres for use in metallurgical operations.

BRIT. THOMSON-HOUSTON Co., LTD., Asses. of F. P. WILSON, JUN. (B.P. 380,428, 5.3.31. U.S., 6.3.30).—A mixture of a fuel gas, *e.g.*, town's gas, and steam is passed through a reaction chamber maintained at a temp. between 700° and 1100° such that the gaseous product, which is supplied to brazing, heat-treating, or other types of metallurgical furnace, is rendered carburising, decarburising, or neutral, as desired, with respect to the metal undergoing treatment.

A. B. M.

Treating the charges supplied to internal-combustion engines. A. V. WATSON (B.P. 381,192,

1.4.31).—An ozoniser is connected to the terminals of the ignition system of the engine to ozonise the air supply and thus ensure a more complete combustion of the fuel charge.

E. D.

Treatment of ammoniacal gas liquor and other liquids containing tar acids. KOPPERS Co., Asses. of D. L. JACOBSON (B.T. 380,699, 30.1.32. U.S., 31.1.31. Cf. B.P. 299,837; B., 1929, 970).—Tar acids are removed from gas liquor etc. by passing an inert gas through the liquor at a temp. near its b.p. and at a pressure above atm., *e.g.*, 50 lb./sq. in. The gas is then scrubbed with aq. NaOH to recover the tar acids and is recirculated.

A. B. M.

Treatment of liquid containing tar acid. H. J. ROSE, Assr. to KOPPERS Co. (U.S.P. 1,840,977, 12.1.32. Appl., 20.12.28).—Effluent liquors containing PhOH or other tar acids are treated with $Br-H_2O$ and the pptd. Br compounds are separated by froth flotation. The Br compounds are decomposed by means of a reducing agent, *e.g.*, Zn and aq. NaOH, and, after pptn. of the phenols by CO_2 , the Br is liberated by chlorination, or other means, and returned for the treatment of a further quantity of liquor.

A. B. M.

Purification of coal-tar crudes. A. O. JAEGER and L. C. DANIELS, Assrs. to SELDEN Co. (U.S.P. 1,841,895, 19.1.32. Appl., 9.1.29).—Coal-tar crudes which are normally solids, *e.g.*, anthracene, are purified by heating them to a temp., *e.g.*, 150° , sufficiently high to dehydrate them, and are then introduced while still hot into a solvent, from which they are recrystallised.

A. B. M.

Manufacture of asphalt. N. E. LOOMIS, Assr. to STANDARD OIL DEVELOPMENT Co. (U.S.P. 1,842,105, 19.1.32. Appl., 28.3.28).—Petroleum oil is passed through a heating coil into a separator from which the vapours and a first liquid residuum are withdrawn separately. The latter is then subjected to further distillation under vac., *e.g.*, 25 mm., and, if desired, in a current of superheated steam.

A. B. M.

Manufacture of pine-tar product. H. A. WINKELMANN, Assr. to PHILADELPHIA RUBBER WORKS Co. (U.S.P. 1,841,235, 12.1.32. Appl., 28.10.27).—Pine-tar oil is heated to $< 100^\circ$ and simultaneously blown with air, in the presence of a catalyst, *e.g.*, 2% of S. A viscous or pitchy product is formed which may be used as a compounding ingredient in the manufacture of rubber goods etc.

A. B. M.

Manufacture of [bituminous] emulsions. W. W. GROVES. From I. G. FARBENIND. A.-G. (B.P. 381,933, 27.5.31).—Stable aq. emulsions of bituminous substances are obtained by emulsifying with humic acid or substances containing humic acid (cf. B.P. 317,496; B., 1929, 843), and mixing with finely-divided siliceous earth. Protective coatings or insulations can be applied with brush or palette knife according to the % of siliceous matter present (usually 4–20%).

Conversion [cracking] of [hydrocarbon] oil. C. P. DUBBS, Assr. to UNIVERSAL OIL PRODUCTS Co. (U.S.P. 1,843,709, 2.2.32. Appl., 22.6.21. Renewed 23.9.25).—Raw oil is fed into the top of each of two dephlegmators (A, B) in quantities sufficient to maintain the vapours leaving A at a temp. above, and

those leaving *B* below, the b.p. of H_2O at the operating pressure. The H_2O collecting in the bottom of *B* is withdrawn and the reflux condensed from *B* passes into *A* at a point about halfway up. The reflux condensate from *A* is heated in a coil and passed into a vaporising chamber from which the residue is withdrawn and the vapours are passed into *A*. The vapours from *A* then enter *B* at a point some distance from the top and those from *B* are condensed. D. K. M.

Cracking of hydrocarbon oils. C. P. DUBBS, Assr. to UNIVERSAL OIL PRODUCTS Co. (U.S.P. 1,843,710, 2.2.32. Appl., 10.11.22. Renewed 3.11.28).—Raw oil is sprayed into a dephlegmator (*A*) at a point some little distance from the top and some of the final distillate obtained by condensing the vapours from *A* is returned to the top. The reflux from *A* and the liquid from the last of several digesting vessels (*B*) in series, each vessel having vapour and liquid connexions with the preceding one at one end and with the succeeding one at the other, are heated in a cracking coil and passed into the first digesting vessel. The vapours from *B* pass into the bottom of *A*. D. K. M.

Conversion [cracking] of hydrocarbon oil. R. T. POLLOCK, Assr. to UNIVERSAL OIL PRODUCTS Co. (U.S.P. 1,844,480, 9.2.32. Appl., 28.9.28).—Oil preheated in a partial condenser (*A*) is mixed with the reflux condensate from a dephlegmator (*B*), heated to cracking temp., and delivered into a vaporising chamber from which the residue is withdrawn and the vapours are passed into the bottom of *B*. The vapours leaving *B* are partly condensed in *A*, the condensate flowing into the top of *B*, and then are condensed. D. K. M.

Treatment [cracking] of petroleum oil. L. C. HUFF, Assr. to UNIVERSAL OIL PRODUCTS Co. (U.S.P. 1,843,158, 2.2.32. Appl., 7.5.25. Renewed 18.2.29).—The oil is pumped through a coil (*A*) in contact with the hottest burner gas, then upwards through a coil down the outside of which the burner-gas flows, and thence to a separating chamber (*B*) with insulated walls fitted with dampers for the circulation of air for temp. control. The vapours from *B* pass through a dephlegmator to a condenser (*C*). The reflux condensate from *C* is returned to *A*. The process is operated under pressure. D. K. M.

Conversion [cracking] of petroleum oil. G. EGLOFF and J. C. MORRELL, Assrs. to UNIVERSAL OIL PRODUCTS Co. (U.S.P. 1,843,711, 2.2.32. Appl., 14.1.22).—A horizontal drum (*A*) is connected to and situated above a coil (*B*), both of which are mounted in a furnace. Oil is pumped into *A*, maintained at a const. level therein, flows through *B* in which it is heated to cracking temp., and is delivered through an upstand pipe (the top of which is below the oil level in *A*) into a separation chamber from which the vapours pass into a dephlegmator (*C*) and also the residue is withdrawn. The light hydrocarbons vaporised in *A* pass into a dephlegmator (*D*) the reflux condensate from which, with or without that from *C*, is returned to *B*. The combined vapours from *C* and *D* are condensed. D. K. M.

Prevention of corrosion in oil-cracking systems. J. C. MORRELL and L. C. HUFF, Assrs. to UNIVERSAL OIL PRODUCTS Co. (U.S.P. 1,844,475, 9.2.32. Appl., 15.7.26.

Renewed 23.2.29).—Aq. alkali, *e.g.*, NaOH, Na_2CO_3 , containing NH_3 is introduced into the apparatus.

D. K. M.

Cracking of coal and oil. W. E. TRENT, Assr. to TRENT PROCESS CORP. (U.S.P. 1,842,132, 19.1.32. Appl., 7.11.27. Cf. U.S.P. 1,589,023; B., 1926, 732).—Oil is cracked to give gasoline and a heavy residue, and the latter is used to form aggregates with pulverised carbonaceous material. The agglomerates are then baked, the oil distillate therefrom being returned for re-cracking. A. B. M.

Cracking of hydrocarbons. G. EGLOFF, Assr. to UNIVERSAL OIL PRODUCTS Co. (U.S.P. 1,843,664, 2.2.32. Appl., 4.12.19).—The oil is passed through a heating coil under cracking conditions and delivered to an enlarged reaction zone. The vapours are refluxed and hot reflux condensate, hot pressure-distillate bottoms, and a quantity of fresh charging stock simultaneously introduced into a mixing chamber and passed to the conversion chamber. H. S. G.

Treatment of hydrocarbons. L. KIRSCHBRAUN, Assr. to UNIVERSAL OIL PRODUCTS Co. (U.S.P. 1,843,683, 2.2.32. Appl., 1.6.20. Renewed 2.6.27).—Oil is cracked and delivered to a reacting stage (*A*) comprising connected chambers, different proportions of the oil being introduced into different reacting chambers at points intermediate to the length of *A*. The vapours are passed to a reflux condenser and the condensate is recycled. Residue is withdrawn from *A*, and the whole system is maintained under pressure. H. S. G.

Treatment of oil. L. KIRSCHBRAUN, Assr. to UNIVERSAL OIL PRODUCTS Co. (U.S.P. 1,843,684, 2.2.32. Appl., 23.12.20. Renewed 13.1.28).—Oil is cracked under a self-generated v.p. and the vapours are dephlegmated under successively reduced pressure, the character of the distillate produced being regulated by controlling the points in the height of each stage of dephlegmation at which vapours are withdrawn. The vapours from the final stage of dephlegmation are condensed, while a regulated differential pressure is maintained during the operation. H. S. G.

Conversion of petroleum oils. W. F. SIMS and J. C. MORRELL, Assrs. to UNIVERSAL OIL PRODUCTS Co. (U.S.P. 1,843,700, 2.2.32. Appl., 1.5.23. Renewed 7.11.28).—Oil is subjected to cracking conditions and discharged into an enlarged reaction zone. The vapours are dephlegmated and the heavier insufficiently cracked portions condensed are returned to the cracking zone. The uncondensed vapours are condensed and the cracked distillate is utilised as cooling medium for the dephlegmation, thereby redistilling portions of the distillate, the vapours from which are passed in intimate contact with additional quantities of the distillate, thereby dephlegmating the vapours and assisting in the redistillation of additional quantities of distillate. The remaining uncondensed vapours are finally separately condensed. H. S. G.

(A) Treatment, (B) cracking, of hydrocarbon oils. G. EGLOFF, Assr. to UNIVERSAL OIL PRODUCTS Co. (U.S.P. 1,843,385—6, 2.2.32. Appl., [A] 12.6.20, [B] 30.6.20. Renewed [B] 24.3.27).—(A) Oil is passed under pressure through a series of cracking stills maintained at

progressively higher temp., *e.g.*, 380°, 390°, and 400°. The vapours from each still are passed to independent reflux condensers and the condensate from each, except the last, is diverted to the next succeeding still of the series from which it originated. (B) The reflux condensate, together with a quantity of raw oil, is returned to the next successive still of the series where it is maintained under a higher temp. and pressure than in the still in which it originated. H. S. G.

Production of cracked hydrocarbons. T. T. GRAY, ASSR. to GRAY PROCESSES CORP. (U.S.P. 1,846,803, 23.2.32. Appl., 3.3.26).—Cracked hydrocarbon distillate in the liquid phase is brought into contact with a non-hydrogenating catalyst containing Cu and favouring the production of gum at approx. cracking temp. Subsequently the pressure is released to effect vaporisation and the gasoline is obtained by rectification of the vapours. H. S. G.

Distillation of oils. E. J. SHAEFFER and E. P. BROWN, ASSRS. to STANDARD OIL CO. (U.S.P. 1,843,520, 2.2.32. Appl., 5.5.24).—A crude oil is distilled under non-cracking conditions to a pitch-like residue which is rapidly passed while hot through a heating zone maintained above decomp. temp. to an enlarged chamber where a body of unvaporised liquid is held under approx. atm. pressure until material decomp. thereof is effected. A quantity of superheated steam is passed into the oil to aid removal of the vaporous decomp. products, which are finally condensed, while the liquid residuum is separately withdrawn. H. S. G.

Distillation of hydrocarbons. F. A. HOWARD, ASSR. to STANDARD OIL DEVELOPMENT CO. (U.S.P. 1,843,560, 2.2.32. Appl., 10.7.24).—The oil is passed through a heated conduit of restricted cross-section where it is raised to a temp. just below that of decomp., and thence into the lower portion of an enlarged vertical zone maintained under a sufficiently low pressure to cause flash-distillation, by the combined heat of the oil alone, of one wide cut containing lubricating fractions together with lower-boiling constituents. The lubricating fractions are condensed within the chamber, collected, and withdrawn at a point above that at which the oil enters the chamber. H. S. G.

Distillation of [hydrocarbon] oil. E. W. LUSTER, ASSR. to STANDARD OIL DEVELOPMENT CO. (U.S.P. 1,843,570, 2.2.32. Appl., 10.11.27).—A middle fraction of the oil is passed through a heating coil under such conditions of temp. and rapid flow as to prevent substantial cracking, and discharged into direct distillation contact with feed oil being continually passed into the contact zone, whereby substantially uncontaminated natural naphtha and other lower-boiling fractions, including the middle fraction, are vaporised. The unvaporised oil is removed. The vapours are condensed, forming the middle fraction, a portion of which is forwarded to the coil without admixture with fresh feed oil, the remainder being withdrawn from the system. Vapours escaping condensation are fractionated in a zone separate from that in which distillation of the feed oil takes place. H. S. G.

Production of gasoline from gaseous and low-boiling liquid hydrocarbons. W. K. LEWIS, P. K.

FROLICH, and W. S. ASBURY, ASSRS. to STANDARD OIL DEVELOPMENT CO. (U.S.P. 1,843,880, 2.2.32. Appl., 8.9.27).—Gaseous olefines admixed with H₂ and a limited quantity of inert gas are passed through a reaction zone packed with a metallic contact material, *e.g.*, Cu shot, maintained at 300–600°/1000–3500 lb. per sq. in.; the H₂ pressure, time, and temp. are adjusted so that the formation of tarry material and coke is substantially prevented, and a liquid is produced the major portion of which has b.p. < 225°. H. S. G.

Recovery of natural gasoline. F. L. KALLAM (U.S.P. 1,846,206, 23.2.32. Appl., 3.8.27).—Natural gas is initially compressed and cooled to obtain a portion of its gasoline content, which is separated, and the remaining gas is further compressed, cooled, and brought in contact with a reflux liquid that condenses and absorbs the liquid-forming constituents of the gas. The lighter liquid so obtained is expanded at a lower pressure and brought into heat-exchange relation with the remaining gas, thereby partly condensing a further portion to form additional reflux. H. S. G.

Manufacture of high-class Diesel oils. EDELEANU GES.M.B.H. (B.P. 381,941, 9.6.31. Ger., 17.6.30).—Oils with low ignition point suitable for low-compression high-speed Diesel motors are prepared either by adding > 30% of the SO₂ raffinate from badly igniting Diesel oils, or by subjecting the oil to incomplete extraction with liquid SO₂ (up to 75% of attainable efficiency). H. E. T.

Manufacture of relatively non-inflammable cleaning fluids. R. LUNGSTRAS (U.S.P. 1,844,290, 9.2.32. Appl., 23.6.30).—The solvent, *e.g.*, gasoline (5 pts. by vol.), is mixed with liquid N₂ (1 pt.) under pressure and maintained at 1371° for approx. 30 min. H. S. G.

Water-soluble sulphonic acid of the unsaturated hydrocarbons of oils for use as a protein precipitant. E. STAEGEMANN, ASSR. to DAYTOL CO. (U.S.P. 1,847,023, 23.2.32. Appl., 24.10.27).—Oil having an asphalt base, containing a substantial amount of unsaturated compounds, is agitated with an equal amount of H₂SO₄, *e.g.*, for 1 hr. at 80° or longer in the cold, and then the mixture is poured into an equal vol. of H₂O and set aside. The thick middle layer is separated and mixed with an equal vol. of H₂O. After removal of any oil which separates on keeping, the dark green aq. solution can be used for the pptn. of proteins from liquids of acid reaction, *e.g.*, sewage and effluents and raw sugar juices; in the latter case it is advantageous to add a small quantity of gelatin or albumin before pptg. J. H. L.

Manufacture of paraffin wax of high m.p. A. J. GENTIL (B.P. 381,308, 9.9.31. Holl., 4.8.31).—The heavy paraffin distillates are mixed with about 10% of a solvent rich in aromatic compounds, thus assuring complete solidification when cooled to room temp. The mixing can be effected before or after the usual purification with alkali. The mass obtained is sweated to give a wax having m.p. > 60°. E. D.

Washer-boxes for coal. SIMON-CARVES, LTD., and V. H. ADAMS (B.P. 381,735, 28.10. and 4.12.31).

Controlling arrangements for gas burners. R. BOSCH A.-G. (B.P. 382,252, 15.6.32. Ger., 18.6.31).

Artificial fuel for gas and like stoves. A. J. EYNON and E. FIELDING (B.P. 382,040, 2.10.31).

Filters particularly designed for reclamation of motor lubricating oils. W. I. CLAYES (B.P. 382,001, 11.8.31).

Heat-treating liquids. Analytical distillation.—See I. Bitumen-saturated fabrics.—See VI. $\text{Na}_2\text{S}_2\text{O}_3$ from gas liquor. S recovery.—See VII. Insulating materials.—See XI. Bitumen paints. Pencil leads. Mouldable masses.—See XIII. Unsaturated hydrocarbons from rubber.—See XIV.

III.—ORGANIC INTERMEDIATES.

Methods and apparatus for oxidation of hydrocarbons. L. F. MAREK (Ind. Eng. Chem., 1932, 24, 1103—1107).—Aromatic hydrocarbons usually require high temp. and a catalyst, and oxidation proceeds in stages so that intermediate products can be recovered with good yield. A suitable converter consists of numerous small catalyst tubes in a heated liquid. A mixture of C_{10}H_8 vapour and air is passed into the tubes of such a converter maintained at 425° by boiling Hg under N_2 pressure, the Hg vapour being continuously condensed and the cooled liquid returned. The heat evolved in practice is 5500 kg.-cal. per kg. of C_{10}H_8 owing to a certain amount of complete combustion occurring. V_2O_5 supported on a catalytically inert carrier is the catalyst, and the loss of Hg need not exceed 1% per year. Aliphatic hydrocarbons are much more sensitive to oxidation. The proportion of O_2 used must be restricted as the stages are not well defined. Even with recirculation yields are low, and catalysts have not been found useful. The use of high pressures and lower temp. promotes the yield of alcohols, but in such processes the explosion risk is considerable.

C. I.

Esterification processes and equipment. D. B. KEYES (Ind. Eng. Chem., 1932, 24, 1096—1103).—The reaction between an alcohol and an org. acid is, in general, a balanced one and is most suitably conducted in a fractionating column with removal of the products. An addition of 1% of H_2SO_4 is an effective catalyst. A *tert.* alcohol loses OH in the process, whilst a primary alcohol loses H, which accounts for, e.g., the difficulty of producing EtCl and the ease of producing amyl chloride by simple esterification. In some cases (Et lactate) the addition of an inert liquid (C_6H_6) increases the rate of esterification by modifying the partial pressures. In the case of higher alcohols which are insol. in H_2O and yield insol. esters the process is simpler. HCO_2Me is produced by heating MeOH vapour in presence of Cu, with H_2 as by-product, but this method has not been used industrially. Batch-working is common, but continuous processes exist for production of MeOAc and EtOAc. EtCl is made from EtOH and HCl vapours in presence of fused ZnCl_2 . Et_2CO_3 is prepared from EtOH, CO, and Cl_2 , COCl_2 and ClCO_2Et being intermediate stages. High-boiling esters can be made by interaction of the alcohols and low-boiling esters, but this is not very economical. Ester gum is made by interaction of rosin acids with glycerol in a Cu kettle.

C. I.

Production of furfuraldehyde from husks of sunflower seeds and other materials containing pentosans. P. BELOV (Masloboino Zhir. Delo, 1931, 10, 22—25).—A continuous process affords a product 98—99% pure and eliminates the use of salt and neutralising agents. CH. ABS.

Evaporation rates and distillation range [of solvents]. L. IVANOVSKY (Farben-Chem., 1932, 3, 335—336).—The distillation range, d , η , γ , and comparative rates of evaporation of 21 common nitrocellulose solvents and thinners are tabulated. The filter-paper method does not give the rate of evaporation when the liquid is present in a lacquer; the figures obtained are variously affected by the η and γ of the liquid, the presence of admixed liquids or nitrocellulose, and the porosity of the paper. A self-recording apparatus is recommended (B., 1932, 590). S. M.

Tars formed in the manufacture of diphenylamine. L. DESVERGNES (Chim. et Ind., 1932, 28, 759—767).—Dimethyl-*p*-toluidine, acridine, α -aminoacridine, and carbazole are isolated from the tars produced in the technical prep. of NHPH_2 . J. L. D.

Sulphuration of aromatic compounds. I. CHMELNITZKAYA and V. VERKHOVSKAYA (Anilinokras. Prom., 1932, 2, No. 1, 31—34).—Sulphuration of aromatic NH_2 -compounds with polysulphides in aq. solution proceeds by decomp. of polysulphide by O with formation of $\text{Na}_2\text{S}_2\text{O}_3$ and a little Na_2SO_3 , the addition of oxidising agents being necessary. In the sulphuration of aromatic NO_2 - and NO_2 - NH_2 -compounds and indophenols the process consists of reducing and oxidising stages, the oxidising agent being introduced at the end of the reducing phase. CH. ABS.

[M.p. of] 2-nitronaphthalene from technical nitronaphthalene. V. LENKHOLD (Anilinokras. Prom., 1932, 2, No. 3, 16—17).—The m.p. is 75.1° (lit. 79°). CH. ABS.

Sulphonation of α -naphthylamine. N. N. VORONTZEV (Anilinokras. Prom., 1932, 2, No. 1, 39—42).—The highest yield of 1:4-disulphonic acid is obtained below 130° with H_2SO_4 containing some H_2O , the heating being rapid (1—2 hr.). Longer heating or more conc. acid leads to formation of 1:5-acid. CH. ABS.

Quality of Chicago SS-acid. Y. G. VENDELSHTEIN (Anilinokras. Prom., 1932, 2, No. 2, 3—6).—The acid, 1:8:2:4- $\text{C}_{10}\text{H}_4(\text{NH}_2)(\text{OH})(\text{SO}_3\text{H})_2$, was contaminated with 1:8:2:4- $\text{C}_{10}\text{H}_4(\text{OH})_2(\text{SO}_3\text{H})_2$ and some isomeric naphthylaminedisulphonic acids in which the NH_2 and SO_3H groups are not in the *peri*-position. CH. ABS.

Determination of diazotised intermediates of azo-dye manufacture. L. SESSA and A. MOSSINI (Boll. Assoc. Ital. Chim. Tess. Col., 1931, 7, 291—292; Chem. Zentr., 1932, i, 3230).—Azo-N is liberated with conc. HCl and determined eudiometrically. A. A. E.

Products from CH_4 . Naphtha-insol. hydroxyacids.—See II. Plant materials—See IV.

See also A., Nov., 1095, Cr_2O_3 as catalyst. 1108, Prep. of pure C_2H_4 from EtOH, and of isoprene from rubber. 1110, Prep. of pure isoamyl ether. 1113, Prep. of *d*-galactonic acid. 1123, Separation

of dinitronaphthalenes. Catalytic hydrogenation of anthracene. Separation of polynuclear aromatic hydrocarbons. 1131, Prep. of pyrene derivative from benzanthrone. 1135, Prep. of aminoanthraquinones. 1136, Dibenzanthraquinones. 1149, Determination of $\text{Pr}^{\circ}\text{OH}$ in $\text{EtOH-H}_2\text{O}$ mixtures, and of Et_2O in $\text{H}_2\text{O-EtOH-MeCHO}$ mixtures. Test for primary amines and for $\text{C}_6\text{H}_5\text{N}$. Determination of arylamines by picryl chloride. 1168, Production of acids by *Aspergillus niger*.

PATENTS.

Concentration of dilute acetic acid or liquor containing it. DISTILLERS CO., LTD., H. LANGWELL, and R. GILMOUR (B.P. 378,463, 12.5.31).—The dil. acid at -2° is cooled by flowing through a heat exchanger so that free ice crystals are carried forward to a separating vessel, deposition of ice crusts being avoided. Vinegar conc. thus in 2 operations to 40% AcOH retains its flavour and bouquet. C. H.

Separation of acetic anhydride from admixture with acetic acid and water. A. H. STEVENS. From E. BERL (B.P. 379,042, 2.7.31).—Brine is added and Ac_2O is extracted with C_6H_6 or other suitable org. solvent, e.g., aliphatic or hydroaromatic hydrocarbons or halogenated hydrocarbons, or $\text{H}_2\text{O-insol.}$ alcohols, ethers, or esters. C. H.

Manufacture of chloroform. C. J. STOSACKER, Assr. to Dow CHEM. Co. (U.S.P. 1,801,887, 21.4.31. Appl., 27.6.28).—Ca trichloroacetate is decarboxylated by heating with milk-of-lime at $50-60^{\circ}$. C. H.

Manufacture of hexachloroethane. G. M. BARTLETT (U.S.P. 1,800,371, 14.4.31. Appl., 9.5.25).— CCl_4 and Al with a little AlCl_3 are heated under reflux at $65-75^{\circ}$. Excess CCl_4 is used to keep in solution the C_2Cl_6 formed. C. H.

Production of alcohols [from olefines]. N. V. DE BATAAFSCHE PETROLEUM MAATS., Assees. of F. A. BENT (B.P. 378,764, 13.1.32. U.S., 14.1.31).—An olefine is passed into an aq. solution or suspension of a heavy-metal sulphate (ZnSO_4) at $275-325^{\circ}/210$ atm. $\text{Pr}^{\circ}\text{OH}$, EtOH , and *sec.*-BuOH are obtained from propylene, C_2H_4 , and mixed α - and β -butylenes, respectively. C. H.

Production of alcohols from olefines. G. F. HORSLEY, and IMPERIAL CHEM. INDUSTRIES, LTD. (B.P. 378,865, 16.5.31).—Hydration of olefines, especially C_2H_6 , in liquid or vapour phase, e.g., at $150-300^{\circ}/100$ atm., is effected in presence of B phosphate, preferably freed from B_2O_3 and H_3PO_4 by steaming at 400° . In the vapour-phase process large excess of olefine may be used and unconverted olefine returned to the cycle. C. H.

Production of organic substances [from acetylenes or olefines]. RUHRCHEMIE A.-G. (B.P. 378,873 and Addn. B.P. 378,979, [A] 17.2.31, [B] 25.2.31. Ger., [A] 17.2.30, [B] 26.2.30).—(A) The conversion of acetylenes or olefines into their additive compounds is effected by passing them in admixture with H_2 , H halides, NH_3 , etc. between surfaces having a considerable temp. difference. Thus C_2H_2 (1 vol.) and Cl_2 (2 vols.) are led through a tube at 205° carrying a

$\text{H}_2\text{O-cooled}$ tube at 110° ; $\text{C}_2\text{H}_2\text{Cl}_4$ is obtained in 93% yield. Similarly C_2H_2 and NH_3 at $600^{\circ}/100^{\circ}$ give MeCN; cracked CH_4 at $290-300^{\circ}/110^{\circ}$ gives a petrol; C_2H_2 and HCl at $300^{\circ}/60-80^{\circ}$ give vinyl chloride; C_2H_2 and AcOH at $200^{\circ}/20^{\circ}$, vinyl acetate and ethylidene diacetate; C_2H_2 and H_2O over Zn vanadate on pumice at $500^{\circ}/100^{\circ}$, MeCHO in 55% yield. (B) The hot and cold surfaces are connected by pieces of good-conducting material, on which the catalysts may be deposited. C. H.

Production of esters. USINES DE MELLE (formerly Soc. ANON. DES DISTILLERIES DES DEUX-SÈVRES) (B.P. 378,498, 13.5.31. Fr., 16.5.30).—Dil. aliphatic acid is extracted with ester, and the extract is distilled with the appropriate alcohol; e.g., 15% AcOH is treated with 2 vols. of EtOAc and the extract and EtOH are introduced into a plate column. Similarly 18% PrCO_2H is extracted with PrCO_2Et and the extract esterified. Where the ester is sol. in the dil. acid, e.g., MeOAc in AcOH, a supplementary solvent, e.g., $\text{Pr}^{\circ}\text{OAc}$, is added during extraction. C. H.

Manufacture of urethane derivatives [carbamic esters]. J. Y. JOHNSON. From I. G. FARBEIND. A.-G. (B.P. 378,390, 6.5.31).—Chloroformates of mono- or poly-hydric aliphatic or alicyclic alcohols above C_5 are treated with primary or *sec.* hydroxyalkylamines. Products are thus obtained from octadecyl chloroformate and hydroxybutylamine, from cetyl chloroformate and β -hydroxyethyl-*n*-butylamine, and from octadecanediol chloroformate and hydroxypropylamine. C. H.

Manufacture of tertiary nitriles. I. G. FARBEIND. A.-G. (B.P. 378,743, 10.12.31. Ger., 10.12.30. Addn. to B.P. 253,950; B., 1927, 892).—The Na compound of a *sec.* nitrile, prepared by interaction of the nitrile and a Na alkyl or aryl, is treated with an alkylating or aralkylating agent. Thus the product from HgEt_2 and Na in dry Et_2O is treated successively with $\text{CHEt}_2\text{-CN}$ and allyl chloride to give allyldiethylacetonitrile, b.p. $71-74^{\circ}/14$ mm. Diallylisoamyl- (b.p. $109-110^{\circ}/7$ mm.), diallylethyl- (b.p. $83-85^{\circ}/13$ mm.), allylethylbutyl- (b.p. $75-77^{\circ}/2-3$ mm.), and triallyl- (b.p. $86-88^{\circ}/8-9$ mm.)-acetonitriles are also described. C. H.

Manufacture of polymerisation products from vinyl ethers. J. Y. JOHNSON. From I. G. FARBEIND. A.-G. (B.P. 378,544, 18.5.31).—A vinyl ether is polymerised at $40-50^{\circ}$ by contact in liquid or gaseous phase with anhyd., inorg., acid-reacting catalysts, e.g., BF_3 , SnCl_4 , SnCl_2 , AlCl_3 , $\text{Al}_2(\text{SO}_4)_3$, FeCl_3 , ZnCl_2 , SiCl_4 , HgCl_2 , NaHSO_4 , H_2SO_4 , HCl, or HF, in presence of solvent, if desired. Suitable starting materials are: vinyl Buⁿ, Et, Me, or octadecyl ether; propenyl or isopropenyl Et ether; *o*- or *m*-tolyl vinyl ether; octadecanediol divinyl ether; diglycol vinyl Et ether. BF_3 is conveniently used in the form of its compound with Bu^n_2O . C. H.

Manufacture of wetting, cleansing, dispersing, and the like agents. J. Y. JOHNSON. From I. G. FARBEIND. A.-G. (B.P. 378,383, 1.5.31).—Aliphatic polyamines, having at least 1 H attached to N, and free from hydroxyalkyl groups, are acylated with org. carboxylic acids (etc.) above C_5 having at least 1 olefine

linking and/or OH group and/or an aromatic nucleus, or with sulphonic or sulphocarboxylic acids above C_5 , and the resulting amide is sulphonated if necessary. Diethylenetriamine or triethylenetetramine is thus condensed with oleic, oleic and stearic, hydroxystearic, butylnaphthalenesulphonic, or phthalic acids, and the product sulphonated. C. H.

Manufacture of wetting, emulsifying, and detergent agents. IMPERIAL CHEM. INDUSTRIES, LTD., A. J. HAILWOOD, and A. W. BALDWIN (B.P. 378,454, 11.5. and 30.6.31).—Saturated alkyl ($>C_5$) ethers of $CH_2Ph \cdot OH$ are sulphonated. The acids or their alkali or NH_4 salts may be mixed with >1 pt. of a H_2O -sol. salt having the same cation to give solid preps. or may be used in aq. solution with or without such salts. Examples are benzyl dodecyl, cetyl, and octadecyl ethers. C. H.

Manufacture of wetting, detergent, foaming, and dispersing agents. IMPERIAL CHEM. INDUSTRIES, LTD., A. W. BALDWIN, and A. J. HAILWOOD (B.P. 378,867, 16.5.31).—Compounds, $RO \cdot CH_2 \cdot CH_2 \cdot SO_3H$, in which R = alkyl or alkylenyl above C_5 , are obtained by interaction of Na derivatives of alcohols ROH (e.g., dodecyl, cetyl, octadecyl, or oleyl alcohol) and Na β -halogenoethanesulphonate. C. H.

Emulsifying agents. CHEM. U. SEIFENFABR. R. BAUMHEIER A.-G. (B.P. 379,076, 6.8.31. Ger., 6.8.30).—Casein, swelled with NH_3 , is stirred with resin soap or fatty acid soap (or with alkali and resin or fatty acid) until the viscosity reaches a max. C. H.

Manufacture of phenol or its homologues. DR. F. RASCHIG GES.M.B.H. (B.P. 378,487, 6.5.31. Ger., 6.5.30. Addn. to B.P. 354,948 and 358,903; B., 1932, 13, 173).—For the artificial catalysts of the prior patents there are used natural siliceous materials (kieselguhr, fuller's earth, clay, asbestos) freed from Fe by treatment with mineral acid. C. H.

Manufacture of phenol ethyl ethers. E. C. BRITTON and H. R. SLAGH, Assrs. to DOW CHEM. CO. (U.S.P. 1,801,901, 21.4.31. Appl., 26.8.27).—Alkali aryloxides, e.g., NaOPh, are ethylated with EtCl in H_2O at 90–120°. C. H.

Production of aromatic hydrocarbons from phenols. W. R. MADEL, W. R. H. HURTLEY, and IMPERIAL CHEM. INDUSTRIES, LTD. (B.P. 378,501, 13.5.31).—In the hydrogenation of phenols to aromatic hydrocarbons at 400–500°, formation of hydroaromatic hydrocarbons is diminished by preheating the phenols above 375°, preferably at 400–500°. The preferred catalyst is Mo oxide or sulphide, which is regenerated by air at 400–450°. C. H.

Manufacture of aromatic nitro-compounds. H. K. IHRIG, Assr. to S. E. CAMPBELL (U.S.P. 1,838,311, 29.12.31. Appl., 31.1.27).—Hydrocarbon distillate is extracted with liquid SO_2 , olefines etc. are removed from the extract with conc. H_2SO_4 , and the residue or a fraction of it is nitrated. C. H.

Manufacture of carbyl sulphate, ethionic acid, isethionic acid, and homologues and analogues thereof. I. G. FARBENIND. A.-G. (B.P. 378,895, 15.5.31. Ger., 16.5.30).—EtOH, or other aliphatic or hydroaromatic alcohol below C_8 , or the corresponding olefine,

is treated with SO_3 and/or $ClSO_3H$ in liquid SO_2 , EtOH or C_2H_4 gives carbyl sulphate or ethionic acid according to the quantity of SO_3 ; Bu^iOH gives $CHEt \langle \begin{smallmatrix} CH_2 \cdot O \\ SO_3 \cdot O \end{smallmatrix} \rangle SO_2$, and cyclohexanol-2-sulphonic acid is obtained from cyclohexene or cyclohexanol. C. H.

Manufacture of aliphatic and hydroaromatic oxides. SCHERING-KAHLBAUM A.-G. (B.P. 378,759, 31.12.31. Ger., 14.1.31).—*o*-Halogenophenols are passed as vapour, alone or with steam, over metal oxides or salts (MgO, Cu phosphate), preferably on a carrier, e.g., at 250–330°. Ethylene chlorohydrin gives ethylene oxide; chloromenthol yields menthene oxide, b.p. 72–79°/13 mm. C. H.

Production of chlorinated derivatives of toluene. T. S. WHEELER, and IMPERIAL CHEM. INDUSTRIES, LTD. (B.P. 378,866, 16.5.31).—PhMe vapour and Cl_2 (preferably 0.5 vol.) are led through a reaction zone (e.g., a porcelain tube) at 250–600°, the space-velocity being 2–5 reciprocal min. for 250–350° and 500–2000 for 500–600°, whereby side-chain chlorination occurs. Nuclear chlorination may be effected in addition by use of a Cl carrier (I or $FeCl_3$). C. H.

Manufacture of 1:6-dibromo-2-hydroxy-naphthalene-3-carboxylic[3-naphthoic] acid. W. W. GROVES. From I. G. FARBENIND. A.-G. (B.P. 378,676, 17.9.31).—2:3-Hydroxynaphthoic acid is dissolved in H_2SO_4 , Br (2 atoms) is added at –5°, and (a) bromination is completed by heating for 6 hr. at 50°, or (b) the HBr liberated is collected in 20% oleum and the solution added to the reaction mixture at 0–15°. C. H.

Production of glycol esters of abietic acid. G. M. NORMAN, Assr. to HERCULES POWDER CO. (U.S.P. 1,839,161, 29.12.31. Appl., 10.8.27).—Colophony is heated with a glycol and Zn dust at 195° for 6 hr. and excess glycol etc. is removed at 300°/10 mm. Glycol gives an ester, m.p. 64°. C. H.

Combustible gas [for EtOH]. Coal-tar crudes.—See II. **Unsaturated hydrocarbons from rubber.**—See XIV. **Tartaric acid from carbohydrates.**—See XVII. **Photographic sensitizers.**—See XXI. **Pentarythritol tetranitrate.**—See XXII.

IV.—DYESTUFFS.

Plant materials for the dye industry. H. MILLER (Chem. Met. Eng., 1932, 39, 486–488).—The corrosion of cast-Fe vessels used for nitration and sulphonation may be reduced by addition of small quantities of Ni and Cr; chilled castings should be used so that there is the min. of free graphite in the inside of the vessel. Everdur is much more resistant than Pb in processes involving the use of 40–65% H_2SO_4 at >50 –60°, e.g., for the hydrolysis of the 1-acid in the manufacture of naphthalene-2-sulphonic acid. For the salting out of amines made by reduction in strongly acid solutions Hastelloy-C gives the best service. For wooden vats cypress gives by far the longest life in all dye-making processes. Grey cast Fe is useful for NaOH fusions, but monel metal or stainless steel gives a much longer life and there is less contamination of the product.

A. R. P.

Determination of the degree of oxidation of log-wood extracts. P. HEERMANN [with H. ZSCHOKKE] (Chem.-Ztg., 1932, 56, 821—822).—The determination of hæmatin and hæmatoxylin, alone or together, in these extracts by means of Cr-mordanted wool is simplified.

R. S. C.

Bremen-blue.—See XIII.

See also A., Nov., 1137, **Yellow dyes of ergot.** 1142, **Acetoneanil.**

PATENTS.

Manufacture of [nitro-]dyes [for wool, silk, or leather]. J. Y. JOHNSON. FROM I. G. FARBENIND. A.-G. (B.P. 378,604, 26.6.31).—An aminosalicyclic acid is condensed with an aromatic halogenonitro-compound, and the product is chromed (etc.) in substance or on the fibre. Examples are 5-aminosalicylic acid with 1-chloro-2:4-dinitrobenzene-6-sulphonic acid (yellow on wool; chromed, deep brown), 1-chloro-2:4-dinitrobenzene (chromed, pale brown on wool or leather), 1:3-dichloro-4:6-dinitrobenzene (yellow on wool; chromed, olive; pre-chromed, yellow), and 1-chloro-2:6-dinitrobenzene-4-sulphonic acid (pre-coppered, olive-brown on leather).

C. H.

Manufacture of vat dyes [from fluoranthene]. R. SEDLMAYR (B.P. 378,476, 9.3.31).—Fluoranthene is condensed with phthalic or other aromatic *o*-dicarboxylic anhydride; the products may be halogenated, nitrated, aminated, or aroylaminated. Vat dyes are thus obtained with phthalic anhydride (green-yellow; chlorinated or brominated, green-yellow); 4-bromophthalic anhydride (redder; condensed with α -aminoanthraquinone, red-brown). Brominated phthaloylfluoranthene gives with α -aminoanthraquinone a corinth vat dye, with leuco-1:4-diaminoanthraquinone a grey to black.

C. H.

Production of dibenzanthrone derivatives [vat dyes]. IMPERIAL CHEM. INDUSTRIES, LTD., I. B. ANDERSON, P. G. CARTER, and R. F. THOMSON (B.P. 378,942, 19.5. and 9.10.31).—Diacylated or dimethylated derivatives obtained according to B.P. 181,304 or 193,431 (B., 1922, 582 A; 1923, 395 A) from the 2:2'-dihydroxydibenzanthrone of B.P. 203,533 (B., 1923, 1064 A; example 13) are condensed with an aliphatic aldehyde, preferably CH_2O , in conc. H_2SO_4 , to give blue or reddish-blue vat dyes.

C. H.

Manufacture of [thio]indigoid vat dyes. Soc. CHEM. IND. IN BASLE (B.P. 380,020, 10.8.31. Addn. to B.P. 372,640; B., 1932, 794).—*Unsym.* indigoid vat dyes are made by condensing a 5-halogeno-6-methylthioindoxyl with a suitable second compound. 5-Chloro-6-methylthioindoxyl is thus condensed with 5:7-dibromoisatin α -chloride (red-violet; brominated, blue-violet), 5-chloro-7-methylthioisatin *p*-dimethylaminoanil (carmine-red), 5-bromoisatin α -chloride (blue-grey); 5-chloro-6-methylthioisatin *p*-dimethylaminoanil with β -naphthathioisatin (yellow-bordeaux).

C. H.

V.—FIBRES; TEXTILES; CELLULOSE; PAPER.

Spinning of artificial textile fibres. E. VIVIANI (Mem. Accad. Italia, 1932, 3, [Chim., No. 1], 6—38).—Results obtained by the author's methods (B., 1931, 196, 291, 625) are given and methods of producing uniform artificial fibres described.

T. H. P.

Industrial applications of the ultra-violet radiation test. II. The textile industry. J. MUIR (Ind. Chem., 1932, 8, 348—351).—The fluorescence shown by oil stains, mildew, etc. in cotton piece goods under ultra-violet light enables the fault to be localised even if the cause cannot be identified with certainty. Rayon fibre can be identified but varieties of cotton cannot. The behaviour of dyes under ultra-violet light is discussed. Some can be identified. The method affords a good test for fastness to rubbing, but not for fastness to light. It also enables textile printing faults to be traced. Photographs ("luminograms") are given.

C. I.

Effect of chemical preparation of linters on the viscosity of the resulting cellulose and its nitrates. D. I. GALPERIN and D. I. TUMARKIN (J. Appl. Chem., Russia, 1932, 5, 34—62).—The viscosity of linters in cuprammonium solutions is the only important practical characteristic, except for very low grades. Ch. Abs.

Sulphite[pulp] digester. W. L. BEUSCHLEIN and F. H. CONRAD (Ind. Eng. Chem. [Anal.], 1932, 4, 415—417).—A 25-litre digester of KA4 metal for the prep. of sulphite pulp is described.

E. S. H.

Chromium-nickel-iron castings for sulphite-pulping equipment. ANON. (Paper Trade J., 1932, 95; T.A.P.P.I. Sect., 93—96).—Methods of overcoming carbide pptn., which is shown to reduce acid-resistance, are considered. A tentative specification for such alloys is outlined.

H. A. H.

"Flour" in wood pulp. P. KLEM (Proc. Tech. Sect. Paper Makers' Assoc., 1932, 12, 342—350).—The structure of woods used for pulp manufacture is fully described. Differences produced by variations in the normal growth of the tree, and their effect on fibre length, strength, and the production of wood flour are indicated.

H. A. H.

Laboratory beating characteristics of unbleached bamboo pulp. H. A. HARRISON (Proc. Tech. Sect. Paper Makers' Assoc., 1932, 12, 382—383).—The difference between the development of strength in bamboo and wood pulps is illustrated graphically. The marked increase in tearing strength of bamboo pulp over an appreciable beating range is attributed to changes in the fibre surface, and not to improved formation of the test-sheet. The usual decrease in tearing strength takes place at a later stage owing to fibre shortening.

H. A. H.

Temperature curves and the sulphite[pulp] cook. R. MONNBERG (Paper Trade J., 1932, 95; T.A.P.P.I. Sect., 99—103).—The work of Miller and co-workers, described in "Chemistry of the Sulphite Process" (1928), is criticised. A no. of experimental cooking conditions are given, and the effect of the different variables on strength, bleachability, and yield is indicated. It is concluded that too great stress has been laid in the past on strict adherence to an optimum schedule.

H. A. H.

Heavy chemicals and the paper industry. H. E. JONES (Proc. Tech. Sect. Paper Makers' Assoc., 1932, 12, 384—399).—The development of the modern heavy chemical industry and its importance to papermaking processes are dealt with.

H. A. H.

Alum feed for paper-mill waters. R. T. BARNES, JUN. (Paper Trade J., 1932, 95; T.A.P.P.I. Sect., 155—157).—It is stated that satisfactory flocculation of natural H₂O supplies by Al₂(SO₄)₃ alone, without the use of NaOH, is improbable except in the case of very hard H₂O. H. A. H.

Chemical-trim process. [Adjustment of acidity of paper stock.] L. M. BOOTH (Paper Trade J., 1932, 95; T.A.P.P.I. Sect., 104—106).—Both p_H and total acidity data are necessary, neither being sufficient alone. For any given p_H , a lower total acidity reduces foam and improves sheet formation, strength, and finish. The quality of H₂O which is best for beaters is not well suited for sheet formation, and it is maintained that the diluted stock should be partly neutralised with Ca(OH)₂. The formation of Al(OH)₃ is stated to purify the white-water and improve size retention. H. A. H.

Effect of inorganic acids on the physical properties of waterleaf rag bond paper. T. J. JARELL, J. M. HANKINS, and F. P. VEITCH (Paper Trade J., 1932, 95; T.A.P.P.I. Sect., 158—163).—Small quantities of Al₂(SO₄)₃, H₂SO₄, or HCl in unsized, unloaded rag paper cause its rapid deterioration, as measured by rapid ageing tests, HCl being the most destructive. Folding-endurance is more sensitive than bursting or tensile strength as an indication of deterioration. Colour is also affected if the p_H of the aq. extract is much below 4.5. H. A. H.

Relation of sheet properties and fibre properties in paper. IV. Use of structural concepts in pulp evaluation and paper design. R. H. DOUGHTY (Paper Trade J., 1932, 95; T.A.P.P.I. Sect., 111—118).—The author's three previous papers (B., 1932, 718) are reviewed in the light of further results. Pressures varying from 2 to 10,000 lb. per sq. in. were employed. The factors affecting sheet structure are analysed and discussed in detail, much of the data receiving mathematical treatment. The relation of strength to solid fraction is probably some complex function of fibre dimensions, adhering power, and arrangement. There is no increase in the strength of sheets at const. solid fraction after a slight beater treatment, though there is considerable increase early in the processing. Drying has an effect opposite to that of slight beating. The strength development of pulps is considered to be in large part due to the production of a denser sheet, rather than to any change in the strength properties. Sheets of greater wt. (made from stock of higher consistency) are weaker when made of the same solid fraction, but are denser when made at the same wet pressure. It is emphasised that this behaviour is a consistency effect, not a wt. effect. Tensile strength was mostly used in this investigation, but a no. of results are also recorded for bursting, tearing, and folding strengths. Air-permeability decreases rapidly with increasing solid fraction, and is very much less, at the same solid fraction, for short- than for long-fibred pulps. With unbeaten pulp air-permeability is practically independent of sheet wt. at solid fractions > 0.40. The relationship between solid fraction and colour and opacity is also discussed, opacity being at a max. at some crit. density. It is suggested that the present inability of the initial strength

test to classify pulps in order of beaten strength may be overcome by corrections for solid-fraction differences. Some practical applications of these results are indicated. H. A. H.

Determination of copper number of paper. J. D. PIPER and C. H. FELLOWS (Ind. Eng. Chem. [Anal.], 1932, 4, 377—379).—Modifications of a standard method (B., 1931, 714) are introduced, the wt. of sample being reduced to 1.5 g. The molybdophosphoric acid method (A., 1924, ii, 280) is used for determining Cu₂O. The error in the Cu no. is about 2.5%. E. S. H.

Physical properties of binders' board. B. W. SCRIBNER and L. W. SNYDER (Paper Trade J., 1932, 95, T.A.P.P.I. Sect., 183—187).

Corrosion in pulp etc. industry.—See X. Rosin-containing ppts.—See XIII. Fibroskin.—See XIV. Stable cellulose nitrates.—See XXII.

See also A., Nov., 1086, Viscosity of cellulose glycollate. 1087, Cellulose-H₂O system. 1117, Viscosity of cellulose solutions. 1177, Acidic constituents of jute fibre.

PATENTS.

Apparatus for continuous digesting [nitrocellulose and the like]. G. C. GRESS and R. T. KERN, Assrs. to FIBERLOID CORP. (U.S.P. 1,846,680, 23.2.32. Appl., 28.7.28).—The dangers caused by generation of explosive gases during the cooking of nitrocellulose are avoided by the use of a continuous digesting range described.

B. P. R.

Manufacture of cellulose esters. A. G. BLOXAM, From SOC. CHEM. IND. IN BASLE (B.P. 380,822, 23.6.31).—NaOAc may satisfactorily replace KOAc in the process of B.P. 353,978 (B., 1931, 921) if the acetylation is conducted under more energetic conditions, e.g., at the b.p. of Ac₂O. D. J. N.

Production of artificial materials by wet-spinning processes from solutions of organic derivatives of cellulose. BRIT. CELANESE, LTD., W. A. DICKIE, and P. F. C. SOWTER (B.P. 380,819, 23.6.31. Addn. to B.P. 340,324; B., 1931, 1043).—Improved results are obtained by the prior process if the spinning bath contains a relatively high-boiling solvent (20% of Et lactate) and a lower aliphatic acid (30% of AcOH) preferably with addition of substances (10% of NaOAc) which reduce the solubility of the acid and/or the high-boiling solvent in the non-solvent medium (H₂O). D. J. N.

Manufacture of [striped] ribbons from solutions of cellulose or cellulose derivatives. I. G. FARBENIND. A.-G. (B.P. 381,456, 3.3.32. Ger., 4.3.31).—The main spinning slot has one or more smaller slots branching from it; the side ribbons obtained subsequently coalesce with the main ribbon. D. J. N.

Manufacture of transparent foils, films, wrapping materials, etc. from regenerated cellulose. TRANS-PARENT PAPER, LTD., R. K. MORCOM, H. HALLAM, and D. L. PELLATT (B.P. 380,053; 2.6.31).—Apparatus for desulphurising, washing, and treating freshly-pptd. cellulose film is described in which the wash-H₂O from a tank following a treating bath (A) is fed back to a washing bath preceding A. D. J. N.

Waterproofing of foils made of or containing organic derivatives of cellulose. BRIT. CELANESE, LTD. From C. DREYFUS (B.P. 380,920, 28.8.31).—The material is thinly coated on one side with nitrocellulose.

D. J. N.

Waterproofing of sheets of regenerated cellulose. COURTAULDS, LTD., and F. SHEDDEN (B.P. 380,832, 20.6.31).—The material is treated with a solution containing nitrocellulose (16.7 pts.), castor oil (4 pts.), wax, *e.g.*, paraffin or ceresin (0.2 pt.), and a softener (tolyl phosphate, 4.3 pts.) in, *e.g.*, BuOAc (75 pts.).

D. J. N.

Making wood pulp. W. BRYDGES and S. C. FOSTER, ASSIS. to BEDFORD PULP & PAPER CO., INC. (U.S.P. 1,846,944, 23.2.32. Appl., 16.7.31).—Blocks of wood are digested under pressure with an alkaline liquor (aq. CaO, Na₂CO₃, etc.), the gaseous products are recovered, the tank is emptied, a vac. is created in it, and warm H₂O is admitted which penetrates the heart wood and thus facilitates subsequent grinding of the wood.

B. P. R.

Production of [wood] pulp. L. BRADLEY and E. P. MCKEEFFE, ASSIS. to BRADLEY-MCKEEFFE CORP. (U.S.P. 1,846,672, 23.2.32. Appl., 10.2.26).—Wood is cooked in a liquor containing a considerable amount of NaOH and smaller amounts of Na₂S₂O₃, Na₂SO₃, and Na₂S. The waste liquor is conc. and ignited to give Na₂CO₃ and Na₂S, which are then converted into Na₂SO₃, NaOH, and Na₂S₂O₃ for the prep. of further liquor.

B. P. R.

Treating fibres for papermaking etc. L. A. DILS, ASSR. to KELLOGG-DILS, INC. (U.S.P. 1,846,093, 23.2.32. Appl., 24.2.31).—Cooked wood fibres are impregnated under pressure with aq. NiSO₄ and ZnSO₄, and kieselsguhr, MgCO₃, and CaCO₃ are added to act as carriers to the Ni and Zn catalysts; the pressure is then released and the material subjected to the action of H₂. If bleaching is desirable, a small amount of NaBO₃ is introduced and the mass treated first with Cl₂ and then with H₂.

B. P. R.

Manufacture of paper. NAAML. VENN. W. A. SCHOLTEN'S CHEM. FABRIEKEN (B.P. 380,674, 23.12.31. Fr., 8.10.31).—Up to 5% of a cold-swelling starch is incorporated with the paper at any stage during its manufacture; *e.g.*, it may be added dry to the beater.

D. J. N.

Manufacture of cigarette papers. SOC. ANON. DES ANC. ETABL. BRAUNSTEIN FRÈRES (B.P. 380,724, 12.3.32. Ger., 12.3.31).—Suitable paper is obtained by incorporating 2–8% of a stearin compound (Na stearate) with the pulp and pptg. the stearin by addition of H₂C₂O₄ to *p*_H 6. The process-H₂O should be pre-treated with H₂C₂O₄ to *p*_H just below 7, to ppt. Ca salts.

D. J. N.

Manufacture of paper material [resembling leather]. J. KNAGGS, J. C. MARSDEN, and PORTALS, LTD. (B.P. 380,739, 1.4.32).—Waterleaf paper made from flax, cotton, etc. is sized with, *e.g.*, gelatin (without alum), treated with CH₂O, optionally in conjunction with a softening agent, *e.g.*, MgCl₂, and after seasoning and air-drying is coated with a cellulose lacquer under conditions which permit recovery of the lacquer solvents.

D. J. N.

Making of mulch paper. M. CLINE and R. A. MASTEN, ASSIS. to INTERNAT. PAPER CO. (U.S.P. 1,846,185—6, 23.2.32. Appl., 14.1.30).—(A) Paper impregnated with CuSO₄ is treated with aq. NaOH or aq. Na₂CO₃ to fix the Cu, then with aq. BaCl₂ to fix the SO₄²⁻, and is afterwards coated with a bituminous substance. (B) The paper is first coated with asphalt and then dusted with powdered S. Alternatively, the asphalt and S may be mixed before application to the paper.

B. P. R.

Treatment of bagasse [for making wallboard]. W. L. S. WILLIAMS, ASSR. to HAWAIIAN CANE PRODUCTS, LTD. (U.S.P. 1,847,050, 23.2.32. Appl., 19.4.30).—Pith is removed from the shredded fibres, partly by screening, by cooking the material under pressure with 4–6% of CaO (on the wt. of fibre) and simultaneously submitting the fibres to mechanical abrasion, and finally by passing it through the pulper.

B. P. R.

Apparatus for treating [rubbing] fibre. W. R. PETTIT, O. TUDOR-HART, and I. TUDOR (B.P. 381,905, 31.7.31).

Device for supporting spun cakes of artificial silk, or the like windings of yarn, which are to be vertically unwound. ALGEM. KUNSTZIJDE UNIE N.V. (B.P. 382,217, 19.4.32. Ger., 1.3.32).

Manufacture of paper. PAPER MAKERS' CHEM. CORP. (B.P. 381,633, 24.7.31. U.S., 25.7.30).—See U.S.P. 1,836,455; B., 1932, 882.

Apparatus for making paper. F. B. DEHN. FROM BELOIT IRON WORKS (B.P. 380,599, 18.9.31).

[Apparatus for] production of moulded articles from fibre pulp. PULP INDUSTRIES, LTD. (B.P. 381,378, 13.11.31. Ger., 13.11.30).

Friction material.—See I. Solid fuel.—See II. Kaolin.—See VII. Pulp digester.—See X. Insulating materials.—See XI.

VI.—BLEACHING; DYEING; PRINTING; FINISHING.

Assembly and calibration of the glass electrode for use in the determination of *p*_H of solutions during bleaching. E. H. VOIGTMAN and B. W. ROWLAND (Paper Trade J., 1932, 95, T.A.P.P.I. Sect., 96–98).—The utility of the glass electrode for determining the *p*_H during bleaching is indicated and a typical electrical circuit described.

H. A. H.

Mode of action of addenda in the dyeing of acetate silk with suspension dyes. K. LAUER (Kolloid-Z., 1932, 61, 91–100).—The dyeing of acetate silk by α -amino-, β -amino-, and 1:4-diamino-anthraquinone is influenced by addenda of Na salts of various aromatic disulphonic acids. At sufficiently high concns. these addenda lower the surface tension of H₂O and increase the solubility of surface-active substances, but the effects are very small at the concns. (0.01–0.001*N*) used in dyeing. The addenda increase the degree of dispersion of the dyes; in this respect they can be arranged in a definite order, which is also observed in the increase produced in electrophoretic velocity. The addenda are further taken up by the acetate silk, thereby inhibiting the adsorption of the dye.

E. S. H.

Treating [delustring] artificial [cellulose acetate] silk. H. FRANKE (Kunstseide, 1932, 14, 300—301).—The silk is steeped in 0.4% aq. $Ti_2(SO_4)_3$ at 80°, hydro-extracted, and then heated in an autoclave (1.5—3.0 atm.). Alternatively, the silk is steeped for 2—24 hr. at room temp. in 10—30% aq. $CaCl_2$, $LiCl$, or $MgCl_2$ and then immersed for 1—20 min. in a boiling bath containing naphthalenesulphonic acid 0.208%, pyrogallol, 0.21%, anthranilic acid 0.137%, H_3PO_4 0.066%, or HCl 0.365%; the silk is stained brown when pyrogallol is used, and the most satisfactory result is obtained with HCl . A. J. H.

Reaction between animal fibres and ammonium chloride solutions. A. E. PORAI-KOCHITZ, E. G. LEVINE, and V. S. REMENNIKOVA (Izvest. Textil. Prom. Torgov., 1931, 10, No. 3—4, 81—82).—The quantity of NH_4Cl fixed becomes const. above a certain concn. (6 × wt. of wool; 3 × wt. of cotton). Meyer's saturation limit of 0.008 g. per g. of wool was confirmed, but the val. for silk is 0.00033 g. instead of 0.0002 g. CH. ABS.

Determination of "colouring power" of printing colours. J. BEKK (Deut. Drucker, 1931, 38, 65; Chem. Zentr., 1932, i, 3501).

Ultra-violet radiation tests.—See V.

See also A., Nov., 1085, Adsorptive power of protein-cellulose membranes.

PATENTS.

Dyeing artificial silks prepared from regenerated cellulose in level blue to blue-violet shades. CHEM. FABR. VORM. SANDOZ (B.P. 378,750, 16.12.31, Ger., 16.12.30).—The viscose silk is dyed with disazo dyes of the type: naphtholsulphonic acid < benzidine → S-acid or an acyl- or aryl-S-acid; 3:3'-dichlorobenzidine, tolidine, or dianisidine may replace benzidine. Suitable first coupling components are 2:8-, 1:4-, 1:5-, and 2:6-naphtholsulphonic acids. C. H.

Dyeing, with the reserving of wool or silk. A. CARPMAEL. From I. G. FARBENIND. A.-G. (B.P. 378,045, 5.5.31. Addn. to B.P. 333,554; B., 1930, 1024).—The amides of the prior patent are applied in a separate reserving bath before dyeing. C. H.

Coloration of textile and other materials. BRIT. CELANESE, LTD., G. H. ELLIS, and E. W. KIRK (B.P. 378,473, 11.2.31).—The fastness of dyeings, especially on acetate silk, is improved by treatment before, during, or after dyeing with 1—2% of a colourless amine above C_6 , especially an aralkylamine, e.g., $NH(CH_2Ph)_2$, 2:4-dinitrodiphenylamine, $NMe(CH_2Ph)_2$, sec-octylamine, the amine being retained in the finished dyeing. C. H.

Coloration of cellulose ester or ether materials [discharge effects]. BRIT. CELANESE, LTD., G. H. ELLIS, and J. ALLAN (B.P. 378,917, 19.5.31).—Coloured discharge effects on acetate silk are obtained by printing with a Zn (or other H_2O -insol. metal) derivative of a leuco-vat dye, or with the free leuco-compound and ZnO or $ZnCO_3$. C. H.

Textile printing by means of sulphur dye preparations. A. CARPMAEL. From I. G. FARBENIND. A.-G. (B.P. 378,553, 20.5.31).—Prints of improved

strength are obtained by incorporating in the printing paste hydroxy-, amino-, arylsulphonamido-, carboxy-, or sulpho-anthraquinones or the corresponding leuco-compounds or anthrones, preferably with glycerol, glycol, diglycol, thiodiglycol, or other H_2O -sol. alcohol. Examples are Indocarbon OL with anthraflavic acid, β-aminoanthraquinone, etc. C. H.

Coating of fabrics [with rubber and cellulose derivative] for use in making wearing apparel. STANLEY CHEM. Co., Assees. of H. W. O'NEILL (B.P. 380,640, 27.10.31. U.S., 28.10.30).— H_2O -repellent, air-permeable fabric is produced by coating it with a composition containing rubber, nitrocellulose, and a solvent, and then rapidly evaporating the solvent; subsequent vulcanising is optional. A. J. H.

Compositions for impregnating and coating textiles and the use thereof. IMPERIAL CHEM. INDUSTRIES, LTD., W. E. SANDERSON, and F. J. SIDDLER (B.P. 381,225, 3.7.31).—The limpness of latex-treated fabrics is obviated by previously mixing the aq. rubber dispersion with an aq. solution of a condensation product of a polyhydric alcohol and a polybasic acid (cf. B.P. 356,738 and 358,095; B., 1932, 1062, 1147). D. F. T.

[Waterproofing] treatment of textiles. ERBA FABR. CHEM. PROD. SPEZIALITÄTEN F. DIE TEXTIL-IND. (B.P. 380,076, 1.6.31. Ger., 17.9.30).—Fabric is impregnated with a liquor prepared by diluting a conc. emulsion containing paraffin, a protective colloid such as glue, and an Al salt which is insensitive to atm. electricity. A. J. H.

Saturation of fabrics [with bitumen]. J. ZAVERTNIK and A. A. MACCUBBIN, Assis. to BARRETT Co. (U.S.P. 1,845,775, 16.2.32. Appl., 29.7.29).—Impregnation of roofing and building fabric with tar or bitumen preps. is secured by leading the fabric (sprayed or otherwise coated with the prep. on both sides) over a rotating perforated drum under reduced pressure. A. J. H.

Dye vats. C. CALLEBAUT and J. DE BLICQUY (B.P. 382,259, 22.7.32).

Dyeing apparatus. ECLIPSE TEXTILE DEVICES, INC. (B.P. 382,021 and 382,030, [A] 3.9.31, [B] 21.9.31. U.S., [A] 3.9.30, [B] 1.10.30).

Singeing of textile materials, metal, and the like. J. E. POLLAK. From C. M. KEMP MANUFG. Co. (B.P. 382,019, 1.9.31).

Saturator.—See I. **Cleaning fluid.**—See II. **Wetting etc. agents.**—See III. **Colouring clay.**—See VIII. **Colouring rubber.**—See XIV. **Colouring sugar.**—See XVII.

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

Contact sulphuric acid converters. G. DUBOIS and T. R. HARNEY (Ind. Eng. Chem., 1932, 24, 1091—1096).—The Schroeder-Grillo converter with preheating jacket is still used in small plants in the United States. No Mannheim plants now exist there. The internal heat-exchange converter, employing a nest of internal catalyst tubes (Badische and Tentelew types), has been modified in America, with the introduction of V.

catalysts and by the placing of the catalyst outside the tubes in 2 layers. The gas to be preheated passes through narrow open tubes placed inside wider closed tubes of which the closed ends are embedded in the catalyst. If elementary S is used the upper catalyst layer is cooled with air. The external heat-exchange converter, in which a 2-stage conversion is used, each converter having its own heat exchanger, has been simplified in the case of V catalysts by the use of fewer and thicker layers. The internal type uses about 30% more catalyst than the other, but practical results with the two designs are about equal. The external type is more flexible to changes in SO₂ content of the gas, which may be distributed as desired between different feed points. In the United States single converter units of 100 tons per day capacity are now being used. Cast Fe is usual, though in some cases steel shells have been installed. C. I.

Corrosion in sulphuric acid plants. J. J. HEALY, JUN. (Chem. Met. Eng., 1932, 39, 492—493).—Metals and non-metallic materials suitable for the construction of plant for the chamber and contact processes, of vessels for storing various grades of H₂SO₄, and of apparatus for use in processes with H₂SO₄ are indicated. A. R. P.

Manufacture of sulphuric acid. Oxidation of sulphurous acid. F. SCHREIBER (Metallbörse, 1932, 22, 241—253; Chem. Zentr., 1932, ii, 264—265).—Since in the catalytic prep. of H₂SO₄ N oxides are formed and the optimal contact temp. falls within the limits of existence of N₂O₃, the scheme: 6H₂O = 6H₂ + 3O₂; 2N₂ + 6H₂ = 4NH₃; 4NH₃ + 3O₂ = 4NO + 6H₂O; 4NO + O₂ = 2N₂O₃ (= 2NO + 2NO₂); SO₂ + N₂O₃ = SO₃ + 2NO is proposed in view of the affinity of the catalyst for H₂. The NO content of the gas is about 10⁻⁶ vol.-%, a result in accord with thermodynamic considerations. Experiments with H₂SO₄ (50—98%) as drying agent were performed; smaller yields of SO₃ and NO were obtained with 50 and 80% than with 90 and 98% acid. Gases in the contact tube contained more SO₃ than corresponded with the temp. equilibrium, and the temp. of the catalyst was higher than that of the surrounding gases; hence reaction occurs at the catalyst surface. A reaction scheme for the chamber process is proposed. A. A. E.

Freezing points of mixtures of oleum and nitric acid. H. M. COSTER and J. A. O'CALLAGHAN (Ind. Eng. Chem., 1932, 24, 1146—1147).—The f.p. of mixtures of oleum (50% SO₃) and 96% HNO₃ from 0 to 30% HNO₃ content have been determined. From 8 to 16% HNO₃ no actual freezing took place at -70°, probably owing to supercooling. From an uncertain min. between these points the f.p. rises to a max. of 28° with 23% HNO₃, after which it falls. With mixtures containing >13% HNO₃ the compound N₂O₅(SO₃)₄·H₂O (m.p. 93—104°, *d* 2.18) crystallises out on keeping (cf. Schultze, B., 1913, 84). C. I.

Special alloys for nitric acid production. T. MCKNIGHT (Chem. Met. Eng., 1932, 39, 490—492).—For concentrating HNO₃ from the NH₃ oxidation process above 60—63%, high Si-Fe alloys give the best results. The oxidation plant beyond the catalyst is

preferably made of 8:18 Ni-Cr steel, but a less expensive and almost as satisfactory alloy is the plain 18% Cr steel. The latter should be annealed at 800° before use and should not subsequently be cold-worked; serious corrosion may occur in caulked joints, hence a design should be chosen which reduces caulking to a min. A. R. P.

Non-metals for resistance to HCl. S. L. TYLER (Chem. Met. Eng., 1932, 39, 488—489).—Stoneware, Vitreosil, and rubber-lined wood or steel vessels are the only suitable materials for the handling and storage of conc. HCl; for more dil. acid Duriron, Illium G, and Hastelloy-C and -D are satisfactory. A. R. P.

Apparatus for determining "available chlorine" in weak hypochlorite solutions. A. H. RUTT (Proc. Tech. Sect. Paper Makers' Assoc., 1932, 12, 354—355).—The Taylor apparatus (Allen's chlorimeter) is described. H. A. H.

Behaviour of calcium salts at boiler temperatures. F. G. STRAUS (Ind. Eng. Chem., 1932, 24, 1174—1178).—The reaction CaSO₄ + Na₂CO₃ = CaCO₃ + Na₂SO₄ was studied at temp. between 182° and 282° by placing various proportions of the reagents in bombs and holding at the desired temp. for 84 hr. The effect of addition of NaOH and NaCl in solution was also investigated. As little as 90 p.p.m. of Na₂CO₃ forces the reaction to the right at these temp. even in presence of a great excess of SO₄²⁻. In presence of NaOH and NaCl as little as 30 p.p.m. Na₂CO₃ is sufficient. A difficulty in the determination of the CO₃²⁻:SO₄²⁻ ratios is that Na₂CO₃ determined at room temp. probably exists as NaHCO₃ at higher temp. A CaCO₃ deposit in a boiler will thus be stable under all likely conditions. CaCO₃ scale forms chiefly in feed-water heaters and pipe lines owing to the breakdown of CaHCO₃, but in the boiler the CaCO₃ is pptd. uniformly (not as scale) owing to its practical insolubility. CaSO₄ is deposited as scale at the heating surface owing to its appreciable solubility. C. I.

Desulphurisation of antimony trisulphide with carbon monoxide. E. V. BRITZKE and M. V. ZAEDEV (Min. Suir., 1931, 5, 816—831).—The v.-p. curve (776—1064°, 9 mm. to 412 mm.) of natural black Sb₂S₃ (90—97% Sb₂S₃) was determined; the b.p. (extrapolated) is 1090° at 760 mm., but at < 1050° some Sb is formed and the b.p. is then 1150° at 760 mm. On slow cooling the liquid Sb₂S₃ solidifies to the black cryst. modification, but on more rapid cooling the amorphous black, red, and violet modifications appear. In the reaction Sb₂S₃ + 3CO = 2Sb + 3COS at a given temp. *v*_{CO}/*v*_{CO} depends on the velocity of flow of the CO. With rise of temp. the equilibrium moves to the right. In the system Sb-Sb₂S₃, except when the composition is near Sb or Sb₂S₃, 2 layers are formed on cooling. The lower (Sb) phase contains inclusions of droplets of the eutectic, and the upper (Sb₂S₃) phase contains inclusions of Sb. CH. ABS.

Waste carbon dioxide and the dry-ice industry. K. HAUPT (Brennstoff-Chem., 1932, 13, 370—373).—Some account is given of the technical production of solid CO₂, particularly in the U.S.A. (cf. B., 1931, 19, 630, 717). A. B. M.

Pb in plant construction.—See I. **Conc. gas liquor.**—See II. **Heavy chemicals and the paper industry.**—See V. **Bremen-blue.**—See XIII.

See also A., Nov., 1096, **Electrolytic oxidations of $\text{Na}_2\text{S}_2\text{O}_3$, I, and of HIO_3 .** 1098, **Direct prep. of conc. H_2O_2 .** [Anhyd.] **LiCN.** **Metal cyanamides.** 1099, **Prep. of anhyd. MgCl_2 .** 1100, **Prep. of pure HF.** 1101, **Synthetic HCl.**

PATENTS.

Manufacture of hydrochloric acid. A. S. BEHRMAN (U.S.P. 1,843,196, 2.2.32. Appl., 13.6.29).— Cl_2 is passed upwards through a column of active C down which H_2O is allowed to trickle. The C is preferably made by destructive distillation of lignite. A. R. P.

Production of alkaline hydrates and ammonia from alkaline bicarbonate or carbonate. A. MENTZEL (B.P. 381,373, 11.11.31. Ger., 17.12.30).—A mixture of an alkali carbonate or bicarbonate, C, and an alkaline-earth or Mg compound capable of yielding the oxide on heating, is cyanidised at a high temp. and the product, spread out in a very thin layer, is hydrolysed at a lower temp.; the product is leached to recover alkali hydroxides and the residue is used again in the process. L. A. C.

Partly dehydrated sodium sulphide. S. B. HEATH, Assr. to DOW CHEM. CO. (U.S.P. 1,843,767, 2.2.32. Appl., 18.3.29).—Aq. Na_2S is conc. at 140–144° in vac. until the liquid contains 66% Na_2S and consists of a slurry of Na_2S suspended in saturated aq. solution. This slurry is made into flakes by running it over a rotary drum and then through a rotary dryer with exhaust fan attached. A. R. P.

Recovery of sodium thiosulphate from gas-purification liquors and the like. D. L. JACOBSON, Assr. to KOPPERS CO. (U.S.P. 1,846,058, 23.2.32. Appl., 4.12.26).—The liquors, containing, e.g., $\text{Na}_2\text{S}_2\text{O}_3$ 115, NaCNS 172, Na_2CO_3 2, NaHCO_3 10.1, $\text{Na}_4\text{Fe}(\text{CN})_6$ 13.7 g. per litre, are evaporated to about 25–30% of the original vol. and filtered at 60° to separate the Na_2CO_3 , $\text{Na}_4\text{Fe}(\text{CN})_6$, and some of the NaCNS. On cooling the filtrate a mixture of 75% $\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$ and 25% NaCNS crystallises. The crystals are dissolved in 8% of their wt. of hot H_2O and the solution is cooled to give $\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$ crystals containing only 7.5% NaCNS. This second crop is dissolved in 35% of its wt. of hot H_2O and the solution allowed to cool, when $\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$ crystals are obtained containing only 0.15% NaCNS. A. R. P.

Halide [sodium bromide] preparation. A. S. BEHRMAN (U.S.P. 1,843,355, 2.2.32. Appl., 23.11.29).—Br vapour is passed upwards through a column of activated C down which Na_2CO_3 solution is trickled to produce aq. NaBr. A. R. P.

Treatment of calcined phosphate [to produce ammonium phosphate and cement]. H. H. MEYERS, Assr. to ARMOUR FERTILISER WORKS (U.S.P. 1,846,347, 23.2.32. Appl., 7.12.28).—Calcined phosphate, prepared by sintering a mixture of phosphate rock with > 3% SiO_2 , an alkali salt, and a carbonaceous reducing agent, is finely ground and heated under pressure with NH_3 , CO_2 , and clay. The residual CaCO_3 -clay mud is

converted into cement clinker and the solution is evaporated for the recovery of $(\text{NH}_4)_2\text{HPO}_4$. A. R. P.

Separation of calcium and magnesium chlorides from mixed solutions thereof. W. R. COLLINGS, Assr. to DOW CHEM. CO. (U.S.P. 1,843,760—1 and 1,843,867, 2.1.32. Appl., [A] 31.1.28, [B, c] 6.9.28. Renewed [B] 31.12.30, [c] 31.5.30).—(A) Tachydrite crystals are dissolved in H_2O at 90° and cooled to < 30° so that $\text{MgCl}_2 \cdot 6\text{H}_2\text{O}$ separates, leaving a mother-liquor of d 1.41–1.43. (B) Solutions containing MgCl_2 and CaCl_2 in the ratio of 1 : 10 are evaporated at 155° under reduced pressure to obtain crystals of $\text{MgCl}_2 \cdot 2\text{CaCl}_2 \cdot 6\text{H}_2\text{O}$. These are separated from the CaCl_2 mother-liquor and dissolved in H_2O , the solution is evaporated at 90° in vac. to obtain tachydrite ($\text{CaCl}_2 \cdot 2\text{MgCl}_2 \cdot 12\text{H}_2\text{O}$), and the latter is treated as in (A). (c) Solutions containing 1.5–10 mols. of MgCl_2 per mol. of CaCl_2 are evaporated to such an extent that on cooling to 30° $\text{MgCl}_2 \cdot 6\text{H}_2\text{O}$ separates, leaving a mother-liquor (of d 1.41–1.43) which on further evaporation deposits tachydrite. A. R. P.

Production of hydrated metal [magnesium] nitrates. A. L. MOHLER, Assr. to HERCULES POWDER CO. (U.S.P. 1,844,862, 9.2.32. Appl., 1.10.27).— MgO , $\text{Mg}(\text{OH})_2$, or MgCO_3 is added to the correct amount of HNO_3 and H_2O to form a neutral solution which on cooling sets to a solid crust of $\text{Mg}(\text{NO}_3)_2 \cdot 6\text{H}_2\text{O}$. A. R. P.

Manufacture of magnesium titanate. S. J. LUBOWSKY, Assr. to METAL & THERMIT CORP. (U.S.P. 1,843,427, 2.2.32. Appl., 25.10.29).—A finely-ground, briquetted mixture of MgO (1 pt.) and rutile (2 pts.) with sufficient C to reduce Fe_2O_3 to FeO is heated at 1410° to produce MgTiO_3 , which dissolves readily in H_2SO_4 to give a solution from which pure $\text{TiO}(\text{OH})_2$ may be obtained by hydrolysis. A. R. P.

Manufacture of titanitic hydroxide. R. J. MC-INERNEY, E. F. WILLIAMS, and H. L. GLAZE, Assrs. to MINERALS INCREMENT CO. (U.S.P. 1,842,620, 26.1.32. Appl., 19.3.28).—Hot air is passed through TiCl_4 and the vapours are mixed with steam, thus hydrolysing the TiCl_4 to $\text{Ti}(\text{OH})_4$ and HCl . The fumes are passed through a dust collector and filter to recover the $\text{Ti}(\text{OH})_4$ and the HCl is passed to a H_2O -scrubber. A. R. P.

Preparation of alumina. H. WÜNSCHE (B.P. 381,520, 2.6.32. Ger., 23.11.31).—Alkaline-earth aluminates containing SiO_2 are extracted with Na_2CO_3 in excess of the Ca content of the material and, after filtration, the solution obtained is treated with excess CaO or $\text{Ca}(\text{OH})_2$ in quantity such that the excess of free CaO over the undecomposed Na_2CO_3 is (a) < 12 (preferably 25–30) times the amount of dissolved SiO_2 , and (b) < 6 kg. and > 17.5 kg. per cu. m. of solution; after removal of the ppt., $\text{Al}(\text{OH})_3$ is pptd., e.g., by a current of CO_2 . L. A. C.

Preparation of alkaline-earth aluminates [and of ferrosilicon as by-product]. LONZA-WERKE ELEKTROCHEM. FABRIKEN G.M.B.H. (B.P. 381,390, 27.11.31. Ger., 6.12.30).—Aluminous material, e.g., bauxite, is introduced into a reducing melt comprising CaO and CaC_2 (which may be previously prepared *in situ* by heating CaO with insufficient C) containing sufficient Ca

for the formation of $\text{Ca}(\text{AlO}_2)_2$; when fusion is complete, the alloy formed (containing, *e.g.*, Fe, Si, and Ti) and the $\text{Ca}(\text{AlO}_2)_2$ are tapped off separately. L. A. C.

Altering the physical properties of finely-divided mineral substances [kaolin]. R. ILLNER and C. FÜRST (U.S.P. 1,840,363, 12.1.32. Appl., 4.10.29. Austr., 13.12.28).—A kaolin slurry is coagulated with milk-of-lime, the coagulum is neutralised with H_2SO_4 and stirred with 0.1% of $\text{Na}_2\text{S}_2\text{O}_4$ and 0.2% of H_2SO_4 (on the wt. of dry kaolin), the mixture is neutralised with CaO, and an excess of 0.1% added, followed by 0.025–0.05% of a dye, *e.g.*, indanthrene. The product is suitable for weighting paper etc. A. R. P.

Treatment of minerals [greensand] containing compounds of iron, potassium, and aluminium. P. L. McWHORTER, JUN., Assr. to ELECTRO Co. (U.S.P. 1,843,779, 2.2.32. Appl., 7.11.27. Renewed 5.12.29).—Greensand is dissolved in hot 1:1 H_2SO_4 equiv. to an excess of 10% over that required to combine with all the Fe, Al, and K, the SiO_2 is removed from the solution, the Fe^{+++} reduced to FeSO_4 with Fe powder, and the solution conc. at 100° to *d* 1.525, whereby most of the Fe separates as $\text{FeSO}_4 \cdot \text{H}_2\text{O}$. On cooling to 30°, $\text{KAl}(\text{SO}_4)_2 \cdot 12\text{H}_2\text{O}$ separates free from FeSO_4 . A. R. P.

Sulphur recovery and purification. M. SHOELD, Assr. to KOPPERS Co. (U.S.P. 1,841,644, 19.1.32. Appl., 18.10.27).—S-containing slurries from gas-purification plants are heated with steam at 140° under pressure and the molten S is withdrawn from the bottom of the autoclave and heated at 350–400° while air is blown through to oxidise org. matter. A. R. P.

Halogen [bromine and iodine] recovery [from brine]. A. S. BEHRMAN (U.S.P. 1,843,354, 2.2.32. Appl., 30.10.29).—The I is liberated by addition of a regulated quantity of Cl_2 and removed from the solution by percolating it through active C. More Cl_2 is added to the treated liquid while it is passed through more active C, whereby the latter becomes saturated with HBr. Heating the C in each case liberates the I and HBr, respectively. A. R. P.

Recovery of iodine [from brine]. C. W. GIRVIN, Assr. to L. LAWRASON (U.S.P. 1,843,127, 2.2.32. Appl., 9.12.29).—The brine is violently agitated while being electrolysed with a Ag anode, whereby a ppt. of AgI and AgCl is formed. The ppt. is collected and dissolved in NaCN, and the solution electrolysed to deposit the Ag on an Fe cathode which can subsequently be used as anode in the first stage. The I is recovered from the spent electrolyte in known manner. A. R. P.

Gas purification. CO-H₂ mixtures.—See II. **Electrolytic cells.**—See XI. **Ti pigments.**—See XIII.

VIII.—GLASS; CERAMICS.

Clarification of soda-lime-silicate glass with antimonious oxide. E. ZSCHIMMER and L. ERNYEI (Sprechsaal, 1932, 65, 197–199; Chem. Zentr., 1932, ii, 268).—The no. and size of the bubbles increased with the Sb_2O_3 content for const. clarification time, or with increase in time for const. Sb_2O_3 content. A. A. E.

X-Ray absorption of some glasses. M. TANAKA (Mazda Kenk. Jiho, 1931, 6, No. 2, 115–121).—X-Ray absorption coeffs. for Na_2O –CaO, Ba, K–Pb, and CaO glasses are recorded. CH. ABS.

Attempted heat balance on a "Manchester" kiln. W. EMERY (Trans. Ceram. Soc., 1932, 31, 361–391).—A "Manchester" (modified Hoffmann) kiln, burning building bricks, and fired with low-grade fuel, is described, and full details of an attempted heat balance are given. Potential savings from the reduction of sensible heat losses were < for many other kilns, and the sensible heat in the stack gases was an important source of loss. A. L. R.

Blast-furnace linings. W. J. REES (Trans. Ceram. Soc., 1932, 31, 317–321).—Factors reducing the life of blast-furnace linings are, in decreasing order of importance: corrosion by slags, corrosion and disintegration from alkali absorption, mechanical weakness, disintegration from C deposition, and unsuitable jointing cements. The durability of linings is promoted by the use of well-burnt bricks of good shape, low permeability, and high cold crushing strength. Close jointing is important, and cements should be free from metallic Fe. Under test, aluminous were more resistant than siliceous bricks, and SiO_2 (95%) almost as resistant as aluminous bricks (37% Al_2O_3), to corrosion by slags and by alkali. Their service behaviour suggests that bricks free from Fe segregations and containing > 2.5% Fe_2O_3 are preferable, but, within limits, the condition of the Fe is more important than its proportion. Open-air storage reduces the furnace durability of bricks. A. L. R.

Elutriation and dressing processes for clays. C. W. CORRENS and W. SCHOTT (Kolloid-Z., 1932, 61, 68–80).—A modification of Odén's self-registering apparatus for sedimentation analysis is described. Standard procedures for elutriation and dressing are compared and the sources of error pointed out. On the whole, good agreement is obtained. Loss of CaO through elutriation (which may exceed 10% of the original material) is obviated by using 0.01N- NH_3 . E. S. H.

Effect of mechanical pressure on the imbibitional and drying properties of some ceramic clays. I. A. E. R. WESTMAN (J. Amer. Ceram. Soc., 1932, 15, 552–563).—Measurements of the H_2O content, density, drying shrinkage, and other properties were made on a no. of clay masses which had been maintained under pressure (200–20,000 lb./sq. in.) between two pistons permeable to H_2O , provision being made to blow out the separated H_2O before the pressure was released. The plastic vols. of the clays could be reduced to equality with their usual dry vols. by the application of low pressure (200 lb./sq. in. for china clays; about 800 for more plastic clays), and at the same time nearly all the drying shrinkage was eliminated. At higher pressure the plastic vols. were reduced still further and release of the pressure caused an increase in vol., an intake of air, and little or no shrinkage or else a definite expansion. Ball and china clays are not sharply differentiated at higher pressure. The analogy between air-drying and moulding at high pressure is discussed. An explanation of the results is offered. The practical aspect of

high-pressure moulding (which accelerates drying and eliminates shrinking, cracking, and variation in size) is reviewed.

J. A. S.

“Moisture expansion” of ceramic white ware.

R. F. GELLER and A. S. CREAMER (Bur. Stand. J. Res., 1932, 9, 291—307).—Of materials important in the ceramic industry, fused felspar is the most susceptible to moisture expansion. Min. resistance to moisture expansion is encountered with bodies matured at cone 6—8. Crazing of glazed pottery may occur through moisture expansion following penetration of moisture through the glaze. The removal of moisture is slow at 120° but apparently complete at 250°.

J. W. S.

Stiff-plastic brickmaking: A new system.

J. PROCTER (Trans. Ceram. Soc., 1932, 31, 392—398).—By using a special prep. of material stiff-plastic bricks are produced on a semi-plastic brick machine, the power and maintenance costs being small compared with those of the stiff-plastic process.

A. L. R.

Review of refractory slag tests.

H. E. SIMPSON (J. Amer. Ceram. Soc., 1932, 15, 536—544).—The various methods are divided into 8 classes, and a comprehensive bibliography is given.

J. A. S.

Investigation of the action of coal-ash slags on firebrick by microscopic methods.

H. E. SIMPSON (J. Amer. Ceram. Soc., 1932, 15, 520—535).—The action of a series of slags on a series of fireclay refractories was studied by heating a small crucible of the refractory containing the slag at various temp., quenching, cutting a thin section, and examining under the petrological microscope. The mineralogical compositions of the ashes, refractories, and slag-refractory interfaces are described in detail. For a given coal ash there is a crit. temp. (within range of 35°) above which rapid attack of the refractory takes place. The crit. temp. falls with increase in flux content of the ash and rises with increase in mullite content and firing temp. of the refractory. The effect of fineness of grinding of the refractory on the crit. temp. is irregular. Stiff mud refractories show a higher crit. temp. than those made by hand or dry-press processes.

J. A. S.

Heating and cooling rates of chequer-brick.

G. SOLER and R. M. KING (J. Amer. Ceram. Soc., 1932, 15, 545—549).—Heat absorption and emission is not influenced much by porosity, is greater with smaller brick, and increases according to the nature of the material in the order Pennsylvania, Kentucky, Ohio, Missouri.

J. A. S.

Determining the effects of rate of firing and rapid and slow cooling on the physical properties of fireclay refractories.

R. C. HUTCHISON (J. Amer. Ceram. Soc., 1932, 15, 517—519).—A no. of clays were fired in a commercial kiln (60 hr.) and also in laboratory furnaces for 60-, 30-, 16-, and 8-hr. schedules. The rate of firing did not affect materially the physical properties of the refractories, and though rapid cooling did not affect the shrinkage, sp. gr., or apparent sp. gr. it increased markedly the absorption and porosity of the well-vitrified specimens (cone 15). This is probably due to the development of cracks.

J. A. S.

Behaviour of refractory materials in continuous vertical retorts.

A. T. GREEN (Trans. Ceram. Soc., 1932, 31, 399—416).—Data are presented showing the influences which reduce the durability of SiO₂ and siliceous materials in continuous vertical retorts. Appreciable vol. changes occurring in SiO₂ products at low temp. may cause weakening or disintegration of settings, the initial heating of which must be slow up to 650—700°. Cooling must also be slow. To minimise spalling and permanent expansion in practice, SiO₂ materials should have a high tridymite content and a true sp. gr. > 2.36. Siliceous are less liable than SiO₂ materials to spalling and permanent expansion. Slagging by alkali and Fe compounds was greatest in the bottom zones of retorts, where higher temp. and excessive reducing conditions prevail. The extent of slag action depends on the design, the working temp. and amount of steaming of the retort, and on the nature of the inorg. constituents of the coal. Slagging may cause erosion (followed by “holing”), failure of the brickwork by slag penetration, and “sticking” of the charge. Localised high temp., produced particularly during scurfing, deposition of scurf, and impregnation with fluxes, weaken the surface of the upper zones of retorts, where flaking often occurs. Continued usage influences the spalling tendency of the retort lining. Thin joints are desirable, and SiO₂ cements may contain > 10% of clay, but no other flux. The flux content of patching cements should be rigidly controlled. (Cf. B., 1931, 112.)

A. L. R.

See also A., Nov., 1090, System PbO—SiO₂.

PATENTS.

Frosting [the interior of hollow] glass [articles].

KOOPERATIVA FÖRBUNDET (B.P. 381,262, 22.7.31. Swed., 7.8.30).—The articles are treated twice with an etching liquid and between the treatments a “resist” (*e.g.*, turpentine, glycerin) is introduced to fill up hollows and limit the second etching to ridges and projections formed previously.

L. A. C.

Annealing of glassware.

R. GOOD, Assr. to HAZEL-ATLAS GLASS Co. (U.S.P. 1,844,154, 9.2.32. Appl., 28.4.24).—The articles, *e.g.*, bottles, are placed on carriers attached to a vertical conveyor and allowed to fall slowly through an insulated casing. No external heat is applied.

B. M. V.

Composite silica article.

E. THOMSON, Assr. to GEN. ELECTRIC Co. (U.S.P. 1,843,792, 2.2.32. Appl., 29.1.30).—A circular slab of SiO₂ is prepared by sintering quartz granules in a graphite mould. After grinding the upper surface flat it is covered with thin squares or hexagons of fused quartz free from bubbles, and these are caused to unite with one another and with the base by heating the whole to the sintering temp. The surface is then finished by spraying granules of pure fused quartz thereon through an O₂—H₂ flame so as to form a smooth, bubble-free layer which can be ground to form an astronomical mirror.

A. R. P.

Colouring of clay.

R. T. VANDERBILT, Assr. to R. T. VANDERBILT Co., INC. (U.S.P. 1,841,309, 12.1.32. Appl., 19.4.30).—The clay is dried, crushed finely while

still hot, and levigated with a current of air. The air suspension is sprayed with a dye solution which colours some of the clay particles, and the dust is collected and thoroughly mixed. A. R. P.

Production of sheet glass. A. E. EDWARDS. From N. V. MIJ. TOT BEHEER EN EXPLOITATIE VAN OCTROOITEN (B.P. 382,163, 15.2.32).

Production of spun threads from glass. W. RÖSSLER (B.P. 381,582, 29.6.31).

Kaolin.—See VII.

IX.—BUILDING MATERIALS.

Rotary [cement] kilns of high output. E. SCHIRM (Cement, 1932, 5, 315—320).—The tendency of the raw material to work back out of the upper end of the kiln when running at higher feed rates is overcome by completely closing the upper end (except for the feed pipe) and providing tangential flues for the waste gases to pass out of the side of the kiln. The same result is achieved in a "dry-fed" kiln by the action of a series of screw-like scoops (at the upper end) which project almost to the axis of the kiln and serve to drive forward any material falling in them. The material is screw-fed through a pipe extending through the scoop system. Slurry ring formation is minimised by arranging a series of short chains to hang in catenaries from points on the shell lying in screw formation. In the Lellep (Polysius) kiln the upper part of the rotating cylinder is replaced by a travelling grate. J. A. S.

Manufacture of Portland cement from anhydrite and gypsum. P. P. BUDNIKOV and M. I. NEKRITSCH (J. Appl. Chem., Russia, 1932, 5, 173—176).—Difficulties are discussed. CH. ABS.

Specific heat of Portland cement clinker. H. E. SCHWIETE (Tonind.-Ztg., 1932, 56, 304—306; Chem. Zentr., 1932, i, 2502).—Vals. up to 1150° agree with those of White (A., 1919, ii, 133), but above that temp. (measured, not extrapolated) are lower. A. A. E.

Setting [of cement]. K. WÜRZNER (Zement, 1932, 21, 243—245; Chem. Zentr., 1932, ii, 107).—Setting depends on the conditions of reaction as well as on the compounds involved; e.g., anhyd. CaCl₂ and aq. CaCl₂ give hard masses. Contraction in the binder is essential. Physical processes are at least as important as chemical processes. A. A. E.

Heat evolved by cement during hardening. H. WOODS, H. H. STEINOUR, and H. R. STARKE (Eng. News-Rec., 1932, 109, 404—407).—From determinations of the heat evolved during the setting and hardening of cements at 3—180-day periods it was concluded that Portland cements continue to evolve heat for 6 months and probably longer, though the greater part (41—91 g.-cal./g.) is evolved within three days. Arranged in descending order of heat evolution are 3CaO, Al₂O₃, 3CaO, SiO₂, and finally 4CaO, Al₂O₃, Fe₂O₃ and 2CaO, SiO₂. The heat evolved may be estimated from the relative proportions of the two former compounds. C. A. K.

Litharge and glycerin mortars. G. W. GLEASON (Paper Trade J., 1932, 95; T.A.P.P.I. Sect., 169—172).—Changes in the properties of sand and cement mortars

containing litharge and glycerin, brought about by varying the proportions of the components, are illustrated graphically, and the uses of such mortars are indicated. H. A. H.

Effect of soluble salts on masonry. W. DAWHIL (Tonind.-Ztg., 1932, 56, 434—435; Chem. Zentr., 1932, ii, 268).—Na₂SO₄ and MgSO₄ are more injurious than is K₂SO₄, which separates anhyd. CaSO₄ is less injurious owing to its slight solubility. Interconversion of hydrates causes vol. changes which may weaken the structure; CaSO₄.2H₂O, however, loses H₂O only with difficulty, and is therefore not injurious in this respect. A. A. E.

Relation between the percentage absorption, the modulus of rupture, and the electrical conductivity of building brick. R. C. LEWIS (J. Amer. Ceram. Soc., 1932, 15, 574—581).—The following equations have been derived: $(B - A)I = K$, where B is the max. % absorption, A is the absorption (wt.-%), I the current, and K a const.; $(M - K_1)(I - K_2) = K_3$, where M is the modulus of rupture, K_1 the min. strength, K_2 the conductivity due to the presence of conducting material and insensible voids, and K_3 a const. J. A. S.

Physical properties and weathering characteristics of slate. D. W. KESSLER and W. H. SLIGH (Bur. Stand. J. Res., 1932, 9, 377—411).—The physical properties of 343 samples of slate have been investigated. The causes of the deterioration of slate are discussed. J. W. S.

Chemistry of Australian timbers. II. Chemical composition of woods of the ironbark group. W. E. COHEN, A. L. BALDOCK, and A. G. CHARLES (Counc. Sci. Ind. Res., Australia, Pamph. No. 32, 1932, 36 pp.; cf. B., 1931, 1051).—Determinations of ash, alkalinity of ash, cellulose, lignin (after extraction with 0.125N-NaOH), total pentosans, pentosans in cellulose, and solubility in hot H₂O, cold H₂O, EtOH, Et₂O, C₆H₆ + EtOH (2:1), and 1% aq. NaOH are given for species of ironbark, and modified analytical methods are described. These woods (of the genus *Eucalyptus*) contain, in the vessels, rays, and fibres, 21—34% of brittle, gum-like substances, insol. in org. solvents but sol. in 0.125N-NaOH. The contents of cellulose (39—50%), total pentosans (13—17%), and ash (0.05—0.2%) are low compared with North American hardwoods, even after allowing for the difference in extractives, but the lignin content is about the same. The ratios of their solubilities in hot H₂O and C₆H₆ and in NaOH solution and EtOH are useful in distinguishing different species. The large proportion of brittle, gummy substances made it essential to sample by powdering until the whole passed through 100-mesh, and other methods may be erroneous with other woods also. A. G.

Pb in plant construction.—See I. **Gas from wood waste.**—See II.

PATENTS.

Manufacture of Portland cement. H. E. WHITE (B.P. 381,223, 2.7.31. Austral., 2.7.30).—A mixture of the ash obtained from furnaces burning powdered coal and Ca(OH)₂ is heated to clinker and the clinker ground. C. A. K.

Waterproofing compound for cement and concrete. A. R. CAMPBELL, Assr. to D. RUBIN (U.S.P. 1,840,566, 12.1.32. Appl., 17.11.27).—A mixture of "burnt" SiO_2 95, Fe 2, SiC 2, and NaCl 1% is added to cement or concrete mixtures. A. R. P.

Manufacture of building blocks and other pre-formed moulded articles. V. LEFEBURE, and IMPERIAL CHEM. INDUSTRIES, LTD. (B.P. 381,155, 23.6.31 and 4.1.32).—A block of cellular structure is cast from natural anhydrite containing chemicals to produce the necessary gasification. The surface of the block may be coated with a reinforcing layer of neat plaster, or special facings may be applied for waterproofing etc. purposes. C. A. K.

Manufacture of [hollow] moulded materials [of concrete]. SOC. GIRA (B.P. 381,551, 29.4.31. Fr., 17.6.30).

[Grid structure for concrete] roads, pavements, floors, etc. P. L. GOULD and C. E. RICHARDS (B.P. 381,814, 3.2.32).

Cooling loose material. Dust collector for cement mills.—See I. Wallboard.—See V. Bitumen-saturated fabrics.—See VI. Cement from phosphates.—See VII.

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

Problem of oxygen in iron. J. RESCHKA, E. SCHELL, and E. H. SCHULZ (Arch. Eisenhüttenw., 1932—3, 6, 105—108).—Alloys of Fe with varying amounts of FeO have been made by pressing, sintering, and forging intimate mixtures of FeO with Fe obtained by H_2 reduction. Examination of the microstructure of these alloys after various heat and mechanical treatments indicates that the solid solubility of FeO in Fe is exceedingly small at any temp. With increasing O content the tensile strength of Fe rises to a max. at 0.2% O, then decreases slowly and linearly to 3% O. The ductility and toughness decrease steadily with increase in O content, but even with 3% O they are higher than for cast Fe. Contrary to previous work, FeO has relatively little effect on the forgeability of Fe, but CaO, SiO_2 , Al_2O_3 , and MgO rapidly reduce the ease of forging. FeS has a similar effect as it results in the formation around the grain boundaries of the Fe-FeS eutectic, which is liquid at the usual forging temp. MnS and FePO_4 are not nearly so deleterious in the forging operation as they form minute liquid droplets which do not spread along the grain boundaries. A. R. P.

Steel in the light of the precipitation theory. A. SAUVEUR (Metals & Alloys, 1932, 3, 177).—From consideration of the changes on cooling steel the γ - α transformation occurs very quickly, at 300° on quenching and at 700° when annealed. The resulting α -Fe for a very short period of time retains 0.85% C in solid solution and is excessively supersaturated. Submicroscopic pptn. of carbides follows and austenite is converted into martensite, to be succeeded by troostite, sorbite, and pearlite. The theory is opposed to the view that austenite decomposes directly into pearlite. C. A. K.

Precipitation theory of steel hardness. R. M. ALLEN (Metals & Alloys, 1932, 3, 233—234).—Sauveur's theory (preceding abstract) is supported in principle, though from the occasional observation of minute diamond crystals in chilled martensitic Fe it is considered that martensite may be defined as an aggregation of α -Fe with carbide and cryst. C (as diamond) of submicroscopic size. It is thought improbable that C in this dense form is directly sol. in either γ - or α -Fe, but more likely that it must first be transformed into graphite or some amorphous state at high temp. before troostite can be formed. Given time for all the C to become associated with Fe in proper arrangement, the theory would allow of slow-cooling austenite decomposing directly into pearlite. C. A. K.

Formation of lamellar pearlite. R. G. GUTHRIE and J. A. COMSTOCK (Metals & Alloys, 1932, 3, 234—235).—It is considered unlikely that the complete transformation austenite \rightarrow martensite \rightarrow troostite \rightarrow sorbite \rightarrow pearlite must invariably take place (cf. preceding abstracts) on quenching and tempering except where typical acicular martensite is produced at room temp. on quenching. A particular specimen of eutectoid composition is described which had been austenised and then partly immersed in Pb at the crit. temp. for 2 min. followed by quenching in H_2O . This specimen showed both martensite and decomposed austenite, which suggests that there was a gradation or crit. zone in which austenite and decomposed austenite were in equilibrium in the same way as ice and H_2O can co-exist at 0°. In the formation of pearlite the carbide is pptd. at the time of recrystallisation and cementite is rejected to the preferred planes of recrystallisation in the forming ferrite to produce the typical laminated structure. C. A. K.

γ - α Transformation in wrought iron. R. H. HEYER (Metals & Alloys, 1932, 3, 226—232).—In consequence of the wider temp. range of the γ - α transformation in wrought Fe than for pure Fe and of the diffusion permitted by the presence of P and other impurities the positions of the α and γ grain markings present during the transformation may be observed at room temp. if the wrought Fe is quenched. The γ "phantom" network was confirmed in pure Fe and observed in wrought Fe and α veining was detected in Aston wrought Fe. C. A. K.

Effects of inclusion streaks on the tensile and dynamic properties of wrought iron and similar materials. F. R. HENSEL and T. F. HENGSTENBERG (Amer. Inst. Min. Met. Eng., Tech. Pub., 1932, No. 488, 29 pp.).—From tensile, Izod, and fatigue tests on a hand-puddled wrought Fe, on a synthetic wrought Fe, and on other materials it is concluded that inclusion streaks have little effect on the resistance of the metal to stresses which are parallel to the streaks. Inclusion streaks in wrought Fe and "ghosts" in steel have a similar effect on physical properties. The presence of inclusions in a hard matrix is little more deleterious than in a soft matrix unless the inclusions are located in regions of high stress concn. E. H. B.

Quenching media for steels. E. E. HALLS (Ind. Chem., 1932, 8, 340—342).—The cooling of steel should

be rapid from 800° to 400° to retain carbide in solution, then slow to avoid cracking. Cooling rates, using H₂O and oils, are compared. The stability of oils and of silicate and soap solutions must be considered. Temp.-cooling time tests are more useful than theoretical data. The specimen consists of a steel block with a projecting stem, the latter being drilled axially to carry a thermocouple into the centre of the block. Curves so obtained for various quenching agents are given. The unsuitability of H₂O above a medium temp. of 50° (due to too rapid cooling) and of mineral oil (too slow cooling in the higher ranges) is deduced. The difference in behaviour of a mineral oil and a compound oil containing a small % of fatty constituent may be due to the difference in viscosity. C. I.

Non-metallic inclusions in steel. F. LATTA, E. KILLING, and F. SAUERWALD (Kohle u. Erz, 1932, 29, 62—66; Chem. Zentr., 1932, ii, 281).—Addition of chamotte or Martin slag during pouring, and the subsequent separation and agglomeration of the inclusions, were studied. A. A. E.

Formation of gas bubbles in ingots of special (particularly electro-) steel. H. BARRET (Techn. mod., 1932, 24, 108—110; Chem. Zentr., 1932, ii, 281).

Silicon steel and the cementation of iron, nickel, and cobalt by silicon. M. DUBOWICKI (Przeglad Tech., 1929, 67, 549—555, 566—572, 1060—1066, 1086—1088, 1107—1214; 1930, 68, 34—38, 74—78, 210—213, 274—278, 300—304, 362—366, 440—444).—The diffusion of Si into Fe (0.07% C), Ni, and Co in air, N₂, or vac. for 4—96 hr. at 900—1200° was studied. The best results were obtained with a mixture of Si and NH₄Cl in vac. The solidification diagrams of the alloys are discussed. CH. ABS.

Determination of silicon in steels. R. M. FOWLER (Ind. Eng. Chem. [Anal.], 1932, 4, 382—385).—Comparative determinations of Si in steel by five standard methods are described. Small amounts of Si may be determined by dissolving the sample in HNO₃, dehydrating with H₂SO₄, and volatilising the Fe as FeCl₃ by means of HCl gas. E. S. H.

Tensile properties of cast nickel-chromium-iron alloys and of some alloy steels at elevated temperatures. W. KAHLBAUM and L. JORDAN (Bur. Stand. J. Res., 1932, 9, 327—332).—Results are given for medium Mn steel (Mn 1.08, C 0.4%) at 900° F., for cast Ni-Cr-Fe alloys (C 0.5, Cr 35, Ni 10—45%) at 1550° F., and for W-Cr-V steels and Mo-Cr-V steels at 850° and 1000° F. J. W. S.

Creep at elevated temperatures in chromium-vanadium steels containing tungsten or molybdenum. W. KAHLBAUM and L. JORDAN (Bur. Stand. J. Res., 1932, 9, 441—455; cf. B., 1930, 865).—The creep in tension of W-Cr-V and Mo-Cr-V steels at 400—600° has been investigated, comparison being made between specimens tempered after rolling and those oil-quenched and tempered. J. W. S.

Electrometric determination of vanadium in self-hardening steels. S. M. GUTMAN and N. V. MIKEEVA (Sobshch. Vsesoyuz. Inst. Met., 1931, No. 5—6, 73—76).—The steel (3 g.) is dissolved in H₂O

(40 c.c.) + conc. H₂SO₄ (11 c.c.); conc. HNO₃ (7—8 c.c.) is added, and the liquid is boiled until most of the WO₃ separates. 25% aq. NH₃ [2—3 c.c. in excess of that necessary to ppt. Fe(OH)₃] is added to the cooled solution, followed slowly and with stirring by Fe alum solution and then 18N-H₂SO₄ (20 c.c.). The resulting clear red solution is treated with conc. HCl (4 c.c.) and, after cooling, with KBrO₃ (1—1.5 g.). The solution is heated for 10—15 min. and then boiled for 10—12 min. The cold solution is treated with H₃PO₄ (1 : 1, 10 c.c.) and then titrated electrometrically with acid FeSO₄ solution, the largest resistance necessary to adjust the galvanometer needle to zero for equal additions of titrating liquid indicating the end-point. CH. ABS.

Precipitation method for determining vanadium [in steel]. S. M. GUTMAN (Sobshch. Vsesoyuz. Inst. Met., 1931, No. 1—2, 66—68).—The steel is heated with dil. H₂SO₄; the ignited residue is dissolved in HNO₃ and the V determined colorimetrically. The results are low if the steel has not been annealed. CH. ABS.

Chromium-manganese steels. J. M. BECKET (Aciers spéc. Met. Alliages, 1931, 6, 519—526; Chem. Zentr., 1932, i, 3492).—A discussion. A. A. E.

Stainless alloys in chemical construction. E. C. WRIGHT and K. E. LUGER (Chem. Met. Eng., 1932, 39, 494—496).—The physical and mechanical properties of 11—15% Cr (high and low C), 16—20% Cr, 25—30% Cr, 18 : 8 and 25 : 12 Cr-Ni steels are tabulated and briefly discussed. The effects of heat- and mechanical treatment and methods of welding these steels are considered. A. R. P.

Quantitative emission-spectral analysis. III. Determination of copper in high-grade aluminium. J. CLERMONT (Z. anal. Chem., 1932, 90, 1—15; cf. A., 1932, 35).—Using the principle of homologous line pairs, standards have been developed for the determination of traces of Cu in Al. J. W. S.

Light cast alloys. B. ÔTANI (Kinz. Kenk., 1931, 8, 43—52).—Al-Cu-Si alloys containing Cu 3.5, Si 4.5, Mg 0.1%, and Cu 6.5, Si 3.5%, and modified silumin containing Cu 0.8, Si 8, Zn 8%, are recommended for casting. CH. ABS.

Kanthal. A new electric-resistance alloy. J. H. RUSSELL (Metallurgia, 1932, 6, 195—197).—Alloys of Al, Cr, and Co are produced in three grades with a permissible temp. of heating elements made from them of 1325°, 1250°, and 1050°, respectively. The alloys may be used in either cast or worked form and have a higher sp. resistance than Ni-Cr alloys, e.g., about 160 microhms per sq. cm. at working temp. Good resistance to oxidation and S is shown. C. A. K.

Plating on cast aluminium and composite assemblies. E. SMITH and C. A. VELARDE (Metal Ind., London, 1932, 41, 15—16).

Determination of arsenic, antimony, tin, and zinc in ores and alloys by titration with potassium iodate. Y. Y. LURE (Min. Suir., 1932, 6, 731—742).—Jamieson's method for Sb and As is satisfactory. The determination of Sn by reducing to metal and titrating with KIO₃ is unsatisfactory, whilst reduction to SnCl₂

and titration in CO_2 with KIO_3 gives good results but is not superior to titration with I. The determination of Zn by pptg. as $\text{ZnHg}(\text{CNS})_4$ and weighing or titrating is satisfactory in absence of Fe, but in presence of much Fe the preliminary reduction of Fe with SO_2 gives poor results. The following method gives good results. To an acid solution of a mixture of Zn and Fe are added 1–2 g. of tartaric acid and a few drops of KCNS solution, then conc. aq. Na_2CO_3 dropwise until the red colour has changed to lemon-yellow. Addition of a few drops of KCNS should not cause a dark coloration. 15–20 c.c. of a solution of 39 g. of NH_4CNS or KCNS and 27 g. of HgCl_2 in 1 litre of H_2O are then added. After 1 hr. the ppt. is washed with H_2O , and the $\text{HgZn}(\text{CNS})_4$ is weighed or titrated. The accuracy is ± 0.0003 g. Zn in a mixture of 0.0488 g. Zn and 0.2 g. Fe. CH. ABS.

Descaling copper surfaces. A. P. HARRISON (Chem. & Met. Eng., 1932, 39, 455–456).—Scale formed by the action of cooling- H_2O on the outside of Cu tanks is removed by pouring saturated aq. NH_4Cl over it while the tank is hot and then knocking off the scale by a stream of H_2O from a nozzle. D. K. M.

Egyptian axe-head of great antiquity. (SIR) H. C. H. CARPENTER (Nature, 1932, 130, 626).—Examination of an axe-head (probably 4000 B.C.; 97.35% Cu, 1.28% Ni, 0.49% As, 0.17% Pb, 0.15% Fe, 0.06% Mn, traces of Sn and Sb) shows that the Egyptians were even then casting, heat-treating, and cold-working Cu alloys of the above type. L. S. T.

Directional properties in cold-rolled and annealed commercial bronze. A. PHILLIPS and C. SAMANS (Amer. Inst. Min. Met. Eng., Tech. Pub., 1932, No. 491, 12 pp.).—Bars of 90 : 10 Cu–Zn alloy and of tough-pitch Cu have been rolled to 0.032 in. by 5 different schedules. Tensile and cupping tests have been made on specimens cut in 5 directions relative to the rolling direction both from the cold-worked material and from material annealed for 30 min. at 400°, 500°, 600°, 700°, and 800°. The directional properties of Cu are markedly different from those of the alloy. In the alloy the max. directional effects result from a rolling schedule including large reductions and high-temp. annealing. E. H. B.

Preparation of acid bronzes. R. BERGER (Z. ges. Giessereipraxis, 1932, 53, 184–185; Chem. Zentr., 1932, i, 3340).—The prep. of an alloy of Cu 83.9, Sn 8, Pb 6, Ni 2, and P 0.1% is described. A. A. E.

Potentiometric determination of zinc. I. TANAEV (J. Appl. Chem., Russia, 1932, 5, 86–91).—Saturated KHSO_4 solution (5 c.c.) is added to ZnSO_4 solution (10–20 c.c.) containing H_2SO_4 ($\approx 2N$), the mixture is heated to the b.p., an excess of 0.025M- $\text{K}_4\text{Fe}(\text{CN})_6$ is added, and the liquid is cooled. The excess of $\text{K}_4\text{Fe}(\text{CN})_6$ is titrated with 0.005M- KMnO_4 , using a Pt electrode. Results are accurate to 0.1–0.15% [direct potentiometric titration in presence of $\text{K}_3\text{Fe}(\text{CN})_6$, 0.5–1.0%]. CH. ABS.

Modern metals. ANON (Chem. Met. Eng., 1932, 39, 497–512).—The composition, thermal and mechanical properties, and the methods of working 258 metals and alloys are tabulated and lists of these alloys

suitable for use in handling numerous chemicals are given. A. R. P.

Modern [corrosion-resistant] materials. ANON. (Chem. Met. Eng., 1932, 39, 513–524).—Recent developments in the manufacture and utilisation of materials of construction are reviewed. A. R. P.

Application of microscopy to an unusual manganese ore-dressing problem. R. E. HEAD, A. L. CRAWFORD, and F. E. THACKWELL (Proc. Utah Acad. Sci., 1931, 8, 131–134).—Failure to concentrate the Mn was due to combination of the Mn with siderite. CH. ABS.

Smelting complex tin residues in the blast furnace. ANON. (Chem. & Ind., 1932, 715–717).—A small, cylindrical blast furnace of the Pilz type but with two semicircular water-jackets is used with the inner lining tapering conically to the charging door and the solid bottom sloping to the taphole. The tuyères are 2 ft. above the taphole and the stage is 5 ft. above the tuyères; blast is supplied at 0.5–4 in. of Hg by a special fan blower to a wind-chest around the jacket which feeds the air to 4 square tuyères. The metal is tapped into a kettle heated by a coal fire to allow impurities to rise to the surface. The furnace is used for smelting all kinds of Sn and Sn–Pb residues to obtain a Sn–Pb alloy, a sulphury speiss, and a slag of low Sn content. Large quantities of Sb in the charge should be avoided and the slag should be as nearly neutral as possible. By reducing Fe from the fluxes used the slag is efficiently cleaned of Sn, and by providing sufficient matte- and speiss-forming materials all the reduced Fe (Cu, Co, and Ni, if present) are retained by the speiss; high S content of the charge tends to cause loss of Sn by volatilisation. A. R. P.

Effect of lead, nickel, bismuth, and zinc on the properties of tin bearing metals. R. J. SNELLING (Metallbörse, 1932, 22, 546–547; Chem. Zentr., 1932, i, 3339).—Good results are obtainable with white bearing metals containing 0.6–1.5% Pb. The presence of notable quantities of Ni diminishes the tensile and compressive strengths. Bi has no unfavourable effect, but Fe is in all circumstances undesirable. Zn also increases the hardness and brittleness. A. A. E.

Sn–Pb–Cu–Sb alloys rich in tin. M. FOURNIER (Rev. Mét., 1932, 29, 101–107; Chem. Zentr., 1932, ii, 283).—The properties of Sn alloys containing \approx Sb 12, Pb 6, and Cu 6% were studied. A. A. E.

Effect of small quantities of aluminium on the structure of Sn–Pb–Cu–Sb alloys rich in tin. M. FOURNIER (Rev. Mét., 1932, 29, 108–111; Chem. Zentr., 1932, ii, 283).—The unfavourable effect of Al on the microstructure of Sn (86)–Pb (3)–Sb (8)–Cu (3%) alloys is described. A. A. E.

Transformation of cobalt. G. WASSERMANN (Metall. Wirt., 1932, 11, 61–65; Chem. Zentr., 1932, i, 2760).—A study of technical Co (Co 95.5, Ni 1.94, Fe 1.84, Mn 0.64%) in relation to its structure after cold- and hot-rolling. Cubic, and possibly also hexagonal, Co exists in several structurally or atomically different forms. A. A. E.

Recovery of gold and silver from graphitic and non-graphitic waste. I. N. PLAKSIN and N. L.

ZHURLOV (Tzvet. Met., 1931, 1156—1179).—The curves showing the effect on recovery of time and concn. of NaCN solution were plotted. Max. extraction of Au is obtained in < 18 hr. By cyaniding in presence of kerosene or pine tar to prevent adsorption, 99.03% Au and 94.93% Ag were recovered. Alternatively, cyaniding followed by treatment with Na_2S , or ignition followed by amalgamation, may be used. Pt may be extracted by chloridising ignition at about 1100° followed by amalgamation, or by amalgamation with Zn-Hg in presence of CuSO_4 or in $\text{Cl}_2\text{-H}_2\text{O}$. The treatment of lean non-graphitic waste is also described. CH. ABS.

Corrosion in the petroleum industry. S. GILL (Chem. Met. Eng., 1932, 34, 481—483).—Pure Ni is the most resistant material for oil-well strainers, wrought Fe and Cu steel protected by an external casing of concrete are the most satisfactory economical materials for casings and tubing, Cr-Ni stainless steels are best for the valve balls and seats, and Cr-plated steels for the barrels of pumps are generally employed; wrought-Fe sucker rods have proved successful in resisting corrosion fatigue failure. The roofs of storage tanks may be protected from the action of moist H_2S by Al foil cemented on with bakelite, or by spraying with Al stearate grease; galvanised wrought-Fe plates may also be used for these roofs. The problem of protecting distillation equipment from corrosion by H_2S and HCl is discussed briefly.

A. R. P.

Corrosion in the pulp and paper industry. J. D. MILLER (Chem. Met. Eng., 1932, 39, 484—486).—Sulphite-pulp digesters and accessories made of stainless steel with 16.5—30% Cr and 7—12% Ni with up to 4% Mo have recently been installed in some American paper mills to reduce corrosion losses. Cr-plated screens have given satisfactory service in removing uncooked chips etc. from the discharge from the digesters.

A. R. P.

Operating cost of corrosion. C. L. MANTELL (Chem. Met. Eng., 1932, 39, 479—480).—The cost may be calc. from the expression $O.C.C. = (10/L)(M + F + Sh + I + R - S) - B$, where L is the expected life of the plant in years, M the total cost of material, F the fabrication cost, Sh the shipping cost, I the installation cost, R the cost of removal and salvage, S the salvage val., and B the min. cost of equipment assuming that no corrosion occurs. The data are compared over a 10-year period.

A. R. P.

Production of nickel plating at low p_{H} . C. E. CLINDININ (Month. Rev. Amer. Electroplaters' Soc., 1931, 18, No. 3, 11—24).—In plating at p_{H} 2—3 it is necessary to keep the solutions clean by adequate filtration and the use of very pure anodes. Solutions operated at p_{H} 2.0—2.5 are not very sensitive to variations in c.d. or temp.; the plate is finer-grained and of better colour than that from more alkaline solutions, and is very adherent and resistant to salt spray. Baths of low p_{H} require fewer NiSO_4 additions owing to improved anode efficiency.

CH. ABS.

Buffering the nickel[plating] solution. O. P. WATTS (Month. Rev. Amer. Electroplaters' Soc., 1931, 18, No. 3, 4—11).— $\text{Na}_2\text{B}_4\text{O}_7$ and H_3BO_3 have no practical val. as buffers against H_2SO_4 ; NaOAc is the most

promising for the Ni solution under ordinary operating conditions. CH. ABS.

Structure of the chromic acid plating bath; theory of chromium deposition. C. KASPER (Bur. Stand. J. Res., 1932, 9, 353—375).—Solutions of importance in Cr plating have been investigated by means of cryoscopic and conductivity measurements and absorption spectra. The first step in reduction of H_2CrO_4 is the formation of $\text{Cr}_2(\text{Cr}_2\text{O}_7)_3$, a strong electrolyte which forms negative mol. ions and does not exist in the green form. The next step is the production of $\text{Cr}(\text{OH})_3$, $\text{Cr}(\text{OH})\text{CrO}_4$, a colloid which may exist in relatively acid solutions. If SO_4^{--} is present it gives $\text{Cr}_2(\text{SO}_4)_3$, only the green form of which exists in H_2CrO_4 solutions. If the basic colloid does not have its electrophoretic velocity reduced it coats the cathode and prevents further reduction. SO_4^{--} lowers the electrophoretic velocity by adsorption. It is transported to the cathode film as a non-reactive ion $[\text{Cr}_4\text{O}(\text{SO}_4)_4(\text{H}_2\text{O})_n]^{++}$. This theory is in agreement with the phenomena encountered in Cr plating.

J. W. S.

Chromium plating of tools and gauges. A. WILLINK (Month. Rev. Amer. Electroplaters' Soc., 1931, 18, No. 4, 32—39).—Plating at < 60° and < 1000 amp. per sq. ft. gives greater range of c.d. for bright plating, improved throwing power, and better-wearing deposits, and requires less delicate control of SO_4 and CrO_3 contents; the limitations are chiefly those of equipment. Cr-plating on steel is discussed; it is suggested that the wearing qualities of Cr-plated steel are related to the hardness of the steel.

CH. ABS.

High-acid chromium [electrodeposition] process. RASSOW and L. WOLF (Metallwaren-Ind., 1932, 30, 225—227; Chem. Zentr., 1932, ii, 117).—The conductivity of the bath is higher than that of the sulphate bath; the new bath is largely independent of CrO_3 concn. Variations of 150—400 g. per litre have an unimportant effect on the yield. Fe (e.g., 0.75%) is not injurious.

A. A. E.

Possibility of use of chromium anodes in chromium plating. J. KORPIUM (Metallwaren-Ind., 1932, 30, 227—228; Chem. Zentr., 1932, ii, 117).—Anodic Cr enters solution as CrO_3 , the current yield being 100%, whilst the cathodic current yield is only 15%; hence by the use of Cr anodes the CrO_3 content of the solution increases undesirably. Unlike Pb, Cr (anode) does not oxidise Cr salt in solution. Hence an anode composed of Cr + Pb is preferred.

A. A. E.

Silver plating. E. B. SANIGAR (Month. Rev. Amer. Electroplaters' Soc., 1931, 18, No. 3, 26—30).—The theory of indirect deposition of Ag is untenable. The effects of CO_3 , PO_4 , OH , Cl , SO_4 , etc. in Ag-plating solutions, and operating conditions, are reported.

CH. ABS.

Gold-plating solutions. O. SIZELOVE (Month. Rev. Amer. Electroplaters' Soc., 1931, 18, No. 4, 45—50).—The bath compositions and operating conditions for (1) depositing (thickly) from $(\text{CN})'$ solutions, (2) salt- H_2O gilding, for "flash" deposits, and (3) immersion gilding (thin deposits), and the production of green, white, and rose Au deposits are discussed. CH. ABS.

Materials for chemical plant. Corrosion of water heaters.—See I. Wood waste fuel gas [for Ag ores].—See II. Plant materials for dyes.—See IV. Sulphite-pulp equipment.—See V. H_2SO_4 plant. Alloys for HNO_3 production.—See VII. Blast-furnace linings.—See VIII.

See also A., Nov., 1081, Fe-W and Cu-Zn systems. 1082, Pb-Zn, Pd-Ag, Pd-Cu, Ag, Al-Sb, Cu-Si, Ag-Cu, and Sn-Pb-Sb alloys. Intermetallic compounds formed in Hg. 1086, Prep. of colloidal Ag and Au. 1089, Free energy of H_2O , CO, CO_2 , and CH_4 . 1090, Liberation of O_2 from Ag. Systems Fe-Co-C and Fe- Fe_3C -FeS. 1093, Passivity of metals. 1096, Cu and ϵ -brass depositions. 1097, Cr-, Mo-, and W-plate. Electrolysis of red NH_4 chromi-oxalate. 1104, Determination of Mo, and of V in titanomagnetites. 1115, Prep. of colloidal solutions of metals.

PATENTS.

Manufacture of manganese pig iron. S. B. SHELDON (U.S.P. 1,846,152, 23.2.32. Appl., 17.7.28).—Basic open-hearth slag with a high Mn content is smelted in a blast furnace with Fe ore having a high SiO_2 content to obtain pig Fe with about 8% Mn. This Fe is then smelted with a high-grade Fe ore in the blast furnace to obtain pig Fe with 2% Mn. A. R. P.

Production of sound [steel] ingots. A. G. EGLER (U.S.P. 1,841,173, 12.1.32. Appl., 26.8.29).—Sound castings of steel with 0.15–0.6% C may be made without addition of Si or Al deoxidisers if the mould is jarred while the metal is solidifying. A. R. P.

Metal [steel] tempering process. J. W. BRANNON (U.S.P. 1,843,200, 2.2.32. Appl., 19.8.30).—The cutting ends of steel tools are tempered by heating the tool to redness, dipping the end in a powdered mixture of SiO_2 and $Na_2B_4O_7$, again heating to redness, immersing the coated end slowly into H_2O to the depth required by the extent of tempering desired, quickly plunging the tool into and removing it from the H_2O , allowing it to air-cool until the desired temper colour appears, then finally quenching it. A. R. P.

Cleaning of metallic [iron or steel] parts. S. R. MASON, Assr. to WESTERN ELECTRIC Co., INC. (U.S.P. 1,839,488, 5.1.32. Appl., 20.4.29).—Before plating, Fe or steel articles are degreased in aq. NaOH, then cleaned from rust etc. by treatment with a.c. in 20% HCl containing 1% CH_2O ; finally any Cu deposit derived from the suspension wires is removed by immersing the articles in aq. KCN. A. R. P.

[Inhibitor for] treating metal [pickling steel] surfaces with acid solutions. J. C. VIGNOS, Assr. to RUBBER SERVICE LABS. Co. (U.S.P. 1,843,653, 2.2.32. Appl., 14.1.28).— NH_3 derivatives of trithioaldehydes, e.g., thialdine, are claimed. A. R. P.

Corrosion-preventing composition [for steel fire-arms]. J. F. McCAMBRIDGE (U.S.P. 1,847,015, 23.2.32. Appl., 26.5.27. Renewed 22.1.30).—A mixture of 30 g. of carbolic acid containing > 87% PhOH with 900 c.c. of lard oil is claimed. A. R. P.

Rust-proofing composition. M. GREEN and E. M. JONES, Assrs. to PARKER RUST-PROOF Co. (U.S.P.

1,842,085, 19.1.32. Appl., 24.10.25).—Fe filings (18.29 oz.) are heated with 65% H_3PO_4 (2 qts.) until a stiff plastic mass is obtained, into which is stirred MnO_2 (4.96 oz.) followed by "manferine" (5.84 oz.). The dry product is ground and used for the prep. of parkerising baths. "Manferine" is the dried sludge which forms at the bottom of these baths during use. A. R. P.

Composition for deoxidising alloys [of nickel and iron]. S. R. KEITH (U.S.P. 1,846,114, 23.2.32. Appl., 3.7.30).—Steels and Ni alloys are deoxidised with a mixture of 25% Mn, 9% ferrovanadium (35–40% V), 16% ferrotitanium (25% Ti), 45.5% of an alloy of 25–30% Ca, 30–50% Na, and 25–30% Si, and 4.5% Mg. A. R. P.

Treating silicon steel. C. E. GIFFORD, Assr. to AMER. ROLLING MILL Co. (U.S.P. 1,842,162, 19.1.32. Appl., 11.2.29).—The sheets are pickled in dil. H_2SO_4 , washed, and heated at 650° in air until a film of Fe_2O_3 is formed on the surface. The oxidised sheets are formed into packs and heated in a reducing atm. until the Fe_2O_3 is reduced; the SiO_2 accompanying the Fe_2O_3 prevents sticking. A. R. P.

Manufacture of rolled silicon-steel sheets. BRIT. THOMSON-HOUSTON Co., LTD., Asses. of W. E. RUDER (B.P. 380,387, 6.4.32. U.S., 7.4.31).—Cast ingots of 5–7% Si steel are removed from the mould immediately after solidification and transferred without cooling to a furnace in which they are heated at 1200° for 4–6 hr. The ingots are then rolled at > 925° until the resulting sheets are a little < 10% thicker than the desired thickness, annealed at 700–760°, and again rolled to the correct thickness. A. R. P.

Heat-treatment of (A) magnetic materials, (B) magnet steels. (A, B) K. L. SCOTT, (B) A. L. KIRBY, and (B) M. R. LEACH, Assrs. to WESTERN ELECTRIC Co., INC. (U.S.P. 1,839,344–5, 5.1.32. Appl., [A] 8.11.27, [B] 18.1.30).—(A) Co steel with 5–60 (36%) Co is annealed above the A2 point (925°), quenched, and tempered at < 705° to increase the remanence. (B) The steel is annealed at 955° and quenched in oil or a salt at 95–315° (260°). A. R. P.

[Manganese-nickel-iron] alloy. H. SCOTT, Assr. to WESTINGHOUSE ELECTRIC & MANUFG. Co. (U.S.P. 1,843,903, 2.2.32. Appl., 11.8.27).—An alloy with a high coeff. of expansion up to 600° comprises Fe with 5–30 (10%) Ni, 12–2 (10%) Mn, and < 0.3% C; %Ni + (2.5 × % Mn) must be between 30 and 36%. A. R. P.

Industrial chemical vessel [stainless steel sulphite-pulp digester]. R. H. MCKEE (U.S.P. 1,841,752, 19.1.32. Appl., 5.3.29).—The vessel is made of steel containing < 0.2% C, < 0.05% P, < 0.05% S, about 0.05% Mn, about 0.5% Si, 15–20 (18%) Cr, and 7.5–10 (8%) Ni. A. R. P.

Production of articles from stainless chromium-nickel steel alloys. F. KRUPP A.-G. (B.P. 380,045, 27.5.31. Ger., 2.6.30).—The steel is heated at 600–900°, then reduced in thickness by > 15% (preferably > 50%), and annealed at 850–1020° until recrystallisation has taken place without dissolution of the pptd. carbides. A. R. P.

Free-machining corrosion-resisting [chromium] steel. F. R. PALMER, ASSR. to CARPENTER STEEL CO. (U.S.P. 1,846,140, 23.2.32. Appl., 7.12.29).—The steel contains Cr 4–60% with Se and/or Te 0.03–2%. A typical composition is Cr 14, C 0.1, S 0.02, Zr 0.15, and Se or Te 0.2%. A. R. P.

Treatment of non-ferrous metals [aluminium]. B. F. HARDESTY, ASSR. to REFINED STEEL PRODUCTS CO. (U.S.P. 1,841,599, 19.1.32. Appl., 9.1.30).—A finely-powdered mixture of BaO (70), BaCO₃ (7), NaF (14), KClO₃ (6), and C (3%) is immersed below the surface of the molten metal to remove oxides etc. A. R. P.

Detinning of aluminium. W. FRAENKEL, ASSR. to AMER. LURGI CORP. (U.S.P. 1,840,708, 12.1.32. Appl., 14.1.30. Ger., 20.3.29).—The Al is melted with Cd, Bi, or, preferably, Pb, containing a little Na. With Na–Pb the Sn divides between the Al and Pb layers in the ratio 1 : 3. A. R. P.

Heat-treatment of aluminium. R. W. BRIDGES, ASSR. to ALUMINUM CO. OF AMERICA (U.S.P. 1,840,562, 12.1.32. Appl., 20.2.31).—In the heat-treatment of Al and its alloys, the metal is heated to the desired temp. in a bath of fused NaNO₃ containing 0.5% K₂Cr₂O₇ to prevent surface-staining and to provide the metal with a corrosion-resistant film. A. R. P.

Protecting magnesium and its alloys against the action of polyhydric alcohols or mixtures thereof with water. I. G. FARBENIND. A.-G. (B.P. 380,427, 28.7.32. Ger., 6.8.31).—A small quantity of KF is added to glycol or glycerin used as anti-freeze additions to cooling H₂O for internal-combustion engines the cylinders and/or pistons of which are made of Mg alloys. A. R. P.

Separating [table for pulverised mixed ores]. D. M. TILLER, ASSR. to W. C. ANDERSON and N. J. SHARP (U.S.P. 1,845,366, 16.2.32. Appl., 14.5.30).—A shaking table is provided with riffles of Al which are connected alternately to opposite poles of an electric supply (a.c. or d.c.), with the object of forming Al(OH)₃ in the H₂O used for dressing. The riffles are longer at the feed edge than at the tailing discharge. B. M. V.

Copper extraction process. W. E. GREENAWALT (U.S.P. 1,841,437–8, 19.1.32. Appl., [A] 9.11.26, [B] 11.2.27).—(A) Mixed oxide–sulphide Cu ores are subjected to flotation to obtain a rich Cu sulphide concentrate (A) and a low-grade oxide–sulphide concentrate (B). Product A is roasted to obtain the max. CuSO₄ and the calcines are leached first with H₂O and then with dil. H₂SO₄; the aq. solution is electrolysed for Cu and the H₂SO₄ electrolyte used for the second leaching operation, the solution from which is used for leaching product B or tailings containing oxidised Cu minerals. (B) The oxidised minerals are removed by leaching with dil. H₂SO₄ and the residue is subjected to flotation; the concentrate is roasted and leached with dil. H₂SO₄, the solution electrolysed and the acid used in the first stage, and the insol. residue mixed with a further quantity of crude ore. A. R. P.

Liquation of copper [from lead]. J. O. BETTERTON, ASSR. to AMER. SMELTING & REFINING CO. (U.S.P. 1,843,413, 2.2.32. Appl., 23.5.28).—The Pb is heated to

420° in a large kettle the sides and top of which are then cooled to 305°, whereby about 25% of the metal crystallises, leaving the Cu–Pb eutectic still liquid. This is withdrawn from below the crust and the latter is again melted and the cupriferos dross removed at the m.p. of Pb; the remaining metal is returned to the first stage of the process. A. R. P.

Refining of metals [copper]. G. S. EVANS, ASSR. to MATHIESON ALKALI WORKS, INC. (U.S.P. 1,841,020, 12.1.32. Appl., 19.3.29).—The metal is melted down with briquettes of Na₂CO₃, with or without a carbonaceous reducing agent, the liquid slag is removed, and the metal washed with a second charge of Na₂CO₃. As and S are thus almost completely removed. A. R. P.

Bronze for welding. H. L. SPENCE, ASSR. to H. L. SPENCE CO. (U.S.P. 1,840,921, 12.1.32. Appl., 1.8.29).—A welding electrode for joining bronze to ferrous alloys comprises an alloy of 80–96 (96)% Cu, 1–10 (3)% Si, and 1–5 (1)% Mn. A. R. P.

Improvement of nickel. A. BURKHARDT, ASSR. to AMER. LURGI CORP. (U.S.P. 1,847,044, 23.2.32. Appl., 16.3.31).—The effect of small quantities of S on the mechanical properties of Ni and its alloys is overcome by the addition of 0.1–0.3% of an alloy of Mg with 15% Li. A. R. P.

Degasifying metal [nickel] bodies. J. H. RAMAGE, ASSR. to WESTINGHOUSE LAMP CO. (U.S.P. 1,842,200, 19.1.32. Appl., 4.5.28).—Ni or Ni alloy parts for radio-valves etc. are degassed by heating first in pure dry H₂ at 550–850° until other absorbed gases are replaced by H₂, then in vac. to remove the H₂. A. R. P.

Recovery of indium [from zinc ores]. W. S. MURRAY, ASSR. to ONEIDA COMMUNITY, LTD. (U.S.P. 1,839,800, 5.1.32. Appl., 11.1.29).—The ore is given a sulphating roast and the calcine leached with dil. H₂SO₄ from the electrolytic tanks. The clarified solution is purified by boiling with Zn dust and passed, after further purification if necessary, to the cells. The Zn ppt. is dissolved in 25% H₂SO₄, the solution adjusted to 2.5–4% free H₂SO₄, the Cu etc. pptd. with H₂S, and the filtrate electrolysed for In. A. R. P.

[Flotation] concentration of [lead–silver] minerals. A. W. HAHN (U.S.P. 1,842,400, 26.1.32. Appl., 1.2.29).—Ag–Pb ores containing the Pb partly as sulphide and partly as oxidised minerals are passed through a series of flotation cells, a S-rich concentrate (A) being taken from the early members of the series, an oxidised concentrate (B) from the middle members, and a middling (C) from the end members. All three products are re-treated in separate series of cleaner cells, the concentrates from all three treatments being sent to the Pb smelter, and the tailings from A returned to the head of the circuit, those from B returned to the head of the oxidised-mineral cells, and those from C smelted for Cu. A. R. P.

Recovery of lead–tin alloys [from white-metal scrap]. E. F. KERN, ASSR. to AMER. METAL CO., LTD. (U.S.P. 1,842,028, 19.1.32. Appl., 29.1.29).—The scrap is liquated at 300–400° to obtain a relatively pure Pb–Sn alloy and the dross is smelted in a reverberatory furnace to remove As, S, Sb, and Fe and yield a crude

Pb-Sn alloy which is returned to the liquation stage. The purified alloy is treated with S at 315° to remove Cu, then mixed with pure Sn-Pb alloy to reduce the total impurities below 10%. Final purification is effected by electrolysis in a bath containing PbSiF_6 and SnSiF_6 with 30–80 g. of free H_2SiF_6 per litre, the electrolyte being constantly circulated through granulated Pb-Sn alloy to remove impurities dissolved from the anode. A. R. P.

Lead-refining apparatus. A. E. HALL (U.S.P. 1,840,946, 12.1.32. Appl., 8.11.29).—The apparatus comprises a series of kettles provided with elevator screws with perforated blades. The refining is carried out by the Pattinson process, the crystals formed in a kettle being elevated to that next higher in the series and the residual liquid containing Bi, Ag, etc. is run by gravity into the next lower kettle. A. R. P.

Refining of lead-bismuth alloys. J. J. FINGLAND, A. D. TURNBULL, and P. F. MCINTYRE, Assrs. to CONSOL. MINING & SMELTING CO. OF CANADA, LTD. (U.S.P. 1,840,028, 5.1.32. Appl., 9.5.29).—Pb-Bi alloys with 20–40% Bi are melted with 1.5–3% of Zn and allowed to cool fractionally, crusts being removed at each stage of cooling and being transferred through a series of pots in one direction while the liquid is transferred in the opposite direction through the series, *i.e.*, in a similar way to the Pattinson process of refining Pb. All the Au, Ag, Cu, etc. follow the Zn through the operations. A. R. P.

Manufacture of tungsten carbide. G. W. and H. B. WOODS, Assrs. to HUGHES TOOL CO. (U.S.P. 1,839,518, 5.1.32. Appl., 7.11.29).—The W and C are melted in a graphite crucible by resistance-heating and the molten WC is tapped into a H_2O -cooled Cu mould filled with NaCl which serves to quench the carbide and thus increase its hardness. A. R. P.

Manufacture of [tungsten carbide] hard metal composition. S. L. HOYT, Assr. to GEN. ELECTRIC CO. (U.S.P. 1,843,768, 2.2.32. Appl., 6.4.27).—A finely-ground mixture of WC and < 25 (13)% Co is pressed into bars and sintered at 1350–1450° under pressure to form compact bars free from voids. A. R. P.

Refractory material [containing tungsten carbide]. C. A. LAISE, Assr. to EISLER ELECTRIC CORP. (U.S.P. 1,842,103, 19.1.32. Appl., 3.7.30).—A mixture of finely-divided WC (97.5), BN (0.5), and BeC_2 (2%) is pressed into shape and heated at 900–1000° in vac. or in an inert or a reducing atm. to produce a hard, porous body which is then ground into the desired shape and immersed in molten Co or Ni in vac., whereby the pores become filled with the molten metal. Excess of Co or Ni is then removed from the surface by grinding or dissolution in acid. A. R. P.

[Ruthenium] alloy for pen points. K. K. LEDIG, Assr. to AMER. PLATINUM WORKS (U.S.P. 1,839,686, 5.1.32. Appl., 22.5.31).—An alloy of 50–80 (55)% Ru, 10–40 (40)% Os, and 2–10% of other metal or metals of the Pt group (5% Pt). A. R. P.

Electrodeposition of chromium. C. G. FINK and H. D. McLEESE, Assrs. to UNITED CHROMIUM, INC. (U.S.P. 1,844,751, 9.2.32. Appl., 12.8.25).—The bath contains,

per litre, 250 g. of CrO_3 with the addition of H_2SiF_6 in an amount which contains the same amount of F as 10 g. of CrF_3 per litre. A. R. P.

Tin-plating [bath]. F. F. OPLINGER, Assr. to ROESSLER & HASSLACHER CHEM. CO. (U.S.P. 1,841,978, 19.1.32. Appl., 6.2.29).—The bath contains Na_2SnO_3 and NaOH in the proportion of 1.6 mols. per mol. of Na_2SnO_3 and a further 0.2–0.4 mol. per litre. A. R. P.

Plating [with zinc-cadmium alloy]. J. N. REPPEN, Assr. to BENDIX BRAKE CO. (U.S.P. 1,839,931, 5.1.32. Appl., 21.5.28).—The bath contains KCN 19, CdO 7, ZnO 3, NaOH 2, and NH_4Cl 2 oz. per gal. A 25:75 Zn-Cd alloy is used as anode or $\frac{1}{4}$ of the anode area may be a Zn plate and $\frac{3}{4}$ a Cd plate. A. R. P.

Preparation of rare metals [uranium] by electrolytic decomposition of their fused halogen compounds. F. H. DRIGGS, Assr. to WESTINGHOUSE LAMP CO. (U.S.P. 1,842,254, 19.1.32. Appl., 11.5.28).—The bath comprises a mixture of KF (2 pts.) and NaF (1 pt.) containing 25% KUF_5 . A Ni, Ni-Cr, or graphite vessel (cathode) is used with a C anode, and current is supplied at 0.27 and 0.90 amp. per sq. cm. at the cathode and anode respectively. U separates as a heavy crystalline powder. A. R. P.

Means for changing the tuyères of blast furnaces. E. E. BROSIUS (B.P. 381,634, 25.7.31).

Moulds for casting ingots of steel. KABUSHIKI KAISHA NIHON SEIKOSHO (B.P. 381,742, 2.11.31. Jap., 16.7.31).

Hg boiler. Cleaning blast-furnace gas.—See I. Gaseous atm. [for metal-working].—See II. Ferrosilicon.—See VII. Melting furnace. Electrolysis tanks.—See XI.

XI.—ELECTROTECHNICS.

Sulphation of lead accumulator plates. C. FÉRY (Bull. Soc. chim., 1932, [iv], 51, 1019–1020).—At the negative plate sulphation during rest is due to the slow action of H_2SO_4 on the spongy Pb: $2\text{Pb} + \text{H}_2\text{SO}_4 = \text{Pb}_2\text{SO}_4 + \text{H}_2$. The Pb_2SO_4 oxidises superficially to PbSO_4 , the O coming from the air or the positive plate. During discharge, sulphation at the negative plate is accelerated by the liberation of SO_4^{--} . Sulphation at the positive plate results from the reaction $\text{Pb}_3\text{O}_4 + 2\text{H}_2\text{SO}_4 = 2\text{PbSO}_4 + 2\text{H}_2\text{O} + \text{PbO}_2$ and possibly also from $\text{Pb}_2\text{O}_3 + \text{H}_2\text{SO}_4 = \text{PbSO}_4 + \text{PbO}_2 + \text{H}_2\text{O}$. This process reduces the porosity of the deposit, with the result that the O_2 liberated on recharging loosens the deposit, which falls off, causing a decrease in the capacity. Such deterioration of the plates may be considerably diminished by partitions preventing the mixing of the gases from the two plates and shutting out the air from the negative plate. D. R. D.

Insulation oil.—See II. Ultra-violet radiation tests.—See V. Glass electrode and bleaching.—See VI. Resistance alloy. Cr-, Ni-, Ag-, and Au-plate. Determining Zn and V.—See X. Rubber insulation.—See XIV.

See also A., Nov., 1077, Ti photo-electric cell. Cr-Se cells. 1082, Resistance of Pd-Ag, Pd-Cu,

and of Ag alloys. 1086, Colloidal Ag and Au preps. 1096, Electrolytic oxidations. Deposition of Cu and of ϵ -brass. 1097, Cr-, Mo-, and W-plate. Electrolysis of red NH_4 chromioxalate. 1098, Orthoactinic radiation. 1105, Control of ultra-violet ray lamps. Portable thermionic electrometer. Automatic [H] recorder. 1113, Prep. of *d*-galactonic acid.

PATENTS

Electrode for electric melting furnaces. A. CORNELIUS (B.P. 381,500, 25.4.32).—Triangular prism-shaped solid or trough-shaped electrodes, completely covered by the molten mass, are arranged at the furnace wall (*A*) so that of the two electrode surfaces which enclose the greatest angle, one extends substantially horizontally towards the centre of the furnace (*B*) and the other vertically downwards, the electrode resting on an abutment of *A* with its lower edge nearer the centre of *B* than the outer edge of the upper surface. J. S. G. T.

Arc-extinguishing fluid. J. D. HILLIARD, Assr. to GEN. ELECTRIC Co. (U.S.P. 1,846,868, 23.2.32. Appl., 26.11.29).—A mixture of high dielectric strength, composed of a substantially dry mineral oil and a detonation suppressor, *e.g.*, NH_2Ph , is claimed. J. S. G. T.

(A) **Electrolytic cells.** (B) **Cathode diaphragms of electrolytic cells.** H. E. POTTS. From HOOKER ELECTROCHEM. Co. (B.P. [A] 381,183 and [B] 381,190, 23.6.31).—(A) Means for reducing radiation from the cell and for returning heat recovered from effluent products to the cell are claimed. (B) Liquid, *e.g.*, aq. NaCl or NaOH, containing fibrous material, *e.g.*, asbestos, in suspension, is forced by differential pressure through perforations in the cathode. J. S. G. T.

Tanks for electrolysis [refining of metals]. J. P. LEEMANS, and SOC. GÉN. MÉTALLURG. (B.P. 381,318, 23.9.31).—Electrodes are insulated from the tank by slabs of natural or artificial, acid-resisting, stony material, *e.g.*, granite or ceramic material, supported by a layer of asphalt arranged between the slabs and the tank. J. S. G. T.

Apparatus for obtaining ion-concentration effects. H. C. PARKER and W. N. GREER, Assrs. to LEEDS & NORTHRUP Co. (U.S.P. 1,846,354, 23.2.32. Appl., 30.7.26).—Apparatus for producing an e.m.f., determined by the concn. of an ion, *e.g.*, H, OH, in a solution, is claimed. J. S. G. T.

Electron-emission material [for radio-valves]. M. N. FREDENBURGH, Assr. to WESTINGHOUSE LAMP Co. (U.S.P. 1,842,161, 19.1.32. Appl., 20.7.28).—Alkaline-earth carbonate (100 g.) is ground in a mixture of Et_2CO_3 (50 c.c.) and a solution (50 c.c.) of 8 g. of nitrocellulose in 160 c.c. of Et_2CO_3 and 40 c.c. of $\text{Et}_2\text{C}_2\text{O}_4$ until a homogeneous, stable suspension is obtained which can be used for dipping filaments or spraying other electron-emitting devices with the active carbonates. A. R. P.

Electrode [for luminescent tube]. F. ALEXANDER and J. P. GIBSON, Assrs. to ARGCO TUBE & TELEVISION CORP. (U.S.P. 1,846,242, 23.2.32. Appl., 5.1.29).—An alkali salt, *e.g.*, silicate, nitrate, mixed with a reducing agent, *e.g.*, Al, Mg, and arranged in a conducting con-

tainer under reduced pressure, is reduced to metal by heating by means of induced eddy currents. J. S. G. T.

[Rod-curtain] electrical precipitator [for gases]. C. H. WEISKOPF, Assr. to INTERNAT. PRECIPITATION Co. (U.S.P. 1,846,169, 23.2.32. Appl., 20.1.31).—Methods of mounting the rods to eliminate buckling due to temp. changes, and of mounting the discharge electrodes, are claimed. J. S. G. T.

Production of [carborundum] electrical-resistance elements. F. EICHENBERGER, Assr. to GLOBAL CORP. (U.S.P. 1,842,088, 19.1.32. Appl., 30.1.23. Switz., 30.1.22).—The terminals of SiC resistors of the "silite" type are impregnated with Si by exposing them to the vapour generated by heating a mixture of SiO_2 and C in the arc, *e.g.*, by striking an arc between the ends of two rods embedded in the SiO_2 -C mixture. The treated terminals have a lower resistance than has the remainder of the rod. A. R. P.

Manufacture of solid insulating materials. N. V. DE BATAAFSCHE PETROLEUM MAATS. (B.P. 381,448, 16.2.32. Ger., 2.3.31).—Paper, silk, or cotton, impregnated with C_5H_{12} and/or lower-boiling homologues which dissolve mineral oils, is heated in viscous, insulating, impregnating material, preferably under reduced pressure, to the temp. required for removing the solvent. J. S. G. T.

Drying chambers [for insulation-impregnated electrical apparatus]. TELEFONAKTIEB. L. M. ERICSSON (B.P. 381,773, 10.12.31. Swed., 9.6.31).

[Pole bridge for] electric accumulators. BRITANNIA BATTERIES, LTD. (B.P. 381,914, 20.7.32. Ger., 17.3.32. Addn. to B.P. 369,700).

Cathodes for thermionic tubes. B. ERBER (B.P. 382,230, 2.5.32).

[Insulating structure for cathodes of] thermionic valves. TELEFUNKEN GES. F. DRAHTL. TELEGRAPHIE M.B.H. (B.P. 382,603, 8.8.32. Ger., 7.8.31).

Luminous electric-discharge tubes. GEN. ELECTRIC Co., LTD., Asses. of PATENT-TREUHAND GES. F. ELEKTR. GLÜHLAMPEN M.B.H. (B.P. 382,042, 2.10.31. Ger., 27.10.30. Addn. to B.P. 363,092).

Ultra-filter.—See I. Recovering halogens from brine.—See VII. Frosting glass.—See VIII. Cleaning Fe etc. parts. Magnet steels. Ore separator. Cu extraction. Welding. Degassing Ni. In from Zn ores. White-metal scrap. Cr-, Sn-, and Zn-Cd-plate. U.—See X.

XII.—FATS; OILS; WAXES.

Oxygen number [of fats etc.]. A. S. GINZBERG and G. K. FOMINA (J. Appl. Chem., Russia, 1932, 5, 221—234).—The O val. is the no. of mg. of O (as KMnO_4) required in the titration; it is not identical with the I val. CH. ABS.

Sapo kalinus. E. BUREŠ and F. FINK (Časopis Českoslov. Lék., 1932, 12, 29—33; Chem. Zentr., 1932, ii, 259).—Addition of 25—50% of vegetable oil to the linseed oil is indicated if the I val. of the acids is <175. 20% is detected with certainty by conversion of the fatty

acids of the soap into Br-acids ($< 26\%$; m.p. 174—181°). When fish oil (7—10%) is present the Br-acids decompose above 200° without melting. A. A. E.

Manufacture of [lubricating] greases. W. MAASS (Petroleum, 1932, 28, No. 38, 1—16).—The raw materials used, formulation, and manufacturing processes in the prep. of various types of greases are discussed in detail. E. L.

Tomato-seed oil. M. DACHERMAN (Masloboino Zhir. Delo, 1931, No. 12, 30—36).—The fruit contains 6—8% of seeds; the edible oil (17—29%) has: d 0.9221, refraction val. 62.3, sap. val. 197.0, I val. 106.

CH. ABS.

Behaviour of oils in Wood's light. M. GISONDI (Ann. R. Staz. Chim.-Agrar. Sperim., 1931, Publ. No. 276, 18 pp.).—Examination of the fluorescence in ultra-violet radiation of olive oil of different qualities and ages, and of oils used as adulterants, leads to the conclusion that such variation in the behaviour of virgin olive oil occurs as a result of ageing under different conditions of storage that this test alone is not suitable for judging whether virgin oil has been mixed with refined oil or otherwise adulterated. R. K. C.

Determination of sulphuric anhydride in sulphonated oils. Titration method. R. HART (Ind. Eng. Chem. [Anal.], 1932, 4, 411—412).—A mixture of the oil and excess of standard NaOH is ignited and the loss of titratable alkali determined. This procedure gives higher results for org. S than are obtained by the method of boiling with mineral acids; it is not applicable to the determination of S in sulphonated mineral oils or other non-saponifiable oils. E. S. H.

Fluorescence analysis of waxes. J. A. RADLEY (Analyst, 1932, 57, 626).—Ultra-violet light causes a pale yellowish-green fluorescence in a 10% solution of paraffin wax in CHCl_3 , and a strong bluish-white fluorescence in a 10% carnauba wax solution. 1% of carnauba wax may be detected in beeswax by this method, using a 0.2% solution of wax. T. McL.

Determination of beeswax in candles. F. W. POWER and E. S. HAUBER (Ind. Eng. Chem. [Anal.], 1932, 4, 389—390).—A procedure is described for determining the sap. val. of beeswax, using KOH in abs. EtOH. In high-grade candles, the amount of beeswax can be determined from the ratio of the sap. val. of the candle to that of beeswax. Stearic acid is determined by titrating the solution in 95% EtOH with aq. 0.5N-KOH. Paraffin wax is determined by difference. E. S. H.

Naphtha-insol. hydroxy-acids.—See II. Butter. —See XIX.

See also A., Nov., 1127, Sol. compounds of cholesterol with soaps. 1174, Reaction of fish-liver oils with SbCl_3 .

PATENTS.

Preservation of soaps, fats, fatty oils, or derivatives thereof. E. I. DU PONT DE NEMOURS & Co., W. S. CALCOTT, W. A. DOUGLASS, and H. W. WALKER (B.P. 378,875, 13.4.31).—Development of rancidity and discoloration is retarded by addition of 0.01—0.1% of certain hydroxylated diarylmethanes, diaryl oxides, or

certain diarylamines or aminodiarylamines. Examples are: *p*-hydroxydiphenylmethane, 4-hydroxy- or 4:4'-dihydroxy-diphenyl ether, *p*-hydroxydiphenylamine, *p*-phenetyl- α -naphthylamine, 4:4'- or 2:4-diamino- or 2:4-diamino-4'-hydroxy-diphenylamine. C. H.

Manufacture of shaped, rapidly and easily soluble mixtures of soaps and per-salts. A. WELTER (B.P. 381,211, 1.7.31).—Per-salts (with or without other salts) are incorporated during the saponification of fatty acids with 2 equivs. of calcined soda. Some KOH or K_2CO_3 may be used to reduce brittleness, and it is advantageous to mix the fatty acids with a non-oxidisable hydrocarbon (e.g., benzene) prior to saponification. E. L.

Manufacture of polishing compositions. HENKEL & Co., G.M.B.H. (B.P. 381,387, 25.11.31. Ger., 22.1.31).— $> 50\%$ of higher (above C_{20}) fatty acids (e.g., carnaubic acid, acids from montan wax or the oxidation of paraffins) are comprised in the mixture of waxes, turpentine, etc., which may be emulsified with H_2O by the help of soaps, sulphonic acids, etc. E. L.

Preparation of liver oil. K. KAWAI (B.P. 381,342, 14.10.31).—The chopped (cod) livers are digested at 80—90° for about 20 min. with dil. (2%) caustic alkali; the oily layer is separated by settling or centrifuging, and heated with small amounts of EtOH and NaCl or Na_2SO_4 etc. to break the emulsion. A high yield of oil with undestroyed vitamins is recovered. The process is also applicable to livers, or boiled-out liver residues, of low oil content. E. L.

Manufacture of products suitable for use as substitutes for neatsfoot oil. F. B. DEHN. From DEUTS. HYDRIERWERKE A.-G. (B.P. 381,316, 15.9.31).—Fatty acids from non-drying oils (e.g., lard, palm oil, sperm oil) are chilled at about 4° and the liquid portion is removed (e.g., by filtration) and esterified with glycerin to yield artificial oils with low turbidity points (from -5° to -20°). E. L.

Wetting etc. agents.—See III. Insecticide.—See XVI.

XIII.—PAINTS; PIGMENTS; VARNISHES; RESINS.

Physical methods for examination of paint. J. A. F. WILKINSON (J. Oil Col. Chem. Assoc., 1932, 15, 259—275).—Methods for the determination of some physical properties of dry paint films are discussed; some hardness data obtained by the rocking-pendulum method are included. S. M.

Bremen-blue and its substitutes. W. LUDWIG (Farbe u. Lack, 1932, 485—486).—The manufacture of Bremen-blue from CuSO_4 and NaOH is detailed. Substitutes usually consist of lakes of Patent-blue A, Brilliant-acid-blue EG, B, or L on a substrate of hydrated Al_2O_3 , barytes, or blanc fixe. Lakes made from the new Fanal dyestuffs (B., 1930, 779) are more resistant, but their purity of tone decreases with increase in fastness; several members of this class are compared. S. M.

Cause of spotting in blue posters under glass. W. HUSSE (Farben-Chem., 1932, 3, 339—340).—The development of greenish-grey spots in varnished ultramarine letters, which were pressed against glass with

gelatin, was traced to previous contact of the undried varnished surface with grease paper. In the places where the impregnating material had been removed, drying of the varnish was retarded; exposure to sunlight in the restricted air supply under the glass led to formation of acid decomp. products which attacked the ultramarine. S. M.

Natural and artificial ageing [of varnishes]. A. V. BLOM (Farben-Chem., 1932, 3, 381—384).—Durability data obtained by Came (B., 1930, 519) for a series of commercial varnishes under conditions of (a) outside exposure and (b) accelerated weathering are graphed and discussed. Grouping of the varnishes into classes according to their probable life is possible from the *a* but not from the *b* curves; maxima shown are attributed to structural changes in the varnishes. Exposure of a new film to sunlight reduces its resistance. The effects of the nature of the covered surface and of its method of prep. on the ageing of a film are emphasised. S. M.

Composition of the resin of *Pinus insignis*, Dougl. B. ARBUSOV, V. ABRAMOV, and F. VALITOVA (J. Gen. Chem. Russ., 1932, 2, 376—387).—The resin consists of about $\frac{1}{3}$ turpentine, $\frac{1}{3}$ cryst. resin acids, and $\frac{1}{3}$ amorphous, non-volatile material. The turpentine contains α - and β -pinene with 0.3% of camphene, isolated as isoborneol. The resin acid, $C_{20}H_{30}O_2$, m.p. 143—145°, $[\alpha]_D^{20}$ —89.2° in EtOH, α_r/α_l 1.173, resembles α -aleppic and sondarsapinic acid (A., 1929, 573) (NH_4 salt, m.p. 55°); it is rapidly isomerised to abietic acid by HCl in EtOH, the levorotation of the solution rapidly decreasing at first and then increasing. One double linking in the acid is almost instantly oxidised by BzO_2H or AcO_2H , the second very slowly. G. A. R. K.

Rosin-containing precipitates. S. R. H. EDGE (Proc. Tech. Sect. Paper Makers' Assoc., 1932, 12, 336—341).—The ppts. obtained by adding neutral rosin size to hard H_2O under varying conditions of p_H have been examined, especially for ash content and solubility in Et_2O . They are considered to be mixtures of normal Ca resinates, ill-defined acid resinates, and free rosin. Mechanically produced colloidal rosin solutions differ from ordinary rosin soaps in not being pptd. by hard H_2O . H. A. H.

Bakelite materials. W. WAHL (Plast. Massen, 1932, 1, 184—189, 209—212, 227—230; 2, 5—9, 30—32, 54—56; Chem. Zentr., 1932, ii, 301).—Physical properties of the constituents of artificial resin mixtures are surveyed. A. A. E.

Evaporation of solvents. Esterification.—See III.

See also A., Nov., 1084, Sorption of EtOH vapours by cellulose etc. 1085, Adsorptive power of protein-cellulose membranes.

PATENTS

Manufacture of bitumen-emulsion paints. N. V. TOT VOORTZETTING DER ZAKEN VAN PIETER SCHOEN & ZOON (B.P. 381,286, 18.8.31. Holl., 19.8.30).—The aq. bitumen is re-emulsified with a solution of an emulsifying agent, e.g., triethanolamine oleate, in a volatile org. solvent and the pigment is incorporated. Drying oils may be added. S. M.

Production of titanium pigments. C. DE ROHDEN, Assr. to KREBS PIGMENT & COLOR CORP. (U.S.P. 1,846,188, 23.2.32. Appl., 17.1.28).—The whiteness of pptd. TiO_2 is improved by digestion in dil. mineral acids, especially if an oxidising agent, e.g., Cl_2 , is also present. S. M.

Manufacture of "lead" for pencils. M. HAMMEL (B.P. 380,177, 27.6.31).—Cryst. graphite is converted into the colloidal state by oxidation, e.g., by treatment with a mixture of $KMnO_4$ and conc. H_2SO_4 , is then mixed with clay and/or other additions used in the manufacture of pencil leads, and the mixture is pressed into strands which are dried and burned. A. B. M.

Pyroxylin enamel. F. C. HOFFMANN, Assr. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,846,869, 23.2.32. Appl., 28.8.28).—Nitrocellulose compositions are modified to give a "crackle finish" by adding 40—60 wt.-% of a mixture containing 25% of Al stearate, 74.5% of EtOAc, and 0.5% of nitrocellulose. S. S. W.

Improving the durability of nitrocellulose coating compositions and films. E. I. DU PONT DE NEMOURS & Co. (B.P. 381,168, 19.6.31. U.S., 19.6.30).—Org. V, Ce, or Ti salts, particularly those of a phthalic acid semi-ester, Et H succinate, or drying oil acids, compatible with nitrocellulose and sol. in org. solvents, are incorporated with nitrocellulose compositions as "ultra-violet light filters." Small amounts of similar salts of Fe, Cu, or Co may also be incorporated if desired. S. S. W.

Vacuum-distillation of wood rosin. I. GUBELMANN and H. R. LEE, Assrs. to NEWPORT INDUSTRIES, INC. (U.S.P. 1,846,681, 23.2.32. Appl., 2.9.27).—Suitable apparatus provides for rapid heating of thin molten films of wood resin in a good vac.; increase of pressure is prevented by continuous removal of the non-volatile residue. S. M.

Refining of wood rosin. I. GUBELMANN and C. O. HENKE, Assrs. to NEWPORT INDUSTRIES, INC. (U.S.P. 1,846,721, 23.2.32. Appl., 2.7.28).—The product from a continuous still (cf. U.S.P. 1,846,681; preceding abstract) is redistilled in batches under a good vac. to remove its colour. S. M.

Manufacture of rosin-size emulsions. S. W. McCUNE, JUN., Assr. to NEWPORT INDUSTRIES, INC. (U.S.P. 1,846,220, 23.2.32. Appl., 1.8.28).—The emulsifier consists of an impeller mounted within an elliptical casing having inlet and outlet ports. The alternating large and small radial clearances cause considerable slippage so that some of the rosin size-hot H_2O mixture recirculates and a stable emulsion is formed. S. M.

Preparation of abietic acid. I. GUBELMANN, C. O. HENKE and H. R. LEE, Assrs. to NEWPORT INDUSTRIES, INC. (U.S.P. 1,846,639, 23.2.32. Appl., 2.7.28).—The intermediate fractions from the distillation of wood resin at 2 mm. contain about 93% of abietic acid which can be crystallised from EtOH. Fractional distillation of the residue from the mother-liquors gives a further crop of crystals. S. M.

Manufacture of synthetic resin. C. ELLIS (U.S.P. 1,846,853, 23.2.32. Appl., 6.5.25).— $CO(NH_2)_2$ or a derivative is caused to react with CH_2O or a derivative in the presence of an acid substance (or an alkaline

substance followed thereby), *e.g.*, HCl, phthalic acid, etc., and the product, *e.g.*, a dimethylolurea, is heated at 125—150° until it is substantially non-plastic. Modifying agents, *e.g.*, glycerin, casein, algin, and pigments, fillers, etc. may be incorporated if desired. Light-coloured articles not readily discoloured by light or heat are obtained. S. S. W.

Production of synthetic resins of the alkyd type and [coating] compositions containing same. R. L. YEATES, and GRINDLEY & Co., LTD. (B.P. 381,422, 9.1.32).—The quantity of glycerol or of other polyhydric alcohol used in the presence of acid resins, oil acids, and cyclohexanol is in excess of that required to saturate the anhydride of phthalic or other polybasic acid. S. M.

Making a make-ready element for printing presses. R. R. LEWIS and A. J. WEISS, ASSRS. to VULCAN PROOFING Co. (U.S.P. 1,846,810, 23.2.32. Appl., 6.8.31).—Such element comprises a (possibly composite) base, coated with a non-porous resilient material, resistant to printers' ink, *e.g.*, a polymerised reaction product of S or a polysulphide and a halogenated unsaturated hydrocarbon, *e.g.*, CHCl:CHCl, together with vulcanised rubber, pigments, accelerators, softeners, etc. as desired, the plastic being suitably heated to set it into final form. S. S. W.

[Manufacture of] masses containing carbon capable of being moulded. DR. A. WACKER GES. F. ELEKTROCHEM. IND. G.M.B.H. (B.P. 381,518, 26.5.32. Ger., 28.8.31).—C obtained by the thermal decomp. of a graphitic oxide is mixed with the usual binding agents; masses so produced are more easily moulded and have good plasticity and conductivity. E. D.

Manufacture of thermoplastic moulding composition [from leather scrap]. W. C. PIERSON, ASSR. to LEAGUM CORP. OF DELAWARE (U.S.P. 1,846,356, 23.2.32. Appl., 21.12.27).—Leather is plumped, *e.g.*, by heating with H₂O at 65—93°, and then C₁₀H₈ (5—15%) and an org. solvent (b.p. >100°), *e.g.*, ethylene glycol, glycerin, are added to the "leather gum" so formed. The expulsion of H₂O is assisted by the addition of methylene-containing substances, *e.g.*, CH₂O, hexamethylenetetramine. S. S. W.

[Apparatus for] manufacture of "tile" or inlaid coverings suitable for floors from linoleum, rubber, etc. LINOLEUM MANUFG. Co., LTD., and A. A. GODFREY (B.P. 381,867, 15.4.32).

Bituminous emulsions.—See II. **Polymerisation products of vinyl ethers.** **Abietic esters.**—See III. **Glue solution.**—See XV.

XIV.—INDIA-RUBBER; GUTTA-PERCHA.

Compounding of aluminium powder with rubber. W. D. GUPPY (Trans. Inst. Rubber Ind., 1932, 8, 131—135).—Al powder does not affect the rate of vulcanisation; the products, however, show a reduction in tensile product and in "slope." Vulcanised rubber containing about 50% Al exhibits a marked reduction in ease of extension under small loads, but at higher loads the extensibility rapidly increases, presumably on account of breakdown of the adhesion between the Al and the

rubber. Vulcanisation does not cause appreciable combination between the S and Al in the rubber.

D. F. T.

Problems in the manufacture of rubber goods. G. W. JAMES (Trans. Inst. Rubber Ind., 1932, 8, 189—206).—A review of problems which have arisen in connexion with rubber-proofing; ageing, spotting, polishing, choice of accelerator, latex-proofing, chemical analysis of proofed material, and adhesives for rubber flooring are among the matters considered. D. F. T.

Surface deterioration of rubber. H. A. DEPEW (Ind. Eng. Chem., 1932, 24, 992—993).—By superposing on a sheet of vulcanised rubber on a board a second sheet of the same dimensions, and comparing the tensile strength of the rubber in the two sheets after the board has been exposed out of doors for 26 or 52 weeks, it is possible to calculate the thickness of the oxidised deteriorated layer which forms on the topmost surface. Deterioration continues with time of exposure but at a decreasing rate, the oxidised film exerting a protective action. The kind of pigment has a considerable effect, and an increase in the proportion increases the protection afforded. D. F. T.

Vulcanisation of rubber by sulphur chloride. W. H. REECE and H. JACKSON (Trans. Inst. Rubber Ind., 1932, 8, 174—188).—After describing the "liquor" and "vapour" methods of vulcanisation, it is shown that the penetration of the effect is not likely to exceed 1 mm. In the "liquor cure" the rates of absorption of the S₂Cl₂ and the solvent are largely independent; in experiments the former was absorbed at one fifth the rate of the CS₂. Stress-strain curves for a no. of S₂Cl₂-vulcanised samples are reproduced, the max. tensile strength recorded being 1.7 kg./sq. mm., but for thin rubber, *e.g.*, in balloons, a strength >2 kg. may be expected. The ageing behaviour of S₂Cl₂-vulcanised rubber is described. Unless a suitable antioxidant is discovered, vulcanisation by S₂Cl₂ is likely to be displaced still further by the S method. D. F. T.

Water absorption by rubber. II. Vulcanised rubber. S. J. SKINNER and T. J. DRAKELEY (Trans. Inst. Rubber Ind., 1932, 8, 117—130; cf. B., 1932, 155).—After a small initial rise, the degree of H₂O absorption decreases with progressive vulcanisation up to the optimum cure; over-vulcanised rubber, however, shows marked absorption, especially if Zn diethyldithiocarbamate has been used as accelerator. Increasing proportions of fillers progressively decrease the H₂O absorption. After vulcanisation, rubber with a high % of protein material does not necessarily absorb more H₂O than rubber with less N. D. F. T.

Manufacture of hard rubber dust. H. McCORMACK (Ind. Eng. Chem., 1932, 24, 1108—1109).—The cost of producing ebonite dust was halved by mixing 2000 lb. of disintegrated inner tubes with 1200 lb. of S in a vac. rotary dryer and heating at 171° for 4½—6 hr., maintaining the "vac." at about 22 in. as far as possible. During cooling at the conclusion of the vulcanising period the stirring was continued. The cooled product was granular and in suitable condition for direct final grinding. D. F. T.

Influence of oxygen on degradation of rubber solutions. P. BARY and E. FLEURENT (Compt. rend., 1932, 195, 665—666; cf. A., 1931, 683; B., 1932, 155).—Similar experiments carried out in vac. (to ensure absence of O_2) give the relation $(\eta - \eta_\infty)(t + \theta) = A$, where η_∞ is the limiting viscosity and η , t , θ , and A have the same meanings as before. At 44° and 92° η_∞ for concn. 3% is 100.0 and 10.9, and for 2% 34.9 and 4.8, respectively, as compared with unity the invariable val. in presence of O_2 . C. A. S.

Electrical characteristics of rubber insulation. E. W. DAVIS and G. J. CROWDES (India-Rubber J., 1932, 84, 437—442).—The properties of rubber compounds which affect the electrical characteristics of a wire or cable so insulated include insulation resistance, dielectric strength, sp. inductive capacity, power factor, permanence, H_2O absorption. Each of these is discussed. The insulation resistance although unaffected by ordinary voltage tests becomes permanently impaired if stressed by too high a voltage. The increased resistance to physical deterioration obtainable with modern compounding is accompanied by reduced rate of deterioration in dielectric strength during service. Impurities, moisture, and poor compounding have a very marked influence on the electrostatic capacity, but suitably compounded rubber rivals gutta-percha in this feature, and with proper design the voltage across the insulation and the adjacent air can be so controlled that the stress is insufficient for the formation of O_3 . The power factor is a trustworthy index of uniformity; a steep power factor-voltage curve reveals the occurrence of air pockets in the insulation. Tests as to alteration of capacitance and power factor by contact with H_2O constitute the best method of assessing the suitability of a rubber insulation for use in H_2O ; accelerated tests permitting prediction of service behaviour within a few weeks are now available. D. F. T.

Development of the modern [rubber-]tyre fabric. W. KNIGHT (Trans. Inst. Rubber Ind., 1932, 8, 136—156).

Fibroskin. E. A. HAUSER (Kautschuk, 1932, 8, 158—159).—Fibroskin is a new substitute for leather, obtained by treating a layer of parallel cotton fibres with compounded conc. latex so that each fibre is surrounded by rubber. Vulcanisation of these layers yields a sheet of high tenacity along the fibres and high extensibility across them. Doubling may be effected so that fibres in the various layers cross at any desired angle. D. F. T.

Measuring microscope for rubber specimens. R. E. LOFTON (Ind. Eng. Chem. [Anal.], 1932, 4, 439—440).—The microscope and specimen holders are described. The results show that the width of specimens is generally $>$ that of the die with which they were cut. The thickness of soft materials determined by this method is $>$ that indicated by a gauge of the plunger type. E. S. H.

Chlorinated rubber. J. RINSE (Chem. Weekblad, 1932, 29, 521—522; cf. B., 1932, 950).—The commercial material when kept at 100° loses wt. slowly but continuously; after 400 hr. the loss in wt. was still $<$ 5%. Heated for 1 hr. with alcoholic potash, the material

lost 2.56% (calc. as HCl); with aq. NaOH for 2 hr. the loss was 0.1—0.2%. S. I. L.

See also A., Nov., 1089, **Elasticity of caoutchouc**. 1108, **Prep. of isoprene from rubber**. 1139, **Caoutchouc and thioglycollic acid**.

PATENTS.

Manufacture of rubber or similar materials. DUNLOP RUBBER CO., LTD., ANODE RUBBER CO., LTD., E. A. MURPHY, and D. F. TWISS (B.P. 381,186, 30.6.31).—Porous or microporous articles are made from aq. dispersions of rubber by converting these into flocculent or granular ppts., filtering (if desired, in conjunction with an operation such as moulding or spreading), and vulcanising the wet coherent mass under conditions preventing the evaporation of the entrained H_2O . D. F. T.

Preparations of halide addition products, polymerides, and oxides of rubber. H. A. BRUSON, Assr. to GOODYEAR TIRE & RUBBER CO. (U.S.P. 1,846,247, 23.2.32. Appl., 11.2.27. Renewed 26.8.31).—A solution of rubber, e.g., in C_6H_6 , is treated with a metal halide, e.g., $SnCl_4$, in which the metal has at least one unsatisfied secondary valency. An additive compound is produced, removal of the metallic halide from which (in an inert atm.) yields a C_6H_6 -sol. polymeride (or mixture of polymerides) of rubber. If air or O_2 be admitted during the reaction the product is a powdery insol. oxide of the polymeride. D. F. T.

Production of unsaturated hydrocarbons from waste rubber and waste compounds containing rubber. A. W. SCHISLER (U.S.P. 1,846,363, 23.2.32. Appl., 7.11.28).—Waste rubber material is subjected to destructive distillation in the presence of a basic agent, e.g., NaOH, and at about 450° . The decomp. products of high b.p. are preferably collected separately from the more volatile fractions, and both, together with the uncondensed gases, are conserved. D. F. T.

Colouring of rubber. J. F. DARLING and D. H. POWERS, Assrs. to E. I. DU PONT DE NEMOURS & CO. (U.S.P. 1,846,820, 23.2.32. Appl., 15.9.30).—A H_2O -insol. colour, e.g., Algol red R or Indanthrene golden-orange R, for incorporation in rubber is prepared by mixing it in colloidal suspension with a rubber latex, coagulating, and milling. D. F. T.

Acceleration of the vulcanisation of natural and artificial varieties of rubber. A. CARPMAEL. From I. G. FARBENIND. A.-G. (B.P. 379,683, 23.4.31).—At least 1 H in the NH or NH_2 of a basic accelerator is replaced by the residue $\cdot S \cdot R$ of a non-accelerator R-SH. Examples are products from: *p*-nitrochlorothiolbenzene ($NO_2 \cdot C_6H_4 \cdot SCl$) with $NHBU_2$, piperidine, diphenylguanidine, *o*-tolyldiguanide, $NHMe_2$, cyclohexylethylamine, $NH(CH_2Ph)_2$, dicyclohexylamine. These are used as accelerators, alone or with other accelerators and/or stearic acid. C. H.

Manufacture of accelerators for vulcanisation. A. CARPMAEL. From I. G. FARBENIND. A.-G. (B.P. 378,525, 15.5.31).—Disubstituted thiocarbamates (2 or 3 mols.) are condensed with cyanuric chloride to give accelerators with favourable crit. temp. The compound from 3 mols. of Na dimethylthiocarbamate has m.p. 182° . C. H.

Vulcanisation of rubber and rubber-like substances. IMPERIAL CHEM. INDUSTRIES, LTD., H. M. BUNBURY, J. S. H. DAVIES, and W. J. S. NAUNTON (B.P. 381,189, 30.6.31).—The desirable effects of the 2-mercaptoarylenethiazole vulcanisation accelerators, together with suppression of all tendency to pre-vulcanisation, are obtained by using them in conjunction with the acid salt of a diarylguanidine and a polybasic carboxylic acid, e.g., 2-mercaptobenzthiazole with 1 mol. of diphenylguanidine H tartrate. D. F. T.

Age-resisting rubber compounds. IMPERIAL CHEM. INDUSTRIES, LTD., H. M. BUNBURY, J. S. H. DAVIES, and W. J. S. NAUNTON (B.P. 381,161, 27.6.31).—An ω -amino-2-hydroxynaphthylarylmethane (or its *N*-substituted derivative), such as is obtained by the condensation of β -naphthol, an aromatic aldehyde, and NH_3 (or a suitable amine), is incorporated in the rubber. D. F. T.

Pine-tar product.—See II. **Treating textiles.**
Coating of fabrics.—See VI.

XV.—LEATHER; GLUE.

Physiology of moulds. III. Moulding of pickled sheepskins. I. H. BLANK (J. Amer. Leather Chem. Assoc., 1932, 27, 380—392; cf. A., 1931, 875).—Species of *Hormodendrum*, *Penicillium*, and *Monilia* have been isolated from moulds on pickled sheepskins and heavy growths obtained on pickled skins. The pigmented hyphæ produced by these moulds were embedded in the skin and could not be mechanically removed, so that the skin was permanently discoloured. In some cases the mould pigment had been absorbed by the skin. The above moulds were proteolytic; growth was not restricted by up to 18% NaCl or by a p_{H} val. of 1.0 in the medium. The above moulds were more restricted in growth by AcOH, and pickles consisting of H_2SO_4 , NaCl, and NaOAc or $p\text{-C}_6\text{H}_4(\text{NO}_2)\cdot\text{OH}$ are recommended to resist mould attack. D. W.

Preservation of adhesives. H. STADLINGER (Kunst-dung. Leim, 1932, 29, 138—141; Chem. Zentr., 1932, ii, 160).—Advantages and disadvantages of various preservatives are discussed. A. A. E.

Fibroskin.—See XIV. **Tannery wastes.**—See XXIII.

PATENTS.

Unhairing of hides. N. D. HARVEY, JUN., ASSR. to CARBIDE & CARBON CHEMICALS CORP. (U.S.P. 1,844,160, 9.2.32. Appl., 21.3.30).—The hides are treated with a liquor containing $\text{Ca}(\text{OH})_2$ (10 pts.) and monoethanolamine (1 pt.). D. W.

Tanning of fur skins. A. ROGERS, ASSR. to ROESSLER & HASSLACHER CHEM. CO. (U.S.P. 1,845,341, 16.2.32. Appl., 14.5.31).—The skins, after pickling and then treating in 2% aq. $\text{Na}_2\text{S}_2\text{O}_3$, are tanned in a bath consisting of CH_2O , $\text{Na}_2\text{S}_2\text{O}_3$, and soap, and finished in the usual manner. D. W.

Tanning [of reptile skins]. S. ISERMANN and H. J. KALSCHUEVER (U.S.P. 1,844,769, 9.2.32. Appl., 29.4.30).—The skins are de-fatted with aq. solutions of alkylated aromatic sulphonic acids admixed first with Na_2CO_3 and later with $\text{Ca}(\text{OH})_2$, de-scaled, de-limed, bated, pickled, and tanned. D. W.

Manufacture of glue solution. R. H. PRICE, ASSR. to GLUE RESEARCH CORP. (U.S.P. 1,844,679, 9.2.32. Appl., 7.12.25).—Commercial glue (29 pts.) is mixed with EtOH (33.3 pts. by wt.), H_2O (35 pts.), and a glue plasticiser, e.g., glycerin or Turkey-red oil (2.9 pts.). The product is a sprayable coating composition. D. W.

Making [waterproof] glue. I. F. LAUCKS and G. DAVIDSON, ASSRS. to I. F. LAUCKS, INC. (U.S.P. 1,845,427, 16.2.32. Appl., 4.10.28).—The reaction products of the protein and other constituents of ground oil-seeds, e.g., soya beans, with NaOH and/or $\text{Ca}(\text{OH})_2$ and H_2O are mixed with Cu salts, chromates or dichromates, phenols, sol. silicates, and rosin or its soaps. (Cf. U.S.P. 1,689,732; B., 1929, 141.) D. W.

Leather dyes.—See IV. **Paper resembling leather.**
—See V. **Moulding composition from leather.**—See XIII.

XVI.—AGRICULTURE.

Mechanical analysis of soil by the pipette method. N. P. KARPINSKI and S. I. DOLGOV (Novij. Agron., 1930, 1, 1—42; Proc. Internat. Soc. Soil Sci., 1932, 7, 187—188).—Results of the authors' modified method agree well with those of Schoene's method, but differ considerably from those of Williams' method in the coarse and medium fractions. A. G. P.

Apparatus for the mechanical analysis of soils. I. S. GRABOVSKI (Nautschn. Agr. J., 1930, No. 3, 237—248; Proc. Internat. Soc. Soil Sci., 1932, 7, 188).—The method is based on observations of the hydrostatic pressure in soil suspensions by means of a siphon pressure gauge. Results agree with those of the standard pipette method. A. G. P.

Analysis of carbonate soils and rocks. N. VERNANDER (Tr. nauk. doslidnoj Katedri gruntosn. Charkov, 1930, 1, 183—198; Proc. Internat. Soc. Soil Sci., 1932, 7, 199—200).—Prior to the determination of exchangeable bases in soils, carbonates are preferably decomposed by AcOH. In soils containing carbonates, recorded vals. for the clay fraction are higher by Robinson's than by Sokolovsky's method. Aq. NH_3 cannot be used in the examination of soils rich in sol. Fe, Al, or SiO_2 . For accurate working, the removal of carbonates with 5*N*- NH_4Cl saturated with CO_2 is preferable to the standard method. The latter is satisfactory where determinations of the clay fraction only are desired. A. G. P.

Electrodialysis [of soils]. D. I. SIDERI (Tr. nauk. doslidnoj Katedri gruntosn. Charkov., 1930, 1, 115—125; Proc. Internat. Soc. Soil Sci., 1932, 7, 190—191).—Determinations of adsorbed bases in soils by electro-dialysis indicate higher vals. for Mg, Na, and K than does the NH_4Cl -leaching method; vals. for Ca were similar by both methods. Treatment of electro-dialysed soil with BaCl_2 indicated the presence of adsorbed H^+ equiv. to approx. 50% of the cations exchanged. A. G. P.

Influence of cations absorbed by soil on certain mechanical and ultra-mechanical fractions obtained by elutriation. W. W. BERNIKOV (Mitt. Sib. land- u. forstwirts. Inst., 1930, 13, 21—59; Proc. Internat. Soc. Soil Sci., 1932, 7, 134).—The dispersive

action of Na in podsol horizons varied in the order $A_1 > B > A_2$. Ca increased the stability of the microstructure in the A_1 horizon and to a less extent in the A_2 horizon, but was without effect in the B horizon. In solonetz soils the action of Ca was of similar intensity in the A_1 and B horizons. A. G. P.

Determination of hygroscopic moisture in soils. C. C. PANAITESCU (Bull. cult. ferment. Tutunului, 1931, 20, 471; Proc. Internat. Soc. Soil Sci., 1932, 7, 188).—Modifications of the distillation method are described. The use of PhMe yields results agreeing with those obtained by oven-drying at 105–110°. With xylene the vals. are higher. A. G. P.

Soil structure. D. I. SIDERI (Tr. nauk. doslidnoj Katedri gruntosn. Charkov, 1930, 1, 127–139; Proc. Internat. Soc. Soil Sci., 1932, 7, 126).—Disintegration of aggregate particles in soils not saturated with Ca⁺⁺ is associated with the leaching of adsorbed Ca. The disintegration of chernozems increases with rising H₂O content. The growth of herbaceous plants in soil does not affect the formation of true aggregates. Fallow land left to grass regains in 6–7 years its original (virgin) structure. A. G. P.

Rôle of absorbed air in soil structure and its determination. F. S. SOBOLEV and M. V. CHAPEK (Nautschn. Agr. J., 1930, No. 1, 3–21; Proc. Internat. Soc. Soil Sci., 1932, 7, 125).—Methods of "aggregate" analysis are examined and the effects of moisture and absorbed air on the disintegration of aggregates discussed. Among soils of different types, variations in capacity for absorbed air were of the same order as was the saturation capacity for bases. A. G. P.

Influence of natural factors on variations in the dispersion of chernozems. M. KONAKOV (Tr. nauk. doslidnoj Katedri gruntosn. Charkov, 1930, 1, 145–157; Proc. Internat. Soc. Soil Sci., 1932, 7, 136).—The degree of dispersion of soils (% of particles not settling after 24 hr.) is largely influenced by the initial H₂O content of the soil, max. dispersion occurring at medium H₂O contents. Dispersion is reduced by a rise in temp. or increased CO₂ production and by a decline in microbiological activity. Alterations in the degree of dispersion due to the above factors may occur without changes in the absorbed bases. A. G. P.

Dynamics of the chernozem. M. KONAKOV (Tr. nauk. doslidnoj Katedri gruntosn. Charkov, 1930, 1, 145–157; Proc. Internat. Soc. Soil Sci., 1932, 7, 136).—Seasonal variations in the proportions of adsorbed Ca⁺⁺ and of "active" clay were similar, those of the "active" clay being the more sharply defined. A direct correlation was observed between soil temp., adsorbed Ca⁺⁺, and "active" clay. The dynamics of Ca absorption and the reactions of "active" clay are mainly influenced by biological factors. A. G. P.

Rapid determination of soil reaction. G. CHEVALIER (Progrès agric. vit., 1932, 97, 354–356; Chem. Zentr., 1932, i, 3217).—The indicator solution contains Me-red 40 mg., bromothymol-blue 80 mg., phenolphthalein 80 mg., 0.1N-Na₂CO₃ 2 c.c., 95% EtOH 50 c.c., and H₂O 50 c.c. The colours are: $p_H > 8.0$ violet, 8.0 blue, 7.0 green, 6.0 yellow, 5.0 orange, 4.0 red. p_H can be estimated to 0.1 unit. A. A. E.

Influence of electrolytes on the organic colloids of the soil. D. I. SIDERI (Tr. nauk. doslidnoj Katedri gruntosn. Charkov, 1930, 1, 111–114; Proc. Internat. Soc. Soil Sci., 1932, 7, 148–149).—Displacement of soil bases by NH₄⁺ by leaching with NH₄Cl and subsequently washing free from Cl⁻ results in the removal of 40% of the soil org. matter. The nature of the coagulation of this org. matter in the filtrate by acids and salts indicates that the electrolytic threshold of coagulation is much greater for org. colloids than for clay suspensions. A. G. P.

Periodic variations in soil acidity. D. FEHER (Arch. Pflanzenbau, 1932, 9, 172–196).—Seasonal variations in the p_H of forest, grassland, and arable soils are recorded. In general, max. p_H is attained in autumn and min. in winter. Changes are ascribed mainly to the effect of soil-H₂O content and temp. The nature of the subsoil is not an important factor. Max. p_H vals. are associated with min. electrical conductivity and vice versa. A. G. P.

Distribution of phosphoric acid in mechanical soil fractions. M. KONAKOV (Tr. nauk. doslidnoj Katedri gruntosn. Charkov, 1930, 1, 173–181; Proc. Internat. Soc. Soil Sci., 1932, 7, 140).—The major proportion of soil phosphate occurs in the finer soil fractions. A. G. P.

Annual changes in the [H⁺] of cultivated soils. A. LØDDESØL (Meld. Norges Landbruks., 1932, 11, [1/2]; Proc. Internat. Soc. Soil Sci., 1932, 7, 127).—Seasonal variations in the p_H of soil were small and could not be correlated closely with rainfall, although, in general, increased acidity followed high rainfall and vice versa. This effect was more pronounced in heavy than in light soils. Reaction changes are discussed in relation to base absorption. A. G. P.

Definition of the absorbing capacity of soil for air and the calculation of the total surface area of soil particles. M. V. CHAPEK (Nautschn. Agr. J., 1930, No. 1, 22–40; Proc. Internat. Soc. Soil Sci., 1932, 7, 200–201).—Relationships between the total surface area of soil particles and air absorption, and between base-exchange capacity, max. hygroscopicity, and absorbed air, are examined. A. G. P.

Adsorption of ions by soils. A. N. HARIIN (Nautschn. Agr. J., 1930, No. 5–6, 353–361; Proc. Internat. Soc. Soil Sci., 1932, 7, 135).—Reduction of surface tension by additions of EtOH decreased the [Cl⁻] and [P₂O₅] of the soil solution to an extent which was greater in chernozems than in podsoles. Ni was positively adsorbed by these soils. A. G. P.

Influence of the anion on the energy of adsorption of bases [by soils]. E. F. PAVLOV (Vladikavkaz, 1929; Proc. Internat. Soc. Soil Sci., 1932, 7, 134–135).—The displacement of adsorbed Ca in soil by Na₂SO₄ was > that by NaCl or NaNO₃. A. G. P.

Titration method for determining the total and exchangeable bases in soils. S. P. AIYAR (Indian J. Agric. Sci., 1932, 2, 225–241).—The soil sample is leached with 0.05N-HCl and the total acidity and total Cl⁻ of the leachate are determined. The difference is equiv. to the bases removed, and is corrected for

base originally present as carbonate by determining the CO_2 in the leachate. A process for determining Fe, Al, and Mn is described. Vals. thus obtained for the total exchangeable bases agree well with the sum of bases determined individually and with those derived by electro-dialysis.

A. G. P.

Mobility of potassium in soils. H. NIKLAS, H. POSCHENRIEDER, and A. HOCK (Ernähr. Pflanze, 1932, 28, 274—280).—Applications of K fertilisers increased the K content of medium and heavy soils to a depth of 25 cm., and of light soils to 80—100 cm.

A. G. P.

Mineralisation of nitrogen compounds in soil. M. LEMOIGNE (Bull. Soc. Chim. biol., 1932, 14, 1113—1162).—A lecture.

Comparison of the methods of Dirks and of Neubauer for determining assimilable plant nutrients [in soils]. H. WIESSMANN, A. BOLLMANN, and F. W. MÜLLER (Z. Pflanz. Düng., 1932, 11B, 441—454).—Agreement between the results of the two methods was observed only in soils rich in K (> 2.0 mg. K_2O , Dirks and Scheffer; > 40 mg. K_2O , Neubauer). Better agreement results if the Neubauer limiting val. is reduced from 30 to 20 mg. K_2O , corresponding to the Dirks and Scheffer limit of 1.5 mg. K_2O . Much more K is extracted from soil by bicarbonate solutions than by H_2O . The methods are discussed in relation to Roemer's manuring tables. In general, the methods agree in differentiating between soils rich and those poor in available P, but differ regarding actual P requirements.

A. G. P.

Quality and yield of silage in relation to filling conditions. T. S. KRISHNAN (Indian J. Vet. Sci., 1931, 1, 259—282).—Slow filling with addition of H_2O gave good silage with min. loss. Sol. constituents, particularly alkali salts, tend to concentrate in the lower part.

CH. ABS.

Fertilisation of wheat with ammonia and nitrates. S. DOJMI DI DELUPIS (Ann. R. Staz. Chim.-Agrar. Sperim., 1932, Publ. No. 281, 19 pp.).—In plots sown with wheat in December the NO_3 content of the soil rose to a high max. in January with $(\text{NH}_4)_2\text{SO}_4$ (30—120 kg./hectare) applied before sowing, and to a lower max. in March with NaNO_3 or $\text{Ca}(\text{NO}_3)_2$ (30—90 kg./hectare) applied from January to March. A slightly greater yield was obtained with $(\text{NH}_4)_2\text{SO}_4$. The yields agreed with those calc. by Mitscherlich's formula.

R. K. C.

Relation of [H⁺] of soils to growth of certain pasture plants. H. P. COOPER (Plant Physiol., 1932, 2, 527—532).—No close relationship exists between the reaction of soils and the predominance of various species of grasses. The latter is controlled more effectively by appropriate nutrient balances with relatively high oxidation-reduction potentials.

A. G. P.

Sulphur content of pastures. H. O. ASKEW and L. BISHOP (New Zealand J. Sci. Tech., 1932, 14, 23—32).—Seasonal changes in the inorg. and total S contents of grasses and white clover are recorded. Max. vals. occur in periods of most rapid growth. Applications of $(\text{NH}_4)_2\text{SO}_4$ increased the inorg. S in grasses but not in the clover. Except in periods of very rapid growth the org. S content was not appreciably altered by this

treatment. No definite relationship was observed between the org. S and N contents. Of the S applied as $(\text{NH}_4)_2\text{SO}_4$ only a small proportion was recovered in the pasture. Top-dressing with "Calnitro" did not increase the org. or inorg. S content of the herbage.

A. G. P.

Influence of growth stage and frequency of cutting on yield and composition of a perennial grass, Phalaris tuberosa. A. E. V. RICHARDSON, H. C. TRUMBLE, and R. E. SHAPTER (Counc. Sci. Ind. Res., Australia, Bull., 1932, No. 66, 35 pp.).—With advancing age the crude protein content, ratio of protein to carbonaceous matter, and P content of the grass decreased and the contents of crude fibre and N-free extractives increased. Towards maturity N and P migrate from leaves to stem bases and roots, but no actual loss from the plant occurs. In the final stages of growth the K content of both herbage and roots decreases and approx. 27% of the total K intake of the plant returns to the soil. Moderately frequent cutting, although decreasing the gross yield of herbage, increased the actual yields of P and protein.

A. G. P.

Effect of potash manuring on the growth and mechanical properties of barley straw. W. ACKER (Arch. Pflanzenbau, 1932, 9, 104—155).—The tensile strength of unripe straw and the breaking strength of stem bases is decreased by K manuring, but the effect tends to be eliminated at maturity. The abs. stability of the stems, however, increases with the amount of K supplied, max. stability corresponding to a definite nutrient ratio of N:P:K which is characteristic for each variety. Additions of P or N in excess of this optimum ratio tend to weaken the straw. Max. yields of barley are not associated with max. strength of straw. K tends to increase tillering and grain yield. Morphological effects of K manuring are apparent from the seedling stage.

A. G. P.

Influence of manuring on the seed value of potatoes. REICHSARBEITSGEMEINSCH. PFLANZENBAUINST. DEUT. HOCHSCHULEN (Arch. Pflanzenbau, 1932, 9, 1—54).—Manuring with N increased the N content of the tubers, but had no definite effect on their seed val. With the heavier dressings of N the non-precipitable N content of the tubers was raised. The NH_2 -acid content was unaffected by the amount of N applied. Seed potatoes from plots receiving superphosphate subsequently yielded crops increasing with the amount of P applied. P manuring tended to increase the sol.-N content of tubers during storage.

A. G. P.

Manurial experiments with sugar cane, I—IV. P. E. TURNER (4th Congr. Internat. Soc. Sugar Cane Tech., 1932, Bull. Nos. 14, 16, 17, and Trop. Agric., 1932, 9, 44).—I. Comparisons have been made of the relative manurial val. of burying and non-burying the $(\text{NH}_4)_2\text{SO}_4$ in sugar-cane cultivation. Three treatments applied were: (1) no manure; (2) 3 cwt. of $(\text{NH}_4)_2\text{SO}_4$ buried in furrows around the stool; and (3) the same amount simply surface-applied. Analysis of the results obtained indicated that a significant increase of yield resulted from the treatment with N equal to 32% of the mean yield from the unmanured plots. The difference due to burying, though definitely not significant,

was of sufficient magnitude to justify a further and more comprehensive test.

II. "Nitrolim" was found to be definitely inferior to $(\text{NH}_4)_2\text{SO}_4$ or NaNO_3 , a fact which appeared to be due to the lower solubility of the former. The increment in yield from $(\text{NH}_4)_2\text{SO}_4$ was found to fall off when dressings exceeded 30 lb. of N per acre, and is contrasted with the increments in the cases of NaNO_3 and "Nitrolim," the yield curves of which over the range investigated approximated to a straight line. Ten tons of pen manure are shown to be roughly equiv. to 100 lb. of N, but the immediate gain is small, less even than that given by "Nitrolim."

III. Degenerated soils containing small quantities of exchangeable potash were given a basic treatment of 3 tons of ground limestone, 14 tons of pen manure, and 2 cwt. of K_2SO_4 , every 4th bed being left as control. It is concluded that for these soils which have been under cane continuously for practically a century, the 140 lb. of potash in the pen manure is inadequate, and that a response amounting to 5 tons of cane per acre results from an additional 2 cwt. of K_2SO_4 .

IV. In the case of plant canes, pen manure and inorg. manure give increments which might be due to chance once in 100 times; the yield from the triple dressing of pen manure, but not that of the double dressing, is significantly $>$ that of the single dressing; the yield from inorg. manure is significantly $>$ the single dressing of pen manure, and = that of the triple dressing.

J. P. O.

Behaviour of various cultivated plants grown simultaneously in an acid field. O. LEMMERMANN, L. FRESENIUS, and E. GERDUM (Z. Pflanz. Düng., 1932, 11B, 454—479).—Data showing the growth of a no. of crops and the weed distribution in soil of varying acidity are given. In general, growth was more closely related to the exchange and hydrolytic acidities of the soil than to its p_{H} .

A. G. P.

The black thistle (*Cirsium oleraceum*) and its control. G. SCHOENE (Arch. Pflanzenbau, 1932, 9, 55—103).—Use of CaCN_2 and kainit is unsatisfactory since, although checking flowering, these materials encourage the development of underground rhizomes.

A. G. P.

Effect of freezing on plants. W. H. CHANDLER (Fruit Products J., 1932, 12, 50—51, 57).—Death of plants and plant parts caused by freezing is discussed in a popular fashion; current theories and examples are given.

E. B. H.

Fumigation of Douglas-fir seed. D. KENNEDY (New Zealand J. Sci. Tech., 1932, 14, 58—61).—Trials with $p\text{-C}_6\text{H}_4\text{Cl}_2$, CS_2 , and $\text{Ca}(\text{CN})_2$ are recorded. The first was the least satisfactory and CS_2 probably the most suitable.

A. G. P.

Interpretation of the inner mechanism of the action of sulphur as a fungicide. C. SEMPINO (Mem. Accad. Italia, 1932, 3, [Biol., No. 2], 5—30).—Exposure of S to light and air under varied conditions does not produce detectable amounts of acid products. Products of oxidation or reduction of S are little toxic to conidia of *Erysiphe graminis*, D.C. It is, therefore, concluded that elementary S is the toxic agent and that in the state of

vapour, perhaps ionised, it diffuses, penetrates the cell walls, and there exerts its toxic action either directly or indirectly in the form of reduction products. R. K. C.

Use of arsenic and lead in the treatment of diseases of the vine. F. HENGL. P. RECKENDORFER, and F. BERAN (Wein u. Rebe, 1932, 13, 459—468; Chem. Zentr., 1932, ii, 109).—Five weeks after spraying with $\text{Pb}_3(\text{AsO}_4)_2$, the grapes contained 0.8—5 mg. As and 0.7—6 mg. Pb per kg.; the must and wine contained 0.1—1 mg. As_2O_3 and 0.2—1.4 (must), 0.15—1 (wine) mg. Pb.

A. A. E.

Sturmer pippins.—See XIX. **Field-cricket control.**—See XXIII.

See also A., Nov., 1108, **Podsol soils. Classification of soil colours.** 1169, **N fixation by *Azotobacter chroococcum*.** 1179, **Determination of cellulose in soil.** 1181, **Effect of TI on growth of tobacco plants.**

PATENTS

Treatment of seeds. W. F. BUSSE (U.S.P. 1,846,510, 23.2.32. Appl., 13.10.28).—Germination of "hard" seeds is improved by exposure for a period to low temp. (e.g., -20°). Apparatus is described.

A. G. P.

Manufacture of insecticides. C. DE GENDRE (B.P. 381,290, 24.8.31).—A nicotine salt of a $\text{C}_6\text{—C}_{14}$ saturated fatty acid, prepared either by direct mixing or from tobacco juice or its vapours and the acid, is treated with alkali and the product dissolved in H_2O in presence of an agent to reduce the surface tension.

E. H. S.

XVII.—SUGARS; STARCHES; GUMS.

Changes in the nitrogen compounds of sugar beets during long storage. A. V. BLAGOVESHCHENSKI, T. M. IVANOVA, and F. D. IONOV (Zhur. Sakh. Prom., 1931, 5, 411—413).—During long (sterile) storage the protein-N increases.

CH. ABS.

Protein and other nitrogen compounds of normal beet juice. A. V. BLAGOVESHCHENSKI and R. V. FENIKSOVA (Zhur. Sakh. Prom., 1931, 5, 408—410).—The isolated protein contains much dark pigment, N 11%, ash 7.34%. Mangold-root protein contains more arginine and cystine than beetroot protein; otherwise the proteins are similar.

CH. ABS.

Determination of hydrophilic colloid content of cane juice. E. A. FIEGER and A. R. CHOPPIN (Ind. Eng. Chem. [Anal.], 1932, 4, 373—374).—The amount of H_2O bound by sucrose and by hydrophilic colloids present in cane juice is calc. from data for the f.-p. depression of the juice with and without addition of sucrose. The amount of H_2O bound by sucrose is greatly in excess of that bound by the colloids. The production of sucrose by plants is more effective than the presence of hydrophilic colloids in resisting the action of drought and frost.

E. S. H.

Flocculation of vegetable juices in alkaline medium. H. COLIN and A. CHAUDUN (Bull. Assoc. Chim. Sucr., 1932, 49, 172—179).—Commenting on expressions used by Teatini in describing his process (cf. B., 1931, 1114) the author remarks that the isoelectric point of vegetable juices is not synonymous with the flocculation point caused by the addition of an alkali, e.g., CaO . A

table is given of the isoelectric points of a series of protein substances occurring in vegetable juices, showing all these to be in the acid zone. J. P. O.

Clarification of raw juices, using sulphurous acid. M. LAMBERT (Bull. Assoc. Chim. Sucr., 1932, 49, 195—197).—It is considered that Teatini's process is only one of double defecation, and is a repetition of Weisberg's "sulphicarbonation" method. In F.P. 394,577 (B., 1909, 213) the author described the special conditions for obtaining a proper coagulation of the pectin matter of raw juice by the combined action of heat and traces of SO_2 , viz., about 0.2 g. per litre, a rapid-filtering juice thus being obtained and CaO also economised. J. P. O.

Utilisation of base exchange in the purification of sugar juices. C. JEANPROST (Bull. Assoc. Chim. Sucr., 1932, 49, 189—195).—In a base-exchange method of purifying beet-factory products demonstrated by the author, molasses suitably diluted was passed through a tube containing zeolite pretreated with a Pb salt; it left considerably decolorised. Pb salts in solution were later removed by passing the liquid through zeolite pretreated with NH_3 . J. P. O.

Pre-defecation with unfiltered limed [beet diffusion] juice. R. KOHLMANN (Centr. Zuckerind., 1932, 40, 155—156).—In the fractional liming of raw juice by the return of limed juice, the best results (in laboratory experiments) in respect of colour and filterability were obtained by using cold raw juice, then warming up the mixed juice to the temp. of the main liming process in the shortest possible time. J. P. O.

Pre-defecation or fractional liming [of raw beet diffusion juice]. H. CLAASSEN (Centr. Zuckerind., 1932, 40, 119—120).—Raw juice is brought to an alkalinity of 0.01—0.015% by the return of about 25% of unfiltered first-carbonation juice, the temp. of the mixture being about 60—65°, which is rapidly raised to 90° on its way to the liming tank. There in one compartment it receives an addition of milk-of-lime amounting to 0.12—0.15% of the wt. of juice, and remains there about 8 min. On entering the second compartment milk-of-lime is added to bring up the alkalinity to 0.6—0.7%, staying there about 4 min. Then it goes to the first-carbonation tanks for the usual treatment. Advantages of this procedure are rapid filtration, excellent juice quality, reduced CaO consumption (about 1.0% on the roots), and smaller amount of press-cake. J. P. O.

Pre-defecation [of sugar juice] to save lime. W. BEYTE (Centr. Zuckerind., 1932, 40, 84—85).—In experiments with the Mühlberg process, the amount of limed juice returned was 28.5% of the raw juice, giving a mixed juice alkalinity of 0.12%. This pre-defecation improved the colour of the 3rd saturation juice from 7.3 to 5.6 Stammer; the colour of the thick-juice was reduced from 18.7 to 8.7 Stammer, and the scums could be readily sweetened down to 1.7—2.0%. Sugar above Type 5 was always obtained. In the Stöbnitz process, the raw juice was given a preliminary dose of about 0.37% CaO with milk-of-lime, thus imparting an alkalinity of 0.16—0.20%. Practically the same results were obtained as in the Mühlberg process. Both

processes demonstrate that by pre-defecation an economy in CaO can be realised without the quality of the sugars suffering. In both the CaO addition could be lowered to 0.9% of the roots without any difficulties in practice arising. J. P. O.

Further experience with pre-liming [of beet juice]. E. NAEHRING (Deuts. Zuckerind., 1932, 57, 195—196).—The favourable results obtained previously (B., 1931, 648) were again obtained, the quality of the clarified juice being improved, filtration facilitated, and a better quality of raw sugar produced. The CaO used was 0.35% CaO in the first and 0.80% in the second stage, and there was > a 50% reduction in the amount of cloth used. J. P. O.

Choice of a pre-liming method [for raw beet juice]. C. TSCHASKALIK (Centr. Zuckerind., 1932, 46, 246—247).—Working continuously, 100 pts. (by vol.) of the raw juice are mixed at 60° with 60 pts. of the unfiltered first-carbonation juice, and the mixture is pumped through heaters to liming tanks where the remainder of the CaO is added, allowing about 10 min. for the completion of the reaction. Working on these lines, the total consumption of CaO is found to be 1.75% on beets sliced. In addition to economy of CaO, there is a decided improvement in the colour of the raw sugar made, and press-work is facilitated, the residue being easily exhausted with about 96% of H_2O on the wt. of the cake. There is also a reduction in the cloth requirement, and, generally, the working of the factory is improved. J. P. O.

Rôle of calcium carbonate in [beet-juice] purification. ANON. (Bull. Assoc. Chim. Sucr., 1932, 49, 76—81).—Beet juice was limed with from 2 to 20 g. CaO/litre and carbonated twice as usual. If a and $(a-x)$ are the amounts of non-sugars remaining in the carbonated juice when 2 g. and $(2+x)$ g of CaO/litre have been used, then $\log a/(a-x) = kc^2/3$, where k is const. for a given juice. It is concluded that CaO in excess of 2 g./litre, on conversion into CaCO_3 , exerts a physical purifying effect which is a function of its surface. Preformed CaCO_3 , added to the juice after carbonation, does not have the same effect. J. H. L.

Economical defecation of beet juice with lime. J. DĚDEK and J. VAŠÁTKO (Z. Zuckerind. Czechoslov., 1932, 57, 1—8).—Beet juice heated to about 85° is defecated either by a continuous flow of milk-of-lime, or by gradually adding lump CaO while constantly stirring, the amount added after 15 min. being 0.2—0.3%. A granular, very slightly voluminous ppt. thus forms, which greatly facilitates the subsequent scum filtration. Following this, the rest of the CaO is added in any convenient manner. Tests made with this method in laboratory and factory show it to give a remarkably easy filtration, even when the CaO dose is reduced to 0.8%. J. P. O.

The sugar-boiling process. R. STANEK (Archief, 1932, 40, 126—128).—Of all the methods of graining, "waiting" is the only one that yields reproducible results. To obtain regular grain, it should be formed in as small a vol. of liquor as possible, and with the greatest rapidity. A coarse-grained massecurite is produced by drawing in thin juice or a mixture of thin and thick

juices, and after graining is checked it is necessary to boil slowly for a while without further syrup draughts, in order thus to increase the surface of the crystals. Excessive primary crystallisation can be avoided only by feeding the pan continuously and thereby maintaining a regular degree of supersaturation. For the control of the operation of boiling, preference is given to the pan refractometer compared with the brasmoscope.

J. P. O.

Viscosity of sugar solutions. II. O. SPENGLER and E. LANDT (Z. Ver. deut. Zuckerind., 1932, 82, 545—552; cf. B., 1931, 510).—Solutions of neutral salts are in most cases less viscous than is a solution of sucrose of corresponding dry substance, exceptions being Na_2SO_4 , CaCl_2 , and SrCl_2 . All alkali-reacting salts greatly increase the viscosity due to their forming saccharates. K salts exert a lower viscosity effect than do Na salts.

J. P. O.

Impurities in white sugars. VI. Direct determination of chlorides. J. A. AMBLER and S. BYALL (Ind. Eng. Chem. [Anal.], 1932, 4, 379; cf. B., 1931, 1115).—The dispersing action of sucrose precludes gravimetric methods, but Cl' in commercial white sugars can be determined accurately by titrating with 0.02N-AgNO₃ in presence of K₂CrO₄.

E. S. H.

Use of animal charcoal [in sugar refining]. G. CAPELLE (Bull. Assoc. Chim. Sucri., 1932, 49, 72—75).—In American refineries animal charcoal is used as purifying and decolorising agent, in proportions up to 100% of the sugar. European refiners employ only about 15—30%, mainly for decolorisation. Fine-grained char removes more colour but less org. and inorg. impurities than similar char in coarser form. Its decolorising effect on faintly alkaline syrups, e.g., from affined beet sugars, can be increased by 30% by acidification to p_{H} 6.5 with CO₂, without danger of inversion. Treatment with CO₂ even after char filtration lightens the colour of such syrups.

J. H. L.

Sugar refining by means of vegetable carbons. D. G. SCOTT (Internat. Sugar J., 1932, 34, 219—221).—Activated C offers a means of sugar refining in the plantation sugar-house which is reasonably cheap without requiring any special skill or any very considerable outlay in special plant. In general, the procedure is to add to the re-melt from washed raw sugar at about 55° Brix and about 90° the necessary quantity of the C to obtain max. decolorisation, after which the liquor is filtered, using a pressure leaf-filter ("Auto" or Vallez). When the filter refuses to accept more treated liquor, the latter is sweetened off, the sweet-water being returned to the melters for dissolving more sugar, and the C either retained for re-use or for revivification. High-grade *pilé* and granulated sugar can be turned out with a recovery of 94—95% and a total consumption of C with revivification representing 0.05% of the sugar melted.

J. P. O.

Decolorising experiments [on sugar juice] with activated carbons. G. VAVRINECZ (Z. Zuckerind. Czechoslov., 1932, 56, 547—548).—Results of refinery tests are described, intended to show the relative efficiencies of 3 activated carbons in terms of the amounts of each necessary to adsorb 1 kg. of "fuscazinc acid," these

being given as follows: Superior Norit 64.5, Carboraffin 35.0, Acticarbon 41.8.

J. P. O.

Decolorisation of sugar-factory solutions with activated carbons in the presence of different filtration media. J. ŠANA (Z. Zuckerind. Czechoslov., 1932, 56, 541—545).—The decolorisation of such solutions of different concns. by means of activated carbons mixed 1:1 with kieselguhrs, earths (e.g., Terrana), MgO, etc. was examined. At low dilutions (e.g., 25° Brix) the carbons behaved in acid or in alkaline solution in a characteristic manner according to their type, whether chemical or gas-activated. In neutral solutions the differences between the two types are less. At higher concns. the favourable effect of the substances added is lowered, especially with Norit.

J. P. O.

Some notes on the refining of sugar. ANON. (Internat. Sugar J., 1932, 34, 267—270, 312—314, 354—356).—Mixed grain is a prolific source of trouble in affining. Lumps may be largely eliminated by passing the magma from the mingler through a pair of laterally ribbed rollers set $\frac{1}{4}$ — $\frac{1}{2}$ in. apart, one revolving 2—3 times as fast as the other. There is evidence that the ash may be incorporated in the grain in varying amount, which must be considered when evaluating the work of the station. Mingling syrup should be kept hot ($< 80^\circ$). It should contain 9—12% H₂O and have a purity of 85—88°, the quantity used being about 1000 lb. per 2000 lb. of raw sugar. Wash H₂O is best applied at 95—100° and about 40 lb. per sq. in. In using sweetwaters for melting, the returning of impurities may be minimised by a judicious separation, the later washings being employed for the dilution of affination syrup, or for the reduction of first press-cakes to a slurry for refiltering. At the melters the temp. should be 80—82° when using filter-aids, and $< 60^\circ$ when applying carbonation; the density should be about 60° Brix, and the p_{H} 7.1—7.4. In kieselguhr filtration, the amount used may be 0.3—1.0% on the solids, the amount of liquors filtered at 60° on each cycle being 3.0—3.5 tons of solids per 1000 sq. ft. of filtering surface per hr. Work with the Williamson clarifier, said to offer possibilities in the refinery, is described. In applying carbonation, good results are obtainable with 0.5—1.0% of CaO on the sugar when the melter liquors contain $< 0.2\%$ of reducing sugars and 0.2% of ash, and it is doubtful if $> 2.0\%$ need be applied. As high a % of CO₂ in the gases should be maintained, this being necessary for the formation of a coarse-grained ppt., the temp. being 50—55°. A final p_{H} of 9.0—9.2 and a temp. of 80—82° should be found satisfactory for filtration. By careful control, it is possible to show practically no destruction of reducing sugars and an actual elimination of ash.

J. P. O.

Volume-weight of moulded and pressed refined sugars. K. ŠANDERA and C. J. ŠTRÍBRNÝ (Z. Zuckerind. Czechoslov., 1932, 57, 9—11).—Loaf sugars showed vals. from 1.09 to 1.24 g. per c.c.; cubes 1.10—1.20, *pilé* and crushed sugars 0.92—1.18.

J. P. O.

"Available sugar" and the expression of the boiling-house result. N. DEERR (Internat. Sugar J., 1932, 34, 217—218).—It is proposed that for international chemical control the "available" sugar be expressed by

$[s-a(B-S)]/s=(j-m)/j(1-m)$, the vals. $a=0.4$ and $m=0.2857$ being accepted as standard. Sugar produced should be reduced to terms of "kristal" or "standard granulated," and determinations entering into such accounting be referred to terms of sucrose and not polarisation. Further, that the ratio of sugar produced to sugar available, which may be termed the "performance," be accepted as a measure of the efficiency of the boiling-house operation. J. P. O.

Simple apparatus for determination of the turbidity of sugar-factory products. K. ŠANDERA (Z. Zuckerind. Czechoslov., 1932, 56, 565–568).—It consists of a wooden block, the side of which has been cut out to make room for a small electric pocket lamp, the beam from which passes across a test-tube held vertically in the block. In this way the Tyndall effect of the solution under examination is observed, but, in order to obviate the disturbing effect of the luminescence exhibited by most sugar-factory products, a filter composed of a thin film of molasses is used for the absorption of the ultra-violet rays from the lamp. J. P. O.

Sensitivity of the Šandera pocket nepheloscope. M. DLOUHÁ (Z. Zuckerind. Czechoslov., 1932, 56, 568–569).—Using the apparatus described above, carbonatation scums and CaCO_3 were found to exhibit the Tyndall effect in dilutions of the order of 0.00001%. About 0.001% of CaCO_3 was found to destroy the brilliancy of a liquid without any appearance of turbidity being detectable. Kieselguhr and activated carbons showed the Tyndall effect less readily. J. P. O.

Practical [sugar-factory] laboratory notes. G. VAVRINECZ (Z. Zuckerind. Czechoslov., 1932, 56, 555–556).—In the author's laboratory, all Stift or Kohlrausch (so-called juice-polarisation) flasks are made in the Erlenmeyer form. The funnel of the continuous-flow polarisation tubes is made smaller than usual, *i.e.*, so as to contain ≈ 20 –40 c.c., thus permitting the use of 80–100 c.c. of the liquid, which is added all at once. In H⁺ determination by the colorimetric method he uses the Bjerrum-Arrhenius double-wedge colorimeter, by means of which results are obtained very rapidly and with an accuracy within 0.05 p_H . J. P. O.

Determination of the loss of sugar in waste waters. L. MATISHEK (Z. Zuckerind. Czechoslov., 1932, 56, 545–547).—A sampling device is described by means of which 4 litres of waste water are collected every 12 hr. as it passes the weir, this being evaporated down to 120 c.c. under reduced pressure and, after polarisation, its sugar content calc. In an example, a loss of 10.72 g. of sugar was found in 4,023,000 litres—the amount discarded in 12 hr. J. P. O.

Report of the 8th International Congress on uniform methods of sugar analysis. F. HERLES, V. SÁZAVSKÝ, K. ŠANDERA, and J. VONDRÁK (Z. Zuckerind. Czechoslov., 1932, 57, 33–36).—It was recommended that the principal inversion methods for the determination of sucrose used in different countries should be compared, and the effect of ash on the Clerget divisor be studied. All polariscopic readings should be made at 20° to avoid temp. corrections altogether. Preference is given to the conductometric rather than the gravimetric method of determining ash, and whether a

concn. of 5 or 26 g. per 100 c.c. be used is optional, but the determination should be made at 20°. In the case of beet products with < 1.5% of ash, the conductometric determination is to be carried out without acid; but for the corresponding cane products the acid titration method should be applied. For the determination of reducing sugars 10 of the principal methods are to be compared. If defecation is applied prior to the determination of the reducing sugars, normal $\text{Pb}(\text{OAc})_2$ should be used, and an excess afterwards eliminated by Na phosphate or $\text{K}_2\text{C}_2\text{O}_4$. Direct titration of SO_2 is pronounced satisfactory for routine sorting out, but where it gives higher results than the permissible limit the distillation method in CO_2 into H_2O_2 , Br, or I, followed by the gravimetric pptn. of the SO_3 , should be applied. It was recommended that further studies be made of the 100° point of the saccharimeter, of the error due to the vol. of the Pb ppt. in polarising raw sugars, of colorimetry as used in the sugar industry, and of the determination of raffinose. J. P. O.

Functional relationship between ash content and electrical conductance of cane syrups and molasses. I. LORGE, L. SATTLER, and F. W. ZERBAN (Ind. Eng. Chem. [Anal.], 1932, 4, 435–438).—The % of ash in cane syrups and molasses can be calc. from the empirical formula $0.01556K - 0.001125K_1 - 0.000623K_2 - 0.000219K_3 + 3.083$, where K is the conductivity $\times 10^6$ of the solution, K_1 is that of the solution obtained after adding 5 c.c. of 0.25N-HCl to 200 c.c., K_2 the conductivity after adding 5 c.c. of 0.25N-KOH, and K_3 that after adding 5 c.c. of N- H_3PO_4 . Ash contents of samples examined vary between 14.34 and 4.84%. The error is about 3%. E. S. H.

Determination of water in [beet] molasses by distillation with perchloroethylene. E. THIELEPAPE and A. FULDE (Z. Ver deut. Zucker-Ind., 1932, 82, 665–673).— C_2Cl_4 , b.p. 119°, may be used instead of the mixture previously recommended (cf. B., 1932, 41; in this, for C_2Cl_4 read $\text{C}_2\text{H}_2\text{Cl}_4$), and unlike the latter it is almost non-poisonous. It requires a somewhat longer distillation period than the mixture, but 1 hr. is sufficient with the forms of apparatus recommended or that of Lundin (A., 1931, 1256), and the results agree closely with those obtained by drying on sand at 105–110°. The C_2Cl_4 can be used 6–10 times without purification, and then needs only a single distillation. J. H. L.

Manufacture of caramel paste. A. D. BAJA (Requind, 1932, 1, 52–53, 74–77).—"Glucose" for caramel should contain at least 41% of glucose (H_2O 10–20%). The effect of the glucose, dextrans, and protein is discussed. Replacement of part of the glucose by invert sugar or honey, but not by molasses, is advantageous. CH. ABS.

Degradation of starch.—See XVIII.

See also A., Nov., 1115, **Determination of sugars. Decomp. products of sucrose and their use. 1177, Properties of starch from tropical etc. climates.**

PATENTS.

Extraction of sugar from desiccated sugar-beet cossettes. SUGAR BEET & CROP DRIERS, LTD., R. O. DAVIES, and R. K. MACDOWALL (B.P. 375,920, 21.4.31).

—Before entering the diffusion battery the cosettes are soaked for a time in hot H_2O or sugar juice, with or without stirring, to dissolve the sugar and allow included air to escape.

J. H. L.

Manufacture of dextrans, sugars, and other products from cellululosic materials. H. DREYFUS (B.P. 376,322—3, [A, B] 7.3.31).—(A) The material is hydrolysed by HCl or other volatile acid in presence of org. diluents, especially those insol. in H_2O , e.g., C_6H_6 , Et_2O , light petroleum. The conversion may be carried to the sugar stage, but is best restricted to the formation of primary products, which can afterwards be further hydrolysed to sugars by known methods. Preferably the material, containing <70—80% of H_2O , is impregnated with 20—200% of the org. diluent and exposed at 10—40° to HCl vapour, which may be mixed with other gases or vapours including that of the diluent. The conversion may be carried out without intensive cooling and with relatively small amounts of acid, which may be recovered if desired. The org. diluent, if immiscible with H_2O , may be recovered by mixing the converted charge with H_2O . (B) The material is converted by relatively small amounts of H_2SO_4 or other non-volatile acid in presence of $COMe_2$. The conversion into primary products (see above) insol. in $COMe_2$ is preferably effected by impregnating 1 pt. of the material (containing < 0.5 pt. of H_2O) with < 2 pts. of H_2SO_4 in the form of a 60—80% solution in $COMe_2$, and maintaining the charge at > 25—30° for 4—12 hr. The acid may be recovered completely or in part by extraction with $COMe_2$ or other org. solvent, and the converted product may be further hydrolysed to sugars. If necessary, uniform impregnation of the original material may be attained by first mixing the material with a large amount of a dil. solution of H_2SO_4 in $COMe_2$, then pressing out sufficient of the solution to leave the required amount of acid in the charge, and finally evaporating part of the $COMe_2$ to raise the concn. of acid.

J. H. L.

Refining of sugar. W. P. SPRECKELS (U.S.P. 1,844,020, 9.2.32. Appl., 25.4.28).—Char filtration is omitted and vac.-pan boiling is replaced by simultaneous evaporation and crystallisation effected by forcing air through the syrup at temp. too low to cause caramelisation or inversion. Raw sugars may be affined and melted as usual; the melt, passed through ordinary filters if necessary, is conc. by injection of air until sufficient grain has been formed, and is then fed with a suitable syrup and evaporated further in the same way so that the crystals grow without increasing in no. The sugar obtained is, if necessary, remelted and recryst. in the same way, and the mother-syrup may be returned to an earlier stage of the process or used for washing raw sugar. If the original raw sugar is of suitable quality it may, without remelting, be mixed with an appropriate syrup and evaporated as described, so that affination is combined with crystal growth; the sugar, after centrifuging, is remelted and recryst. Suitable apparatus is described.

J. H. L.

Refining [decolorisation of] sugar, or substances containing it, such as beet pulp or slices, crushed sugar cane, etc. I. TRAUBE (B.P. 378,832, 14.4.32.

Austr., 15.4.31).—Saccharine liquids are decolorised by means of lyophobic adsorbents such as active C, kieselguhr, etc., in presence of optically isotropic $Al(OH)_3$ gels of high adsorbent power. The effect is much greater than when the C and $Al(OH)_3$ are employed separately. Methods of prep. of the $Al(OH)_3$ are indicated.

J. H. L.

Colouring and flavouring of sugar. T. CLARKE, Assr. to NUNNALLY Co. (U.S.P. 1,841,432, 19.1.32. Appl., 15.7.29).—Cube or granulated sugar is given an orange, lemon, mint, or other flavour, and a corresponding tint, by moistening with either a sugar solution or a mixture of EtOH and EtOAc containing the appropriate flavouring oil and dye.

J. H. L.

Preparation of lactose. P. F. SHARP, Assr. to CORNELL UNIVERSITY (U.S.P. 1,810,682, 16.6.31. Appl., 4.12.29).— β -Lactose, which is much more sol. than the ordinary α -lactose and has other practical advantages, is obtained substantially free from the α -form by heating commercial lactose with a limited amount of H_2O (e.g., 540 c.c.—2 kg.) above the transition temp. of the two forms, viz., 93°, preferably in an autoclave fitted with a stirrer, until the solid phase consists only of β -lactose. The charge is then dropped into a heated centrifuge and the β -lactose is finally washed with a small amount of cold H_2O .

J. H. L.

Manufacture of a colloidal carbohydrate. T. MIYAGUCHI and M. FUKUI (B.P. 376,533, 26.8.31. Jap., 2.3.31).—Sucrose (1 pt.) is gradually dissolved in conc. H_2SO_4 (1.5 pts.) below 5° without formation of humus products. After about 24 hr. the solution is poured into H_2O , the acid removed as $CaSO_4$, and the filtrate, after treatment with active C, evaporated. The product is a colourless, tasteless, colloidal substance, which improves the flavour of foods and has possible cosmetic and medical applications.

J. H. L.

Conversion of carbohydrates into products of higher oxidation [tartaric acid]. H. L. HENZERLING, Assr. to ROYAL BAKING POWDER Co. (U.S.P. 1,834,057, 1.12.31. Appl., 26.10.23).—100 pts. of starch are heated with about 90 pts. of H_2SO_4 (d 1.53—1.56) until hydrolysed to the required extent, then diluted with a mixture of 180 pts. of H_2SO_4 with 500 pts. of H_2O , treated with 100 pts. of $NaNO_3$ or other nitrate, and heated for 2—3 days.

J. H. L.

Protein precipitant.—See II. Treating bagasse.—See V.

XVIII.—FERMENTATION INDUSTRIES.

Measurement of activity of commercial invertase. H. C. GORE (Ind. Eng. Chem. [Anal.], 1932, 4, 367).—The activity is defined as the unimol. reaction coeff. (calc. after reaction for 50 min. with sucrose) multiplied by the dilution. The val. is determined polarimetrically, stopping the inversion after 50 min. at 20° by adding NH_3 .

E. S. H.

Degradation of starch during mashing. W. WINDISCH, P. KOLBACH, and E. SCHILD (Woch. Brau., 1932, 49, 289—295, 298—303).—The rate of dissolution and conversion of the starch in malt, as measured by the increase of total extract during mashing, was greater within the temp. range 0—75° the higher the temp.

Irregularities in the increase at low temp. were due, apart from the effect of temp., to changes of the p_H optima for the amylolytic action. The production of maltose, as measured by the increase in the total amount of fermentable extract, reached maxima at a temp. which progressively fell from 66° to 63° according as the mashing period was prolonged from 0.25 to 3 hr. The true fermentable extract produced during mashing, *i.e.*, the amount of fermentable extract as a percentage of the total extract, showed maxima at 63–64° with the normal p_H for the above mashing periods, and rapidly decreased on raising the temp. The p_H optima for conversion of the starch were 4.6–4.8 at 40°, 4.7–4.9 at 50°, 4.9–5.1 at 55°, 5.2–5.4 at 60°, and 5.4–5.8 at 65°, and at 70° and 75° the optimal zones were very broad. The p_H optima for the production of maltose were slightly lower than those for the dissolution of starch at the same temp., *e.g.*, 5.0–5.2 at 60°. The rate of starch dissolution and maltose production at 60° and normal p_H increased as the concn. of the mash decreased, and the ratio of starch to maltose was approx. const. at concns. which ranged from 1:2 to 1:5.3 for malt:H₂O. A slight decrease of true fermentable extract which occurred with dilution of the mash was more marked at higher mashing temp. C. R.

Laboratory malting equipment. T. J. HARRISON and H. ROWLANDS (*J. Inst. Brew.*, 1932, 38, 502–508).

Determination of carbon in fermented liquors. O. L. OSBORN and C. H. WERKMAN (*Ind. Eng. Chem. [Anal.]*, 1932, 4, 421–423).—The liquor is oxidised in presence of CO₂-free H₂O by K₂S₂O₈, and the CO₂ is absorbed in KOH bulbs and weighed. If Cl is present, AgNO₃ is added in slight excess. Under these conditions, S, N, and Cl have no serious effect. An error of 2.5 mg. CO₂ may be expected. E. S. H.

Analytical characteristics of coconut toddy. J. C. COWAP and F. H. GEAKE (*Analyst*, 1932, 57, 627–628).—Original solids may be calc. from the formula: $O.S. = 2 \times (\text{EtOH by wt.}) + 1.5 \times (\text{acid as AcOH}) + \text{extract}$. At least 25% of original solids should be present. T. McL.

Diseases of the vine.—See XVI.

See also A., Nov., 1110, **Prep. of pure isoamyl ether.** 1165, **Yeast lipase.** 1166, **Histaminase.** 1167, **Indene and indones in alcoholic fermentation.** **Classification of cultivated yeasts.** 1168, **Production of acids by *Aspergillus niger*.**

PATENT.

Concn. of AcOH.—See III.

XIX.—FOODS.

Modern methods of heating milk. E. HOBBS (*Milch. Zentr.*, 1932, 61, 241–247).—A preliminary note. The Ahlborn large-scale plate pasteuriser is discussed in detail and mention is made of a smaller plant, "Perkco" by Ahlborn. Milk treated by these pasteurisers is equal to fresh milk in odour and flavour, slightly less acid, has better keeping qualities at all temp. up to 26°, gives a softer curd with rennin, and the cream layer on keeping is rather thinner but more compact. E. B. H.

Electrical conductivity in milk testing. A. SCHWEERS (*Arch. Hyg.*, 1932, 107, 354–385; *Chem. Zentr.*, 1932, ii, 308).—After boiling, λ falls slightly and transiently. Parallelism exists between λ and the Cl content. Vals. for rennin serum are higher than for milk. Development of acidity by bacterial infection was examined. A. A. E.

Phospholipin content of fluid cream. H. F. WIESE, J. H. NAIR, and R. S. FLEMING (*Ind. Eng. Chem. [Anal.]*, 1932, 4, 362–365).—The cream is treated with conc. aq. NH₃ and extracted with EtOH, Et₂O, and light petroleum. The extracts obtained after evaporation of the solvent are oxidised by heating with Mg(NO₃)₂, and P is determined in the ash by Briggs' method (A., 1924, ii, 498). Inorg. P is not extracted. The phospholipin content of cream is 8.0 ± 0.24 g. per 100 g. of cream, but it is recommended to express the result in terms of mg. of P per 100 g. of extract (18–20 mg. P per 100 g.). E. S. H.

Tests for the keeping quality of unsalted butter. J. T. MINSTER (*Analyst*, 1932, 57, 615–621).—Methods of estimating the activity of catalase and reductase are described, together with a simple method for the bacteriological examination of butter. The presence of much catalase and reductase and of organisms which produce acid in absence of sugar is characteristic of poor keeping qualities. T. McL.

Iodine and thiocyanogen values of Irish butter. P. ARUP (*Analyst*, 1932, 57, 610–615).—The CNS val. of butter kept at 25–26° for 7 hr. has been determined. The influence of winter-feeding, as shown by the I val., becomes evident in November, *i.e.*, 2 months later than with Danish or Swedish butters. The oleic acid content of butters of different origin may vary (27.5–39.0%), but the linolenic acid remains more or less const. at 3.5–4.2%. T. McL.

Physico-chemical processes in the ageing of egg-white. C. SCHWEIZER (*Mitt. Lebensm. Hyg.*, 1932, 23, 17–29; *Chem. Zentr.*, 1932, ii, 307).—[H] does not approach the isoelectric point of albumin, but is displaced towards alkalinity by loss of CO₂. $p_H < 9.4$ does not indicate freshness with certainty, but $p_H > 9.4$ indicates an age > 8 days. Diminution of viscosity or osmotic pressure is not sufficiently sensitive a test. Flocculation with EtOH is usually greater with fresh eggs than after 8–14 days. A. A. E.

Detection of gelatin in dairy products. M. B. JACOBS and L. JAFFE (*Ind. Eng. Chem. [Anal.]*, 1932, 4, 418–420).—The sample is treated with aq. 50% Pb(NO₃)₂ and 5% NaOH. Ignited C is added to adsorb pseudo-gelatins and proteoses. After filtration, 2 drops of conc. HNO₃ and 5% tannic acid are added. In presence of gelatin a white or brownish ppt. forms, but otherwise the solution remains clear. Alternatively, tannic acid may be replaced by picric acid, without addition of HNO₃. The procedure is especially suitable with sour cream and cultured milks. One pt. of gelatin in 2000 pts. of the milk product can be detected. E. S. H.

Microscopical examination of tapioca meal. O. KLYKKEN (*Landw. Versuchs-Stat.*, 1932, 114, 171–174).—Tapioca meal infested with a black mould caused

injury to pigs. The colour developed by boiling the meal with very dil. HCl is a measure of the infestation. Microscopical examination is necessary to confirm that the colouring matter is derived from the fungus and not from coloured cortical cells. A. G. P.

Heat penetration and canned meats. D. E. A. JONES (Food Tech., 1932, 2, 36—38).—The construction of a thermocouple from steel hypodermic tube and Eureka wire is described. The very small cross-sectional area reduces errors due to conduction of heat along the stem and enables a more accurate determination of temp. at a definite point to be made. E. B. H.

Influence of carbon dioxide on internal breakdown in the Sturmer [pippin]. L. W. TILLER (New Zealand J. Sci. Tech., 1932, 14, 20—22).—An atm. containing 75% of CO₂ considerably increased the proportion of apples showing breakdown in storage at 2°. A. G. P.

Browning of canned peaches. W. V. CRUESS, P. J. QUIN, and E. M. MRAK (Fruit Products J., 1932, 12, 38—40).—Causes of this defect are suggested and methods for its prevention given. E. B. H.

Brining and candying of citron peel. W. V. CRUESS and D. GLICKSON (Fruit Products J., 1932, 12, 17—18, 25).—Recommendations for concn. and type of brine, proportions of sugars, and the addition of acid are made. E. B. H.

Composition of dried California prunes of the French (prune d'Agen) variety. L. GALE and W. V. CRUESS (Fruit Products J., 1931, 10, 302—304).—The locality affects the composition more than the size of the fruit; differences are recorded. Average vals. are: pits 14.75, H₂O 18.36, total sol. matter 77.97, total sugar (as invert) 46.78, sucrose 3.37, invert sugar 43.93, protein 2.79, total acid as citric 1.20, ash 2.19, H₂O-sol. alkalinity of ash 20.46, acid-sol. alkalinity of ash 7.30, total alkalinity of ash 25.15%. Ash constituents are recorded. Ch. Abs.

Preparation of glacé Kadota figs. S. BLUMENTHAL (Fruit Products J., 1932, 12, 11, 22).

Specific test for orange honey. R. E. LOTHROP (Ind. Eng. Chem. [Anal.], 1932, 4, 395—396).—Among a large no. of honeys tested, only orange honey gave a reaction for Me anthranilate. E. S. H.

Firing of tea. D. I. EVANS (Tea Quart., 1932, 5, 35—37).—Tea should leave the dryers with 3% H₂O and be packed with \geq 6% H₂O. E. B. H.

Moisture content of made tea. D. I. EVANS (Tea Quart., 1932, 5, 54—58).—High H₂O content of tea may be caused by improper firing of the fermented leaf and absorption during grading and storing. The R.H. of the atm. in the grading rooms should be 60—65%. Tea containing $>$ 6% H₂O requires refiring before packing. E. B. H.

Caffeine determination in coffee extracts. H. JESSER (Chem.-Ztg., 1932, 56, 842—843).—The Grossfeld-Steinhoff method (B., 1931, 609) is modified. The filtrate from the NaOH ppt. is treated directly by the Kjeldahl method. It is unsatisfactory for "caffeine-free" coffees. E. H. S.

Temperature changes in foods during freezing and subsequent thawing. M. A. JOSLYN and G. L. MARSH (Fruit Products J., 1932, 12, 12—16, 44—48).—The chief factors determining rate of change were the sp. heat and heat conductivity, temp. at which ice began to separate, the amount of ice that separated, size and shape of container, initial temp. of product, and temp. and nature of refrigerant. The effect of neighbouring containers in the case was $>$ that of the type of case used. E. B. H.

Sulphur content of foods. Modification of turbidimeter for determination of small quantities of sulphur. K. S. KEMMERER and P. W. BOUTWELL (Ind. Eng. Chem. [Anal.], 1932, 4, 432—425).—The sample is oxidised with HNO₃ and HClO₄ (cf. B., 1930, 393) and S is determined by the S turbidimeter (cf. A., 1931, 451), modified so as to work with 25 c.c. containing 0.7—1.3 mg. S. Determinations of the S content of 96 foodstuffs are given. E. S. H.

Tomato-seed oil.—See XII.

See also A., Nov., 1161, Cottonseed meal. 1173—6, Vitamins (various). 1181, Determination of traces of Cu in foods.

PATENTS.

Artificially coloring fruit. O. W. RICE, Assr. to BROGDEN Co. (U.S.P. 1,846,143, 23.2.32. Appl., 14.8.29).—Green citrus fruits, before being placed in the colouring room (C₂H₄ gas), are washed in warm aq. borax (6—8 oz. per gal.), dried, and sprayed with wax, e.g., a 1:1 mixture of paraffin and carnauba wax. Fruit so treated colours satisfactorily and also remains in perfect condition on storage. E. B. H.

[Pellet] form of [infantile] animal food and manufacture thereof. A. W. SIZER (B.P. 382,480, 16.1.32).

Colloidal carbohydrate.—See XVII. Preservatives.—See XX.

XX.—MEDICINAL SUBSTANCES; ESSENTIAL OILS.

Rapid detection of adulteration of saffron by capillary analysis. H. SCHMIDT-HEBBEL (Pharm. Zentr., 1932, 73, 657—659). The drug (5 g.) is extracted with 10 c.c. of 50% aq. EtOH and the extract examined by capillary analysis, alone, and after dilution (1:10) with (a) EtOH, (b) H₂O-EtOH (1:1), and (c) H₂O. Comparison with similarly prepared extracts of genuine saffron quickly indicates the presence or absence of foreign colouring matters and plants. E. H. S.

De-nicotinisation of tobacco smoke during smoking. R. KISSLING (Chem.-Ztg., 1932, 56, 822—823).—Nicotine is partly removed from tobacco smoke by cotton-wool or SiO₂ gel. R. S. C.

Retention of alkaloids by oak sawdust, U.S.P. R. W. MORRISON and A. R. BLISS, JUN. (Amer. J. Pharm., 1932, 104, 590—593).—When 10 g. of unpurified oak sawdust are kept in 20 c.c. of an aq. solution containing about 1% each of strychnine and brucine sulphates, it retains about 16% of the alkaloids, which cannot be recovered by ordinary methods. Purified oak sawdust, U.S.P., retains about 17.5%, but the marc from

exhausted nux vomica < 1%. Oak sawdust must, therefore, not be used as adsorbent in alkaloidal assays. **R. S. C.**

Extraction and determination of morphine. A. I. PORTNOV (Farm. Zhur., 1932, 292—296).—The acidified sample is extracted with EtOH, the EtOH is evaporated, H₂O and HCl are added, and the mixture is extracted with Et₂O until the Et₂O washings are colourless; sand is then added and the mixture extracted with CHCl₃. After neutralising, 5 c.c. of 4% NaHCO₃ are added for each 20 c.c. of extract. A mixture of Pr⁶OH (1 pt.), CHCl₃ (3 pts.), and 4% Na₂CO₃.10H₂O (5 c.c.) is added; after shaking, the lower layer is separated. It is then extracted 4 times, evaporated, and titrated. **CH. ABS.**

Determination of novocaine and benzocaine. Y. FRYALKOV and M. YAMPOLSKA (Farm. Zhur., 1932, 13—16).—*Novocaine*: The aq. hydrochloride (0.03—0.05 g.) is treated with 2.5N-HCl (20 c.c.), 0.1N-KBrO₃ (15—25 c.c.), and KBr (1 g.); after 15 min. 0.1N-As₂O₃ (15—30 c.c.) is added, the solution being agitated until colourless and titrated with 0.1N-KBrO₃ and Me-red until the red colour disappears. *Benzocaine*: 0.5 g. is dissolved in the min. quantity of 0.2N-HCl and diluted to 100 c.c. 10 c.c. are treated with 0.1N-KBrO₃ (25 c.c.), and 2.5N-HCl (25 c.c.), agitated for 15 min., and treated as above. A blank determination on the KBrO₃ and As₂O₃ is essential. **CH. ABS.**

Pharmaceutically important arsenic compounds. K. BRAND and E. ROSENKRANZ (Pharm. Zentr., 1932, 73, 641—649, 659—660).—0.007% of As₂O₅ can be detected in Fowler's solution by addition of 1.5 c.c. of 30% aq. AcOH (in 3 separate additions of 0.5 c.c. each) to a mixture of 0.5 c.c. of 5% aq. AgNO₃ and 3 c.c. of the solution. The lowest concn. detected with the D.A.B. VI method was 0.0554%. Similarly, 0.0005% of As₂S₃ (as Na₃As₂S₃) can be detected by treatment of 2 c.c. of Fowler's solution with 0.5 c.c. of 25% HNO₃ followed by 3—6 drops of 5% aq. AgNO₃ (D.A.B. VI method, sensitivity 0.008%). The following modification of the D.A.B. method for the detection of As₂S₃ in H₂AsO₄ is sensitive to 0.01%: 0.5 c.c. of 5% aq. AgNO₃ is added to a mixture of 1.5 c.c. of 25% HNO₃ and 2 c.c. of a solution of 1 g. of the acid in 10 g. of 10% NH₃ solution and 10 g. of H₂O. **E. H. S.**

Cineole content of French lavender oil. R. M. REED (Perf. Essent. Oil Rec., 1932, 23, 340—341).—The *o*-cresol method (B., 1932, 161) is not applicable to French lavender oils, owing to the presence of alcohols, esters, etc. Linalyl and terpinyl acetates with ester contents of 96.8—98.2% showed apparent cineole contents of 22.4—23.2%, and the fraction of French lavender oil, b.p. 108—135°/20 mm., a cineole content of 22.4%. The actual quantity of cineole present is much < 5% (cf. B., 1921, 869). **E. H. S.**

Caffeine in coffee extracts.—See XIX. **Essential oils and the cockroach.**—See XXIII.

See also A., Nov., 1118, **Prep. of aliphatic NH₂-acids.** 1126, **Synthesis of mescaline.** 1137, **Yellow dyes of ergot.** 1139, **Production of synthetic menthols.** 1147, **Ergot alkaloids, Detection of solanine. Derivatives of ψ -strychnine.** 1150,

Microchemical reaction of cocaine. 1164, **Assay of *Digitalis* preps.** 1171, **Bactericidal action of dyes. Secretin.** 1173, **Isomeric follicular hormone from mare's urine.** 1173—6, **Vitamins (various).** 1177, **Glucosides from tobacco leaves.** 1178, **Alkaloids of *Fritillaria Roylei*. Strychnine-brucine ratio of *Nux vomica*. Seeds of *Erythrina variegata*.** 1181, **Effect of TI on growth of tobacco plants.**

PATENTS.

[**Manufacture of**] **alkali salts of halogenohydroxybenzoic esters [disinfectants and preservatives].** W. SCHOELLER and H. G. ALLARDT, Asss. to SCHERING-KAHLBAUM A.-G. (U.S.P. 1,793,021, 17.2.31. Appl., 1.8.29. Ger., 10.8.28).—Na salts of 3-bromo-, 3-iodo-, and 3:5-dibromo-4-hydroxybenzoic acids are disinfectants. **C. H.**

Manufacture of antipyrine. E. F. GREYER and J. P. BELSLEY, Asss. to DOW CHEM. CO. (U.S.P. 1,792,833, 17.2.31. Appl., 19.7.28).—The methylation of 1-phenyl-3-methyl-5-pyrazolone to antipyrine is effected by means of alkyl halides, e.g., EtBr, in MeOH at 120°. **C. H.**

Production of choline compounds. (FRL.) F. KÖRNER (B.P. 379,260, 28.4.32. Ger., 29.4.31).—Carbonates of choline and its homologues are prepared by action of alkylene oxides on *tert.* bases in presence of H₂O and CO₂; the carbonates may be converted into other salts by means of acids, e.g., HCNS, salicylic or oleic acid. Carbonates of choline and of products from tri-(β -hydroxyethyl)amine or quinoline with ethylene oxide, and from C₅H₅N and propylene oxide are described. **C. H.**

Preparation of additive products of alkaloids. F. W. R. OSTEN (B.P. 378,935, 12.5.31).—Quinine, quinidine, or their salts are heated with a bile acid or an alkali salt thereof in PhMe or CPh:CH, and the solvent is removed by evaporation in vac. Caffeine may be added to counteract undesired heart effect. **C. H.**

Manufacture of arsenic compounds. W. W. GROVES. From I. G. FARBENIND. A.-G. (B.P. 377,994, 2.4.31).—Arsenobenzenes, containing fused hetero-rings which carry SH groups, are synthesised by usual methods. Examples are 7:7'-dichloro-2:2'-dithiol-4:4'-arsenobenzimidazole, 2:2'-dithiol-7:7'-arsenobenzoxazole-5:5'-disulphonic acid, and the following 2:2'-dithiol-5:5'-arsenobenzoxazoles: 7:7'-dichloro-, -diacetamido-, -diamino-, -dimethoxy-, -di-iodo-, 6:6'- and 7:7'-dicarboxy-. **C. H.**

Cigarette papers.—See V. **Insecticide.**—See XVI. **Colloidal carbohydrate.**—See XVII.

XXI.—PHOTOGRAPHIC MATERIALS AND PROCESSES.

Simplified method of preparing Schumann plates. J. J. HOPFIELD and E. T. S. APPLEYARD (J. Opt. Soc. Amer., 1932, 22, 488—495).—Full details for making photographic plates sensitive to ultra-violet light down to 500 Å. are given. The plates consist of a thin layer of AgBr deposited from a dil. emulsion on top of a hardened gelatin layer (fixed-out plates), the spent liquid being drained off. The speed of the

plates increases on storage (2 months) or heating at 60° for about 48 hr. After drying, the plates are very durable.

J. L.

Sensitisation of ordinary photographic plates to wave-lengths below 2500 Å. A. J. ALLEN and R. G. FRANKLIN (J. Opt. Soc. Amer., 1932, 22, 469—476).—The sensitisations produced by thin surface films of various substances fluorescent in ultra-violet light, e.g., naphthylaminesulphonic acids, are compared. Spectrographs taken with an Al spark and with a H₂ arc, and also densitometer curves, illustrate the results.

J. L.

See A., Nov., 1097, **Photolysis of AgNO₃ and AuCl₃ by oxides. Destruction of the latent image by monochromatic light.** 1098, **The latent image and physical development. Orthoactinic radiation.**

PATENTS.

Manufacture of light-sensitive photographic materials [thiocarbocyanines]. KODAK, LTD., and L. G. S. BROOKER (B.P. 378,870, 12.3.31. U.S., 12.3.30).—A quaternary salt of a 2-methyl- α - or - β -naphthathiazole is condensed with an ortho-ester other than an orthoformic ester. 2-Methyl-1-ethyl- β -naphthathiazole *p*-toluenesulphonate, e.g., is boiled in C₅H₅N with CMe(OEt)₃, CEt(OMe)₃, or Me diethylorthoisohectoate, and the dye is salted out as bromide with NH₄Br. C. H.

Sensitisation of photographic emulsions. KODAK, LTD., and L. G. S. BROOKER (B.P. 378,885, 12.3.31. U.S., 12.3.30).—Emulsions sensitive from λ 520 to 690 m μ , and especially at 660 m μ , are obtained by use of the thiocarbocyanine obtainable by condensing a quaternary salt of a 2-methyl- α - or - β -naphthathiazole with the ortho-ester of an aliphatic acid above C₁, particularly from 2-methyl- β -naphthathiazole and Et orthoacetate. C. H.

XXII.—EXPLOSIVES; MATCHES.

Preparation of stable cellulose nitrates of high nitrogen content by washing with alcohol. H. MURAOUR (Bull. Soc. chim., 1932, [iv], 51, 1089—1093).—EtOH or MeOH removes unstable impurities from commercial guncotton, rendering the product more stable and increasing the N content. If the guncotton (13.56% N), after washing with H₂O, is treated in a Soxhlet extractor with EtOH for 240 hr., washed with H₂O, and dried, a very stable product is obtained which contains 13.84% N. Even if extracted for only 25 hr., the product is very stable. D. R. D.

Instability of guncottons and gunpowders. H. MURAOUR (Bull. Soc. chim., 1932, [iv], 51, 1094—1096).—Ordinary, non-stabilised guncotton (cf. preceding abstract), kept in a stoppered bottle for 26 months, had decomposed almost completely, leaving a residue containing only 2.3% N, whereas when the bottle contained in addition a tube of P₂O₅ no decomp. occurred. Similarly, no decomp. occurred when the air in the bottle was saturated with H₂O. Hydrolysis is due to the action of HNO₃; if the concn. of H₂O is too small, no HNO₃ can be formed, whilst if it is too large, the HNO₃ is diluted and the action ceases. NHPh₂ and centralite only partly inhibit decomp. Acid oxidation products of Et₂O accelerate decomp. The instabil-

ity of certain gunpowders is attributed to the use of Et₂O in their manufacture. D. R. D.

PATENTS.

[Irritant] gas-liberating charge. A. LOWY, Assr. to FEDERAL LABS., INC. (U.S.P. 1,842,369, 19.1.32. Appl., 24.5.29).—A cartridge or shell for distributing irritant gas consists of a lower portion filled with a propellant powder separated by an impermeable diaphragm from the upper portion, which is filled with a loose, finely-divided, inert, light powder impregnated with CPh·CH₂Cl. A. R. P.

Manufacture of pentaerythritol tetranitrate. T. R. PATERSON, and IMPERIAL CHEM. INDUSTRIES, LTD. (B.P. 378,500, 13.5.31).—A product showing an Abel heat test of at least 40 min. is obtained by dissolving crude pentaerythritol tetranitrate in a H₂O-immiscible inert solvent, volatile in steam and stable to hot dil. Na₂CO₃, filtering, and removing the solvent by steam-distillation in presence of Na₂CO₃ or aq. NH₃. Suitable solvents are PhNO₂ and *n*-amyl alcohol. C. H.

Shot-gun cartridges. IMPERIAL CHEM. INDUSTRIES, LTD., and C. A. HISLOP (B.P. 381,575, 7.7.31).

Steel fire-arms.—See X.

XXIII.—SANITATION; WATER PURIFICATION.

Hydrogen sulphide formation in sewage. W. RUDOLFS and W. H. BAUMGARTNER (Ind. Eng. Chem., 1932, 24, 1152—1154).—Inorg. sulphates, commonly present in hard waters and sewage, are potential sources of H₂S by reduction under anaërobic conditions; thiosulphates and sulphites are attacked at approx. the same rate. C. J.

Colon-aërogenes types of bacteria as criteria of faecal pollution. F. O. TONNEY and R. E. NOBLE (J. Amer. Water Works' Assoc., 1932, 24, 1267—1280).—Four general types of colonies are found on ferro-cyanide-citrate-agar pour-plates made directly from the sample, viz., (a) distinctive *B. coli* type, (b) distinctive *B. aërogenes* type, (c) variable intermediate strains, and (d) extraneous growths not of the *colon-aërogenes* types. Of these, only type (a) is definitely indicative of faecal pollution; the (b) and (c) types of colonies are of no special faecal significance and should be excluded from consideration as evidence of dangerous faecal pollution. C. J.

Bacterial enzymes in the purification of sewage. W. R. WOOLDRIDGE and A. F. B. STANDFAST (Nature, 1932, 130, 664—665).—The most important factor in sewage purification is a series of catalysed oxidation-reduction reactions due to bacterial enzymes present in either dead or living cells. L. S. T.

Insecticidal control of the common black field cricket (*Gryllus assimilis*, Fabr.). J. A. MUNRO and L. A. CARRUTH (J. Econ. Entom., 1932, 25, 896—902).—In poison baits Na₂SiF₆ and NaF gave effective control. Arsenicals and TiSO₄ were unsuccessful. Dusting with pyrethrum gave satisfactory results in houses etc. A. G. P.

Olfactory responses of the cockroach (*Blatta orientalis*) to the more important essential oils, and a control measure formulated from the results.

A. C. COLE, JUN. (J. Econ. Entom., 1932, 25, 902—905).—Data for a no. of oils are recorded. A satisfactory HgCl_2 -beef-broth bait is obtained by incorporation of oil of banana, orange, apple, or pineapple as an attractant. A. G. P.

Water softening by zeolite in municipalities. S. B. APPLEBAUM (J. Amer. Water Works' Assoc., 1932, 24, 1364—1393).—The relative merits of the zeolite and CaO-soda methods of water softening are discussed. The chief advantages claimed for the former are: low initial and maintenance costs, simplicity and flexibility of operation, and the absence of sludge; on the other hand, the proportion of solids in solution is higher than in the case of CaO-soda treatment, which in some cases may cause foaming and priming in boilers. The zeolite method is not suitable for use with turbid waters, and the zeolite-softened water is more likely to be corrosive than a CaO-soda-treated one. C. J.

Experience with activated carbon [in water treatment]. G. R. SPALDING (J. Amer. Water Works' Assoc., 1932, 24, 1394—1400).—A dosage of > 10 lb. (per 10^6 gals.) of powdered activated C along with the alum coagulant proved effective at a New Jersey plant in controlling seasonal odours due to microscopic organisms, e.g., *Synura*, and produced a stable and inodorous sludge. Odours were also eliminated at the filters and at the storage wells for filtered water which are used as CaO-treatment reservoirs for the correction of the p_{H} and the removal of CO_2 from the H_2O supplied to the mains. C. J.

Manganese [in water] and its relation to filters. P. BOYNTON and L. V. CARPENTER (J. Amer. Water Works' Assoc., 1932, 24, 1341—1351).—The presence of Mn in water is often due to acid drainage from bituminous coal mines. Its presence is objectionable to the consumer as it causes rust spots and stains, and to the plant operator as, by incrustation, it increases the effective size of the sand grains and also causes caking to such an extent that ordinary washing will not break up the sand, and under-water cracking frequently occurs. The experiences gained from a no. of plants and the various methods adopted to deal with the problem are described and discussed. C. J.

Floc formation and mixing-basin practice [for water]. G. E. WILLCOMB (J. Amer. Water Works' Assoc., 1932, 24, 1416—1441).—A lecture, emphasising the importance of determining the precise conditions under which the max. benefit can be obtained from the coagulation process on a particular water. Suitable laboratory apparatus for this purpose, a new method of measuring low turbidities, and present-day conditioning processes are described. C. J.

Control of tastes and odours due to microscopic organisms in Spot Pond reservoir, Boston, Mass. S. E. KILLAM (J. New England Water Works Assoc., 1932, 46, 241—251).—The offending organisms were *Dinobryon*, *Synura*, and *Uroglenopsis*, and as the reservoir was ice-covered the H_2O was treated for 3 weeks with NH_3 and Cl_2 until they could be destroyed with CuSO_4 (2.6 lb. per 10^6 gals.). C. J.

Automatic-transfer fermentation-tube battery for determination of *B. coli* in water. W. F.

WELLS (J. New England Water Works Assoc., 1932, 46, 283—287).—The recently recommended "double-planting" procedure (B., 1932, 866) is simplified by the arrangement described, in which the fermentation tubes are connected by an automatic capillary siphon; the formation of gas in the primary enrichment tube causes the inoculation of the secondary tube. C. J.

Powdered activated carbon in water purification. F. E. STUART (J. New England Water Works Assoc., 1932, 46, 312—315).—The advantages and technique of employing activated C in the form of a fine powder (94% passing 200-mesh) are described and discussed. C. J.

Determination of hydrogen sulphide in industrial waters. KAPP (Compt. rend., 1932, 195, 608—610).— H_2S in such waters is liable to oxidation by dissolved O_2 , the O_2 dissolved in ordinary H_2O being sufficient to oxidise 18 mg. H_2S per litre and so cause an error in its determination which may amount to 100%. This is avoided by adding to the sample immediately on its being taken excess of aq. CdSO_4 , the CdS thus pptd. not being liable to oxidation. This is distilled with H_2SO_4 and the H_2S determined as usual. C. A. S.

Treatment of tannery wastes. T. OBERLANDER (J. Amer. Leather Chem. Assoc., 1932, 27, 393—402).—Tannery wastes are highly coloured by the soda solution from the bleach and the spent tan liquors; the Na_2CO_3 and tannin present are easily pptd. by $\text{Ca}(\text{OH})_2$ in the form of lime waste and lime sludge. Good filtration of the spent tan liquors was obtained after the addition of hydrated CaO. The sludge obtained was calcined, and on addition of the residue and hydrated CaO to further quantities of spent tan liquors, the rates of settling and of filtration were increased. Poor settling was caused by the admixture of old CaO liquors and bleach liquors, and mixed CaO liquors were found to be beneficial. The sludge was filtered through linen cloth, the max. p_{H} being 10—12. The rest of the CaO liquors and wash waters, except the soak liquors, were treated with 1 g. of $\text{Al}_2(\text{SO}_4)_3$ per gal., and CO_2 was passed through them until the p_{H} was 6.5. D. W.

Graphical representation of mineral components in water analyses. A. A. HIRSCH (Ind. Eng. Chem. [Anal.], 1932, 4, 405—406).—Milliequiv. concns. of the various ions are plotted along the sides of a rectangle, so that its segmentation, form, and size describe the dissolved minerals completely. E. S. H.

See also A., Nov., 1170, **Bacterial examination of H_2O . Action at a distance of metals on *B. coli*.** 1182, **Circulation of I in nature.**

PATENTS.

Decomposition chambers for sewage sludge. M. PRÜSS (B.P. 381,799, 15.1.32. Ger., 15.1.31).—A form of digestion tank is claimed in which the heating element is placed in a separate portion of the tank and can be removed for cleaning without interfering with the digestion process. The tank contents are circulated through the heating chamber either automatically or by means of a pump. C. J.

Protein precipitant.—See II.