

BRITISH CHEMICAL ABSTRACTS

B.—APPLIED CHEMISTRY

JAN. 6 and 13, 1933.*

I.—GENERAL; PLANT; MACHINERY.

Carbon. Neglected material of construction for reaction equipment. C. L. MANTELL (Ind. Eng. Chem., 1932, 24, 1255—1259).—The use of C equipment for electrostatic precipitators for H_3PO_4 and H_2SO_4 , for lining pulp digesters, for electrochemical industries, for refractory linings for high-temp. furnaces, and for handling corrosive liquids is discussed. R. N. B.

The Prandtl-Taylor equation. A. E. LAWRENCE and J. J. HOGAN (Ind. Eng. Chem., 1932, 24, 1318—1321).—When the Prandtl-Taylor equation is applied to experimental data on the heat transfer of H_2O flowing turbulently in a vertical pipe, r , the ratio of fluid velocity at the boundary between the turbulent core and laminar layer to the average velocity is found to be a complex function of inlet- H_2O velocity and temp. and average temp. difference between pipe wall and H_2O . Another equation, in better agreement with the data, is given. M. S. B.

Drying of solids. B. HEASTIE (Ind. Chem., 1932, 8, 382—383).—Tests on the drying of $CuSO_4$ and $NaCl$ in the Jenkins dryer (B., 1932, 451) are given. A dryer for material in which the principal factor is the rate of diffusion of moisture through the body of the particles consists of a vertical cylinder divided into a no. of compartments by horizontal hollow plates heated by oil, H_2O , or steam, with a V cut in each, the cuts being staggered. The material is fed on to and swept over the top plate by a rotating arm attached to a central vertical shaft, and then falls through the V cut on to the next plate where a similar operation occurs. Hot air enters each compartment between the plates, and is carried across the material, discharging to an outlet duct on the other side of the cylinder. D. K. M.

Washing of cake on continuous filters. G. W. O'KEEFFE (Chem. Met. Eng., 1932, 39, 559).—Displacement washing is more efficient in continuous pressure filters than in plate-and-frame filterpresses, but they are not suitable for cakes presenting high resistance. These should be repulped and filtered in a countercurrent system. For cakes which crack readily, as also with very granular cakes, a special washing and compressing belt is useful. C. I.

Nomogram for the calculation of soda in boiler water and of alkali in boiler feed-water. A. NICTERLEIN (Chem. Fabr., 1932, 388—389).—100 c.c. of the water are titrated with 0.1N-HCl, using phenolphthalein and Me-orange. A series of parallel scales enables the content of $NaOH$ and Na_2CO_3 to be read off. C. I.

Slide-rule for gas calculations. P. F. MARX (Chem. Met. Eng., 1932, 39, 556—557).—The slide-rule based on Boyle's and Charles' laws enables gas wt. to be converted into vol., or vice versa, for any pressure or temp. C. I.

Extraction of dissolved gases in the Claude-Boucherot process. G. CLAUDE (Compt. rend., 1932, 194, 1778—1782).—Machinery is described which satisfactorily extracts the dissolved gases, difficulty in effecting which was one of the chief obstacles to the success of the Claude scheme to obtain power from the difference in temp. of the water at great depths and at the surface of tropical seas. C. A. S.

Vitreosil air-lift pump. B. MOORE (Ind. Chem., 1932, 8, 411—412; cf. A., 1931, 1027).—Air is delivered through holes in an internal pipe into the liquor stream in the converging portion of a diverging-converging-diverging conduit. The pumps are easily started, are reliable and uniform in operation, and can lift 1000 gals. of liquid per hr. to 100 ft. Curves of water discharge-air supply are given; the discharge increases with the air supply to a point beyond which it remains const. D. K. M.

Facilitating higher vacua in industrial processes. D. H. JACKSON (Chem. Met. Eng., 1932, 39, 549—551).—High vac. (1—2 mm. Hg) is obtained by the use of the steam ejector, pumps being suitable only for small vols. of gases, owing to the much higher velocity of gas removal with the former. Practical applications are in petroleum fractionation, in the deodorising of vegetable oils, and in vac. refrigeration by spraying a jet of H_2O or brine into an evacuated chamber. The last-named process is suitable only for min. temp. of 2° , but is simple and cheap in first cost. Still higher vacua on small vols. of gas are given by the Hg-vapour rotary pump. C. I.

Viscosity determination with the Ford cup. KOLKE (Farbe u. Lack, 1932, 559—560).—The apparatus, which is of Engler type, is described and gives rapid results if the η of the liquid (e.g., lacquer) is not very high. S. M.

Pressure vessels.—See II. Automatic control in factories.—See XVII.

PATENTS.

Gas-fired regenerative reheating furnaces. C. F. PRIEST and J. MATHISON (B.P. 382,394, 30.9.31).—The regenerators are below the hearth of the furnace and are constructed to give a zig-zag rising flow to the air and similar downflow to the waste gases. Gas is admitted to the upper part of the ingoing regenerator to produce smoky combustion therein, and additional

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

air to the upper part of the outgoing regenerator to complete the combustion. B. M. V.

Open-hearth furnace control. J. K. MAWHA, Assr. to SMOOT ENG. CORP. (U.S.P. 1,848,184—5, 8.3.32. Appl., [A] 26.9.30, [B] 13.10.30).—Twin air supplies are forced by one or two fans, both supplies are led to Venturi throats in twin chimneys, and one throat is closed by a damper so that the air is forced back through the regenerator into the furnace for combustion. The other throat is open and the forced air causes ejection of the waste gases through the other regenerator. The air supplies are taken through a 4-way reversing valve so that control devices need be placed only in one air pipe for both directions of operation. If two fans are provided they are preferably adjustable in speed so that the ejector draught may be the stronger. B. M. V.

Furnaces. A. T. COTTON (B.P. 382,273, 19.6.31).—Devices on the furnace front for regulating the air supply to coal-fired furnaces are described. B. M. V.

Incinerators and the like. PILLATT & Co., LTD., and A. E. PILLATT (B.P. 382,039, 1.10.31).—The hopper for an incinerator (for waste wood etc.) is provided with a foraminous cover through which air used to transport the refuse is discharged to atm. B. M. V.

Heating apparatus employing catalytic [combustion] reactions. H. G. TERRET (B.P. 382,472, 7.1.32. Belg., 9.1.31).—The catalyst in or on which combustion takes place is slightly spaced from a filter from the neighbourhood of which a sufficient mass of metal conducts heat into the reservoir of fuel to vaporise the latter. B. M. V.

Apparatus for conducting chemical reactions. T. GRISWOLD, JUN., Assr. to DOW CHEM. CO. (U.S.P. 1,848,346, 8.3.32. Appl., 1.2.27).—A setting for producing vapours and passing them up through a granular mass is described. Means are provided for removal of ash, the fume during the operation being drawn into the flues. The apparatus is suitable for the prep. of CS_2 . B. M. V.

Apparatus for performing reactions between molten substances and gases. I. G. FARBENIND. A.-G. (B.P. 382,314, 24.7.31. Ger., 25.8.30).—A furnace, preferably a vertical shaft, is heated by electric currents supplied through three electrodes or sets thereof, viz., (a) at the bottom of the furnace, (b) at an intermediate point, in an upper layer of conductive filling material which is irrigated by the charge, and (c) in the charge resting on the filling material. Three-phase currents may be used, but the currents must be individually adjustable so as to regulate the heat in the two zones. The apparatus is applicable to the prep. of Na_2S from Na_2SO_4 and CO. B. M. V.

Catalytic apparatus [for synthesis of methyl alcohol etc.]. W. J. EDMONDS, Assr. to COMMERCIAL SOLVENTS CORP. (U.S.P. 1,848,466, 8.3.32. Appl., 6.10.28).—A bomb for operation at 400° and at high pressure is described. The claims mainly refer to a construction of inner vessel or cage permitting expansion of the parts. B. M. V.

Method of heat transfer. J. F. WAIT, Assr. to SUN OIL Co. (U.S.P. 1,847,542, 1.3.32. Appl., 13.12.24).—Heat is transmitted from a metal wall to a liquid under the conditions that the surface must be wetted, and the upward flow must be at high velocity with reduced velocity in the upper part. B. M. V.

Apparatus for carrying out heat-exchange processes. G. BOJNER (B.P. 382,006, 15.8.31).—Pulverulent material is placed in a drum which is slowly rotated and heating, cooling, and/or reacting gases are admitted through a hollow vane wheel which is not co-axial with the drum but is submerged in the material and is positively rotated. B. M. V.

Heater. T. and J. R. RAY (U.S.P. 1,848,197, 8.3.32. Appl., 28.6.29).—A vertical, tubular heat exchanger is provided with baffles alternately of disc-like and annular form and suitably perforated so that definite zig-zag flow of the outer fluid is produced. B. M. V.

Construction of tubular heat-exchange apparatus with corrugated fins. SOC. ANON. MANUF. GÉN. MÉTALLURG. (B.P. 382,098—9, 23.11.31. Belg., 28.11.30).—In (A), various forms of corrugations for fins in sheet form are described; in (B) the corrugated plates alternate with flat ones. B. M. V.

Preventing or removing scale or preventing corrosion in boilers and steam-power plants. ALLIS-CHALMERS MANUF. Co., Asses. of J. P. A. McCoy (B.P. 382,269, 9.4.31. U.S., 14.4.30).—An oxidisable metal, one of a group consisting of Fe, Ni, and Mn, is prepared in a colloidal or similar reduced state and added to the feed-water. The prep. may be effected by an electric arc, at least one of the electrodes consisting of the metal, submerged in H_2O . B. M. V.

Rotary drying apparatus. J. S. WITHERS. From N. V. MACHINEFABRIEK GEBR. STORK & Co. (B.P. 382,056, 16.10.31).—The apparatus comprises inner and outer perforated cylinders rotating together, the annular space being divided into an even no. of longitudinal compartments by radial partitions. Inclined blades are provided to cause the material, e.g., coffee beans, to travel longitudinally twice while drying gases are passed through radially from the axial compartment. B. M. V.

Rotary drying machines. D. STEWART & Co., LTD., ANIMAL FOOD PRODUCTS, LTD., and J. B. TALBOT-CROSBIE (B.P. 382,890, 6.5.32).—A hot-gas supply-box rubbing against the truly machined surface of a perforated drum is described. B. M. V.

Spray-drying apparatus. A. L. MOND. From METALLGES. A.-G. (B.P. 382,129, 8.1.32).—The spray chamber. B. M. V.

Drying apparatus [for timber etc.]. J. B. WELCH (U.S.P. 1,848,811, 8.3.32. Appl., 16.1.29).—A system of ducts for producing both longitudinal and transverse circulation in a timber kiln is described. B. M. V.

Apparatus for drying sticky materials. D. J. VAN MARLE, Assr. to BUFFALO FOUNDRY & MACHINE Co. (U.S.P. 1,810,691, 16.6.31. Appl., 16.10.28).—Two rolls at the same level rotating in opposite directions

at the line of contact are employed; that roll on which the material is fed is heated, while the other is cooled and preferably rotates the faster. B. M. V.

Open-air spray-cooled apparatus. C. STILL (B.P. 382,212, 15.4.32).—To prevent formation of vegetable growths a very small proportion of PhOH is added to the spraying water. B. M. V.

Crusher. J. A. FLINT, Assr. to TRAYLOR VIBRATOR Co. (U.S.P. 1,847,083, 1.3.32. Appl., 2.11.26).—The swing jaw is operated by an electromagnetic vibrator. The jaw is resiliently supported and has a natural frequency of vibration slightly different from that of the supply. B. M. V.

Hammer pulverisers. COMP. FRANÇ. HOWDEN BUELL COMBUSTION (B.P. 382,211, 15.4.32. Fr., 3.11.31. Addn. to B.P. 365,597; B., 1932, 292).—A method of securing the hammers is described; the air classifier is adjusted by moving its walls. B. M. V.

Pulverising of materials by jet impact. P. ANGER (B.P. 381,591, 8.7.31).—The use of an air jet moving at velocity $<$ that of sound at the same temp. is claimed. It is advisable to use a cylindrical nozzle, and 1.89 atm. pressure is sufficient at 0°. B. M. V.

Grinding mills. W. G. HAMBLIN (B.P. 382,705, 12.9.31).—In a disc mill the rotating disc is pressed up against an adjustable stop (giving definite clearance) by spring pressure. B. M. V.

Solid grinding or abrading material. P. NEVEN (B.P. 382,626, 20.7.31).—Powdered Fe is mixed with 20–30% of diamond dust and the mixture sintered. B. M. V.

Attrition mill. W. L. KEEFER, Assr. to WOLF Co. (U.S.P. 1,847,967, 1.3.32. Appl., 6.10.28).—A disc grinder is caused to have a centrifugal feeding effect by forming the feed aperture in the fixed disc of smaller diam. than a recess in the disc opposite, the recess being provided with radial vanes to cause the material to spin before entering the grinding zone. B. M. V.

Apparatus for separation of granular materials. M. BOUQUET (B.P. 382,875, 15.4.32. Fr., 20.4.31).—A pair of superposed rolls are rotated in the same direction (oppositely at the nip) but at different speeds; the gap between them is not parallel, and the material is fed in at the narrowest end. An additional discharge may be allowed between the guide shoot and the bottom roll. B. M. V.

Handling pulverulent material, particularly flue dust. E. E. BROSIUS and L. C. EDGAR (Assr.) (B.P. 382,003, 13.8.31. U.S., 30.6.31).—An apparatus is described in which dust is wetted by sprayed water while in a suspended condition. B. M. V.

Mixing of granular, powdered, or like substances. MUREX, LTD., A. B. SMITH, and H. A. SKELLEY (B.P. 382,087, 12.11.31).—In a mixer of the Continuous Reaction Co's. type as described in B.P. 168,729 (B., 1921, 726A), the radial height of the pyramids is $<$ either the length or width of their bases. B. M. V.

Mixing of non-homogeneous finely-divided solid materials. W. W. TRIGGS. FROM INTERNAT. PRECIPITATION Co. (B.P. 382,113, 8.12.31).—A tall vessel is provided with a no. of compressed-air inlets at different

levels. If the vessel is already charged the topmost inlet is opened first and then those following downwards in succession; in any case the mixing is completed by air from the lower inlets only. B. M. V.

Vacuum mixing machine. E. G. LOOMIS (U.S.P. 1,848,572, 8.3.32. Appl., 24.10.28).—A form of construction is described in which all parts in contact with the material (even the mixing blades) are formed of or lined with sheets of non-corrodible metal. B. M. V.

Apparatus for producing suspensions. H. P. BENNER and J. C. MORRELL, Assrs. to UNIVERSAL OIL PRODUCTS Co. (U.S.P. 1,848,100, 8.3.32. Appl., 30.10.24).—The mixture is passed through a no. of disc grinders on one shaft, having adjustable clearance. B. M. V.

[Pneumatic] plant for separation of materials from one another. B. NORTON and J. N. COLLINS (B.P. 382,153, 1.2.32).—A pneumatic shaking table or other device utilising air currents is provided with an air-collecting hood connected to the suction of a circulating fan through a cyclone separator. Air is permitted to enter the circuit at the points where the material is fed and discharged, and this excess (over that constantly circulated) is discharged to atm. from the delivery side of the fan through a special filter. B. M. V.

Hydro-extractors. S. H. HOUGH and J. B. J. PRIVETT (B.P. 381,819, 17.2.32).—One of a pair of rolls, for the wringing of paper etc., preferably the lower, is provided with a surrounding box in which suction is maintained, the H₂O being drawn through a slot in the top of the box which is level with the nip. B. M. V.

Centrifugal treatment of liquids. AKTIEB. SEPARATOR (B.P. 381,913, 13.7.32. Swed., 14.7.31).—In a centrifuge having a supply of additional liquid to discharge solids, that liquid is supplied: (a) freely to the separating chamber in the neighbourhood of inner discharge orifices, and (b) through restricted passages into an outer chamber also provided with orifices opposite to the inner ones. B. M. V.

Centrifugal bowls. AKTIEB. SEPARATOR (B.P. 382,895, 11.5.32. Swed., 31.5.31).—The bowl is provided with co-axial baffles sealing alternately with the top and bottom and provided on their inner, and, if desired, on their outer, surfaces with helical or circular ribs to afford additional collecting space for solids. B. M. V.

Filters more especially intended for liquid fuels. R. BOSCH A.-G. (B.P. 381,806, 26.1.32. Ger., 29.1.31).—The filter consists of a roughly-pleated sheet of cloth placed between two pot-shaped, nested, perforated metal supports, the outer one of which forms a preliminary coarse filter. B. M. V.

Apparatus for straining liquids or gases. VICKERS-ARMSTRONGS, LTD., and J. WARDLE (B.P. 382,733, 14.10.31).—A scraper for a coiled-wire strainer is in the form of a thin cogwheel which gears with the supporting flutes of the helix and passes between the turns of wire. B. M. V.

Apparatus for use in the settling of liquids containing matter in suspension. C. J. H. PENNING (B.P. 382,711, 17.9.31).—From a feed tank to an actual

separating tank the liquid (*e.g.*, sugar juice) is caused to flow through a no. of inclined pipes or channels in which a preliminary separation into clear and muddy laminae takes place. B. M. V.

Plant for treatment of vegetable and animal raw materials with an extraction or lixiviation liquid. J. W. A. ELLING (B.P. 382,091, 13.11.31. Addn. to B.P. 358,536; B., 1932, 4).—A simpler arrangement of conduits and valves is described. B. M. V.

Handling articles through treating liquids. PAKO CORP., Assees. of J. W. HOUGH and G. M. DYE (B.P. 381,636, 27.7.31. U.S., 9.3.31).—The articles are placed in perforated containers and moved on conveyors through one vessel, then emptied into other containers in the next vessel, and so on in a series suitable, *e.g.*, for photographic developing and fixing. B. M. V.

High-vacuum steam-distillation. (A) E. G. RAGATZ, (B) P. SUBKOW, (A,B) ASSRS. to UNION OIL CO. OF CALIFORNIA (U.S.P. 1,847,625 and 1,848,051, 1.3.32. Appl., 7.3.28).—In the distillation of oil in the presence of steam and under a vac. so high that it is normally impossible to condense the steam, the latter is condensed in a solvent, *e.g.*, CaCl_2 , which, after separation from the oil, is regenerated by heat and the steam re-used for distillation. B. M. V.

Fractionating tower. C. M. CORBETT, Assr. to R. MONCRIEF (U.S.P. 1,848,462, 8.3.32. Appl., 26.2.30).—The trays are of inverted conical form; a sludge valve is provided at the apex, and a discharge pipe leads outside the tower. The valves are of 3-way type, the other open position leading into the tower and permitting any tray to be drained entirely so as to reduce the capacity of the tower. B. M. V.

Drying of gases. E. J. MULLEN, Assr. to GEN. CHEM. CO. (U.S.P. 1,847,845, 1.3.32. Appl., 27.1.28).—The moisture is removed from the gases by a solvent, *e.g.*, H_2SO_4 , which is flowed over the outside of thin, wavy, hollow baffles which are cooled by H_2O inside. B. M. V.

Dust separation. A. F. WENDLER, Assr. to NAT. ANILINE & CHEM. CO., INC. (U.S.P. 1,847,368, 1.3.32. Appl., 14.5.26).—The dust-laden gas is caused to pass upwardly through a conduit from the vessel in which it is produced and inwardly through a filterbag suspended in the conduit; after issuing from the bag the gas is caused to deflect in order to separate any remaining dust, which drops into the bag, while the bulk of the dust collected outside drops off into the vessel from which it arose. B. M. V.

Filtering apparatus for air and other gases. H. WITTEMEIER, Assee. of B. RICHTER (B.P. 381,901, 1.6.32. Ger., 29.1.32).—In a filter comprising a no. of units suspended on a vertical chain conveyor, the units are allowed to abut on the straight runs and are prevented from jamming while travelling around the sprockets by suspending them from brackets projecting out from the pitch line of the chains. B. M. V.

Apparatus for dispersing gases in liquids. BRIT. OTTO OZONE WATER, WOOD, AND TEXTILES TREATMENT CO., LTD., Assees. of M. P. OTTO (B.P. 382,542, 7.4.32.

Fr., 8.4.31).—An ejector apparatus with an adjustable tapered needle is described. B. M. V.

Gas-washing method and apparatus. A. L. GENTER, Assr. to BARTLETT HAYWARD CO. (U.S.P. 1,848,945, 8.3.32. Appl., 9.4.30).—The lower part of the apparatus comprises coarse H_2O sprays produced by the rotation of conical throwers; in the upper part the gas is further scrubbed by fog-like spray produced by woven wire grids alternately rotating and fixed, the rotating ones being irrigated by upwardly-directed sprays. B. M. V.

Viscosimeter. R. C. BECKSTROM and C. F. BARR (U.S.P. 1,848,928, 8.3.32. Appl., 19.4.28).—The liquid is forced through a calibrated jet back to the supply tank by a screw pump, the viscosity being measured by the pressure generated. The walls of the pump cylinder are thick and are continued as a solid extension which is heated. During the heating-up period the jet is bypassed by a much larger conduit. B. M. V.

Instruments for rapid examination of transparent microscopic preparations. C. ZEISS (B.P. 382,184, 3.3.32. Ger., 10.3.31).—A pencil of rays from the specimen is reflected from a nearly horizontal mirror on to a projection screen which is inclined to the vertical in such a way that that part of the screen opposite the observer's eyes shows an image of greater magnification than that higher up the screen, which therefore has the combined advantage of wide field and high local magnification. B. M. V.

Substance for the filling of hydraulic apparatus. C. REINHOLD (B.P. 382,331, 30.7.31. Switz., 31.7.30).—The compositions comprise pitch, asphalt, and a fluid or semi-fluid petroleum product. B. M. V.

[Apparatus for shutting off combustion air from] furnaces, refuse destructors, and the like [during charging]. WOODALL-DUCKHAM (1920), LTD., and S. A. BROOKE (B.P. 382,551, 12.4.32).

[Method of attaching refractory material to the water-walls of] furnaces. H. J. GREEN (B.P. 318,619, 14.7.31).

Treating gases.—See XI.

II.—FUEL; GAS; TAR; MINERAL OILS.

Tendency of coal to spontaneous ignition. IX. D. J. W. KREULEN (Chem. Weekblad, 1932, 29, 566—567; cf. B., 1932, 1013).—The ignition curve of coal is not altered by substitution of CO_2 , CO , SO_2 , or NO_2 for the film of air normally adsorbed on the surface; H_2S and CCl_4 , however, cause the temp. of spontaneous ignition to fall by about 5° . H. F. G.

Unusual occurrences of inflammable and noxious gases in mines. A. M. BRYAN (Trans. Inst. Min. Eng., 1932, 83, 151—169).—Details are given of accidents due to (a) leakage of coal gas into a shallow mine from a fractured gas main, (b) noxious gases from a fire caused probably by the overheating of delivery mains from an air compressor, (c) occurrence of H_2S during shaft sinking for the purpose of mining anhydrite, and (d) occurrence of nitrous fumes from explosives. The precautions to be taken to avoid such accidents are indicated. A. B. M.

Microstructure of coal in certain fossil trees. H. G. A. HICKLING and C. E. MARSHALL (North Eng. Inst. Min. Mech. Eng., Oct., 1932. Advance copy, 6 pp.).

—The coal of the fossil trees examined was of the brilliantly glossy type (vitrain); it was a normal coal and differed in composition from the mean of the adjacent seam only in being of slightly higher rank. Microscopical examination of etched surfaces and of thin sections showed that it consisted of woody plant tissue which had been subjected to extreme mechanical deformation in the mass whilst retaining perfect continuity of its fine structure. The stems examined were derived from trees which exhibit annual rings of growth. It is suggested that coals of isolated plant stems should be particularly suitable for the study of problems of coal constitution.

A. B. M.

Use of NCT_3 steel tubes for the elementary analysis of solid and liquid fuels by Liebig's method. W. ZWIEG and F. ECK (Chem.-Ztg., 1932, 56, 882—883).—Seamless, cold-drawn tubes of NCT_3 alloy steel, 900 mm. long, with H_2O -cooled ends, have a higher heat conductivity and general heat stability than has Jena glass, and may be used up to 1200° ; 60 analyses of various fuels with the same tube showed differences of -0.02% C and nil for H.

J. G.

Determination of water in solid fuels. S. DE WAARD and F. VAN BEEK (Chem. Weekblad, 1932, 29, 598—603).

—The applicability of available methods to different kinds of peat, coal, and coke has been critically examined. Direct determination of the H_2O removed in a current of inert gas or by distillation with, e.g., xylene is satisfactory in general, but cannot be used for low-temp. coke. Extraction of the H_2O with hot abs. EtOH and determination of the miscibility of the resulting solution with petroleum gives satisfactory results with low-temp. coke, but measurement of the loss of wt. on heating in dry air for 30—60 min. at 105 — 110° is more convenient; the particle size of the sample should be ≥ 0.3 mm.

H. F. G.

Action of steam on coal. Superimposed equilibria. P. DOLCH (Z. Elektrochem., 1932, 38, 596—601).

—Experiments with various coals and at different temp. show that the amount of CO in the gases produced is governed primarily by the equilibrium $\text{CO} + \text{H}_2\text{O} \rightleftharpoons \text{CO}_2 + \text{H}_2$, which is superimposed on the reaction $\text{C} + \text{H}_2\text{O} = \text{CO} + \text{H}_2$ and is determined by the reactivity of the C surface. The direct reaction $\text{C} + 2\text{H}_2\text{O} = \text{CO}_2 + 2\text{H}_2$ does not take place. These views are confirmed by the vol. changes of CO_2 - H_2 mixtures in contact with charcoal (600 — 1100°) and coke (800 — 1200°); in the latter case the two gases begin to react at about 800° , but the solid C does not react at temp. $< 980^\circ$.

H. F. G.

Influence of catalysts in the liquefaction of Fushun coal by berginisation. VII. X-Ray spectroscopic analysis of Fe_3O_4 catalyst after use in an atmosphere of hydrogen or nitrogen. R. ABE (J. Soc. Chem. Ind., Japan, 1932, 35, 411—415B; cf. B., 1932, 408).

—No reduction of Fe_3O_4 was observed when the coal was heated in an atm. of N_2 (initial pressure 75 kg./sq. cm.; max. temp. 350 — 500°) in spite of the presence of nascent H. In a H_2 atm. some reduction

to α -Fe occurred at 350° , and above 400° the greater part of the Fe_3O_4 was reduced; at 500° reduction to α -Fe was complete.

A. B. M.

Heat of coking and total heat expenditure in coke ovens. K. BAUM and W. LITERSCHIEDT (Brennstoff-Chem., 1932, 13, 386—391; cf. B., 1932, 789).—The limits of accuracy in determining the heat of coking on the large scale and on the laboratory scale are estimated at $\pm 2.4\%$ and ± 10 — 20% , respectively. The fluctuations observed by Terres (*loc. cit.*) which give rise to maxima and minima on the temp.-heat of coking curves are probably due to experimental error. The heat of coking determined in the laboratory cannot usefully be applied to large-scale operation. The heat expenditure in coke ovens can only be determined with the required accuracy by direct large-scale experiments.

A. B. M.

Mechanism of the combustion of fuel in industrial furnaces. M. W. TRAVERS (J. Inst. Fuel, 1932, 6, 45—48; cf. B., 1926, 305).—Results obtained by Kreisinger and co-workers (B., 1917, 919) lead to the relation $w = kp^{0.7}$ between p , the pressure drop in the fuel bed of a furnace, and w , the wt. of air supplied per hr.; this holds both with coke and with a non-coking coal. The rate of consumption of air per lb. of fuel and the $\text{CO} : \text{CO}_2$ ratio at the surface seem to be independent of the rate of combustion. The mechanism of combustion in the hand-fired furnace (*A*) and on the chain-grate stoker (*B*) is discussed in relation to these results; in *A* rapid carbonisation is effected on the top of the fuel bed, whereas in *B* volatile products of carbonisation are evolved within a very restricted space, involving a large and sudden change in the kinetic energy of the gas stream (cf. B., 1932, 918).

A. B. M.

Improving the quality of Upper Silesian coke.

VI. W. SWIENTOSŁAWSKI, B. ROGA, and M. CHORĄŻY (Przemysł Chem., 1932, 16, 188—196; cf. B., 1932, 966).

—Gradual rise of temp. in coke ovens leads to the production of large coherent masses of soft coke, whilst rapid heating yields a brittle, hard coke in small pieces. No advantage is gained by heating agglutinating coal in two stages. The admixture of $\geq 20\%$ of non-caking coal or of semi-coke produced at $< 500^\circ$ with agglutinating coal greatly improves the quality of the resultant coke.

R. T.

Wet and dry combustion methods for determining total carbon in soils and other materials.

N. J. KING (Chem. Eng. Min. Rev., 1932, 24, 429—431).

—Accurate results are obtainable by a wet-combustion process involving oxidation with H_2SO_4 - H_3PO_4 - CrO_3 . Absorption of CO_2 in weighed tubes of ascarite is more reliable than the use of a solution of NaOH and subsequent titration.

A. G. P.

Water-gas production in coke-oven chambers.

H. HECKEL (Brennstoff-Chem., 1932, 13, 383—386).

—In the Collin system, superheated steam is passed diagonally through the hot coke charge of two chambers in series, downwards through the first and upwards through the second. At suitable (7-hr.) intervals the first chamber is disconnected and the second is connected in series with the next adjacent chamber, and the process is repeated with this pair. In the second oven of each

pair a further quantity of water-gas is formed from the excess steam from the first oven and at the same time the CO_2 content of the gas is reduced ($\text{CO}_2 + \text{C} \rightarrow 2\text{CO}$). Data are given relating to a setting of 40 ovens which has been operated successfully on the Collin system for some months.

A. B. M.

Gum deposits in gas-distribution systems.

I. **Liquid-phase gum (contd.).** A. L. WARD, C. W. JORDAN, and W. H. FULWEILER (Ind. Eng. Chem., 1932, 24, 1238—1247; cf. B., 1932, 1111).—Attempts to isolate pure hydrocarbons from natural gums were unsuccessful. Mol. wt. determinations show that the N and ash are impurities arising from the leather and metal parts of meters. Synthetic gums prepared from gas condensates show that a quant. relationship exists between the styrene and indene formed by pyrogenetic decomp. and the amounts of the two hydrocarbons polymerised and oxidised to form them. At least 70—80% of the liquid-phase gum is formed from indene and styrene, and although the latter is present in gas in much larger quantities (about twice the amount) than the former and is also polymerised and oxidised more rapidly, yet the former accounts for 1.8—4.0 times as much gum. Mercaptans are strong positive, and phenols strong negative, catalysts for gum formation. Pyrogallol in small quantities will counteract the effect of PhSH. Straight coal and coke-oven gases do not contain sufficient styrene and indene to form enough oily condensate to produce gums; these are characteristic of water-gas. Removal of C_{10}H_8 by wash oil may also remove PhOH and so increase gum formation.

R. N. B.

Gas burner jets. W. J. G. DAVEY (Gas World, 1932, 97, 459—463).—A machine for calibrating liquid flow from carburettor jets is described and the results obtained are correlated with gas flow through similar jets. These have been made to conform to a tolerance of 1%.

R. N. B.

Determination of phosphine in crude acetylene. S. Y. MILOSLAVSKI (Avtogen. Delo, 1931, No. 10, 10—14).—In the Lunge-Cedercreuz method (recommended), the gas is preferably passed at 4—6 litres per hr. through a 0.3% NaOCl solution neutralised with dil. acid or NaHCO_3 .

CH. ABS.

Treatment of tar. J. G. KING and M. A. MATTHEWS (J. Inst. Fuel, 1932, 6, 33—44).—The use of tar as a fuel oil is limited owing to the pptn. of pitch on admixture with petroleum fuel oils, and this outlet for tar distillates is of little importance owing to the present low prices of fuel oils. Creosote may find an outlet in the Diesel oil market. The most promising possibilities in the commercial utilisation of tar appear to be its increased use for road purposes and its conversion into motor spirit. By the hydrogenation-cracking of a low-temp. tar in a 2-litre converter (initial H_2 pressure 100 atm.; 2 hr. to reach and 2 hr. at max. temp. 450°) in the presence of a catalyst of active C impregnated with NH_4 molybdate, together with S, a 43.3 wt.-% yield of spirit boiling below 200° was obtained; the product contained no tar acids and no pitch; the oils boiling above 200° could be reprocessed to yield further quantities of spirit. By the hydrogenation-cracking of a

low-temp. tar in a continuous plant designed to treat 5 gals. per day (partly in the liquid and partly in the vapour phase) at $450\text{—}490^\circ/200$ atm., 20 gals. of tar (*i.e.*, the yield from the carbonisation of 1 ton of coal) yielded 11.6 gals. of motor spirit to 200° and 8.6 gals. of Diesel oil, with an expenditure of 2400 cu. ft. of H_2 . The spirit, after refining with 70% H_2SO_4 and aq. NaOH, was water-white (d 0.80) and of high anti-knock val.; after 3 months' storage the gum content was 3 mg./100 c.c.; the distillation range was 18% to 100° , 31% at $100\text{—}120^\circ$, and 48.5% at $120\text{—}200^\circ$. The yields of spirit from the hydrogenation of high-temp. tars or tar oils were lower than those from the corresponding low-temp. products; with high-temp. tar there was also a less efficient conversion of pitch and tar acids into neutral oils. A satisfactory conversion of anthracene paste into more readily saleable oils was effected by this treatment. Experiments have also been carried out on the hydrogenation-cracking of tar oils in a small continuous plant designed to work entirely in the vapour phase. With one passage of a tar oil boiling to 360° a 75 vol.-% conversion to spirit boiling below 200° was effected; it is estimated that with recirculation of the higher-boiling oils a 90 vol.-% conversion is possible at a reaction temp. of 480° . The yields of spirit from a high-temp. tar creosote in this apparatus were 75 and 84.5 vol.-% at 495° and 510° , respectively. The catalyst (NH_4 molybdate on active C) maintained its activity well; as far as revivification is concerned, bauxite is preferable to active C as a support as it permits complete revivification by air oxidation without injuring the support. These catalysts also effected the reduction of cresols to PhMe by H_2 under the ordinary pressure. Other tar outlets of minor importance are briefly discussed.

A. B. M.

Hydrogenation of Alberta bitumen. T. E. WARREN (Canada Dept. Mines, 1930—31, No. 725—1, 1—14).—During hydrogenation in the absence of catalysts, coke formation is increased by high temp., long duration of heating at the working temp. (*e.g.*, 410°), and low pressure; gasoline formation is independent of pressure, but increases with rise in temp. and long duration of heating. Removal of S is increased by low temp., increased duration of heating, and high pressure. The kerosene yield is only slightly increased by long duration of heating, and H_2 absorption is proportional to pressure, independent of temp., and increased slightly by prolonged heating. When catalysts (*e.g.*, Fe_2O_3 , Cr_2O_3 , ZnO, NH_4 molybdate, CaO, and NiCO_3) were used Fe_2O_3 produced greatest C formation and NiCO_3 least. S was removed by Fe_2O_3 or CaO, and if the mixture of bitumen and Fe_2O_3 or CaO was preheated with H_2 at $300\text{—}350^\circ$ before hydrogenation at 410° formation of C was effectively reduced. The refining loss was markedly dependent on experimental conditions and was least under those which eliminated S from the liquid product. The commercial significance of the results is discussed. It is concluded that the bitumen may be hydrogenated without formation of solid C to yield 90.5 wt.-% of crude oil and 18.2 wt.-% of unrefined gasoline, the duration of the actual hydrogenation being 30 min. at 410° and initial pressure of 1470 lb./sq. in.

H. E. B. q

Heating asphalt with diphenyl vapour. W. L. McCABE (Dept. Eng. Res., Univ. Michigan, 1932, Bull. 23, 78 pp.).—Heating by Ph_2 vapour in a single-tube, semi-commercial-scale heater using forced asphalt circulation was found to be practicable and to permit controlled heating at relatively high rates (e.g., 8500 B.Th.U./hr./sq. ft. of heating surface). Heat-transfer rates from Ph_2 to tube wall varied from 250 to 330 B.Th.U./sq. ft./hr./° F., and those from wall to asphalt from 35 to 50 units, i.e., equiv. to an over-all heat-transfer rate from Ph_2 to asphalt of 31–44 B.Th.U./sq. ft./hr./° F. No increase in % of free C in the heated asphalt was detected. New data are reported on the effects of heat on the sp. gr., penetration properties, softening points, and viscosity of asphalt. H. E. B.

General constituents of Japanese petroleum. III. Constituents of the fractions boiling up to 200° at atmospheric pressure of the petroleum from the Nittsu field. R. KOBAYASHI (J. Soc. Chem. Ind., Japan, 1932, 35, 426–429 B; cf. B., 1932, 489).—The d_4^{25} and n_{20}^{20} of the fractions of 10° boiling range of the neutral oils from 4 samples of petroleum are tabulated. The unsaturated hydrocarbons in the fractions (determined by extraction with 80% H_2SO_4) varied from 0.05 to 0.45% and the aromatic hydrocarbons (extraction with 98% H_2SO_4) varied from 1.2 to 5.65%. From the vals. of d and n of the washed and refractionated residual oils the presence of octa-, nona-, and deca-naphthenes was inferred. A. B. M.

Pressure vessels for oil cracking. G. EGLOFF, J. C. MORRELL, and E. C. LEONHARDY (Ind. Eng. Chem., 1932, 24, 1264–1275).—Modern practice tends towards the use of electric-welded and seamless forged-steel vessels. The manufacture of the former is described, stress being laid on the necessity of accurate annealing treatment. The testing of welds by X-rays and photomicrographs is discussed. The various formulæ for calculating the strength of pressure vessels and the change in tensile strength of steels at high temp. are reviewed. R. N. B.

Benzene synthesis from carbon monoxide and hydrogen at atmospheric pressure. XII. K. FUJIMURA and S. TSUNEOKA (J. Soc. Chem. Ind., Japan, 1932, 35, 415–416 B; cf. B., 1932, 666).—A highly active and porous catalyst (Co : Cu : Th : U = 8 : 1 : 0.2 : 0.1) was prepared by adding starch to the mixed nitrates and heating. The gas contraction was 78% and the yield of benzene 145 c.c./cu. m. with one passage of the gas over this catalyst at 210°. Variation of the proportions of Th and U had little influence on the yield of benzene. Subjecting this and similar catalysts to X-ray radiation had no marked influence on their activity. A. B. M.

Laboratory experiments on gum-bearing gasolines. S. P. MARLEY and W. A. GRUSE (Ind. Eng. Chem., 1932, 24, 1298–1302).—Rise in the temp. of the manifold greatly increased the amount of gum deposited in the intake but lowered the C deposit in the cylinder; this val. tends to become const. at 80° for all fuels used. The C deposit probably has its origin in the lubricating oil used. Low intake temp. give similar gum deposits both with rich and lean

mixtures, but at higher temp. a rapid increase is noted with rich mixtures. Using a spirit of very high preformed gum val. (265) an engine ran 50% longer without failure with a manifold temp. of 30° instead of 53°.

R. N. B.

Fractional oxidation and cracking of Pennsylvania naphthas. J. W. SCHULTZ and A. H. WHITE (Ind. Eng. Chem., 1932, 24, 1277–1285).—Non-catalytic air-oxidation and cracking at 400–700°/1 atm. gave products of similar enhanced knock rating. Time, temp., and O_2 concn. affect both the reaction velocity and increase in knock rating. The reaction appears to be unaffected by extent of wall surface and is homogeneous. With air the reaction velocity is $>$ with cracking and the time required to produce a similar product is about one third. The knock rating is a function of the amount of gas formed, which itself depends on the time of contact and temp. Increase of pressure lowers gas formation in producing a similar liquid product. The velocity coeffs. for both reactions have been calc. and may be expressed in terms of the wall temp. These vals. have been used to predict yields of gas and liquid and the knock rating of the latter with fairly good agreement. The velocity coeffs. for oxidation and cracking are doubled for a rise in temp. of 75° and 28°, respectively. Oxidation of fractions obtained by distillation shows that the reaction velocity increases with mol. wt. R. N. B.

Applications of infra-red absorption spectra to the examination of oils and their constituents (aliphatic hydrocarbons). P. LAMBERT and J. LECOMTE (Ann. Office Nat. Combust. liq., 1931, 6, 1001–1083; Chem. Zentr., 1932, ii, 408).—A discussion. Saturated hydrocarbons are readily recognisable from the infra-red spectrum; straight and branched chains are distinguishable in such hydrocarbons. The course of distillation of oil fractions can be followed by means of the infra-red spectrum. A. A. E.

Solubilities of [lubricating] oil and waxes in organic solvents. III. J. W. POOLE and T. A. MANGELSDORF (Ind. Eng. Chem., 1932, 24, 1215–1218; cf. B., 1931, 377).—Data have been obtained for the solubility of paraffin wax, m.p. 50°, between 0° and 30° in mixtures of Pennsylvania lubricating oil with the following solvents: BuCHO, *s*-amyl alcohol, and HCO_2Bu . The temp.-solubility curves for the pure solvents are logarithmic, $\log W_s = A(\log T - K_s)$, where A is a const., 38.5, depending on the wax, W_s is g. of wax per 100 g. of solvent, T is abs. temp., and K_s is a function of the solvent. For the 3-component system the results are given by the relationship $\log W_e = B \times (\log T - K_e)$. W_e is obtained from the equation $W_s + (W_e \times L) = W$, where W is the amount of wax dissolved by 100 g. of org. solvent and the oil associated with it, W_s is the amount sol. in 100 g. of pure solvent, and L is the oil : solvent ratio; B is a function of the wax only and has a val. 29.4; K_e is related to K_s by the expression $K_e = K_s - 0.0268$. Vals. of K_s for a large no. of solvents are given. For certain solvents the experimentally determined val. of $W/(W + 100L)$ decreases instead of increasing as L decreases. This is attributed to an error of measurement due to phase inversion. M. S. B.

Graphical interpretation of the viscosities of lubricating oils at various temperatures. J. GROFF (Mem. Soc. Ing. Civ. France, 1932, 85, 614—627).—The relationship between viscosity determined kinematically, by the Redwood, Saybolt, and Engler instruments, and fluidity in Barbey units is discussed. A nomograph is given by which readings at any temp. by one method may be converted into those of another at any different temp. The viscosity of mixtures of known constituents may also be calc. R. N. B.

Dilution, viscosity, and lubricating power. J. TAUSZ and A. RABL (Angew. Chem., 1932, 45, 616—617, 618). M. ROEGIERS (*Ibid.*, 617—618, 618).—Replies to criticisms (cf. Roegiers, B., 1932, 632). H. F. G.

C equipment. Steam-distillation. High vacua.—See I. Thermal decomp. of CH_4 .—See III. Thionate chemistry.—See VII. C black as adsorbent.—See XIV. New fertiliser.—See XVI. Benzol from effluents.—See XXIII.

PATENTS.

Vertical [coking] retort structure. J. VAN ACKEREN, Assr. to KOPPERS Co. (U.S.P. 1,847,199, 1.3.32. Appl., 4.1.24).—An arrangement of reversible-flow, vertical heating and waste-gas flues between vertical retorts or coke ovens is described. H. E. T.

Preparation of [low-temperature] fuel. P. D'H. DRESSLER, Assr. to SWINDELL-DRESSLER CORP. (U.S.P. 1,812,432, 30.6.31. Appl., 15.6.25).—Plastic briquettes made from froth-floated coal amalgam are preheated and dried on a conveyor in a continuous tunnel kiln at $\gt 230^\circ$ and carbonised at about 425° in a second part of the same kiln, to produce smokeless fuel. A longitudinal, horizontal combustion chamber extends between upper and lower portions of the conveyor. Waste gases are recirculated with air in the preheating portion of the kiln. Gases evolved are reheated in a regenerator and recirculated in the carbonising chamber. H. E. T.

Destructive hydrogenation of distillable carbonaceous materials. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 381,367, 2.11.31 and 5.7.32).—The material is hydrogenated under pressure in the presence of a finely-divided catalyst which is added, e.g., in the form of a paste in a suitable oil, after the material has been heated to the reaction temp. A. B. M.

Gas producer. L. D. HOULIS (U.S.P. 1,846,334, 23.2.32. Appl., 28.2.30).—An air-carburetted arrangement is described. H. E. T.

Production of water-gas in coke ovens. COLLIN & Co., and J. SCHAFER (B.P. 382,597, 11.7.32. Ger., 2.2.32).—Superheated steam is admitted to the oven from a distribution main, at the gas off-take end, above the charge and towards the end of carbonisation. On closing the hydraulic-main valve, steam and gases pass diagonally downwards through the charge and enter at the lowest point of another oven. Any undecomposed H_2O with the gases traverse the second carbonised charge in an upward diagonal direction and leave by an ascension pipe. H. E. T.

Retort settings for manufacture of gas and coke. C. JOHNSON and J. GREGSON (B.P. 382,741, 22.10.31).—

Preheated tertiary air is led from the regenerator of a horizontal retort setting through a vertical flue arranged in the side walls of the setting and distributed horizontally to the upper part of the retort chamber.

H. E. T.

Manufacture of water-gas. A. JOHNSON, Assr. to COMBUSTION UTILITIES CORP. (U.S.P. 1,848,015, 1.3.32. Appl., 28.1.25).—Increased thermal efficiency is obtained by regenerating the heat from the blow gases for preheating the blast, generating and superheating steam, and for carburetted gas, waste fuel, and ash is also utilised. The usual carburettor and superheater are duplicated and connected with the generator, which is provided with a combustion chamber above the fuel bed. During the blow, air is preheated by admission through one set of superheater and carburettor, passing up through the fuel. Secondary air is admitted to the combustion chamber in the generator, and to the second carburettor and superheater, if necessary to complete combustion. During the run period, the direction of flow through the carburettors and superheaters is reversed, but runs may always be made up or down. H_2O is sprayed on the chequer-work of the second superheater, and the steam generated is superheated on the way to the generator. H. E. T.

Manufacture of gases from oil. J. F. L. MOELLER (B.P. 382,620, 24.7.31).—Oil at 170 — 240° and superheated steam at 650 — 850° are mixed in the nozzle of an injector the chamber of which contains oxidised Fe tubes as catalyst and the mixture is passed upwards through oxidised Fe tubes in a retort maintained at 800 — 950° . The hot gases (H_2 , CH_4 , C_2H_4 , CO , and a little CO_2) leaving the retort generate the steam, afterwards superheated by the retort furnace waste gases, used in the process, and are then scrubbed with H_2O . D. K. M.

Dehydration of tar. H. A. KLEINMAN, Assr. to GAS MACHINERY Co. (U.S.P. 1,847,654, 1.3.32. Appl., 13.3.29).—Batches of tar emulsion are circulated in closed circuit through a separate heater and are discharged as a spray into a vertical settling tank. Demulsification is assisted by reduction of pressure and evaporation of H_2O and light oils. Circulation is continued until the desired degree of separation is effected; the emulsion is then allowed to settle and H_2O drawn off by valves at suitable vertical intervals. H. E. T.

Production of asphalt and tar emulsions. HANSEATISCHE MÜHLENWERKE A.-G. (B.P. 382,432, 2.11.31. Ger., 15.11.30).—Aq. emulsions of asphalt and tar, suitable for road treatment, are stabilised by addition of approx. 2% of soya-bean lecithins or phosphatides, with or without saponification of the contained fatty oils. Salts of fatty acids or sulphonic acids usually employed may be added. H. E. T.

Heat-treatment of gaseous hydrocarbons. W. W. TRIGGS. From PHILLIPS PETROLEUM Co. (B.P. 381,816, 9.2.32).—Natural gas hydrocarbons, pressure-still, oil, and vapour-phase gases, etc. are subjected, preferably in a tube coil, to sufficient preheating (with endothermic cracking) to produce a gaseous mixture of aliphatic hydrocarbons containing sufficient olefines to initiate

subsequent exothermic conversion; this is allowed to proceed in an insulated chamber without the addition of heat and in the absence of a catalyst, at 593–953°, until a max. yield of aromatic compounds and oils has developed. Subsequently, a hydrocarbon oil is added to the heated mixture, thereby thermally decomposing a portion thereof, and finally the liquid portions are separated from the gaseous constituents of the resulting mixture, a portion of which is returned to the preheating zone.

H. S. G.

Apparatus for cooling and separating out mixtures [of oil and water] of distillates. C. STILL (B.P. 382,891, 6.5.32).—The mixed condensate enters a separator (*A*) fitted with vertical tubes down which cooling H₂O passes at a mid-point, any gas entering at the top. Oil withdrawn from the top and H₂O from the bottom enter a second separator which may be formed by a casing surrounding *A* at mid-points.

D. K. M.

Dehydration of emulsified oils. R. C. POLLOCK, ASSR. to UNION OIL CO. OF CALIFORNIA (U.S.P. 1,847,413, 1.3.32. Appl., 12.7.23).—Petroleum-H₂O emulsions are cut by heating to 49–93° and forcing through a bed of sand with the largest grains at the top and bottom and the smallest in the middle, previously wetted with a hot solution of an electrolyte containing a small quantity of a hygroscopic substance, e.g., aq. NaCl containing MgCl₂. Slime deposited on the sand is periodically removed by forcing hot electrolyte and compressed air through the bed in the reverse direction. The process may be operated continuously.

D. K. M.

Treatment of oil [emulsion cutting] under vacuum. H. C. EDDY, ASSR. to PETROLEUM RECTIFYING CO. OF CALIFORNIA (U.S.P. 1,847,602, 1.3.32. Appl., 10.7.28).—A gas-tight cylindrical vessel (*A*) contains a centrally placed tubular electrode (*B*) having inwardly projecting spikes; one side of *B* is connected to a secondary terminal of an electrical transformer and the diametrically opposite side is connected to *A*. The other terminal is connected to *A*. A rod electrode extends along the vertical axis of *A* to which it is attached at the bottom, and at the top it is connected by a spider to a conoidal nozzle (*C*) attached to *A*. A heating coil surrounds *B*. *A* is filled with petroleum-H₂O emulsion and a vac. is produced by pumps on the oil (*D*) and H₂O (*E*) discharge pipes. A slow stream of emulsion is fed into *A* through *C* and is cut during its passage through *B*. Oil is withdrawn from the top of the annular space between *A* and *B* and H₂O from the bottom of *A*.

D. K. M.

Recovery of paraffin from paraffin-containing materials. H. O. LINDGREN and K. G. MALM, ASSRS. to DE LAVAL SEPARATOR CO. (U.S.P. 1,847,488, 1.3.32. Appl., 17.5.24. Ger., 28.6.23).—Cryst. or amorphous paraffin wax may be recovered from oils by cooling, with or without the additions of a diluent, e.g., gasoline, and centrifuging. The semi-solid paraffin product is diluted and repeatedly centrifuged, the paraffin-free liquid from a subsequent operation being used as diluent for a preceding one. By varying the rate of flow of the oil through the centrifuge the paraffin products may be obtained in different grades.

D. K. M.

Dewaxing of petroleum oil. E. F. BURCH, ASSR. to DOHERTY RESEARCH CO. (U.S.P. 1,848,054, 1.3.32. Appl., 24.7.29).—In the removal of wax from chilled vac.-distilled lubrication oil by means of a rotary-drum filter, three filtrates are obtained: (1) that from the section of the drum immersed in the liquid; this has the lowest cold-pour test, (2) that from the section out of the liquid, but not being washed; this is usually rechilled and refiltered, and (3) that from the section being washed.

D. K. M.

Treatment of petroleum oils. J. C. MORRELL, ASSR. to UNIVERSAL OIL PRODUCTS CO. (U.S.P. 1,847,409, 1.3.32. Appl., 27.4.23. Renewed 15.3.28).—Simultaneous cracking and refining of petroleum oils is effected by the action of permanganates (preferably of K or Na; > 10%) in the presence of air or O₂ at 370–500°/50–300 lb. per sq. in. The yield of low-b.p. hydrocarbons is thereby increased from 5 to 10% and their odour and colour are improved.

H. E. T.

Decolorisation and neutralisation of oils. R. C. POLLOCK, ASSR. to UNION OIL CO. OF CALIFORNIA (U.S.P. 1,847,442, 1.3.32. Appl., 1.2.26).—Oil, especially lubricating oil, free from inorg. acidity is mixed with 4–18N-NaOH (0.25–1.0%) and clay (3–12%), with or without the addition of H₂O, heated at 54–160°, and filtered. When inorg. acidity is present Na silicate is added also, or replaces all or part of the NaOH; or a paste made by agitating clay and H₂O (1:1) with NaOH may be used.

D. K. M.

Separation of light oils from wash oils by distillation. C. STILL (B.P. 381,871, 19.4.32).—Wash oil containing C₆H₆ is preheated in an exchanger (*A*), a condenser (*B*), an exchanger (*C*), and finally raised to stripping temp. (140°) by steam-heated coils and passed into a still (*D*) with a rectification column (*E*). The C₆H₆ and H₂O vapour leaving *E* are condensed in *B* by the benzolated wash oil, and the condensate is cooled by indirect contact with H₂O and the C₆H₆ separated. The stripped wash oil effluent from *D* is cooled in *A* and *C* and finally in a water-cooler.

D. K. M.

Simultaneous recovery and purification of benzol contained in benzolated oils. SOC. DES ETABL. BARBET (B.P. 381,429, 21.1.32. Fr., 21.1.31).—Preheated oil containing C₆H₆ is heated in a coil under 5–6 kg. per sq. cm. pressure and discharged with reduction of pressure into the lower part of a rectifying column (*A*). The vapours from (*A*) are condensed in two condensers (*B* and *C*) in series, CS₂ being condensed in *C*. From intermediate points of *A* a PhMe-xylene mixture and C₆H₆ are separately withdrawn. The C₆H₆ is washed by upward flow through H₂SO₄ and then aq. Na₂CO₃ and passed into *B*, in which it is evaporated under vac. by the heat in the vapours from *A*. The vapours are condensed, yielding C₆H₆ suitable for use in internal-combustion engines. The liquid from the bottom of *A* is passed into another rectifying column (*D*) operating under vac. from an intermediate point of which a liquid which yields crystals of C₁₀H₈ on cooling is withdrawn. The distillate is naphtha. The stripped oil leaving the bottom of *C* after preheating the feed of benzolised oil may be re-used for scrubbing gas.

D. K. M.

Revivification of clays [containing acid sludge from treatment of oils]. R. C. POLLOCK, Assr. to UNION OIL CO. OF CALIFORNIA (U.S.P. 1,847,624, 1.3.32. Appl., 10.8.29).—The clays, after de-oiling, are washed with H_2O until free from acid sludge and other acid reaction products, and are then dried and calcined.

L. A. C.

Absorption of olefines in strong acids. N. V. DE BATAAFSCHE PETROLEUM MAATS. (B.P. 381,723, 15.10.31. Addn. to B.P. 323,748; B., 1930, 359).—The absorption is carried out under conditions of acidity that cause the formation of hydrolysable compounds, e.g., 90% H_2SO_4 , in the presence of substantially non-hydrolysable compounds of hydrocarbons with one or more double linkings, e.g., butylene, CMe_2CHMe , and complex cyanides, e.g., $K_4Fe(CN)_6$.

D. K. M.

Treatment of gases. J. GOLDSTEIN (U.S.P. 1,848,561, 8.3.32. Appl., 13.7.29).—Exhaust gases from a motor car are passed through an apparatus giving them many changes of direction, whereby the lighter gases are stated to be separated and may be re-used in the carburettor.

B. M. V.

Treatment of [lubricating] oil. T. F. OTT, Assr. to UNION OIL CO. OF CALIFORNIA (U.S.P. 1,847,623, 1.3.32. Appl., 15.7.29).—Highly viscous lubricating oil is treated with 40–90% H_2SO_4 , and after removal of sludge is neutralised, washed, and dried by blowing compressed air through the hot oil; or the oil, after removal of the sludge or separation of excess neutralising agent, is heated with absorbent clay to 93–177° and then the clay is separated.

D. K. M.

Dehydration of [mineral lubricating] oil. L. D. GRISBAUM, Assr. to RAILWAY SERVICE & SUPPLY CORP. (U.S.P. 1,848,125, 8.3.32. Appl., 18.2.29).—The oil is heated to above 100° but below its distillation temp., under reduced pressure, and subsequently violently agitated to release H_2O vapour by admitting air or other inert gas into the body of the oil well below the surface.

H. S. G.

Production of motor benzol. BARRETT CO., Asses. of C. BANTA (B.P. 382,647, 24.7.31. U.S., 30.7.30).—Gum-forming substances, but not unsaturated hydrocarbons with antiknock properties, are removed from crude benzol by treating with H_2SO_4 ($d < 1.795$, preferably 1.842; 0.08–0.13 lb. per gal.) for 45–60 min. at 20–40°, removing sludge, neutralising, and distilling.

D. K. M.

Antiknock gasoline. V. VOORHEES, Assr. to STANDARD OIL CO. (U.S.P. 1,848,681, 8.3.32. Appl., 15.12.28).—Gasoline, produced by vapour-phase cracking, that has deteriorated in antiknock effectiveness through storage is subjected to a non-cracking distillation, leaving $< 1\%$ of residue.

H. S. G.

Fuel [for internal-combustion engines]. L. B. KIMBALL, Assr. to FUEL DEVELOPMENT CORP. (U.S.P. 1,848,063, 1.3.32. Appl., 31.1.31).—The fuel from which crystals of NH_2Ph do not separate when cooled to -43° consists of gasoline, NH_2Ph (1–3%), Bu^oOH (0.1–1.0%), and $EtOH$ (0.2–3%).

D. K. M.

Hydrocarbon jell composition. G. KLINCKENSTEIN (U.S.P. 1,848,568, 8.3.32. Appl., 10.6.29).—A gela-

tinous composition for use as a solid fuel for petrol lighters, a cleaning compound, etc. comprises a mixture of coconut oil 32 pts., $NaOH$ (30%) 9 pts., H_2O 60 pts., $EtOH$ 3 pts., gasoline 6000 pts. by vol., approx.

H. S. G.

Coke chambers of vertical gas retorts [shaped to facilitate coke extraction]. F. J. and E. WEST, and WEST'S GAS IMPROVEMENT CO., LTD. (B.P. 383,041, 28.10.31).

Liquid fuel burners. E. J. Y. RUTHERFORD (B.P. 383,016, 9.10.31).

Combustion catalyst. Spray-cooled apparatus. Filters for fuels. Hydraulic apparatus.—See I. Alkyl esters.—See III. SO_2 and H_2S in gases.—See VII. Insulating material.—See XI. C black.—See XIII. Rubber composition. Reclaiming (etc.) rubber.—See XIV. Fertilisers from peat.—See XVI.

III.—ORGANIC INTERMEDIATES.

Thermal decomposition of methane. Synthesis of benzene and acetylene. F. FISCHER and H. PICHLER (Brennstoff-Chem., 1932, 13, 381–383; cf. B., 1928, 844; 1929, 767).—When CH_4 was passed under atm. pressure through a heated tube under conditions giving no deposit of C, the max. yield of C_6H_6 (60 g. of light oil per cu. m.) was obtained at 1300° with a time of contact of 0.016 sec.; the C_2H_2 produced simultaneously amounted to 76 g./cu. m. Above about 1400° only C_2H_2 was produced. The optimum conversion of CH_4 into C_6H_6 (33% of the CH_4 introduced or 60% of that decomposed) was obtained by passing the gas through several tubes at 1200° in succession, the liquid products being removed after each heating. On passing a coke-oven gas containing 25% of CH_4 through a tube at 1600° (time of contact 0.004 sec.) 75% of the CH_4 was converted into C_2H_2 ; the yield of C_6H_6 from the coke-oven gas was negligible even at lower temp. Passing CH_4 under reduced pressure, e.g., 50–70 mm., through the heated tube gave a 70–80% yield of C_2H_2 ; the yield of C_6H_6 fell as the pressure was reduced. The results conform with the calc. equilibria for the reaction $3C_2H_2 = C_6H_6$. The introduction of a catalyst, e.g., Pt, Fe, or Cu, accelerated decomp. of the CH_4 to C and H_2 .

A. B. M.

Effect of pressure on pyrolysis of methane. T. C. WARREN (Canada Dept. Mines, 1930–31, No. 725–1, 15–21).—The pyrolysis of CH_4 in a vitreous SiO_2 tube (4 mm. bore) was investigated between 902° and 1122° at 0.467–104 atm. and with rates of flow of 0.377–2.92 c.c./sec. Increase of pressure from 2 to 10 atm. increases the yield of unsaturated hydrocarbons, but has little effect on the H_2 yield, which shows tendencies to increase at higher pressures. The yield of H_2 and unsaturated hydrocarbons is little influenced by pressures < 1 atm. It is concluded that there is no advantage in using pressures other than atm. if the object of pyrolysis is to produce unsaturated hydrocarbons.

H. E. B.

Preparation of absolute alcohol by lime under pressure. O. VON KEUSSLER (Z. Spiritusind., 1932, 55, 236).—After heating 94% spirit in an autoclave (4 atm.) with CaO for $1\frac{1}{2}$ hr., the distillate is freed from traces of

CaO by being led into a container filled with abs. EtOH. The volatilised EtOH from this container is, in turn, led to the condensers and collected. Residual EtOH in the sludge of spent CaO is distilled off in a vac. and is added to the next charge of spirit. The following vats. are associated with the dehydration of 1 hectolitre of 94% spirit: 42 kg. of saturated steam, 0.6 cu. m. of cooling-H₂O at 15°, 25 kg. of 90% CaO, 0.5 kw. power, and a loss of 1.5 litres of EtOH. C. R.

Azeotropy and its application to the dehydration of ethyl alcohol. R. FRITZWEILER and K. R. DIETRICH (Angew. Chem., 1932, 45, 605—611).—When a suitable quantity of C₆H₆ is added to 95.6% EtOH and the whole is distilled, all the H₂O may be removed as the ternary azeotrope (b.p. 64.85°), leaving the binary azeotrope (32.4% EtOH, 67.6% C₆H₆) of b.p. 68.25°, and by removing this by distillation anhyd. EtOH is obtained. On the industrial scale, C₂HCl₃ is more satisfactory than C₆H₆, as it has a lower sp. heat and latent heat of evaporation, and the vol. relationships are more convenient. Details are given of a technical process, in which EtOH-free MeOH is isolated also by forming the binary azeotrope of b.p. 60.2°, containing 49% MeOH and 51% C₂HCl₃. H. F. G.

Determination of acetone in mixtures of organic solvents, using hydroxylamine hydrochloride. M. KRAJČINOVIĆ (Arh. Hemiju, 1932, 6, 161—165).—1—2 g. of NH₂OH.HCl dissolved in 20 c.c. of H₂O are added to a known vol. of solvent, and the solution is titrated in the presence of Me-orange with 0.1N-NaOH, the no. of c.c. of which multiplied by 0.0058 gives the COMe₂ content in g. R. T.

Determination of lead in organic material, with special reference to dyestuffs. N. L. ALLPORT and G. H. SKRIMSHIRE (Analyst, 1932, 57, 440—449).—The sample is destroyed by heating with H₂SO₄-HNO₃ and citric acid is dissolved in the cooled diluted residue previously freed from HNO₃. The solution is made alkaline with aq. NH₃ and 10% aq. KCN is added. The cooled solution is completely extracted by shaking with a solution of diphenylthiocarbazon in CHCl₃. The extract is washed with H₂O, the CHCl₃ evaporated, and the dry residue destroyed by wet oxidation and diluted; NH₄OAc is then added, the liquid made alkaline with aq. NH₃, and the Pb determined colorimetrically as sulphide. For this test > 0.0001 g. of Pb should be present. Fe, SiO₂, Ca₃(PO₄)₂, Cu, Zn, Ag, Hg, Mn, and Cr do not interfere. Sn, Al, Ni, and Co require special procedures. The method is inapplicable in presence of Bi. W. J. B.

Trichlorophenols and their application in industry. W. IWANOWSKI and J. TURSKI [with J. RYTŁÓWNA, J. BOJANOWSKI, Z. CEGLIŃSKI, S. ELJASZ, C. NIKOŁOW, and P. WOJCIESZAK] (Przemysł Chem., 1932, 16, 205—221).—The min. fungicidal concn. of aq. Na trichlorophenoxide (*A*) used for impregnating pine wood is 0.05—0.07% for *Merulius*, 0.1—0.2% for *Coniophora*, and 0.03—0.05% for *Polyporus*. NaF, Cu salts, and dinitrophenol in impregnated wood are more readily extracted by H₂O than is *A*, only 20% of which is removed by an amount of H₂O corresponding to 12 years' rainfall, as compared with 40—80% for

other fungicides. Hard subsoil waters do not inactivate *A*. Impregnation may be carried out in Fe vats, on which *A* has no action. *A* is non-inflammable and practically non-volatile at < 105°. Dichlorophenols and trichlorocresols are feebler fungicides than is *A*.

R. T.

Benzene synthesis. Absorption spectra of aliphatic hydrocarbons.—See II.

PATENTS.

Production of organic bromine compounds [ethylene dibromide, acetylene tetrabromide]. KALI-FORSCHUNGS-ANSTALT G.M.B.H. (B.P. 381,070, 22.2.32. Ger., 16.12.31).—C₂H₄, C₂H₂, etc. in finely-divided bubbles is passed through aq. Br liquor (*e.g.*, 0.3%), *e.g.*, in countercurrent through a packed tower.

C. H.

Continuous separation [extraction] of a body [acetic acid] from its solution in a liquid. USINES DE MELLE (formerly SOC. ANON. DES DISTILLERIES DES DEUX SÈVRES) (B.P. 380,928, 8.9.31. Fr., 8.9.30).—Extraction is effected in stages at or above b.p., the solvent and liquid being mixed by means of vapours from the preceding stage, and separation being effected after each stage. Suitable apparatus is a column having a series of double plates comprising a collecting plate with bell to act as mixing chamber and provided with a central pipe conveying vapours from the preceding plate, each plate being connected with a decanting chamber as in B.P. 307,868 (B., 1930, 275). The extraction of 25% AcOH with methylcyclohexanone, with Pr^oOAc, with EtOAc and C₆H₆, and with amyl alcohol is described. C. H.

Production of primary alcohols. H. T. BÖHME A.-G. (B.P. 381,476, 17.3.32. Ger., 15.7.31).—Ca salts of aliphatic acids above C₁ are heated with (HCO₂)₂Ca in a solvent and the resulting aldehydes are simultaneously reduced to alcohols with H₂ in presence of catalysts. Thus Ca octoate, formate, a Cu catalyst, and lauryl alcohol (solvent), heated in a closed vessel with H₂ at 350°/220 atm. for 1 hr., give octyl alcohol. C. H.

Production of higher alcohols [from ethyl alcohol]. BRIT. INDUSTRIAL SOLVENTS, LTD. From DEUTS. GOLD- U. SILBER-SCHNEIDANSTALT VORM. ROESSLER (B.P. 381,185, 25.6.31).—EtOH vapour and H₂ are passed with MeOH vapour at 200—400° over alkaline-earth oxide activated with > 10% of PbO, ThO₂, Ag₂O, UO₂, WO₂, CdO, SnO₂, ZnO, Fe₂O₃, NiO, CoO, or CuO, or mixtures of these. The presence of the MeOH results in avoidance of side-reactions and production only of alcohols. C. H.

Production of alkyl esters of sulphuric acid [from mixed hydrocarbons]. F. A. APGAR, Assr. to SINCLAIR REFINING Co. (U.S.P. 1,846,666, 23.2.32. Appl., 16.12.29).—The gas, containing unsaturated hydrocarbons such as propylene and butylene, from the end receiver (*A*) of a cracking plant is scrubbed under 250—300 lb. per sq. in. pressure in a tower (*B*) by the condensate from *A*. The liquid from *B* is rectified and the vapour leaving the column is cooled; uncondensed gas is separated in a vessel (*C*) and recirculated through *B*. The gas from *B* is scrubbed by 70—90% H₂SO₄ and the liquid at 21—27° is mixed with the condensate

from *C* and passed through a tower under 100—150 lb. per sq. in. pressure in which the immiscible oil is separated from the acid extract. Alternatively, the gas may be scrubbed in *B* by an absorbent, *e.g.*, gas oil, and the unsaturated hydrocarbons separated from the liquid by distillation and then treated with H_2SO_4 , or they may be absorbed in an acid-resistant medium and treated with H_2SO_4 while in solution in it. The products are worked up by known methods. D. K. M.

Direct esterification of alkyl sulphates. F. M. ARCHIBALD and R. B. LEBO, Assrs. to STANDARD OIL DEVELOPMENT Co. (U.S.P. 1,844,536, 9.2.32. Appl., 5.9.30).—In the production of alkyl acetates from $Ca(OAc)_2$ and alkyl sulphates in an org. solvent, separation of $CaSO_4$ from mother-liquor is facilitated by addition of a hygroscopic solid, *e.g.*, plaster of Paris, anhydrite, Na_2SO_4 . C. H.

Production of homologues of aniline. W. MINNIS, Assr. to NAT. ANILINE & CHEM. Co., INC. (U.S.P. 1,844,518, 9.2.32. Appl., 13.11.29).—Hydrohalides of *N*-alkylated arylamines are heated under reflux at ordinary pressures at 230—250°, whereby migration of alkyl to the nucleus takes place. Methyl-*o*-toluidine hydriodide and monomethylated xylydines thus give higher arylamines. C. H.

Synthetic MeOH. Reaction apparatus [for CS_2].—See I. Absorption of olefines.—See II. Org. nitrates for explosives.—See XXII.

IV.—DYESTUFFS.

Determining Pb in dyes.—See III.

PATENTS.

Manufacture of vat dyes of the anthraquinone series. I. G. FARBENIND. A.-G. (B.P. 381,090, 14.3.32. Ger., 12.3.31. Addn. to B.P. 339,267; B., 1931, 338).—Two mols. of an α -aminoanthraquinone are condensed with 1 mol. of a *m*- or *p*-diphenylbenzenedicarboxylic acid (obtained from the hydrocarbon by condensation with $AcCl$ and oxidation with CrO_3 in $AcOH$). α -Aminoanthraquinone gives a greenish-yellow vat dye. C. H.

Manufacture of [thio]indigoid vat dyes. I. G. FARBENIND. A.-G. (B.P. 380,902, 4.8.31. Ger., 1.8.30).—An alkoxy- β -naphthisatin chloride or anil is condensed with α - or β -naphthathioindoxyl or a nuclear alkoxy-derivative thereof. Examples are: 7-methoxy- β -naphthisatin (m.p. 292°) 2-chloride with α -naphthathioindoxyl (olive), or 7-methoxy- α -naphthathioindoxyl (olive-green); 8-methoxy- β -naphthisatin (m.p. 280°) 2-chloride with α -naphthathioindoxyl (violet-brown); 4-methoxy- β -naphthisatin (m.p. 280°) 2-chloride with 7-methoxy- α -naphthathioindoxyl (olive-brown). C. H.

[Manufacture of] brown acid azo dyes. IMPERIAL CHEM. INDUSTRIES, LTD., and M. MENDOZA (B.P. 381,238, 6.7.31).— α -Naphthylamine-2-sulphonic acid is diazotised and coupled with 1:5-aminonaphthol; in acid medium a full brown dye, or in alkaline medium a bluer brown, is obtained. C. H.

Manufacture of azo dyes containing copper. A. CARPMAEL. From I. G. FARBENIND. A.-G. (B.P.

381,118, 30.6.31).—The pre-coppering is effected by intimate mixing with finely-divided Cu, Cu oxides or hydroxides, or a Cu salt of a weak acid, or a complex Cu compound in which the Cu is associated with a basic component. Thus, anthranilic acid \rightarrow *m*-aminophenol-4-sulphonic acid is ground for 24 hr. in a ball mill with dry cryst. tetrammine-cupric sulphate. $Cu(OAc)_2$, Cu_2O , "cupric chloride urea," Cu powder, etc. may also be used. C. H.

Red ink.—See XIII.

V.—FIBRES; TEXTILES; CELLULOSE; PAPER.

Analyses of straw and of humified products derived from it. G. PICHARD (Proc. 2nd Internat. Cong. Soil Sci., 1932, 3, 134—142).—Details are given of a system of separation and determination of resins, proteins, sugars, pentosans, hexosans, humus, cellulose, and lignin. A. G. P.

Bagasse cellulose. D. F. J. LYNCH and M. J. GOSS (Ind. Eng. Chem., 1932, 24, 1249—1254).—The neutral sulphite method gives a yield of 37.5% of pulp from bagasse, the soda and sulphate methods somewhat less, and the HNO_3 method 4% more. The pulp obtained by the last method has a high NaOH solubility, but if this is lowered by boiling with NaOH, the pulp is then of good quality and has NaOH solubility 8%, ash 0.3%, α -cellulose 95%. A. G.

[Use of] nitric acid for decomposing wood. A. SCHAARSCHMIDT and P. NOWAK (Cellulosechem., 1932, 13, 143—149).—If wood is decomposed by boiling with the most suitable concn. (7%) of HNO_3 the consumption of acid, after allowing for recovery of NO , is 25% of the dry wt. of wood, but by slight modifications of procedure and recovery of NH_3 and HCN this is reduced to 12—15%. The yield of cellulose is 45—49% and its quality reasonably good; it has a Cu no. about 1 (Schwalbe) and contains α -cellulose 90%, pentosans 10%. The consumption of HNO_3 is mainly due to oxidation of lignin. CO , CO_2 , HCN , $AcOH$, and $H_2C_2O_4$ are formed ($\frac{1}{3}$) as well as products of higher mol. wt. ($\frac{2}{3}$). The pentosans are mainly hydrolysed without consumption of HNO_3 . A. G.

Potential reducing numbers of lignin and of carbohydrates from wood. G. J. RITTER, R. L. MITCHELL, and R. M. SEBORG (Ind. Eng. Chem., 1932, 24, 1285—1287).—Lignins from catalpa and spruce have reducing powers after hydrolysis of 39 and 30% of that of glucose, whether they are isolated by the H_2SO_4 or by the Cl_2 method. The reducing power of the carbohydrates after hydrolysis is the same whether the cellulose is isolated as a solid or is dissolved directly from the wood. A. G.

Determination of lignin in cellulose. A. NOLL, F. BOLZ, and H. FIEDLER (Papier-Fabr., 1932, 30, 613—616; cf. B., 1931, 1005).—When cellulose is brought into solution by means of $NPhMe_2$ and H_2SO_4 the residual lignin is contaminated with resins. This is avoided by diluting the mixture with $EtOH$ instead of with H_2O , and washing the ppt. with H_2O to remove dextrans. The filter paper is replaced by porous porcelain. A. G.

Tearing strength in cellulose testing. A. J. LÜTTGEN (Zellstoff u. Papier, 1932, 12, 435—437).—With some pulps, e.g., spruce and especially hemlock, the tearing strength is diminished by milling. A. G.

Effect of variables in the soda [wood-pulp] process. C. R. MITCHELL, G. J. POTTER, and J. H. ROSS (Pulp & Paper Canada, 1932, 33, 25, 44, 46, 48, 50).—The effects of concn. of NaOH, time, and temp. on the digestion of poplar wood have been investigated. Rise of temp. or increase in concn. lowers the viscosity and increases the ratio of rate of dissolution of carbohydrate to that of lignin. Digestion in very dil. solutions causes dissolution of carbohydrate without delignification. Max. yield of high-quality pulp is not attained by digestion to a given yield, but requires the observance of one set of conditions for a given wood. T. T. P.

Standardisation of cooking degree and bleachability tests on wood pulp. ANON. (Papier-Fabr., 1932, 30, 649—652).—Various methods have been investigated by a Swedish committee, experimental details of recommended methods for the determination of Cl no. and of KMnO_4 absorption being given. Both methods are applicable to sulphite- and sulphate-pulps, the only condition being that an appreciable correction must be made to the Cl no. of well-digested pulps. T. T. P.

Hydrogen-ion concentration in the liquid during sulphite-cellulose cooking. E. HÄGGLUND and A. JOHANSSON (Cellulosechem., 1932, 13, 139—143).—The $[\text{H}^+]$ of sulphite cooking solutions was determined at 110° or 120° by comparing the rate of hydrolysis of starch added to these solutions with its rate of hydrolysis by H_2SO_4 solutions of known $[\text{H}^+]$ under the same conditions. The p_{H} of a cooking solution containing (per 100 c.c.) 5 g. of total SO_2 and 1.24 g. of CaO was initially 2.36, rose to 2.5 after 8 hr., and fell again to 2.26 after cooking for 17 hr. When the CaO was reduced to 0.80 g./100 c.c. the p_{H} was initially 2.32 and, after a slight rise, fell rapidly to 2.0 after 8 hr., this being ascribed to the smaller buffering power of this solution. At cooking temp. the activity of lignin-sulphonic acid is equal to that of strong mineral acids. A. G.

Chemical investigations of bamboo cellulose. VII. Water-soluble content of bamboo. VIII. Optical properties of bamboo cellulose. S. OGURI (J. Soc. Chem. Ind., Japan, 1932, 35, 399—400 B; 400—404 B; cf. B., 1932, 1022).—VII. Bamboo contains more H_2O -sol. matter than does wood, which explains why bamboo decays the more readily.

VIII. Air and light are without influence on the rotation of a solution of cellulose in cuprammonium. Bamboo cellulose is found to have the same optical rotation as cotton cellulose in corresponding solutions, from which it is assumed that the two are chemically similar. V. E. Y.

Viscosity of cellulose in cuprammonium solution. I, II. T. NAKASHIMA and M. NEGISHI (J. Soc. Chem. Ind., Japan, 1932, 35, 422—429 B).—Viscosity changes of such solutions during ripening are similar to those already described in the case of viscose (B., 1932,

1022). The relationship between cellulose concn. (C) and viscosity of cuprammonium solutions is represented by the Baker formula $\eta = (1 + aC)^k$, where a and k are consts. V. E. Y.

Spinning of viscose silk. VIII. Factors affecting the coagulation velocity. IX. Reaction taking place during ripening of the cakes. S. HASE (J. Soc. Chem. Ind., Japan, 1932, 35, 392—393 B; cf. B., 1932, 1022).—VIII. Coagulation velocity increases as the ripening of the viscous proceeds, but decreases as spinning velocity increases. Increase in the H_2SO_4 content causes considerable increase in the rate of coagulation; increase of Na_2SO_4 content has the opposite effect.

IX. The change of total, by-product, and xanthate I equiv. of viscose cake during ripening was measured. Total I equiv. decreases after spinning, the rate of decrement decreasing progressively and becoming const. after 3 hr. Cake usually has xanthate I equiv. inversely as the H_2SO_4 content. This decomposes slowly, the rate of decomp. varying directly with the H_2SO_4 content. V. E. Y.

Semi-micro-method for determining the stability of cellulose nitrates. E. BERL and W. KUNZE (Angew. Chem., 1932, 45, 669—670).—The specimen (0.5 g.) is placed in a tube in a Cu-block electric thermostat, and the N oxides evolved are carried by a stream of CO_2 over heated Cu; the rate of N_2 production is measured by means of a small nitrometer. Typical curves obtained with stable and unstable nitrocelluloses are reproduced. H. F. G.

Preparation and properties of protein-cellulose rayon. J. LOISELEUR and L. VELLUZ (Chim. et Ind., 1932, 28, 538—544).—Synthetic fibres were produced having as far as possible the chemical and physical properties of natural silk from solutions containing cellulose acetate and a protein such as gelatin or casein in a common solvent such as 98—99% HCO_2H , the protein content varying from 15 to 25%. Alternatively, a solution of casein in HCO_2H was added to cellulose acetate dissolved in CMe_2 containing MeOH. The mixed solutions were limpid and remained homogeneous during the evaporation of the solvent. Cellulose acetate films containing 15% of casein equalled pure cellulose acetate films in tensile properties, which is accounted for by the intimate association of the micellar units of protein and cellulose ester. The dyeing properties of the mixed rayon differed from those of pure cellulose acetate and resembled more nearly natural silk. Of the proteins examined, casein gave the most satisfactory mixed products. The question of micellar association is discussed. V. E. Y.

Controlled chlorination of water as a means of preventing slime formation in paper mills. H. A. HARRISON (Paper-Maker, 1931, 82, lx—lxii, lxxix—lxxx, 4—5 T.S.).—Three principal types of org. growths occurring in paper-mill slime are fungi, algæ, and bacteria, but of these only the last-named are actual slime formers. Both raw water and cellulose materials are natural sources of infection. Chlorination of the fresh water markedly decreases the amount of slime, but owing to the rapidity with which Cl_2 is absorbed by cellulose and lignin, it is not possible entirely to

eliminate slime from the backwater pipes. A description of the Wallace-Tiernan chlorinating apparatus (solution-feed type) is given. Methods of determining the Cl_2 demand and the residual Cl_2 are reviewed, and a Cl_2 residual of 0.2 p.p.m. is recommended. Other possible uses of chlorination in paper mills are indicated. A concn. of Cl_2 as low as 0.2 p.p.m. is sufficient to affect the shade of paper dyed with certain basic dyes of the Malachite-Green class. H. A. H.

Early history of wood-pulp testing [for moisture]. J. STRACHAN (Paper-Maker, 1931, 82, xlix—li T.S.) H. A. H.

Design of pulp-drying ovens. J. STRACHAN (Paper-Maker, 1931, 82, xxv—xxix T.S.) H. A. H.

Bewoid process and theory of rosin sizing [of paper]. J. STRACHAN (Paper-Maker, 1931, 82, lxiii—lxiv, lxxxvi—lxxxvii, 1—3 T.S.).—A review of current theories of rosin sizing is given, and a new theory is developed to explain difficulties met with in practice. The essential difference between Bewoid free rosin size and ordinary rosin soaps is stressed. A simple method of calculating the alum requirement in sizing operations is described. H. A. H.

Relation of sizing and acidity to permanence of paper. J. E. MINOR (Pulp & Paper Canada, 1932, 33, 26).—A statistical summary of experiments carried out on the effect of rosin- and tub-sizing on the permanence of bond and ledger papers is given. Exposure for 3 years to a smoky city atm. shows rosin to be a great factor in degradation, tub-sizing acting in a protective manner. Acidity has no effect on ageing, as determined by loss of folding-endurance after exposure. T. T. P.

Durability and permanence of modern paper. J. STRACHAN (Paper-Maker, 1930, 80, xiii—xiv; 81, xxxvii—xxxviii, lxi—lxiii, lxxxix—cx T.S.).—The durability and permanence of paper are differentiated, and the factors in modern paper manufacture which affect these two properties are discussed. The source of the cellulose in paper is not so important as its method of prep. and its degree of purity. H. A. H.

Porosity and air space of paper. J. STRACHAN (Paper-Maker, 1931, 81, xli—xliv T.S.).—Papers the air-penetration properties of which are important are divided into 3 classes, viz., those having (a) max. permeability and low strength, (b) max. permeability consistent with max. strength, and (c) min. permeability and max. strength. Practical considerations affecting the manufacture of each of these classes are discussed. Methods of making permeability tests are described. H. A. H.

New types of equipment for testing paper. F. T. CARSON and F. V. WORTHINGTON (Paper Trade J., 1932, 95; T.A.P.P.I. Sect., 188—190).—Auxiliary apparatus for use in the dry-indicator sizing test, a micro-pipette for testing the absorbency of thin semi-bibulous paper, and a method of removing impregnating and coating materials from processed papers such as "carbon" papers by a combined solvent and scrubbing action, are described. H. A. H.

C equipment.—See I. Nitrocellulose.—See XXII. Sulphite waste-liquor pollution.—See XXIII.

PATENTS.

Processing of [extracting resinous impurities from] cellulose fibre. M. O. SCHUR and R. H. RASCH, Assrs. to BROWN Co. (U.S.P. 1,847,311, 1.3.32. Appl., 8.8.28).—An aq. suspension of the fibre is treated by a countercurrent washing process in such a way that the H_2O content of the pulp is first replaced gradually by a H_2O -miscible org. solvent for the resin etc. and this solvent is then gradually replaced by H_2O . B. P. R.

Making of paper pulp. L. I. ALSTED (U.S.P. 1,847,326, 1.3.32. Appl., 28.1.28).—Dried ground-wood is rendered capable of subsequent repulping by incorporating with it 20% of resin-free sulphite pulp with or without the addition of a small proportion of colloidal clay. B. P. R.

Manufacture of wood pulp etc. L. BRADLEY and E. P. MCKEEFE, Assrs. to BRADLEY-MCKEEFE CORP. (U.S.P. 1,848,602, 8.3.32. Appl., 23.12.24).—Wood is cooked with a liquor containing Na_2SO_3 but no NaOH or Na_2S , the process being stopped while the material still contains a considerable amount of non-cellulose org. matter. The product is then pulped by mechanical disintegration. B. P. R.

Chemical pulping process. G. A. RICHTER, Assr. to BROWN Co. (U.S.P. 1,848,661, 8.3.32. Appl., 12.6.30).—Wood chips are cooked first in aq. Na_2SO_3 , and then in a liquor containing both H_2SO_3 and Na_2SO_3 . B. P. R.

Production of pulp of high α -cellulose content. G. A. RICHTER, Assr. to BROWN Co. (U.S.P. 1,848,662, 8.3.32. Appl., 17.6.30).—Wood, straw, bamboo, etc. is treated with mercerising NaOH solution containing hypochlorite first at room, and then at higher, temp., and the product is washed and then cooked with aq. H_2SO_3 . B. P. R.

Making cellulosic products. A. H. HOOKER, Assr. to HOOKER ELECTROCHEM. Co. (U.S.P. 1,847,111, 1.3.32. Appl., 8.4.29).—Sulphite pulp is converted into "high α -cellulose" by treatment with dil. aq. NaOH , the waste liquor is used for the conversion of wood fibre into soda-pulp, and NaOH is regenerated from the waste liquor from this second process and used again for the production of "high α -cellulose." B. P. R.

Production of highly acetylated cellulose acetates. A. H. STEVENS. From E. BERL (B.P. 381,991, 6.8.31).—Cotton linters is pretreated with glacial AcOH containing about 0.3% H_2SO_4 , the greater part of the liquid is removed, and the residue is treated at 0° with excess of Ac_2O and a large proportion of a liquid (e.g., C_6H_6) that swells but does not dissolve the cellulose acetate. The product is fibrous, stable, and substantially free from H_2SO_4 . B. P. R.

Production of artificial silk, films, and the like. H. T. BÖHME A.-G. (B.P. 382,089, 12.11.31. Ger., 4.12.30).—Higher aliphatic monohydric alcohols ($>\text{C}_5$), or their H_2SO_4 esters, are added to solutions of cellulose acetate, thereby giving soft and pliable filaments etc. on spinning. B. P. R.

Making paper. O. ERR (U.S.P. 1,848,610, 8.3.32. Appl., 8.7.29).—Cornstalks, grasses, etc. (free from chlorophyll) are digested at about 132° under pressure

with 5% aq. H_2SO_4 , washed, bleached with aq. Cl_2 or $CaOCl_2$, and beaten to form pulp. B. P. R.

Manufacture of paper. H. R. RAFTON, Assr. to RAFFOLD PROCESS CORP. (U.S.P. 1,848,658—9, 8.3.32. Appl., 8.4.29. Renewed 28.7.31).—(A) Fibrous material (sulphite- and soda-pulp and old paper stock) is treated with a rosin-montan wax-paraffin emulsion in amount insufficient for good sizing, and with alum. An alkaline filler ($CaCO_3$ etc.) is subsequently added and the product made into paper. (B) The fibre, saponaceous paraffin emulsion, and alum are mixed in the beater and a $CaCO_3$ - $Mg(OH)_2$ filler is then added. B. P. R.

Spinning centrifuges. BRIT. BEMBERG, LTD. (B.P. 383,141, 7.3.32. Ger., 6.3.31. Addn. to B.P. 373,500).

[Device for] manufacturing seamless casings from regenerated cellulose. KALLE & Co., A.G. (B.P. 383,113, 25.1.32. Ger., 23.1.31).

Dryer-felts for paper machines. R. SPENCER (B.P. 383,097, 29.12.31).

Hydro-extractor.—See I. **Liquors from pulp manufacture.** Na ligninsulphonate.—See VII. **Adhesive cement.**—See XV. **Catgut.**—See XX.

VI.—BLEACHING; DYEING; PRINTING; FINISHING.

Printing with Rapidogen dyes. G. BERNARDY (Textilber., 1932, 13, 17—21).—These dyes (I. G.; stabilised mixtures of naphthols and diazotised arylamines) are similar to the Rapid Fast dyes but are more stable, even when printed on fabric, and cannot be satisfactorily developed by steaming alone. Printing is effected with a starch-thickened paste containing NaOH, methylated spirits or Monopole Brilliant oil, and the dye; the dried fabric is then developed by passage either through a boiling bath containing AcOH, HCO_2H , and $Na_2SO_4 \cdot 10H_2O$ or between two fabric-lapped squeezing bowls (the lower bowl rotates partly immersed in a cold liquor containing AcOH and HCO_2H). Indigosol dyes may be printed simultaneously with the Rapidogen dyes, but then ZnO should be added to the Rapidogen printing paste and methylated spirits used instead of Monopole Brilliant oil. Rapidogen dyes may be used in reserve pastes under NH_2Ph black, a satisfactory process consisting of printing the fabric with the Rapidogen dye paste (etc.), drying, slop-padding, developing, steaming, and after-chroming. Rapidogen dyes may also be used in reserves under Indigosol colours. Other methods of development, together with full details of the various processes, are given. A. J. H.

Sizing, finishing, and printing materials. G. F. DALENOORD (J. Soc. Dyers and Col., 1932, 48, 275—280).—The properties of the proprietary sol-starch products, Quellin, Textiline W and W1, and Superdex, and their advantages over other starch, gum, and glue products for sizing and finishing purposes, are described and the results of large-scale trials are given. The use of Nafka Crystal Gum and Nafka Thickening in printing pastes is similarly discussed. A. J. H.

Synthetic resins and anti-crease cellulosic materials. E. CLAYTON (J. Soc. Dyers and Col., 1932, 48, 295—298).—The production of creaseless cotton and

artificial silk fabrics by impregnation with a synthetic resin in the intermediate hydrosol stage and subsequent further polymerisation in the material is discussed, particularly from the viewpoint of the suitability of the $PhOH-CH_2O$ and CH_2O -urea or -thiourea type of resin. (Cf. B., 1928, 636; 1929, 352.) H. A. P.

Possible health hazard of lead-weighted silk fabric. L. T. FAIRHALL and J. W. HEIM (J. Ind. Hygiene, 1932, 14, 317—327).—The Pb-weighting in silk is not sol. in any of the body fluids even under rigorous conditions of exercise, and suspended Pb is not absorbed, as evidenced by its complete absence from the urine and faeces. P. G. M.

Protein-cellulose rayon. [Dyeing in] paper mills.—See V. **Oils in the soap industry. Wetting etc. agents.**—See XII. H_2O for laundries.—See XXIII.

PATENTS.

Bleaching [of cellulosic materials]. L. MEL-LEERSH-JACKSON. FROM MATHIESON ALKALI WORKS (B.P. 380,488, 19.3.31).—Chlorites, instead of the more usual hypochlorites, of alkali and alkaline-earth metals are used within wide limiting conditions of time, temp., and acidity or alkalinity since their deleterious action on cellulose is negligible. A. J. H.

[Softening of] textile [pile] fabrics. BRIT. CELANESE, LTD. (B.P. 381,964, 16.7.31. U.S., 16.7.30).—Slippage and disturbance of the pile surface of cellulose (acetate etc.) silk fabrics during wear is prevented by impregnation with a softening or swelling agent (e.g., solutions of $COMe_2$, MeOH, EtOH, triacetin) followed by hot-pressing or calendering. A. J. H.

Manufacture of material impregnated with regenerated cellulose. A. H. KILNER (B.P. 381,950, 16.4.31).—Apparatus is described for impregnating fabric with viscose solution *in vacuo* and afterwards regenerating the cellulose while the fabric is stretched in both warp and weft. A. J. H.

Treatment of natural and artificial cellulosic fibres with alkali [mercerising liquors]. CHEM. FABR. VORM. SANDOZ (B.P. 382,345 and 382,373, [A] 12.8.31, [B] 11.9.31. Ger., [A] 20.8.30, [B] 16.9.30. Addns. [A] to B.P. 359,399 and [B] 378, 194; B., 1932, 99, 978).—(A) Improved wetting agents comprise mixtures of phenols or halogenated phenols with mixtures of ethers of polyhydric alcohols containing < one free OH group together with alicyclic carboxylic acids, such as the naphthenic and resinic acids; polyhydric alcohols containing < one C atom more than the no. of OH groups may also be present. (B) The alicyclic carboxylic acids previously described are partly replaced by the non-phenolic compounds cited in B.P. 279,784, 250,018, 364,844, and 365,323 (B., 1928, 228; 1931, 801; 1932, 503, 337), or sulphonation products of fats, fatty oils, fatty acids, or aromatic hydrocarbons. A. J. H.

[Production of shrinkage effects in] textiles containing cellulose derivatives. BRIT. CELANESE, LTD., W. A. DICKIE, and P. F. C. SOWTER (B.P. 380,504, 18.6.31).—Woven or knitted fabrics containing suitably distributed threads of a cellulose derivative associated with cotton, wool, silk, etc. are treated with a liquid

(e.g., a chlorinated hydrocarbon diluted with an alcohol or, preferably, C_6H_6 , PhMe, light petroleum, etc.) which is capable of swelling the cellulose derivative. A. J. H.

[Production of shrinkage effects in] textile materials [containing cellulose derivatives]. H. DREYFUS (B.P. 380,505, 18.6.31).—Cellulose acetate (etc.) threads are first shrunk at spaced intervals by application thereto of a shrinking agent (CH_2Cl_2 , $C_2H_4Cl_2$, $C_2H_2Cl_2$, $CHCl_3$, $C_2H_2Cl_4$, MeCl, and EtOAc are specially claimed) and an alcohol suitably diluted with C_6H_6 , CCl_4 , etc., then doubled with a thread of another fibre such as cotton, viscose silk, etc., and the mixed threads treated with an agent adapted to shrink the remaining portion of the locally-treated threads. Crêpe or cockled effects are thus obtained. A. J. H.

Waterproofing mixture. R. BRACEWELL (B.P. 382,073, 29.10.31).—Tent material is waterproofed by impregnation with a mixture of paraffin wax 6.5 oz., hard soap 4 oz., gum tragacanth 4 oz., $Pb(OAc)_2$ 2.5 lb., alum 2 lb., and H_2O 67 lb. A. J. H.

Treating [waterproofing] textiles. MERKEL & KIENLIN G.M.B.H. (B.P. 381,864, 14.4.32. Ger., 25.4.31).—Wool (etc.) is impregnated with a cold conc. (about 10%) aq. solution of $Al_2(SO_4)_3$ and then immersed, without intermediate drying, in H_2O at 100° ; it thereby becomes H_2O -repellent owing to fixation of $Al(OH)_3$. A. J. H.

Manufacture of felt fabrics or bodies. S. PLATT, W. O. STREET, and BURY FELT MANUFACTURING CO., LTD. (B.P. 381,986, 1.8.31).—Felted fabric is made waterproof and less shrinkable by coating it on one or both sides with latex; vulcanisation is optional. A. J. H.

Sizing of textile fibres. I. G. FARBENIND. A.-G. (B.P. 382,785, 30.11.31. Ger., 29.11.30. Addn. to B.P. 345,207; B., 1931, 535).—In the prep. of sizes with polyvinyl alcohols, the hitherto necessary pretreatment of these alcohols with an aldehyde is rendered unnecessary by using polyvinyl alcohols of specially high viscosities which may be obtained by hydrolysis of polyvinyl esters. A. J. H.

Sizing of textile materials. ACETA GES.M.B.H. (B.P. 381,764, 30.11.31. Ger., 28.11.30).—Artificial silk, particularly cellulose acetate silk, is sized with an aq. emulsion of the oxidation product of a drying oil having an I val. < 75 together with an anti-oxidant such as an amine, phenol, or mercaptan. A. J. H.

[Puddling] method of [multi-colour] dyeing loose textile materials. ECLIPSE TEXTILE DEVICES, INC. (B.P. 383,183, 22.4.32. U.S., 23.4.31).

Plastic compositions.—See XIII. **Rubberised fabric.**—See XIV.

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

Determination of hydrogen chloride in air. A. HELLER (Gesundheitsing., 1932, 55, 261—262; Chem. Zentr., 1932, ii, 252).—Total S and Cl are determined by means of Liesegang's apparatus (B., 1932, 841). A. A. E.

Corrosion problems with phosphoric acid. W. C. WEBER (Chem. Met. Eng., 1932, 39, 542—545).—

In the manufacture of H_3PO_4 by digestion of phosphate rock with H_2SO_4 wood has been found serviceable for concns. up to 10% P_2O_5 and temp. up to 70° . Synthetic resins are resistant, but are not good structurally. Rubber coverings are now satisfactory and stoneware and high- SiO_2 bricks and cement are resistant. A low-Cr-Ni-Mo steel has been found satisfactory for many purposes, but all welded or processed parts must be reheated. A nitrated cotton cloth is suitable for filtering up to 35% P_2O_5 acid. The wet-grinding of rock with dil. H_3PO_4 is done in Fe or steel tube-mills, rubber-covered and then lined with SiO_2 blocks, separated from the shell by wood strips. Centrifugal pumps of stainless steel are used for most purposes. Diaphragm slurry pumps are constructed of rubber-covered Fe. Pb piping is resistant, but with some solutions suffers from internal scaling; in such cases rubber hose is better. H_3PO_4 itself is stored in Pb-lined wood tanks. Fume ducts are made of wood. Floors subject to acid spillage are made of concrete covered with asphalt.

C. I.

Calculation of the velocity of contact oxidation of ammonia. G. K. BORESKOV (J. Appl. Chem., Russia, 1932, 5, 163—172).—At a Pt gauze, $\log t = (3RTE/2) + \log \log C_{NH_3}P + c$, where t is the time of contact, E the heat of activation, C_{NH_3} the vol.-% NH_3 in the original mixture, P the total pressure, and c a const. The heat of activation is calc. as 17,350 g.-cal. per mol. Optimal times of contact at various concns. and temp. are tabulated.

CH. ABS.

Determination of ammonia by Ostwald's nitrometer method. F. MÜHLERT (Gas- u. Wasserfach, 1932, 75, 874).—The NH_3 solution is contained in an inclined side tube attached to a larger tube half filled with 25—50 c.c. of NaOBr solution. The two solutions are cautiously mixed by tilting and the N_2 given off is measured in a nitrometer tube. R. N. B.

Mercury or diaphragm processes of electrolysis of alkali chloride. B. SCHULZ (Chem.-Ztg., 1932, 56, 889—890).—The Hg process was largely displaced by the diaphragm process on economic grounds, but has been revived by the demand of the rayon industry for a Cl-free product. The modern Krebs cell consists of the electrolytic cell proper and the decomp. cell into which the Na-Hg passes. The Hg requirement is $<$ with the older cells. The respective cells are of protected cement and Fe and require only 4.2 volts. A 6-months test has given a current efficiency of 92.4% and a NaOH concn. of 420 g. per litre. The Cl_2 gas is of 96% purity. If the whole process in each case is considered the capital cost for a Krebs plant is not $>$ that for a diaphragm plant. The Hg loss is 2% per annum. C. I.

Manufacture of sal ammoniac. R. FREITAG (Ind. Eng. Chem., 1932, 24, 1235—1237).—The commercial production of pure NH_4Cl by the double decomp. of $(NH_4)_2SO_4$ with NaCl is described. M. S. B.

Leucite as a source of alumina, potash, and silica. (BARON) G. A. BLANC (Trans. Inst. Chem. Eng., 1931, 9, 49—62).—Italian leucitic lava contains sufficient Fe to render magnetic separation possible after grinding. An ore is thus obtained containing Al_2O_3 22—23, K_2O 17—18, SiO_2 53—55%, and traces of Ca, Na, and Fe. The

Al and K are entirely dissolved by HCl or HNO₃, leaving the SiO₂ as a permeable mass of hydrogel granules. If colloidal SiO₂ is in suspension in the liquid, which may occur if finely-powdered leucite has been present, it is removed by filtration through such a mass. Thus a liquid free from SiO₂ is obtained at once. The heat of reaction with acid is sufficient for efficient working, a temp. of 80–90° being reached. The slightly acid liquid is cooled to crystallise KCl. Gaseous HCl is added and the temp. raised to 70°, when hydrated AlCl₃ is deposited. The liquor on cooling deposits impurities (Fe, Na, and Ca) and small quantities of residual KCl. The liquor can be used again and again. If HNO₃ is used the Al is pptd. first by addition of conc. HNO₃ to the liquor up to 70% HNO₃ concn. On cooling, only Al(NO₃)₃ crystallises. The KNO₃ is then obtained by evaporation. If evaporation is carried out to 50% of the original vol. before addition of the excess HNO₃ an economy in the latter is effected. If H₂SO₄ is used potash alum is obtained, this process being in operation at Manchester. AlCl₃ or Al(NO₃)₃ are readily decomposed in a rotary kiln lined internally with Al, the acid vapours being recovered. The Al₂O₃ contains varying proportions of H₂O, which, however, does not cause trouble in electrolysis; it is very sol. in cryolite and is considered to be a new type of Al₂O₃ mol. Pure SiO₂ can be obtained from the residue from extraction by passing through rubber rollers which allow harder impurities to pass unchanged. C. I.

Technical thionate chemistry. III. Conversion of ammonium thiosulphate into ammonium sulphate and ammonium sulphate-phosphate mixtures. C. J. HANSEN [with G. HILLER, K. VOITURET, and R. ZÜNCKEL] (*Angew. Chem.*, 1932, 45, 647–650; cf. B., 1932, 1028).—An account is given of the technical processes employed for the manufacture of (NH₄)₂SO₄, S, and SO₂ from (NH₄)₂S₂O₃ solutions and H₂SO₄, and of SO₂ from (NH₄)₂S₂O₃ and H₃PO₄. The reaction between H₃PO₄ (2 mols.) and (NH₄)₂S₂O₃ (3 mols.) in a closed vessel at 100° is nearly complete (99%) within 2 hr., but filtration is difficult and salts cannot be entirely removed from the S; it is therefore preferable to operate under pressure and above the m.p. of S. At sufficiently high temp. the second H of the acid takes part in the reaction; with a mol. ratio of 3:1 of 40–50% (NH₄)₂S₂O₃ solution and 40% H₃PO₄ 96% conversion into (NH₄)₂SO₄, (NH₄)₂HPO₄, and S takes place within 2 hr. at 200°. The impurities present in some forms of commercial H₃PO₄ prevent coalescence of the fused S, whilst if F compounds are present corrosion difficulties arise. H. F. G.

Continuous method of analysis of ammonium salt solution. M. MATSUI, T. NODA, and S. MIYAGI (*J. Soc. Chem. Ind., Japan*, 1932, 35, 429–433 B).—Both discontinuous and continuous methods are described for the determination of NH₃ in NH₄ salt solutions by measurement of the electrical conductivity of solutions obtained by absorption of the NH₃ expelled from the original liquid. J. W. S.

Minor metallic constituents of phosphate rock. W. L. HILL, H. L. MARSHALL, and K. D. JACOB (*Ind. Eng. Chem.*, 1932, 24, 1306–1311).—In general, the

metallic elements occurring in American phosphate rock are present also in commercial bone ash, although the bone ash examined contained a higher % of Mg, Na, Cu, and Zn, and a lower % of K, Ti, Mn, Cr, V, and As, than phosphate rock. M. S. B.

Change of water-soluble phosphoric acid content of superphosphate during storage in bulk. VII. Reaction between monocalcium phosphate and iron oxide. T. SHOJI and E. SUZUKI (*J. Soc. Chem. Ind., Japan*, 1932, 35, 417–421 B; cf. B., 1931, 545).—When a mixture of Ca₂(PO₄)₂ and Fe₂O₃ is treated with H₂SO₄, most of the Fe₂O₃ remains unchanged in the resulting superphosphate. Practically no reaction occurs between Ca(H₂PO₄)₂ and Fe₂O₃ at room temp., but at 60° some H₂O-sol. P₂O₅ passes into an insol. form. Thus the H₂O-sol. P₂O₅ content of superphosphate made from minerals containing Fe₂O₃ may decrease gradually when stored at a high temp. J. W. S.

Superphosphate industry of the U.S.S.R. and the five-year plan. ANON. (*Superphosphat*, 1932, 8, 139–144).—Manufacturing processes are described. A. G. P.

Determination of magnesia in phosphate rock. J. I. HOFFMAN (*Bur. Stand. J. Res.*, 1932, 9, 487–491).—The sample is dissolved in a mixture of HCl, HNO₃, and H₂O (2:1:1), Ca is separated as CaSO₄ in EtOH solution, and Mg is determined by pptn. as Mg(NH₄)PO₄. Addition of citric acid prevents interference by Fe, Al, or Ti. The Mg ppt. is contaminated by Mn, but Mn is determined by the KIO₄ method and subtracted. As does not interfere. E. S. H.

Specific gravity of "Dry-ice" [solid carbon dioxide]. A. SALMONY (*Chem.-Ztg.*, 1932, 56, 901–902).—Solid CO₂ prepared without the use of pressure has *d* 1.45 (approx.). The Pegna process (described), in which a hydraulic pressure of 180 kg. is used, gives a product having *d* 1.55. The figure is obtained by weighing in EtOH saturated with CO₂ at –82° in a thermostat cooled with liquid air. C. I.

Study of pure liquid sulphur dioxide by micro-photography. C. W. JOHNSTON (*Ind. Eng. Chem.*, 1932, 24, 1315–1316).—Photomicrographs (× 75 diam.) of liquid SO₂ indicate no impurities in the best available products. They also show that SO₂ becomes dirty in a refrigerating machine and that the super-refining now generally practised visibly increases the purity. On evaporation of the SO₂ the impurities become more conc. due to their lower volatility. M. S. B.

C equipment. Drying of solids.—See I. Cast Fe and NH₃.—See X. Fertilisers.—See XVI.

PATENTS.

Purification of sulphuric acid. E. A. TAYLOR, Assr. to GRASSELLI CHEM. Co. (U.S.P. 1,842,884, 26.1.32. Appl., 31.8.29).—H₂O₂ (3 vol.-%) is used to bleach discoloured H₂SO₄, *d* 1.7–1.83, previously freed from SO₂. F. Y.

Process for concentrating nitric solutions and denitrifying nitric-sulphuric acid mixtures. U. ORLANDI and G. LEVI (*B.P.* 382,101, 23.11.31. It., 21.11.30).—Hot, conc. H₂SO₄ is introduced at various points in the denitrating column, in such amounts and at such

temp. that sufficient heat is maintained for evaporating without decomposing the HNO_3 . The outflowing dil. H_2SO_4 passes to a column in which it is conc. by direct heat, and from which it again passes to the denitrating column.

W. J. W.

Production of ammonium sulphate. WETIALL (B.P. 382,215, 19.4.32. Fr., 20.4.31).— $(\text{NH}_4)_2\text{SO}_3$, $(\text{NH}_4)_2\text{S}_2\text{O}_3$, or a polythionate is oxidised solely and directly to $(\text{NH}_4)_2\text{SO}_4$ by means of HNO_3 , the NO formed being removed and oxidised to HNO_3 etc., and the $(\text{NH}_4)_2\text{SO}_4$ is solidified in known manner. Catalysts may be used.

F. Y.

Purifying an opacifying agent [sodium antimonate] for enamels, glazes, and glasses. A. H. STEVENS. From AMER. SMELTING & REFINING Co. (B.P. 382,524, 14.3.32).— NaSbO_3 , obtained, e.g., as a by-product in the Pb softening process, is washed with alkaline NaCN solution.

L. A. C.

Relieving alkaline waste liquors from the soda- or sulphate-pulp manufacture, of silica. E. L. RINMAN (B.P. 381,697, 19.9.31).—Oxides or hydroxides of metals, e.g., Al, Ca, Zn, Mg, yielding silicates insol. in the waste liquor (preferably 1 mol. Al_2O_3 per 4–1 mols. SiO_2) are added before or during the digestion of cellulosic material with aq. NaOH, with or without the addition of Na_2S , Na_2SO_3 , or Na_2SO_4 , so that the SiO_2 is pptd. on the fibres.

L. A. C.

Manufacture of sodium lignosulphonate. W. E. B. BAKER (U.S.P. 1,847,709, 1.3.32. Appl., 7.4.23).—Waste sulphite liquor is neutralised with $\text{Ca}(\text{OH})_2$, conc., e.g., to 50% solid content, filtered to remove CaSO_3 and CaSO_4 , treated with Na_2CO_3 to ppt. Ca, and filtered. The Na lignosulphonate solution obtained may be used direct, or acidified, e.g., with AcOH for use as a tanning agent.

L. A. C.

Precipitating and separating alumina hydrate from solutions of alkali-metal aluminates. ELECTRIC SMELTING & ALUMINUM Co., Assees. of A. H. COWLES and E. L. PRENTISS (B.P. 382,366, 4.9.31. U.S., 10.10.30).—The NaAlO_2 solution flows down a series of pptn. tanks provided with means for withdrawing solution and air from the top and returning it to the bottom of each tank so as to cause an upward flow of liquid which prevents the $\text{Al}(\text{OH})_3$ particles from settling until they have reached a predetermined size. The suspension containing the settled particles passes to a final settling tank from which portions are returned to each pptn. tank for "seeding."

L. A. C.

[Production of] flaked lead acetate. R. E. LAWRENCE, Assr. to GRASSELLI CHEM. Co. (U.S.P. 1,842,908, 26.1.32. Appl. 14.10.29).— $\text{Pb}(\text{OAc})_2 \cdot 3\text{H}_2\text{O}$ in the form of hard, compact, and coherent flakes weighing, when packed, 50–70 lb. per cu. ft., is produced by pouring a solution of $\text{Pb}(\text{OAc})_2$ of d 2.42 upon the surface of a rotating cooling drum fitted with a suitable scraper.

F. Y.

Determination of sulphur dioxide, hydrogen sulphide, or both in gas mixtures. A. H. HENNINGER, Assr. to GEN. CHEM. Co. (U.S.P. 1,840,952, 12.1.32. Appl., 5.11.26).—Gas mixtures containing SO_2 and/or H_2S are passed through a Hempel, Orsat,

or similar apparatus in which the absorbing liquid has the approx. composition: saturated aq. CaCl_2 100 c.c., KI 27 g., I 9 g., H_2O 58 c.c., and HCl (d 1.18) 5 c.c., the change in gas vol. being determined. Other gases such as CO_2 , unsaturated hydrocarbons, H_2 , CO, N_2 , O_2 , and CH_4 do not interfere.

F. Y.

Manufacture of phosphorus and compounds thereof. W. H. WAGGAMAN and H. W. EASTERWOOD, Assrs. to VICTOR CHEM. WORKS (U.S.P. 1,841,071, 12.1.32. Appl., 21.12.25).—Phosphatic material mixed with > 18% of bituminous coal and > 20% of SiO_2 is heated to 1100–1450°, but without fusing the charge, in an externally-fired chamber having a bottom layer of bituminous coal; adhesion of the charge to the walls is thereby prevented.

F. Y.

Recovery of bromine. KALI-FORSCHUNGS-ANSTALT G.M.B.H. (B.P. 382,512, 1.3.32. Ger., 17.12.31).—Solutions containing free Br are treated at the b.p. of Br (at atm. or reduced pressure) with a current of air; the Br-air mixture is cooled to condense the Br or is used for the manufacture of HBr, bromides, etc.

L. A. C.

Auto-oxidative recovery of iodine from brines. F. K. RANDOLPH, Assr. to GEN. SALT Co. (U.S.P. 1,848,081, 1.3.32. Appl., 7.4.30).—Brines containing iodides and alkaline-earth or Mg bicarbonates are treated with Cu_2Cl_2 and FeCl_2 ; the ppt., which contains Cu_2I_2 and $\text{Fe}(\text{OH})_2$, is heated in the presence of air and H_2O to oxidise the $\text{Fe}(\text{OH})_2$ to $\text{Fe}(\text{OH})_3$, and the product is treated with H_2SO_4 to liberate I. The residue is heated with NaCl and Cu in the presence of H_2O to yield Cu_2Cl_2 and FeCl_2 for re-use.

L. A. C.

Reaction apparatus.—See I. Tools etc. of Al_2O_3 .—See VIII. Pigments.—See XIII. Fertilisers.—See XVI.

VIII.—GLASS; CERAMICS.

Testing of "resistant glass" ampoules. J. PRITCHARD (Pharm. J., 1932, 129, 350).—The method previously described (B., 1930, 663) gives an accurate indication of the changes in alkalinity of aq. solutions due to contact with glass. Tests over a period of 2½ years of 8 samples of glass are given.

E. H. S.

Relation of crushing strength of silica brick at various temperatures to other physical properties. S. S. COLE (J. Amer. Ceram. Soc., 1932, 15, 611–621).—Petrographic examinations and measurements of refractiveness, sp. gr., porosity, hot and cold crushing strength, abrasion-resistance, and thermal expansion were made on brick manufactured from 3 samples of American quartzites. The cold strength is a measure of the resistance to abrasion, but is not fully indicative of the strength at higher temp., although the bricks, in general, have the same relative vals. The crushing strength depends on the bond developed and has little relationship to the porosity and apparent d . Addition of Fe_2O_3 and TiO_2 does not affect materially the failure under load, the curves for which show decided changes in slope at approx. 980° and 1340°. Under load failures (25 lb./sq. in.) below 1150° are shear failures due to the presence of unconverted quartz and cristobalite, whilst those above this temp. are of the plastic-flow type due to

large amounts of tridymite. Tridymite development is little affected by variation in CaO content, but is much increased by the addition of Fe_2O_3 and TiO_2 . Abrasion loss above 1000° is less at lower temp. and is related to the crushing strength and plastic flow. Incorporation of TiO_2 produces a brick stronger at high temp. J. A. S.

Effect of boric acid in raw milled glazes. K. M. KAUTZ (J. Amer. Ceram. Soc., 1932, 15, 638—643).—Raw ZnO and pptd. BaCO_3 and MgCO_3 in presence of H_3BO_3 cause a thickening of the glaze on keeping. The use of calcined constituents and PbCO_3 reduces the tendency to thicken, but for leadless glazes the B_2O_3 content should be introduced as an insol. frit or one having an alkaline reaction. J. A. S.

Simplified method for accurate wet blending of glazes and slips. K. M. KAUTZ (J. Amer. Ceram. Soc., 1932, 15, 644—646).—The *G* val., *i.e.*, the wt. of suspended matter per unit vol. of slip, is used as the basis for all blends. J. A. S.

Special types of crazing [of ceramic glazes]. H. G. SCHURECHT and G. R. POLE (J. Amer. Ceram. Soc., 1932, 15, 632—637).—Crazing may be due to (a) the action on the glaze of a reducing kiln atm., (b) the repeated thawing and freezing of H_2O -soaked ware causing small changes in size of the body, and (c) effect (b) modified by the stresses already acting on the tile built into a structure (*e.g.*, wall). The crazing in the last case takes the form of long straight or curved parallel cracks due to the moisture-expansion in one direction being restricted by the existing stresses. J. A. S.

Application of underglaze colour crayons. K. E. SMITH and W. STEVENS (J. Amer. Ceram. Soc., 1932, 15, 630—631).—The colour or stain is made plastic with a mucilage of gum tragacanth (2 pts.), CH_2O (1 pt.), and H_2O (40 pts.), moulded into a crayon, and dried. After the colour has been applied it is fixed by spraying with a solution of gum tragacanth, dried, and the overglaze applied. J. A. S.

Control of plasticities of ceramic slip. W. SHEARER (J. Amer. Ceram. Soc., 1932, 15, 622—629).—The applications of the R & S (flow-type) plastometer to the control of the working properties of casting slips, glazes, and enamels, to clay testing, and for testing the action of deflocculants are described in detail. J. A. S.

Ceramic bodies of low absorption maturing at temperatures below 1000° . R. F. GELLER and D. N. EVANS (Bur. Stand. J. Res., 1932, 9, 473—485).—Ceramic materials comparable in transverse breaking strength with earthenware, nearly white in colour, and varying in H_2O absorption from 1 to 5% have been made by the dry-press process from fluxes of $\text{Na}_2\text{B}_4\text{O}_7$, H_3BO_3 , MgCO_3 , ZnO, ZrO_2 , CaF_2 , etc. with two or more of the following: kaolin, ball clay, feldspar, artificial mullite (containing 12% SiC and 23% glass). These were matured below 1000° . The products resist mechanical abrasion better than non-ceramic flooring, such as marble, and glazed specimens resist crazing satisfactorily. The substitution of kaolin for ball clay decreases the resistance to abrasion, increases the H_2O absorption, and darkens the colour. The introduction of 5% of mullite at the expense of the clay is beneficial. E. S. H.

Effect of preparation and calcination treatment on the properties of the kaolin-alumina mixtures Al_2O_3 , SiO_2 . F. H. RIDDLE (J. Amer. Ceram. Soc., 1932, 15, 583—597).—The mixture was ground for different lengths of time, fired at various temp. from slightly above the dehydration temp. of clay to 1700° , and examined by the X-ray spectrograph and the petrological microscope. Longer periods of grinding of the unfired mixtures were found to break up the aggregates of particles rather than to reduce the particle size. X-Ray methods served to detect the finely-grained and less cryst. components and the microscope detected small amounts of well cryst. materials. Partial dehydration of the kaolin particles took place at 630° and was more pronounced at 800° . At 1000° the kaolin was quite non-cryst. and unrecognisable, but there was no evidence of combination between the decomposed kaolin and the Al_2O_3 . At 1200° the kaolin appeared to have decomposed into SiO_2 and mullite or Al_2O_3 , but no recombination was observed. Raising the firing temp. increased mullite formation until at cone 30 all the Al_2O_3 had combined to give mullite and the body consisted of 15—20% of glass (composed of fine crystals of cristobalite) and the remainder of mullite crystals (0.0005 in. long) or aggregates of crystals. The longer grinding period (3—9 hr.) caused a marked increase in mullite formation in all cases but the cone 30 firing. On the basis of the mullite development in the above calcines, porcelain bodies were made up and tested for impact and heat shock. A good body is dependent on a reasonable mullite development. J. A. S.

Electrical refractory porcelain bodies containing magnesium oxide. J. M. HIGGINS and R. J. MONTGOMERY (Univ. Toronto Eng. Res. Bull., 1932, 9, 159—179).—Measurements of the burning shrinkage, apparent porosity, transverse strength, resistance to thermal shock, thermal expansion (to 900°), and electrical resistivity (to 700°) of such porcelain bodies burned to cones 10 (approx. 1260°) and $13\frac{1}{2}$ (1370°) showed that bodies of improved properties were obtained by increasing the Al_2O_3 and MgO content of mixtures representing present Canadian commercial products. A. L. R.

Electrical resistivity of specialised refractories. H. E. WHITE (J. Amer. Ceram. Soc., 1932, 15, 598—606).—Measurements were made on a standard 9-in. brick heated in a gas-fired furnace, graphite contacts being used. The resistivity of all types of refractories (chrome, magnesite, fireclay, SiC, mullite, Al_2O_3 , etc.) decreases rapidly and uniformly with rise in temp. MgO exhibits an anomaly at 1200 — 1300° . The resistivity is not const., but varies with the period and conditions (atm.) of heating. Those refractories composed of minerals of the same petrographic classification (*e.g.*, Al_2O_3 - SiO_2) undergo less change than those containing dissimilar minerals (*e.g.*, magnesite and chromite). J. A. S.

Sources of glass-making sands in India. K. C. MUKERJEE and H. D. H. DRANE (Bull. Acad. Sci. Agra and Orta, 1931—1932, 1, 131—139).

Graphite for crucibles. W. FRÖHLICH (Chem.-Ztg., 1932, 56, 809—810).

C equipment. Air-lift pump.—See I.

PATENTS.

Glass. Z. VON VERESS, Assr. to R. VON KREYBIG (U.S.P. 1,842,772, 26.1.32. Appl., 23.10.28. Hung., 25.10.27).—A glass free from alkali and having the appearance of porcelain is made from dolomite and quartz sand, its composition being MgO 4—21, CaO 13—32, and SiO₂ 60—70%. F. Y.

Manufacture of compounded structures of sheet material such as splinterless glass. F. J. O. HOWE (B.P. 381,967, 17.7.31).—The assembled structures suitably packed are passed down and up a tank of liquid heated at the bottom so that they are subjected first to rising and then to falling temp. and pressure.

L. A. C.

Manufacture of unsplinterable glass. L. T. LEVEY (B.P. 381,855, 31.3.32. S. Afr., 2.4.31).—Canada balsam is claimed as the adhesive.

L. A. C.

Treatment of frosted or coloured glass. KOOPERATIVA FÖRBUNDET (B.P. 381,979, 22.7.31. Swed., 7.8.30).—Glass articles previously frosted or coloured to excess are graded according to the excess, and the grades are treated separately, e.g., with aq. HF or mixtures of it with H₂SO₄ or HCl, until a uniform range is obtained.

L. A. C.

Purification of silica sand. O. C. TRAUTMANN (U.S.P. 1,840,338, 12.1.32. Appl., 15.10.27).—Citric acid is mixed with the sand, to remove colouring matter, and the mixture is quickly fused in an electric furnace.

F. Y.

Production of silica bricks and the like. M. HOLLENWEGER (B.P. 382,913, 6.6.32. Ger., 19.6.31).—To the CaO and/or clay bonding material is added sufficient quartzite to form a mixture melting at the max. firing temp. of the brick; this is ground to pass 10,000-mesh per sq. cm., and added to the main bulk of crushed quartzite.

J. A. S.

Making ceramic [moulding] material [of high electrical insulation]. (A) W. J. SCOTT, (B) L. I. SHAW and W. J. SCOTT, Assrs. to WESTERN ELECTRIC CO., INC. (U.S.P. 1,847,102 and 1,847,197, [A, B] 1.3.32. Appl., [A] 11.7.28, [B] 26.12.29. Renewed 24.9.31).—In (A) the ground body is mixed with a solution of paraffin wax in CCl₄, and in (B) the body is ground with a solution of a mixture of paraffin and carnauba (or other) waxes in CCl₄; the mixtures are then dried, ground, pressed, and fired.

J. A. S.

Ceramic material and manufacture of ceramic articles. W. J. SCOTT, Assr. to WESTERN ELECTRIC CO., INC. (U.S.P. 1,847,196, 1.3.32. Appl., 8.1.30).—The body for moulding under pressure (e.g., talc + clay) is ground with a solution of paraffin wax in CCl₄, dried, broken up, sieved, and the separated granules are coated with a lubricating soap (e.g., Na, K, or Zn stearates, palmitates, etc.) before being fed to the press or hopper. No pressing oil is necessary.

J. A. S.

Manufacture of tools and implements of aluminium oxide. T. F. HARGREAVES. From SIEMENS-SCHUCKERTWERKE A.-G. (B.P. 382,071, 28.10.31).—Al₂O₃ of great purity is made plastic by the addition of a mineral acid (HCl) without a binding medium, is

moulded by casting, and then sintered at > 1600° in an area free from C, in a single working process. F. Y.

Production of refractory substances. A. SPRENGER (B.P. 382,014, 25.8.31. Ger., 25.8.30).—A highly slag-resisting refractory is made by fusing (electrically) suitable raw materials so that the product contains 80% Cr₂O₃ + Al₂O₃ + MgO + Fe₂O₃ in proportions conforming to the spinels MgO, Cr₂O₃, FeO, Cr₂O₃, MgO, Al₂O₃, and FeO, Al₂O₃ and with the ratios MgO:FeO 4:1, Al₂O₃:Cr₂O₃ > 8.5:1, the remainder of the material containing > 11% SiO₂.

J. A. S.

Manufacture of [refractory] articles of zirconium oxide. E. RYSCHKWITSCH, Assr. to ROESSLER & HASSLACHER CHEM. CO. (U.S.P. 1,847,101, 1.3.32. Appl., 18.6.28. Ger., 29.6.27).—Plastic masses prepared from ZrO₂ and non-metal halogen compounds which are volatile or yield volatile products on hydrolysis (e.g., SO₂Cl₂, NH₄F, AcCl, BzCl, NH₂Ph, HCl), with the addition, if necessary, of H₂O, are moulded and fired.

L. A. C.

Spalling-resistant, refractory and chemically neutral brick. G. M. CARRIE, J. W. CRAIG, F. E. LATHE, and A. C. HALFERDAHL (B.P. 381,981, 25.7.31. Can., 31.1.31).—A mixture of 15—50% of chrome-Fe ore and 50—85% of dead-burnt MgO clinker (containing 5—25% CaO) is fired at cone 16—17. The coarser (> 28-mesh) particles of the mixture are wholly or in part the chrome-Fe ore.

J. A. S.

[Continuous] manufacture of glass tubes and similar products. N. V. MAATS, TOT BEHEER EN EXPLOIT. VAN OCTROOÏEN, and L. S. VELLO (B.P. 383,146, 14.3.32. Fr., 17.3.31).

Machines for shaping articles of silica or the like. BRIT. THOMSON-HOUSTON CO., LTD., Asses. of I. F. HOOPER, B. F. NIEDERGESASS, and P. K. DEVERS (B.P. 383,219, 24.6.32. U.S., 24.6.31).

Pure opacifiers.—See VII. **Rubber goods [for sand-blasting glass].**—See XIV.

IX.—BUILDING MATERIALS.

Influence of calcium aluminates and ferrites on the properties of Portland cement. J. KONARZEWSKI (Przemysł Chem., 1932, 16, 186—188).—Cements consisting of CaO, SiO₂, and Al₂O₃ set faster than those consisting of CaO, SiO₂, and Fe₂O₃. Cements containing Fe₂O₃ set as ordinary Portland cement, and the product possesses a high crushing strength. R. T.

Formation of calcium silicates, aluminates, and ferrites in the process of burning Portland cement. J. KONARZEWSKI (Przemysł Chem., 1932, 16, 165—185).—The velocity of reaction between CaCO₃ and acidic oxides increases in the order Al₂O₃ < SiO₂ < Fe₂O₃. Al₂O₃ catalyses the reaction between CaO and SiO₂ only at temp. at which a liquid phase exists, whilst Fe₂O₃ catalyses even in the solid phase. R. T.

Effect of composition of Portland cement on heat evolved during hardening. H. WOODS, H. H. STEINOUR, and H. R. STARKE (Ind. Eng. Chem., 1932, 24, 1207—1214).—An expanded account of work already noted (B., 1932, 1081). C. A. K.

Effect of cement composition on mortar strength.

H. WOODS, H. R. STARKE, and H. H. STEINOUR (Eng. News-Rec., 1932, 109, 435—437; cf. B., 1932, 1081).—Cements high in $3\text{CaO}, \text{SiO}_2$ generally develop a high early strength, the greater proportion of it within 1 month. The increase in strength after 1 month is largely attributable to $2\text{CaO}, \text{SiO}_2$, which shows an initially less rapid but more prolonged strength development than $3\text{CaO}, \text{SiO}_2$. At 6 months the strengths of cements high in (a) $3\text{CaO}, \text{SiO}_2$ and (b) $2\text{CaO}, \text{SiO}_2$ are of the same order of magnitude. The influence of other constituents is exerted within 1 month. C. A. K.

Properties of porous building materials. VI. An autographic apparatus for measuring rates of flow of water. VII. Problem of damp walls. E. MADGWICK (Phil. Mag., 1932, [vii], 14, 486—491, 491—496; cf. B., 1932, 772).—VI. An optical lever is used.

VII. The rate of deposition of H_2O on a surface is proportional to the thermal conductivity. Visible condensation occurs on painted and sized surfaces, but not on bare plaster. H. J. E.

Trichlorophenols [for wood].—See III. SiO_2 brick.—See VIII. Primers for fresh plaster.—See XIII.

PATENTS.

Binding composition, suitable for binding materials for roofs, flooring, and the like, and covering preparations produced therefrom. H. D. MURRAY, and RAGUSA ASPHALTE PAVING CO., LTD. (B.P. 382,004, 13.8.31).—Resin which has been "sweated" to reduce its acidity, or a non-acid (Ca) resinate, is mixed with a rosin oil or heavy mineral oil in quantity sufficient to yield a firm, non-brittle product fusible at $140\text{--}180^\circ$; fillers, pigments, waxes, and, when a mineral oil is used, caoutchouc, gutta-percha, etc. may also be added. L. A. C.

Production of a plastic substance for cleaning walls and the like. H. WALTER and P. BUKATZ (B.P. 382,148, 26.1.32).—Bran is stirred into boiling H_2O containing a small amount of water-glass and the mixture is kneaded; turpentine oil may also be added. H. R.-D.

Composition for reconditioning wood, abraded spike holes in rail sleepers, or for filling other holes and for similar purposes. S. KRISHNA (B.P. 382,557, 19.4.32. India, 7.9.31).—A solution of rubber in, e.g., castor oil is incorporated with sulphurised asphalt (prepared by heating asphalt, rosin, and S at about 250°), and the mixture is vulcanised by heating with S at $260\text{--}270^\circ$. L. A. C.

Sand drying apparatus. J. KUHNEN (B.P. 383,117, 1.2.32. Ger., 30.1.31).

Manufacture of [sand-faced pressed] bricks, blocks, tiles, etc. H. BOOT (B.P. 383,036, 27.10.31).

[Waste-wood] incinerator. Timber kiln.—See I. SiO_2 bricks.—See VIII. Flooring.—See XI. Soap [for road emulsions].—See XII. Floor covering.—See XIII. Paving blocks etc. Decorative rubber.—See XIV.

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

Efficiency of blast furnaces operating on low-sulphur coke. A. GOTLIB (Domez, 1932, No. 4—5, 69—73).—Economies resulting from reduction of S in coke are discussed. CH. ABS.

Polycowper (air-heating apparatus for blast furnaces). V. P. MASHOVETZ (Domez, 1932, No. 1—2, 21—26).—The stoves (3 or 4) are enclosed in one cylindrical shell. Methods of construction are proposed. CH. ABS.

Selivanov's calorimeter for determining the heat of fusion of slag. B. P. SELIVANOV, I. D. TZAREGORODTZEY, and N. P. ASEEV (Tzvet. Met., 1931, 6, No. 1, 5—16).—The apparatus and method are described. CH. ABS.

Cast iron and ammonia. A. D. GOTLIB (Domez, 1932, No. 3, 1—8).—The utilisation of blast-furnace gas for the production of NH_3 is discussed. Introduction of O_2 to reduce the amount of N_2 , and treatment with H_2O to produce CO_2 and H_2 from CO, leaving $\text{H}_2 : \text{N}_2 = 3 : 1$ after removal of CO_2 , is impracticable. CH. ABS.

Comparative investigation of acid and basic open-hearth steels. G. L. SAKHAROV and M. M. STRUSELBA (Soobshch. Vsesoyuz. Inst. Met., 1931, No. 2—3, 10—26).—A study of C, Cr, and Ni-Cr ordnance steels is made by forge tests, chemical analysis, mechanical tests, and micrographic examination. Acid steel has the better mechanical properties; the Si reduction process is preferable, since no deoxidisers are used, the sonims are smaller and spherical, and less O is present. CH. ABS.

Effect of silicon on ductility of malleable iron. N. G. GIRSHOVICH and E. K. VIDIN (Soobshch. Vsesoyuz. Inst. Met., 1931, No. 1—2, 30—33).—In hard castings tensile strength and ductility increase whilst d decreases with increase in Si; hardness is not affected. Shrinkage increases up to 0.8% Si and thereafter decreases. In tempered samples Si decreased d but did not affect tensile strength. For European malleable Fe the Si content should be from 0.4 (for low S, strongly heated metal) to 0.7% (high S, low tempering temp.). CH. ABS.

Effect of high content of silicon on cast iron. A. LE THOMAS (Compt. rend., 1932, 195, 657—660).—20 samples consisting of a cast Fe (C 3.0, Mn 0.4, S 0.01, P 0.1%) with addition of 1—10% Si were examined. Total C declined very appreciably with $> 5.68\%$ Si, but combined C fell throughout the series; with $> 7.5\%$ Si the structure is almost entirely ferrite + graphite. Hardness is a min. for approx. 5% Si; Ac and Ar rise steadily until with $> 7.4\%$ Si both are $> 1030^\circ$. Temp. of graphitisation falls rapidly at first, then slowly to a min. of about 700° for about 4% Si, and rises to 760° for 6—7%, above which it does not occur up to 1030° . C. A. S.

Cementation in molten salts. D. V. KUTUVRIN and B. I. BABICHEV (Soobshch. Vsesoyuz. Inst. Met., 1931, No. 5—6, 16—19).—Fe was treated at 700° , 850° , or 950° for 0.5, 1.2, or 3 hr. in a bath of molten BaCO_3 10, KCl 35, BaCl_2 40, and $\text{K}_4\text{Fe}(\text{CN})_6$ 15%, the

results being compared with those obtained in solid media containing KOH and C, cast Fe, or "cryptol."

CH. ABS.

Desulphurising cast iron with manganese. P. P. BERG and M. S. PSHONIK (Soobshch. Vsesoyuz. Inst. Met., 1931, No. 5—6, 66—73).—Cast Fe (C 3.15—3.32, Si 1.40—2.18, Mn 0.26—0.36, S 0.196—0.7%) was kept liquid in a cryptol furnace for 5—15 min. Equilibrium ($Mn + FeS \rightleftharpoons Fe + MnS$) is established in < 5 min. $k = [Mn][S]$ increases with rise of temp.; at 1250°, 1300°, and 1380° k is \gtrsim 0.10, 0.15, and 0.20, respectively.

CH. ABS.

Corrosion tests for unoxidisable steels. J. COURNOT (Compt. rend., 1931, 193, 1091—1093).—The results of attack of various unoxidisable Ni-Cr and Cr steels, compared with that of pure Fe, when subjected to (a) alternate immersion in and withdrawal from sea-water; (b) salt-spraying, in both cases for 10, 20, and 50 days; and (c) the perhydrol test for 1, 2, and 3 days, are compared, the losses of wt. being shown by curves. All methods are of val., the loss of wt. method showing the more uniform forms of corrosion, and the results of stamping (not given) irregular effects such as pitting. Results with (c) are less sensitive but more rapid.

C. A. S.

Influence of state of surface on corrosion of non-oxidisable steels. J. COURNOT (Compt. rend., 1931, 193, 1335—1337).—The results of the tests described previously (cf. preceding abstract) on the two steels containing 18% Cr and 8% Ni and one containing only 13% Cr are tabulated for samples the surfaces of which were (a) as manufactured, (b) sand-blasted with "40" sand, (c) pickled in 10% aq. HNO₃, and (d) and (e) polished with 00 (d) and 000 (e) emery. The results with (b) are regular but unsatisfactory, with (c) very irregular and unsatisfactory, with (d) and still more with (e) by far the best, indicating the necessity of the finest polishing to secure the best results with these steels.

C. A. S.

Corrosion tests for metals. E. HERZOG and G. CHAUDRON (Compt. rend., 1932, 194, 180—181).—A claim for priority regarding Cournot's method (cf. preceding abstracts) is made. Examples of the evaluation of the expression $\Delta F/\Delta m$, where ΔF is the diminution in rupture strength and Δm that in wt., for samples of duralumin and of soft Fe (cf. B., 1930, 105, 615, 1072) are given.

C. A. S.

Determination of loss of weight in corrosion tests. J. COURNOT and M. CHAUSSAIN (Compt. rend., 1932, 194, 1823—1824).—Suitable methods are (in the case of Fe): (a) to reduce the Fe salt formed, by Zn and boiling 20% NaOH; the reduced Fe then readily separates; or (b) to determine, by analysis of the oxide that has separated, the val. λ , i.e., the ratio wt. of Fe in such oxide to wt. of oxide, whence the loss of metal is deduced by the formula $\lambda(p + O - P)/(1 - \lambda)$, where p is the wt. of separated oxide, O that of the corroded sample (with some adherent oxide), and P the original wt. of the sample. Method (a) is to be preferred.

C. A. S.

Peculiar mode of corrosion of chromium-nickel austenitic steels. A. SANFOURCHE and A. PORTEVIN

(Compt. rend., 1932, 194, 1741—1743; cf. B., 1931, 844).—Less HCl is required to attack the steel (18% Cr, 8% Ni) the more conc. is the aq. H₃PO₄, but an attack once started proceeds with increasing velocity. The state of the surface has considerable effect with the more conc. acid. With acid of d 1.712 and HCl:H₃PO₄ = 1:790 there is a preliminary passive period, then a rapid attack, followed by slow decline of e.m.f., but the attack continues until stopped by accumulation of mixed carbides of Fe and Cr. If an attack is stopped, e.g., by washing, the sample becomes passive for some hr.

C. A. S.

Machinability of steel and cast iron. F. RAPATZ (Stahl u. Eisen, 1932, 52, 1037—1045).—The machinability of a metal is judged by the rate at which it can be turned or drilled, the appearance of the machined surface, and the power consumption. The rate of turning depends on the friction, the ease of deformation, the tensile strength, the tendency to harden with cold-work, and the presence of hard constituents, e.g., carbides. Highly alloyed steels are more difficult and automatic steels more easy to turn than would be expected from their tensile strength. The machinability of cast Fe is dependent on its hardness. High cutting speeds and high tensile strength of steel result in smooth surfaces on turning. The drilling properties of steel depend on the toughness as well as on the tensile strength.

A. R. P.

Structural changes in thin sheets of mild steel produced by annealing. W. BUSSON (Stahl u. Eisen, 1932, 52, 1045—1047).—Sheets of unkilld steel with 0.07% C and 0.3% Mn with a grain size of 600 μ^2 after normalising were cold-rolled 0—23% and annealed at 550—950° for 1—40 hr. In 20 hr. at 650° the undeformed sheet developed an extremely coarse structure, the crystals growing inwards from the surface; at higher temp. the time required for the coarse crystals to develop decreased until at 850° the new crystals were smaller than those obtained at 800°. With reductions up to 4.5% coarse crystal growth became more rapid, but above 850° grain refinement again occurred. With 4.5—13% reduction coarse grain growth began in 1 hr. at 650°, whilst with 23% reduction recrystallisation began at 550°, but at no temp. did coarse crystal growth appear. Grain refinement above 850° is attributed to the pearlite-austenite transformation. The formation of new crystals on annealing takes place at higher temp. or after longer annealing with Thomas steel than with open-hearth steel. The structure of Fe sheets obtained by various technical annealing operations and the causes of imperfections in the annealed sheet are discussed.

A. R. P.

Removal of arsenic from metal. V. V. SKORCHELLETTI and A. I. SHULTIN (Soobshch. Vsesoyuz. Inst. Met., 1931, No. 3—4, 67—71).—Addition to Fe (0.18% As) of 0.1—1.47% Ca removed 0—55.5% of the As as insol. Ca₃As₂; 0.1—1.0% Ca as an alloy containing Si 62.97, Ca 27.79, and Fe 5.98% removed 0—16.6% of the As. 1% Ca as an alloy containing Si 54.27, Ca 21.58, Al 8.62, and Fe 12.58% removed 17.6—55.5% of the As. Remelting without dearsenicisers did not affect the As content of the metal. Pb + 10% Na,

and CaCl_2 were less effective with pig Fe. With steel, CaCl_2 had a marked effect. CH. ABS.

Rapid determination of phosphorus in tungsten steels. S. M. GUTMAN and P. F. FEDOROV (Soobshch. Vsesoyuz. Inst. Met., 1931, No. 1—2, 69—70).—The steel (3 g.) is dissolved in conc. HCl + conc. HNO_3 + H_2O (1:2:2; 50 c.c.), the liquid is evaporated to a syrup, and again evaporated to 15 c.c. after addition of conc. HNO_3 (10 c.c.); after cooling, a slight excess of 25% NaOH solution is added. Fe etc. hydroxides are dissolved by warming with a little HNO_3 , and the solution is boiled for 5—10 min. with 4% KMnO_4 (5 c.c.); to the boiling solution 10% AcOH (15 c.c.) is added to dissolve MnO_2 . After cooling to 80° , the liquid is shaken with molybdate reagent for 5 min. and set aside for 1.5—2 hr. The ppt. is collected, washed 6—8 times with 1% KNO_3 solution, and titrated with NaOH . The method is applicable to alloys containing up to 7% W. CH. ABS.

Rapid determination of vanadium in steel and ferrovanadium. S. M. GUTMAN and L. N. MONYAKOVA (Soobshch. Vsesoyuz. Inst. Met., 1931, No. 1—2, 68—69).—The metal (1 g.) is dissolved in 6N- H_2SO_4 (60 c.c.), and the solution is oxidised by dropwise addition of conc. HNO_3 and H_3PO_4 (3:1, 20 c.c.), N oxides being removed by boiling. The cold solution is treated with conc. HNO_3 (50 c.c.) and evaporated to (H_2SO_4) fuming. 30% H_2O_2 is then added, with const. shaking, until the greenish-yellow liquid becomes bluish-yellow. The cooled liquid is diluted to 300 c.c. and titrated at 60 — 70° with 0.1N- KMnO_4 . CH. ABS.

Utilising third-grade Nikopolak manganese ore. A. G. ELISEEV, S. A. SAKHARUK, and P. P. SHIPALIN (Soobshch. Vsesoyuz. Inst. Met., 1931, No. 3—4, 1—10).—The tailings (16%) are mechanically conc. and smelted in an arc furnace, affording Si-Mn ($> 0.4\%$ P). CH. ABS.

Nature of flakes (white spots of minute cracks) in turbine discs. A. L. BABOSHIN, A. V. SMIRNOV, A. P. TULYAKOV, and A. I. NORMARK (Soobshch. Vsesoyuz. Inst. Met., 1931, No. 3—4, 27—36).—The flakes are closely related to dendritic inclusions. Strains along dendritic axes and in interaxial spaces during the crit.-temp. interval of cooling cause minute cracks. CH. ABS.

Action of chloride flux on oxides contained in aluminium. T. HARADA (Suiyokwai-Shi, 1932, 6, 807—816).—Molten Al containing 2.5% Al_2O_3 , after treatment with ZnCl_2 and TiCl_4 , contained 0.45% Cl_2 and N_2 decreased the Al_2O_3 to 0.8%. The action may be mechanical. CH. ABS.

Short-time annealing of aluminium strips and sheets in continuous electric annealing furnaces. H. MASUKOWITZ (Z. Metallk., 1932, 24, 236—239).—Rapid passage of Al strip through an electric furnace the walls of which are heated at 700 — 800° so that the metal is < 1 min. in the furnace has the same beneficial effect on the Erichsen val. as a short anneal at 420 — 550° ; both treatments give a val. of > 11 for 1-mm. strip and in both cases a fine-grained structure is obtained. Large-scale tests, however, show that the first-named procedure is preferable for continuous work. A. R. P.

Determination of phosphorus in aluminium. W. D. TREADWELL and J. HARTNAGEL (Helv. Chim. Acta, 1932, 15, 1023—1029).—The sample is dissolved in aq. HCl and the liberated PH_3 is carried over by a stream of H_2 to a combustion chamber in which the products (H_2O , HPO_3 , SiO_2) are condensed. The condensate is boiled with H_2SO_4 and the H_3PO_4 determined colorimetrically. F. L. U.

Precipitation-hardening [illustrated by] photomicrographs. Micrography of aluminium alloys. H. RÖHRIG (Z. Metallk., 1932, 24, 231—233).—Photomicrographs of an alloy of Al with 0.5% Mn, 1.2% Si, and 4.8% Cu are shown after various heat and mechanical treatments. From the characteristic structures it is shown to be possible to deduce the previous history of the specimen from micrographic examination. A. R. P.

Static and vibration strength of sand-cast light-metal alloys. W. SARAN (Z. Metallk., 1932, 24, 181—184, 207—210).—Static and dynamic tensile, bending, and torsion tests have been made on sand-castings of 86:12:2 Al-Zn-Cu, 94:6 and 86:14 Al-Cu, 88:12 Al-Si, KS sea-water, laural, alufont, and elektron (5:2.4:92.6 Al-Zn-Mg) alloys. In no case was any relationship found between the endurance limit in dynamic tests and the elastic limit, yield point, or breaking stress in static tests. Considering the widely different composition of the alloys tested, the endurance limits in dynamic tests were remarkably close, being 4.5—5.5 kg./sq. mm. in the bending test and 2.5—3.8 kg./sq. mm. in the torsion test. A. R. P.

Determination of zinc in aluminium and its alloys. H. WAGNER and H. KOLB (Chem.-Ztg., 1932, 56, 890—891).—Zn in Al alloys is usually determined by dissolving in NaOH , filtering, and pptg. as ZnO or ZnS or electrolysing. In either case, however, the Zn will contain some Fe if present, and for accuracy the ppt. should be redissolved and the Fe removed. C. I.

Chemical identification of additions to alloys and inhomogeneities in metallic industrial materials. M. NIESSNER (Mikrochem., 1932, 12, 1—24).—An "impression process" is described, in which the polished surface of a metal or alloy is placed in contact with a filter paper containing gelatin and some reagent which reacts with one of the phases present in the metal to form a coloured compound. By suitable choice of reagents both the nature and distribution of the inhomogeneities, whether non-metallic or metallic inclusions or intermetallic compounds, can be determined by examining the impression on the filter paper. In certain cases where the reagent reacts with one of the phases present, but forms a colourless compound, the impression can be "developed" by subsequently immersing the paper in another solution which reacts with the colourless compound to give a coloured compound. Special directions are given for the detection of S, P, and oxide inclusions in Fe and steel and for the recognition of Cu, Ni, and Co singly and in presence of each other. E. S. H.

Theory of frictional oxidation [of metals]. M. FINK and U. HOFMANN (Arch. Eisenhüttenw., 1932—3, 6, 161—164).—The dust formed by dry-rolling friction

in air of electrolytic Fe, Ni, and Cu has been shown by chemical and X-ray examination to be considerably oxidised. The production of this oxidised dust and the fact that wear and friction are much less in N_2 are explained as follows. When two metallic surfaces slide over one another the unavoidable small inequalities in the surface result in plastic deformation of the upper metal layers, whereby "loose spaces" are produced in the crystal lattices and the atoms around these spaces have a high chemical activity and are therefore readily oxidised in contact with the air. This oxidation can penetrate relatively deeply and by loosening the cohesion between the metal particles in the surface layers leads to flaking of the upper layers with the production of dust. A. R. P.

Mechanism of oxidation of copper and its alloys in liquids and their electrochemical behaviour.

L. W. HAASE (Z. Metallk., 1932, 24, 223—226).—Loosely-adherent oxide coatings or dense, non-porous protective oxide films may be produced on Cu and its alloys by aeration in neutral alkali salt solutions according to the nature of the salt and the conditions of formation. The latter type of film is produced slowly by using mild oxidising agents, e.g., air, whereas the former type is produced by more rapid oxidation with stronger oxidising agents, e.g., Cl_2 , O_3 , or H_2O_2 . Protective films are formed more rapidly in aq. Na salts than in aq. K salts. NH_4 salts form films very slowly and the process is complicated by the formation of complexes. A. R. P.

Relation between regular atomic distribution and resistance limits [of electroplated brass].

U. DEHLINGER and F. GIESEN (Z. Metallk., 1932, 24, 197—198).—Röntgenographs of electrodeposits of 60:40 brass from alkaline cyanide show that the alloy has an α -structure, but the X-ray lines are very diffuse; this diffuseness disappears on annealing at 400° for 10 min., and hence it is unlikely to be due to non-homogeneity of the deposit. The most probable explanation is that the diffuseness is caused by the minuteness of the grains in the deposit which have an average size of 150—200 Å. This would also explain the higher dissolution potential of electrodeposited brass compared with cast brass. A. R. P.

Expansion of zinc with rise in temperature.

H. SIEGLERSCHMIDT (Z. Metallk., 1932, 24, 198—200).—The inflexion in the thermal-expansion curve of Zn at 150—200° becomes less pronounced the higher is the purity of the metal and is hardly detectable in 99.99% Zn. Addition of 0.5% Cd produces a large inflexion in the curve at 200°; Pb, Fe, and Cu have similar effects, which are therefore ascribed to dissolution and reprecipitation of these metals from solid solution. A. R. P.

Hardened nickel. W. KROLL (Metall-Wirt., 1932, 11, 31—32; Chem. Zentr., 1932, i, 1818).—Ni-Mg-C alloys were prepared and the rôle of C and Mg in the binary and ternary fields was investigated. With approx. 0.6% Mg and 0.2% C 130 Brinell is reached according to the quenching, and 350 Brinell after ageing for 24 hr. at 500°. Similar but somewhat lower vals. are obtained with Mg-C-monel alloys. L. S. T.

Flowability of alloys: its relation to the solidification interval. A. PORTEVIN and P. BASTIEN (Compt. rend., 1932, 194, 850—853).—Using the same mould (cf. B., 1926, 983) and keeping the difference between the temp. of pouring and that of commencement of solidification const., flowability-composition curves for Pb-Sb and Cd-Sb alloys show that this quality varies inversely with the distance between the solidus and liquidus, and is greater where definite crystals, and less where dendrites, are formed. The curves show a distinct max. for the Pb-Sb eutectic (13% Sb), and a very sharp one for the compound CdSb. C. A. S.

Corrosion-resistance of the dental alloy "Chrogo U 42."

H. CHOULANT (Z. Metallk., 1932, 24, 263—264).—The loss in wt. in (A) 1% aq. HCl and (B) 1% aq. lactic acid containing 0.25% NaCl has been determined for 17 dental alloys comprising carat Au alloys, Ni-Cr-Fe alloys, V2A steel, monel metal, Ni brass, and Ni-Cr alloys. Chrogo U 42 (Au 39.8, Pt 0.2, Cu 45, Ni 14, and Cr 1%) lost 0.42 g. per sq. m. per day in (A) and remained unchanged in (B); its behaviour is thus much superior to that of base metals and closely resembles that of high-carat Au alloys. A. R. P.

Electrochemistry of chromium. III. Tervalent chromium.

A. V. PAMFILOV and O. S. FEDEROVA (J. Gen. Chem. Russ., 1932, 2, 208—216; cf. A., 1932, 478).—Both the yield and the quality of Cr plate obtained by electrolysis of aq. $CrCl_3$ or of alkaline aq. Cr alum are unsatisfactory as compared with that derived from solutions of Cr^{+++} . R. T.

Chromium plating on zinc.

M. DE K. THOMPSON and F. C. JELEN (Trans. Electrochem. Soc., 1933, 63, 1—8).—Zn was electroplated with Ni, Cu, Sn, or Cd, and then with Cr, and the resistances of the composite coatings to corrosion in NaCl or Na_2SO_4 solution were compared. Ni was most effective as an intermediate layer, especially when deposited from a bath containing citrate, and the "life" of the deposits increased with the thickness of Ni, but was independent of that of Cr up to 0.00014 in. Deposits of Cr on Sn or Cd, or directly on Zn, were unsatisfactory. Difficulties in depositing Cr on Ni-coated Zn were overcome by preheating the latter in boiling H_2O . H. J. T. E.

Electrodeposition of iron-cobalt alloys. I.

S. GLASSTONE and J. C. SPEAKMAN (Trans. Faraday Soc., 1932, 28, 733—740).—The composition of alloys deposited from acetate buffers of pH 3.2, 4.0, and 5.2 containing 0.4—2.0 g.-equiv. of $Fe^{++} + Co^{++}$ per litre (Fe^{++} varied from 3 to 70% of total $Fe^{++} + Co^{++}$) has been investigated at 16° with c.d. between 0.02 and 12 amp. per sq. dm. The % Fe in the deposit increased with c.d. to a const. val., which is independent of pH , and then decreased slightly at very high c.d. The deposit always contained a relatively larger proportion of Fe than the solution, but the composition is affected by stirring and the total concn. of the solution. However, at very low c.d. the deposits contained relatively less Fe^{++} than did the solutions. The results are compared with those obtained in the electrodeposition of Fe-Ni and Co-Ni alloys and are consistent with the views previously developed (cf. B., 1931, 592). J. G. A. G.

Pressure vessels. Steel tubes for fuel analysis.—See II. H_3PO_4 and corrosion.—See VII.

PATENTS.

Cyaniding furnace [for ferrous articles]. E. F. DAVIS, Assr. to WARNER GEAR CO. (U.S.P. 1,848,058, 1.3.32. Appl., 2.10.29).—Articles are caused to traverse an elongated cyanide bath by means of a horizontal screwed bar overhead from which they are suspended.

C. A. K.

Flotation apparatus. F. W. MACLENNAN, Assr. to MATLESS CELL PATENT HOLDING CORP. (U.S.P. 1,847,659, 1.3.32. Appl., 26.11.28).—An elongated flotation chamber contains a longitudinal uplift chamber through which pulp is conveyed by means of a current of air along a substantially continuous slot throughout the length of the tank. The opening of the slot is controlled.

C. A. K.

Preparation of briquettes for introducing manganese and silicon into cupola castings. H. FRAUENKNECHT (B.P. 379,994, 7.3.32).—Crushed natural oxides of Mn and Si, mixed with a reducing agent (Al) and a flux (CaO), are kneaded with cement and moulded.

H. R.-D.

Combustion-arc process [of ore reduction]. A. E. GREENE (U.S.P. 1,847,527, 1.3.32. Appl., 8.7.26).—Finely-divided ore, e.g., Fe ore, is fed into the reducing flame produced by passing a mixture of air and carbonaceous material, e.g., coal, along an electric arc.

J. S. G. T.

Production of chromium [electro-]deposit. M. GUERDIN (B.P. 379,987, 26.2.32. Fr., 28.7.31).—The electrolyte (*d* 1.21—1.24) consists of CrO_3 400 g., H_3BO_3 1 g., $H_2C_2O_4$ 1 g., H_2O to 1 litre; an alloy composed of Zn 60, Pb 30, Sb 10% serves as anode and the article to be treated forms the cathode. H. R.-D.

Preventing boiler corrosion.—See I. **Ore-reduction furnace.** Heating metal sheets.—See XI. **Ag from photographic baths.**—See XXI.

XI.—ELECTROTECHNICS.

Automatic temperature control of electric furnaces. J. SMITTENBERG (Chem. Weekblad, 1932, 29, 614—615).—A hermetically sealed N_2 -filled thermostat is used to make and break the current through a resistance placed in parallel with a second resistance in the main heater circuit. A temp. of, e.g., 300° may be maintained to within $\pm 0.4^\circ$.

H. F. G.

Distilled water for photovoltaic cells with sensitised electrodes. V. PASTEL (Bull. Soc. Chim. Yougoslav., 1932, 3, 75—84).—Distilled H_2O is preferable to aq. NaCl as the electrolyte of photovoltaic cells with oxidised Cu electrodes. H_2O may be replaced by glycerin but not by C_6H_6 . The anode, at first violet, changes colour during illumination, indicating that OH^- enters into the reaction.

R. T.

C equipment.—See I. **Analysis of NH_4 salt solutions.** Electrolysis of alkali chloride.—See VII. **Electrical porcelain.** Resistivity of refractories.—See VIII. **Cu and its alloys.** [Properties of] cold-worked metals. Electroplated brass. **Cr-plate.** Electrodeposited Fe-Co alloys.—See X.

Automatic control in factories. **Sugar-juice concn.**—See XVII.

PATENTS.

Electric furnace [for ore reduction in fused electrolytes]. H. K. MCINTYRE and G. C. COX (U.S.P. 1,849,749, 15.3.32. Appl., 4.9.24).—Separate electrode systems are provided for supplying the d.c. for effecting electrolysis and the a.c. for heating purposes, respectively.

J. S. G. T.

Electric induction furnaces [for heating metal sheets]. ELECTRIC FURNACE CO., LTD., Asses. of E. F. NORTHRUP (B.P. 382,708, 15.9.31. U.S., 24.9.30).—Metallic plate or sheet resistors, e.g., of Cu, preferably slit, are distributed between the charge sheets, the whole forming a pile arranged in parallel horizontal planes at right angles to the axis of the induction coil surrounding the furnace.

J. S. G. T.

[Three-phase] induction furnaces. HERAEUS-VACUUMSCHMELZE A.-G., and W. ROHN (B.P. 382,002 and Addn. B.P. 382,082, [A] 12.8.31, [B] 3.11.31. Ger., [A] 28.8.30, [B] 7.11.30).—The primary current flows in 3 pancake coils shaped to (A) the smelting hearth, (B) the cylindrical surface of the hearth, and (A, B) spaced 120° apart on the circumference of a circle co-axial with the furnace.

J. S. G. T.

Electric furnace resistor element. F. A. FAHRENWALD (U.S.P. 1,849,288, 15.3.32. Appl., 11.7.30).—An integral, sinuous casting comprising members of uniformly curved channel section, free from angles or abrupt deflections, is claimed.

J. S. G. T.

Electrical apparatus and electrodes therefor. SIEMENS & HALSKE A.-G. (B.P. 381,576, 7.7.31. Ger., 7.7.30).—The interstices of a lightly compressed, powdered, sintered refractory metal, e.g., W, are filled with metal or alloy of high thermal and electrical conductivity, e.g., Ag, Cu, Pt.

J. S. G. T.

Oxide [electron-emitting] cathode. F. SCHRÖTER, Assr. to TELEFUNKEN GES. F. DRAHTL. TELEGRAPHIE M.B.H. (U.S.P. 1,849,594, 15.3.32. Appl., 12.6.29. Ger., 9.6.28).—An adherent coating of a Ba compound is formed on a carrier of W mixed with Ce oxide and, if desired, La oxide, e.g., by heating Ba azide *in vacuo*.

J. S. G. T.

[Degassing the cathodes of] electron-discharge tubes. N.V. PHILIPS' GLOEILAMPENFABR. (B.P. 382,520, 8.3.32. Fr., 24.3.31).—The cathode is bombarded by electrons emitted from a substance, e.g., Ba azide, applied to one of the other electrodes.

J. S. G. T.

[Clean-up agent for] electron-discharge device. S. W. CROWLEY, Assr. to DE FOREST RADIO CO. (U.S.P. 1,849,056, 15.3.32. Appl., 14.3.30).—P and Mg are successively flashed by high-frequency currents in an evacuated discharge tube having a thoriated filament.

J. S. G. T.

Manufacture of [degassing agent for] electron-discharge devices. F. L. HUNTER, JUN., Assr. to DE FOREST RADIO TELEPHONE & TELEGRAPH CO. (U.S.P. 1,849,527, 15.3.32. Appl., 10.5.24).—A mixture of KI and Ca-Mg alloy is flashed to produce free I.

J. S. G. T.

[Control electrode of] electron-discharge tubes. IGRANIC ELECTRIC CO., LTD., Asses. of E. A. GIARD

(B.P. 382,605, 15.8.32. U.S., 15.8.31. Addn. to B.P. 367,310; B., 1932, 432).—An electrode of Ni-Ta alloy, preferably containing <30% Ta, coated with Ta oxide is claimed. J. S. G. T.

[**Electric**] gaseous-conduction device. E. E. CHARLTON, Assr. to GEN. ELECTRIC Co. (U.S.P. 1,847,927, 1.3.32. Appl., 17.7.24).—The operating voltage of a gaseous-discharge device is reduced by a filling composed of the oxide of an alkali metal, *e.g.*, Cs, an inert gas (He or Ne), and an alkaline-earth metal. J. S. G. T.

Manufacture of filaments for use as cathodes in thermionic valves. F. HANSRIG (B.P. 381,934, 2.7.31. Fr., 19.11.30).—Filaments of Au, Ag, or a Pt metal, or consisting of a refractory core, *e.g.*, of W or Ni-Cr alloy coated with Au, Ag, etc., are coated electrolytically with an adherent oxide-hydroxide mixture of alkaline-earth metals by electrodeposition at very high c.d. from a solution containing formates, *e.g.*, aq. Ba(OH)₂ together with (HCO₂)₂Ba and (HCO₂)₂Sr. J. S. G. T.

Manufacture of photoelectric cells. ELECTRICAL RESEARCH PRODUCTS, INC., Asses. of G. R. STILLWELL and C. H. PRESCOTT (B.P. [A] 381,606 and [B] 381,608, 10.7.31. U.S., 11.8.30).—(A) The support of the light-sensitive layer is first oxidised and then reduced to roughen it. (B) Hot vapour of photoelectric material, *e.g.*, Cs, produced in the cell by a chemical reaction initiated by heat, is condensed on part of the cell wall and then evaporated by baking and deposited on the electrode. J. S. G. T.

Heat-treatment of piezo-electric crystal sections. J. A. LAVALLEE, Assr. to WESTINGHOUSE ELECTRIC & MANUFG. Co. (U.S.P. 1,848,893, 8.3.32. Appl., 5.12.29).—Quartz plates are annealed at 149—538°. J. S. G. T.

Method of [ultra-violet] irradiation. C. E. BILLS, Assr. to MEAD JOHNSON & Co. (U.S.P. 1,848,305, 8.3.32. Appl., 24.3.30).—A stream of fluid, irradiated while flowing in the space between the quartz jacket of the burner of a Hg-vapour lamp and the lamp casing, is subsequently cooled and the cycle of operations repeated until irradiation is complete. J. S. G. T.

Measuring the absorption of small quantities of material by means of X-rays. C. H. F. MÜLLER A.-G. (B.P. 382,518, 7.3.32. Ger., 11.3.31).—Material to be tested is placed in a hollow metal container impervious to the rays and secured to a window of the X-ray tube. J. S. G. T.

Electrolytic cell. S. RUBEN, Assr. to RUBEN RECTIFIER CORP. (U.S.P. 1,849,436, 15.3.32. Appl., 29.4.26).—In cells having asymmetric conductivity, a filmed Al electrode (A) is enclosed in intimate contact with a thick porous cup (B), and means are provided for preventing access of electrolyte to the interface between A and B. J. S. G. T.

(A, B) **Electrolytic condensers and (B) rectifiers.** N. V. PHILIPS' GLOELAMPENFABR. (B.P. 382,886 and 382,916, [A] 2.5.32, [B] 11.6.32. Holl., [A] 2.5.31, [B] 20.6.31).—(A) One at least of the electrodes is formed of profiled-wire, *e.g.*, U-shaped, wound in helices one with the other. (B) An electrolyte composed of one or more primary and/or secondary phosphates, *e.g.*,

KH₂PO₄, dissolved in an alcohol, *e.g.*, EtOH or glycerol, and, if desired, H₂O (10%) is claimed. J. S. G. T.

Manufacture of electric condensers. G. WASHINGTON, JUN. (U.S.P. 1,850,298, 22.3.32. Appl., 20.7.27).—A condenser comprising an anode of Al foil coated with a cryst. deposit of (NH₄)₃PO₄, borax, and Al, produced electrolytically, a moist film of aq. (NH₄)₃PO₄ and borax, separated from the cryst. deposit by a thin film of gas evolved electrolytically, and a cathode of Sn foil is claimed. J. S. G. T.

Incandescence electric lamps. B. ARAKAWA and T. ONO (B.P. 382,786, 30.11.31. Jap., 29.11.30).—A metal cap is secured to the bulb by a conducting paste composed of powdered Sn or C (1 pt.), PbO (2 pts.), and glycerin. J. S. G. T.

Generation of electrical potential. S. RUBEN, Assr. to RUBEN PATENTS Co. (U.S.P. 1,847,670—1, 1.3.32. Appl., [A] 6.3.30, [B] 9.12.30).—(A) A jet of Hg is discharged into an alkali metal, *e.g.*, K, in an inert gas, the jet and alkali metal being connected in an external conducting circuit. (B) Apparatus for carrying out the above process is claimed. J. S. G. T.

Electric dry batteries. E. GROOVE (B.P. 381,908, 22.6.32. Ger., 22.6.31).—A Zn container with an outer covering of Pb is claimed. J. S. G. T.

Apparatus for electrical treatment of gases. WHESOE FOUNDRY & ENG. Co., LTD., and A. G. GRANT (B.P. 381,631, 23.7.31).—The nest of treating passages for pptn. of suspended particles is surrounded by a jacket through which the gases pass before being treated. J. S. G. T.

Electrical precipitator [for gases]. F. SEIPP, Assr. to INTERNAT. PRECIPITATION Co. (U.S.P. 1,848,579, 8.3.32. Appl., 29.3.30. Ger., 28.5.29).—The ends of the collecting electrode pipes are designed and arranged to facilitate mounting and interconnexion of the pipes and to reduce electrical disturbances thereat. J. S. G. T.

Testing [the efficiency of] catalysts. L. F. CURTISS (U.S.P. 1,849,911, 15.3.32. Appl., 2.4.29).—A potential difference is applied between two electrodes mounted in an atm. ionised by radioactive material or X-rays, one of the electrodes being coated with catalyst, and the electrical surges in a circuit including the electrodes are measured. J. S. G. T.

Impregnation of electrical conductor [coil] insulations. J. T. GOFF, Assr. to WESTINGHOUSE ELECTRIC & MANUFG. Co. (U.S.P. 1,848,344, 8.3.32. Appl., 22.9.30).—Fibrous insulating wrapping is heated under reduced pressure to remove air and moisture, impregnated with a solution of a gum in a vegetable drying oil in a non-oxidising atm., *e.g.*, CO₂, and drained at 125—150° in the same atm. J. S. G. T.

Manufacture of hard or highly viscous [electrical insulating] materials. W. T. HENLEY'S TELEGRAPH WORKS Co., LTD., and H. A. TUNSTALL (B.P. 381,716, 3.10.31).—A mixture (100 pts.) containing rosin (15—40%), petroleum pitch (40/50 penetration grade, 15—35%), and transformer oil (35—50%) is added to 3—24 pts. of a hardening paste containing Ca(OH)₂ (50%) and transformer oil (50%). J. S. G. T.

Resistor [having negative temperature coefficient]. C. A. NICKLE, Assr. to GEN. ELECTRIC CO. (U.S.P. 1,847,888, 1.3.32. Appl., 9.8.29).—A self-reducing resistor composed of Te, heated and compressed, is claimed. J. S. G. T.

Filling substance [for electric insulating materials, flooring, etc.]. G. A. NEUBAUER (B.P. 379,992, 4.3.32. Ger., 4.3.31).—Ground coffee shells is used as filler in the pressed mixture. H. R.-D.

Mercury-vapour rectifiers. A.-G. BROWN, BOVERI & Co. (B.P. 382,932, 2.8.32. Ger., 30.7.31).

Capless electric incandescence lamps or discharge tubes. N. V. PHILIPS' GLOEILAMPENFABR. (B.P. 381,837, 2.3.32. Holl., 3.3.31). J. S. G. T.

Reactions apparatus. Scale prevention.—See I. **Emulsion cutting.**—See II. **Ceramic insulators.**—See VIII. **Ore reduction. Cr-plate.**—See X. **Insulating materials.**—See XIII. **Rubber goods [by electrodeposition]. Rubber products.**—See XIV. **Photographic baths.**—See XXI.

XII.—FATS; OILS; WAXES.

Edible animal fats. Industrial treatment, uses, and economic survey. R. LECOMTE (Mem. Soc. Ing. Civ. France, 1932, 85, 522—550).—A survey of the French margarine industry is included. E. L.

Edible animal fats. Physical and chemical constitution of fats from the physiological viewpoint. C. WOLF (Mem. Soc. Ing. Civ. France, 1932, 85, 507—521).—The physical and chemical characteristics and composition of edible tallows, lard, and hardened whale oil are outlined. Oxidation and rancidification are considered briefly. E. L.

Deer (roe) tallow. J. PRITZKER and R. JUNGKUNZ (Pharm. Acta Helv., 1932, No. 7, 4 pp.).—The characteristics of two authentic samples of deer fat were: m.p. 43—46°, n (calc. to 40°) 46.5—46.7, acid val. 1.6—1.8, sap. val. 195.8—196.4, I val. (Hanus) 38.2—38.9, Reichert—Meissl val. 0.77, Polenske val. 0.6, unsaponifiable matter 0.15%, Bömer diff. no. 65, m.p. of fatty acids 48—51° saturated fatty acids (Bertram) 51.5—57.3% (on fat), "isoleic acid" (Grossfeld) 2.8—4.6% (on fat), arachidic acid absent. The fat appears to contain little or no myristic acid, but otherwise resembles goat fat (cf. B., 1932, 805). E. L.

Centrifugal extraction of palm oil at Serdang. C. D. V. GEORGI (Malay. Agric. J., 1932, 20, 446—459; cf. B., 1932, 39).—Satisfactory methods of sterilising and digesting the fruit before centrifugal removal of the oil are detailed, 88—89% of the oil in the fruit being recovered. The "nuts," separated from the residual pulp by screening, yielded satisfactory kernels, and the fibrous pulp, retaining about 10.5% of the oil originally present, was used for fuel without further treatment. E. L.

Bleaching of palm oil by air. E. I. BETTER (Allgem. Oel- u. Fett-Ztg., 1932, 29, 486—491; cf. B., 1932, 776).—On blowing the oil with air at 110—115°, the red colour was succeeded by a yellow-green, which gradually fades; further oxidation caused darkening. From about the same point, the active-O no. (Lea) and

the intensity of the Kreis reaction (which had increased steadily during blowing) slowly diminished. No characteristic spectral absorption appeared. Treatment with alkali produced a re-darkening in peroxidised bleached oils, but did not degrade the colour of an unusual bleached oil which gave no Kreis reaction. Hence blowing should be performed for the min. of time necessary to reduce the colour, in order to avoid peroxidation of the fat itself. Bleached fats had a softer consistency than the original fats. E. L.

Examination of curcas seed and oil [from *Jatropha Curcas*, L.]. (MLLE.) S. DROIT (Bull. Mat. Grasses, 1932, 16, 270—273, and Thesis, Paris, 1932).—Commercial samples of hot-expressed oils and laboratory-extracted oils had, respectively: sap. val. 188—190, 176—180; I val. 93, 97—98; Ac no. (André) 6.4—9.6, 4—8; n^{15} 1.4720—1.4730; flash and ignition points (Luchère method) 247°, 395°. The oil is non-drying and optically inactive; on heating, the characteristics change but little, but the oil becomes more viscous and is sol. in mineral oils. Stearic, palmitic, myristic, oleic, and linoleic acids are present, but no OH-acids could be detected. The oil contains a toxic (resino-lipoid) principle, which can be conc. in an alcoholic extract of the oil; neither the fatty acids nor the "unsaponifiable matter" (a phytosterol, m.p. 135°, and a resinous substance) obtained by the saponification of this fraction exhibited toxic properties when examined separately. Another toxic principle, "curcine" (a toxalbumin), remains in the seeds after removal of the oil. A full histological description of the seed is given in the thesis. E. L.

Detection and determination of certain special oils [added to edible fats]. H. SCHMALFUSS and H. WERNER (Z. Unters. Lebensm., 1932, 64, 362—367).—A brown, gummy oil used as an addition to edible fats had n_D^{20} 1.467, sap. val. 205, I val. (Hanus) 51, acid val. 3.0, Reichert—Meissl val. 7.5, and Polenske val. 8.7. It was sol. in most org. solvents but only sparingly so in light petroleum (b.p. 30—50°), and the presence of a cloudiness or of brown masses on addition of 15 c.c. to 1 g. of edible fat indicates > 1% of the oil; the filtered insol. may be dried in N₂ and weighed, and the oil content deduced from the curve given. The insol. contains no ash, N, or S and is completely saponifiable, the soap yielding a partly volatile and partly light petroleum-sol. acid (mean mol. wt. 256). J. G.

Semi-micro data for butter fat and cacao butter. J. GROSSFELD (Z. Unters. Lebensm., 1932, 64, 433—460).—A semi-micro method for the determination of (B) the butyric acid val. (cf. B., 1928, 90; 1931, 399, 652, 1017) for 0.5 g. of sample is described, in which saponification is assisted by addition of EtOH, and the formation of KOAc is avoided by evaporation with glycerol. Modifications are also introduced to inhibit loss of PrCo₂H as the volatile Et ester, and special apparatus is described for each operation. The "total val." (T) is the c.c. of 0.01N-NaOH corresponding with the fatty acids in 0.5 g. of sample not pptd. by MgSO₄, and the "residual val." (R) = B - T. T is determined by saponification as above, removal of the EtOH by evaporation, addition of 1.5% MgSO₄ to a

solution of the residue in 50 c.c. of H_2O , and titration of the distillate obtained from the filtrate; it gives greater vals. than any other expressions of lower fatty acid content, and is a reliable const. Numerous data for T and R are given (butter fat 39.7, 19.3; cacao butter 38.0, 37.1; lard 0.3, 0.2; cacao fat 0, 0, respectively). From these vals. it is shown that for mixtures which contain butter fat (x) and cacao butter (y), $x = 5.12B - 0.12R$, and $y = 2.77R - 2.63B$, the accuracy of results obtained (*e.g.*, for cacao fat and lard) from these formulæ being 1–2%; corrections, which are tabulated, should be applied for residual lauric acid (L). Decoic acid (%) may be calc. from the formula: $(614 - 8.075k + 3.91B + 1.48C - 1.72L)$, where k is the $KClO_4$ val. of the mixture of K salts, and C the hexoic acid content (*cf. loc. cit.*). Further, $L = 3.3(U - 0.7B - 0.6R - 197)$, where U is the sap. val. (*loc. cit.*) and has the mean vals.: cacao butter 126, palm-kernol oil 123, butter fat 11. The product RL is also a useful indication of x or y , being 209 and 4862, respectively. J. G.

Test for cacao and butter fat. R. STROECKER (Z. Unters. Lebensm., 1932, 64, 392–393).—If 5 g. of clear, filtered lard containing > 5% of cacao butter or of margarine containing > 10% of butter fat are mixed with 20 c.c. of 0.5*N*-KOH in EtOH at 20°, and if after 15 min. the EtOH is removed on the H_2O -bath, then the ester of lauric or butyric acid, respectively, is detectable in the residue by its odour. The test is applicable to the detection of these fats in confectionery; sesamé and ground-nut oils and hardened cacao and butter fats give negative results. J. G.

Cacao butter and the quartz [mercury-vapour] lamp. E. A. MAUERSBERGER (Chem.-Ztg., 1932, 56, 861–862).—The fluorescence of cacao butters under ultra-violet light is unreliable as an analytical criterion. Crude extracted butters have a normal fluorescence, but may show a brilliant white fluorescence after refining; this appears to be due to the formation of metal soaps by interaction of traces of alkali soap in the refined fats and the bleaching earth used. Traces of metal soaps are probably responsible for the variable fluorescence of expressed butters. E. L.

Significance of the carboxyl group of the fatty acids for the industry of textile aids [wetting etc. agents]. H. STADLINGER (Chem. Umschau, 1932, 39, 217–220).—A review of the methods adopted to “block” the reactive CO_2H group in washing and wetting agents (sulphonated oils etc.), with especial reference to the sulphonated fatty alcohols. E. L.

Fat-hardening without hydrogen? J. DAVIDSOHN (Allgem. Oel- u. Fett-Ztg., 1932, 29, 545–546).—Samples of sesamé and arachis oil hardened by a new process (patent applied for; details unknown) without the use of H_2 had, respectively: m.p. 44° (unsharp), 35°; I val. 85, 64; unsaponifiable matter 7.09% (m.p. 48°), 8.15% (m.p. 52°). The unsaponifiable matter was waxy in appearance and consisted mainly of alcohols, with only small amounts of hydrocarbons. E. L.

Study of edible oils, and detection and determination of arachis oil in sesamé oil. G. BENZ (Z. Unters. Lebensm., 1932, 64, 486–491).—Various

methods are compared. The Adler-Lüers qual. test and Bohrisch's quant. method (separation of K salt of arachidic acid) are dependent on the temp. of separation. The Tortelli-Ruggeri method (separation as Pb salt) gives quant. results if the separation of palmitic and stearic acids is avoided by use of a temp. $\leq 16^\circ$; microscopical examination will distinguish arachidic acid (pearly appearance) in admixture with these acids. J. G.

Iodine values of drying oils, with especial reference to the “rapid” [Margosches] method. R. KLATT (Chem. Umschau, 1932, 39, 225–226).—The Margosches method for the determination of I val. can be applied satisfactorily to drying oils by using 10 c.c. of a mixture of Et_2O and $COMe_2$ (1:2) or EtOH and amyl alcohol (1:4) in place of the EtOH in the original method. E. L.

Castor oil and Turkey-red oil in the soap industry. J. GROSSER (Allgem. Oel- u. Fett-Ztg., 1932, 29, 546–550, 553).—The use of these materials in soaps and in the textile and leather industries is reviewed. E. L.

Sample of castor oil 135 years old. N. EVERS (Pharm. J., 1932, 129, 372).—The acid val. and rotation were high. A. A. L.

New waxes and their industrial application. G. FRIEDERICHS (Farben-Chem., 1932, 3, 413–416).—An account is given of the properties and various technical uses of new synthetic waxes. “Lanette” waxes consist mainly of mixtures of palmityl and stearyl alcohols. With an emulsifying agent they readily form aq. emulsions which can also stabilise aq. emulsions of paraffins, oils, fats, and other waxes; the palmitic esters can substitute spermaceti. Comparison of several “I-G.” waxes with carnauba wax and beeswax (vals. are tabulated) shows that the first possess higher m.p., d , acid, sap., and ester vals., but lower unsaponifiable content; I-G. “S” wax can substitute stearin in the manufacture of candles. Aq. dispersions or snow-white emulsions of monohydric alcohols which have high mol. wts. can be made with addition of soaps, Turkey-red oil, or other emulsifying agent. S. M.

High vacua.—See I. **Drying oils.**—See XIII. **Insecticides.**—See XVI.

PATENTS.

Manufacture of soap. P. PANOFF (B.P. 382,291, 24.4.31).—A finely-dispersed colloidal prep. of sifted and partly dried sea-mud is incorporated with soap. [Stat. ref.] E. L.

Production of liquid soaps. DEUTS. HYDRIERWERKE A.-G. (B.P. 382,516, 3.3.32. Ger., 29.9.31).—The K soaps of the lower homologues (C_{12} – C_{16}) of oleic acid (obtained, *e.g.*, by fractional distillation of the fatty acids of sperm-whale oil) yield clear, stable, aq. solutions which remain liquid without further additions. E. L.

Manufacture of soap compositions. A. JACOBI A.-G. (B.P. 382,846, 4.3.32. Ger., 23.3.31).—Soft soap is mixed with up to 17% of starchy material (*e.g.*, potato flour) and powdered NaOH is finally added, producing a dry homogeneous powder suitable for use as a cleanser,

or, particularly, as an emulsifier, *e.g.*, for road-making emulsions. E. L.

Detergent. A. MOSCOWITZ (U.S.P. 1,847,437, 1.3.32. Appl., 24.10.29).—The composition comprises 50–70% of K and triethanolamine soaps (preferably of oleic acid), the triethanolamine soap forming 40–75% of the total soaps (dry basis), < 4% of H₂O, and sufficient EtOH. (or MeOH or PrOH) to render the detergent transparent. E. L.

Improving the taste and smell of fish oils. I. G. FARBENIND. A.-G. (B.P. 382,060, 21.10.31).—Hydrogenation of the oil at 50–100° over a non-noble metal (*e.g.*, Ni) catalyst to a very slight extent, *e.g.*, H₂ absorption of the oil = 10–20 litres/kg., removes odour without reducing the vitamin content. E. L.

Extractor for vegetable etc. materials.—See I. **Hydrocarbon gel.**—See II.

XIII.—PAINTS; PIGMENTS; VARNISHES; RESINS.

Primers for freshly plastered surfaces. H. A. GARDNER, L. P. HART, and J. R. STEWART (Amer. Paint & Varnish Manufrs.' Assoc., Feb., 1932, Circ. 405, 1–17).—A series of tests on the efficiency of different types of primer in the coating of plaster panels, the plaster, backing, and conditions being varied, is described. Imbedding the panels in wet sand was found to be a more useful test than drawing moisture through the panels in a humidity cabinet. The performance of the various primers and sealers is tabulated, together with composition, can stability, brushing properties, penetrative power (on newspaper and blotting paper), hiding power, and brittleness. Although the general conclusion reached is that large-scale trials of recommended products by manufacturers or consumers are essential, it is considered that the effects of free CaO in plaster are usually nominal and that mechanical and optical effects, *e.g.*, CaO cracks, uneven absorption spots, are more significant. Conflicting views as to the sealing and hiding powers, and consistency desirable for plaster primers, are summarised. S. S. W.

Quick-drying house paint tests and graphic method of recording defects. H. A. GARDNER and L. P. HART (Amer. Paint & Varnish Manufrs.' Assoc., Feb., 1932, Circ. 406, 18–79).—A further inspection of a series of exposures described earlier (B., 1931, 260 etc.) is reported, and results are illustrated by photograph and superimposed photomicrograph in each case. The condition of the various paints after 1 year's can storage is also described. The following are among the conclusions drawn: quick-drying paints based on bodied tung oil–linseed oil mixtures are favourably commented on; “glyptal” type compositions will have their widest application in the field of solid colours, but adverse ageing phenomena indicate the need for precaution in manufacturing processes; brushing properties of “varnish paints” seem to be inferior to linseed oil paints; nitrocellulose compositions and paints containing large amounts of Pb tungate give unsatisfactory results. S. S. W.

Aluminium paints. H. A. GARDNER (Amer. Paint & Varnish Manufrs.' Assoc., June, 1932, Circ. 412, 181–207).—Available information on Al paints is

summarised as abstracts of the literature on heat radiation, effect on evaporation losses, light-reflection vals., painting of metal, priming of wood, etc. In a general discussion, the limitations of Al paints are stressed. S. S. W.

Yellowing of some protective coatings. A. W. VAN HEUCKEROOTH (Amer. Paint & Varnish Manufrs.' Assoc., Mar., 1932, Circ. 407, 80–103).—The effects of different pigments, oils, driers, resins, and plasticisers on the yellowing of coatings were observed, and the influence of three sets of conditions, viz., (a) dark–moist heat (30°), (b) indirect light, normal humidity and temp., and (c) dark–moist cold (–20°), was also studied. The results are tabulated and discussed, the following points being of main interest: nitrocellulose combinations show less tendency to yellow than oil–pigment and oil–pigment–resin combinations; Pb driers impart less surface drying and yellowing than do Mn and particularly Co; pigments of greatest opacity, *e.g.*, Ti compounds, generally show least yellowing and vice versa; refined sunflower oil and blown soya oil are distinctly resistant to yellowing; in plasticiser investigations, the phthalates as a whole yellow but little. S. S. W.

Flocculation, dispersion, and settling of pigments in relation to adsorption. L. W. RYAN, W. D. HARKINS, and D. M. GANS (Ind. Eng. Chem., 1932, 24, 1288–1298).—Comparison of the vols. of a pigment when suspended in pure dry C₆H₆ and in very dil. solutions in C₆H₆ gives a measure of the settling, flocculative, or dispersive effect produced by the solute. Tabulated data for several white pigments when suspended in C₆H₆ and in other non-polar solvents containing various small proportions of oleic acid, stearic acid, metallic soaps, etc. show that when the solute mole. contain both polar and non-polar groups, the pigment particles adsorb on their surface a unimol. film of the solute which causes max. settling. No advantage is obtained by increasing the concn. of such solute beyond approx. 0.003 equiv. per 1000 g. of C₆H₆. The settling effect resembles the total heat of immersion of the pigment (cf. B., 1930, 1038) in that it is controlled by the polarity of the groups present in the mols. of solute or pure solvent, a large no. of which were examined; non-polar liquids give flocculated suspensions of large vol. and low heats of immersion. The addition of H₂O to these suspensions increases the flocculation, but the increase is least with liquids or solutes the mols. of which contain strong polar groups. The greater the concn. of the polar solute, the greater is the amount of H₂O generally necessary to overcome its effect. It is concluded that the settling is not a simple function of wetting. The adsorptive capacities of the various pigments used do not differ widely and are dependent on the fineness of the sample. The orientation and packing of the adsorbed mols. at the solid–liquid interface are discussed and methods of preparing and manipulating extremely dry pigments and liquids are described. S. M.

Surface forces of pigments. H. GERET (Farben-Ztg., 1932, 38, 99, 127–129).—Klump's views on the behaviour of pigments in paints (B., 1932, 687) are criticised. From consideration of MeOH vapour adsorption,

settling vols., and the influence of traces of wetting solvents on the latter, a range of pigments examined are classified as oxophilic or carbophilic and shown to possess sp. physico-chemical surface forces which control solvent-sheath formation (with polar and non-polar solvents) and agglomeration. On these factors depend painting characteristics, film formation, and hardening, etc. Durability and weather-resistance, on the other hand, depend on such factors as chemical disintegration of pigment and/or vehicle by O_2 , fumes, etc., influence of pigment on photochemical reactions, H_2O absorption, swelling, etc. A series of 2-year exposures under contrasting weather conditions are described and the results tabulated. Cr pigments give particularly satisfactory durability. S. S. W.

Light-sensitivity of nitrocellulose films. W. M. MÜNZINGER (Chem.-Ztg., 1932, 56, 851—852).—The presence of plasticisers accelerates the photochemical changes to which nitrocellulose films are subject, causing yellowing and brittleness, accompanied by decrease of solubility in Me_2O , CO_2 , and other org. solvents. Nitrocellulose lacquer films containing a comprehensive range of plasticisers were irradiated with ultra-violet light (Hg-vapour lamp), and whilst only relatively slight changes are visible in normal light, the fluorescence under filtered ultra-violet light changes considerably; thus with castor oil and tolyl phosphate changes from light blue to grey, and violet to brown, respectively, were noted. The changes are tabulated for the plasticisers tested. Plasticisers do not have a similar adverse effect on cellulose acetate. S. S. W.

Evaluation of physical tests in respect to durability of plasticised nitrocellulose films. A. W. VAN HEUCKEROTH (Amer. Paint & Varnish Manufs.' Assoc., May, 1932, Circ. 411, 172—179).—Current views on the relationship between ultra-violet light transmission and durability of nitrocellulose lacquers are summarised. The following properties of a series of lacquers containing a representative range of plasticisers were observed: ultra-violet transmission spectra, yellowing, tensile strength and elongation, flexibility, permeability, and hardness. Films transmitting the least ultra-violet light proved durable under accelerated weathering (C arc) tests, and tallied with normal exposure experience. No correlation with the other physical properties was possible. S. S. W.

A factor in rosin coloration. J. A. HALL (Ind. Eng. Chem., 1932, 24, 1247—1249).—Pine resins contain small proportions of reactive secretions which must be removed by agitation with hot H_2O to obtain a pale rosin. The discoloration is increased by oxidation or decomp. of these compounds. S. M.

Phenol-formaldehyde resinification. II. J. NOVÁK and V. ČECH (Ind. Eng. Chem., 1932, 24, 1275—1276; cf. B., 1928, 719).—Control of the resinification process by following changes in the n , η , and Br vals. is shown to apply to the rapid reaction which takes place between $PhOH$ and ozonised CH_2O . This resinification is of acid type. S. M.

Comparative studies of the hardening process for shellac and phenol-formaldehyde resins. W. NAGEL and E. BAUMANN (Wiss. Veröff. Siemens Konz., 1932, 11,

No. 2, 99—113).—The reaction mechanism for the hardening of shellac and of $PhOH-CH_2O$ resins is due to the formation of larger mol. aggregates, and only in the case of shellac, in which a very small quantity of H_2O is eliminated, is there evidence of chemical reaction. A new formula for shellac resin is put forward. The dependence of the hardening of shellac on time, temp., and pressure is shown in numerous tests, which exhibit the effect of the non-resinous components. $PhOH-CH_2O$ resin was not softened by the treatment described.

A. J. M.
Carbamide-formaldehyde condensation and polymerisation products. E. B. DE CHESNE (Kolloid-Beih., 1932, 36, 387—428).—Experiments are described on the condensation and polymerisation of these products, especially in relation to the change in $[H^+]$ and viscosity. In the first stages $NH_2 \cdot CO \cdot NH \cdot CH_2 \cdot OH$ and methylene-carbamide (composition variable) are formed and have been isolated together with another substance of unknown composition. The condensation products are unstable and are transformed spontaneously into polymerisation products; the presence of catalysts (H^+) or rise of temp. accelerates this change. All the products formed at any stage appear to be complex mixtures and cannot be separated into chemical individuals. Mol.-wt. determinations cannot be made by the usual methods. Photomicrographs of the products have been obtained. The polymerised products behave as electronegative, highly solvated colloids. X-Ray examination indicates an amorphous structure for the end-products. Oxidation of the end-product with H_2O_2 gives a substance $C_6H_{12}O_6N_4$ and treatment with $NaOH$ gives NH_3 and NH_2Me . The end-product is believed to consist of thread-like, highly-polymerised mols. E. S. H.

Drying oils. XVI. X-Ray study of some natural and synthetic varnish resins. G. F. BEAL, H. V. ANDERSON, and J. S. LONG (Ind. Eng. Chem., 1932, 24, 1068—1072; cf. B., 1931, 893).—X-Ray diffraction patterns obtained with Cu and Mo radiation from a variety of resins are described (cf. Mahadevan, A., 1930, 1504). E. L.

Viscosity [of lacquers].—See I. **Anti-crease materials.**—See VI. **Tung-seed oil.**—See XII.

PATENTS.

[Zinc-free titanox] paint. A. H. SABIN, Assr. to TITANIUM PIGMENT Co., INC. (U.S.P. 1,847,539, 1.3.32. Appl., 9.10.26. Renewed 30.6.31).—A paste of raw linseed or other drying oil and titanox, free from ZnO , is mixed gradually with nitrocellulose solutions in usual solvents and the bulk of the oil containing a drier is then added. S. M.

Manufacture of white lead [sulphate] pigment. W. E. NEWNAM and J. MCCALLUM, Assrs. to NAT. LEAD Co. (U.S.P. 1,847,358, 1.3.32. Appl., 14.11.27).—A pure Pb matte, made by heating refined Pb with S in a closed chamber to 204—314° (S content being 67—110% of that of natural galena), is powdered and volatilised rapidly and completely at 1370°, and then oxidised under controlled conditions at 650—760°, normal $PbSO_4$ or a basic sulphate of any desired degree of basicity being obtained. S. S. W.

Manufacture of a red pigment of iron oxide. E. RENKOWITZ, Assr. to STAHL-CHEMIE GES.M.B.H. (U.S.P. 1,848,660, 8.3.32. Appl., 5.12.30. Ger., 11.7.30).—Rust or natural or artificial Fe oxides which contain $> 18\%$ of combined H_2O are wetted with a dil. solution of a ferric salt or an acid and heated to $130\text{--}150^\circ/3\text{--}6$ atm., with or without small proportions of S. The product is not calcined. S. M.

High-colour carbon black. W. B. WIEGAND (U.S.P. 1,848,213, 8.3.32. Appl., 7.9.29).—Addition of 1—5% of a stable amine, e.g., triethanolamine, a guanidine soap, or a substituted guanidine, improves the dispersion of C black in lacquer, paint, etc. H. E. T.

[Red] ink. W. D. HUFFMAN, Assr. to GEN. MOTORS CORP. (U.S.P. 1,848,077, 1.3.32. Appl., 11.5.29).— H_2O -sol. eosin, HCO_2H , an alkali, and glycerin are mixed together in H_2O . S. M.

Synthetic resin coating material. J. M. TAYLOR, Assr. to CONTINENTAL-DIAMOND FIBRE CO. (U.S.P. 1,848,913, 8.3.32. Appl., 18.6.26).—A hardened synthetic resin is ground into a drying oil or varnish. S. M.

Coating compositions. BRIT. THOMSON-HOUSTON CO., LTD., Asses. of C. S. FERGUSON (B.P. 382,861, 14.3.32. U.S., 13.3.31).—Xylenol is caused to react with an aldehyde, e.g., paraformaldehyde, an ethanolamine, and a drying oil, e.g., tung oil at $110\text{--}115^\circ$, and the clear resin produced is dissolved in, e.g., solvent naphtha. S. S. W.

Manufacture of coating compositions. (Miss) A. THIELMANN (B.P. 382,147, 25.1.32. Ger., 18.5.31. Addn. to B.P. 380,693; B., 1932, 1041).—In place of the depolymerised vulcanised soft rubber, crude rubber, depolymerised only slightly above its m.p., is used. S. S. W.

Pyroxylin composition. R. CALVERT, Assr. to VAN SCHAACK BROS. CHEM. WORKS, INC. (U.S.P. 1,848,105, 8.3.32. Appl., 10.11.27).—The use of hydroxyacetals, e.g., aldol dimethylacetal, as high-b.p. solvents in nitrocellulose lacquers is claimed. These show good solvent power without excessive "lifting" tendency. S. S. W.

Manufacture of decorated material. A. F. CAPRIO, Assr. to CELLULOID CORP. (U.S.P. 1,848,158, 8.3.32. Appl., 26.2.29).—The use of oxanilide in cellulose ester lacquers or plastics, giving "pearl" and other lustrous effects, is claimed. S. S. W.

Manufacture of artificial resins, moulding compositions, and artificial masses by condensation of dicyanodiamide with formaldehyde. K. RIPPER (B.P. 382,271, 9.7.31. Austr., 30.7.30. Addn. to B.P. 287,177; B., 1929, 691).—A hydrophobe, heat-convertible resin is obtained by effecting the condensation in a medium of $p_H > 5$ (preferably 8—10), e.g., in presence of NaOH and a buffering mixture, with or without the addition of metal salts such as $CuSO_4$ or $ZnCl_2$. E. L.

Plastic compositions. H. HANDS (B.P. 382,419, 23.10.31).—Compositions, e.g., for coating fabric for the manufacture of boots and shoes, linoleum, etc., comprise rubber, a vegetable or mineral wax, gutta-percha pitch, Burgundy pitch, and a vegetable pitch or bitumen, with

or without the addition of a metal oxide, e.g., ZnO , Fe_2O_3 , Cr_2O_3 . L. A. C.

[Resinous] moulded materials [for electrical insulation]. A. E. O'DELL. From A. ZIVY (B.P. 381,694, 15.9.31).—Mouldings of the type made from asbestos, Portland or magnesia cement, and a resin or pitch are rendered waterproof and heat-resistant by impregnation, after setting and heating, with a $PhOH\text{--}CH_2O$ or other artificial resin. S. M.

Production of artificial moulded materials from cellulosic materials and binders. N. V. HISTOXYL MAATS. "HISTOMA" (B.P. 381,583, 29.6.31. Ger., 28.6.30).—The solution of binder is forced through the cellulose sheets, which, if wet, may be pretreated with a liquid which is non-miscible with H_2O . The action of hardening agents [e.g., alum on glue and $Ca(OH)_2$ on casein] is controlled by addition of volatile compounds ($AcOH$ and NH_3 , respectively). Drying and moulding are done either by application of slight pressure after coagulation of the binder or by heating at 100° under pressure after air-drying. S. M.

Floor coverings or like materials. IMPERIAL CHEM. INDUSTRIES, LTD., A. C. HETHERINGTON, and S. A. SIM (B.P. 381,590, 8.7.31).—"Dicresylin" and other aromatic ethers of polyhydric alcohols plasticise benzylcellulose products, which may also contain a resin and/or chlorinated aromatic hydrocarbons. S. M.

Non-curling floor covering. C. ELLIS, Assr. to REZYL CORP. (U.S.P. 1,848,329, 8.3.32. Appl., 22.11.27).—Such coverings comprise a base carrying a sheeted tread of a cellulose acetate composition, containing a polybasic acid-polyhydric alcohol condensation product, ground cork, plasticisers, ceresin wax, and pigments. S. S. W.

Rubber conversion products. Rubber waste.—See XIV.

XIV.—INDIA-RUBBER; GUTTA-PERCHA.

Carbon black as a rubber filler. I, II. Adsorption properties of carbon black. T. SEMBA and S. ITOH (J. Soc. Chem. Ind., Japan, 1932, 35, 470—472 B).—Results are recorded of the relative adsorption of diphenylguanidine, NaOH, AcOH, I, methylene-blue, malachite-green, linseed oil, and H_2O vapour. Atm. oxidation of mercaptobenzthiazole solutions interfered with the use of this for adsorption experiments. The logarithmic curves calc. on the basis of Freundlich's adsorption isotherm for genuine gas blacks did not intersect. The usual method for comparing the adsorptive intensities by experiments in moderately dil. solution is recommended only for gas blacks; some types of C black show pronounced selective adsorption, so that a general conclusion is not justified from an adsorption test with a single substance. D. F. T.

Production of highly transparent rubber goods. A. ANDRESEN (Kautschuk, 1932, 8, 174).—Rubber articles prepared from raw rubber or from latex are immersed for 3—50 sec., according to their thickness, in a rubber solvent, e.g., C_6H_6 , containing S, ZnO, and one or more accelerators of vulcanisation. This solution is prepared by shaking the mixture for several hr. and then

clearing by sedimentation or filtration. The dipped articles, after evaporation of the solvent, are vulcanised in hot air, steam, or hot H_2O .

D. F. T.

Nature of the action of organic accelerators for vulcanisation. I. Action on rubber sols. K. SHIMADA (J. Soc. Chem. Ind., Japan, 1932, 35, 473—478B).—Org. accelerators can be classified into 3 groups according to their influence on the viscosity of a solution of $COMe_2$ -extracted crêpe rubber in C_6H_6 . The CH_2O-NH_2Ph condensation products, the Zn salts of dithio-acids, tetramethylthiuram di- and tetra-sulphides, and $p-NO \cdot C_6H_4 \cdot NMe_2$ have almost no effect. The substituted thiocarbamides, mercaptobenzthiazole and the corresponding disulphide, tetramethylthiuram monosulphide, and dinitrophenyl dimethyldithiocarbamate cause a gradual decrease in viscosity comparable with that of the depolymerisation effect produced by heat. The di- and tri-arylguanidines, the diguanides, the dithiocarbamates of *sec.* amines, the arylamine condensation products of aldehydes other than CH_2O , hexamine, and triethyltrimethylenetriamine cause a rapid initial loss in viscosity which is referred to physical disaggregation of the rubber mols.

D. F. T.

Measurement of plasticity in the rubber industry. II. J. BEHRE (Kautschuk, 1932, 8, 167—171; cf. B., 1926, 890; 1927, 119).—Experiments with the Marzetti apparatus at various temp. enable the relation of the nerve of the rubber to its plasticity to be calc. Review of the characteristics of different types of plastometer for rubber indicates that the Marzetti apparatus gives results having the best correlation with works behaviour.

D. F. T.

PATENTS.

Inspissation and concentration of rubber latex. METALLGES. A.-G. (B.P. 382,235, 9.5.32. Ger., 9.5.31).—Latex, containing, if desired, anticoagulants such as alkali and protective colloids, and heated, *e.g.*, to 90° , under conditions preventing the formation of steam, is injected into a chamber in which the pressure is $<$ the v.p. of the hot latex, *e.g.*, $<$ 50 mm. The atomised latex loses H_2O rapidly and the concentrate is remarkably free from bubbles and coagulum. The operation, for which apparatus is described, may be repeated several times; the final product may contain $<$ 40% H_2O .

D. F. T.

Manufacture of crude rubber. GEN. RUBBER CO., Assees. of J. MCGAVACK (B.P. 381,743, 2.11.31. U.S., 12.11.30).—Preserved latex, *e.g.*, from *Hevea brasiliensis*, is treated with a creaming agent so as to effect separation into two layers. The denser layer, relatively poor in rubber, is then conc., *e.g.*, by spraying, in such a manner as to prevent denaturing of the proteins. By adjusting the degree of original creaming, the proportion of non-rubber latex solids in the resulting crude rubber may range from 12% to 80%.

D. F. T.

Manufacture of spongy rubber or similar material. L. E. HOWARD (B.P. 381,975, 20.7.31).—An aq. dispersion, *e.g.*, compounded rubber latex, is mixed with a solvent such as petrol in insufficient proportion to cause coagulation, but sufficient to cause swelling and promote setting. Before pouring into moulds in which it is allowed to set, the mixture is preferably

beaten to the consistency of stiff cream. Vulcanisation in hot air leads to the formation of an exceedingly light and resilient mass.

D. F. T.

Production of goods of or containing rubber. ANODE RUBBER CO., LTD., Assees. of A. SZEGVARI (B.P. 382,305, 23.7.31. U.S., 29.10.30).—Objects are coated with layers of rubber by applying a film of coagulant of varying thickness and/or concn. and then contacting with an aq. dispersion such as latex. Rubber acid-gloves are thus produced with thickened palms. Glass surfaces on which patterns are to be produced by sand-blasting are protected over the desired polished areas by previously printing with a coagulant and immersing in latex.

D. F. T.

Manufacture of goods of or containing rubber or the like. DUNLOP RUBBER CO., LTD., ANODE RUBBER CO., LTD., and C. HEMM (B.P. 382,359, 29.8.31).—In the manufacture of articles, *e.g.*, Wellington boots, by electro-deposition from latex, the receiving electrode is in sections electrically insulated from one another so that the thickness of the deposit over various areas may be controlled. Fabric or other reinforcing material may be applied at any convenient stage of the deposition process.

D. F. T.

Production of (A) articles of porous or micro-porous rubber, (B) rubberised fabric made from fibrous material. ANODE RUBBER CO., LTD., Assees. of MAGYAR RUGGYANTAARUGYAR R.T. (B.P. 381,595—6, 9.7.31. Hung., [A] 31.10.30, [B] 4.11.30).—(A) Filtering cones, diaphragms, etc., which may comprise filaments or wires, are coated wholly or in part with porous or micro-porous rubber produced directly from an aq. dispersion; the articles may first receive a covering of compact rubber. (B) Textile fabric is coated with rubber so that the warp and weft are protected by a common rubber covering of such thickness as to leave an open mesh-work.

D. F. T.

Production of rubber composition. A. B. COWDERY, Assr. to BARRETT CO. (U.S.P. 1,847,641, 1.3.32. Appl., 9.12.29).—Rubber is compounded with a coal-tar residue, m.p. about 105° , containing $<$ 40% of constituents ("free C") which have been produced *in situ* and are insol. in C_6H_6 .

D. F. T.

Preparation of compositions of matter [containing rubber]. F. S. MALM, Assr. to WESTERN ELECTRIC CO. (U.S.P. 1,847,123, 1.3.32. Appl., 6.3.29).—Rubber, particularly suitable as an ingredient in insulating material for submarine cables, is produced by heating diluted latex at $90-100^\circ$ so as to coagulate the bulk of the natural nitrogenous constituents and render them non-absorbent to H_2O ; the latex is then coagulated and the rubber washed and dried.

D. F. T.

Decorative rubber compositions. A. E. BOND (B.P. 382,709, 15.9.31).—Rubber latex is formed into a paste, which will finally set solid, by mixing with powdered fillers such as clay, asbestos, SiO_2 , C black, or cement; colouring materials and vulcanising agents may also be added. Small pieces of decorative material, *e.g.*, coloured stone, are incorporated in the paste so as to produce a mottled effect. The surface of the dried spread material may be ground or polished.

D. F. T.

[Rubber] compositions for covering surfaces of roads and the like, and for the manufacture of paving blocks. DUNLOP RUBBER CO., LTD., ANODE RUBBER CO., LTD., B. W. D. LACEY, and P. J. BAWCUTT (B.P. 381,927, 11.7.31).—Compositions, preferably completely free from cement, are prepared by mixing rubber crumb with an artificial aq. dispersion of coagulated rubber, reclaim, or similar material, of relatively high concn., e.g., 76%. The mixtures, which may be further compounded, may be used in a dispersed, flocculated, or semi-coagulated condition. D. F. T.

Treatment of rubber compositions. FIRESTONE TYRE & RUBBER CO., LTD., Assees. of R. D. WILHELM and E. E. BEVAN (B.P. 381,822, 19.2.32. U.S., 4.6.31).—A method and apparatus are described for forming a continuous sheet of rubber, e.g., on a mill roll, and progressively slitting the sheet into a central and lateral strips; the central strip is then removed from the roll and the lateral strips are returned to the central portion of the remaining mass. D. F. T.

Vulcanisation of rubber. M. H. HUBACHER, Assr. to RUBBER SERVICE LABS. CO. (U.S.P. 1,848,721, 8.3.32. Appl., 26.9.29).—The compound obtained by treating the reaction product of an aryl hydroxide, e.g., PhOH, and an aliphatic aldehyde (C₂—C₄), e.g., MeCHO, with a primary arylamine such as NH₂Ph is applied as an antioxidant. D. F. T.

Manufacture of conversion products of rubber. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 382,755, 2.11.31).—Rubber, mixed if desired with up to an equal wt. of a stable solvent, e.g., cyclohexane, is heated at 150—300° in the presence of a porous surface-active substance with slightly acidic reaction, e.g., a slightly acid active C or bleaching earth. The products are generally transparent resinous bodies suitable for the prep. of adhesives and insulating coatings. D. F. T.

(A) Devulcanising and reclaiming rubber. (B) Plasticising rubber. (C) Reclaiming rubber. (A—C) R. A. DUNHAM and (C) M. T. FLAXMAN, Assrs. to UNION OIL CO. OF CALIFORNIA (U.S.P. 1,847,599, 1,847,600—1, 1.3.32. Appl., [A] 17.10.28, [B] 14.3.31, [C] 24.4.31. Renewed [A] 4.8.30).—(A) Vulcanised rubber scrap is digested with Edeleanu extract from petroleum distillates at a temp. above approx. 163°; the rubber recovered from the resulting solution is formed into an article and vulcanised below 163°. (B) Sufficient Edeleanu extract is incorporated in rubber, e.g., by milling, to soften and plasticise the mass, which is then shaped and vulcanised. (C) Vulcanised rubber is reclaimed by heating with sufficient Edeleanu extract, e.g., 3—5%, to devulcanise the material; H₂O and an alkali may also be present. D. F. T.

Utilisation of rubber waste. INTERNAT. GEN. ELECTRIC CO., INC., Assees. of ALLGEM. ELEKTRICITÄTS GES. (B.P. 381,587, 7.7.31. Ger., 7.7.30).—A moulding material is produced by mixing rubber waste or dust with a binding agent consisting of an aldehyde-amine condensation product, which softens within the range of temp. at which the rubber becomes soft or plastic. D. F. T.

Manufacture of rubber sheet from coagulated latex. J. L. MILNE. From HUTTENBACH, LAZARUS & SONS, LTD. (B.P. 383,062, 13.11.31).

Dividing resilient sheet material such as rubber or the like into strips or filaments. DUNLOP RUBBER CO., LTD., H. WILLSHAW, and F. G. BROADBENT (B.P. 383,038, 27.10.31).

Felt fabrics.—See VI. **Reconditioning wood etc.**—See IX. **Plastic composition.**—See XIII. **Rubber-filmed leather.**—See XV.

XV.—LEATHER; GLUE.

Determination of the p_H of chestnut [tanning] extracts. Report of the British Section Committee of the Society of Leather Trades' Chemists. D. BURTON (J. Soc. Leather Trades' Chem., 1932, 16, 479—489).—Const. readings were not obtained by the quinhydrone electrode, but were given in < 1 min. with a saturated H electrode, which was then available for other solutions. On diluting tan liquors, increased p_H vals. were recorded with the H electrode, but not always with the quinhydrone electrode. Greater concordance and agreement with the results of measurements with the glass electrode were ensured by the use of the H electrode. D. W.

Absorption of oxygen by [vegetable] tanning materials. III. E. W. MERRY (J. Soc. Leather Trades' Chem., 1932, 16, 489—504; cf. B., 1932, 809).—The rate of absorption of O₂ by chestnut extracts was characteristic for each extract, and for a particular extract was increased by raising the p_H val. of the solution (by additions of Cu or Fe salts) or the temp. of extraction of the chestnut wood, and was reduced by additions of H₂C₂O₄. The order of diminishing rates of absorption of O₂ by infusions of different tanning materials is: chestnut, oakwood, valonia, oak bark, mimosa bark, gallotannic acid, myrobalans, sumac. Irregular results were obtained for gambier, quebracho, and sumac extract. D. W.

Oils and the soap industry.—See XII.

PATENTS.

Producing an adherent film of rubber on the grain surface of vegetable-tanned leather. B. MEAD, Assr. to UNITED SHOE MACHINERY CORP. (U.S.P. 1,848,135, 8.3.32. Appl., 22.10.25).—The natural grain surface is treated with a weak non-volatile alkali, e.g., borax of suitable concn., e.g., < 0.02N and of p_H > 11, sufficient to open the pores, and rubber latex is simultaneously applied. When a dry adherent film has formed, the leather may be attached to another piece of material, similarly prepared, by contact and pressure. D. F. T.

Manufacture of animal and vegetable glues and gelatinous materials generally. DOW CHEM. CO., Assees. of S. W. PUTNAM and N. POFFENBERGER (B.P. 382,152, 1.2.32. U.S., 2.2.31).—*o*- or *p*-PhC₆H₄·OH, or a Cu or alkali salt of these, is used as preservative. L. A. C.

Adhesive cement. F. J. WALLACE, Assr. to ROBESON PROCESS CO. (U.S.P. 1,848,981, 8.3.32. Appl., 13.9.30).—A solution of casein in NaOH is heated to

60° with neutral waste sulphite liquor (d 1.262) and the mixture incorporated with dry clay, NaHSO_3 being added as a bleaching agent. Glue and/or water-glass solution or glycerin may also be added. W. J. W.

Na ligninsulphonate.—See VII. Plastic composition.—See XIII.

XVI.—AGRICULTURE.

Supply of bases in cultivated soils. A. JACOB (J. Landw., 1932, 80, 241—269).—The literature is reviewed and discussed. Except on sandy and moor soils loss of K by leaching is not increased by applications of K fertilisers. In unsaturated soils K may be entirely adsorbed at the surface and become available only to the upper roots of plants. CaO increased the solubility of K only in K-rich soils. A. G. P.

Reaction of padi [rice] soils. J. H. DENNETT (Malay. Agric. J., 1932, 20, 518).—A preliminary note. Large differences in $[\text{H}^+]$ between rice soil during fallow and the same soil when flooded are considered to be due not only to the formation of NH_3 on water-logging, but also to a change in the equilibrium between Fe^{++} and Fe^{+++} ions. Attention is drawn to the possibility of Fe^{+++} acting as a base. W. G. E.

Winogradsky's *Azotobacter* test applied to rice-field soils in Japan. A. ITANO and S. ARAKAWA (Proc. 2nd Internat. Cong. Soil Sci., 1932, 3, 279).—The *Azotobacter* test alone is insufficient as an indication of soil productivity and should be supplemented by determinations of p_{H} and PO_4^{+++} content. A. G. P.

Nature of "Kuhlerde" and its action on marsh soils. E. BLANCK and F. KLANDER (J. Landw., 1932, 80, 293—316; cf. B., 1930, 681).—Analytical data and cropping trials are recorded and the effectiveness of "Kuhlerde" as a soil amendment is examined and discussed. A. G. P.

Action of magnesium in acid soils. G. VON STRUNCK (Arch. Pflanzenbau, 1932, 9, 306—343).—In soils exhibiting exchange acidity, physiologically acid fertilisers containing K increased the Mg, Ca, and K contents of the soil solution, but the ratios CaO/MgO and $\text{CaO}/\text{K}_2\text{O}$ were not markedly different from those of unmanured soils. Fertiliser mixtures containing no K, or with K applied with CaO, tend to increase these ratios. On soils receiving physiologically acid fertilisers with K, plant injury was not increased by applications of MgSO_4 . The proportion of sol. Mg to other bases in soil has little influence on plant growth. A. G. P.

Contribution of clay and organic matter to the base-exchange capacity of soils. R. WILLIAMS (J. Agric. Sci., 1932, 22, 845—851).—Relationships between the exchange capacity of soils and their contents of clay, total and oxidisable C are examined. Assuming all org. matter to have the same exchange capacity, no correlation was observed between the exchange capacity of clays and the ratios $\text{SiO}_2:\text{Al}_2\text{O}_3$ or SiO_2 :sesquioxides. After prolonged contact with finely-divided CaCO_3 soils may be assumed to have become saturated with bases. Carbonate soils exhibiting $<$ max. exchangeable base contents had either $<$ 1% CaCO_3 or CaCO_3 in very coarse particles. The base-exchange

capacity of soils may be calc. from the clay and org. matter contents. A. G. P.

Exchange capacity of soil parent materials. N. I. SOKOLOV (Trans. Dokuchaiev Soil Inst., 1932, 6, 133—151).—Exchange capacity of the soil bears a direct relationship to that of parent material in case of non-carbonate parent materials. The magnitude of the exchange capacity may be gauged from the amount of exchangeable Ca; the amount of Mg in most cases is very small. The quantity of Ca removed in the HCl extract differs little from exchangeable Ca in the soils examined. A. M.

Replaceable bases, hydrogen, and base-holding capacity of Alberta soils. N. HOLOWAYCHUK (Canad. J. Res., 1932, 7, 64—74).—The three main soil groups of Alberta—the brown, black, and wooded soils—have a relatively high content of replaceable bases; the Ca, Mg, and Na:K ratios are normal. Only the wooded soil shows excessive leaching from the A_2 horizon and appears to be of the podsol type. W. G. E.

Influence of adsorbed sodium on the leaching of carbonate soils. V. A. KOVDA (Trans. Dokuchaiev Soil Inst., 1932, 6, 119—131).—An artificial solonetz was prepared from a chernozem soil containing free carbonate. Leaching with successive portions of distilled H_2O showed that the amounts of adsorbed Ca and Mg, org. matter, SiO_2 , and sesquioxides removed increased with increasing content of adsorbed Na. The lowering of the horizon of effervescence in soils of the semi-arid zone is due to their former salinity being reduced by the removal of Na in sol. form through exchange reactions with Ca (Mg) during the process of solodisation. A. M.

Determination of exchangeable bases in carbonate soils. R. WILLIAMS (J. Agric. Sci., 1932, 22, 838—844).—Exchangeable bases are removed from soil by treatment with 0.5N-AcOH. Correction is made for carbonate bases simultaneously removed in this process, by direct determinations of the CO_2 evolved. A. G. P.

Reaction and calcium content of drainage water from peat deposits in New York. B. D. WILSON, E. V. STAKER and G. R. TOWNSEND (J. Amer. Soc. Agron., 1932, 24, 589—593).—Drainage from soils derived from sphagnum was acid, but in all other cases examined drainage waters were alkaline although passing through acid peat. No relationships were observed between the p_{H} val. or Ca content of peat soils and the reaction of drainage waters. The latter is largely influenced by the nature of the strata underlying the peat. A. G. P.

Mechanical analysis [of soils] by the decantation and the pipette processes as affected by various pretreatments. E. UNGERER (Z. Pflanz. Düng., 1932, 26A, 330—336).—The most effective agent for dispersing soil clay is LiCl. NaCl is recommended for routine work. The use of Li_2CO_3 is unsatisfactory. For heavy soils the pipette method gives more accurate vals. for the clay fraction than does the decantation process. A. G. P.

Determining combined water and organic matter in soils. G. BOUYOUKOS (Soil Sci., 1932, 34, 259—267).

—The sample, previously dried at 108°, is heated in a metal tube by means of an electric furnace (to 330° for org. soils and 800° for mineral soils). The H₂O is condensed and collected in small graduated cylinders over CCl₄. The "loss on ignition" is determined separately and the difference between these two vals. represents org. matter. In general, the combined H₂O in soils varied with the clay content, but no close relationship existed.

A. G. P.

Humic matter in soils of Brittany; determination and importance as nitrogen reserves. M. VINCENT (Proc. 2nd Internat. Cong. Soil Sci., 1932, 3, 164—167; cf. B., 1931, 506).—During the extraction of org. matter from soils by means of 1% NaOH, NH₃ is liberated in amounts which bear no relation to the total org. matter present. In fertile soils the N of the sol. humus (*i.e.*, humus not repptd. on acidifying a NaOH extract) exceeds the humus-N (*i.e.*, that pptd. from NaOH solution by acid). In acid soils humus-N predominates. The ratio N of org. matter insol. in NaOH : N of org. matter sol. in NaOH varies considerably, tending to be high in acid soils and low in neutral cultivated soils.

A. G. P.

Chemical aspects of the decomposition of organic matter in soil. T. J. MIRCHANDANI (Soc. Biol. Chem. India, Symp., July, 1932, 5—7).—The effects of the C : N ratio of org. matter on the manner and rate of its decomp. and on the accumulation of NH₃ are recorded. Crops on soils treated with org. manures having C : N > 16 : 1 suffered from N deficiency.

A. G. P.

Utilisation of soil water by plants. F. SEKERA (Z. Pflanz. Düng., 1932, 26A, 57—125).—The H₂O-supplying power of soil is determined by the rate of H₂O absorption of a cylindrical cast of plaster of Paris previously dried at 100—110°. The cast is held in an Al container, and the free surface pressed lightly into the soil surface. Curves relating the H₂O-supplying power of soils with the H₂O content consist of 3 essential sections. In the drying-out of a saturated soil the emptying of macroscopic capillaries (>0.1 mm.) corresponds to a rapid fall in H₂O-supplying power, followed by a slower fall as the finer capillaries empty, until a crit. val. is reached when the curve falls suddenly to a min. val. At this val. only the "film H₂O" remains. Mechanical treatment affects the H₂O-supplying power only so long as some macroscopic capillaries remain filled. Application of fertilisers, CaO, etc., by modifying the adsorptive complex, influence the H₂O-supplying power at all H₂O contents down to the min. val. Relationships between characteristic vals. for soils determined as above and those by other methods are examined and their practical interpretation is discussed.

A. G. P.

Determination of phosphate requirement by the seedling method and by the absorption of phosphates by soil. A. NĚMEC (Z. Pflanz. Düng., 1932, 26A, 203—211).—Soils having high proportions of assimilable P (Neubauer) have also low absorptive capacities for PO₄^{'''} from superphosphate solutions. The absorptive power for PO₄^{'''} is reduced by saturation with CO₂, especially in the case of carbonate-containing soils.

A. G. P.

A phosphometer for the rapid determination of the phosphate requirement [of soils]. K. KRUMINS (Z. Pflanz. Düng., 1932, 26A, 337—349).—Soils of p_H > 5.5 are extracted with a buffer solution (p_H 4.0) which is 0.01N with respect to Ca(OAc)₂ and 0.04N to AcOH. For soils of p_H < 5.5 a buffer solution of p_H 2.6 (0.05N to AlCl₃ and 0.1N to AcOH) is used. P is determined in the extracts by means of a modified Molybdeum method, using a solution of NH₄ molybdate in H₂SO₄ as reagent and SnCl₂ for reduction. An adaptation of the method for field work is described in which colour standards are prepared from mixed solutions of Co, Cu, and U salts. Results agree well with those of the Mitscherlich method except in the case of very acid subsoils, for which Ca(OAc)₂-AcOH extracts give more comparable results than does the AlCl₃-AcOH solution.

A. G. P.

Aspergillus method [for evaluating soil phosphorus]. G. VÁRALYAY (Mezőg. Kutat., 1932, 5, 119—126; Chem. Zentr., 1932, ii, 425).—The soil-sol. P can be determined by the *Aspergillus* method. Soils which are highly adsorbent for P may appear by various methods to be poor in P, but are found not to react to P fertilisation.

A. A. E.

Production of ammonium fertilisers. G. FAUSER (L'Ind. Chimica, 1932, 7, 1343—1350).—A spray of H₂SO₄ is produced in a chamber containing NH₃. When using H₂SO₄ (*d* 1.56) the heat developed in the reaction is sufficient to evaporate the H₂O of dilution. Dry (NH₄)₂SO₄ falling to the bottom of the chamber is removed by a worm which is provided with a device for granulating the salt. The H₂O vapour formed and containing some NH₃ is passed through a tower and brought in contact with the incoming acid. Slight modifications of the apparatus permit the production of NH₄NO₃ + (NH₄)₂SO₄ (26% N) and NH₄H₂PO₄ + (NH₄)₂SO₄ (20% N, 15.5% P₂O₅).

O. F. L.

Urea-ammonia liquor. A new fertiliser material. F. W. PARKER and F. G. KEENEN (Chem. Met. Eng., 1932, 39, 540—541).—This product is a solution of urea in liquid NH₃ of *d* 1.0, containing 55% total N as NH₃ and 20% H₂O. It is conveyed in tank wagons and is recommended for mixing with K and P compounds to form complete fertilisers. The temp. rise on mixing or diluting is much < with anhyd. NH₃, and the liquor does not cause the fertiliser to stick to the sides of the mixer. The solution is stable for several months.

C. I.

Granulation of fertilisers. W. H. ROSS (J. Assoc. Off. Agric. Chem., 1932, 15, 632—635).—Granulation is achieved by: (a) passing the moist fertiliser through a perforated plate, (b) tableting, (c) crystallising the molten material (*e.g.*, NH₄NO₃) in grains, (d) rotary drying in a countercurrent of air, this method being particularly suitable for superphosphates, since addition of NH₃ to neutralise free acidity develops sufficient heat for drying, and (e) spraying an atomised solution, a slurry, or the molten material down a tower in a countercurrent of rising hot gas.

J. G.

Determination of nitrogen in artificial fertilisers. H. A. J. PIETERS and M. J. MANNENS (Chem. Weekblad, 1932, 29, 573—577).—The distillation method is the

most accurate for NH_4 salts and nitrates. The use of 4% HBO_3 solution to absorb the NH_3 is satisfactory. The bromometric and CH_2O methods are recommended for routine analysis, the former being applicable also to urea. For nitrate-N reduction with Al in alkaline solution in presence of CuSO_4 gives very accurate results; reduction with acidified Fe^{++} salt solution is suitable for routine work, the error being about 1%.

H. F. G.

Determination of nitrogen in fertilisers. P. F. M. DE PAUW (Chem. Weekblad, 1932, 29, 603).—Pieters and Mannens' remarks (cf. preceding abstract) are criticised. The modified Schlösing method is considered simple and suitable for routine work, and to yield results having an error of $> 0.2\%$. H. F. G.

Determination of insoluble phosphoric acid in fertilisers. O. W. FORD and H. R. KRAYBILL (J. Assoc. Off. Agric. Chem., 1932, 15, 653—660).—The modified official method (in which the quantity taken has now been changed to 1 g., and the digestion period to 1 hr.) gives vals. 0.1—1.7% lower than previously; these are probably a better measure of the availability of the phosphates to plants. It is unsafe to use NH_4Cl in the wash H_2O for the usual commercial fertilisers, although if rock phosphate is present the insol. H_3PO_4 is not thereby lowered appreciably. The filter-papers used should be tested, as few grades are suitable for the filtration of bone ash or pptd. $\text{Ca}_3(\text{PO}_4)_2$. J. G.

Is the action of potash manures increased by the presence of humus? M. POPP (Ernähr. Pflanze, 1932, 28, 308—310).—The increased yield of oats produced by admixture of soda-humus to K fertilisers is recorded and discussed. A. G. P.

Organic manures versus artificial fertilisers. B. V. NATH (Soc. Biol. Chem. India, Symp., July, 1932, 9—10).—The greater reliability of org. manures is emphasised. A. G. P.

The phosphoric acid [fertiliser] question. O. ENGELS (Superphosphat, 1932, 8, 127—131).—The practice of phosphate manuring in the light of recent investigations is discussed. A. G. P.

Fertiliser ratios of ammonia, phosphoric acid, and potash for potatoes. H. H. ZIMMERLEY and B. E. BROWN (Virginia Truck Exp. Sta. Bull., 1931, No. 77, 991—1032).—Results of numerous field trials are recorded. The supply of N was the dominant factor controlling yield. A. G. P.

Organic materials as direct sources of plant nutrition. G. S. SIDDAPPA (Soc. Biol. Chem. India, Symp., July, 1932, 7—9).—The existence of accessory growth-promoting substances in dried blood manures is confirmed. A. G. P.

Ammonia- and nitrate-nitrogen for cotton. I. Influence on absorption of other elements. K. T. HOLLEY, T. A. PICKETT, and T. G. DULIN (Georgia Agric. Exp. Sta. Bull., 1931, No. 169, 14 pp.).—Cotton plants supplied with $\text{NO}_3\text{-N}$ in culture solutions produced more matter than when $\text{NH}_3\text{-N}$ was given. With nutrients of high concn., plants having $\text{NH}_3\text{-N}$ had a very high N content. With dil. nutrients the two series of plants had similar total N contents, but variations

occurred in the distribution of N between roots, leaves, and stems. Use of $\text{NH}_3\text{-N}$ reduced the absorption by plants of bases, especially of Ca and Mg. The lowered Ca content under these conditions was evident principally in leaves, whereas that of Mg occurred in stems, leaves, and roots. In the early stages of growth plants receiving NH_3 absorbed slightly more P and S than those receiving NO_3 . The reverse was the case after the beginning of the fruiting stage. A. G. P.

Soluble aluminium studies. II. Minimum concentration of aluminium found to be toxic to maize, sorghum, and barley in culture solutions. W. S. LIGON and W. H. PIERRE (Soil Sci., 1932, 34, 307—321; cf. B., 1932, 952).—Plant injury resulted from the presence of 1.0 p.p.m. of sol. Al in the nutrient and increased with rising concn. of Al in media of the same pH. Injury was first apparent in retarded root growth. Factors concerned in Al toxicity are discussed. A. G. P.

Effect of lack of available manganese in the oils on crop yields. T. E. ODLAND and F. K. CRANDALL (J. Amer. Soc. Agron., 1932, 24, 622—626).—The response of a no. of crops to manuring with Mn is recorded. Seasonal variations in the Mn deficiency of soils are shown. Differences in the Mn requirement of various crops are considerable. A. G. P.

Rôle of nitrogen in the production of spots in wheat fields. P. L. GAINNEY and M. C. SEWELL (J. Agric. Res., 1932, 45, 129—137).—Soil from small areas in wheat fields in which plants show an unusually dark colour or heavy growth is characterised by high total N and NO_3' contents. This effect is not the outcome of the increased acitivity of N-fixing or nitrifying bacteria. Plants from these spots produce higher grain yields and have high % of N in the grain. A. G. P.

Growth of rice in heavy black soils of the Central Provinces [of India]. D. V. BAL and R. N. MISRA (Agric. Live-stock India, 1932, 2, 404—416).—Results of field and pot experiments indicate that the rice plant prefers a neutral to slightly acidic soil. Application of S to heavy black soils which have a higher Ca content and are alkaline in reaction increases the [H] and the crop yield. Superphosphate either alone or in combination with S gave even better results. W. G. E.

Yields and composition of pasture grasses from the Tree Field plots at Cockle Park. B. THOMAS and F. J. ELLIOTT (J. Agric. Sci., 1932, 22, 736—754).—On grass cut at 14-day intervals throughout the season, manuring did not produce significant differences in total dry matter yields. Seasonal variations were considerable. The protein content of grass from unmanured land was significantly lower than that from manured plots, but neither the protein nor fibre content was influenced by the nature of the fertilisers applied (basic slag alone or with CaO, or KCl, or NaNO_3). On soils receiving slag + CaO or KCl the herbage had a higher Cu content than on that receiving slag alone. The assimilation of P from soils treated with basic slag was markedly increased by supplementary dressings of K fertilisers. A. G. P.

Leaf diagnosis of the potato. II. H. LAGATU and L. MAUME (Ann. agron., 1932, 3, 306—362; cf. A., 1930, 965).—Application of P fertilisers to the soils

examined did not increase the yield of potatoes or the P content of the leaves. N fertilisers increased both yield and N content of leaves. There was a general parallelism between K added as fertiliser and the K content of leaves, but no definite relationships were observed. Displacement of adsorbed K from soils by liming resulted in an increased K intake by the plants to an extent > their physiological requirement, without any corresponding yield increase or any ill-effect on growth. Surplus absorption of nutrients is examined in relation to the efficiency of "complete" manures and the effects of CaO on P intake. A. G. P.

Effects of various manurial treatments on the chemical composition of strawberries. L. D. M. KNIGHT and T. WALLACE (J. Pomology, 1932, 10, 147—180).—Plants receiving farmyard manure produced the heaviest, and those grown with a deficiency of K the lightest, crops. Berries were largest from plants receiving complete artificials and farmyard manure, and smallest where K was omitted. The N content of the berries declined steadily throughout the picking season. Inorg. fertilisers tended to produce fruit of high N content and farmyard and other org. manures fruit of low N content. K deficiency is associated with high-N fruit where N manures were applied. A negative correlation exists between acidity and N content and between the total sugar and N contents. The acidity of the fruit varied somewhat irregularly throughout the season. Total sugars and sucrose gradually increased with advancing growth; reducing sugars fluctuated irregularly. On soils receiving no K acidity and sucrose contents were low. Variations in ash constituents through the season were small, inorg. fertilisers tending to produce high, and farmyard manure low, vals. The smallest ash contents were found in K-deficient plants. The K content was correlated positively with the proportion of total ash and negatively with the Na and Mg contents. The Mg and P contents remained practically const. throughout the season and bore no relationship to the contents of other ash constituents or to each other. The Ca content was higher in late than in early pickings. Applications of K fertilisers to strawberries are clearly reflected in the composition of the fruit. A. G. P.

Mineral content of pastures. A. E. V. RICHARDSON (J. Counc. Sci. Ind. Res., Australia, 1932, 5, 141—151).—A report on co-operative investigations in progress at the Waite Agricultural Research Institute is made. W. G. E.

Influence of defoliation and pinching back on young mulberry trees. I. Defoliation. Y. KISHI and S. MONOBE (Bul. Sci. Fak. Terkult. Kjusu, 1932, 5, No. 1, 60—78).—Dry matter and total, protein-, and non-protein-N, and acid-hydrolysable carbohydrates decreased. H₂O-sol. carbohydrates decreased in the roots, but less readily in the stems. CH. ABS.

Rotenone content of Malayan tuba [*Derris*] root. C. D. V. GEORGI and G. L. TEIK (Malay. Agric. J., 1932, 20, 498—506).—The variation in rotenone content of various samples of the root drawn from commercial consignments is due to age and varietal differences. Of several varieties examined, *D. elliptica* contains the highest proportion of rotenone. W. G. E.

Contact insecticides. IV. Sodium soaps of the normal saturated fatty acids. W. C. O'KANE and W. A. WESTGATE. **V. Performance of certain contact agents on various insects.** W. C. O'KANE, W. A. WESTGATE, and L. C. GLOVER (New Hamps. Agric. Exp. Sta. Tech. Bulls., 1932, No. 48, 4 pp.; No. 51, 20 pp.).—IV. The contact performance (as measured by the angle of contact) of solutions of the Na salts of acids in the series acetic—lauric improved with the lengthening of the C chain.

V. Optimum wetting efficiency was shown by solutions of Na laurate (0.25—0.5%). Triethanolamine oleate and "Penetrol" were effective on some insects. Saponins were unsatisfactory. (Cf. B., 1931, 361.)

A. G. P.

Larvicide studies. IV. Various toxic substances partially adsorbed on charcoal as an *Anopheles* larvicide. A. P. WEST (Philippine J. Sci., 1932, 49, 211—218; cf. B., 1932, 955).—Among a considerable no. of heavy-metal salts and org. insecticides examined, none proved as effective as Paris-green. A. G. P.

Amount and variability of spray residue on New Hampshire Baldwin apples. G. P. PERCIVAL and G. F. POTTER (New Hamps. Agric. Exp. Sta. Tech. Bull., 1932, No. 49, 15 pp.).—Numerous records of fruit sprayed with Ca and Pb arsenates are given. The possible error in sampling technique is considerable. The rainfall between final spraying and harvest is the dominant factor controlling the amount of spray residue. The As residue on fruit from the lower third of trees is approx. 3 times that from the upper third.

A. G. P.

Infection of oranges by *Penicillium*. F. M. GREEN (J. Pomology, 1932, 10, 184—215).—Infection is not controlled by the supply of available nutrient for the fungus. Acids and NH₄ salts promote infection by their action on the rind, whereby insol. pectic matter is hydrolysed to pectin and the cell walls are softened. *Penicillium* decomposes pectin and destroys the cell wall. This action is influenced by [H⁺], ease of infection decreasing with rising p_H. Certain alkaline substances (notably borax) delay infection through deep wounds to an extent which is not entirely attributable to their alkalinity. A. G. P.

Melon aphid. C. C. GOFF and A. N. TISSOT (Florida Agric. Exp. Sta. Bull., 1932, No. 252, 23 pp.).—Nicotine sulphate dust or wet sprays containing pyrethrum, derris, or nicotine gave satisfactory control. A. G. P.

Control of the celery leaf tier in Florida. W. E. STONE, B. L. BOYDEN, C. B. WISECUP, and E. C. TATMAN (Florida Agric. Exp. Sta. Bull., 1932, No. 251, 23 pp.).—Immature larvæ were effectively treated by dusting with pyrethrum, alone or mixed with dry CaO-S.

A. G. P.

Action of fungicides on *Cladosporium fulvum*, Cooke, and the possibility of chemotherapeutic control of the fungus. K. RIPPEL (Arch. Mikrobiol., 1932, 3, 543—558).—Under conditions in which the ratio of fungus spores to concn. of fungicide was maintained const., the toxic doses of Uspulun, HgCl₂, AgNO₃, CuSO₄, Na₂CO₃, and NaCl for a no. of fungi are recorded. The relatively high resistance of *C. fulvum*

to fungicidal injury renders its control on tomato plants a matter of some difficulty. A. G. P.

Significance of superphosphate manuring for fish ponds. W. WUNDER (Superphosphat, 1932, 8, 132—134).—The action of superphosphate in increasing the growth of green algae and its relation to increased fish production is examined. A. G. P.

Organic manures and animal nutrition. P. V. RAMIAH (Soc. Biol. Chem. India, Symp., July, 1932, 10—11).—Cattle manure increased the nutrient val. of a no. of crops. This cannot be ascribed in all cases to increased N content, but probably results from differences in the form in which the N is stored in the plants. A. G. P.

Determining total C in soils.—See II.

PATENTS.

Preparation of fertilisers [from peat]. R. SCHUBERT (B.P. 382,128, 5.1.32).—Air-dried peat dust is mixed with inorg. fertilisers, *e.g.*, $\text{CaH}_4(\text{PO}_4)_2$, kainit, $\text{Ca}(\text{OH})_2$, or with conc. aq. solutions or suspensions of these, and the product is compressed. L. A. C.

Manufacture of fertilisers having a base of ammonium magnesium phosphate. R. DURAND-GASSELIN (B.P. 382,127, 30.12.31).—“Burnt plaster” (calcined gypsum), together, if desired, with hydrated CaSO_4 , K_2SO_4 , etc., is added to moist pptd. NH_4MgPO_4 to yield a dry, pulverulent product. L. A. C.

Fertiliser and destroyer of moss. F. MORGAN (B.P. 382,988, 8.9.31).—A 1 : 1 mixture of CaO and soot is employed. D. R. D.

XVII.—SUGARS; STARCHES; GUMS.

Automatic control of continuity of working in factories employing gases and liquids. E. SZÉGO (Bull. Assoc. Chim. Sucr., 1932, 49, 116—128).—Application of the Dabrowski system of electrical control to beet-sugar factories is described. Interruptions of the flow of liquids at important points, *e.g.*, supply of water to diffusers, of raw juice to liming vessels, of carbonated juice to filters, etc., are indicated by extinction of lamps on a panel and automatically recorded on moving charts graduated in hr. At each point the actuating device is a “stop index” valve consisting of a hinged metal disc inside the pipe, which takes up different positions according as the liquid is stationary or flowing. Provision can also be made for indicating and recording the operation of automatic beet scales, centrifugals, etc. J. H. L.

Control of concentration of sugar juice by means of electrical conductivity. O. SPENGLER, F. TÖDT, and J. WIGAND (Z. Ver. deut. Zucker-Ind., 1932, 82, 789—816).—The variation of electrical conductivity of sugar juices with supersaturation, temp., and purity is sufficiently great to provide a means of controlling the concn. by evaporation. Conductivity-time curves, obtained during the evaporation of solutions in vac., exhibit a fairly regular periodicity. This feature appears to be due to the intermittent liberation of bubbles at the electrodes. E. S. H.

Sedimentation process. J. MARCHÉS (Arch. Suikerind. Ned.-Indië, 1932, 750—785; Chem. Zentr.,

1932, ii, 455).—With Ca phosphate, and 0.365—1.702 g. of ppt. in 10 c.c., the ppt. concn. and % clear syrup were inversely proportional after 75 hr.; with < 0.365 g. the amount of clear syrup was relatively greater. In sucrose solutions the influence of sp. gr. (15—20 Brix) is small. No improvement follows the addition of KCl, and pptn. at 30° instead of 100° has little advantage. The results are applied to the defecation process. A. A. E.

Toury process of coagulation of raw [beet] juice by means of sulphurous acid. D. SIDERSKY (Bull. Assoc. Chim. Sucr., 1932, 49, 130—134).—Lambert's raw-juice sulphitation process (R.P. 394,577; B., 1909, 213) has been employed for many years at the Toury sugar factory (Eure-et-Loire) as it improves filtration after liming and carbonation. Liquid SO_2 is now used (0.15—0.25 g./litre of juice), gasified just before it enters the juice. No pptn. occurs below 75°, but at 85° a slimy coagulum is formed which is unfilterable, so the juice is at once limed and carbonated as usual. Analysis of the coagulum leads to the conclusion that about 12% of the insol. matter in it is inorg., 41% protein, and 47% pectin and other org. matter. J. H. L.

Industrial results with the Zamaron process of beet juice purification. J. ZAMARON (Bull. Assoc. Chim. Sucr., 1932, 49, 134—141).—Factory trials with the process (B., 1931, 1114) gave very good results. The raw juice, limed at 85° in presence of “Gelzam” $\text{Al}(\text{OH})_3$ gel, filtered well and was afterwards carbonated only once. Further laboratory experiments on the process indicate that the amount of Gelzam may be reduced from 5 g. to 2 g./litre without increasing the total amount of CaO used (about 8 g./litre of juice). J. H. L.

Correction tables for dextrose and lactose in the presence of sucrose for use in the Lane-Eynon method. J. FITELSON (J. Assoc. Off. Agric. Chem., 1932, 15, 624—625).—Lane and Eynon's data (B., 1928, 206) are extended to sucrose:lactose ratios of from 0.05 to 20. J. G.

Differentiation of sucrose, glucose, and lactose. E. A. LUM (Pharm. J., 1932, 129, 371).—Glucose and lactose give a red colour of K picrolonate with K picrate. Distinctive colour reactions are described with each in presence of resorcinol and conc. H_2SO_4 . A. A. L.

Bagasse cellulose.—See V. **Sol. sugars of wheat. Sucrose in condensed milk. Determining sugars in chocolate.**—See XIX.

PATENT.

Settling liquids.—See I.

XVIII.—FERMENTATION INDUSTRIES.

Influence of sprayed acid on germinating barley. G. PAULA (Woch. Brau., 1932, 49, 329—334, 339—344).—The amount of extract from barley sprayed with aq. HNO_3 during germination increased as the concn. of the acid increased, and reached a max., together with a minimal malting loss, when the solution contained 20 g. HNO_3 (*d* 1.4) to 80 g. H_2O . Spraying reduced the quantity of rootlets and the colour of the malt was

darker. The amount of extract was the greater the longer the interval between the removal of the barley from the steep and its treatment with HNO_3 . The malting loss increased at the same time, and the optimal effect, having regard to both extract and malting loss, was obtained by treatment with the acid 48 hr. after steeping. No advantage was obtained by increasing the no. of sprayings with acid during germination. The acid treatment increased the potential and real acidity, the contents of formol-N, invert sugar, maltose, and total protein, but decreased the amount of the real and apparent degree of fermentation. The content of salt-sol. protein was increased and that of the insol. protein was correspondingly decreased, whilst that of the EtOH-sol. protein remained almost unaffected.

C. R.

Determination of the sterility of beer bottles. I. JANENSCH (Woch. Brau., 1932, 49, 365—368).—The bottles for the determination are withdrawn at intervals of $\frac{1}{2}$ hr. from the cleansing plant and at once closed with a sterile stopper. They are approx. half filled with sterile H_2O and agitated in a mechanical shaker for 5 min. According to the degree of infection expected, plates of gelatin-hopped wort are inoculated with 1 drop or 1 c.c. of the rinsing- H_2O from the bottles, and are incubated at room temp. or in the ice-chest. The presence of yeasts is determined by adding 5 c.c. of the H_2O to 50 c.c. of sterile hopped wort and 5 c.c. of 10% aq. tartaric acid and incubating for 8 days at 25° . Sarcinae and rods are tested for by inoculating 120 c.c. of yeast autolysate and 10 c.c. of 97% EtOH with approx. 60 c.c. of the rinsing H_2O and incubating for 3 weeks at 25° . A fourth series of tests is made with pasteurised beer as the medium for inoculation. The results of a series of determinations are tabulated.

C. R.

Detection of sorbitol in wine. B. BLEYER, W. DIEMAIR, and G. LIX (Z. Unters. Lebensm., 1932, 64, 337—348; cf. B., 1931, 413).—A modification of Werder's method (B., 1930, 78) and special apparatus are described, MeOH being used as the pptg. agent. The method gives reliable qual. results for 5% of fruit wine in grape wine and is quant. in the absence of mannitol. Dibenzylidenesorbitol is more easily prepared than the mono-compound, but in the presence of much mannitol (1:1) tribenzylidenemannitol (m.p. 200—217°) is formed, although this may be obviated to some extent if 50% H_2SO_4 is used as condensing agent, or by removing the sorbitol derivative from the mixture in hot COMe_2 . The sorbitol content remains const. during fermentation.

J. G.

Determination of tartaric acid in wine. P. BERG and S. SCHEMEL (Z. Unters. Lebensm., 1932, 64, 348—357).—A solution of 15 g. of KCl in 50 c.c. of warm wine is mixed with 2 c.c. of AcOH and 1 c.c. of 1:5 KOAc solution and pptd. with 100 c.c. of 96% EtOH at 0— 5° . The filtered ppt. is washed with EtOH and Et_2O , and a solution in 75 c.c. of hot H_2O is titrated with 0.1N-NaOH to litmus paper (no. of c.c. $\times 0.3 =$ g. of tartaric acid/litre). The accuracy of the method is high for aq. solutions, but is dependent in the case of wines on a knowledge of the correct solubility factor of the ppt. under the experimental conditions.

J. G.

Determination of volatile acidity of wines. J. FOURCY (J. Pharm. Chim., 1932, [viii], 16, 376—382).—Mathieu's process is the most exact, but a more rapid method, suitable for routine work, is described. It involves addition of KOH, removal of EtOH by distillation, acidification, distillation of a known fraction of the resulting liquid, and titration of the distillate.

R. S. C.

Wine for the manufacture of wine vinegar. P. BERG (Z. Unters. Lebensm., 1932, 64, 357—362).—A discussion (with analyses) of the chemical criteria of wines for the prep. of wine vinegar.

J. G.

EtOH.—See III.

PATENTS.

Production of durable yeast. NORDDEUTS. HEFEIND. A.-G. (B.P. 381,741, 2.11.31. Ger., 25.7.31. Addn. to B.P. 308,471; B., 1929, 450).—The raising power of dry yeast is activated by stirring and aërating the dry yeast in H_2O at 35° . A small quantity of sugar may be added to the suspension.

C. R.

Manufacture of non-alcoholic beverages or beverages containing a low proportion of alcohol. R. STEPHAN and K. SCHREDER (B.P. 382,048, 6.10.31. Austr., 14.7.31).—Wort from well-modified malt mashed at 52° rising to 65° is freed from proteins by intense cooling and filtration. It is sterilised at approx. 80° and aërated during cooling to 28° , when it is inoculated with *Bact. termo*. The fermenting liquid is raised to 35° and cooled again to 28° and is finally filtered and carbonated with its own CO_2 and flavour substances collected during fermentation.

C. R.

XIX.—FOODS.

Soluble sugars of the grain from varieties of wheat and their relationship to the baking value. A. DE CUGNAC (Ann. Agron., 1932, 3, 375—383).—Chemical and polarimetric data for the sol. sugars present in wheat flours are recorded. Milling offals contain larger amounts of sol. sugars than does the flour. High proportions of sol. sugar in flour when associated with high gluten contents are characteristic of flours of high baking val.

A. G. P.

Reserve of fermentable sugar of flour, and bread-making correctives. P. BRUÈRE (Bull. Soc. Chim. biol., 1932, 14, 1240—1241).—During bread-making, diastase raises the content of reducing sugar of flour from 0.2% (as glucose) to 1.2% in the dough. This is more than sufficient to produce, under the influence of yeast, the necessary amount of CO_2 . Bread-making correctives tend to produce excessive quantities of sugar from inferior flour.

A. C.

Loss by fermentation in the manufacture of bread. M. P. NEUMANN and K. SEIDEL (Z. Unters. Lebensm., 1932, 64, 372—375). J. GERUM (*Ibid.*, 376).—Gerum's results (B., 1932, 365), corrected for H_2O content, indicate a loss on fermentation of 8—11%, which is still considered high, since the authors find 1—2% for a normal fermentation and a max. of 3% in exceptional cases. GERUM comments on the foregoing. Higher results may be due to differences in the initial product and procedure.

J. G.

Comparison of crispbread with other bread. E. G. DRESEL and H. O. HETTICHE (Arch. Hyg., 1932, 108, 1—19; Chem. Zentr., 1932, ii, 458).

Citric acid in milk. B. G. HARTMANN and F. HLLIG (J. Assoc. Off. Agric. Chem., 1932, 15, 643—645).—The milk is coagulated with H_2SO_4 and tartaric acid, filtered, diluted with EtOH, and centrifuged with $Pb(OAc)_2$, excess of which is removed by H_2S . The resulting Pb citrate is heated at 50° with KBr and H_2SO_4 , and then with $KMnO_4$, excess of MnO_2 being removed by $FeSO_4$. Pentabromoacetone is then filtered from the cool solution, dried *in vacuo*, and weighed, and the crucible is re-weighed after removal of the ppt. in $Et_2O-EtOH$. Added citric acid was completely recovered from synthetic milks, and 5 bottled milks were shown to contain 0.0163—0.177 g./100 c.c. J. G.

Analysis of sweetened condensed milk in which sucrose has altered during storage. Rept. III. Milk Products Sub-Committee to the Standing Committee on Uniformity of Analytical Methods (Analyst, 1932, 57, 630—652; cf. B., 1930, 636).—An organism producing lævan has been isolated from samples of sweetened condensed milk. Lævan has $[\alpha]_D^{20} -50^\circ$ and is reconverted into fructose during the inversion of sucrose. The presence of 0.1% of glucose or fructose may be detected by the use of a modified Barfoed solution. If significant alteration has taken place the % of original sucrose (S) = $0.964E - 1.29R$, where E = I absorbed by the chloramine-*T* process and R = $[\alpha]_D^{20}$ of inverted Zn-serum from the sample.

T. McL.

Use of the Hortvet apparatus in determining the f.p. of milk. H. C. LOCKWOOD (Analyst, 1932, 57, 698—703).—Parallax is eliminated by the use of a pointer fixed horizontally on the frame of the lens. The rate of stirring should be kept uniform and the vol. of liquid should be const. CH_2O forms the hydrate and polyhydrate in 40% solution, but a 0.8% solution has f.p. -0.553° and is without effect on the f.p. of pure milk. 1 c.c. added to 100 c.c. of milk is the most satisfactory preservative.

T. McL.

Determination of the f.p. of milk. K. WISS (Z. Unters. Lebensm., 1932, 64, 367—371).—A claim of priority for the work of Schmid (1907), and a discussion of the extent to which recent refinements are justified in view of the inherent errors of the method; a mean val. of 0.545 is cited for a normal milk (acidity 7).

J. G.

Factors in the separation of serum from bottled cream. G. M. TROUT and J. C. McCAN (J. Agric. Res., 1932, 45, 483—500).—The effects of temp. of separation, pasteurisation, viscolisation, and of the addition of various substances on the separation of serum are recorded.

A. G. P.

Detection of benzoic acid and of *p*-chlorobenzoic acid in cheese. J. SCHWAIBOLD (Pharm. Zentr., 1932, 73, 513—516).—An emulsion of the sample in NaOH is pptd. with 15% NaOH and 30% $ZnSO_4$, and the acid filtrate is extracted with C_6H_6 . The extract, rendered alkaline, is evaporated slowly and a solution of the residue in H_2SO_4 containing 10% of KNO_3 is treated with $NH_2OH.HCl$ and aq. NH_3 . BzOH gives a red colour

(which may be matched against that produced from NH_4CNS and a Fe^{+++} salt, 50—80% being recoverable from cheeses containing 0.05%), and the *p*-Cl-derivative green if < and red if > 3 mg. J. G.

Detection of decomposition in eggs. H. D. GRIGSBY (J. Assoc. Off. Agric. Chem., 1932, 15, 341—344).—In determining the acidity of the Et_2O extract of eggs, 2 g. of dried egg are repeatedly extracted with Et_2O . The extract is filtered, the Et_2O removed, and the wt. of the extract after drying at 100° is determined. The extract is dissolved in neutral C_6H_6 and titrated with 0.05N-NaOEt to phenolphthalein. The acidity is reported as c.c. of 0.05N-NaOEt per 1 g. of dried extract. In determining acid-sol. P_2O_5 in eggs, 12 g. of dried egg or 50 g. of liquid egg are mixed for 30 min. with 150 c.c. of saturated picric acid solution to which 0.75 c.c. of conc. HCl has been added immediately before use. The liquid is centrifuged and filtered, and the P_2O_5 in the filtrate determined by oxidation of the org. matter with $HNO_3-H_2SO_4$ and pptn. of the P_2O_5 as phosphomolybdate. W. J. B.

[Detection of glycerol in] eggs and egg products. S. ALFEND (J. Assoc. Off. Agric. Chem., 1932, 15, 331—340).—A colorimetric method is described which depends on the action of acraldehyde on fuchsin-sulphite reagent; other known methods are discussed. A method applicable in the absence of added sugars involves removal of proteins and other substances by treatment first with $Hg(NO_3)_2$ and $MgCO_3$, and then with basic Pb acetate, the glycerol being determined finally by dichromate oxidation. W. J. B.

Water-soluble nitrogen and water-soluble nitrogen precipitable by 40% alcohol [in eggs and egg products]. L. C. MITCHELL (J. Assoc. Off. Agric. Chem., 1932, 15, 344—354).—The optimum p_H for filtration of an aq. extract of egg mixtures is obtained by adding 2.0—2.5 c.c. of 0.01N-AcOH for each 1 g. of fresh whole egg or 3.0—4.0 c.c. for storage eggs. Addition of insufficient acid gives a cloudy filtrate and high results for H_2O -sol. N and crude protein-N. Excess acid gives low results. W. J. B.

Detection of adulteration of Indian coffee, with special reference to the extract method. E. H. BUNCE and G. C. MOITRA (Analyst, 1932, 57, 708).—Indian coffee gives 28.0% of extract. Roasted gram (*Cicer arietinum*, L), frequently used as an adulterant, gives approx. the same amount of extract; it is therefore identified microscopically and the degree of adulteration ascertained by determining the starch present, of which it contains about 50%. T. McL.

New ground-nut coffee substitute. J. PRITZKER and R. JUNGKUNZ (Z. Unters. Lebensm., 1932, 64, 389—392).—The product contained N 23.4, ash 2.42, fat 34.8 (refractivity at 40° 57.5), caffeine 0.4, H_2O extract 17.8%, acidity 8 c.c. of N-NaOH. Thence it is deduced that the approx. composition was 33% of coffee-bean powder and 5% of sugar in admixture with roasted ground-nut powder. J. G.

Rapid determination of common salt in flesh products. G. MÉSZÁROS (Z. Unters. Lebensm., 1932, 64, 491—493).—The sample is minced and mixed, 2—3 g. are shaken with 200 c.c. of H_2O for 10 min., and 20 c.c.

of liquid titrated with 0.1N-AgNO₃ by Mohr's method. It is unnecessary to filter or otherwise pretreat the mixture as in the (German) official method. J. G.

Commercial descriptions of fishes and crustacea and their methods of preparation. A. BEHRE (Z. Unters. Lebensm., 1932, 64, 460—470).—The products discussed are classified in the following categories: shark, ray, salmon (and its substitutes), cod, trout, carp, flounder, herring (including brisling, sprat, sardines, etc.), roes, and crustacea. J. G.

Deterioration in shelled green peas held a few days in storage prior to canning. Z. I. KERTESZ and E. L. GREEN (J. Agric. Res., 1932, 45, 361—370).—Peas were kept in storage at -1° with and without previous blanching and chilling: these were compared with peas kept at room temp. The peas deteriorated on keeping but the rate of deterioration was much slower if blanched, chilled, and stored at -1° than if stored at -1° without blanching and chilling. Analysis threw no light on the change in quality which occurred. E. B. H.

Sources of vitamin-A, particularly lucerne products, for maintaining the life of chicks. B. W. HEYWANG and H. W. TITUS (Poultry Sci., 1932, 11, 234—238).—Fresh lucerne, cod-liver oil, and yellow carrots are richer in vitamin-A than is sun-cured lucerne meal or leaf meal. CH. ABS.

Changes during freezing and subsequent thawing of fruits and vegetables. M. A. JOSLYN and G. L. MARSH (Fruit Products J., 1932, 12, 79—81, 85).—Tables are given for expansion of H₂O and sugar solution, of strawberries and raspberries crushed and whole; effect of freezing on average depth of berries after freezing; loss in wt. of fruits packed in syrup; balling degree of drained syrup fruit, fruits packed in syrup, etc. E. B. H.

Cause for hydrogen swells [of canned fruits] in hot climates (Canning Trade J., 1932, 2, 267—273).—Charcoal tinplate is better than coke plate. Fruits containing H₂O-sol. colour must be put in lacquered cans; others such as Pershore plums, greengages, and gooseberries have a longer life in plain cans. The higher the temp. of closure the longer is the life of the can. Addition of citric acid with certain fruits, especially greengages and sweet cherries, helps to prevent H₂ swells. E. B. H.

Commercial processing of apple juice. D. C. CARPENTER and W. F. WALSH (Fruit Products J., 1932, 12, 71—75, 89, 91).—The suspended matter in apple juice was examined with a view to its removal. The following methods of clarification are examined: (a) flash-heating and filtering, (b) gelatin-tannin process, (c) use of "Clarase" and of "Pectinol-E." Method (a) is preferred. E. B. H.

Keeping qualities of dried grapes as affected by processing. W. R. JEWELL and A. V. LYON (J. Coun. Sci. Ind. Res., Australia, 1932, 5, 170—176).—The controllable factors affecting keeping qualities are: the substances used in the dip prior to drying, the moisture content, severity of treatment in cleaning machines, the application of a paraffin emulsion, and entomological pests. Of four kinds of dip tested, only that known as

"cold dip" gave a satisfactory product. Final treatment with a 10% emulsion of paraffin (showelling) is essential for control of *Plodia interpunctella*. W. G. E.

Determination of l-malic acid in fruits and fruit products. B. G. HARTMANN and F. HILLIG (J. Assoc. Off. Agric. Chem., 1932, 15, 645—653).—The saponified sample is diluted with EtOH (to remove pectins), filtered, and centrifuged with tartaric acid and Pb(OAc)₂ to separate the Pb salts of the acids from the sugars. Tartaric, citric, and isocitric acids, tannins, and colouring matters are removed from a neutral solution of the ppt. by the action of 2PbO.Pb(OAc)₂ at 0°, the sol. basic Pb malate is then shaken with U acetate in the dark, and the filtrate examined in the polarimeter. If an arbitrary conversion factor is used, the results for 25—150 mg. of malic acid in "synthetic" juices are accurate to within 3%; vals. are tabulated for a no. of fruit products. Succinic, benzoic, glycollic, salicylic, oxalic, and quinic acids do not interfere. J. G.

Potentiometric titration of strongly coloured fruit solutions containing added phosphoric acid. A. GAINES, JUN. (J. Assoc. Off. Agric. Chem., 1932, 15, 617—618).—The method, using the quinhydrone electrode, is satisfactory for the determination of the acidity of fruit products when these are so highly coloured that decolorisation with Pb(OAc)₂ (B., 1930, 837, 392) cannot be used. Sucrose, artificial colours, or HNO₃ do not interfere, but H₃PO₄ in the presence of org. acids should first be removed by Pb(OAc)₂. J. G.

Determination of the effect of lecithin on the viscosity of chocolate. B. REWALD and W. HÖFLING (Bull. Off. Office Internat. Fabr. Choc. Cacao, 1932, 2, 69—75; Chem. Zentr., 1932, ii, 462).—The Duffing viscosimeter is used to determine the economy in fat (e.g., 6%) possible by addition of lecithin (e.g., 0.3%). A. A. E.

Polarimetric determination of sucrose in chocolate. T. VON FELLEBERG and J. RUFFY (Mitt. Lebensm. Hyg., 1932, 23, 6—17; Chem. Zentr., 1932, ii, 461).—The chocolate (10 g.) is treated with H₂O (90 c.c.) at 50°; after cooling, the quantity of H₂O is adjusted to 96 g. and 4 c.c. of Pb(OAc)₂ are added. After a test for reducing sugar the solution is polarised at 20°. A. A. E.

Determination of sugars in chocolates containing dextrose. J. FITELSON (J. Assoc. Off. Agric. Chem., 1932, 15, 618—624).—If 5 g. of chocolate are boiled with 80 c.c. of H₂O, 10 c.c. of Fehling's solution, and 6 c.c. of 0.5N-NaOH and filtered, and the filtrate is heated with 15 c.c. of Barfoed's reagent, then > 0.5% of glucose in the presence of other sugars (including lactose) is detectable from the red pptd. Cu₂O formed. For quant. work, sucrose is determined polarimetrically after 15 min. at 85°, whilst glucose and lactose are determined by a combined reduction and optical method. The Lane-Eynon Cu reduction figures (cf. B., 1933, 38) may, however, be used to obtain more accurate vals. for lactose and glucose contents if the other sugars are removed by fermentation with yeast, and if the sucrose effect is allowed for by subtracting the glucose equiv. of the lactose present, respectively.

The correction for the presence of unfermented reducing substances in the yeast and the chocolate is -0.35% .

J. G.

Analysis of milk chocolate. M. RICHARD (Bull. Off. Office Internat. Fabr. Choc. Cacao, 1932, 2, 65—68; Chem. Zentr., 1932, ii, 461).

[Biological] completion of honey analysis. J. GRÜSS (Z. Unters. Lebensm., 1932, 64, 376—383).—Fruit blossom, crude, linden, and heather honeys were examined (and nos. are given) for pollen grains, mould colonies (*Mucor*, *Dematia*, and *Penicillia*), and cocci; yeast cells were also present. A new yeast (*Anthomyces ruber*, n. spec.) was isolated from linden honey, which assimilated all common sugars except mannose and xylose, and a new *Mucor* mould (*Cephalosporium candidum*, n. spec.) from heather honey; the latter evolved H_2S from S media, and, like the above yeast, contained hydrogenase but no zymase. As additional tests of biological activity, (1) a mixture of honey and a reducible dye (e.g., violamine) is titrated with $0.1N-Na_2S_2O_3$ in the presence of AcOH after 2 hr.; (2) the H_2S evolved at $25-28^\circ$ from milk-of-S is determined as CdS.

J. G.

Identification of flavouring constituents of commercial flavours. II. Detection and qualitative separation of classes. J. B. WILSON (J. Assoc. Off. Agric. Chem., 1932, 15, 635—642; cf. B., 1930, 1003).—The sample is steam-distilled and by acid and alkaline extractions with Et_2O the residue is separated into (a) esters, lactones, and other inactive constituents, (b) higher fatty and aromatic acids, (c) vanillin and phenols. A second scheme involving neutralisation, saponification, and pptn. with semicarbazide at 0° enables the distillate to be separated into (a) Na salts of free and (b) of combined volatile acids, (c) aldehydes and ketones, (d) alcohols, (e) lactones and anhydrides; in some cases the results are approx. quant.

J. G.

Nutritive value of kolukkattai grass (*Pennisetum cenchroides*) dried artificially. T. MURARI (Agric. Live-stock India, 1932, 2, 380—382).—A preliminary experiment with calves indicates that the dried grass has a satisfactory feeding val.

W. G. E.

Effect of artificial drying on the availability of the nutrients of alfalfa [lucerne] hay. E. B. HART, O. L. KLINE, and G. C. HUMPHREY (J. Agric. Res., 1932, 45, 507—511).—Artificial drying (40 sec. at $480-535^\circ$) did not appreciably affect the digestibility of lucerne hay for milch cows.

A. G. P.

Presence of castor beans in feeding-stuffs [oil cake etc.]. E. I. BETTER (Allgem. Oel- u. Fett-Ztg., 1932, 29, 541—544).—A review of methods for the detection of castor seed contamination is given. E. L.

Determination of small amounts of aluminium in food. L. H. LAMPITT and N. D. SYLVESTER. Note on the spectrographic method. P. BILHAM (Analyst, 1932, 57, 418—428).—Two methods are described, viz., (A) a modified and standardised form of Hammett and Sottery's method (B., 1925, 381), based on the colour produced when aurintricarboxylic acid is added to an Al solution; and (B) a spectroscopic method. In A

the application of the Lovibond tintometer to the determination has rendered it sensitive and of a high degree of accuracy (0.2 p.p.m. Al in 20 g. of food can be detected). Cu, Pb, Sn, Fe, Zn, Mn, Ni, Ca, P_2O_5 , and B do not interfere. The Al contents of various foods cooked in Al utensils varied from 0.6 to 14 p.p.m. In B the Al content of the sample is conc. on an electrode, without loss, and the spectrum is excited by a condensed spark discharge modified to remove air lines; a quartz spectrograph is employed to photograph the spectrum. The plate after development is compared with standards. Al is detectable down to 0.1 p.p.m. and the intensities of the lines at 3944 and 3961-5 Å. can be used in judging the amount present up to 2 p.p.m. Method A is preferred.

W. J. B.

Statistics in the service of cereal chemistry. A. E. TRELOAR (Cereal Chem., 1932, 9, 573—590).

Edible oils and fats.—See XII.

PATENTS.

Prepared flour. A. H. FISKE, Assr. to RUMFORD CHEM. WORKS (U.S.P. 1,811,264, 23.6.31. Appl., 26.3.28).—A peroxide, such as urea peroxide, is added to self-raising flour and an excess of the acid ingredient is used, so that, on wetting, O_2 or H_2O_2 is available as a gluten improver.

E. B. H.

Baking powder. A. H. FISKE, Assr. to RUMFORD CHEM. WORKS (U.S.P. 1,811,263, 23.6.31. Appl., 2.3.28).—The starch diluent of a baking powder is slightly oxidised so that, on wetting, the O_2 is available as a gluten improver.

E. B. H.

Making and treating dough. E. RABINOVITCH (B.P. 382,640, 20.5.31. Ger., 24.5.30).—In the prep. of wholemeal dough direct from wheat, the enzymes are activated and fermentation is prevented by applying a continuously increasing pressure to the dough. The cells of the aleurone layer are then opened up by suddenly applying a vac. in the apparatus described. By this means the time required to produce bread from grain is reduced to 8—12 hr.

E. B. H.

Treatment of [rancid] nuts. W. F. SEYER (U.S.P. 1,848,806, 8.3.32. Appl., 6.7.29. Can., 1.6.29).—The nut meats are steeped in dil. (5%) aq. NaOH, then washed, dipped in a 1% solution of HCl, washed, and dried.

H. R.-D.

Making and freshening cheese. P. CACCIA (U.S.P. 1,847,210, 1.3.32. Appl., 16.4.30).—Old hard cheese is finely comminuted and mixed with pasteurised acid whey to form a homogeneous paste. This is added to pasteurised milk, to which rennin has been added 5 min. previously. Cheese is then prepared by standard methods.

E. B. H.

Preparation of a syrup carrying pectin in suspension. R. T. NORTHCUTT, Assr. to GEN. PACKING CORP. (U.S.P. 1,847,356, 1.3.32. Appl., 10.10.25).—Fruit juices are conc. and the sugar and acid contents so adjusted that subsequently added pectin may form a suspension but not a solution in the syrup. Fruit jellies are prepared from this concentrate by the addition of sugar and H_2O .

E. B. H.

Preservation of animal and vegetable substances.

H. S. EGEBERG (B.P. 382,644, 22.7.31. Ger., 23.12.30).—Fish, meat, etc. at 5° is rubbed with 0.5–1.0% of preservative, such as NaOBz or borax, the rate of penetration of which is then increased by treatment with an equal wt. of H₂O at a temp. at least 10° higher, e.g., 35°. E. B. H.

[Rotary drum-screen] apparatus for extracting substances [e.g., caffeine] from vegetables or vegetable matter [e.g., coffee beans]. E. A. CLOSMANN (B.P. 383,170, 9.4.32. Ger., 10.4.31).

Rotary drying apparatus [for coffee beans].—

See I. Fish oils.—See XII. Beverages.—See XVIII.

XX.—MEDICINAL SUBSTANCES; ESSENTIAL OILS.

Preparation of narcotic chloroform in the tropics. O. TONN (Pharm. Ztg., 1932, 77, 1177).—After treatment with 1% HNO₃ (Sbarski's method) the CHCl₃ is shaken with Nessler's reagent and then with benzidine (Sbarskago). E. H. S.

Detection of methyl alcohol in spirit preparations. H. PATZSCH (Pharm. Ztg., 1932, 77, 1191–1192).—The prep., after a pretreatment to remove or fix compounds such as free acids, essential oils, alkalis, soap, etc., is distilled and alcohol determined by the official method. 5 c.c. of a mixture of the distillate (5 c.c.) with H₂O (35 c.c.) are shaken with 2 drops of 25% aq. H₃PO₄ and 25 drops of 2% aq. KMnO₄ and the mixture is kept for 15 min.; 2 drops of 10% aq. H₂C₂O₄ and 5 c.c. of dil. H₂SO₄ are added and, after shaking, the mixture is set aside until perfectly clear and colourless, 1–2 drops of aq. H₂C₂O₄ being added if necessary. 5 c.c. of colourless fuchsin–H₂SO₃ solution are added and in the presence of MeOH a blue-violet colour is formed within 15 min. As a control, 1 drop of MeOH is added to the distillate, which is then treated in the same manner. The suspected presence of CH₂O in the original prep. may be proved by the omission of the oxidation. E. H. S.

Detection of veronal and luminal in presence of one another. L. DÁVID (Pharm. Ztg., 1932, 77, 1165–1166).—Colour reactions are described. The free acids are separable by crystallisation from aq. EtOH.

R. S. C.

"Hydrolysis" of nitroglycerin, evaluation of "nitroglycerinum solutum," and analysis of nitroglycerin and nitromannitol preparations containing fat. E. SCHULEK and B. KERÉNYI (Pharm. Zentr., 1932, 73, 673–680, 692–698).—"Hydrolysis" of nitroglycerin takes place in solutions of $p_H > 6.4$. The HNO₂ formed may be used to detect nitroglycerin, or similar substances, but cannot be used for their determination. Methods involving the addition of H₂O₂ depend on the introduction of compensating errors, and in some cases over-compensation results. A method depending on the reduction of the hydrolysis products to NH₃, and applicable to preps. containing fat, is described. About 97% of the theoretical N is thus obtained. A. A. L.

[Ammonium molybdate] reaction of industrial cherry-laurel water distillates. H. PECKER (J.

Pharm. Chim., 1932, [viii], 16, 388–390).—This reaction (A., 1922, ii, 537) is mostly, but not entirely, due to Cu (cf. B., 1932, 816). R. S. C.

Luminescence of ginseng. H. NEUGEBAUER (Pharm. Ztg., 1932, 77, 1154).—Ginseng preps. are variable in their behaviour under ultra-violet light, some showing a blue fluorescence instead of the usual green. Observations on these differences are given. E. H. S.

Standardisation and stabilisation of ergot preparations. C. E. POWELL, H. A. SCHULZE, and E. E. SWANSON (J. Amer. Pharm. Assoc., 1932, 21, 1003–1006).—EtOH solutions of ergotamine tartrate appear to be partly stabilised by a definite p_H , but the % of EtOH alone has no effect on the deterioration. NaH₂PO₄ and acid together are more efficient in preventing deterioration than is NaH₂PO₄ alone. NaH₂PO₂ with or without acid fails to stabilise the alkaloid, but Na₂S₂O₄ partly stabilises irrespective of the p_H . The p_H of the fluid extract appears to have some influence on the stability, and apparently in the extract or crude drug there is some compound other than alkaloid which aids in its stability (cf. B., 1932, 656).

E. H. S.

Injectational medicine. III. Decomposition of solutions of atropine and homatropine on sterilisation by heat. S. A. SCHOU and P. B. BJERREGAARD (Dansk Tidsskr. Farm., 1932, 6, 185–193).—The extent of hydrolysis of solutions of atropine and homatropine has been determined by extracting the solution with Pr⁶OH-CHCl₃ mixture in presence of Na₂CO₃, shaking the extract with 0.1N-HCl, and determining dissolved alkaloid by titrating the excess acid. The original solution left after extraction is then acidified, extracted 3 times with Pr⁶OH-CHCl₃, and the extract evaporated; the residue of tropic or mandelic acid is then titrated with 0.1N-NaOH. The results showed that a 0.4% aq. solution of atropine sulphate was only slightly (3.4%) hydrolysed by sterilisation at 120° for 20 min., provided that the container was of alkali-free glass. In the presence of a phosphate buffer and at $p_H < 6.0$, up to 51% of the atropine was hydrolysed under the same conditions. A similar solution of homatropine hydrobromide was even less stable, and could not be sterilised by heat even in aq. solution without considerable decomp.; in the presence of a phosphate buffer and at $p_H 7.3$ complete hydrolysis resulted on keeping at 120° for 20 min. H. F. H.

Nicotine and ammonia contents of cigarette tobacco smoke. L. BARTA and E. TOOLE (Angew. Chem., 1932, 45, 671–673).—In the method of analysis used, currents of air are drawn both through and over the burning cigarettes. Of the total nicotine content, 86–100% (mean 93.5%) is found in the smoke and 50–87%, according to the rate of burning, passes through the cigarette. The NH₃ content of the smoke (1.08–1.68%) is always > that of the tobacco (0.21–0.88%), and comparatively little (7–27%) passes through the cigarette, whatever the rate of burning.

H. F. G.

Preparation of fluid extracts by diacolation. C. J. T. MADSEN (Dansk Tidsskr. Farm., 1932, 6, 148–157).—Diacolation is more efficient for the prep. of

several fluid extracts than are percolation methods (cf. B., 1930, 439). R. S. C.

Pine-needle extracts. ROJAHN (Pharm. Ztg., 1932, 77, 1113—1114).—Methods of prep. are further discussed (cf. B., 1932, 864). A. A. L.

Preparation of fluid extract of ipecacuanha. F. GSTIRNER (Pharm. Ztg., 1932, 77, 1112—1113).—The method of the Swedish Pharmacopœia gives a product most suitable for pharmaceutical purposes. A. A. L.

Capillary analysis as an aid to the evaluation of fluid extracts. H. SCHMIDT-HEBBEL (Pharm. Zentr., 1932, 73, 689—692).—Distinctive phenomena are described for extracts of cascara sagrada, frangula (root), liquiritia officinalis, *Aconitum napellus* (leaves and roots), and belladonna. The method of prep. affects the colorations with kola-nut extracts. A. A. L.

Rapid analysis of medicinal extracts and tinctures. R. MONTERUMICI (Boll. Chim.-Farm., 1932, 71, 757—761).—The "dry residue" is determined by distilling with C_6H_6 in an apparatus in which distilled H_2O is collected separately and C_6H_6 returns to the boiler. The C_6H_6 is removed by evaporation, the "dry residue" weighed, extracted with ligroin, and glycerol is determined in the residue by extraction with $COMe_2$ - $EtOH$ (9 : 1). R. K. C.

Production of citrus fruits. E. MANELSKI (Braun-Malzind., 1932, 25 No. 32, 62—63; Chem. Zentr., 1932, ii, 459).—Oil (0.3—0.4%) of orange peel had $d^{15} 0.845$ — 0.859 , $\alpha_D^{20} +83.5$ — 92° , residue 4—8%, aldehydes 1—2%. The use of HCN , C_2H_4 , and paraffin in the citrus industry is discussed. A. A. E.

Determination of citronellal in citronella oil. P. A. ROWAAN (Chem. Weekblad, 1932, 29, 603—605).—The sample (2 g.) is mixed with 2 c.c. of $EtOH$ and neutralised with 0.1N-KOH; 20 c.c. 0.5N-alcoholic KOH and 20 c.c. of 5% alcoholic $NH_2OH.HCl$ are added, and after 1 hr. at room temp. excess KOH is titrated with 0.5N-HCl. The % citronellal is given by $15.4an/g$, where n is the normality and a the vol., corrected by means of a blank determination, of the HCl used, and g the wt. of the sample. H. F. G.

Ampoules.—See VIII. **Rotenone in *Derris* root.**—See XVI.

PATENTS.

Manufacture of sterilised catgut. A. MAYR, and R. GRAF & Co., A.-G. (Assees.) (B.P. 381,661, 17.8.31. Ger., 16.3.31. Cf. B.P. 333,847; B., 1930, 1091).—Each thread or intestine is separately suspended on sterile loops in a closed trough where sterilisation is effected without manipulation of the material. E. H. S.

Filling for dental purposes. H. TREBITSCH (B.P. 381,774, 10.12.31. Austr., 12.12.30).—A gutta-percha base is mixed with finely-divided Ag or coated with a thin Ag film, e.g., by pptn. E. H. S.

Manufacture of female sexual hormone. SCHERING-KAHLBAUM A.-G. (B.P. 381,758, 25.11.31. Ger., 18.12.30).— H_2O is removed from the hormone mol. $C_{18}H_{24}O_3$ either catalytically or by treatment with $KHSO_4$, P_2O_5 , etc., thus giving the hormone $C_{18}H_{22}O_2$. E. H. S.

Manufacture of female sexual hormone. B. ZONDEK (B.P. 382,047, 6.10.31. Ger., 13.10.30).—The hormone is extracted from the stale of mares in foal either by adsorption, or pptn., e.g., with heavy-metal salts of org. acids, or by extraction with solvents. Extraction may be preceded by boiling with acid, with or without initial extraction with Et_2O . [Stat. ref.] E. H. S.

Manufacture of œstrus hormone. F. HOFFMANN-LA ROCHE & Co., A.-G. (B.P. 381,900, 31.5.32. Ger., 25.7.31).—The hormone, obtained from known sources by adsorption on charcoal, is recovered therefrom by extraction with $MeOH-CHCl_3$. E. H. S.

Tobacco bleaching. C. W. ANDREWS, Assr. to THOMPSON & Co., Inc. (U.S.P. 1,847,162, 1.3.32. Appl., 14.11.30).—The uniformly moistened tobacco, contained in a gastight container, is treated with a bleaching agent, e.g., a mixture of SO_2 and Bz_2O_2 , and then air-dried. The combustion properties are restored by the introduction of an aq. mist, e.g., dil. KNO_3 solution, and the tobacco is finally aerated and conditioned. E. H. S.

[Rose water-sugar] toilet [lotion] or cosmetic preparations. M. E. R. DEWHURST and V. M. GLASSPOOL (B.P. 383,005, 3.10.31).

XXI.—PHOTOGRAPHIC MATERIALS AND PROCESSES.

Thallium in silver bromide [photographic emulsions]. LÜPPO-CRAMER (Z. wiss. Phot., 1932, 31, 168—171).—The addition of Tl salts (about 4% of the Ag salts) to a $AgBr-AgI$ emulsion causes a decrease in speed, an increase in γ , and the appearance of marked solarisation in the densitometer curves; these differences increase with the ripening of the emulsion. The excess bromide in the emulsion is not the cause of the solarisation. Capri-blue strongly desensitises this emulsion (cf. B., 1932, 162). Pb salts do not behave similarly to Tl salts. J. L.

Ripening and sensitisation of silver iodide [in photographic emulsion]. LÜPPO-CRAMER (Z. wiss. Phot., 1932, 31, 182—184).— Ag_2S nuclei are formed in an alkaline AgI emulsion by addition of $CS(NH_2)_2$ (optimum amount 0.1% of the AgI). After ripening for $\frac{1}{2}$ hr. at 65° the emulsion has strong panchromatic sensitivity, though the total sensitivity is not increased. Further ripening only causes fog. (Cf. B., 1927, 508.) J. L.

Unexplained fog formation [in photographic emulsions]. LÜPPO-CRAMER (Z. wiss. Phot., 1932, 31, 172—178).—Mn salts added to desensitising dye solutions cause heavy fog in plates developed with Neol, but not with quinol. $FeSO_4$ causes similar fog, using either developer. The results with various dyes are described. The fogging action of $Hg(CN)_2$ in conjunction with pyrogallol developer (cf. B., 1929, 227) is investigated. J. L.

PATENTS.

Recovery of silver from photographic fixing baths. KODAK, LTD., Assees. of K. C. D. HICKMAN (B.P. 381,903, 4.6.32. U.S., 4.6.31. Cf. B.P. 377,051; B., 1932, 898).—In a continuous electrolytic process,

when the fixing solution attains a Ag concn. of 2–3 g. per litre it is circulated through a series of electrolytic units, some through "working units" removing part of the Ag, and some of this into "tailing units" removing substantially all the Ag. The solution is adjusted in concn. after leaving the working units so as to be suitable for fixing (Ag content 0.5–1 g. per litre). Apparatus is described. J. L.

Production of photographic relief images. KODAK, LTD., Assees. of M. W. SEYMOUR (B.P. 381,787, 24.12.31. U.S., 27.12.30).—An emulsion is used having photographic sensitivity varying from a max. on one side of the layer to a min. on the other, the more sensitive side being in contact with the support. This emulsion is made by coating the support with a suitable sensitising dye before applying the emulsion, or by treating a standard emulsion for a short time with KI, desensitising dyes, etc., acting mostly on the surface. After exposure the gelatin is differentially hardened during or after development of the image and the sol. gelatin removed in the usual manner. Relief images are thus obtained on the original support. The process is applicable to two-colour motion-picture film. J. L.

Differential treatment of photographic images in different depths of an emulsion. TECHNICOLOR MOTION PICTURE CORP., Assees. of L. T. TROLAND (B.P. 382,320, 27.7.31. U.S., 26.8.30).—The top image is oxidised (bleached) in a solution of a certain speed of penetration, and the action stopped when desired by treatment with a reducing solution of a greater speed of penetration; suitable solutions are, e.g., I in KI, and 10% NaHSO₃ respectively. The two images are then differentiated by suitable dyeing, toning, etc. J. L.

[Two]-colour photography. J. B. HARRIS, JUN. (U.S.P. 1,848,714, 8.3.32. Appl., 5.3.29).—The first image (*A*) is printed, developed, and toned with a Cu salt toner (which also mordants the image); the remaining emulsion is cleared (and resensitised) in a bath of NH₄Br and K₂Cr₂O₇. The second image (*B*) is printed in register and developed. *A* is then restored with a solution of CuSO₄ (only) and dyed with a basic green dye. The print is fixed and *B* then toned red with Cu toner. J. L.

Multicolour photography. TECHNICOLOR MOTION PICTURE CORP., Assees. of J. A. BALL (B.P. 382,239, 19.5.32. Can., 27.5.31. Addn. to B.P. 373,429; B., 1932, 704).—Apparatus described previously (*loc. cit.*) is improved. J. L.

Blackening or subsequently colouring pictures in graphite or the like on paper. A. GRÜNERT (B.P. 382,156, 8.2.32. Ger., 10.2.31).—The paper is moistened with a grease-repelling liquid, e.g., acidified H₂O, glycerin, and smeared over with an oily paint; only the lines of the picture, in graphite (lead pencil), charcoal, etc., take the paint. Suitable papers are made of short and pulpy cellulose fibres, e.g., parchment, paraffin paper. These can be easily moistened by incorporating H₃BO₃ or montan wax (sizing) during manufacture, by roughening the surface mechanically or with NaOH, or by applying a coating of a cellulose compound. J. L.

Treating articles in liquids.—See I.

XXII.—EXPLOSIVES; MATCHES.

Influence of composition of mixed acid on properties of nitrocellulose. M. SENDO (J. Cellulose Inst., Tokyo, 1932, 8, 210–246).—Details are given of nitrations at 20° with 120 mixed acids in which H₂SO₄/HNO₃, in wt.-% (= *R*) was 0–16 and % H₂O was –0.83 to +24.6. The properties of the nitrocellulose depend almost entirely on its N content (% N). When *R* is < 2.5 % N increases as % H₂O decreases, and when *R* is > 2.5 there is an optimum % H₂O. For const. % H₂O the optimum val. of *R* is 2–4. When *R* is high and % H₂O is low, or when *R* is low, % N is low. A sol. nitrocellulose (solubility *R* 90%) is obtained over the widest range of % H₂O when *R* is 0.5–2.5, and in ordinary mixtures in which *R* = 2–4 the % H₂O must be 15.5–19.5. In sol. products N = 10–12.8% and solubility is greatest when N = 11–12.5%. The max. % N in nitrocelluloses insol. in COMe₂ is 5–7. Uniformity of nitration can be judged by the amount of insol. material remaining and is poor when *R* is > 5. The most stable nitrocelluloses are obtained when *R* = 0.5–2. Viscosity increases with decreasing *R*. A. G.

Influence of diphenylamine, aniline, etc. on the birefringence of nitrocelluloses. A. MICHEL-LEVY and H. MURAOUR (Compt. rend., 1932, 194, 372–373; cf. B., 1930, 168).—Stabilisation of (American) nitrocellulose powders (> 11.7% N) by EtOH and NHPH₂ causes the elongation to change from negative to positive. Microscopical examination of the action of an evaporating EtOH solution of NHPH₂ on sections of such a powder shows that the change occurs at a certain concn., and is accompanied by change in the sign of the birefringence. On dilution the phenomenon is reversed. Many other nitrocellulose and nitroglycerin powders behave similarly. An EtOH solution of NH₂Ph acts even more vigorously than one of NHPH₂, and solutions of NHPH₂Et and NPhEt₂ increasingly less so. NH₃, CH₂(C₆H₄·NMe₂)₂, camphor, etc. have no effect. C. A. S.

Cellulose nitrates.—See V. Nitroglycerin.—See XX.

PATENTS.

Manufacture of organic nitrates applicable in the explosives industry. A. HOUGH (B.P. 382,123, 15.12.31. Addn. to B.P. 341,456; B., 1931, 319).—Mixtures of diethylene glycol and glycerin are nitrated with an acid mixture containing 2–8% of H₂O and 44–54% of H₂SO₄. For mixtures of mono- and diethylene glycol, free from glycerin, the H₂O content of the mixed acid should be 3.8–10% and the H₂SO₄ content 39–55%. The mixed acid is mechanically stirred in a downward direction, and the mixture of polyhydric alcohols introduced below the surface and near the agitator. W. J. W.

Filler for projectiles. H. J. NICHOLS (U.S.P. 1,848,193, 8.3.32. Appl., 22.4.24).—Aromatic NO₂-compounds, e.g., C₆H₂Me(NO₂)₃ or NH₄ picrate in cryst. form, are mixed with 2.5–15% of a metallic soap, e.g., Zn stearate, and compressed (up to 15,000 lb./sq. in.); such mixtures remain friable and semi-plastic, and are therefore less sensitive to detonation on impact, when

filled into armour-piercing shells. The stearate also reduces the hygroscopicity of the explosive. W. J. W.

Loading of high-explosive shells. N. C. BOYD, Assr. to HERCULES POWDER CO. (U.S.P. 1,847,520, 1.3.32. Appl., 2.1.29. Cf. U.S.P. 1,840,431; B., 1932, 1010).—A mixture of amatol (80:20) and $Mg(NO_3)_2 \cdot 6H_2O$ is heated to melt the trinitrotoluene and release H_2O of crystallisation from the Mg salt to dissolve the NH_4NO_3 , the fluid composition being poured into a shell and allowed to cool. W. J. W.

Concn. of mixed acids etc.—See VII.

XXIII.—SANITATION; WATER PURIFICATION.

Determination of fine soot inhaled by man. A. I. BURNSTEIN (J. Ind. Hygiene, 1932, 14, 339—344).—A known vol. of air containing soot is drawn through filter-paper by means of a special type of pump and the soot content determined by comparison of the colour of the deposit with that of standards. P. G. M.

Aërobic and anaërobic decomposition of sewage solids. I. Changes during decomposition processes. W. RUDOLFS and H. HEUKELEKIAN (Ind. Eng. Chem., 1932, 24, 1312—1315).—The order of decomp. of volatile matter, proteins, and fats and the reduction in the biochemical O_2 demand is very similar when mixtures of fresh sewage solids and ripe sludge are decomposed under aërobic and anaërobic conditions. In the latter case, if the mixture is unseeded the rate of decomp. is much $<$ when treated aërobically, but if properly seeded the reverse is observed. Stable sludge of low biochemical O_2 demand is produced by aëration in 92 days, but unseeded anaërobic sludge is still very unstable at the end of that period. In both cases the rate of reduction of N corresponds closely with that of fats and a destruction of proteins is observed; under aërobic conditions a loss of mineral ash is recorded. C. J.

Softening of water for laundries. W. FEHRE (Arh. Hemiju, 1932, 6, 165—168).—Mg and Ca are pptd. by adding a mixture of $H_2C_2O_4$ and $Na_2C_2O_4$, and allowing the H_2O to settle for 9—12 hr. R. T.

Preparation of soap solution for use in determining the hardness of water. K. SCHERINGA (Chem. Weekblad, 1932, 29, 606—607).—Commercial stearine (10 g.) is dissolved in 200 c.c. of 95% EtOH and the warm solution neutralised with 0.5N-KOH; 400 c.c. of H_2O and sufficient EtOH to produce a total vol. of 1 litre are then added. H. F. G.

Determination of hardness of water by Wartha's method in the case of water high in chlorides. BRAUER and REISS (Chem.-Ztg., 1932, 56, 903).—The supposed effect of large additions of NaCl in modifying results by this method has been found to be due to the Mg and Ca content of the NaCl used. C. I.

Incrustations and corrosion in the water-mains of the town of Schwenning. K. HERRMANN (Gas- u. Wasserfach, 1932, 75, 890—893).—Cast-Fe water-mains distributing deep well water after sand filtration were heavy incrustated with scale which was shown by microscopical examination to be due to the alga *Gallionella ferruginea*. The decay of the alga produced a hollow space between the pipe wall and the crust containing

Fe oxides, and imperfections in the asphalt covering of the pipe led to pitting and graphitisation. The scaling is minimised by high pipe velocities and by better filtration. C. I.

Stream pollution by irrigation residues. C. S. SCOFIELD (Ind. Eng. Chem., 1932, 24, 1223—1224).—When stream water is used for the irrigation of arid or semi-arid regions the vol. decreases owing to loss by plant absorption and evaporation, but the total wt. of solids in solution remains substantially the same, and thus causes increased salinity, which by repeated re-use of the water may become excessive. It is found that salts of low solubility ($CaCO_3$, $CaSO_4$) tend to diminish, but there is a substantial increase in NaCl. Special attention should be paid to the drainage of irrigated lands in order to remove the salt along with the drainage water, and so prevent unproductiveness due to excessive salinity. C. J.

Chemical studies of sulphite waste liquor pollution of sea-water. H. K. BENSON (Ind. Eng. Chem., 1932, 24, 1302—1304).—The addition of 1 pt. of waste liquor to 1200 pts. of sea-water reduced the dissolved O_2 by 2.7 p.p.m. and increased the biochemical O_2 demand by 34.6 p.p.m. and the O_2 consumed from $KMnO_4$ by 57.2 p.p.m. The actual discharge of liquor into the sea was complete in $\frac{1}{2}$ hr., and 1 hr. later the effect could hardly be detected; there is no evidence that the pollution is cumulative. It is suggested that the lignin present, though resistant to decay under aërobic conditions, may be destroyed by organisms normally present in sea-water. C. J.

Recovery of benzene and benzol from industrial effluents by active carbon. C. MÜLLER (Petroleum, 1932, 28, 1—4).—The benzol (etc.) content of coke-oven liquors may be reduced from 1 to 0.1 kg. per cu. m. by passing them through a layer of active C (Hydriffin) at a rate of 4—5 m. per hr. The benzol is recovered by steaming, the costs of the process being 0.1—0.4d. per cu. m. of liquor passed. All solid materials must be previously removed by sieving and sand-filtering. R. N. B.

Cellulose nitrates. H_2O for paper mills.—See V. **Pb-weighted silk and health.**—See VI.

PATENTS.

Septic tanks. F. J. COMMIN (B.P. 382,421, 23.10.31).—The construction of sectional tanks of asbestos cement is described. C. J.

Treatment of gelatinous and colloidal materials. A. M. BUSWELL (U.S.P. 1,847,080, 1.3.32. Appl., 4.2.27).—The use of $AlCl_3$ ($\frac{1}{2}$ —1 $\frac{1}{2}$ lb. per 1000 gals.) is claimed for the conditioning of activated sludge and the like, prior to de-watering. C. J.

Making insecticides floatable. G. E. SANDERS (U.S.P. 1,847,540, 1.3.32. Appl., 11.3.30).—The heat of slaking CaO is used to melt fatty acids or their esters and with suitable agitation to coat the particles of dust formed and render them waterproof and floatable on H_2O . The necessary poison may be introduced before, with, or after the H_2O . Suitable ingredients are CaO 300 lb., paste Cu arsenite 300 lb., stearic acid 12 lb. C. J.