

BRITISH CHEMICAL ABSTRACTS

B.—APPLIED CHEMISTRY

JULY 8 and 15, 1932.*

I.—GENERAL; PLANT; MACHINERY.

Heat transmission in radiant sections of tube stills. D. W. WILSON, W. E. LOBO, and H. C. HOTTEL (Ind. Eng. Chem., 1932, 24, 486—493).—Available data from 12 tube stills used under widely differing operating conditions have been employed to derive the following relationship: $\mu = \{1 + (G\sqrt{Q/A_c}/3200)\}^{-1}$, where μ is the fraction of heat available in fuel, air, and recirculated gases absorbed by the radiant tubes, G the air-fuel ratio, Q the net heating val. of the fuel used per hr., and A_c the total outside tube area exposed to radiation. The relationship applies to box-type furnaces having tubes in one row; for other types of furnace a rather more complicated equation is given.

H. I.

Heat transmission in convection sections of pipe stills. C. C. MONRAD (Ind. Eng. Chem., 1932, 24, 505—509).—Experimental data on the heat-transfer coeffs. in convection banks of pipe stills in several types of furnace under various working conditions are compared with calc. vals. Agreement is within about 10%. Gas temp. were measured with a thermocouple in which the gases were drawn rapidly over the joint. Differences in temp. up to 200° F. were recorded when comparison with the ordinary static thermocouple was made. Simplified formulæ for calculating heat transfer and pressure drops from gases flowing past banks of staggered tubes are given.

H. I.

Apparatus for the rapid determination of dry substance. J. HAMOUS (Z. Zuckerind. Czechoslov., 1932, 56, 335).—To accelerate the determination of moisture in liquid or loose solid materials, the capsules containing the weighed materials are fastened by clasps to an inclined tray which is rotated at about 20 r.p.m. by a spring-and-ratchet device. The whole apparatus can be placed in a drying oven. J. H. L.

Use of hygrometers for industrial processes. F. W. MORRIS (Food. Tech., 1932, 1, 266—269).—The main types of hygrometer, their accuracy and suitability for use in the food industries are considered.

E. B. H.

Fundamental design of absorbing and stripping columns for complex vapours. M. SOUDERS, JUN., and G. G. BROWN (Ind. Eng. Chem., 1932, 24, 519—522).—Theoretical. A relationship is developed between the no. of equilibrium plates in column and the absorption and stripping factors, and the terminal compositions.

H. I.

Rectifying columns. Fractionation [columns].—See II. **Vulcanisation stoves etc.**—See XIV.

See also A., May, 461, **Blocking phenomena in ultra-filters.** 485, **Sedimentation analysis.**

PATENTS.

Furnace. E. G. DE CORIOLIS, Assr. to SURFACE COMBUSTION CORP. (U.S.P. 1,824,747, 22.9.31. Appl., 8.9.30).—The furnace is suitable for heating goods out of contact with the furnace gases, but in contact with another gas, e.g., NH_3 for nitriding. The container for the goods has a circulating fan at one end, the shaft and bearings for which are in a boss long enough to extend through the back wall of the furnace. B. M. V.

Regenerative-furnace-controlling apparatus. W. SYKES (U.S.P. 1,825,372, 29.9.31. Appl., 22.1.30).—Electro-mechanical devices are described by which the furnace is reversed after a predetermined time interval or at the moment of attaining certain temp. conditions, whichever is the sooner.

B. M. V.

Air-cooled retorts of stokers. AMER. ENG. CO. (B.P. 371,161, 15.4.31. U.S., 6.3.31).—Fins and inclined blades are provided in the air-supply passages which alternate with the retort sections to promote cooling of the walls of the latter by the air in the former.

B. M. V.

Scale prevention in boilers or the like. W. M. REICHAUT, Assr. to EFFENARE MANUFG. CO. (U.S.P. 1,825,477, 29.9.31. Appl., 14.8.26).—An electric current (preferably d.c.) is applied to an insulated electrode and to an earthed part of the boiler, the current being switched on intermittently by the rise and fall of the H_2O level, either by means of a float-operated switch or by placing the insulated electrode at about the mean H_2O level.

B. M. V.

Tubular heat-exchange apparatus. SOC. ANON. MANUF. GÉN. MÉTALLURGIQUE (B.P. 370,780, 27.7.31. Belg., 30.7.30).—Forms of tubular exchangers with headers cast around the ends of the tubes are described.

B. M. V.

Dryer. W. A. HARTY and F. W. MOORE, Assrs. to HARMOR & CO., INC. (U.S.P. 1,824,717, 22.9.31. Appl., 26.5.30).—A dryer comprising outer and inner co-axial shells has the latter supported from the former by radial bolts having springs and ball joints outside the shell.

B. M. V.

Drainage-bucket system for drying cylinders. W. ARMSTRONG (B.P. 370,621, 19.3.31).—A drainage bucket for removing H_2O of condensation from the interior of a drying cylinder for fabrics, paper, etc. is mounted on a hollow arm which is rotatable separately from the cylinder.

B. M. V.

Fire extinguisher. W. C. BAUER (U.S.P. 1,823,882, 22.9.31. Appl., 5.3.29).—A fire-extinguishing liquid of f.p. below -40° , e.g., aq. CaCl_2 , CCl_4 , is ejected from a container by a mixture of N_2 and CO_2 liberated by

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

the interaction of a nitrite (NaNO_2), an org. amide (urea), and an acid, preferably dil. $\text{HCl} + \text{H}_2\text{SO}_4$, with or without a carbonate. L. A. C.

Optical pyrometer. R. HASE (U.S.P. 1,825,229, 29.9.31. Appl., 9.12.26. Ger., 26.2.26).—The image of a hot body is reflected into the eye of the observer and in the centre of the reflector is an aperture, preferably + - shaped, which is illuminated by diffused light from an electric lamp maintained at const. brilliancy. The light from the object is reduced by a calibrated screen of varying transparency until the two images are equal in brilliancy. B. M. V.

Lined tank or pressure vessel. W. C. JOHNSON, Assr. to INDUSTRIAL WELDED ALLOYS, INC. (U.S.P. 1,824,898, 29.9.31. Appl., 31.1.30).—A non-corrodible lining is attached to the pressure-resisting vessel by means such as rivets at a no. of points and is spaced from the wall of the vessel at those points by means of flanges; intermediately it is spaced from the wall to a rather greater extent by tension only. B. M. V.

Corrugated pot. C. H. STEVENSON, Assr. to HEVI DUTY ELECTRIC CO. (U.S.P. 1,825,556, 29.9.31. Appl., 12.7.28).—A pot for metal melting etc. is formed with a cylindrical top and hemispherical bottom and is fluted inside and out, the depth of the flutes on the bottom decreasing to the lowest point. B. M. V.

Hammer crusher. C. A. JAMISON, Assr. to PENNSYLVANIA CRUSHER CO. (U.S.P. 1,824,272, 22.9.31. Appl., 28.8.28).—A method of supporting the screening grid is described. B. M. V.

Crusher roll. G. E. KRIDER, Assr. to McLANAHAN-STONE MACHINE CO. (U.S.P. 1,824,088, 22.9.31. Appl., 16.12.29).—The roll face is composed of longitudinal and annular ribs forming pockets adapted to cause cubical crushing. The longitudinal ribs project generally beyond the annular, but teeth may be formed on either set. B. M. V.

Tube mill. A. W. CATLIN, Assr. to BRADLEY PULVERIZER CO. (U.S.P. 1,825,333, 29.9.31. Appl., 27.9.30).—A spiral conveyor is provided on the axis to return partly ground material to any desired point of the mill. B. M. V.

Separation or grading of granular material such as coal and ores. L. HOVOIS (B.P. 371,174, 6.5.31).—The material is conveyed by a current of H_2O in an inclined, nearly horizontal trough and passes over openings through which the heavy material drops countercurrent to an upwardly inclined current of H_2O which mixes with the horizontal stream. The combined stream passes over a curved baffle of which the inclination is initially equal to that of the upward stream and finally equal to that of the horizontal stream. B. M. V.

Apparatus for separating the relatively heavy constituents from minerals. W. C. MENZIES (B.P. 370,516, 16.1.31).—An apparatus of the type in which the mixed materials are passed over an inclined perforated plate upwards through which H_2O is forced has the perforations larger and/or more closely spaced at the lower end where the bed of heavy material is thickest, so as to increase the lifting power of the H_2O at that

point. A discharge gate for the heavy material is described. B. M. V.

Pneumatic sorting of materials of different densities. P. SOULARY, and COMP. DES MINES DE BRUAY (B.P. 371,086, 14.2.31. Fr., 26.2.30. Addn. to B.P. 320,207; B., 1929, 1036).—In the apparatus described in the prior patent the skimming dam is of considerable (adjustable) thickness so as to maintain a layer of middling between the lighter and heavier layers skimmed off. Means for distributing the air currents is also described. B. M. V.

Extractor. W. BUSS, Assr. to BUSS A.-G. (U.S.P. 1,824,424, 22.9.31. Appl., 18.1.30. Ger., 12.11.26).—A no. of extractors are provided with a circulating pump to each extractor and a separate pump to remove liquid from any one extractor to any other or elsewhere. While extracting, the flow of liquid is through a lower perforated partition, through the material, and out through a perforated vertical pipe. During removal of liquid both sets of perforations are used as outlets. The apparatus is suitable for extraction of tanning material or dyestuffs from wood, bark, etc. B. M. V.

Addition of reagents to liquids [flowing in a pipe]. UNITED WATER SOFTENERS, LTD. From PERMUTIT A.-G. (B.P. 370,842, 24.10.31).—A portion of the main liquid under pressure forms the motive fluid of a diaphragm pump which delivers the reagent into the main stream lower down. The motive valves of the pump are operated by a water meter in the main stream; if the pressure drop in the meter is insufficient to allow the diaphragm pump to operate, an additional throttle is provided. Methods of varying the stroke of the diaphragm are described. B. M. V.

Liquid-treating apparatus. O. I. CHORMANN and J. N. JACOBSEN, Assrs. to PFAUDLER CO. (U.S.P. 1,825,443, 29.9.31. Appl., 14.6.28).—Pipes and valves for the filling and emptying of a series of tanks, e.g., milk pasteurisers, are described. The parts are quickly detachable for cleaning. B. M. V.

Filter. C. B. FOLEY, Assr. to S. F. BOWSER & CO., INC. (U.S.P. 1,824,079, 22.9.31. Appl., 2.8.28).—A pair of ribbons are wound into a spiral; each ribbon has cross-bars on one face and is assembled with the bars against the flat side of the other, but the bars on one ribbon are of opposite inclination to those on the other, to prevent choking of the grooves by indentation. B. M. V.

Filter. A. WRIGHT and F. W. YOUNG (U.S.P. 1,825,295, 29.9.31. Appl., 28.2.28).—A rotary drum filter is provided with a continuous belt which embraces part of the circumference and squeezes the cake between it and the drum. A form of roller giving even pressure irrespective of uneven thickness of cake is described, the roller at the inlet end being so supported by links that the pressure is regulated by the tension of the belt. The formation of a smooth joint in the belt and a roller device for removing creases are described. Wash-water may be applied through the belt, which is porous for the purpose. B. M. V.

Rotary apparatus for sedimentation tanks. J. W. and E. HARTLEY (B.P. 370,665, 20.4.31).—A

thickener mechanism is supported on a vertical shaft which is rotated by a boom extending to a motor running around a peripheral track; the boom may be either under or over the bridge supporting the axial shaft. A form of feed well and a scum rake are described. B. M. V.

Filtering. C. R. BAKER, Assr. to STANDARD OIL Co. (U.S.P. 1,825,330, 29.9.31. Appl., 9.1.29).—A leaf- (or other) type filter is prepared for use, *e.g.*, for decolorising oils, by spraying the filter surfaces with a suspension of filter aid (in clean oil) while both sides of the filter are maintained substantially at atm. pressure. B. M. V.

Centrifugal separator. G. W. WATTS, Assr. to STANDARD OIL Co. (U.S.P. 1,825,377, 29.9.31. Appl., 18.2.26).—A stationary separator for, *e.g.*, oil mist from vapour comprises an entrance chamber into which the mixture is admitted tangentially and having a much reduced outlet whence there is sudden expansion into the main separating chamber. The vapour is exhausted through an axial pipe in the main chamber and through a filter. B. M. V.

Centrifugal bowls. AKTIEB. SEPARATOR (B.P. 370,651, 10.4.31. Swed., 10.4.30).—Channels for the supply of additional liquid to a zone close to the outlets for solid matter are described. B. M. V.

Purification of liquids. C. J. RODMAN and R. P. DUNMIRE, Assrs. to BUCKEYE TWIST DRILL Co. (U.S.P. 1,824,498, 22.9.31. Appl., 25.6.29).—Fluids having high v.p. are removed from a liquid of lower v.p., *e.g.*, moisture and gases from transformer oil, by heating the latter to 32–71° and spraying it at a pressure of 60–200 lb. per sq. in. into a chamber maintained at a high vac. It is stated that on exposure to air, even moist air, after treatment the insulating val. of such oils will increase. B. M. V.

Fractional distillation. CHEM. & METALLURG. CORP., LTD., J. W. CRABTREE, S. B. CASSON, and G. C. RILEY (B.P. 370,412, 31.12.30).—A multi-stage still, *e.g.*, for the concn. of NH_3 liquor, in which the bottom section only is heated and the vapours therefrom are absorbed in the unheated upper section, forming conc. liquor therein, has the sections heat-insulated from each other (they may be separated if desired) and preferably supplied with separate liquors. B. M. V.

Bonnet for rectifying columns. C. S. PIGGOT (U.S.P. 1,824,836, 29.9.31. Appl., 25.5.27).—The skirt of a bubbling cap (preferably of elongated form) is extended as a perforated plate inclined at 30–60°, the perforations increasing in size further down the slope so that a sudden rush of vapour will be freely passed and still be broken up into bubbles. B. M. V.

Absorption of vapours and liquids. I. N. BEALL, Assr. to RESEARCH PROCESS Co. (U.S.P. 1,824,458, 22.9.31. Appl., 13.1.28).—When it is desired to strip from a gas only those constituents having a narrow range of b.p., the gas and absorption liquid (oil) are sprayed simultaneously into the top of a tower and travel concurrently downwards through foraminous diaphragms (to disperse the liquid in the gas) and then

through bubbling wells (to effect dispersal of the gas in the liquid). B. M. V.

Apparatus for contacting vapours with solids. T. T. GRAY, Assr. to GRAY PROCESSES CORP. (U.S.P. 1,823,895, 22.9.31. Appl., 28.8.26).—The solids are allowed to pass downwardly through one or more parallel sinuous conduits having walls permeable to the gases but impermeable to the solids, while the gas flows in a countercurrent sinuous course through the walls. The provision of several conduits permits the use of several different solids for treatment. B. M. V.

Treatment of divided non-gaseous material in suspension in a gaseous medium. W. W. TRIGGS, From WESTERN PRECIPITATION Co. (B.P. 370,942, 13.1.31).—The material is supplied in a finely-divided condition to an inner zone of gas and is caused to pass into an outer zone of gas. The inner gas supply may be highly heated, damage to the material being prevented by moisture or other volatile substance therein, and is preferably caused to whirl in the opposite direction to the outer zone of gas; it may also be tempered by minor supplies of low-temp. gas. The outer zone of gas is caused to swirl by withdrawing it tangentially from the casing and returning it in the same manner after removal of the treated material from part of the current. B. M. V.

Gas filters having travelling filter elements. H. WITTEMEIER, Assee. of "DELBAG" DEUTS. LUFT-FILTER-BAUGES.M.B.H. (B.P. 370,748, 23.6.31. Ger., 10.9.30).—The filters, whether of plain or zig-zagged plates or of fibrous material, are mounted on a flexible conveyor and at the lower return end of the run they are subjected to two series of sprays, one for washing, the other for moistening, the runnings from each being separately collected. B. M. V.

Apparatus for separating dust from air. J. W. JACKMAN & Co. LTD., and F. W. NEVILLE (B.P. 371,114, 9.3.31).—Filter bags are sewn up all round except for a small aperture (or two) at the top corner through which a perforated pipe is inserted to form the outlet for clean gas. They are stretched by weighted bars at the bottom and are shaken by agitating the bars. B. M. V.

Removal of dust or other impurities from gases by washing. DAVIDSON & Co., LTD., and J. C. TRILL (B.P. 371,129, 18.3.31).—The gases are put into rotation by vanes in the arrival pipe, pass through water sprays, and impinge on a no. of conical surfaces wetted by other sprays. B. M. V.

Gas-cleaning apparatus. A. J. BOYNTON, Assr. to H. A. BRASSERT & Co. (U.S.P. 1,824,463, 22.9.31. Appl., 8.3.30).—The apparatus is similar to a twin-inlet centrifugal fan, but has disintegrator bars instead of blades; the washing liquid is centrifugally sprayed by an inner part of the rotor. B. M. V.

Apparatus for cleaning gas. J. P. FISHER and G. F. DOWNS, Assrs. to EMPIRE OIL & REFINING Co. (U.S.P. 1,824,713, 22.9.31. Appl., 10.6.27).—The gas is cleaned with a liquid that produces a mist and the mist is removed by passing the mixture whirlingly upward through the annular space between an impermeable outer wall and

a permeable inner cylinder forming the outlet for the cleaned gas. A bubbling scrubber may be placed in the base of the apparatus. B. M. V.

Controlling the vapour content or humidity of air and other gases. H. A. GILL. From B. F. STURTEVANT Co. (B.P. 371,177, 7.5.31).—A beam of light on its way to a photoelectric cell is caused to pass several times through a window the outside of which is at a different temp. from that of the room of which the atm. is to be controlled. The reduction of the light due to its repeated passage through any film of deposited moisture causes control of the conditioning apparatus. B. M. V.

Recording gravimeter for gases. D. A. SILLERS, H. W. PRICE, and J. W. BARTLETT, Assrs. to REFINERY SUPPLY Co. (U.S.P. 1,824,305, 22.9.31. Appl., 27.4.29).—A continuous current of the gas is passed through a balanced bell, liquid seals being placed at inlet and outlet; compensation for barometric pressure and for temp. is effected by the expansion of air in a vessel driving Hg through a flexible pipe into a vessel suspended with the bell. B. M. V.

[Wedge-operated disc] valves. A. R. TAYLOR, and IMPERIAL CHEM. INDUSTRIES, LTD. (B.P. 372,782, 11.2.31).

Mineral-wool blocks.—See IX. **High-temp. steel. Piston alloys.**—See X. **Temp. control. Measuring the concn. of liquids.**—See XI. **Rubber-fibre plastics.**—See XIV.

II.—FUEL; GAS; TAR; MINERAL OILS.

Solid and gaseous fuels in the iron and steel industry. H. NIELSEN (Fuel Econ., 1932, 7, 279—285).—The reductions in fuel costs in the Fe and steel industry which may be effected by using low-grade coal are examined and a scheme is outlined which comprises coal-handling and drying plant, a low-temp. distillation retort, screening plant, pulverising equipment, and centralised gas producers. C. B. M.

Microstructure of bituminous coals. (MRS.) G. E. FINN (Gas World, 1932, 96, Coking Sect., 44—47).—A method is given for the prep. of thin sections and their significance when examined microscopically is discussed. The occurrence of spores, cuticle, and cell structure and the microscopical properties of fusain, vitrain, durain, and clarain are described. Clarain as a microscopical term signifies that which is not fusain, vitrain, or durain. The microstructure, more especially the megaspore content, is of considerable val. in identifying and correlating coal seams. C. B. M.

Dry cleaning of coal in England. K. C. APPELYARD (Amer. Inst. Min. Met. Eng., Tech. Publ. No. 374, Sept., 1930, 34 pp.).—The design, development, and operation of the Birtley dry-cleaning plant is described. C. B. M.

Present state of development of the pneumatic process for dry-cleaning coal. K. C. APPELYARD and E. O'TOOLE (Amer. Iron & Steel Inst., Advance Paper, Oct., 1930, 48 pp.).—The development of pneumatic cleaning processes is described with special reference to those industries using metallurgical fuels. C. B. M.

Theory of coal cleaning. H. E. WALLSOM (Fuel Econ., 1932, 7, 211—217).—Attention is drawn to the enormous wastage resulting from the handling of incombustible matter. The occurrence and nature of coal ash and its influence in combustion are reviewed briefly. The influences of NaCl, S, P, and the ash m.p. in coal-utilisation processes are discussed. The "washability" of a coal and the construction of "washability" curves from laboratory data are described together with the factors governing the movements of particles in liquids. C. B. M.

Occurrence of sulphur in the tertiary coals of Assam. N. N. CHATTERJEE (Quart. J. Geol. Min. Met. Soc. India, 1931, 3, 101—113).—Total, fixed, volatile, pyritic, sulphate, combustible, non-combustible, and org. S have been determined in different kinds of Assam coal. Such data, and not merely total S, should be considered in selecting high-S coals for particular purposes. C. W. G.

Determination of sulphur in coal by the perchloric acid method. G. F. SMITH and A. G. DEEM (Ind. Eng. Chem. [Anal.], 1932, 4, 227—229).—The oxidation of coal, prior to determination of S by pptn. as BaSO₄, may be carried out completely by hot 70% HClO₄. The velocity of oxidation is increased markedly by certain catalysts, of which Ce(NO₃)₃, CrO₃, and V₂O₅ are the most satisfactory. The results obtained are low in comparison with those obtained by the Eschka method. The HClO₄ method is not recommended for the determination of S in coke. E. S. H.

Determination of sulphur in coals and cokes. R. LANZMANN (Brennstoff-Chem., 1932, 13, 167).—A comparison of the total S determined by Eschka's method with the sum of the combustible S and ash S determined by Dennstedt's method has shown that, if carried out carefully, the former method gives correct results even with coals of high S content. The S content of a coal or coke as determined in the calorimeter bomb may agree with either the total S val. or the combustible S val., but, in general, lies between (though occasionally outside) these vals. A. B. M.

Determination of phosphorus in coal and coke ash. W. M. HYSLOP and T. S. BURNS (Gas World, 1932, 96, Coking Sect., 48—52).—The Fuel Research Board method and those depending on the extraction of the coke ash with H₂SO₄ or HNO₃ are shown to give low results. The following two methods are claimed to give accurate results for P. In the "oxide ignition" method the ash is evaporated first with HF and then with conc. HNO₃ and finally ignited strongly; the residue is extracted with dil. NH₃ and the P determined volumetrically in the extract (phosphomolybdate method). In the "SO₂" method, the ash after treatment with HF is dissolved in conc. H₂SO₄ and the Fe, Al, and P are pptd. as hydroxides and phosphates with aq. NH₃; SO₂ is passed through the solution until the ppt. has dissolved, the solution is boiled, and the pptd. Ti(OH)₄, Al(OH)₃, and AlPO₄ are separated, fused with Na₂CO₃, and the melt is extracted with H₂O; the P is determined in the filtered aq. extract. C. B. M.

Effect of degree of fineness on chemical analysis and physical properties of coking coals. S. M. KROLEVETZ (J. Appl. Chem., Russia, 1931, 4, 903—925).—With increase in fineness the H_2O content increases whilst the ash, S, and volatile matter contents decrease.

CH. ABS.

Testing of pulverised coal. R. A. W. CONNOR (Fuel Econ., 1932, 7, 309—310).—The precautions to be taken in sampling, the methods for making sieve tests, and the recording of their results are described. C. B. M.

Complete gasification in vertical retorts. M. BARASH and T. A. TOMLINSON (Gas World, 1932, 96, 310—312).—Curves are given for various coals showing coke used in producers, reduction in coke due to steaming, and wt. of steam used relative to coal carbonised when steaming in vertical retorts to such an extent as to give no saleable coke. The waste heat generated is nearly completely absorbed by the steaming process and by power needed for fans, exhausters, etc. Theoretically, a coal which gives 13,000 cu. ft. of gas (540 B.Th.U. per cu. ft.) and 13 cwt. of coke on dry distillation should yield 58,000 cu. ft. of gas (353 B.Th.U.) when steamed to this limit, the thermal efficiency being 82.5%. In practice a coal of calorific val. 14,100 B.Th.U. per lb. gave 53,180 cu. ft. of gas (360 B.Th.U.). The cost per therm of crude gas, including capital charges, is calc. to be 1.85 d. R. N. B. D. B.

Caking indices of typical Canadian coking coals. J. H. H. NICOLLS (Canada Dept. Mines, Invest. Fuels, 1929, No. 721, 42—60).—56 Canadian and 10 United States coals, of known analyses and coking properties, were selected for determination of their caking indices by a method similar to that of Gray. The most satisfactory index, by comparison with the determined coking properties, was that in which the button would just support a 500-g. wt.; sand (40—50-mesh I.M.M.) was slightly preferable to petroleum coke as an inert material. Separate consignments of sand and carbon material, respectively, gave different caking indices for the same coal sample; leaching of sand with acid also altered the vals. Pt and illium crucibles gave almost the same results, but as the last-named do not lose their shape nor corrode they are recommended for caking index work. The caking indices of 23 different bands, taken from top to bottom of the Phalen (Sydney area) seam, showed wide variations. The caking indices of several coals were considerably lowered by allowing them to weather for a year or less. No conclusive proof was obtained to show that the caking index determination is superior to the examination of the coke button produced in the laboratory determination of volatile matter, for predicting commercial coking properties. C. B. M.

Relation of caking indices and agglutinating values of coals to their laboratory- and plant-scale coking properties. R. E. GILMORE (Canada Dept. Mines, Invest. Fuels, 1929, No. 721, 36—41).—Examination of 15 different coals and coal mixtures by the Gray and Marshall-Bird methods, and comparison of the results obtained with laboratory and commercial coking properties, shows that there is little agreement between caking indices, agglutinating vals., and commercial coking properties. C. B. M.

Comparison of low-temperature carbonisation results by the "lead bath" and the Gray-King methods. R. E. GILMORE (Canada Dept. Mines, Invest. Fuels, 1929, No. 721, 31—35).—The tar oil yields obtained by the Gray-King test are generally higher than those obtained by the larger laboratory-scale methods using Fe retorts, this difference being greater for non-coking coals than for coking bituminous coals, for which the Gray-King method was originally devised. For the lower rank, non-coking coals, on the dry ash-free basis, the yields obtainable on a 5—6-lb. scale, in an Fe retort, will average 3—5 gals. per ton (2000 lb.) less than by the Gray-King test; small laboratory-scale yields by this method should be discounted to this extent before applying a general factor of 60—70% to arrive at a plant-scale dry tar recovery figure in terms of laboratory yields. C. B. M.

Report of tests on Sydney [Canadian] coal by Illingworth low-temperature carbonisation process. R. A. STRONG and E. J. BURROUGH [with preface by B. F. HAANEL] (Canada Dept. Mines, Invest. Fuels, 1929, No. 721, 8—30).—Tests carried out in the Illingworth plant at Pontypridd, S. Wales, show that Sydney coal is suitable for treatment by this process. The fuel produced is hard (2-in. shatter index = 83) and dense (porosity 26%) and preliminary tests indicate that it is entirely suitable for Canadian conditions of house heating. The yields of unscrubbed gas from the washed and unwashed coals were 6050 and 4910 cu. ft. per ton, respectively, of average calorific val. 700 B.Th.U./cu. ft. The average yield of dry tar oils (d 1.04) was about 13 gals. (per ton); the light oil content of this tar was 1.4 gals., which when added to 2.8 gals. obtainable by scrubbing the gas gave a total of 4.2 gals. per ton. The yield of coke was 74%. C. B. M.

Fusion of coal ash. H. E. WALLSOM (Fuel Econ., 1932, 7, 313—316).—The influence of the atm. on the m.p. is discussed and the Fuel Research Board and American Bureau of Mines methods are reviewed. Analyses of typical English and American coal ashes, together with their fusion temp., are given. C. B. M.

Pulverised-fuel ash. J. WATSON (Fuel Econ., 1932, 7, 296—298).—The collection of fine grit and dust by adequate and suitable means is recommended; such recovered material may be used as a building material and as a filler in rubber manufacture. C. B. M.

Manufacture and supply of 400 B.Th.U. gas. R. H. DUXBURY (Gas World, 1932, 96, 507—511).—A plant for producing 100 therms of 400 B.Th.U. gas per ton of coal by mixing Tully gas with 25% horizontal gas is described, the total inerts being only 9.5%. The complete gasification plant is mechanically operated, and it is suggested that it should be used alone by small gasworks to supply 350 B.Th.U. gas. Good non-swelling coal is necessary, and all consuming appliances must be altered. Costs per therm into holder of horizontal gas, horizontal-Tully mixture (1 : 3), Tully gas, and Tully gas with waste-heat boiler are quoted as 4.244, 3.951, 3.264, and 2.459 d., respectively. R. N. B. D. B.

Town gas in a modern tinplate works. W. C. JACKSON (Gas World, Ind. Gas Suppl., 1932, 96, 11—15).

—Gas is led through a series of Fe nozzles and burned on a bed of firebrick supporting the Sn-pot. The temp. of the Sn is thermostatically controlled to $\pm 1.5^\circ$ by alteration of the air-gas mixture flow. The advantages and possible further developments of gas are discussed. R. N. B. D. B.

Analysis of natural gas from the Turner Valley field in Alberta. P. V. ROSEWARNE and R. J. OFFORD (Canada Dept. Mines, Invest. Fuels, 1929, No. 721, 109—128).—Analyses of 35 samples of natural gas and naphtha are given. All were subjected to fractional analysis in a special Podbielniak apparatus. Other types of gas-analysis apparatus, commercial separators used in the field to recover crude naphtha from the gas, and methods used for collecting gas samples are described. C. B. M.

Determination of true temperature and total radiation from luminous gas flames. Use of special two-colour optical pyrometer. H. C. HOTEL and F. P. BROUGHTON (Ind. Eng. Chem. [Anal.], 1932, 4, 166—175).—The true temp. and total emissivity of a luminous flame may be determined from two apparent temp. obtained with an optical pyrometer, using screens of two different wave-lengths. Red and green brightness readings should predict the true flame temp. independently of the no. of flames through which the pyrometer is sighted. The theory has been tested experimentally on a series of six amyl acetate flames in a row. The average deviation from the mean of the six predicted true temp. was only 4° , although the brightness temp. varied by $>200^\circ$ for different flame thicknesses. The total radiation from the flames was calc. and compared with independent measurements made with a narrow-angle thermopile replacing the optical pyrometer. The two-colour pyrometer may be used to determine radiation from luminous flames with an average error of 5%. E. S. H.

Nomography. Calculation of calorific values from gas-analysis data. W. SCHREIBER (Chem. Fabr., 1932, 5, 12).—A nomogram is constructed for the calculation of calorific vals. of gas mixtures containing CO, C₂H₄, CH₄, and H₂. E. S. H.

Fundamental design of fractionating columns for complex mixtures. G. G. BROWN, M. SOUDERS, JUN., and H. V. NYLAND (Ind. Eng. Chem., 1932, 24, 522—527).—A graphical method for finding the no. of plates required in a fractionating column for separating complex gasoline mixtures is described. H. I.

Studies in distillation. Design of rectifying columns for natural and refinery gasolines. W. K. LEWIS and G. L. MATHESON (Ind. Eng. Chem., 1932, 24, 494—498).—The Hausbrand equation for the calculation of the concn. gradients in a rectifying column for binary mixtures is applied to the complex case of gasolines. An illustration of the method adopted in carrying out the calculation is given. H. I.

Studies in distillation. Graphical method of computation for rectifying complex hydrocarbon mixtures. J. Q. COPE, JUN., and W. K. LEWIS (Ind. Eng. Chem., 1932, 24, 498—501).—The graphical method used in treating problems in the rectification of

binary mixtures is applied to complex hydrocarbon mixtures and is illustrated by a problem in the fractionation of natural gasoline. H. I.

Direct cracking of German raw oil giving high yields of benzine. E. F. NELSON and G. EGLOFF (Petroleum, 1932, 28, 10—13).—Cracking of two kinds of German raw oil (from Hanover and Thuringia) was carried out according to the non-residue and flashing methods. The yields of benzine were 55% and 68%, respectively, with C₈H₁₈ nos. of 75 and 73. Analyses and yields are given of all raw material and products obtained. E. D.

Corrosion protection in [oil]-cracking equipment. J. C. MORRELL and G. EGLOFF (Ind. Eng. Chem., 1932, 24, 509—513).—H₂S is the main agent in the corrosion of oil-cracking units, and although a high-S oil may be very corrosive the nature of the S compounds undergoing cracking is more important than the S content. Various ways of overcoming the trouble arising through corrosion are outlined. E.g., with slight corrosion use of extra thick steel walls may be the cheapest method, whilst the use of ganister liners (made from Portland cement and crushed firebrick) and non-metallic linings of furnace cement, silica, asbestos, and water glass, has been successful. Linings of corrosion-resistant alloys welded to the outer casing have been employed. H. I.

Fractionation of straight-run Pennsylvania gasoline. M. R. FENSKE (Ind. Eng. Chem., 1932, 24, 482—485).—Theoretical. Owing to the difficulties involved in using the step method of calculating the min. no. of plates in a fractionating column necessary to separate the constituents of a straight-run gasoline, a method using key components has been adopted. Equations for the min. no. of perfect plates necessary and for the min. reflux ratios are given. These equations have been used to design columns which have given effective fractionation. H. I.

Gum stability of gasolines. J. W. RAMSAY (Ind. Eng. Chem., 1932, 24, 539—542).—The induction period and period of gum stability of a gasoline at a given temp. are linear functions of the O₂ pressure, whilst at a given O₂ pressure they are functions of the temp. It seems probable that if the induction periods of a gasoline are known under 100 lb. O₂ pressure at a low temp., its period of gum stability under atm. air pressure and at any temp. may be fairly accurately predicted. H. I.

Comparative engine tests of a synthetic benzene prepared by the Fischer-Tropsch method (Kogasin I) and a petroleum benzene. H. KOCH and O. HORN (Brennstoff-Chem., 1932, 13, 164—167).—The anti-knock val. of the synthetic benzene was relatively low, but could be brought to a val. suitable for a motor spirit by the addition of about 25% of EtOH. The anti-knock val. was high for the fractions boiling below 75°, but fell off rapidly with rising b.p. The olefine content fell from 46% in the lowest-boiling to 23% in the highest-boiling fraction. In a similar investigation made with a petroleum benzene the olefine content of the different fractions was roughly const., but the anti-knock val. fell with rising b.p., though not so rapidly as with the synthetic benzene fractions. A. B. M.

Analysis of hydrocarbon gases. H. S. DAVIS and J. P. DAUGHERTY (Ind. Eng. Chem. [Anal.], 1932, 4, 193—197).—The procedure is based primarily on the fractionation of a liquid condensate, but all the gas is not condensed; liquid air is not used, solid CO_2 and COMe_2 being sufficient. The original gas is partly condensed at -80° . The liquid condensate is measured and is fractionated by means of a low-temp. column into a gas fraction, a C_3H_8 fraction, a C_4H_{10} fraction, a C_5H_{12} fraction, and a residue. These fractions are analysed by methods described in detail. A method of analysis of the uncondensed gas is given. The procedure may be used for testing the efficiency of stabilisers in petroleum refineries.

E. S. H.

Relation between constitution and anti-knock value of hydrocarbons. I. F. HOFMANN, K. F. LANG, K. BERLIN and A. W. SCHMIDT (Brennstoff-Chem., 1932, 13, 161—164).—The anti-knock vals. of a no. of pure hydrocarbons have been measured by determining the H.U.C.R. of mixtures of 30 vols. of the hydrocarbon with 70 vols. of a standard benzine (H.U.C.R. 1:4.84), giving, *e.g.*, for $n\text{-C}_6\text{H}_{14}$ 1:4.56; β -methylpentene 1:5.41; C_6H_6 1:5.33; cyclohexane 1:4.96. The anti-knock val. of the *n*-paraffins decreases with increase in the length of the chain; that of the isomeric paraffins increases with the no. of branched chains. Both acyclic and cyclic olefins have higher anti-knock vals. than the corresponding saturated compounds, but the vals. decrease on storage. In the aromatic series the anti-knock val. increases with the no. of side chains, but the Et group is less effective than the Me group; the relative positions of the side chains, *e.g.*, in *o*-, *m*-, and *p*-xylene, are without appreciable influence on the anti-knock vals.

A. B. M.

Emission spectra of engine flames. G. M. RASSWEILER and L. WITHROW (Ind. Eng. Chem., 1932, 24, 528—538; cf. B., 1931, 829).—Spectrographic studies of the flame fronts and afterglows in a petrol engine have been extended into the ultra-violet, and comparisons of the spectra of knocking and non-knocking combustion have been made simultaneously on one spectrogram. It is shown that as the flame front travels through the detonating zone, the intensities of the bands due to CH and C_2 decrease if the engine is knocking, whilst if the engine is not knocking the densities of these bands decrease. It appears likely that this decreased band intensity arises from changes occurring in the relatively cool mixture in advance of the wave front, which alter the course of the combustion reactions. OH radicals are present in both flame fronts and afterglows. Comparisons have been made of the spectra of engine and burner flames.

H. I.

Automatic open Cleveland flash and fire equipment [for oils]. TEXAS Co. (Ind. Eng. Chem. [Anal.], 1932, 4, 209).—The apparatus described has been constructed to conform with all the requirements of the American Society for Testing Materials.

E. S. H.

Bisulphite cooking.—See V. NaCl from petroleum refineries.—See VII. Coke-oven gas for steel furnaces.—See X. Brown coal preps. as fertilisers.—See XVI. Determining C_6H_6 in air. [Contaminated] River Tees water.—See XXIII.

See also A., May, 460, Problems of lubrication. 479, Condensation of hydrocarbons by electric discharge. 485, Sedimentation analysis. 495, Prep. of pure C_2H_6 , CH_4 , and H_2 .

PATENTS.

[Gravity] separation of carbonaceous materials, especially coal. CLEAN COAL CO., LTD., R. LESSING, and E. S. GYNGELL (B.P. 370,564, 12.2.31).—The material is projected horizontally into a vessel containing liquid of suitable sp. gr. so that the lighter components float and the heavier sink. The former are carried across the vessel to an outlet. The vessel is provided with a cross-partition so that material which sinks adjacent to the inlet may be collected separately from that which sinks remote from the inlet.

A. B. M.

Preparatory treatment of pulverised fuel for engines and furnaces. R. PAWLIKOWSKI (B.P. 370,461, 4.10.30).—The fuel is freed from its low-melting ash constituents by treatment with a dil. mineral acid followed by washing with H_2O . The acid and wash- H_2O may be heated, and the fuel subsequently dried, by utilising the waste heat of the engine or furnace.

A. B. M.

Coke ovens. F. TOTZEK (B.P. 370,635, 24.3.31. Ger., 31.3.30).—The heating walls have vertical heating flues arranged in pairs which communicate with each other near the top and bottom. Gas and air are supplied to the bottom of one flue of each pair and the products of combustion are removed from the bottom of the other flue of the same pair. The communicating passage at the bottom of the flues allows part of the combustion gases to pass from the down-flow to the up-flow flue, thereby causing a retardation of the combustion and a lengthening of the flame therein. The admission passages for air and rich gas are so situated that the recirculated combustion gases enter the up-flow flue between the currents of rich gas and air and so delay their mixing. The admission passage for weak gas may join the air inlet before opening into the heating flue.

A. B. M.

Making coke. C. W. ANDREWS, Assr. to H. A. BRASSERT & Co. (U.S.P. 1,824,526, 22.9.31. Appl., 22.9.28).—Metallurgical coke is manufactured by carbonising a mixture of 85—95% of high-volatile coal, crushed to pass through a $\frac{1}{4}$ -in., or preferably a $\frac{1}{8}$ -in., mesh screen, with 5—15% of low-volatile material, *e.g.*, anthracite culm or coke breeze, crushed to pass a $\frac{1}{8}$ -in. mesh or finer screen according to the desired porosity of the product.

A. B. M.

Carbonisation of fuel. H. L. DOHERTY, Assee. of H. O. LOEBELL and A. L. KLEES (B.P. 368,215, 6.2.31. U.S., 14.2.30. Addn. to B.P. 349,937; B., 1931, 793).—The feeding hopper and the conveyor are so arranged that the layer of fuel passes in contact with the internally-heated drum before any appreciable carbonisation of the free surface can occur.

A. B. M.

Distillation of solid material containing combustible carbonaceous material. C. T. LOUGHREY (U.S.P. 1,824,282, 22.9.31. Appl., 1.4.22. Renewed 19.9.30).—The material is passed continuously down a vertical column comprising a no. of concentric, cylindrical stacks so arranged that the material, which is fed in at

the top of the innermost stack, expands into the successively wider stacks at successively lower levels in the column. The rate of travel of the material is regulated by a discharge mechanism at the bottom of the column. The upper ends of the annular spaces formed between the stacks are connected to separate suction and condensing devices. Air is drawn into the lower part of the column and forms therein a zone of combustion, the hot gases from which pass up through the material, and through the surrounding annular spaces, and effect the distillation. Steam, and if desired an oil fuel, may be injected into the combustion zone. A. B. M.

Removal of carbon deposits [from internal-combustion engines]. W. G. LOVELL and T. A. BOYD, Assrs. to GEN. MOTORS RESEARCH CORP. (U.S.P. 1,825,358, 29.9.31. Appl., 28.8.29).— MeNO_2 , alone or mixed with C_6H_6 or EtOH , is applied to the C-coated parts at $> 65^\circ$. R. N. B. D. B.

Preparation of fuel and generation of gas therefrom. H. F. SMITH, Assr. to GAS RESEARCH CO. (U.S.P. 1,824,576, 22.9.31. Appl., 20.9.21).—The gas producer (A) is surmounted by a treating chamber (B) wherein the coal is heated by the hot gases from A. B is divided into sections by horizontal partitions and the coal is subjected therein alternately to the compacting action of rollers and to the breaking action of rotary ploughs which serve also to feed the coal from one section to the next and finally to A. By these means fine coal can be agglomerated and/or coked into lumps of suitable size for A. If desired, the tar which is recovered from the gas on cooling may be introduced into B for admixture with the fuel. A. B. M.

Gas-generating apparatus. H. F. SMITH, Assr. to GAS RESEARCH CO. (U.S.P. 1,823,382, 15.9.31. Appl., 14.12.25).—A gas-generating plant suitable for household use is described. A. B. M.

Gas generator. C. S. CHRISMAN, Assr. to UNITED GAS IMPROVEMENT CO. (U.S.P. 1,824,764, 29.9.31. Appl., 18.10.28).—The bottom of the generator is fitted with a rotatable conical platform, on which are mounted a series of cutting bars. A central blast tuyère, also fitted with cutting bars, is stationary or rotates in the opposite direction. By this means ash and clinker are removed from the fuel bed. They are then swept by ploughs attached to the rotating platform into a water-sealed pit from which they are removed by a screw-conveyor. R. N. B. D. B.

Apparatus for the manufacture of carburetted water-gas. HUMPHREYS & GLASGOW, LTD., Assees. of (A) J. A. PERRY and (A, B) E. L. HALL (B.P. 370,815—6, 14.9.31. U.S., [A] 9.12.30, [B] 28.11.30).—(A) The apparatus comprises a generator (A) and superheater (B), the former having means for admitting secondary air marginally to the top of the fuel bed and for spraying oil thereonto. The base of B may form a dust-collecting chamber, or a separate dust separator may be provided. During the blast the top of the fuel bed is highly heated by the combustion of the blast gases with the secondary air, so that when, during the steam up-run, oil is sprayed on to the marginal hot zone of the fuel bed it is vaporised and cracked, the oil vapours being subsequently fixed in B. The up-run is followed by a down-run with steam

which has been passed through B. (B) A and B are combined within a single cylindrical shell. A. B. M.

Manufacture of acetylene from hydrocarbons in the electric arc. J. Y. JOHNSON. From I. G. FARBEN-IND. A.-G. (B.P. 370,414, 31.12.30).—Hydrocarbon gases, or oils in a fine state of division, are passed through a furnace so dimensioned that an electric arc playing therein has a min. energy consumption of 2 kw./sec./c.c. of space. Yields up to 16% C_2H_2 are obtained from CH_4 . R. N. B. D. B.

Gasification of heavy oils through partial combustion. C. CHILOWSKY (B.P. 371,143, 30.3.31. Fr., 29.3.30).—Oil and hot air flow through an atomiser into a chamber in which partial combustion at 1000–1100° takes place. The hot gases are rapidly cooled to 700–900° by flowing through an annular space around the chamber surrounded by another annular space in which the air in its passage to the atomiser flows parallel-currently. D. K. M.

Gas-purification process. F. W. SPERR, JUN., Assr. to KOPPERS CO. (U.S.P. 1,824,103, 22.9.31. Appl., 9.4.25. Cf. B.P. 190,118; B., 1924, 173).—The gas is scrubbed with an aq. suspension of an alkaline-earth compound, e.g., MgO , containing in solution a metal chloride, e.g., MgCl_2 , and a peptising agent, e.g., glycerin. The chloride facilitates expulsion of the H_2S during revivification, and the peptising agent prevents coagulation of the suspension. Revivification is effected by heating with agitation. Suitable apparatus is described. A. B. M.

Aëration and gas-purification process. F. W. SPERR, JUN., Assr. to KOPPERS CO. (U.S.P. 1,824,104, 22.9.31. Appl., 9.4.25).—The gas is scrubbed with a suspension of finely-pulverised Fe_2O_3 , e.g., bog Fe ore, in a solution of Na_2CO_3 , the liquid entering the scrubber being maintained at 30° or above. The spent solution is revivified by aëration, the liberated S being separated as a settled sludge. A. B. M.

Desulphurisation of gases. J. Y. JOHNSON. From I. G. FARBEN-IND. A.-G. (B.P. 370,466, 5.11. and 24.12.30).—Gases containing > 7 g. of S (as H_2S) per cu. m. are diluted with gases free from or low in S until their S content is reduced to < 7 g. per cu. m., and are then desulphurised in known manner by the catalytic oxidation of the H_2S to S by air in the presence of activated C. The process may be carried out in stages. A. B. M.

Treatment of gases and vapours containing sulphur compounds. TRINIDAD LEASEHOLDS, LTD. From F. L. MELVILL (B.P. 370,911, 12.1.31).—Gases such as those obtained from the cracking of mineral oils and containing S as H_2S are brought in contact with a countercurrent (descending) stream of SO_2 solution at about 8 atm. and 40°, the polythionic acids formed being decomposed by the gases with production of S, which is withdrawn in a molten condition. W. J. W.

Treating tar acids [to remove sulphur compounds]. C. BANTA and F. W. HIGHTOWER, Assrs. to BARRETT CO. (U.S.P. 1,824,864, 29.9.31. Appl., 24.11.28).—Tar acids are heated with about 1% of an aromatic sulphonic acid or its salt, and in the absence of substantial

amounts of aldehydes or sugars, *e.g.*, Na β -naphthol-sulphonate, at 105° for 18–24 hr. and then distilled in a vac. R. N. B. D. B.

Preventing the formation of hydrogen sulphide in combustible gases during removal of benzol therefrom. CARBO-NORIT-UNION VERWALTUNGS-GES. M.B.H., Assees. of I. G. FARBENIND. A.-G. (B.P. 370,822, 28.9.31. Ger., 4.10.30).—Small quantities (1%) of finely-divided oxides of Zn, Pb, Cu, Sn, Ni, or Fe are added to the C used for treating the gases.

R. N. B. D. B.

Distillation of tar and simultaneous production of high- and low-m.p. pitches. BARRETT CO., Assees. of G. E. McCLOSKEY (B.P. 370,387, 3.12.30. U.S., 11.12.29).—The hot gases and vapours from a coke oven or similar plant are passed through a still and a saturator in succession. In the latter they are brought into direct contact with tar, which is thereby distilled to form a pitch of low m.p.; part of this is withdrawn, whilst the remainder is sprayed into the gases in the still, *e.g.*, by means of a roller rotating at high speed, and is distilled therein to form a pitch of high m.p. The hot enriched gases from the saturator pass to the condensers for separation of the oil distillates.

A. B. M.

Elimination of waste liquors [from coal-carbonisation plant] and recovery of ammonium salts and phenols therefrom. W. R. KNAPP, Assr. to SEMET-SOLVAY CO. (U.S.P. 1,823,364, 15.9.31. Appl., 2.12.26).—The gases and vapours are scrubbed and cooled by sprays of weak liquor. Excess liquor from this system is freed from tar, extracted with benzol to recover PhOH, C₁₀H₈, and pyridine, distilled to recover free NH₃, and finally evaporated under such conditions that NH₄Cl, (NH₄)₂S₂O₃, and NH₄CNS are recovered successively in cryst. form.

A. B. M.

Recovery of oil from oil sands. G. W. COGGESHALL (U.S.P. 1,822,271, 8.9.31. Appl., 21.1.31).—An aq. liquid comprising a highly dispersed colloidal mixture including a hydrocarbon sulphonate (preferably the acid sludge from the H₂SO₄ treatment of petroleum or coal-tar products) is caused to flow through the oil sands.

H. S. G.

Cracking of oils. A. IRINYI (B.P. 369,791, 18.5.31).—The cracking coil consists of a coiled tube in which the turns are substantially horizontally positioned in such manner that no free space is left between superimposed adjacent layers.

H. S. G.

Cracking of oil vapours into vapour phase. J. B. WEAVER and C. R. WAGNER, Assrs. to GYRO PROCESS CO. (U.S.P. 1,818,513, 11.8.31. Appl., 17.2.28).—Hydrocarbon oil vapour to which steam has been added is cracked at above 538°/30 lb. per in. and immediately cooled to < 315° by spraying into it cold raw oil. The vapours are fractionated, passed through fuller's earth, again fractionated, and then condensed, yielding motor fuel. The liquids formed in the cooler and the fractionating towers are returned to the cracking coil.

D. K. M.

Conversion [cracking] of hydrocarbons. W. M. CROSS, Assr. to GASOLINE PRODUCTS CO., INC. (U.S.P. 1,818,674, 11.8.31. Appl., 11.3.25).—Hydrocarbon oil

cracked at 316–538°/500–1500 lb. per sq. in. is cooled and passed into a separator (A) the gases from which, *e.g.*, CH₄, C₂H₆, are fired to heat the cracking coil (B), while the liquid flows into a tank from which it is returned, and after being heated by that passing into A, flows through a coil in a reflux boiler (C), thereby heating and partly vaporising the reflux from a dephlegmator (D) which flows into C. From the coil the liquid passes into an evaporator the vapours from which and those from C pass into D while the unvaporised liquid is withdrawn. The vapours from D are condensed, yielding gasoline. The unvaporised liquid from C is returned to A. D. K. M.

Treatment of hydrocarbons. L. KIRSCHBRAUN, Assr. to UNIVERSAL OIL PRODUCTS CO. (U.S.P. 1,824,215, 22.9.31. Appl., 1.11.22. Renewed 25.11.29).—Oil is raised to cracking temp. while flowing under pressure in a restricted stream through a heating zone (A), and delivered to the top of an enlarged reaction zone (B) (in which vaporisation occurs while the oil is flowing downwardly through the central portion thereof). The released vapours pass upwardly through B in an annular stream without coming in contact with the unvaporised oil, and are refluxed to remove insufficiently cracked fractions which are later returned to A. The residue from B is cooled by heat exchange with incoming charging oil and delivered to a zone of lower pressure wherein distillation is effected at the temp. to which it has been cooled, the products obtained being returned to the pressure-distillation zone. H. S. G.

Treatment of hydrocarbons. J. C. CLANCY (U.S.P. 1,822,127, 8.9.31. Appl., 29.4.30).—Hydrocarbon oils are subjected to catalytic thermal decomp. by contact at > 400° with a molten eutectic mixture of alkali carbonate and cyanide, produced by treating the partly spent mixture containing distillation residues from a previous oil-cracking operation with NH₃ at cyanide-forming temp., and adding sufficient Na₂CO₃ to prevent liberation of HCN at cracking temp. (Cf. U.S.P. 1,658,116; B., 1928, 221.) H. S. G.

Heat-treatment [cracking] of [hydrocarbon] oils. A. OBERLE (B.P. 370,591, 3.3.31. U.S., 30.4.30).—Preheated oil is cracked by mixing with hot liquid Hg under pressure in a coil from which the mixture flows with reduction of pressure on to a baffle in a vaporising chamber. Hg and/or oil residue is (are) withdrawn from the latter, reheated, and recirculated, or the residue may be withdrawn from the system. Any Hg carried to the condenser by the vapours from the vaporising chamber is returned to the latter. D. K. M.

Conversion of petroleum oil. G. EGLOFF, Assr. to UNIVERSAL OIL PRODUCTS CO. (U.S.P. 1,822,924, 15.9.31. Appl., 2.6.27).—Hot oil is passed into a vaporising chamber (A) the vapours from which pass through a separating chamber into a dephlegmator, and the reflux from these together with the vapours evolved from a chamber into which the residue from A is discharged with reduction of pressure are reheated in a secondary coil and returned to A. D. K. M.

(A) Degumming and stabilising low-boiling hydrocarbons. (B) Degumming petrol and the like produced by cracking. GULF REFINING CO., Assees.

of D. R. STEVENS and W. A. GRUSE (B.P. 370,671—2, 24.4.31. U.S., [A] 5.5.30, [B] 3.5.30).—(A) The vapours from cracking stills or dephlegmators, with or without the addition of 20% of a higher-boiling oil, or (B) petrol condensates, are degummed and stabilised by heating at 371—426°/20—70 atm. pressure for 10—30 min.

D. K. M.

Apparatus for fractionation of certain hydrocarbons [from oil cracking]. H. S. DAVIS and W. J. MURRAY, Assrs. to PETROLEUM CHEM. CORP. (U.S.P. 1,824,947, 29.9.31. Appl., 5.8.26).—An apparatus for separating the hot, sharp-b.p. fractions from products of the cracking of petroleum oils (1) C_2H_4 , C_3H_6 , CH_4 , and H_2 , (2) butylene, amylene, and hexylenes, (3) crude motor spirit, b.p. 100—225°, (4) a fraction, b.p. > 225°, and (5) tarry products, is described.

D. K. M.

Distillation of hydrocarbon oils. W. H. BAHLKE, Assr. to STANDARD OIL Co. (U.S.P. 1,822,607, 8.9.31. Appl., 4.4.27).—Oil is passed through a heating coil where it receives the entire heating for the process. The vapours and unvaporised liquid are separated and the unvaporised oil is passed downwardly through a fractionating column through which the previously separated vapours together with steam are allowed to ascend.

H. S. G.

(A) Conversion, (B) fractionation, of hydrocarbon oils. (A) F. W. HALL, (B) C. W. WATSON, Assrs. to TEXAS Co. (U.S.P. 1,823,897 and 1,823,922, 22.9.31. Appl., [A] 27.1.28, [B] 26.6.28).—The vapours from cracking stills are passed through two dephlegmators in series. The reflux condensate from the first is re-cracked, that from the second withdrawn, while the vapours are condensed, yielding light hydrocarbons. Heat is transferred to each dephlegmator by preheated feed oil which then passes to the cracking coil.

D. K. M.

Separation [distillation] of oil. A. B. JONES, Assr. to INDUSTRIAL ASSOCIATES, INC. (U.S.P. 1,824,780, 29.9.31. Appl., 24.2.28).—The desired constituent of an oil is vaporised by bringing the atomised oil in contact with hot gas. The vapour is condensed by contact with a spray of liquid of lower b.p. than that of the vaporised constituent of the oil, *e.g.*, H_2O , and the gas, after venting part of it, is reheated and recirculated.

D. K. M.

Vacuum distillation of [mineral] oils. A. E. HARNSBERGER, Assr. to PURE OIL Co. (U.S.P. 1,822,733, 8.9.31. Appl., 20.10.27).—Oil is passed under vac. through a pipe still formed of a series of groups of pipes serially connected so that the no. of pipes in the several groups increases along the length of the still, the diam. of all the pipes being substantially the same. H. S. G.

Treatment of hydrocarbon oil. W. M. STRATFORD, Assr. to TEXAS Co. (U.S.P. 1,823,994, 22.9.31. Appl., 13.1.28).—Lubricating oil is rendered more resistant to emulsification and oxidation, and its colour stability is increased, by mixing with an absorbent clay, heating to >260° (preferably 315—330°), and distilling under a vac.

D. K. M.

Treatment of hydrocarbons. (A) V. N. JENKINS and C. P. WILSON, JUN., and (B) E. R. WOLCOTT, Assrs.

to TEXAS Co. (U.S.P. [A] 1,825,270, [B] 1,825,294, 29.9.31. Appl., 14.6.24).—(A) A compound formed by passing HCl through a mixture of a hydrocarbon oil and $AlCl_3$ at 38—94° is used instead of $AlCl_3$, because of the volatility of the latter, in the conversion of hydrocarbon oils. (B) When a mixture of a hydrocarbon oil and $AlCl_3$ through which HCl is being passed is distilled the oil is converted into lower-boiling hydrocarbons. D. K. M.

Refining of hydrocarbons. J. G. STAFFORD, Assr. to SINCLAIR REFINING Co. (U.S.P. 1,823,175, 15.9.31. Appl., 30.3.28).—The colour of cracked petroleum distillates, *e.g.*, gasoline, is improved and stabilised and disagreeable odour removed by passing their solution in a stable solvent, *e.g.*, kerosene, gas oil, at 190—260° and under sufficient pressure to prevent substantial vaporisation, over an absorbent, *e.g.*, fuller's earth, SiO_2 gel, and then separating the solvent, in which remain the polymerides formed in the reaction, by distillation.

D. K. M.

Refining of hydrocarbon oil. A. L. LYMAN, Assr. to STANDARD OIL Co. of CALIFORNIA (U.S.P. 1,818,488, 11.8.31. Appl., 6.10.26).—Oil, *e.g.*, lubricating hydrocarbon oil, is agitated with H_2SO_4 (*d* 1.84) and after settlement of the H_2SO_4 and part of the sludge it is filtered through a bed of clay at <60° (to remove the rest of the sludge) and then through another bed of clay at <60° to decolorise it.

D. K. M.

Edeleanu process for purification of hydrocarbons. EDELEANU GES.M.B.H. (B.P. 372,173, 24.7.31. Ger., 25.7.30).— SO_2 is removed from the extract or raffinate obtained in the Edeleanu process by heating to 60—70° and then by rectification at about atm. pressure.

D. K. M.

Treatment [purification] of petroleum hydrocarbons. R. CROSS, Assr. to CROSS DEVELOPMENT CORP. (U.S.P. 1,817,969, 11.8.31. Appl., 28.8.24).—Oil, *e.g.*, gasoline, is stabilised and S removed by cold countercurrent agitation with H_2SO_4 (*d* 1.706—1.84) and, after separation of H_2SO_4 , by agitation with a dry absorptive material, *e.g.*, C, SiO_2 gel, fuller's earth, combined with a metal salt, *e.g.*, of Cu, Pb, Mn, according to U.S.P. 1,515,733 (B., 1925, 64), and filtration.

D. K. M.

Purification of mineral oils. STANDARD OIL DEVELOPMENT Co., Assees. of R. K. STRATFORD (B.P. 369,737, 12.3.31. U.S., 13.3.30).—The oil is treated continuously with a countercurrent stream of liquid solvent consisting of PhOH (65—95 wt.-%) and MeOH. The oil layer is separated and the dissolved solvent removed therefrom.

H. S. G.

Purification of [cylinder] oil. L. H. CLARK, Assr. to SHARPLES SPECIALTY Co. (U.S.P. 1,823,087, 15.9.31. Appl., 4.2.26).—A mixture of oil and 10—20 vol.-% of aq. alkali in which part of the reagent is in the colloidal form or to which a substance imparting colloidal properties has been added, *e.g.*, Na silicate with 3.25 pts. by wt. of SiO_2 to 1 pt. of Na_2O and alkalinity equiv. to 0.25—1.0 wt.-% NaOH, is heated to 80—95° with agitation, and then the aq. phase is separated by centrifuging. The oil is then heated to 130°, steam is blown through it to assist the distillation of light products, and the oil is again centrifuged.

D. K. M.

Purification of used crank-case oil. D. S. BELDEN, Assr. to FILTROL CO. OF CALIFORNIA (U.S.P. 1,823,185, 15.9.31. Appl., 8.6.29).—The oil is mixed with 1–30% by wt. of acid-activated clay, heated to 316°, and blown with a stream of inert gas, *e.g.*, N₂.

D. K. M.

Purification of tar acid-bearing oils. S. P. BURKE, Assr. to COMBUSTION UTILITIES CORP. (U.S.P. 1,823,558, 15.9.31. Appl., 22.9.26).—The colour of acid-bearing tar oil, *e.g.*, tar from low-temp. or vertical-retort distillation of bituminous material, due largely to the presence of *o*-dihydric tar acids, excluding pyrocatechol, is removed by agitation with aq. Pb(OAc)₂ or antimony salts, separating the aq. layer, and filtering the oil with a filter-aid, *e.g.*, bone black fuller's earth.

D. K. M.

Hot filtration of decolorised oils. P. W. PRUTZMAN (U.S.P. 1,818,274, 11.8.31. Appl., 20.4.27).—Mineral oils are heated with a decolorising agent, *e.g.*, fuller's earth, to above 177° and filtered hot.

D. K. M.

Destructive hydrogenation of high-b.p. hydrocarbons with the formation therefrom of hydrocarbons having a lower b.p. GAS LIGHT & COKE CO., and R. H. GRIFFITH (B.P. 370,909, 12.1.31).—The process is carried out according to B.P. 349,991 (B., 1931, 794), with the addition of the optimum quantity of H₂S or substance yielding H₂S, *e.g.*, CS₂.

D. K. M.

Production of lubricating oils and lighter hydrocarbons by hydrogenation of hydrocarbons. W. L. GOMORY (B.P. 371,273, 19.9.31. U.S., 19.9.30).—Hydrocarbons, *e.g.*, crude oil or oil residues, are, if necessary, distilled to remove light hydrocarbons, then mixed with H₂ or substances capable of yielding H₂, heated to 260–426°/100–3000 lb. per sq. in., and passed into a conversion chamber which may contain catalysts. Thence the liquid passes under vac. into a vaporising chamber (A) from which the vapours pass through diphegmators (B) to a condenser; the uncondensed gas (largely H₂) is scrubbed with oil from light hydrocarbons, purified from H₂S, and recirculated. The condensates from B and the residue in A may be withdrawn from the system or separately subjected to a process similar to the above. Alternatively, by careful regulation of the temp. and pressure of a separator, the greater part of the H₂ and light hydrocarbons may be removed before the hydrogenated products are subjected to subatm. vaporisation.

D. K. M.

Production of naphtha from hydrocarbon oils. M. L. CHAPPELL, Assr. to STANDARD OIL CO. OF CALIFORNIA (U.S.P. 1,823,967, 22.9.31. Appl., 1.12.26).—A metal halide, *e.g.*, AlCl₃, is fed into a dephlegmator (A) into which the vapours from a reaction chamber containing hydrocarbon oil preheated to 204–370° pass. The reflux condensate separates at the bottom of A as a layer of metal halide sludge (which passes into the reaction chamber) and one of oil, which is withdrawn and separately cracked, the vapours from this being passed into a dephlegmator (B) and the reflux returns to A. The vapours from A and B are separately condensed, yielding hydrocarbons of low b.p., *e.g.*, naphtha, gasoline.

D. K. M.

Sulphonation of mineral oil. L. D. MYERS, Assr. to TWITCHELL PROCESS CO. (U.S.P. 1,824,615, 22.9.31. Appl., 2.3.29).—A heavy petroleum distillate is treated with 5 wt.-% of conc. H₂SO₄, the sludge is allowed to settle and is removed, and the surface of the oil is sprayed with fuming H₂SO₄ containing 25–35% SO₃, at 50–60°. After settling and removing the sludge, the product may be resulphonated and then extracted with aq. MeOH, sufficient alkali being added to neutralise the mineral oil sulphonic acids and free H₂SO₄.

H. S. G.

Sulphurised oils. E. W. ADAMS, Assr. to STANDARD OIL CO. (U.S.P. 1,824,523, 22.9.31. Appl., 8.8.29).—A light-coloured, sulphurised cutting oil is produced by heating to 150–177° a hydrocarbon oil distillate, free from fatty oil and containing initially < 0.75% S, with additional S sufficient to bring the total S to 2–3%.

H. S. G.

Coloured gasoline. G. ALLEMAN, Assr. to SUN OIL CO. (U.S.P. 1,824,977, 29.9.31. Appl., 28.7.28).—Highly refined gasoline may be coloured blue by certain halogeno-, especially 4:6:7:4':6'-penta- and 4:6:7:4':6':7'-hexa-bromo-, derivatives of indigo.

D. K. M.

Protection of stored combustibles against fire. W. S. WILLENBORG (B.P. 371,021, 13.1.31. U.S., 13.1.30).—Oil tanks are fitted with automatic non-return valves to prevent rise in pressure. The oil-pump chambers are sealed and filled with inert gas (cf. B.P. 352,006; B., 1931, 869), but air is admitted when it is desired to enter them. The composition of the gas in the tanks and pump chambers is kept at that required to prevent combustion, the desired pressure being maintained by the automatically-controlled admission of inert gas.

D. K. M.

Quenching oils [for steel]. H. RODMAN, Assr. to RODMAN CHEM. CO. (U.S.P. 1,818,431, 11.8.31. Appl., 16.5.29).—The addition of the residuum (about 5%) obtained from the vac. distillation of mineral oils increases the initial quenching speed of low-viscosity low-flash mineral oils.

D. K. M.

Solidified liquid fuels and compositions for cleaning fabrics. J. Y. JOHNSON, From I. G. FARBENIND, A.-G. (B.P. 370,392, 31.12.30).—A liquid containing 0–50 vol.-% of alcohols having 2–4 C atoms per mol., and 100–50 vol.-% of a mixture consisting of < 70% of paraffin hydrocarbons having 7–10 C atoms in the mol. and > 3 Me groups in side chains, the remainder of the mixture consisting of ketones, *e.g.*, COMe₂, and/or other saturated or aromatic hydrocarbons, is converted into a solid-like form by the production therein of a voluminous framework-like mass formed by the chemical interaction of a base, *e.g.*, NH₃, or NH₂Ph, with a high-mol. org. acid, *e.g.*, abietic acid, or with casein or CH₂O.

A. B. M.

Manufacture of conversion products of higher paraffin hydrocarbons. A. CARPMAEL, From I. G. FARBENIND, A.-G. (B.P. 367,545, 6.2.31. Addn. to B.P. 343,948; B., 1931, 578).—Further examples of the prior process, leading to harder products, are given.

C. H.

Separation of alcohols from oil [petroleum still residues]. T. A. WERKENTHIN, Asst. to SOLAR REFINING Co. (U.S.P. 1,824,521, 22.9.31. Appl., 24.11.25).—The mixture is continuously fed through a still wherein a relatively large quantity is maintained at 103–121°/1 atm., and led into a heated chamber in a finely-divided condition while under reduced pressure. Alcohol vapours are withdrawn from the still and final chamber.

H. S. G.

Removal of volatile hydrocarbon compounds from aqueous halogen acids. M. E. PUTNAM, Asst. to DOW CHEM. Co. (U.S.P. 1,822,372, 8.9.31. Appl., 27.5.29).—The aq. solution resulting from the chlorination of an org. compound (*e.g.*, C_6H_6) is passed through granular activated charcoal.

H. S. G.

Deoxidiser [for use in transformers, oil switches, etc.]. J. G. FORD and W. C. WILHARM, Assts. to WESTINGHOUSE ELECTRIC & MANUFACTURING Co. (U.S.P. 1,825,226, 29.9.31. Appl., 21.12.23).—The material comprises equiv. proportions of Cu and NH_4Cl together with $CaCl_2$ and H_2O ; fillers (kieselguhr) and catalysts (activated C) may also be added.

L. A. C.

Separating coal, minerals, etc. Filtering [oils]. Centrifugal separator [for oil]. Purification of liquids [oils]. Fractional distillation. Absorption of vapours.—See I. Org. acids. Amines from phenols.—See III. Cryst. NH_4 salts. H_2 and $CO-H_2$.—See VII. Cementitious material. Tennis courts etc.—See IX.

III.—ORGANIC INTERMEDIATES.

Importance and determination of evaporation rates [of solvents]. L. IVANOVSKY (Farbe u. Lack, 1932, 231–232, 244–245).—A self-recording apparatus is proposed for measuring the loss in wt. of a liquid during spontaneous evaporation.

S. M.

White acetone oil. V. E. TISCHTSCHENKO and L. I. ANTZUS (J. Appl. Chem., Russia, 1931, 4, 806–818).—The oil contained $MeCHO$ 0.02, $PrCHO$ 0.04, $COMe_2$ 8, 2-methylfuran 0.5, $COMeEt$ 22, $COMePr^i$ 0.5, $COMePr$ 19, $COMeBu^i$ 2, $COMeBu^a$ 4%; mesityl oxide is probably present.

CH. ABS.

Variability of commercial samples of diphenylguanidine. T. H. MESSENGER and T. R. DAWSON (J. Res. Assoc. Brit. Rubber Manuf., 1932, 1, 17–23).—Examination of 6 commercial samples of diphenylguanidine, of British and American origin, as to m.p., moisture, ash, matter insol. in dil. HCl and in 95% $EtOH$, content of Pb and of diphenylguanidine, and vulcanisation characteristics shows that relatively marked chemical differences produce almost negligible effects in the vulcanisates, whether judged by their mechanical properties or their ageing qualities. Three trade specifications as to composition of diphenylguanidine are quoted each of which ensures material satisfactory for rubber manufacture.

D. F. T.

Determination of technical dye intermediates by chromic acid oxidation. R. LANTZ (Rev. Gén. Mat. Col., 1932, 46, 121–126, and Chim. et Ind., 1932, 27, 775–779).— $C_{10}H_8$, β -naphthol, the naphthylamines, their sulphonic acids, and the toluenesulphonic acids may be rapidly and accurately determined by oxidation in

0.2–0.24% solution in conc. H_2SO_4 with an excess of conc. aq. CrO_3 at 100°, followed by iodometric titration of the unused CrO_3 . They are oxidised to CO_2 and H_2O , and in the case of the NH_2 -derivatives NH_3 is split off. In the case of Na β -naphthol-6-sulphonate equally reliable results are obtained by direct titration with CrO_3 at 150–155° (at which temp. oxidation is almost instantaneous even at the end of the titration), using starch-KI as external indicator.

H. A. P.

Analysis of hydrocarbon gases.—See II. Products from esparto grass treatment. [By-products from] bisulphite cooking.—See V. Jointing materials for pipes for solvents.—See IX. Staining $EtOH$ by rubber.—See XIV. Action of $K_2Cr_2O_7$ on phenolic substances.—See XV. Dicyanodiamide as fertiliser.—See XVI. Stability of aspirin.—See XX.

See also A., May, 477, Catalysts for hydrogenation and for $MeOH$. 478, Reactions of $MeCHO$ over oxide catalysts. 479, Condensation of hydrocarbons. 495, Electrochemical oxidation of ketones. 495, Prep. of pure C_2H_6 , CH_4 , and H_2 . 496, Prep. of allyl chloride. 497, Prep. of epichloro- and epibromo-hydrins. Synthesis of polyhydroxylic compounds. 499, Prep. of Ac_2 . Identification of primary and sec.-amines. 509, [Preps. of] Ph_2 and its derivatives. 512, Prep. of naphthalenecarboxylic acids. 516, Synthesis of dihydroxyanthraquinones. 522, Prep. of 2-bromo- and 2:6-dibromo-pyridine. 523, Azo derivatives of pyrimidines. 530, Purification of benzidine.

PATENTS.

Conversion of olefins into alcohols. DISTILLERS Co., LTD., W. P. JOSHUA, H. M. STANLEY, and J. B. DYMCK (B.P. 368,051, 25.2.31).—Olefine and steam are led over 60–85% H_2SO_4 on pumice at 140–160°/1–15 atm., whereby alcohols are obtained directly, *e.g.*, $EtOH$ from C_2H_4 .

C. H.

Preparation of acetic acid [from acetaldehyde]. BRIT. CELANESE, LTD., E. B. THOMAS, W. H. GROOMBRIDGE, and H. F. OXLEY (B.P. 367,863, 26.11.30).—A Mn^{+++} salt (acetate) is used as catalyst; *e.g.*, air is passed at 1.3–2.0 atm. through $MeCHO$ at 30–40° containing 0.25–1.0% of $Mn(OAc)_3$ made by oxidising $Mn(OAc)_2$ in $AcOH$ with $KMnO_4$.

C. H.

Manufacture of acetic acid [from acetaldehyde]. BRIT. CELANESE, LTD., H. F. OXLEY, and W. H. GROOMBRIDGE (B.P. 368,348, 4.12.30).—The air- or O_2 -oxidation of liquid $MeCHO$ is effected, preferably continuously, in such a manner that the concn. of $AcOH$ is \geq 60–70%; *e.g.*, fresh $MeCHO$ is added intermittently or continuously and the oxidation product removed and recovered.

C. H.

Manufacture of organic acids [from oxidised non-aromatic compounds]. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 368,552, 7.4.31).—The crude oxidation products from paraffin wax etc. are heated under pressure with aq. Na_2CO_3 at 75° to b.p. of H_2O at the pressure used, whereby esters, estolides, lactones, and lactides are converted into acids. Apparatus for continuous operation is figured.

C. H.

Manufacture of alkyl esters of carboxylic acids. I. G. FARBENIND. A.-G. (B.P. 367,680, 16.6.31. Ger.,

16.6.30).—In the esterification of carboxylic acids with alkyl sulphates or alkyl hydrogen sulphates, neutral sulphates or *sec.* or *tert.* phosphates are added in such quantity that free H_2SO_4 is not liberated during reaction. Examples are: EtHSO_4 and Et_2SO_4 (from H_2SO_4 and C_2H_4) with $\text{Ca}_3(\text{PO}_4)_2$ (1.25 pts.) and AcOH (0.44 pt.), or with $(\text{NH}_4)_2\text{SO}_4$ (1.3 pts.) and HCO_2H , or with K_2SO_4 (1.44 pts.) and AcOH , or with $(\text{NH}_4)_2\text{SO}_4$ (1.05 pts.) and crotonic acid, or with $(\text{NH}_4)_2\text{SO}_4$ (1.4 pts.) and BzOH ; BuHSO_4 with $(\text{NH}_4)_2\text{SO}_4$ and HCO_2H ; PrHSO_4 with $(\text{NH}_4)_2\text{SO}_4$ and AcOH . C. H.

Production of monoalkyl ethers of glycol and its homologues. ANGLO-PERSIAN OIL CO., LTD., S. F. BIRCH, and W. D. SCOTT (B.P. 367,353, 17.10.30).—Ethylene oxide and an alcohol are heated at $100^\circ/3-4$ atm. in presence of about 0.3% by vol. of Me_2SO_4 or Et_2SO_4 . C. H.

[Manufacture of] esters of di- [and tri-]ethylene glycols. R. CALVERT, ASSR. to VAN SCHAACK BROS. CHEM. WORKS, INC. (U.S.P. 1,807,304, 20.5.31. Appl., 25.6.28).—Mixed esters of diethylene glycol with aliphatic acids respectively below C_5 and above C_{10} are useful as fixatives for perfumes. Diethylene glycol monoacetate is esterified, *e.g.*, with coconut oil acids or oleic acid. C. H.

Manufacture of [hydr]oxyalkyl compounds. I. G. FARBERIND. A.-G. (B.P. 368,530, 18.3.31. Ger., 18.3.30).—An aq. alkylene oxide solution is made to react with a polymeric OH compound (*e.g.*, polyvinyl alcohol) or with a protein (*e.g.*, casein, horn, wool) in presence of alkali. The resulting hydroxyalkylated products give alkyl derivatives on hydrogenation with H_2 and Pt-black or Ni. C. H.

Manufacture of dimethylolurea [di(hydroxymethyl)carbamide]. J. Y. JOHNSON. From I. G. FARBERIND. A.-G. (B.P. 368,027, 6.2.31).—The product from $\text{CO}(\text{NH}_2)_2$ and CH_2O (2 mols.) in H_2O or very dil. alkali at $20-45^\circ$ is conc. in vac. below 45° , *e.g.*, $30^\circ/20$ mm., to 55–60%; di(hydroxymethyl)carbamide crystallises out in almost theoretical yield on cooling. C. H.

Catalytic dehydration. J. Y. JOHNSON. From I. G. FARBERIND. A.-G. (B.P. 367,892, 27.11.30).—For the dehydration of org. compounds, *e.g.*, butadiene from α -butylene glycol, isoamylene from isoamyl alcohol, EtOAc from AcOH and EtOH , Ac_2O from AcOH , the catalyst (NaH_2PO_4 , NaH_2PO_4 with Al_2O_3 or ZrO_2 , NaPO_3 with bauxite) is supported on the inner surface of the heated tube etc. C. H.

Purifying a phenol by distillation. E. C. BRITTON, ASSR. to DOW CHEM. CO. (U.S.P. 1,824,867, 29.9.31. Appl., 15.9.28).—The condenser and vapour tubes are made of or lined with Cr. The product is and remains water-white. E. H. S.

Manufacture of phenolic compounds [from aryl halides]. W. J. HALE and E. C. BRITTON, ASSRS. to DOW CHEM. CO. (U.S.P. 1,806,798, 26.5.31. Appl., 6.8.28).—Hydrolysis is effected in vapour phase in presence of a catalyst (ThO_2) and added diaryl oxide which has been separated from the product of a previous batch. C. H.

Manufacture of phenolates. A. HEMPEL (U.S.P. 1,808,722, 2.6.31. Appl., 7.7.30. Ger., 9.4.29).—In the

manufacture of PhOH from PhSO_3H the fusion product, preferably after adding PhOH to neutralise excess NaOH , is allowed to stratify and pure NaOPh (upper layer) is removed. C. H.

Manufacture of aromatic amines from phenols. J. Y. JOHNSON. From I. G. FARBERIND. A.-G. (B.P. 368,373, 4.12.30).—A phenol vapour is passed with NH_3 under pressure (100–300 atm.) over a dehydrating catalyst, preferably $\text{Al}(\text{OH})_3$, at 450° . The crude amines from the phenols obtained by destructive hydrogenation of brown-coal tar are useful anti-knock agents. C. H.

Manufacture of condensation products containing nitrogen. J. Y. JOHNSON. From I. G. FARBERIND. A.-G. (B.P. 367,352, 8.9.30).—Aromatic CN-compounds are converted by anhyd. acid condensing agents (ClSO_3H , H_2SO_4 , oleum) into 2:4:6-triaryl-1:3:5-triazines. Products from PhCN (m.p. 233°), *p*-tolunitrile (m.p. $278-279^\circ$), *m*-tolunitrile (m.p. $152-153^\circ$), *p*-tolunitrile (1 mol.) and PhCN (2 mols.) (m.p. $176-178^\circ$), β -naphthonitrile (m.p. 290°), and 2-amino-3-cyanoanthraquinone (orange vat dye) are described. C. H.

Manufacture of 1-phenyl-2-alkylaminopropanols-1 hydroxylated in the phenyl nucleus [β -alkylamino- α -hydroxyphenyl-*n*-propyl alcohols]. I. G. FARBERIND. A.-G. (B.P. 367,951, 8.12.30. Ger., 6.12.29).—The aralkyl ether of a hydroxylated propiophenone is halogenated, preferably in presence of an acid-binder, the halogen is replaced by an alkylamino- or aralkylamino-group, and the product is catalytically hydrogenated, whereby the aralkyl groups are also removed. *o*-Benzylpropiophenone, m.p. $50-51^\circ$, b.p. $158^\circ/1$ mm., is brominated in CH_2Cl_2 in presence of CaCO_3 , then treated with $\text{NHMe}\cdot\text{CH}_2\text{Ph}$ in EtOH , and finally hydrogenated to give β -methylamino- α -*o*-hydroxyphenyl-*n*-propyl alcohol (B.HCl, m.p. 176°). The *m*-isomeride (B.HCl, m.p. $185-186^\circ$), the *p*-isomeride (B.HCl, m.p. 212°), and the 3:4-(OH) $_2$ compound (B.HCl, m.p. $190-191^\circ$) are similarly obtained from the benzyloxy- or dibenzyloxypropiophenones, b.p. $153-155^\circ/0.5$ mm., m.p. $100-101^\circ$ and m.p. 60° , respectively. C. H.

Manufacture of [sulphonated] derivatives of polymerised styrenes. J. Y. JOHNSON. From I. G. FARBERIND. A.-G. (B.P. 367,416, 13.11.30).—Polymerised styrene or alkylstyrenes are sulphonated, *e.g.*, with ClSO_3H in CCl_4 at $20-30^\circ$, to give emulsifying, wetting, or sizing agents, useful also in tanning. C. H.

Manufacture of substituted carboxylic acid amides. SOC. CHEM. IND. IN BASLE (B.P. 368,590, 11.5.31. Switz., 9.5.30).—An aminoalkyl halide or arylsulphonate is heated with a Na or other metal derivative of an amide. Examples are: stearic β -dimethylaminoethylamide, m.p. 71° , from sodio-stearamide and β -dimethylaminoethyl chloride; benzoic β -diethylaminoethylanilide, b.p. $149-151^\circ/0.1$ mm. (perchlorate, m.p. $123-125^\circ$); β -diethylaminoethylamides of 2-phenyl- (m.p. 75°), 2-*n*-butoxy- (m.p. 65°), and 6-bromo-2-ethoxy- (m.p. 106°) -quinoline-4-carboxylic acids; 2-ethoxyquinoline-4-carboxylic β -diethylaminoanilide, b.p. $205-210^\circ/0.5$ mm. (perchlorate, m.p. $160-162^\circ$), benzyl- β -diethylaminoethylamide, ethyl- β -diethylaminoethylamide, b.p. $158-160^\circ/0.02$ mm., bis-(β -diethylaminoethyl)amide, b.p. $165^\circ/0.01$

mm., β -diethylaminopropylamide, m.p. 69°, β -diethylaminoethylamide, m.p. 74°; 2-*n*-butoxyquinoline-4-carboxylic β -piperidinoethylamide, m.p. 93°; stearic β -diethylaminoethylamide, m.p. 67°; oleic β -diethylaminoethylamide, b.p. 190°/0.03 mm.; *N*- β -diethylaminoethylidibenzamide (nitrate, m.p. 160°); benzoic (b.p. 124—126°/0.05 mm.) and acetic (b.p. 137—138°/12 mm.) β -diethylaminoethylamides. C. H.

Manufacture of ester-like wetting, foaming, and dispersing agents. I. G. FARBENIND, A.-G. (B.P. 367,585, 10.3.31. Ger., 20.10.30. Addn. to B.P. 366,916; B., 1932, 540).—A fatty acid or acid halide above C_6 is condensed with a hydroxylated alicyclic or hydroaromatic sulphonic acid; or a fatty salt above C_6 with a halogenated alicyclic or hydroaromatic sulphonic acid. Examples are: Na cyclohexanol-2-sulphonate with oleyl chloride; Na oleate with Na α -chlorocamphenesulphonate; palm-nut oil acid chlorides with ar-tetrahydro- α -naphthol-4-sulphonic acid. C. H.

[Treatment of] crystalline organic compounds [for convenient packing]. C. J. SCHWINDT, Assr. to SELDEN RESEARCH & ENG. CORP. (U.S.P. 1,806,715, 26.5.31. Appl., 27.9.30).—Cryst. org. compounds, e.g., phthalic anhydride, anthraquinone, β -naphthol, are felted between callender rolls (preferably differential) into thin sheets, which break up into large scales without dust. C. H.

Production of naphthenates of heavy and alkaline-earth metals. I. G. FARBENIND, A.-G. (B.P. 367,666, 30.5.31. Ger., 2.6.30. Addn. to B.P. 335,863; B., 1931, 20).—In the process of the prior patent, lighter coloured products are obtained by evaporation in vac., in presence of added C_6H_6 , xylene, etc. if desired. The fusion of the naphthenates is facilitated by addition of tolyl phosphate or other plasticisers, castor oil, linoleic acid, etc., which are miscible in all proportions with the naphthenates and are sol. in the same solvents. C. H.

Manufacture of hydroxybenzocarbazolecarboxylic [hydroxynaphthacarbazolecarboxylic] acids. I. G. FARBENIND, A.-G. (B.P. 367,597, 19.3.31. Ger., 19.3.30).—An alkali 2:3-hydroxynaphthoate carrying in 5- or 8-position an OH or NH_2 group is heated with aq. $NaHSO_3$ and then with an arylhydrazine in presence of mineral acid. The following are described: 2-hydroxy- α -naphthacarbazole-3-carboxylic acid, m.p. 329—330°, and its 8-Cl- (m.p. > 330°) and 11 (*N*)-, 8-, and 10-Me-derivatives, m.p. 310°, 334°, and 330°, respectively; 2-hydroxy- $\alpha\alpha'$ -dinaphthacarbazole-3-carboxylic acid, and its 9-Cl- and 11-OH-10- CO_2H -derivatives; 8-hydroxy- $\beta\alpha'$ -dinaphthacarbazole-9-carboxylic acid. C. H.

Manufacture of Δ^3 -menthene. SCHERING-KAHLBAUM A.-G. (B.P. 367,593, 16.3.31. Ger., 20.3.30).— Δ^1 -Menthene is isomerised by passing its vapour over a catalyst, e.g., pumice at 450°, pumice and $MgSO_4$ at 350°, granular $Ca_3(PO_4)_2$ with H_3PO_4 at 320—350°, or oxidised Cu turnings at 300—350°. The mixture of Δ^3 - and Δ^1 -isomerides obtained is readily separated by distillation. C. H.

Manufacture of 1-phenyl-2:3-dimethyl-5-pyrazolone. G. B. ELLIS. From SOC. DES USINES CHIM. RHÔNE-POULENC (B.P. 367,797, 19.11.30).—Me halide is

led at substantially 1 atm. into or through liquid phenylmethylpyrazolone at 125—130°, preferably in presence of a high-boiling diluent, which may be 1-phenyl-2:3-dimethyl-5-pyrazolone; unmethylated material may be removed by extraction with aq. NaOH.

C. H.
Manufacture of 2-hydroxyanthracene-3-carboxylic acid, arylamides thereof, and azo dyes derived therefrom [ice colours and pigments]. A. CARPMAEL. From I. G. FARBENIND, A.-G. (B.P. 367,907, 28.11., 3.12., and 4.12.30).—2-Hydroxyanthracene-3-carboxylic acid, decomp. 295°, obtained by Kolbe reaction from 2-hydroxyanthracene, is converted into its arylamides (anilide, m.p. 297°; *o*- and *p*-anisidides, m.p. 231° and 309°; *o*-toluidide, m.p. 270°; 4-methoxy-*o*-toluidide, m.p. 253°; α - and β -naphthylamides, m.p. 293° and 314°; *m*-nitroanilide, m.p. 280°; 2:5-dimethoxyanilide, m.p. 252°; 5-chloro-*o*-toluidide, m.p. 282°), which are coupled in substance or on the fibre with diazo-compounds. Examples of couplings are: 4-amino-4'-methoxydiphenylamine \rightarrow anilide (dark green); 2-amino-5-benzamidoquinol Et_2 ether \rightarrow *o*-toluidide (blue-green); 5-chloro-*o*-toluidine \rightarrow *o*-toluidide (red-violet); *p*-nitroaniline \rightarrow aminoquinol Me_2 ether \rightarrow *o*-anisidide (greenish-black). C. H.

Production of anthraquinonenaphthacridone derivatives. R. F. THOMSON, W. SMITH, J. PRIMROSE, and IMPERIAL CHEM. INDUSTRIES, LTD. (B.P. 367,793, 18.10.30).—One or both halogens in a 5:8-dihalogeno-anthraquinone-2:1(β)-naphthacridone are replaced by NH_2 or substituted NH_2 groups; *N*-acyl groups may be removed by hydrolysis, and the products may be benzoylated. The 5:8- Cl_2 -compound is, e.g., heated with phthalimide and Cu in phthalic anhydride at 220° for a mauve vat dye, which is hydrolysed to the diamine (green-blue, redder on benzoxylation); or with aq. NH_2Me at 120° (blue-red), NH_2Bz (violet), or *p*-toluenesulphonamide (pale violet). C. H.

Production and use of benzanthrone derivatives. R. F. THOMSON, I. B. ANDERSON, S. THORNLEY, and IMPERIAL CHEM. INDUSTRIES, LTD. (B.P. 367,462, 25.8.30 and 26.5.31).—Benzantrones react with Se or SeO_2 , preferably in a diluent, to give benzanthranyl H selenides, selenides, or selenones, which may be used in the synthesis of isodibenzantrones etc. as in the case of the S analogues. 3-Benzanthranyl H selenide, m.p. 290—300°, 3:3'-bisbenzanthranyl selenide, m.p. > 310°, a dibrominated selenide, m.p. 253—256°, and their conversion products are described. Many of the products are suitable as dyes. C. H.

C_2H_2 . Phenols from waste liquors. Conversion products of paraffin hydrocarbons. Removing hydrocarbon compounds from halogen acids.—See II. EtOH from wine etc.—See XVIII.

IV.—DYESTUFFS.

Ponceau-2R and -3R. M. LOMBARD (Ann. Falsif., 1932, 25, 153—154).—The reaction with $BaCl_2$ distinguishes Ponceau-3R from all similar colours of the group. The addition of aq. $BaCl_2$ to a solution of the dye gives a flaky, bulky, bright purple ppt. The Ba salt formed is even less sol. in excess of reagent than in H_2O . The filtrate is practically colourless except in

deep layers. All the pure analogous xyloidine colours give coloured filtrates and ppts. of different shades. Ponceau-2R gives a reddish-purple ppt. of a distinct shade when viewed on a filter-plate, and the filtrate is definitely coloured.

H. R. J.

Mechanism of the formation of azo dyes from diazonium salts and antidiazotates. E. MÖHLAU (Chem.-Ztg., 1932, 56, 305—306).—Theoretical (cf. B., 1931, 963).

H. A. P.

See also A., May, 516, Alizarin [purification]. 520, Vegetable dyes. 525, Blue S dyes.

PATENTS.

Production and use of [vat] dye preparations. IMPERIAL CHEM. INDUSTRIES, LTD., and A. D. NICHOLSON (B.P. 367,864, 19.8.30).—A dry vat dye and a dry insol. metal soap (which may be produced *in situ*) are incorporated, together or separately, with an org. liquid to form a solution or colloidal solution, suitable for colouring and waterproofing canvas, leather, etc. by impregnation and evaporation. Examples are: Caledon-jade-green, soap, and $\text{Al}_2(\text{SO}_4)_3$; Caledon-blue 3G, $\text{Al}(\text{OH})_3$, and palmitic acid; Caledon-brown R, Na stearate, and ZnSO_4 ; Caledon-red BN, Na oleate, and ZnSO_4 . Suitable org. liquids are petroleum spirit and C_6H_6 .

C. H.

Manufacture of [oxazine] dyes soluble in water. W. W. GROVES. From I. G. FARBENIND. A.-G. (B.P. 367,389, 17.11.30).—Non-sulphonated 2:5-diarylamino-*p*-benzoquinones, carrying in 3:6-positions either H, alkyl, aryl, or halogen, are converted into H_2O -sol. dyes, probably oxazines, by treatment with conc. H_2SO_4 , ClSO_3H , or oleum, preferably in a solvent and in presence of HBO_3 or an oxidant such as MnO_2 , KMnO_4 , As_2O_5 , Fe^{+++} salts, persulphates, or chloranil. A halogenating agent may be used before, during, or after condensation. Products from the following *p*-benzoquinones are described: 3:6-dichloro-2:5-dianilino- (brown); 3:6-dichloro-2:5-*m*-toluidino- (brown); 3:6-dichloro-2:5-di- β -naphthylamino- (red-violet); 2:5-di- β -naphthylamino- (red-violet); 3:6-dichloro-2:5-di-(4-aminodiphenylamino)- (blue); 3:6-dichloro-2:5-di-(*N*-ethyl-3-carbazolylamino)- (navy-blue); 3:6-dichloro-2:5-di- β -anthramino- (green); 2:5-di- β -naphthylamino-3-methyl- (red-violet); 2:5-di-(*N*-ethyl-3-carbazolylamino)-6-phenyl- (blue).

C. H.

Manufacture of [direct green tris]azo dyes. I. G. FARBENIND. A.-G. (B.P. 367,675, 10.6.31. Ger., 10.6.30).—Aminoazo compounds of the type: $\text{R}\cdot\text{N}_2\cdot\text{Ar}\cdot\text{NH}\cdot\text{CO}\cdot\text{Ar}'\cdot\text{NH}_2$, in which R is the residue of a "yellow" component (PhOH, salicylic or cresotic acids, acetoacetic arylamides, α -methylindoles, pyrazolones) and Ar and Ar' are phenylene residues, are diazotised and coupled with a 1:2-aminonaphthol alkyl ether (or sulphonic acid), rediazotised, and coupled with a 1:8-acylaminonaphtholsulphonic acid. Examples are: *p*-phenylenediamine \rightarrow PhOH, *p*-nitrobenzoylated, reduced \rightarrow 2-ethoxy-Cleve acid \rightarrow acetyl-H-acid; *p*-nitrobenzoyl-*p*-phenylenediaminesulphonic acid \rightarrow acetoacetic anilide or 1-phenyl-3-methylpyrazolone, reduced \rightarrow 2-ethoxy-Cleve acid \rightarrow acetyl-H-acid; *p*-nitroaniline-2-sulphonic acid \rightarrow salicylic acid, reduced, *p*-nitrobenzoylated, reduced \rightarrow 2-ethoxy-Cleve acid \rightarrow acetyl-H-acid.

C. H.

Extractor.—See I. **Products containing N. Azo dyes.** Anthraquinonenaphthacridone derivatives. Benzanthrone derivatives.—See III.

V.—FIBRES; TEXTILES; CELLULOSE; PAPER.

Texture of natural cellulose. F. LUFT (Veröff. wiss. Zentral-lab. phot. Abt. Agfa, 1931, 2, 169—178; Chem. Zentr., 1931, ii, 2143).—Cactus spines show particularly clear X-ray diagrams of native cellulose. Lignite preps. showed the interference lines of native cellulose. β -Cellulose when swollen shows the diagram of an amorphous substance; when dry it shows that of native cellulose.

A. A. E.

Industrial extraction of cellulose by chlorination. U. POMILIO (Giorn. Chim. Ind. Appl., 1932, 14, 161—170).—The Celulosa Argentina Co. of Rosario (Santa Fe) uses mainly wheat straw, but occasionally jute (sack cuttings), flax, and maize stems. Cl_2 and NaOH are obtained by electrolysis of Cordoba salt of high purity. The power station consists of 2 Sulzer boilers producing steam at 22 atm. superheated at 375° and a Siemens turbo-alternator of 400 kv.-amp. In the electrolytic plant there are 28 cells of 300 amp. The straw cleaned from seeds is cut in a special machine, treated in lye tanks, and after pressing is passed to 4 chlorination towers which act on the countercurrent principle. The straw descends by gravity and Cl_2 gas is forced through by fans. The treated straw is placed in airtight boxes until all Cl_2 has disappeared, then washed successively with H_2O , dil. alkali, and H_2O . The process is continuous. The pulp is then passed to the paper plant. The output is 14 tons of cellulose (88% dry matter) in 24 hr.

O. F. L.

Factors affecting determination of lignin by the 72% sulphuric acid method. G. J. RITTER, R. M. SEBORG, and R. L. MITCHELL (Ind. Eng. Chem. [Anal.], 1932, 4, 202—204).—The following modifications of the method of Mahood and Cable (B., 1922, 934A) are recommended: (1) the residue after extraction with $\text{EtOH}\cdot\text{C}_6\text{H}_6$ should be extracted with hot H_2O ; (2) the conc. acid-wood mixture should be kept in a bath at 20°; (3) 2 hr. should be allowed for dissolution of the carbohydrates in 72% H_2SO_4 ; (4) the diluted mixture should be hydrolysed for 4 hr.

E. S. H.

Effect of temperature on the sulphuric acid method for [determining] lignin. C. J. PETERSON, A. W. WALDE, and R. M. HIXON (Ind. Eng. Chem. [Anal.], 1932, 4, 216—217).—The lignin vals. obtained by the 72% H_2SO_4 method vary greatly with the temp. A standard temp. is desirable. (Cf. B., 1929, 591.)

E. S. H.

Chemico-bacteriological processes in the water medium in presence of cellulose nitrate. S. M. DRACHEV (J. Appl. Chem., Russia, 1931, 4, 886—900).—When cellulose nitrate is stored under H_2O , reducing conditions, which may be remedied by aëration or by addition of Hg compounds, are produced. CHCl_3 is less effective.

CH. ABS.

Determination of cuprammonium viscosity. ANON. (Paper Trade J., 1932, 94, T.A.P.P.I. Sect., 245—246).—A slightly modified Shirley Institute method for the determination of the viscosity of paper pulps is described. It has been found applicable to both bleached

and unbleached chemical pulps and also to rag stocks and has been tentatively adopted as the T.A.P.P.I. standard method. Accuracy of repetition is 2.0% on bleached, 3.0% on unbleached, pulps. H. A. H.

Manufacture of chemical products from the non-cellulosic constituents of esparto grass with the recovery of soda. J. MACGREGOR (Paper-Maker, 1932, 83, 180—183 t.s.).—A new process, based on a no. of recent patents by Rinman, for dealing with the black liquor which results from the digestion of esparto with caustic alkali is described. The conc. black liquor is carbonised after the addition of a mixture of Ba and Ca oxides, the product being obtained as a powder, from which clear NaOH liquor of the required sp. gr. may be obtained by boiling with H_2O . Calcination of the residual $BaCO_3$ and $CaCO_3$, containing some free C, is effected in a revolving kiln. Many economic advantages are claimed. The addition of milk-of-lime to the NaOH liquor used in the digestion of esparto causes the pptn. of the SiO_2 present in the grass, thus minimising incrustation on the evaporator tubes and reducing the amount of NaOH necessary. The Ca silicate is deposited inside the fibres. The products of distillation of esparto black liquor include primary, sec., and tert. alcohols, ketones, and hydrocarbons. H. A. H.

Bisulphite cooking of woods rich in rosin. C. BERGSTRÖM (Papier-Fabr., 1932, 30, 241—246, 255—257).—Difficulties in the production of pulp from fir and pine woods that contain relatively large amounts of rosin are discussed. They can be overcome by removal of some of the non-cellulose impurities by pretreatment of the material with org. solvents, with 0.25—2.5% NaOH, aq. NaOAc, or with lime-water or milk-of-lime, but most of these methods are too expensive. The NaOAc method is satisfactory if this substance is obtained as a by-product, but sulphite pulp is best obtained by pretreatment of the wood with hot aq. CaO for several hr. followed by the introduction of SO_2 or Cl compounds into the mixture and finally cooking by the ordinary bisulphite process. Directions for the production of various kinds of pulp are given. The recovery of by-products is specially advantageous in the sulphate process. Yields of rosin, gum, and oil of turpentine obtainable from numerous kinds of pine wood are given, and the recovery of turpentine, MeOH, $COMe_2$, AcOH, $COMeEt$, heavy and light oils, rosin, tar, etc. in the manufacture of soda-, sulphate-, and sulphite-pulp from spruce, pine, and fir woods, and the consumption of chemicals in the various pretreatment operations, are discussed. B. P. R.

Analysis of sulphite cooking acids [for pulp]. W. STEUER (Papier-Fabr., 1932, 30, 253—255).—The determination of total acid in the liquor by the I method is satisfactory, but the vals. for "free" and "combined" acid are often variable owing to the volatility of the H_2SO_3 and to the fact that the various indicators used in titrating with aq. NaOH have different p_H ranges and therefore give different end-points. If the free H_2SO_3 is first oxidised to the non-volatile H_2SO_4 better results are obtained. Two reliable methods are described. In the first the total acid is first found in one sample of liquor by titration with I solution, and

then to 50—100 c.c. of H_2O containing H_2O_2 and methyl-red, neutralised to a yellow end-point with 0.1N-NaOH, 3.2 c.c. of the cooking acid are added, and the titration is continued to the reappearance of the yellow colour. In the second method the "free," "combined," and total acids are determined in the same sample. The free acid is found by titration with 0.1N-NaOH, using bromophenol-blue as indicator ($=a$), H_2O_2 is then added, and the titration is continued ($=b$); then % total acid $= 0.1 \times 2b$, and the % "combined" acid $= 0.1(b - a)$. Satisfactory agreement between the vals. obtained by both methods for the same liquors is given. B. P. R.

Determination of methoxyl groups in wood or pulp. ANON. (Paper Trade J., 1932, 94, T.A.P.P.I. Sect., 243).—Tappi's tentative official standard procedure is based on the Zeisel method, details of which are given. The result is reported as a % of the bone-dry wt. of the sample. H. A. H.

Relation of substance to strength of machine-made (high-grade) papers. T. B. HOYLE (Paper-Maker, 1932, 83, 155—156 t.s.).—With increasing substance, both burst factor and breaking length decrease, especially at low substances. This applies to both waterleaf and tub-sized papers. Tear factor remains const. with waterleaf papers, and increases with tub-sized papers. Fold factor remains const. for both types of paper of the higher qualities, but decreases in the lower qualities. Thickness factor decreases with increasing substance, provided the finish remains the same. The burst/break ratio for fine papers varies from 2.3 to 2.9 for different qualities. Tub-sizing increases the burst, tensile, and folding strengths, but decreases the tearing strength. The lighter substances are affected most, owing to the higher gelatin content. H. A. H.

Porosity of wrapping papers. G. WALSH and J. M. PHILIPSON (Food Tech., 1932, 1, 282—283).—A note giving the rate of penetration through a few commercial wrapping materials under experimental conditions. E. B. H.

De-inking of book and magazine stock. H. A. MORRISON (Paper Trade J., 1932, 94, T.A.P.P.I. Sect., 239—241).—A no. of flow diagrams for the treatment of waste paper are discussed in the light of practical tests made at various mills. Screening and riffling devices and cooking reagents for the removal of C and grease are fairly well standardised, but there exists no uniformity in many of the other stages. It is stated that cooking at low consistency produces a whiter stock, but the steam demand is greater. In a well-operated de-inking plant the losses amount to about 25%. H. A. H.

Bleaching wood pulp.—See VI. **S burners for sulphite-pulp mills.**—See VII. **Staining of paper by rubber.**—See XIV. **Analysis of agricultural products.**—See XVI.

See also A., May, 451, Mol. structure of textile fibres. 462, Swelling and solubility of cellulose acetate. 465, Solution and desolution of cellulose esters. 466, Oxide gels and sols [for textiles and paper]. 486, Moisture determination [in cotton etc.]. 502, Degradation of cellulose. Chloroacetic esters of cellulose.

PATENTS.

Manufacture of fibre products. NAUGATUCK CHEM. CO., ASSEES. OF W. A. GIBBONS (B.P. 372,217, 29.9.31. U.S., 3.11.30).—A pulp of animal, vegetable, or mineral fibres is mixed with an aq. dispersion of styrene or its homologues or polymers, which are deposited on the fibres by a coagulating agent; the product is pressed into the desired form. F. R. E.

Production of material rich in xylan. E. R. DARLING, ASSR. TO CORNSTALK PRODUCTS CO., INC. (U.S.P. 1,825,307, 29.9.31. Appl., 19.6.29).—Cornstalks are treated with 1% aq. NaOH at 100° for about 1 hr., whereby the lignin is dissolved, but substantially all the xylan remains. B. P. R.

Manufacture [of threads, films, etc.] and application of new protein solutions and new protein derivatives [therefor]. A. G. BLOXAM. From Soc. CHEM. IND. IN BASLE (B.P. 370,860, 21.1.32. Switz., 27.1.31. Addn. to B.P. 359,249; B., 1932, 224).—Proteins or their degradation or conversion products are dissolved in the additive products of alkylating or aralkylating agents with heterocyclic *tert.* bases and the resulting solutions used either alone or in admixture with the cellulose solutions described in the main patent for the manufacture of artificial filaments etc. By treating these protein solutions with acylating agents acylated protein derivatives are obtained. The prep. of benzoylated casein and of artificial silk solutions containing cellulose and either casein, natural silk, or a keratin degradation product is described. D. J. N.

Manufacture of cellulose esters. DR. A. WACKER. GES. F. ELEKTROCHEM. IND. G.M.B.H. (B.P. 372,241, 19.11.31. Ger., 18.12.30).—Triacylcelluloses, *e.g.*, cellulose triacetate, are partly hydrolysed to products suitable for manufacture of threads, films, etc. by subjecting them, while swollen or dissolved by means of EtOH, CH₂Cl₂, C₂HCl₃, etc., or their mixtures, to the action of NH₃ or aliphatic amines. F. R. E.

Preparation of cellulose propionate. C. DREYFUS and G. SCHNEIDER, ASSRS. TO CELANESE CORP. OF AMERICA (U.S.P. 1,824,877, 29.9.31. Appl., 20.7.28).—Cotton linters or other cellulosic material is pretreated with a lower fatty acid and/or with propionic anhydride in the absence of a catalyst; H₂SO₄ is then added as catalyst to cause propionylation, and the product is partly hydrolysed. B. P. R.

Manufacture of artificial silk. S. DUNLOP. From "CHÂTILLON" SOC. ANON. ITAL. PAR LA SETA ARTIFICIALE (B.P. 370,943, 13.1.31).—Thread of high wet and dry strength and with a dry extension of 16–24% is produced by spinning viscose into a bath at 55–80° containing 8–20% of H₂SO₄, with or without ZnSO₄, Na₂SO₄, or MgSO₄, but without added glucose, dextrin, etc. After a fraction of a sec. the thread is removed, and after a further 1–1½ sec. is submitted to a gradually increasing tension resulting in an elongation of 20–80%. Coagulation is completed during this period by the coagulating medium carried by the thread itself. B. P. R.

Manufacture of artificial silk. N. V. HOLLANDSCHE KUNSTZIJDE INDUSTRIE, and L. A. VAN BERGEN (B.P.

370,772, 14.7.31. Holl., 14.7.30).—Normally ripened viscose solutions containing >6% cellulose, to which an excess of CS₂ (9–18% of the α -cellulose content) has been added, are spun in the usual manner into acid salt baths with production of threads of from 6 to <1 denier.

F. R. E.

Manufacture of artificial structures such as filaments or the like from viscose. R. O. HERZOG and H. HOFFMANN (B.P. 370,847, 6.11.31. Ger., 12.11.30).—Viscose containing >7% of cellulose and comparatively little alkali, *e.g.*, half that of the cellulose, is dry-spun by extrusion under pressure into air heated initially above the decomp. temp. of cellulose (about 120°), the temp. gradually falling in the direction in which the filaments etc. are drawn off; the product is then given a final coagulation, washed, and after-treated as usual. F. R. E.

Production of artificial silk [of reduced lustre]. A. LELY (B.P. 370,512, 14.1. and 13.3.31).—A small quantity (<3%) of a solution of adeps lanæ (purified wool fat) in a volatile solvent (C₆H₆, COMe₂, petrol, turpentine, pine oil) is emulsified with viscose or cuprammonium cellulose solutions, which are then spun as usual. F. R. E.

Production of textile yarns or threads. | BRIT. CELANESE, LTD., and W. I. TAYLOR (B.P. 371,910, 1.1.31).—Dry-spun threads of cellulose acetate are stretched beyond the elastic limit at intervals along their length; suitable apparatus is described.

F. R. E.

Spinning and after-treatment of artificial silk. VEREIN. GLANZSTOFF-FABR. A.-G. (B.P. 370,666 and 372,085, [A] 20.4.31, [B] 24.4.31. Ger., [A] 19.4.30, [B] 26.4.30).—(A) The material is spun directly on to a fabric which is arranged on the winding member so that it projects over both ends. By means of strips previously laid on the winding member, the fabric, after turning the ends over the spun material, is removed and the whole is after-treated in the usual way, remounted (the ends of the fabric being turned back), and the filaments are wound off with twisting. (B) A skeleton cruciform member fits into slots in the circular winding member and serves for the withdrawal of the spun thread for after-treatment. F. R. E.

Beating or refining machines for paper or like pulp. C. W. MORDEN (B.P. 371,145, 30.3.31. U.S., 1.4.30).—A machine for the conversion of pulp into paper stock is described which combines the action of both the beater and the Jordan engines and is adapted for continuous working. B. P. R.

Manufacture of paper pulp from bagasse and other gramineæ plants. T. HAGIWARA, ASSR. TO R. MIURA (U.S.P. 1,825,349, 29.9.31. Appl., 10.4.30. Jap., 1.4.29).—The fibrous material is digested for 30–40 hr. at 100–115° with a liquor containing mainly Mg(HSO₃)₂ with a small amount of MgSO₃ added to prevent liberation of H₂SO₃. B. P. R.

Papermaking composition. G. A. RICHTER, ASSR. TO BROWN CO. (U.S.P. 1,824,837, 29.9.31. Appl., 15.11.29).—A mixture is made of two wood pulps of high α -cellulose content, one from a long-fibred wood (*e.g.*,

spruce) and the other from a short fibred-wood (*e.g.*, poplar). The product has good felting qualities and gives papers resistant to the action of air, heat, and light.

B. P. R.

Manufacture of fire-resistant pulp board. G. M. CLARK. From AGASOTE MILLBOARD CO. (B.P. 370,391, 30.12.30).—A mixture of a colloidal clay, *e.g.*, bentonite, $\text{Al}(\text{OH})_3$ and CaSO_4 , preferably prepared by double decomp. of aq. $\text{Al}_2(\text{SO}_4)_3$ and a suspension of $\text{Ca}(\text{OH})_2$ and bentonite, is added to the pulp in the beater in sufficient quantity to give a final product of, *e.g.*, the following composition: fibre 50, $\text{Al}(\text{OH})_3$ 13, CaSO_4 29.5, bentonite 5.2%.

D. J. N.

Protective papers for use in agriculture and in horticulture. W. A. HALL (B.P. 370,482, 2.1.31. Fr., 18.2.30).—Paper is coated on one side with an animal or vegetable oil or wax and on the other with a fertiliser and optionally an insecticide. Two or more such sheets may be superimposed with their waxed sides outermost and perforated to facilitate percolation of H_2O . These papers retain their fibrous structure for 4–6 months and then rot.

D. J. N.

Decortication of sisal and other fibrous leaves. KINGS PATENT AGENCY, LTD. From QUIRIN & CO., LTD. (B.P. 372,353, 4.2.31).

[Roller] apparatus for obtaining fibres from plant stalks, especially bast fibre stalks. F. KRUPP GRUSONWERK A.-G. (B.P. 372,757, 10.2.31. Ger., 19.4.30).

Manufacture of elastic textile products [with rubber insertion]. GOTTFRIED HAGEN A.-G. (B.P. 373,014, 10.8.31. Ger., 17.11.30).

Apparatus for treating [shrinking and stretching] woven and like fabrics. J. H. WRIGLEY, A. MELVILLE, and A. B. HENSHILWOOD (B.P. 372,803, 10.2.31).

Producing artificial silk bobbins on the bobbin spinning machine. BARMER MASCHINENFABR. A.-G. (B.P. 372,395, 5.2.31. Ger., 20.2.30).

Apparatus for supplying spinning solution to artificial silk spinning machines. BRIT. BEMBERG, LTD. (B.P. 372,710, 16.1.32. Ger., 30.1.31).

Drying cylinders.—See I. Glass.—See VIII. Varnishes etc. from sulphite liquor.—See XIII. Cigarette mouthpieces.—See XX. Cartridge cases.—See XXII.

VI.—BLEACHING; DYEING; PRINTING; FINISHING.

Alkalinity in bleaching [of wood pulp]. F. H. YORSTON (Pulp and Paper Canada, 1932, 33, 74–77). Interaction of hypochlorites and incrustants of wood yields CO_2 , reducing alkalinity of the bleach liquor. $[\text{H}^+]$ may be maintained at approx. 9 by the addition of about 2% of MgO , bleaching proceeding at a lower rate. Improvement in papermaking quality and viscosity of pulps is claimed, and the use of the method suggested for the first (high-density) stage in step-bleaching.

T. T. P.

Fastness of coloured material to light. P. W. CUNLIFFE (Paper-Maker, 1932, 83, 156–158 T.S.).—A summary of previous work, dealing with the effect of

quality and intensity of light, R.H., temp., concn. of colour, p_{H} of support, atm. impurities, nature of support, and continuity of exposure.

H. A. H.

Discharging indigo with manganese dioxide. E. PODRECHETNIKOV (Sealed Note No. 2083, 15.4.11. Bull. Soc. Ind. Mulhouse, 1932, 98, 49–50). Report by L. DESIRENS (*Ibid.*, 50–51).—Fabric dyed with indigo is printed with MnCl_2 , steamed, passed through a solution containing 200 g. NaOH (d 1.18) and 20 g. Na_2O_2 per litre, washed, soured in aq. HCl (d 1.075), rinsed in aq. NaHSO_3 , and washed in cold H_2O . Satisfactory discharge pastes consist of (for white) aq. gum tragacanth (600 g.) and MnCl_2 (400 g.); (for green) Solid Green (100 g.), aq. gum tragacanth (400 g.), MnCl_2 (300 g.), and aq. $\text{Fe}(\text{CNS})_2$ (d 1.092, 200 g.); and (for cachou) Solid Green (100 g.), aq. gum tragacanth (400 g.), MnCl_2 (300 g.), and $\text{Co}(\text{OAc})_2$ (200 g.). DESIRENS cites similar processes previously described or used and adversely criticises the white discharges obtained.

A. J. H.

PATENTS.

Bleaching of bast fibres, especially flax, hemp, and the like. I. G. FARBENIND. A.-G. (B.P. 371,494 and Addn. B.P. 371,496, [A] 2.2.31, [B] 3.2.31. Ger., [A] 26.2.30).—The textile material is partly bleached ($\frac{1}{4}$ – $\frac{1}{2}$ -white), but with complete elimination of lignin impurities, by (A) bowking with boiling aq. Na_2CO_3 (4–6% on the wt. of material), or (B) mere softening in warm aq. Na_2CO_3 , either treatment being followed by rinsing, bleaching in a liquor containing 1–8 g. of available Cl /litre and having $p_{\text{H}} < 5.0$, rinsing, infusion in dil. aq. Na_2CO_3 , bleaching in a weak alkaline liquor containing 0.5–4 g. of available Cl /litre, rinsing, infusion in dil. aq. Na_2CO_3 , rinsing, and drying.

A. J. H.

Vat dyeing and stripping. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 367,420, 15.11.30).—The polymerised ethylene oxides of B.P. 346,550 (B., 1931, 666) are added to vat or sulphide dye baths or to stripping baths to facilitate even dyeing or stripping of close-woven fabrics.

C. H.

Finishing of textile fibres and the like. ERBA A.-G. FABR. CHEM. PROD. (B.P. 370,407 and Addn. B.P. 371,003, [A] 29.11.30, [B] 8.12.30. Ger., [A] 29.11.29, [B] 7.10.30).—(A) A dressing for artificial silk yarns and fabrics which may be easily removed by washing contains glue admixed with about 4% of casein, together with other substances, *e.g.*, soaps and alkali silicates. (B) Proteins and carbohydrates are used instead of glue, and vitellin replaces the casein.

A. J. H.

Treatment of fibres or fibrous materials. R. D. COGHILL (U.S.P. 1,825,178, 29.9.31. Appl., 26.12.29).—Materials such as sacking, made from raw cellulose fibres, are squeezed, rubbed, and pounded in a bath of hot aq. Na silicate, washed, treated with oil, sized, and pressed between hot rollers. Alternatively, the Na silicate is replaced by NaOH and the material, while still containing alkali, is treated with CS_2 .

B. P. R.

Apparatus for treating and ageing fabrics. E. S. CHAPIN (B.P. 371,690, 6.7.31).—An ageing machine similar to those described previously in B.P. 312,423 and 334,020 (B., 1929, 751; 1930, 320) and U.S.P. 1,738,946 (B., 1930, 1063) is described, wherein heat

liberated in the fabric during the early stage of its travel is rapidly dissipated by the introduction of steam which passes through Cu-gauze aprons over which trickles cold H_2O . A. J. H.

Treatment [raising the safe ironing temperature] of [cellulose derivative] textile materials. BRIT. CELANESE, LTD. (B.P. 372,129, 11.6.31. U.S., 27.6.30).—Cellulose acetate (etc.) silk is moderately weighted with salts of Sn, Zn, Al, Bi, or Sb in the presence of inorg. salts which repress swelling of the silk; the safe ironing temp. is raised from 220° to 320° . A. J. H.

Sizing of natural and artificial textile threads, particularly silk threads. L. CAVAILLON (B.P. 370,810, 7.9.31).—A sulphonated product suitable for sizing crêpe yarns, either alone or in admixture with glue, gums, soap, etc., is obtained by treating a mixture of a semi- or non-drying oil (e.g., olive oil) and a drying oil (e.g., linseed oil) with H_2SO_4 (d 1.84) at 35 – 40° , then washing, and neutralising with aq. alkali. A. J. H.

Sizing agents [for artificial silk threads]. ACETA GES.M.B.H. (B.P. 371,048, 21.1.31. Ger., 21.1.30).—An adherent, but non-sticky, textile size comprises a drying oil (other than tung oil) and a softening agent such as a highly viscous blown semi-drying (rape, cottonseed, etc.) oil, an estolide or the product of esterification thereof with an alcohol (especially glycerol). Driers, amine soaps, etc. may be added to the size, which is applied in solution or emulsion. E. L.

Matting and rendering opaque artificial silks, artificial straw, films, and the like. R. SPEITEL and M. SCHENK (B.P. 371,239, 17.7.31. Ger., 18.7.30).—Cellulose artificial fibres are permanently delustrated by immersion for about 15 min. in a hot, very dil., aq. solution of colloidal $Ti(OH)_4$, followed (optionally) by a soaping treatment; solutions containing 0.001–0.4% TiO_2 are suitable. A. J. H.

Manufacture of non-inflammable fibrous materials. I. G. FARBENIND. A.-G. (B.P. 370,511, 14.1.31. Ger., 15.1.30).—Jute fabrics, paper, cotton, etc. are impregnated with aq. $(NH_4)_2HPO_4$, NH_4Br , or Na_2SO_4 , followed by drying and coating with a layer of $C_{10}H_8Cl_2$ or a mixture of chlorinated naphthalenes having an average content of 2 Cl atoms per mol. of $C_{10}H_8$. A. J. H.

Manufacture of waterproof sheet materials [floor coverings etc.] J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 371,812, 26.11.30).—Polymerised esters of acrylic acid, or mixtures thereof with other polymerised derivatives of acrylic acid, are mixed with 10–400 wt.-% of finely-divided amorphous fillers (cork meal, C black, talc, waste fibres), with addition, if desired, of pigments, softening agents, or adulterants. F. R. E.

Machines for bleaching or otherwise treating fabrics in the open width. (Sir) J. F. NORTON & Co., LTD., and W. J. NORTON (B.P. 372,943, 8.5.31).

Dye jigs for dyeing fabrics. J. DALGLISH (B.P. 373,076, 8.12.31).

[Multi-tier] tentering and drying machines. H. and W. KRANTZ (H. KRANTZ SÖHNE) (B.P. 372,430, 16.2.31. Ger., 17.1.31).

Coloured gasoline. **Fabric-cleaning compositions.**—See II. **Styrene derivatives.** **Wetting etc. agents.**—See III. **Use of vat-dye preps.**—See IV. **Bleaching liquid.**—See VII. **Washing etc. agents.** **Rubber-fibre plastics.**—See XIV.

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

Total solids in natural brines. G. ZINZALIAN and J. R. WITHROW (Ind. Eng. Chem. [Anal.], 1932, 4, 210–214).—Determinations of the total solids vary with the temp. of heating, owing to the different degrees of decomp. of the salts. Results obtained at 105° or 120° may be 12% in error. Ignition at 750° is recommended for brines containing $MgCl_2$, $CaCl_2$, and $NaCl$ as major constituents. The true result is then calc. from the formula $R + (0.577 \times MgCl_2) + (K \times CaCl_2)$, where R is the weighed residue and K is 0.02 when the $CaCl_2$ content is 25–50% of the $NaCl$ content, 0.01 when the proportion is 10–20%, and 0.00 when $<10\%$ of the $NaCl$ content. E. S. H.

Salt, a by-product of [petroleum-refinery] condenser cooling. O. M. SMITH (Ind. Eng. Chem., 1932, 24, 547–548).—A natural brine is used to cool petroleum vapours in the condensers. The % composition of the brine used is $NaCl$ 12.75, $CaCl_2$ 2.95, $MgCl_2$ 0.83, Br 0.03, I 0.001, sulphates etc. traces, KCl 0.22. The corrosive $MgCl_2$ is removed by pptn. with CaO before the brine is put into circulation. On leaving the cooling coils the brine is sprayed into the air and recirculated until $NaCl$ crystallises out. Products obtained are $NaCl$, KCl , Br , I , $CaCl_2$, and Mg products. The plant is expected to produce 400 tons of $NaCl$ per day. H. I.

Pyrogenic decomposition of sodium sulphate. K. I. LOSEV, N. I. NIKOLSKAYA, and T. G. GUSEVA (J. Appl. Chem., Russia, 1931, 4, 743–756).—Decomp. of Na_2SO_4 below 1400° is negligible in absence of CO , but is appreciable at 1200° in presence of CO . The reaction between Na_2SO_4 and SiO_2 is facilitated by increase of the latter and by presence of CO . Na_2SO_4 and Al_2O_3 react more readily; Na_2SO_4 and Fe_2O_3 react very slowly. CH. ABS.

Rapid determination of the amount of sodium nitrite in pickling and preserving salt. J. PELTZER (Chem.-Ztg., 1932, 56, 383).—A solution of 10 g. of salt in 150 c.c. of H_2O , neutralised to phenolphthalein, is boiled with 15 c.c. of 0.1N- H_2SO_4 to remove all NO , and back-titrated with 0.1N- $NaOH$ (1 c.c. of 0.1N-acid \equiv 0.0103515 g. $NaNO_2$). For qual. work a test may be applied for the $NaNO_3$ formed in this reaction, or a solution of the salt in an excess of conc. H_2SO_4 may be shaken with brucine, when a red colour results. J. G.

Potash analyses. Methods for eliminating errors in determination of potash in fertiliser mixtures high in phosphoric acid. C. M. BIBLE (Ind. Eng. Chem. [Anal.], 1932, 4, 234–235).—Errors in determining K salts in fertilisers are attributed to the attack of metaphosphates on SiO_2 and to occlusion of K salts. The errors are eliminated by neutralising with $NaOH$ instead of NH_3 . E. S. H.

Colorimetric determination of P_2O_5 in phosphates. G. A. MARTOVA (Udobr. Urozhai, 1931, 3, 832—836).—The mineral (5 g.) is treated for 30 min. with aqua regia (40 c.c.), the mixture diluted to 250 c.c., 5 c.c. being then diluted to 100 c.c. Of this, 10 c.c. are treated with 4 drops of a solution containing citric acid (50 g.), 25% aq. NH_3 (63 c.c.), and H_2O (to 100 c.c.), 5 drops of a solution containing $(NH_4)_6Mo_7O_{24}$ (15 g.) in H_2O (100 c.c.) poured slowly into 100 c.c. of 6*N*- HNO_3 , and 4 drops of a solution of benzidine hydrochloride (0.25 g.) in 33% $AcOH$ (5 c.c.) and H_2O (to 100 c.c.). Standards of KH_2PO_4 are treated similarly.

CH. ABS.

Comparison of 2% citric acid and neutral ammonium citrate solutions as solvents for phosphates. K. D. JACOB, L. F. RADER, JUN., and W. H. ROSS (J. Assoc. Off. Agric. Chem., 1932, 15, 146—162).— $CaHPO_4$, Ca_3PO_4 , Ca hydroxyphosphate, bone products, and mineral Ca phosphates, except macrocryst. fluorapatite (which was practically insol. in both), were significantly more sol. in 2% citric acid than in neutral citrate solution, even when 0.5 g. was used for the citrate test. The two reagents gave vals. close to each other for basic slags when 0.5 g. samples were used for the citrate test. Fluorspar basic slags were only slightly sol. in both cases. Fe and Al phosphates were much more insol. in citric acid than in neutral citrate solution, the natural products being practically insol. in the former whereas the impure pptd. materials were highly sol. The H_2O -insol. P_2O_5 in straight unmanipulated superphosphates was much less sol. in citric acid than in neutral citrate solution. The ammoniated superphosphates usually showed more citrate-insol. than citric acid-insol. P_2O_5 when 1- or 2-g. samples were used for the citrate test. The reverse held in some cases when 0.5 g. was used. Significant decrease in citric acid-insol. P_2O_5 was obtained by decreasing the wt. of sample except for the less sol. products. The presence of $CaSO_4$ had little effect on the citric acid-solubility of Ca_3PO_4 , but synthetic $CaCO_3$ and high- Ca limestone decreased it greatly. Dolomite had only a slight effect.

W. J. B.

Permanganates from activated dioxide. K. I. LOSEV and I. I. SOTNIKOV (J. Appl. Chem., Russia, 1931, 4, 737—742).—Pyrolusite, finely divided, is mixed with KOH (3 pts.) and heated for 3 hr. at 575° and 50 atm.; the molten mass is then blown with air at $\geq 600^\circ$.

CH. ABS.

Alkalinity of chalks. J. F. SACHER (Farben-Chem., 1932, 3, 89—91).—Chalk does not normally contain free CaO or $Ca(OH)_2$; its alkalinity is due either to hydrolysis or to the presence of the more sol. $MgCO_3$. Lack of agreement in the reported solubility and alkalinity of chalk is due either to variation in the size of the particles or to the presence of small proportions of NH_3 or CO_2 in the H_2O used. For the manufacture of putty all the materials should be dry and the linseed oil should have low acid val. The more finely-divided the chalk, the more rapidly does binding with the oil ensue. The tendency of finely-divided chalk to form soaps in some tooth-pastes is prevented or retarded by addition of glycerin, sugar, honey, or tragacanth. (Cf. B., 1932, 601.)

S. M.

Separation of traces of iron from aluminium chloride. V. V. IPATIEV, JUN., and M. N. PLATONOVA (J. Appl. Chem., Russia, 1931, 4, 701—703).— Fe can be separated from $AlCl_3$ solutions by heating with HCl under pressure; with 1.4*N*- HCl at 300° $FeCl_3$ does not hydrolyse, whilst $AlCl_3$ hydrolyses in HCl < 2.8*N*.

CH. ABS.

Determination of uranium in carnotite ore. Glacial acetic acid method. W. W. SCOTT (Ind. Eng. Chem. [Anal.], 1932, 4, 244).—The glacial $AcOH$ method (A., 1922, ii, 788) of separating U from V gives better results than the Pb vanadate method of Low. Some improvements in technique are given. E. S. H.

Reports of investigations: [Canadian ore-dressing and metallurgical laboratories] non-metallic minerals section. R. K. CARNOCHAN, R. A. ROGERS, B. P. COYNE, J. S. GODARD, and M. F. GOUDGE (Canada Dept. Mines, Repts. Ore Invest., 1930, 170—186).—Samples of ore from two pitchblende veins in the Great Bear Lake district contained (a) U_3O_8 51.9, Cu 0.7, Co 0.13, PbO 12.0, Bi 0.18, As 0.15, Fe 1.01, S 2.08%, Ag 1.4, Au 0.19 oz. per ton, and Ra 144.5 mg. per ton, (b) U_3O_8 63.9, Cu 0.66, Co 0.1, PbO 12.1, As 0.14, Fe 0.77, S 0.9%, Ag 1.72 oz. per ton, and Ra 162.4 mg. per ton. Experiments on the grinding of mica, on the use of calcined dolomite in cyaniding Au ores, and on the production of plasters from anhydrite are briefly recorded.

A. R. P.

Rapid determination of nitrogen by Kjeldahl's method. II. J. ELLBURG (Svenska Bryggareförs. Manadsbl., 1931, 46, 333—334; Chem. Zentr., 1932, i, 260).—The vals. obtained (B., 1929, 596) accord with those of Andersen and Jensen, but are higher than those of Kühl and Gottschalk.

A. A. E.

Analysis of nitrous oxide by solubility in water. A. L. CHANEY and C. F. LOMBARD (Ind. Eng. Chem. [Anal.], 1932, 4, 185—187).—An apparatus and procedure are described by which the amount of N_2 in the gas is determined by dissolving the N_2O in H_2O at room temp.

E. S. H.

Sulphur-burning equipment for sulphite[pulp] mills. A. AASEN (Paper Trade J., 1932, 94, T.A.P.P.I. Sect., 198—201).—A no. of variables occurring during the manufacture of SO_2 for sulphite-pulp manufacture are investigated. It is concluded that the partly insulated burners at present in use are unsatisfactory from an operating and economic viewpoint. The ideal S burner should have no hampering "mixing strain" (relationship between air and S) and no heat loss. This can be accomplished by thoroughly mixing the S in powder form with the required air in a suitable burner, and completing the combustion in an insulated chamber. A very high combustion temp. (about 800°) is necessary for SO_2 formation in order to eliminate SO_3 as far as possible, but if the combustion gases are cooled slowly the SO_2 is converted into SO_3 . It is therefore important to cool rapidly to 200° by means of H_2O showers.

H. A. H.

$NaOH$ from esparto grass treatment.—See V. Chalks for putty. —See IX.

See also A., May, 450, Prep. of $AgIO_4$. 461, Prep. of $Fe(OH)_3$ hydrosols. 466, Freezing of oxide gels

and sols. 477, Prep. of Cu-Cr₂O₃ catalysts. MeOH catalysts. 481, Synthesis of CuAl₂O₄. Ag ferrites. 482, Prep. of anhyd. chlorides and metallic couples. Hexafluorodisilane. Alkali aluminosilicates. 483, Prep. of GeO₂ gel and of GeBr₄. 484, Reduction of phosphates. 485, Prep. of UF₆. Oxyacids of F. Prep. of I-free Br. Metal carbonyls. Synthesis of NiCr₂O₄. Sedimentation analysis. 486, Detection of Cl' in presence of Br'. 487, Determination of mixed halides, SO₄'', NO₃'', NO₂'', PO₄''. 488, Analysis of gas mixtures. Determining KCl in sylvites. 495, Prep. of pure H₂.

PATENTS.

Solidification of sodium hypochlorite solution (bleaching liquid). SOC. ANON. "CHLOROSODA" (B.P. 371,176, 6.5.31. Ger., 26.5.30).—A small proportion (2–3%) of saturated fatty acids, *e.g.*, lauric acid or its lower homologues (C₁₂–C₆), are incorporated in the bleaching liquid. H. R.-D.

Manufacture of burkeite. H. W. MORSE (U.S.P. 1,824,360, 22.9.31. Appl., 30.3.29).—Searles Lake brine is heated to 90–100° with 6–10% of solid "tails salt" (Na₂CO₃ + Na₂SO₄ + NaCl), derived from evaporation of the brine, until Na₂SO₄.Na₂CO₃ separates. The latter is continuously removed and replaced by fresh material. W. J. W.

Manufacture of potassium sulphate. H. W. MORSE (U.S.P. 1,824,361, 22.9.31. Appl., 29.4.29).—The mother-liquor, obtained from the recovery of KCl and Na₂B₄O₇ from Searles Lake brine, is treated with anhyd. Na₂SO₄, the liquor, after removal of the separated double salt of Na₂SO₄ and K₂SO₄, being further treated with solid Na₂SO₄ at 25°. W. J. W.

Leaching of phosphate rock. KUNSTDÜNGER-PATENT-VERWERTUNGS A.-G. (B.P. 370,706, 20.5.31. Swed., 27.4.31. Addn. to B.P. 356,627; B., 1931, 1010).—K₂SO₄ is completely dissolved in a portion of the unseparated reaction products resulting from the acid leaching and the solution is used for the pptn. of the Ca dissolved in the leaching operation. F. Y.

Manufacture of dichromates. BOZEL-MALETRA, SOC. INDUSTR. DE PROD. CHIM. (B.P. 371,059, 23.1.31. Fr., 14.8.30).—An alkali (Na) dichromate or a chrome-ore frit is treated, *e.g.*, at 250–300°, with an equiv. wt. of Cr₂O₃, Cr(OH)₃, Cr, ferrochrome, or a reduced chrome-ore frit, in the presence of H₂O and O₂ under pressure. Alkaline-earth compounds, if present, are removed by pptn., *e.g.*, as carbonates. [Stat. ref.] L. A. C.

Obtaining coarse crystals of ammonium salts formed in an acid saturator. COLLIN & CO. (B.P. 370,793, 21.8.31. Ger., 25.9.30).—The liquor and fine crystals from the saturator are ejected into a cooled collecting vessel, in which coarse are separated from fine crystals by means of compressed air. The former are passed into a centrifuge, whilst the latter with the liquor are returned to the saturator, into which they are admitted through the entering NH₃ vapours. A basic neutralising agent may be introduced into the collecting vessel. W. J. W.

Elimination of chlorine from solutions containing zinc chloride. NICHOLS COPPER CO., ASSEES. OF

J. E. DRAPEAU, JUN. (B.P. 370,965, 8.11.30. U.S., 25.11.29).—ZnCl₂ solutions are treated with excess CuSO₄ and excess Cu powder to ppt. Cu₂Cl₂ and leave a ZnSO₄ solution suitable for the manufacture of lithopone. The Cu₂Cl₂ is treated with Zn to recover Cu. L. A. C.

Preparation of alumina. LONZA-WERKE ELEKTRO-CHEM. FABRIKEN G.M.B.H. ASSEES. [of (A)] of LONZA ELEKTROZITÄTWERKE U. CHEM. FABR. A.-G. (B.P. 371,112 and Addn. B.P. 371,259, [A] 7.3.31, [B] 18.8.31. Ger., [A] 7.3.30. Switz., [B] 21.8.30).—(A) An alkaline-earth aluminate is dissolved in an aq. solution of an Al salt, which may contain an alkaline-earth salt, the mol. ratio of the aluminate to the Al salt being at least 1:1. Al₂O₃ is pptd. by electrolysis, or by NH₃, the solution being freed from NH₃ by addition of an alkaline-earth oxide and the residual alkaline-earth salt solution being used for further treatment of aluminate. (B) Decomp. of the alkaline-earth aluminate is first effected by digestion with acid, in amount less than that required to produce a neutral salt, the remainder of the aluminate then reacting with the normal salt to give a solution of a basic Al salt, from which Al₂O₃ is pptd. W. J. W.

Manufacture of alumina and compounds thereof. ALTERRA A.-G. (B.P. 371,236, 16.7.31. Austr., 26.7.30).—Argillaceous material, after heating at atm. pressure to expel moisture, is calcined below 900° under vac., the product being comminuted and extracted with successive portions of aq. SO₂. W. J. W.

Separation of aluminium hydroxide from silicic acid. ALTERRA A.-G. (B.P. 371,307, 16.7.31. Austr., 26.7.30).—A mixture of Al(OH)₃ and H₂SiO₃ is dissolved, without previous drying, in aq. SO₂ and the solution is heated at a gradually rising temp. under conditions such that either no SO₂ escapes, or a little is allowed to escape but is returned to the solution during the subsequent cooling; when the solution has become turbid, owing to the pptn. of H₂SiO₃, it is left in contact with the ppt. until cold and is then filtered. (Cf. B.P. 371,236; preceding.) L. A. C.

Production of lime. G. H. HUNT (U.S.P. 1,824,351, 22.9.31. Appl., 2.12.26).—Limestone in the form of granules is admitted from a hopper to a heated chute and subjected to vibration, the CO₂ concn. being reduced by exhaustion or by means of a current of air. W. J. W.

Production of anhydrous neutral calcium nitrate. KALI-FORSCHUNGS-ANSTALT, G.M.B.H. (B.P. 371,279, 2.10.31. Ger., 24.2.31).—HNO₃ vapour or nitrous gases are absorbed by a mixture of Ca(NO₃)₂ with CaO, Ca(OH)₂, or CaCO₃; the mixture may be in the form of agglomerated spheres, a light powder, or briquettes. L. A. C.

Strontium perchlorate composition and its preparation. G. F. SMITH (U.S.P. 1,824,101, 22.9.31. Appl., 10.5.30).—A Sr compound, *e.g.*, SrCO₃, is ground with NH₄ClO₄ in a ball-mill, the mixture heated in vac. to about 250°, and the product purified by dissolving in an org. solvent and subsequently separating. W. J. W.

Manufacture of metal carbonyls. J. Y. JOHNSON, FROM I. G. FARBENIND. A.-G. (B.P. 370,962, 8.10.30)

and 2.2.31).—The temp. in the reaction zone is regulated and excess heat withdrawn by introducing a cooled liquid (oil, H_2O , metal carbonyls) or a gas (H_2 , N_2 , CO_2 , or excess CO) at one or more points in the reaction vessel and withdrawing the liquid or gas at one or more points. The liquid may be cooled and returned to the vessel, or the conditions may be so arranged that the heat content of the liquid is not greater on leaving than on entering the vessel. L. A. C.

Manufacture of carbonyls of molybdenum and tungsten. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 370,894, 3.12.30 and 5.6.31).—Mo or W obtained by reduction of MoO_3 or WO_3 admixed with $Cu(NO_3)_2$ to give 10–20% Cu in the metal powder is treated with CO under pressure at above 210° , preferably at 240 – 275° . A. R. P.

Recovery of arsenic from arseniferous metallurgical intermediate products and by-products. NORDDEUTS. AFFINERIE (B.P. 372,189, 13.8.31. Ger., 9.9.30. Addn. to B.P. 368,316; B., 1932, 506).—The material is leached with 10–20% H_2SO_4 , with an oxidising agent if necessary, to convert any As_2O_3 into As_2O_5 , and the solution, conc. if necessary, is reduced with liquid SO_2 and cooled to recover pure As_2O_3 . A. R. P.

Manufacture of hydrogen [from water-gas]. ATELIERS GÉNÉRAUX DE CONSTRUCTION SOC. ANON. (B.P. 370,834, 9.10.31. Belg., 16.1.31).—Reaction bodies in the form of granules for use in the process are made from a paste of $Ca(OH)_2$ to which Fe_2O_3 has been added, preferably in a proportion by wt. corresponding to the CaO in the paste. F. Y.

Production of hydrogen or carbon monoxide-hydrogen mixtures or gases containing the same. B. R. GOODFELLOW, W. D. SPENCER, and IMPERIAL CHEM. INDUSTRIES, LTD. (B.P. 370,457, 8.1.31).—The efficiency of the Cr catalyst in the treatment of gaseous hydrocarbons with steam at 1000° is increased if about 1% of H_2S or other gaseous S compound is present in the reacting mixture. When coke-oven gas is used, it is first washed under pressure with kerosene to dissolve most of the CH_4 and H_2S , so that, after releasing the pressure, the gas contains 5% of H_2S . W. J. W.

Preparation of carbon dioxide and siliceous materials. PROCESS DEVELOPMENT CO. (B.P. 370,889, 6.10.30. U.S., 6.5.30).—A metal carbonate other than $MgCO_3$ is heated with SiO_2 in the presence of H_2O at a pressure >150 lb./sq. in. (preferably 500–1000 lb./sq. in.); the CO_2 evolved is withdrawn, separated from H_2O , and stored in cylinders. L. A. C.

Absorption of carbonic acid from gaseous mixtures by alkali carbonate solutions. GES. F. LINDE'S EISMASCHINEN A.-G. (B.P. 370,396, 1.1.31. Ger., 2.1.30).—The alkali carbonate lye is circulated in an absorption tower, and, after each physical saturation with CO_2 , is conducted into a large container where conversion into bicarbonate slowly takes place, the quantity of lye present in the tower and container amounting to at least half that yielded by the tower or discharged therefrom per hr. The process is carried out at approx. 40 – 70° . F. Y.

Removal of carbon oxysulphide from gases. (S.I.R.I.) SOC. ITAL. RICERCH. INDUST. (B.P. 370,978, 12.1.31. It., 21.1.30).—The gases, mixed with about 20% of H_2 , are passed at 200 – 250° over a catalyst consisting of Cu_2S , K_3PO_4 , and K_2CO_3 , the H_2S produced being removed. The Cu_2S may be produced on an inert carrier *in situ* by the action of the gases on a Cu compound. W. J. W.

Recovery of sulphur dioxide from gas mixtures. J. S. DUNN, and IMPERIAL CHEM. INDUSTRIES, LTD. (B.P. 371,888, 29.1.31).—The gas is passed through towers filled with packing material down which NH_4Ph or one of its homologues or *N*-alkyl derivatives is trickled. The NH_4Ph absorbs up to 5% SO_2 , which is liberated by circulating the liquid through a second tower up which heated air or steam is passed. A. R. P.

Extraction of iodine from mineral waters and other iodine-containing liquids. R. PAJETTA and A. MAGGIONI (B.P. 372,157, 8.7.31. It., 17.7.30).—The I is liberated by treating the H_2O (etc.) with Cl_2 or other oxidising agent and is collected by passing the H_2O through towers packed with gravel moistened with petrol or C_2HCl_3 to abstract the I. The latter is recovered by circulating aq. SO_2 , Na_2SO_3 , or $NaHSO_3$ through the towers. A. R. P.

Removing hydrocarbon compounds from halogen acids. NH_4 salts from waste liquors. S (etc.) from gases.—See II. Measuring the concn. of liquids.—See XI. Fertilisers.—See XVI.

VIII.—GLASS; CERAMICS.

Sodium silicate glasses containing FeO and Fe_2O_3 . C. ANDERSEN-KRAFT (Glastechn. Ber., 1931, 9, 577–597; Chem. Zentr., 1932, i, 566).—For the production of glass containing Fe_2O_3 a $Na_2O.3SiO_2$ glass containing 5–13% Fe as FeO was fused in a Pt furnace. By increase in the alkali content more Fe_2O_3 could be retained. In the prep. of FeO-glasses the appearance of sulphide-yellow is difficult to avoid. The FeO content can be increased up to 80%. Optical and magnetic measurements were made. A. A. E.

See also A., May, 451, Silicate structures of cristobalite type. 495, Nature of clay.

PATENTS.

Compound glass. RHEINISCH-WESTFÄLISCHE SPRENGSTOFF-A.-G. (B.P. 370,958, 13.1.31. Ger., 27.1.30).—The intermediate layer comprises acetylcellulose or a cellulose ether mixed with one or more esters of mono- or poly-hydric alcohols the free OH groups of which may be esterified with H_3PO_4 ; suitable compounds include Pr_3PO_4 and dimonomethyl glycol monobutyl glycol phosphate. L. A. C.

Manufacture of window-glass substitutes. KALLE & Co. A.-G. (B.P. 371,222, 6.7.31. Ger., 5.12.30. Addn. to B.P. 367,288; B., 1932, 462).—The fabric used comprises wire warps and wefts consisting of narrow strips of regenerated cellulose, which may be coloured. L. A. C.

Apparatus for making vitrified argillaceous products. W. B. PINE (U.S.P. 1,824,684, 22.9.31.

Appl., 22.7.30).—Clay, shale, etc., heated until it is plastic but not completely fused, is divided into, *e.g.*, four portions as it leaves the kiln, and the portions, after individual compression, are superposed and compressed together to form a dense, thick mass suitable for working into paving slabs, structural beams, etc.

L. A. C.

Making of ceramic masses. C. E. EVERY-CLAYTON. From STELLAWERK A.-G., VORM. WILSCH & Co. (B.P. 370,477, 31.3.32).—The bonding material (mineralisers etc.) is mixed in the form of a cloud or spray with the non-plastic materials. The article is moulded by successively pressing layers of material which are no thicker than the diam. of the largest grain. A smooth finish is obtained by treating the surface with a solution, *e.g.*, alkali, humic acid, etc. (to which finely-divided foundation material may be added), which will disperse the bonding agent.

J. A. S.

Manufacture of (A) fire bricks, (B) ceramic masses, or other fire-resistant articles. R. LÖSSNITZ (B.P. 370,435 and 370,501, 3.1.31. Ger., 4.1.30).—(A) Dense firebricks are made by mixing coarse particles (*e.g.*, 60%, 5–7 mm.) with fine (10%, 1–2 mm.) and very fine (30%, 0.1–0.2 mm.) particles, with the finely-divided bonding agent (etc.), and spraying with H_2O simultaneously or separately. (B) The bonding material is added, in stages during mixing, in the form of a cloud of dust (subsequently spraying with H_2O) or a spray of slip. The non-plastic material is preferably previously soaked in H_2O .

J. A. S.

Firing of ceramic materials. J. E. POLLAK. From PORZELLANFABR. KAHLA (B.P. 371,440, 22.1.31).—After the H_2O -smoking period the material passes through an isolated section of the kiln (easily provided for in a tunnel kiln by suitable dampers and the muffle system of heating) in which the oil from the pressing process is driven off and utilised.

J. A. S.

Manufacture of refractory blocks. SOC. ANON. DES GLACES ET PROD. CHIM. DE ST.-GOBAIN, CHAUNY & CIREY (B.P. 371,272, 17.9.31. Fr., 17.10.30).—A fused mass containing CaO (56 pts.), SiO_2 (60 pts.), and CaF_2 (up to 5 pts.) is cast into sand-moulds and allowed to cool slowly, forming a microcryst. mass of wollastonite resistant to corrosion by glass and alkalis.

J. A. S.

IX.—BUILDING MATERIALS.

Influence of aggregates on strength of concrete. M. VILLA (Rev. Soc. Cubana ing., 1931, 23, 205–261).—The H_2O :cement ratio, workability, and tests for org. matter are discussed. 0.25% of sugar (often present in Cuban sand) causes rapid disintegration of concrete. The characteristics and effects of coarse aggregates are discussed.

CH. ABS.

Behaviour of lime-containing chalks in manufacture of putty. H. SANDER (Farben.-Chem., 1932, 3, 56–57).—Putty which has been made with chalk containing free CaO in proportions as low as 0.025% ppts. free oil on being kept and subsequently forms a hard mass; it hardens superficially on exposure to air, the undercoat remaining soft. Commercial varieties of chalk may contain appreciable quantities of CaO (cf. B., 1931, 1047; 1932, 598).

S. M.

Jointing materials for [pipes for] solvents. L. PIATTI (Farben.-Chem., 1932, 3, 85–89).—The compositions, prep., and properties of common jointing materials for pipes, liquid containers, etc. are given and an apparatus is described for testing their efficiency. The commonest causes of leaking are the solvent action, low viscosity, and low surface tension of the liquid. Pb and Cu possess low elasticity; asbestos may be attacked by org. acids and is liable to penetration by liquids; combined metal-asbestos packings are free from these defects. The tendency of rubber to be attacked by solvents and to swell is reduced by addition of resins, factice, etc. Leather may gradually become brittle through removal of the fatty matter with which it is usually treated. Cellulose should either be soaked in a liquid which renders it impervious to subsequent penetration or be covered with a varnish. A plasticiser must be added to cellulose esters. "It" sheets (prepared by pressing from a mixture of asbestos fibre, rubber dissolved in C_6H_6 , Fe oxide, and S) are widely employed; the rubber and asbestos are liable to attack. Reference is made also to the use of white and brown factice (B., 1927, 229), linoxyn, litharge-glycerin putty, asbestos powder-waterglass putty, and chalk-waterglass putty.

S. M.

Pulverised-fuel ash.—See II. Chalks. Reports on non-metallic minerals.—See VII.

See also A., June, 481. Synthesis of Ca silicates. 485, Sedimentation analysis.

PATENTS

Making porous cement or plaster of Paris bodies for building purposes and the like by means of porous cement or plaster of Paris mortars. R. HANDL (B.P. 371,245, 27.7.31. Holl., 1.8.30).—Cement or plaster of Paris is mixed with wood meal, sawdust, or peat dust, etc. which has been soaked in a solution of an inorg. sulphate, *e.g.*, $Al_2(SO_4)_3$, and H_2O_2 .

C. A. K.

Preparation of a glassy-drying substance from cement with or without colours. J. F. BARR (B.P. 371,257, 14.8.31. Denm., 15.11.30).—The dry material formed by slaking CaO with 50% of H_2O in which 10% of soap is dissolved is mixed with 4 times its vol. of a solution obtained by mixing 45% of $CaCl_2$, 7.5% of HCl , 46.75% of H_2O , and 0.75% of Al . Cement is then gauged with this aq. suspension.

C. A. K.

Manufacture of [water-resistant] cementitious material. B. E. WILLIAMS and R. E. FORBES (B.P. 370,530, 21.1.31).—Articles, *e.g.*, pipes or sheets, are moulded from a mixture of fibrous material, cement, filler, and a bitumen emulsion, and are treated with steam to melt the bitumen either during or after the maturing period.

C. A. K.

Coating of damp or wet stone. S. S. SADLER, ASSR. to AMESITE ASPHALT CO. OF AMERICA (U.S.P. 1,824,931, 29.9.31. Appl., 18.8.27).—Damp stone is agitated with a colloidal clay (bentonite) to give it a thin coating, then with a volatile hydrocarbon, and finally with hot asphalt.

C. A. K.

Manufacture of insulating tile or brick. E. B. BJORKMAN, ASSR. to AEROCRETE CORP. OF AMERICA

(U.S.P. 1,823,928, 22.9.31. Appl., 7.3.30).—The finer fluffy portion of quenched, basic, blast-furnace slag is separated from porous lumps by screening and the latter are pulverised to cement fineness. A mixture of the two portions together with H_2O and with or without up to 20% of Portland cement is moulded under pressure and the blocks are cured in high-pressure steam. C. A. K.

Dust layer having improved hygroscopic properties [for use on roads]. E. O. BARSTOW and S. B. HEATH, Assrs. to DOW CHEM. CO. (U.S.P. 1,824,588, 22.9.31. Appl., 6.11.28).—The material comprises hydrated $CaCl_2$ mixed with 6–10% of $MgCl_2$, calc. on the $CaCl_2$ content. L. A. C.

Compositions for making tennis courts, foot-paths, pavements, roofs, etc. R. A. R. JONES and J. H. P. BURKE (B.P. 370,917, 13.10.30).—A heated mineral aggregate, preferably stone-sand graded from $\frac{1}{8}$ in. to dust, is coated with 5–6% of a solution of coumarone or indene resin in a heavy petroleum distillate to produce a mobile granular powder suitable for rolling. C. A. K.

Treatment of mineral wool [for insulating blocks]. C. C. HALL, Assr. to BANNER ROCK CORP. (U.S.P. 1,824,430, 22.9.31. Appl., 25.11.27).—To secure adherence to the fibres a binder, *e.g.*, bitumen, is mixed with cellulose pulp and the product agitated with the mineral wool in an excess of H_2O . The batch is drained and moulded into blocks. C. A. K.

Making products of finely-divided vegetable material. A. P. ALLEN (U.S.P. 1,824,421, 22.9.31. Appl., 9.7.27).—Waste vegetable material, *e.g.*, shredded wood, is heated at 80–100° for 30–90 min. in a solution of saccharides (glucose, sucrose), drained, moulded, and dried. Fireproofing or preservative agents, dielectrics, or dyes may be incorporated for the purposes of wall boards etc. C. A. K.

Emulsion for wood preservation. A. FISHER, Assr. to W. G. ATWOOD (U.S.P. 1,824,428, 22.9.31. Appl., 25.7.28).—The emulsion comprises a heavy (fuel) oil, montan wax, colloidal clay, and aq. $ZnCl_2$. L. A. C.

[Block-printing machine for] manufacture of decorated materials [printed floor coverings]. ARMSTRONG CORK CO., Asses. of W. P. BRINTON (B.P. 371,168, 27.4.31. U.S. 7.5.30).

Waterproof floor coverings.—See VI.

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

Blast-furnace engineering, with particular reference to the Dagenham furnace of the Ford Motor Co., Ltd., and the Pretoria furnace of the South African Iron & Steel Industrial Corp., Ltd. W. R. BROWN (Iron and Steel Inst., May, 1932. Advance copy. 20 pp.).—A general description of the layout of two new blast-furnace plants at these works. C. A. K.

Use of coke-oven gas in open-hearth steel furnaces and in the steel foundry. E. MATEJKA (Stahl u. Eisen, 1932, 52, 481–489).—The construction of open-hearth furnaces, drying ovens for sand moulds, and

annealing furnaces fired with coke-oven gas is described, with special reference to the shape of the burners and their disposition in the furnaces. The operation of the furnaces and the cost and heat economy of gas firing are discussed at some length. A. R. P.

Reports of investigations : Canadian ore-dressing and metallurgical laboratories, section of ferrous metallurgy. T. W. HARDY, H. H. BLEAKNEY, and W. S. JENKINS (Canada Dept. Mines, Repts. Ore Invest., 1930, 187–210).—The Musso process of making sponge Fe and steel direct from ores is shown to be impracticable. Concn. tests on two Fe ores and sintering and reduction tests on three other Fe ores are also recorded. A. R. P.

Recent improvements in the Greenawalt sintering apparatus. J. TORNBLAD (Iron and Steel Inst., May, 1932. Advance copy. 10 pp.).—The grate bars are supported by rocking cast-steel frames and the spacing between the bars is increased to 14% of the total grate area. The exhaust fans now operate with a suction of 45–50 in. of H_2O and the power per ton of sinter is less than when previously operated at 34 in. Escape of dust during crushing and screening is prevented completely by means of ventilation fans and dust hoods which are moved over the pans when they are to be tipped. Simultaneous ignition of the whole surface of the charge is secured by a new form of ignition hood, and leakage of air around the perimeter of the pan due to shrinkage of the charge is prevented by constructing the pan with sloping sides. C. A. K.

Behaviour of manganese in the acid open-hearth process. E. MAURER and W. BISCHOF (Iron and Steel Inst., May, 1932. Advance copy. 30 pp.).—The reaction $FeO + Mn \rightleftharpoons MnO + Fe$ has been studied in relation to the open-hearth process, and the const. $K = (FeO) \cdot Mn / (MnO)$ is shown plotted against % SiO_2 for slags containing < 1%, 1–5%, and 5–11% CaO . In the presence of low- CaO - Fe - Mn -silicate slags with 45% SiO_2 , K increases slightly with the SiO_2 . A const. K' , in terms of Fe and Mn concns. of the slags of higher C , Si , and Mn contents, when divided by the theoretical K vals. corresponding to the SiO_2 and CaO concns., showed no deviation from unity for vals. up to 4% C and 3.5% Mn . The calculations as applied to process work showed good agreement with the concns. found in practice. C. A. K.

Works production of sponge iron by the Norsk Staal process. I. BULL-SIMONSEN (Stahl u. Eisen, 1932, 52, 457–461).—The plant of the Eisenschwamm Ges.m.b.H. producing sponge Fe from high-grade ores by the Norsk Staal A./S. process is described and its heat economy discussed. Used gases from the reduction furnace are collected in a large gasometer to equalise pressure in the system; from there the gases pass down a long refractory-lined tube through which is passed a high-tension discharge which heats the gas current to 1800° in a fraction of a sec. The hot gases pass through a coke column wherein the H_2O and CO_2 are reduced to CO and H_2 , the heat of the gases being sufficient for the reaction. The producer gas is freed from S compounds by passing it through a column of CaO , whence it passes directly at 1000° downwards through the

reducing shaft which contains a series of superimposed muffles each containing 3 tons of ore which has been preheated to 1000° in a second shaft by means of the heat generated by the combustion of part of the waste gas from the reducing shaft. The reduced ore is passed downwards through a third shaft in which it is cooled to 50° by cold gas from the gasometer passing upwards through the shaft; the gas thus preheated passes into the electric heater and back through the circuit. The gas from the reducing shaft serves to preheat the greater part of the cold gas from the gasometer and then passes through purifiers into the gasometer. During the whole process the charge remains in its original muffle, which has a porous refractory bottom, and by an ingenious arrangement the muffles are lowered hydraulically through the preheating shaft, transferred one by one to the reducing shaft, raised slowly through this, then transferred to the cooling shaft, and slowly lowered through this, the whole operation being conducted in such a way that transfers from the top and bottom of each shaft are made simultaneously and without access of air. For the production of 1 ton of sponge Fe from 1400 kg. of ore with 68% Fe there are required 1750 kw.-hr. of electric energy for the heating tube and for driving motors etc., 350 cu. m. of coke-oven gas (N.T.P.) for circulation through the reduction circuit, a further 115 cu. m. of the same gas for preheating the ore to 1000°, 70–80 kg. of coke for regeneration, and 60 kg. of limestone. The sponge Fe produced contains < 0.025% P + S, about 1.2% C, and 92–94% Fe; the min. reduction obtained is 90%. A. R. P.

Changes in the composition of steel and slag during tapping from the furnace to the ladle and during casting in the ingot mould. N. J. WARK (Arch. Eisenhüttenw., 1931–2, 5, 503–509).—During casting of steel prepared in electric furnaces little reaction occurs between metal and slag owing to the low content of metal oxides of the slag, but appreciable reaction occurs between the oxide-rich slags of open-hearth furnace melts and the molten metal. With low-Si ingot steel the Mn content decreases and the P and S contents increase, and with high-Si steel the Mn content frequently increases and the Si content decreases towards the end of the pour, whilst the S content remains fairly const. and the P content of the later ingots tends to rise. The ladle slag is much richer in SiO₂ and Al₂O₃ and poorer in CaO than the furnace slag; as the SiO₂ increases, the content of reducible oxides decreases, but the effect varies with the nature of steel. A. R. P.

Transformation of austenite below the critical range. J. M. ROBERTSON (Iron Steel Inst., Carnegie Schol. Mem., 1931, 20, 1–64).—Tests on the effect of rate of cooling of austenite in plain C steel show that with increase in the cooling rate the quantity of ferrite formed as irregular crystals at the grain boundaries of the austenite is decreased, but does not disappear until the steel is quenched in H₂O, and that in the interior of the austenite grains the ferrite shows an increasing tendency to develop a lattice structure of thin elongated crystals and an increasing proportion of the interior of the austenite grains tends to be occupied by a brown-etching (1% HNO₃) constituent which increases with

speed of cooling until it occupies the whole grain after H₂O quenching. This constituent appears at first to be a form of the eutectoid, but with more rapid cooling it shows a definite martensitic structure consisting, in the case of low-C steels, of thin plates parallel to the crystallographic planes of the austenite and comprising alternate layers of α -solid solution low in C and α -solid solution with a higher C content; the etching characteristics of this structure depend on the orientation of these plates to the polished surface, different orientations producing the ζ and η structures of Hanemann. The intermediate change which occurs before the temp. of the martensite change is reached results in the formation of α -Fe and cementite which form a fan-like structure when the change takes place at max. speed and, at lower temp., alternate parallel sheets of α -Fe and cementite resembling the martensitic structure. In hypereutectoidal steels the martensite change proceeds by growth of α -crystals which separate as plates along certain planes in the austenite and are nearly of the same composition as the austenite from which they are derived; when conversion into martensite is complete in steels with 0.7–0.9% C the plates come in contact and the structure can then be distinguished only by tempering slightly to produce "white" martensite, but in steels with > 0.9% C sufficient austenite is retained to prevent contact. The changes which occur during tempering of quenched steels are attributed to movement of C by a process of dissolution and redeposition resulting from differences in solubility in different parts of the structure; examples of this movement are given and illustrated by photomicrographs. The part played by internal stress in the formation of martensite and the breakdown of austenite is discussed at some length, and it is concluded that whilst stress controls some features and has a quant. effect on others it is without influence on the rest.

A. R. P.

Influence of the more common elements in inhibiting needles in nitrogen-rich steels and arc welds. L. W. SHUSTER (Iron and Steel Inst., May, 1932. Advance copy. 27 pp.).—N may be present in steels (a) in solution, (b) in braunite, and (c) in needles of nitrides. The presence of nitride needles in steel welds is regarded as particularly undesirable. The investigation has included a study of the influence of composition and rates of cooling on the structure of steels which had been contaminated with N either intentionally or by absorption from the atm. during the making of a weld. Needles are most frequently found after slow cooling. Mn appears to be very effective in preventing the formation of needles, as also does Si. No needles were formed with 1% Mn or 0.25% Mn + 1.1% Si; up to 0.10% P or S has no apparent effect on the distribution of nitride. C probably has no effect. Cr and Ni both inhibit needles, but not to the same degree as Mn or Si. No needles were observed with 0.5% Mn + 2.2% Ni or with 0.75% Mn + 1% Cr. E. H. B.

Annealing of steel castings. W. R. D. JONES and P. F. FOSTER (Proc. S. Wales Inst. Eng., 1932, 48, 43–62).—The ordinary commercial practice of annealing at 875° for 1 hr. per in. of cross-section gave satisfactory results, and though no serious damage is caused

to the static properties of steel by longer treatment the resistance to fatigue is reduced. The fatigue test is probably too severe for unforged cast material. More regular results were obtained from fatigue tests by annealing at 760°, but it has not been determined whether the improvement was due principally to the effects of the inclusions or to a less harmful influence on the steel itself. C. A. K.

Heterogeneity of a sand-cast steel ingot. A. KRÍŽ (Iron and Steel Inst., May, 1932. Advance copy. 18 pp.).—The constitution of ingots cast under various conditions was investigated, including one cast in a preheated sand mould with consequently very slow cooling. C. A. K.

Fourth report on heterogeneity of steel ingots.

I. Further study of steel ingots. II. Oxygen and silicates in steel. III. Distribution of silicates. IV. Principles involved in the making of rimming steel. V. Pyrometry as applied to liquid steel. VI. Ingot mould material. (A) Thermal properties of ingot mould irons. J. G. PEARCE and E. MORGAN. (B) Thermal conductivities of ingot mould irons. J. W. DONALDSON. VII. Cooling and freeing of steel ingots. N. M. H. LIGHTFOOT. VIII. Bibliography. (Iron and Steel Inst., May, 1932. Advance copy. 204 pp.; cf. B., 1929, 600.)—I. The distribution of S, P, C, Cu, Si, Mn, Ni, Cr, Ti, Al, and As in large steel castings made under varying conditions has been determined; in killed steel S, P, and C show the greatest tendency to segregate, whereas in unkilld steel P segregates most in the pipe and S and C have a smaller tendency. Si, Mn, Ni, Cr, Ti, and Al have little tendency to segregate, whilst Cu and As occupy an intermediate position between these groups, although the tendency of Cu to segregate appears to decrease with $>0.5\%$ Cu.

II. In determining O in steel by the H_2 reduction method, the H_2 is best prepared by electrolysis of aq. $Ba(OH)_2$ between Ni electrodes; the steel (8 g.) is used as a block and is heated together with a 1:1 Sn-Sb alloy (20 g.) in a boat in a SiO_2 tube at 1080°, the issuing gases being passed over a Ni catalyst at 250–300° to convert CO into H_2O and CH_4 . Al_2O_3 and SiO_2 are not reduced and must be determined separately.

III. Determinations of silicate inclusions in various parts of steel ingots indicate that two distinct opposing influences determine the ultimate distribution, viz., the settling of finely-dispersed particles on the floor of the ingot by the action of convection currents or showers of falling crystallites, and an upward movement of larger and more fluid particles which grow into comparatively large globules by collecting other smaller particles in their ascent.

IV. The characteristics of rimming steels are discussed with especial reference to adsorption and removal of gases, and it is suggested that most of the evidence available at present points to gaseous segregation (chiefly H_2) as the cause of rimming; this segregation also governs the segregation of solid impurities.

V. Variations in optical pyrometer readings on steel furnaces made by practised observers should agree

within $\pm 5^\circ$ and the reproducibility of the calibration of these pyrometers at different times and by different people should be within $\pm 10^\circ$. Frequent calibration is essential, checking being made against a standard thermocouple attached to a sighting block placed in a uniformly heated chamber. Attempts to use thermocouples in steel furnaces gave erratic results owing to the difficulty of obtaining suitable protection tubes; in all cases severe contamination of the couple occurred. The C-rod dip method likewise gave erratic results.

VI(A). Hämatite Fe for making ingot moulds has substantially a pearlitic structure, as cast, with graphite inclusions the size of the individual flakes in which varies from mould to mould and also from one part of the mould to another. The density of the Fe decreases, and the electrical resistance increases, with rise in Si and C content. The temp. of the crit. points on heating and cooling and the thermal expansion show little, but the capacity for growth shows considerable variation with the composition within the usual limits for ingot-mould Fe. During use decarburisation occurs at the working face and the neighbouring pearlite is converted into ferrite by the heat.

VI(B). The thermal conductivity of ingot-mould Fe is lower than that of grey cast Fe of similar composition and structure owing to the greater porosity; it increases with the life of the mould owing to the annealing effect of the molten steel on the mould metal.

VII. Mathematical.

A. R. P.

Tensile properties of rail steels at elevated temperatures. G. W. QUICK (Bur. Stand. J. Res., 1932, 8, 173–189).—Tensile tests on rails of various compositions and after various heat-treatments have been made at 20–750° and the results are recorded graphically; from these it appears that secondary brittleness is an inherent property in all the steels used at present in the manufacture of rails, but that the ductility may be considerably improved by slow cooling through the temp. range of brittleness. The tensile strength of such slowly-cooled rails is lower than that of normally-cooled rails, the structure is better developed, and the pearlite is coarser. Rails heat-treated to produce a sorbitic structure show marked secondary brittleness and contain a large no. of shatter cracks which are apparently formed on the cooling bed while the rails cool through the brittle range. All the steels with a medium Mn content, including one that had been deoxidised with Zr, showed marked secondary brittleness. The presence of shatter cracks is the cause of the development of transverse fissures during use.

A. R. P.

Resistance to impact of rail steels at elevated temperatures. G. W. QUICK (Bur. Stand. J. Res., 1932, 8, 191–198).—The energy absorbed in breaking rail steels with a V-notch in the Charpy test increases between 20° and 400°, then decreases to a min. at about 600°, after which it increases sharply to 700° and again falls with further rise in temp. Tensile tests on the same specimens show a marked decrease in ductility between 400° and 700° with a min. at 550–600°; the improvement in ductility produced by slow cooling through the range of secondary brittleness is not revealed by impact tests, but plain steel with 0.6% C, which

shows no range of secondary brittleness in the tensile test, shows a marked decrease in energy absorbed in the impact test in this range. The fracture in the impact test is transcryst. at all temp. A. R. P.

Rejected [steel] rails. L. P. VLADIMIROV (Domez, 1930, No. 5, 5–33).—Brittle rails resulted from steel prepared by substitution of Fe-Mn + coke for spiegeleisen when an ore rich in P and Mn was employed.

CH. ABS.

Nitrogen hardening of cast iron. J. E. HURST (Iron and Steel Inst., May, 1932. Advance copy, 10 pp.).—Cast Fe containing Al (1.4%) and Cr (1.6%) has distinct air-hardening properties and the penetration of N is better after a stabilising treatment at 600–650°. The castings are exposed to NH_3 at 510° for 80–90 hr. The elasticity and hardness vals. of the alloy are higher and the permanent set vals. lower than those of ordinary cast Fe, and under commercial N-hardening conditions a diamond-hardness val. of 982 with a penetration of 0.018 in. was obtained. C. A. K.

Theory and practice of nitrogen case-hardening. A. FRY (Iron and Steel Inst., May, 1932. Advance copy, 22 pp.).—Increase in hardness due to the action of N on pure Fe is not sufficient to be of technical importance, but a high degree of surface hardness may be attained when Fe is alloyed with Al, Ti, Cr, W, Mo, or Mn. The hardness of the nitrified layer is not to be attributed to the inherent hardness of the nitride crystals, but rather to the influence exerted by them on the properties of the space lattice of Fe. In certain alloy steels the nitrides formed are in a state of crit. dispersion and are firmly fixed, and so set up considerable slip interference. The use of this process may prove of interest in the design of engines of the Diesel type and for cylinder linings for internal-combustion engines.

C. A. K.

Determination of vanadium in special alloy steels. H. H. WILLARD and P. YOUNG (Ind. Eng. Chem. [Anal.], 1932, 4, 187–190).—V is determined in the presence of Cr by selective oxidation in cold solution with excess of KMnO_4 , the excess being reduced by NaN_3 . HN_3 is removed by boiling and the H_3VO_4 is titrated with standard FeSO_4 , using diphenylbenzidine as internal indicator. W, if present, is kept in solution as a complex fluoride and in this form does not interfere. In these circumstances diphenylaminesulphonic acid is used as an internal indicator for the titration of H_3VO_4 with FeSO_4 . W may be oxidised completely without the formation of a protective coating by dissolving the steel in HCl, when W remains as a powder, and treating the boiling liquid with successive small quantities of HNO_3 . E. S. H.

Properties of some silico-manganese steels. G. BURNS (Iron and Steel Inst., May, 1932. Advance copy, 22 pp.).—Both Si and Mn raise the elastic limit, yield point, and max. load, and lower the elongation and impact val. of a normalised steel. When > 1% Mn is present, > 1% Si is detrimental to ductility. All the steels examined (> 0.36% C) suffer from the disadvantages of high-C steels. Si-Mn steels require a high hardening temp. to develop the best mechanical properties and are susceptible to mass effect. For

springs a steel of high Si and low Mn content and a low yield ratio was less affected by surface irregularities than one higher in Mn. A low-Mn steel, however, was more affected by surface conditions due to heat-treatment. Mn and Si affect surface decarburisation in a direction opposite to their effect on scaling tendencies. C. A. K.

Tensile properties of cast steel at low temperatures. R. WALLE (Stahl u. Eisen, 1932, 52, 489–490).—The tensile properties of cast steel with (a) C 0.23, Si 0.27, Mn 0.59, P 0.013, S 0.026%, and (b) C 0.30, Si 0.36, Mn 0.64, P 0.013, S 0.023%, have been determined at 20° to –80°. The tensile strength rises linearly with fall in temp. and the yield point and hardness rise in a curve slightly convex to the temp. axis. The elongation of (a) rises in a similar curve and that of (b) falls in a curve concave to the temp. axis with fall in temp. The notched impact strength falls almost linearly to –60°; at still lower temp. there is only a slight fall. A. R. P.

Action of sea-water on mild steel. G. D. BENGOUGH and A. R. LEE (Iron and Steel Inst., May, 1932. Advance copy, 17 pp.).—Tests under laboratory conditions showed that about 50% of the corrosion in sea-water was due to the evolution of H_2 . No solution of inorg. salts with or without saponin was found which would give the high H_2 evolution of sea-water, which is probably associated with sol. org. material. No H_2 was evolved in the absence of O_2 . The rate of corrosion in sea-water in the presence of O_2 was about 20 times that in air; in 0.5N-NaCl it was 2.5 times. The evolution of H_2 may be an important factor in the adhesion of paint films on steel exposed to sea-water.

C. A. K.

Determination of the porosity of tin coatings on steel. D. J. MACNAUGHTAN, S. G. CLARKE, and J. C. PRYTHORCH (Iron and Steel Inst., May, 1932. Advance copy, 16 pp.).—A reliable guide to the porosity of Sn coatings on steel is afforded by the hot- H_2O test, in which specimens are immersed in distilled H_2O (p_{H} 4.5–7) at 95° for 6–8 hr. or for a shorter period followed by cooling to room temp. and prolonged immersion in the H_2O . Under these conditions a hard adherent rust spot forms over each of the pores which penetrate to the Fe or Fe-rich compound. Some suggestions are made as to the best methods of conducting other tests such as the ferricyanide test. The hot- H_2O test may be applied to other coatings on Fe, e.g., Ni, Cr, Cu.

E. H. B.

Foundry [copper-aluminium] alloy A.P. 33. J. SUHR (Rev. Aluminium, 1932, 9, 1669–1680).—The alloy consists of commercial Al (0.25% Fe and 0.25% Si) with about 4.5% Cu and 0.4–0.45% Ti. When properly cast it has a tensile strength of 16–18 kg. per sq. mm. with an elongation of 3–4.5%; the microstructure shows small needles of a Ti-rich constituent more or less regularly distributed in a ground-mass of polygonal Al crystals surrounded by CuAl_2 to produce a network effect. After quenching from above 500° the CuAl_2 has practically all entered into solid solution, but the Ti constituent has remained almost unaffected. The Ti addition serves to refine the grain of the alloy and its effect rises to a max. with about 0.4% Ti; with

larger proportions larger needles are formed which tend to segregate and produce weak spots. The tensile strength of the heat-treated alloy increases with addition of Ti from 21 kg. per sq. mm. with 0.01% Ti to a max. of 32 kg. per sq. mm. with 0.39% Ti; the elongation rises correspondingly from 2% to 7%. The presence of Fe has little effect on the properties of the cast alloy, but with > 0.35% Fe the effect of heat-treatment is reduced and the hardness and tensile strengths of the heat-treated alloy fall rapidly with increasing Fe until with about 1.1% Fe the vals. of these properties are lower than those of the cast alloy. A. R. P.

Oxide content of aluminium and its determination. F. L. HAHN (Z. anorg. Chem., 1932, 204, 40; cf. B., 1930, 512).—A reply to criticisms by Löwenstein (A., 1931, 1025). F. L. U.

Autogenous welding of aluminium and its important alloys. H. BUCHHOLZ (Z. Metallk., 1932, 24, 19–22).—Methods of welding pure Al, cast Al alloys, and hardenable Al alloys are briefly described with reference to practical examples. A. R. P.

Large grain size in aluminium wire. C. BLAZEY (Chem. Eng. Min. Rev., 1932, 24, 193–196).—Al wire which formed misshapen heads when used as rivets and gave a non-circular impression when tested with a Brinell ball was found to contain large grain crystals. To produce the coarse-grained metal a crit. amount of cold-work, followed by a crit. annealing temp. (600–625°), is necessary. D. K. M.

Hardness change of duralumin with time and at different depths. F. BOLENRATH (Met. & Alloys, 1932, 3, 120–126).—The ageing of duralumin is not of such simple nature as the Brinell or Rockwell hardness tests would indicate, as these tests give only average results for the depth of penetration. The characteristic hardness distribution was a rapid increase from the surface to a max. at a depth of 0.4–0.6 mm. The hardness then falls at first slowly and thereafter more rapidly to a min. at about the middle of the specimen. The variation of hardness at different depths is attributed to the separation of some component, probably Mg_2Si followed by $CuAl_2$, from an unstable supersaturated condition. As the ageing continues a second and even a third max. val. may occur. C. A. K.

Detection and determination of lead in preserving cans. CHEFFEL (Ann. Falsif., 1932, 25, 156–157).—The great importance is emphasised, in testing for Pb in tinsplate, of ensuring that very minute droplets of Pb solder, sometimes far removed from the seams, are not included in the test-sample. It is recommended first to search the selected surface with a lens, then to heat the tinsplate over a small flame, and scrape with a Ni knife. For analysis, 20 mg. of such metallic dust are evaporated with 2 c.c. of conc. HNO_3 . The process is thrice repeated and the residue taken up with H_2O , filtered from metastannic acid, and the Pb in the filtrate determined in the usual way. H. R. J.

Reports of investigations. [Canadian ore-dressing and metallurgical laboratories] metallic ores section. C. S. PARSONS, A. K. ANDERSON, J. S. GODARD, G. B. WALKER, and D. S. HALFORD (Canadian

Dept. Mines, Repts. Ore Invest., 1930, 3–169).—The results of laboratory and semi-large-scale tests on the treatment of 14 Au ores, 1 Au–Cu ore, 1 Ag ore, 2 Pb–Ag ores, 2 Cu– FeS_2 ores, 2 Cu–Zn ores, 3 Cu–Ni ores, and 2 Ni–Cu ores by flotation, gravity separation, and, in the case of Au and Ag ores, cyanidation and amalgamation, are reported. No outstanding improvements in ordinary methods of treatment are recorded. (Cf. B., 1931, 887.) A. R. P.

Volatilisation of antimony in the converter. W. KROLL (Metall. u. Erz, 1931, 28, 521–523; Chem. Zentr., 1932, i, 866).—In the blowing of Sn bronzes Sn and Pb are easily volatilised and relatively pure Cu remains. If much Sb is present highly basic slags are formed towards the end of the process so that the volatilisation of Sb is diminished. Experiments on the vac. volatilisation of Sb from Cu–Sb converter slags on addition of Fe showed that in 2 hr. 33.5% of the Sb was eliminated. Volatilisation was retarded by CaO and FeS. At 600° up to 50% of the Sb was volatilised. A. A. E.

Arsenic in ternary lead-base bearing alloys. K. H. WEGNER (Met. & Alloys, 1932, 3, 116–119).—By adding graduated quantities of As to a metal of the babbitt type, alloys were produced, those with insufficient As lacking homogeneity. As forms needle-shaped crystals containing a core rich in As, probably a ternary solid solution of As, Sb, and Sn. The interlocking of these needles prevents segregation and permits the production of uniform alloys of the Pb-base type. C. A. K.

Electrodeposition of nickel and chromium. J. W. CUTHBERTSON (Metallurgia, 1932, 6, 15–16).—An outline of a commercial type of plating plant is given. Electrical heating is preferred, but external heating of Cr tanks is usual in practice. Ni solutions are often agitated by pumps or by aëration and filtered continuously, but this is not customary for Cr solutions. Satisfactory filtering of the solution is necessary to prevent pinholing of the film by solid particles. Continuous movement or an oscillation of the cathode at about 30 full movements per min. is an advantage, but too rapid a motion destroys the cathodic polarisation. For Ni rolled anodes are better than cast, because of their greater purity. Pb anodes are used for Cr plating. (Cf. B., 1931, 162, 929.) C. A. K.

Adhesion of electrodeposited nickel to brass. A. W. HOTHERSALL (J. Electroplaters' & Depositors' Tech. Soc., 1932. Advance proof. 115–141).—Relatively good adhesion to filed or machined brass was obtained, but cleaning with emery appeared to cause embrittlement of the surface layers by adsorption of H_2 . Heat-treatment of the Ni-coated specimens at 250° for 2 hr. improved the degree of adhesion considerably, as did also a preliminary deposition of Cu. Etching of the brass by mixtures containing HNO_3 was unsatisfactory owing to lack of control, but anodic etching at 10 amp. per sq. ft. in aq. KCN or in a solution containing citric acid and NH_4 citrate ensured highly adherent Ni deposits. C. A. K.

Technical zinc electrolysis. P. RÖNTGEN and R. BUCHKREMER (Metall.-Wirt., 1931, 10, 931–936; Chem.

Zentr., 1932, i, 993).—With c.d. of 100–4000 amp. per sq. m., c.d.-p.d. curves are in accord with the equation $\varepsilon = a + b \log i/g$, where ε is the deposition potential, i the current intensity, g the cathodic surface, and a and b are consts. depending on the conditions of operation. The H overvoltage on Zn depends on the c.d., temp., acid content of electrolyte, and the nature of the cathode surface. b is the greater the smoother is this surface; a changes proportionally with the temp. when the acid concn. is const. The potential fall with increasing acid concn. is expressed by $\varepsilon = c + d \log e$, where c depends on the c.d. and e on the acid concn. An analogous formula gives the fall in cathode potential with increase in Zn content of the electrolyte. The temp. coeff. increases with increasing c.d. The influence of acid concn. on the cathode potential falls with increasing Zn content of the electrolyte. For c.d. < 100 amp. per sq. m. the above equation no longer holds.

A. A. E.

Zinc electrolytes. I. Purification from nickel. L. CAMBI and V. TOJA [with F. CREMASCOLI] (Giorn. Chim. Ind. Appl., 1932, 14, 125–129).—The velocity and limit of the pptn. of Ni from Zn electrolytes by means of Zn dust are markedly lowered by the presence of metals of low overvoltage to H_2 or of arsenical compounds and by the other conditions of the process of cementation. In general, the pptn. is activated by metals of high overvoltage to H_2 , the action of some of them, e.g., Pb and Hg, being enhanced in presence of As, which probably takes part directly in the reduction of the Ni by the adsorption and hence activation of an As-H compound at the surface of the metal: $2As_xH + Ni \rightarrow 2H + As_xNi$, $Zn + 2H \rightarrow H_2Zn$. Procedure based on these results is of no advantage over the use of promoters (cf. A., 1932, 580) and is costly.

T. H. P.

Examination of electrodeposited metals and alloys with X-rays. H. KERSTEN (Ind. Eng. Chem. [Anal.], 1932, 4, 178–180).—The X-ray method reveals not only the composition of a thin electrodeposit, but may be applied to determine its thickness by using rays of different penetrating power.

E. S. H.

Fuels for Fe and steel industry. Town gas in Sn-plate works.—See II. Reports on non-metallic minerals.—See VII. Permeameter.—See XI.

See also A., May, 455, Fe-Be, Fe-Mn, Fe-Mn-C systems. Polymorphic transformations in Fe. La alloys. Systems Ag-Sb-Zn, Ag-Cd-Sb, and Ag-Cu-Sb, Al-Zn-Cu. Poly-antimonides and -bismuthides. NaTi. 456, Sn-Cu, Zn-Cu, Zn-Fe, Fe-Hg, Ni-Hg, and Fe-Co-W systems. 458, Electrolytic Fe. 470, Mn amalgam and Mn-Ag alloys. 472, Electrodeposition of noble metals. Electrochemical behaviour of Au in HCl and HBr solutions. 473, Formation of single crystals. Separation of Cr from aq. H_2CrO_4 . 478, Prep. of Mg-Al alloys. Passivity of Fe and steel. Electrolysis of $CrCl_2$ - $CrCl_3$ solution. Electrolytic separation of metals. 481, Separation of metals without an external source of current. Reduction of MgO by Si. 491, Determining Mn in ferrous products.

PATENTS.

Reverberatory furnaces. W. F. SKLENAR and A. H. RONAN (B.P. 370,636, 25.3.31).—A reverberatory furnace is rocked during the melting of the charge and a blast of air is then directed on to or through the metal while the furnace is in a tilted position. C. A. K.

Blast furnaces. H. A. BRASSERT & Co., LTD. From H. A. BRASSERT, S. P. KINNEY, and H. L. WETHERBEE (B.P. 370,018, 1.1.31).—The intermediate zone is tapered slightly inwardly and at the uppermost part flares outwardly in a cone shape, the bell closing the furnace when in the lowest position. When charged the stock impinges on the inclined face and is directed towards the centre of the furnace. Metal protection plates are secured to the brickwork. C. A. K.

Metallurgical process and apparatus. F. LAWACZECK, Assr. to LAWACZECK GES.M.B.H. (U.S.P. 1,824,960, 29.9.31. Appl., 22.12.27. Ger., 17.12.25).—Excess energy generated in electric power plants is utilised for the production of H_2 and O_2 by electrolysis; the O_2 is mixed with air and used for operating a blast furnace.

A. R. P.

Smelting furnaces. P. MARX (B.P. 370,042, 2.1.31. Ger., 3.1.30. Addn. to B.P. 300,559; B., 1929, 780).—The shaft is in direct communication with the refining chamber, the intervening partition being either omitted or replaced by a simple partition to retain slag.

C. A. K.

Metallurgical furnaces [for zinc etc. smelting]. NEW JERSEY ZINC Co., Assees. of E. H. BUNCE and P. McL. GINDER (B.P. 370,217, 4.5.31. U.S., 29.5.30).—To reduce expansional stresses, the walls of a Zn distillation furnace are constructed with essentially tongued-and-grooved joints which are sealed with a powdered refractory material.

C. A. K.

Open-hearth furnace. WELLMAN SMITH OWEN ENG. CORP., LTD., and H. W. SOWARD (B.P. 369,717, 7.2.31).—The curvature of the bed is designed so that the thickness of the lining at the slag line is greater than that above the slag level or at the bottom of the furnace hearth.

C. A. K.

Open-flame furnaces. (SIR) W. G. ARMSTRONG, WHITWORTH & Co. (ENGINEERS), LTD., and I. L. HALL (B.P. 369,565, 19.12.30).—In stationary or rotary furnaces having oppositely disposed burners, the fuel jets are deflected downwards by means of a nozzle at right angles to the normal flame jets. This nozzle may be utilised either as an extra fuel or air supply according to the nature of the process.

C. A. K.

Continuous reheating furnace for ingots, billets, and the like. J. GRYZC (B.P. 366,661, 18.12.30).—Claim is made for H_2O -cooled ingot tracks supported on a structure built up of internally H_2O -cooled members having independent H_2O outlets and inlets and secured to anchorages which are built into the brickwork as a protection against heat.

A. R. P.

(A) Smelting of ores and other similar operations. (B) Refining of copper and other metals. A. G. MCGREGOR (B.P. 367,346 and 367,384, [A, B] 11.11.30 and [A] 6.3.31).—(A) The ore is introduced

into a melting furnace by means of an endless conveyor which moves the ore forward on to a horizontal hearth terminating in a well to collect the molten charge. The flames of the burners are directed against the continuously advancing sloping face of the ore charge so that the material is continuously melted and runs into the well, where the molten charge separates into slag and metal or matte. In smelting sulphide Cu ores an excess of O_2 is admitted with the burner flames to oxidise part of the S and thus utilise the heat of combustion in melting the charge. In smelting Fe ores C is added to the charge to produce additional heat for melting the charge, additional air being introduced as the gases pass backwards over the molten bath to complete their combustion and assist in refining the metal. (b) The process is applied to the melting and refining of Cu. A. R. P.

Production of metal castings. R. W. BAILEY, and ASSOCIATED ELECTRICAL INDUSTRIES, LTD. (B.P. 371,880, 26.1.31).—The metal is poured into the mould through a sleeve containing internal orifices through which gas is passed to produce a reducing or neutral atm. around the metal stream. A. R. P.

Apparatus for annealing metals. W. H. DODERER (B.P. 371,080, 11.2.31).—A protective gas is admitted into the extension of the passage of a muffle furnace serving as a cooling chamber and is led towards both ends of the furnace. A no. of hinged plates or brushes are provided in pairs to act as a labyrinth packing in the cooling chamber. C. A. K.

Heat-treatment [annealing] of metal. J. J. BOWDEN (U.S.P. 1,824,865, 29.9.31. Appl., 29.12.30).—The metal is enclosed in an airtight Fe box and immersed in a fused-salt or -metal (Pb, Cu, Sn) bath maintained at the desired temp. A. R. P.

Testing instruments for measuring the mechanical properties of steel etc. L. H. HOUNSFIELD (B.P. 367,927, 3.12.30).—In apparatus for measuring the tensile strength etc. of metals, in which the load is applied to a calibrated spring the deflexion of which is indicated by means of a liquid gauge operating at atm. pressure without damping, a sliding plunger pervious to air, but not to Hg, is provided to permit removal of air from the system. When liquids other than Hg are used the plunger is so arranged as to be capable of movement to expose an air vent above the normal level of the liquid. A. R. P.

Production of metal [e.g., steel] castings. R. W. BAILEY, and ASSOCIATED ELECTRICAL INDUSTRIES, LTD. (B.P. 371,371 and 371,491, [A] 20.1.31, [B] 2.2.31).—(a) Air or other gas is, or (b) a gas and a molten metal (e.g., Pb) are, alternately blown into the space between the mould wall and the casing as the latter contracts, so as to regulate the cooling rate. A. R. P.

[Steel for] machine parts and apparatus intended for high-temperature operation. F. KRUPP A.-G. (B.P. 371,633, 15.5.31. Ger., 6.6.30).—The steel contains $\geq 0.3\%$ C, $2.1\text{--}4.5\%$ Cr, and $0.15\text{--}0.8\%$ Mo, with (or without) 2% Ni. Part or all of the Mo may be replaced by twice as much W, and up to 0.4% V may also be added. A. R. P.

Heat-treatment of steel. N. D. CHOPRA, and BRIT. & INTERNAT. STEEL REFORM SYND., LTD. From W. M. CROSS (B.P. 371,054, 21.1.31).—The steel is heat-treated in a furnace the atm. of which is controlled by inserting in the furnace a no. of briquettes made by mixing CaO with boiler ash, exhausted carburiser, or other inert material containing up to 10% C. A. R. P.

Cleaning of metal [steel] sheets. E. G. BUDD MANUF. CO., Assees. of G. L. KELLEY (B.P. 371,985, 16.2.31. U.S., 20.2.30).—The sheets are sprayed with oil while they are travelling in an inclined position, and means are provided for wiping off the excess oil and leaving just sufficient to prevent rusting. A. R. P.

Protected metal article [steel sheet]. J. H. YOUNG, and H. H. ROBERTSON CO. (B.P. 371,683, 30.6.31).—Steel sheet is coated with felt impregnated with a fire-resisting mixture of asphalt and chlorinated Ph_2 . A. R. P.

Manufacture of silicon-iron compounds [ferro-silicon]. J. A. PARSONS, Asst. to DURIRON CO., INC. (U.S.P. 1,819,479, 18.8.31. Appl., 23.1.30).—Fe-Si alloys with $14.25\text{--}18\%$ Si are prepared by melting ferrosilicon with Fe and adjusting the composition by measuring the electrical resistance of a cast test-piece and determining therefrom the Si content by reference to a previously constructed curve. A. R. P.

Metallurgical process [for production of steel, ferrochromium, etc.]. K. M. SIMPSON, Asst. to INTERNAT. CHROMIUM PROCESS CORP. (U.S.P. 1,812,563, 30.6.31. Appl., 24.2.31).—An open-hearth furnace is provided with a series of burners in the roof preferably arranged in two rows, the burners in one row being opposite the spaces between the burners in the other. In this way high-velocity flames are caused to impinge vertically over the entire surface of the charge and max. use is made of the heat generated. The burners are fed with preheated oil or gas fuel and with preheated as well as secondary air, and may be adjusted independently of one another. A. R. P.

Austenitic ferrous alloys [chromium steel] and articles made thereof. BABCOCK & WILCOX TUBE CO., Assees. of H. D. NEWELL (B.P. 368,154, 26.5.31. U.S., 29.5.30).—Non-rusting Cr or Ni-Cr steels with a low C content are worked hot or cold to produce a fine-grained structure, and then annealed at $900\text{--}1010^\circ$ (980°) for sufficient time to produce the desired ductility without inducing coarse grain growth after recrystallisation. A. R. P.

Steel alloys, particularly tool steels. E. BECKER (B.P. 371,999, 23.2.31. Czechoslov., 22.2.30).—The alloy contains $0.3\text{--}0.8\%$ C, $8\text{--}13\%$ W, $0.6\text{--}1.8\%$ V, with or without $0\text{--}1\%$ Mo and about 4% Cr. Alloys with (a) C 0.68 , V 10.5 , W 1.5 , Cr 4% , (b) C 0.68 , W 12.4 , V 1.5 , Cr 4% , and (c) C 0.7 , W 8.1 , Cr 3.9 , Mo 0.57 are specifically claimed. A. R. P.

Magnetic [iron-nickel] alloys. W. S. SMITH, H. J. GARNETT, and W. F. RANDALL (B.P. 371,969, 5.2.31).—Alloys of $62\text{--}75$ (69)% Ni, $22\text{--}10$ (16)% Fe, and $11\text{--}20\%$ Cr, W, or Mo (15% Cr) are claimed. Up to 5% Cu may be added to stabilise the magnetic properties during heat-treatment and up to 1% Mn to increase the forgeability. [Stat. ref.] A. R. P.

[Magnetic] iron-nickel alloys. L. MELLERSH-JACKSON. From SIEMENS & HALSKE A.-G. (B.P. 370,630, 20.3.31).—Alloys containing 0.5–3.5% Co, 30–64% Ni, and the remainder Fe are annealed at 800–1100° for at least 1 hr. and then cooled to 200° within a further 1–24 hr. to obtain a const. high permeability. A. R. P.

Manufacture of magnetic [iron-nickel] alloys. BRIT. THOMSON-HOUSTON Co., LTD., Assees of W. E. RUDER (B.P. 371,205, 10.6.31. U.S., 11.6.30).—An alloy of 40–50% Ni with 60–50% Fe is hot-rolled at 1100° down to 600° into sheet 0.014 in. thick, the final pass at 600–700° effecting a reduction of 5–7% in thickness. The sheets are then annealed in H₂ at 900–1100° for 6–1 hr. according to the temp., and cooled down to 600° at 20–100° (60–80°) per min. A. R. P.

Hard-metal [beryllium-iron-tungsten] alloys. W. MÜLLER (B.P. 370,566, 12.2.31. Ger., 14.2.30).—The alloy consists of 38–98% W, 0–57% Fe, 2–9.5% Be, and 0–3% C, the Be being at least double the C content and at least 5% if the W is < 82%, and the Fe being at least 5% if the C is > 2%. Part or all of the W may be replaced by Mo or Cr, part or all of the Fe by Ni, Co, Mn, and/or Ti, and part of the C by B, Al, Mg, Sr, Zr, and/or Ce. The alloy may be melted and cast in vac. or in H₂, or prepared by sintering mixtures of W, Mo, or Cr carbides with Fe, Co, Ni, or Mn powder. A. R. P.

Improving the mechanical properties of ferro-nickel-chromium alloys. SOC. ANON. DE COMMENTRY-FOURCHAMBAULT ET DECAZEVILLE (B.P. 371,334, 13.10.30. Fr., 11.10.29).—Alloys of 7–80% Ni, 5–40% Cr, 0.3–4% Mn, 0–10% W, 0–10% Mo, 0–5% Ti, 0–2% V, 0–3% Si, and the remainder Fe are rendered capable of pptn.-hardening by addition of Al and Si; Al, C, and Si; Cu and Al; Cu and Si; or Cu, Al, and Si. Part of the Ni may be replaced by Co and the Si by Be. The alloys are quenched from 800–1150° and tempered for 2–200 hr. at 400–900°. A. R. P.

Treatment of steel alloys [nitrogenisation of manganese steel]. (SIR) R. A. HADFIELD and W. J. DAWSON (B.P. 369,918, 20.11.30).—Steel containing < 1% C, 9–17% Mn, and 2.5–10% Ni, with, if desired, > 10% of one or more of the elements Si, Cr, W, Al, Cu, Mo, Co, V, Ti, Zr, is nitrogenised in NH₃ at 500–680° to produce a very hard surface layer. A. R. P.

Recovery of metallic aluminium from [scrap] material. NAT. SMELTING Co. (B.P. 370,694, 11.5.31. U.S., 27.5.30).—The Al scrap or dross is treated within a vessel from which air is excluded, with Cl₂ insufficient to combine with all the Al, but sufficient to generate enough heat to melt the unattacked Al. A. R. P.

Corrosion-resistant articles of aluminous metal. ALUMINIUM, LTD., Assees of F. C. FRARY (B.P. 370,947, 7.10.30. U.S., 30.11.29).—The material comprises a sheet of Al alloy containing 3–5.5% Cu, 0.5% Mg, and 0–6% Mn, coated on both sides with a welded-on thinner sheet of Al alloy containing 0.7% Mg and 0.9% Si. A. R. P.

Production of corrosion-resisting coatings on aluminium or its alloys. SIEMENS-ELEKTRO-OSMOSE G.M.B.H. (B.P. 371,213, 24.6.31. Ger., 1.7.30).—In the electrolytic oxidation of Al and its alloys by treatment with a.c. in aq. CrO₃, the counter-electrode consists of similar material which has been preheated in the same way. A deep black elastic coating is obtained by using 40% CrO₃ solutions and counter-electrodes which have been given a yellow to brown coating in dil. CrO₃. A. R. P.

Non-corrodible aluminium light alloy. I. IYATA, and MITSUBISHI ZOSEN KABUSHIKI KAISHA (B.P. 370,979, 12.1.31).—The alloy consists of Al with 0.3–5% Cr, 0.5–7% Mg, and 0.3–4% Fe, the Mg content always exceeding the Cr. A. R. P.

[Silicon]-aluminium alloys [for pistons]. K. SCHMIDT GES.M.B.H., and R. STERNER-RAINER (B.P. 371,740, 8.9.31. Addn. to B.P. 334,777; B., 1930, 1076).—The addition of 0.05–5% Mg and 0.5–5% Cu to the alloys previously specified is claimed. A. R. P.

Casting of magnesium and its alloys. F. BADGER, and BRIT. MAXIUM, LTD. (B.P. 370,919, 2.12.30).—Mg (etc.) is melted in a tilting crucible furnace and poured from a spout below the flux level into a closed container filled with an inert vapour, e.g., SO₂, or containing a material which will evolve an inert vapour. C. A. K.

Preventing corrosion of metallic [magnesium] surfaces. H. SUTTON and L. F. LE BROcq (B.P. 370,949, 9.10.30).—Articles of Mg or its alloys are coated with paint, lacquer, varnish, or cellulose dope in which is incorporated BaCrO₄, SrCrO₄, or CaCrO₄, so that the resulting film contains 50% of the chromate. A. R. P.

Refining of copper. D. R. TULLIS and P. OAKLEY (B.P. 370,494, 10.1.31).—Occluded gas and other impurities are removed and the grain is improved by introducing into the molten metal BCl₃, either alone or together with a volatile metallic chloride, e.g., VCl₄. H. R.-D.

[Copper-silver]-gold alloy. CARTIER SOC. ANON. (B.P. 372,236, 12.11.31. Fr., 10.3.31).—The alloy comprises Au according to the desired standard, Co 0.5–4.0, Cr 0.5–1%, and the remainder Cu and Ag in the ratio 1:1.2–1.5. Examples are (a) Au 75, Cu 13.5, Ag 10, Co 1, Cr 0.5%, (b) Au 65, Cu 19.5, Ag 14, Co 1, Cr 0.5%. A. R. P.

Treatment of ores containing lead. P. GAMICHON (B.P. 370,738, 15.6.31. Fr., 18.6.30).—Galena ground through 80-mesh is treated with Cl₂ while suspended in aq. NaCl or CaCl₂ (250 g. per litre) containing HCl and some FeCl₃ as a Cl carrier. The hot solution is filtered and cooled to recover PbCl₂. A. R. P.

Improvement [hardening] of nickel-molybdenum alloys. VEREIN. STAHLWERKE A.-G. (B.P. 371,102, 28.2.31. Ger., 4.7.30).—Ni alloys containing 8–30% Mo are rapidly cooled from above 900°, and then annealed at 400–800°. H. R.-D.

Manufacture of [molybdenum-tungsten-platinum] metal alloys. S. G. S. DICKER. From N.V.

PHILIPS' GLOEILAMPENFABR. (B.P. 371,361, 20.12.30).—Alloys resistant to aqua regia contain 65–85% Pt, the remainder being W and/or Mo; the most resistant correspond with the formulæ Pt_2W and Pt_2Mo . A. R. P.

Plating or coating of wire. R. M. HUGHES. From JOHNSON STEEL & WIRE CO., INC. (B.P. 370,626, 20.3.31).—Wire after being straightened is passed over the surface of troughs containing, respectively, an acid cleaning solution and a plating solution, both of which are caused to bubble over the wire. The wire is maintained perfectly straight throughout the process.

C. A. K.

Manufacture of sheet iron by electrolysis. E. KELSEN and E. AUSNIT (B.P. 370,704, 20.5.31).—The anode and cathode are separated by porous diaphragms and the electrolyte is continuously circulated and filtered to prevent formation of large nodules on the cathode. After removal of the deposit from the cathode it is passed between rolls which flatten out the small nodules without appreciably altering the dimensions of the sheet.

A. R. P.

Electrolytic production of aluminium. ALUMINIUM IND. A.-G. (B.P. 371,719, 31.7.31. Ger., 31.7.30).—The molten Al is removed continuously from the bottom of the electrolytic bath by the action of a screw lifting device operated by a compressed-air motor the exhaust air from which serves to cool the device.

A. R. P.

Electrolytic deposition of silver. KODAK, LTD., Assees, of K. C. D. HICKMAN and W. J. WEYERTS (B.P. 371,229, 21.12.30. U.S., 22.10.29. Cf. B.P. 364,711; B., 1932, 431).—No activator is required for the solutions described previously, provided electrolysis is effected at a temp. ranging from 50° to near the b.p. of the solution.

H. R.-D.

Electrolytic production of gold embossing foils on plates or bands. L. KURZ (B.P. 370,760, 6.7.31).—Au or Au-Ni deposits on sheet or band cathodes are removed therefrom by coating them with a solution of acetylcellulose in CO_2 , and drying the film at 30–45°. After cooling, the skin with the Au or Au-Ni deposit is readily removed from the cathode and may be used directly for embossing.

A. R. P.

Electrodeposition of palladium-rhodium alloy. W. W. TRIGGS. From PRECIOUS METALS DEVELOPING CO., INC. (B.P. 370,539, 28.1.31).—A solution containing 1.5 g. of Rh and 3 g. of Pd as chlorides or other salts is added to a boiling solution containing 20 g. of $(NH_4)_2HPO_4$, 120 g. of Na_2HPO_4 , and 3 g. of H_3BO_3 . The solution deposits a bright, hard, white Rh-Pd alloy when operated hot at 0.1–10 amp. per sq. ft. Replenishment is effected by adding $PdCl_2$ and $RhCl_3$ followed by Ag_3PO_4 sufficient to remove the chlorides formed.

A. R. P.

[Water-cooled] apparatus for charging, discharging, and turning the material in rotary-hearth furnaces. I. G. FARBENIND. A.-G. (B.P. 372,965, 4.6.31. Ger., 29.8.30).

Casting of metals [steel ingots in tilted moulds]. N. D. CHOPRA, and BRIT. & INTERNAT. STEEL REFORM SYND., LTD. (B.P. 372,822, 13.2.31).

Metal-working presses. F. J. RODE (B.P. 373,038, 5.10.31).

Corrugated [metal-melting] pot. [Nitriding] furnace. Separating ores etc.—See I. **Quenching oils. Corrosion in oil-cracking equipment.**—See II. **Arseniferous products.**—See VII. **Annealing furnaces. Arc-welding electrodes.**—See XI. **Coatings for metals etc.**—See XIII. **Al printing forms.**—See XXI.

XI.—ELECTROTECHNICS.

Electric furnaces. W. ROHN (Chem. Fabr., 1932, 113–116).—Resistance furnaces for temp. of 300–400° can be constructed of practically any material as resistor, especially if a transformer is used. The connexions can be made gastight so that heating *in vacuo* is possible. The element may be actually immersed in the medium to be heated or contained in a socket tube. Immersion resistors for temp. up to 700° may be of steel, for 650–1050° of Cr-Ni alloys, and for 1050–1250° of Cr-Fe-Al alloys such as "Megapyre." Under corrosive conditions Cr-Ni-Mo alloys are suitable. For high-pressure work welded Cr-Ni tubes are used to contain the element. Ceramic elements may be used up to 1400°, but are fragile and the connexion to metal offers difficulties. Mo may be used up to 1700° and W to 2800° under reducing conditions, as may also graphite. A graphite resistor furnace for work at 1700° and an electrical thermostat are described.

C. I.

Permeameter. K. V. KARANTHA (J. Indian Inst. Sci., 1932, 15B, 1–16).—A small search coil passing through two holes in a flat sheet of Fe measures the induction produced by a current flowing through a straight conductor passing at right angles through the centre of the sheet.

C. W. G.

Dielectric properties of varnished cloth at low voltage gradients. L. HARTSHORN (J. Inst. Elect. Eng., 1932, 70, 417–435).—The permittivity and power factor, the absorption and leakage currents produced by a const. applied voltage, and variations of the dielectric properties with atm. humidity and temp. and frequency of the applied voltage have been determined for typical conditioned samples of varnished cloth.

J. S. G. T.

Extraction of cellulose.—See V. **Ni- and Cr-plate. Ni-plated brass. Zn. X-Ray examination of electrodeposited metals.**—See X.

See also A., May, 446, [Prep. of] CdS [electrode]. 458, Electrolytic Fe. 471, Prep. of quinhedrone electrodes. 472, Electrodeposition of noble metals. Behaviour of Au in HCl and HBr solutions. 473, Electrolytic crystallisation processes. Separation of Cr from aq. H_2CrO_4 . 478, Prep. of Mg-Al alloys. 478, Electrochemistry of Cr. Separation of metals. 479, Oxidation of ketones. Condensation of hydrocarbons. 481, Separation of metals without an external source of current. 490, Determination of Ga. 491, Xe lamp. Recording reactions between electrolytes. 492, Apparatus for micro-electroanalysis.

PATENTS.

[Travelling-grate] electric furnaces. A.-G. BROWN, BOVERI & Co. (B.P. 371,266, 28.8.31. Switz., 16.9.30).—The two upper sides of superposed chain-like conveyors moving through the furnace in opposite directions are charged with material by feeding devices arranged at either end of the furnace, and the discharge at opposite ends is effected by tilting the parts of the conveyor moving over the conveyor rollers.

J. S. G. T.

Electric-resistance furnace. E. F. RUSS (B.P. 370,628, 20.3.31).—The hearth component is formed by a refractory-metal wall, *e.g.*, of Cr-Ni alloy, surrounding that compartment, resistance elements being fixed on the inner side of the metal so as to heat the charge by radiation, and the outer side being surrounded by a suitable heat-insulating material.

H. R.-D.

Induction [electric] furnaces. (A, B) P. H. BRACE, (c) T. H. LONG, Assrs. to WESTINGHOUSE ELECTRIC & MANUFACTURING CO. (U.S.P. 1,823,873—4 and 1,823,908, 22.9.31. Appl., [A] 23.1.30, [B] 23.4.20, [C] 20.9.30).—(A) An earthed, water-cooled protecting shield embedded in granular insulating material is arranged between the crucible and a surrounding induction coil. (B) An energising coil surrounds an annular chamber containing the charge to be melted, and means are provided whereby the c.d. is substantially uniform throughout the charge. (C) A furnace comprising a helical energising coil having a no. of relatively thin conductors, a tubular conductor traversed by cooling fluid, and a heat shield similarly kept cool arranged between the conductor and material to be heated is claimed.

J. S. G. T.

Induction electric furnace. E. F. NORTHUP, Assr. to AJAX ELECTROTHERMIC CORP. (U.S.P. 1,824,618, 22.9.31. Appl., 9.7.29).—A furnace comprising a primary coil, inner and outer hollow-focus inductor coils in series (one of which forms a secondary to the primary while the other surrounds the charge), and connexions for passing fluid through the two focus coils in parallel is claimed.

J. S. G. T.

Electric [annealing] furnaces. O. JUNKER GES.M.B.H., and K. SCHERZER (B.P. 370,903, 12.1.31).—Heating coils, preferably of Ni-Cr alloy, are completely embedded in the thin, thermally-conducting, elliptical or oval-shaped walls of a muffle furnace through which material to be annealed is transported.

J. S. G. T.

Electrodes for gas-protected electric arc-welding. INTERNAT. GEN. ELECTRIC CO., INC., Asses. of ALLGEM. ELEKTRICITÄTS-GES. (B.P. 371,249, 5.8.31. Ger., 12.8.30).—The electrodes consist of mixed crystals containing 4 pts. of Ta carbide and 1 pt. of Zr (or Hf) carbide.

H. R.-D.

Electric device comprising a gas-filled discharge space. N. V. PHILIPS' GLOEILAMPENFABR. (B.P. 370,813, 11.9.31. Holl., 13.9.30).—A bulb containing an incandescence body (*e.g.*, a gas-filled incandescence lamp) is arranged within a discharge tube and has a gas filling differing in composition and/or pressure from that in the discharge tube, whereby the character of the emitted light can be modified.

J. S. G. T.

Photoelectric tube. F. SCHRÖTER, Assr. to GES. F. DRAHTL. TELEGRAPHIE M.B.H. (U.S.P. 1,824,573, 22.9.31.

Appl., 13.5.26. Ger., 8.7.25).—The light-sensitive cathode is formed of an alloy of K with about 3% Cs.

J. S. G. T.

Thermionic cathodes. M.-O. VALVE CO., LTD., K. A. MACFADYEN, and J. W. RYDE (B.P. 370,722, 29.5.31).—A core of refractory metal, *e.g.*, Mo, coated with a mixture of kaolin and Al_2O_3 is surrounded by a metal helix, *e.g.*, of W, coated with electron-emitting material, *e.g.*, Cs.

J. S. G. T.

Cathode for thermionic devices. A. McL. NICOLSON, Assr. to COMMUNICATION PATENTS, INC. (U.S.P. 1,823,984, 22.9.31. Appl., 13.5.26).—A core, *e.g.*, of Pt or Pt-Ir, is coated with a mixture of BaO (3–5 pts.) and ZrO_2 (1 pt.).

J. S. G. T.

Insulation of the cells in galvanic batteries. A. B. HÄRJE (B.P. 371,289, 31.10.31).—Each cell is encased in paper or textile fabric coated with an insulator, *e.g.*, goudron, coal tar, paraffin, bakelite, etc.

J. S. G. T.

Treatment of dry-cell containers. O. E. RUHOFF and G. H. SCHROEDER, Assrs. to MARATHON BATTERY CO. (U.S.P. 1,824,626, 22.9.31. Appl., 4.5.28).—Hg is deposited upon the inside of Zn containers from a dil. solution of $HgCl_2$ placed therein.

J. S. G. T.

Apparatus for electrically measuring the concentration of liquids. W. CROCKATT & SONS, LTD., and W. C. CROCKATT (B.P. 370,658, 17.4.31).—Means are provided for measuring the electric current passing between electrodes connected with a battery and immersed in the liquid, and warning devices, *e.g.*, electric lamps, are operated when the current falls outside a high or low limiting val.

J. S. G. T.

[Electrical] temperature-control apparatus. A. W. STEWART (B.P. 370,533, 22.1.31).—Means are described for altering the adjustment of a thermostat from a remote point and for indicating back the adjustment when made.

B. M. V.

Electric-discharge devices for control of energy in electrical circuits. A. PATIN (B.P. 370,967, 10.12.30).

Metallic vapour electric-discharge apparatus. INTERNAT. GEN. ELECTRIC CO., INC., Asses. of ALLGEM. ELEKTRICITÄTS-GES. (B.P. 370,472, 9.12.30. Ger., 9.12.29).

Boiler-scale prevention. Purification of liquids [oils]. Humidity control.—See I. C_2H_2 .—See II. Products from vegetable material.—See IX. Magnetic alloys. Coatings on Al etc. Plating wire. Sheet Fe. Al. Electro-Ag. Au foils. Pd-Rh.—See X. Insulation.—See XIII. Irradiated ergosterol.—See XX.

XII.—FATS; OILS; WAXES.

Fat extraction using the extraction bracket. H. BARSCH (Chem.-Ztg., 1932, 56, 372).—The substance to be extracted is packed in a cartridge which is plugged at the top and bottom and supported vertically, in the warm vapour of the boiling solvent in the extraction flask so as to receive the drips from an ordinary reflux condenser, on a wire bracket held in the stopper of the flask and consisting of two horizontal rings. Extraction is complete in 1–2 hr.

J. G.

Chemical study of rancidity. II. Factors influencing the keeping quality of shortenings and crackers. H. O. TRIEBOLD and C. H. BAILEY (Cereal Chem., 1932, 9, 91—106; cf. B., 1932, 474).—The importance of oxidation in rancidity tests is stressed and the short inductive period of O_2 absorption (static method at 90°) is adopted for this type of fat as corresponding to a quickened rancidification tendency. Tests with unopened cans of freshly made hydrogenated fat showed no change in the induction period after 16 months' storage either at 10° or at room temp. When once opened, induction is quicker at a later period; with air access after 2 months' storage at room temp. the induction period was reduced from $6\frac{1}{2}$ to $2\frac{1}{2}$ hr., and the fat gave definite rancidity reactions. Storage at 10° after exposure produced less change in the induction time. Lard was quite good after a year in a closed can, was passable, with air access, below 10° in 12 months, but rancid at room temp. with air. Although, in general, high-acidity fats have short induction periods the catalytic effect was irregular with lard. "Smoking temp." tests show that the greatest resistance to rancidity is related to the highest decomp. With such biscuit products as crackers it is shown that moisture retards oxidative rancidity. Crisping crackers by reheating at 204° reduced the induction period from $7\frac{1}{2}$ to 4 hr. p_H vals. of cracker extracts were not indicative. H. R. J.

Test for fat aldehydes resulting from oxidation of fats and oils. H. SCHIBSTED (Ind. Eng. Chem. [Anal.], 1932, 4, 204—208).—The substances having talloxy flavours and odours, formed by the oxidation of edible fats and oils, are considered to consist of aldehydes of high mol. wt. A new reagent for these aldehydes consists of a 2% solution of rosaniline hydrochloride in abs. EtOH, to which is added an equal vol. of 0.03M-aq. SO_2 . The aldehydes may then be determined colorimetrically by comparing the red coloration produced on adding the reagent to a solution of the fat in light petroleum with a colour standard, consisting of 0.001% cresol-red solution buffered at p_H 8.3. The rosaniline reagent is >20 times as sensitive as the Kreis test or the Schiff reagent; it is sp. for fatty glyceride aldehydes. The results are expressed in arbitrary sp. colour units, which are called "fat aldehyde vals.," and these vals. have been determined for a no. of fats and oils. Oxidation tests with butter fat at 50° showed a correlation between the amount of O_2 absorbed and the fat aldehyde val.

E. S. H.

Manufacture of tung-oil stand oil. H. BRENDL (Farbe u. Lack, 1932, 145—147).—The gelation and frosting of tung oil are prevented by heat-treatment as follows. (a) The oil is maintained at 180 — 200° for $1\frac{1}{2}$ —6 hr. (according to the required consistency), cooled to 80° , and the heating repeated several times. (b) The oil is rapidly heated to 240 — 250° , i.e., above its gelation temp., and rapidly chilled. (c) A small proportion of the oil is heated as rapidly as possible to 260° , and cooled to 240° by adding 50—60% of linseed-oil stand oil; the further-cooled product is added to another portion of the tung oil which has been heated to 260° and cooled to 240° , and the operation is continued until all

the tung oil is incorporated. Films made from oil prepared by method (a) dry slowly and superficially. Resin esters, rosin, and various artificial resins can replace Albertol III L in the determination of the "Albertol no." (B., 1931, 1060), which is better named the "frosting no." S. M.

Rubber-seed [oil].—See XIV. Deterioration of fat in foods.—See XIX.

See also A., May, 498, Glycerides of partly hydrogenated fats. 532, Oil from the giant lizard.

PATENTS.

Washing and cleansing agents [soap]. DEUTS. HYDRIERWERKE A.-G. (B.P. 370,769, 10.7.31. Ger., 13.8.30).—Fully hydrogenated sperm oil is fused with excess of NaOH (KOH) at 250 — 280° ; the fatty alcohols present as well as the pre-existent acids are converted into soaps. The soap mass is worked up as usual. E. L.

Shaving soap. V. SCHEFFER (B.P. 370,670, 24.4.31).—Dry NH_4 soap (stearate) is mixed with a greater amount (>4 times) of a solid alkali soap, in the presence of so small a quantity of H_2O that the mass is solid. Liberation of NH_3 and formation of a rich lather occur on mixing with H_2O . E. L.

Rendering odourless soaps bleached with hypochlorous acid. A. WELTER (B.P. 370,649, 9.4.31. Ger., 31.10.30).—The unpleasant odour of the bleached soaps is removed by heating the soap with a small excess (0.5—3%) of alkali hydroxide or carbonate under (steam) pressure of 5—10 atm.; in difficult cases small quantities of NH_3 , or its salts, or certain other amines may be used cautiously at lower pressures. E. L.

Treatment of glycerin liquors. T. SCHWARZ, Assr. to WURSTER & SANGER, INC. (U.S.P. 1,824,507, 22.9.31. Appl., 31.5.28).—5—15% glycerin liquors [after treatment with $Ca(OH)_2$, with or without $Al_2(SO_4)_3$ and, optionally, Na_2CO_3] are passed over a zeolite before being conc. E. L.

Manufacture of improved fatty acids from low-quality fatty oils and fats. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 370,964, 5.11.30).—A higher yield of distilled fatty acids is obtained if the highly acid unsaturated oils (e.g., train oil, linseed oil) are esterified with glycerol (or EtOH etc.) and the neutral product is polymerised in a current of inert gas at 200 — 300° prior to the splitting treatment and recovery of the acids by distillation. E. L.

Recovery of substances of value in varnish and paint manufacture from thickened fatty oils. T. KOTTHOFF (B.P. 370,614, 16.3.31).—Bodied (stand) oils are mixed with 2 or 3 vols. of a suitable solvent (e.g., amyl alcohol, Et_2 malonate). On settling, the valuable lowest disperse phase (for use in varnishes etc.) separates as one layer, the highly dispersed phase being removed in solution. E. L.

Irradiated ergosterol.—See I. Wetting etc. agents.—See III. Sizing.—See VI.

XIII.—PAINTS; PIGMENTS; VARNISHES; RESINS.

Swelling of oil films. K. BUSER (Farbe u. Lack, 1932, 256—257).—The ability of drying-oil films to

absorb H_2O and swell (vals. given) is dependent on the formation of hydrophilic colloids and is directly proportional to the degree of oxidation and inversely proportional to the degree of polymerisation. Thin films display max. swelling. The swelling of films made from mixtures of (a) wood oil-stand oil, and (b) linseed oil-stand oil, decreases with increase in proportion of a. Two coatings of a gave min. H_2O absorption but low adherence; the most satisfactory film was obtained with a layer of a over a layer of b. S. M.

Casein paints. H. C. BRYSON (Ind. Chem., 1932, 8, 146—149).—An account is given of the sources and prep. of casein and of its application in the manufacture of H_2O - and oleo-paints. Typical recipes are included. The H_2O -resistance of casein paints is increased by addition of $CuCl_2$ or by brushing the finished film with $AcOH$ or CH_2O . The presence of MgO in the CaO used as casein solvent reduces the durability of the paint. Amorphous chalk should be used; pptd. $CaCO_3$ is cryst. and unsuitable. Flocculation of many oxide pigments ensues when the p_H of the medium exceeds 8. Settling of the pigment is hindered by substituting borax for CaO or adding clay or asbestine; raising the viscosity is not effective, because softening of the film may ensue. S. M.

The turbidimeter in paint manufacture. E. J. DUNN, JUN. (Ind. Eng. Chem. [Anal.], 1932, 4, 191—193).—The application of the turbidimeter to the determination of the fineness of pigments is discussed. A relation has been established between obscuring power and hiding power and between obscuring power and tinting strength, enabling the turbidimeter test to give both the hiding power in sq. ft. per lb. and tinting strength on the basis of white lead as 100. E. S. H.

Use of fluorescence in analysis in the paint and varnish industry. P. W. DANCOWORTH (Farben-Chem., 1932, 3, 140—142).—An account is given of the examination of solvents, oils, natural and artificial resins, inorg. and plant pigments, and driers by observation of the fluorescence which is displayed by some of these substances under ultra-violet light. S. M.

Hardness of paint films. W. TOELDT (Farben-Ztg., 1932, 37, 1017).—By means of a device, which is described and illustrated, comprising two metal frames fixed to the jaws of an extensometer, carrying needle and film respectively, Dantuma's method of measuring the penetration of a paint film by a loaded gramophone needle (B., 1932, 195) is simplified and observations are made more rapidly. Typical results are quoted. S. S. W.

Relations between pigments and paint media. W. VAN WÜLLEN-SCHOLTEN (Farben-Chem., 1932, 3, 51—54, 91—93, 130—132).—A review is given of recent investigations into the factors on which the oil absorption of pigments depends. The effects of cohesion of the particles, their total surface area, relative vol. of pores, adsorptive power for oil, comparative ease of wetting, acid val. of oil, and presence of metal soaps are discussed. The vals. obtained vary also with the method of determination; several investigators' results for many pigments are tabulated. Reference is made also to soap formation in paints and to the effect of such soaps on the

consistency, thickening, and weathering properties of paints. S. M.

Measurement of average particle size of fine pigments. S. D. GEHMAN and T. C. MORRIS (Ind. Eng. Chem. [Anal.], 1932, 4, 157—162).—Dispersions of rubber pigments of known concn. were obtained by milling the pigment with rubber until the process appeared complete by microscopical examination, followed by shaking with xylene. The particle size was determined by counting in the ultramicroscope; C blacks gave vals. between $0.061\ \mu$ and $2.22\ \mu$, whilst ZnO varied from $0.076\ \mu$ to $0.57\ \mu$. These vals. are smaller than those determined by photomicrographic methods. The results have been used to calibrate a microturbidimeter of the extinction type and with its aid curves have been constructed, showing how the turbidity of suspensions of C black or ZnO varies with particle size, concn., and wave-length of light used. E. S. H.

Manufacture of nitrocellulose ester and spirit lacquers. F. BERGWALD (Chem.-Ztg., 1932, 56, 369—370).—Manufacturing details are given. Dissolving vessels of enamelled Fe, wood, or Al and a temp. $< 40^\circ$ are recommended. Grinding is conveniently carried out at 40 — 50° in a no. of hopper mills arranged in series, a feature of which is temp. control by running water. J. G.

Solvent balance [in nitrocellulose lacquers]. P. S. SYMONS (Brit. Plastics, 1932, 3; Synth. Finishes, 2, 95, 101, 115—116, 118).—The dilution ratios of a representative range of nitrocellulose solvents against mixtures in all proportions of $EtOH$ with C_6H_6 , $PhMe$, xylene, and white (petroleum) spirit, respectively, are tabulated. The results are discussed and the use of triangular co-ordinates in the formulation of economic, non-blushing solvent mixtures is described. S. S. W.

Weather-resistance of nitrocellulose lacquers. H. BRENDL (Farben-Chem., 1932, 3, 136—138).—Nitrocellulose lacquers containing "Alkyd" artificial resins remained almost intact after outside exposure for 7 months; the durability of films containing this type of resin is not a function of the viscosity of the nitrocellulose, a comparatively low proportion of which should be used. Nitrocellulose lacquers made with mixtures of linseed and tung oils and other resins were less resistant; Resenoplast gave much better results than either Albertol III L or esterified resins, and in these cases low-viscosity was superior to high-viscosity nitrocellulose. For formation of durable films the resin cannot be substituted by either drying oils or plasticisers. S. M.

Physical properties of varnish films. A. MANN (Farbe u. Lack, 1932, 230, 250).—The tensile strength (R) of oil films increases during oxidation, but the elasticity (D) may decrease. D is directly and R inversely proportional to the absorptive power of the film for H_2O ; judicious addition of glycerin to a varnish may therefore be advantageous. Stoving reduces D and increases R , particularly with long-oil varnishes. Exposure to ultra-violet light leads to some loss of D ; the presence of white pigments affords some protection, but "chalking" may ultimately ensue. Zn -white films show lower D than those containing white lead or lithopone; D is reduced by Zn soaps and increased by Pb

soaps formed from the free fatty acid in the oil. Nitro-cellulose films are more sensitive to temp. changes than oil films, but less sensitive to humidity. Of 10 common plasticisers examined, Et butyrate, lactate, acetoacetate, and oxalate imparted max. *R*, whilst Et phthalate gave max. *D*. S. M.

[By-products from] bisulphite cooking.—See V.

See also A., May, 462, Swelling and solubility of cellulose acetate. 465, Solution and desolution of cellulose esters. 510, Action of AgCl and CuCl on cholesterol. 514, Condensation reactions of aldehydes with substances containing active CH_2 groups.

PATENTS.

Manufacture of varnishes, solid plastics, etc. from sulphite waste liquor. ROBESON PROCESS CO., Assees. of F. J. WALLACE (B.P. 370,752, 26.6.31. U.S., 2.8.30).—Dry or liquid products containing the characteristic lignosulphonates of sulphite waste liquor (preferably freed from CaO) are heated under pressure with a phenol, *e.g.*, PhOH, and an aldehyde, *e.g.*, CH_2O , furfuraldehyde, in the presence, if desired, of an acid catalyst, *e.g.*, NH_4Cl , giving a thermoplastic H_2O -insol., EtOH-sol. condensation product.

S. S. W.

[Coating] materials [*e.g.*, lacquers] for protecting metal and other surfaces. KODAK, LTD., Assees. of F. T. MURRAY, JUN. (B.P. 370,699, 12.5.31. U.S., 29.5.30).—The use of 0.25–10% of $\text{C}_6\text{H}_4\text{Ph}_2$ or diphenylguanidine in finishing (*e.g.*, cellulose acetate) lacquer coats used over one or more preliminary coats, *e.g.*, nitrocellulose lacquer, on such surfaces is claimed. Plasticisers, *e.g.*, Ph_3PO_4 (20–50 wt.-% on the lacquer), may also be incorporated in the finishing lacquer.

S. S. W.

Cellulose derivative compositions. W. E. LAWSON, Assr. to E. I. DU PONT DE NEMOURS & CO. (U.S.P. 1,824,961, 29.9.31. Appl., 13.9.28).—Tough adherent lacquers and films with high flexibility are obtained from cellulose acetate by incorporating with it as softener or plasticiser acetals in which the alcohol constituents contain > 1 ether group, *e.g.*, the acetal of the Et ether of diethylene glycol.

B. P. R.

Resinous condensation products. BRIT. THOMSON-HOUSTON CO., LTD., Assees. of P. F. SCHLINGMAN (B.P. 370,440, 5.12.30. U.S., 6.12.29).—Excess of a polybasic org. acid, *e.g.*, phthalic anhydride, is heated under reflux, with or without a natural resin, *e.g.*, rosin, to 270–300°, and drying or semi-drying oil, *e.g.*, tung or castor oil, is added drop by drop with stirring, a trace of H_2O being continuously kept in the system. Exactly sufficient polyhydric alcohol, *e.g.*, glycerol, to combine with the excess of acid is then added slowly, the temp. being lowered and the esterification completed under atm. pressure to allow H_2O to escape.

S. S. W.

Manufacture of siccatives. J. Y. JOHNSON. From I. G. FARBERIND. A.-G. (B.P. 370,550, 6.2.31).—The reaction between org. (C_7 or higher, preferably C_7 – C_{20}), *e.g.*, naphthenic, abietic, acids or their H_2O -sol. salts and salts, oxides, or hydroxides of suitable metals, *e.g.*,

Pb, Co, preferably in 1–35% excess over the theoretical amount, is carried out in the presence of amines, *e.g.*, NH_2Et , NH_2Ph , or alkylolamines, *e.g.*, monohydroxy-ethyl ether of triethanolamine.

S. S. W.

[Brown]-coloured cold-moulded insulation. R. E. COLEMAN, Assr. to MONOWATT ELECTRIC CORP. (U.S.P. 1,825,620, 29.9.31. Appl., 18.11.26).—Finely-divided Fe_2O_3 , ground in a linseed oil dispersing medium, is incorporated with a heated mixture of drying oil, copal resin, and asphaltic material. A homogeneous mixture of suitable proportions of inert filler with the binder so produced is cold-moulded and the pressed article baked until hard.

S. S. W.

Denture [from heat-settable plastic]. E. ROBERTS, Assr. to NAUGATUCK CHEM. CO. (U.S.P. 1,825,286, 29.9.31. Appl., 9.2.29).—Use of a tough α -m-styrene, substantially free from unpolymerised styrene, is claimed.

S. S. W.

Cementing agents [for plastic materials]. CELLULOID CORP. (B.P. 370,913, 12.1.31. U.S., 11.1.30).—Plastic materials sol. in org. solvents, *e.g.*, cellulosic plastics, are cemented under heat and pressure by mixtures of high-, medium-, and low-boiling solvents comprising 5–100 pts. of b.p. > 200°, 25–100 pts. of b.p. 100–200°, and 5–50 pts. of b.p. < 100°.

S. S. W.

Machine for producing moulded articles from artificial resins and the like. BISTERFELD & STOLTING (B.P. 372,902, 7.4.31. Ger., 7.4.30).

Ice colours.—See III. Aq. ZnCl_2 .—See VII. Tennis courts etc.—See IX. Preventing corrosion of Mg.—See X. Varnish materials from thickened oils.—See XII. Rubber-fibre plastics.—See XIV. Glue powder.—See XV.

XIV.—INDIA-RUBBER; GUTTA-PERCHA.

Storage of rubber seeds. C. D. V. GEORGI, V. R. GREENSTREET, and G. L. TEIK (Malayan Agric. J., 1932, 20, 164–176).—For the preservation of rubber seeds these should be collected frequently, otherwise the wet weather following the main harvest induces acidity of the oil. Without delay they should then be dried, or sterilised and dried, after which storage is possible for 4 months without marked increase in acidity of the oil content. Dry storage is desirable. Increase in humidity leads to increased mould development and insect attack, the latter in particular favouring development of acidity in the oil, whilst both lead to considerable loss of material. Analytical results are given for the composition of the seeds, the oil, the kernel meal, and the shells.

D. F. T.

Variation in plantation sheet rubber. R. O. BISHOP and R. G. FULLERTON (J. Rubber Res. Inst. Malaya, 1932, 3, 129–149).—Samples of sheet rubber from a recent exhibition in Malaya showed a high degree of variation in vulcanisation characteristics and similar irregularities were observed in material from the normal output of first-class estates. The methods of testing and the average results obtained by the Institute for various standard types of rubber are indicated.

D. F. T.

Quebrachitol—a possible by-product from latex. E. RHODES and J. L. WILTSHIRE (J. Rubber Res. Inst. Malaya, 1932, 3, 160—171).—Quebrachitol is conveniently obtained from the residual serum from the coagulation of *Hevea* latex containing $1\frac{1}{2}$ lb. of rubber per gal. by evaporation to 1% of its original vol., removing heat-coagulated proteins, and cooling to 0° until crystallisation is complete. The brown crystals are separated by centrifuging and purified by charcoal and recrystallisation. The yield of pure product is 0.2% on the serum. With plant capable of treating 1000 gals. of serum daily for 47 weeks per annum, the cost of production is estimated at approx. 85 cents per lb. D. F. T.

Effect of simple carbohydrates on the vulcanisation of rubber. R. O. BISHOP and E. RHODES. (J. Rubber Res. Inst. Malaya, 1932, 3, 150—159).—Addition of 1—3% of a sugar, viz., glucose, fructose, galactose, arabinose, sucrose, or maltose, retards vulcanisation of slab rubber and accelerates that of a slow-curing rubber. Quebrachitol differs from the true carbohydrates in that it retards vulcanisation in all types of rubber. Addition of a sugar to latex gives similar results to those obtained by addition to the dry rubber. D. F. T.

Vulcanisation in hot air. Construction of stoves and autoclaves with uniform temperature. P. WALTER (Chim. et Ind., 1932, 27, 513—526).—The advantages of vulcanisation in hot air at atm. or increased pressure are indicated. Points of practical importance, e.g., selection of vulcanisation temp., construction of equipment, methods for heating and circulating the air, temp. regulation, etc., are discussed. D. F. T.

Atmospheric cracking with unstretched rubber goods. O. MERZ (Kautschuk, 1932, 8, 73—79).—Sunlight accelerates the development of cracks in material for collapsible boats and a state of tension is not a necessary condition. Protective paints of single character, e.g., waxes, coloured rubber solutions, oil varnish, or cellulose nitrate varnish, generally are not satisfactory preventives, but application of suitable composite coatings to the material when new affords efficient protection against the cracking. D. F. T.

Staining of paper and alcohol by rubbers containing organic accelerators and antioxidants. T. R. DAWSON and J. R. SCOTT (J. Res. Assoc. Brit. Rubber Manufs., 1932, 1, 1—6).—Experiment shows that, in general, accelerators and antioxidants consisting of aromatic amines or certain derivatives, e.g., guanidines, thioureas, and aldehyde-condensation products, cause vulcanised rubber to stain paper containing lignocellulose and also EtOH. Naphthylamine derivatives are particularly liable to produce stains. For the avoidance of staining of paper wrappers, either accelerators and antioxidants of the arylamine class should be avoided or paper free from lignocellulose should be chosen. D. F. T.

Viscosity of solutions of raw rubber in mixed solvents. T. H. MESSENGER and B. D. PORRITT (J. Res. Assoc. Brit. Rubber Manufs., 1932, 1, 7—15).—The addition of a small proportion of a non-solvent, e.g., an alcohol, aldehyde, ketone, ester, or H_2O , to a rubber solution or dough reduces the viscosity more than would a similar additional quantity of the pure solvent. The

effect increases with decrease in the solvent power for raw rubber and in the swelling power for vulcanised rubber and with increase in the dielectric const. With active liquids such as alcohols the main effect is produced by the first 2—3%. The added liquid appears to be more effective the more viscous is the original solution. D. F. T.

Pulverised-fuel ash.—See II. **Diphenylguanidine.**—See III. **Particle size of pigments.**—See XIII.

PATENTS.

Manufacture of rubber. P. SCHIDROWITZ, M. W. PHILPOTT, and R. M. UNGAR (B.P. 370,578, 20.2.31).—In the manufacture of vulcanised rubber containing a substantial proportion of vegetable light fillers, vulcanisation is effected by heat and pressure after the formed or sheeted material has been slightly vulcanised throughout its mass, e.g., by heating at 65—121° in an unconfined condition. D. F. T.

Manufacture of rubber articles. L. MELLERSH-JACKSON. From NEW YORK BELTING & PACKING CO. (B.P. 370,476, 30.12.30).—An article composed of rubber and fibrous material is produced by passing an aq. dispersion of rubber, e.g., latex of increased filterability, into the interior of a tubular body of fibrous material so that the aq. medium passes through the walls. The tube with its internal deposit is then dried and, if desired, vulcanised. The outer surface may subsequently be coated with rubber, e.g., with calendered sheet. D. F. T.

Production of compositions of or containing rubber and articles therefrom. MAGYA RUGGY-ANTAARUGYAR RESZVENYTARSASAG (B.P. 370,937, 13.1.31. Hung., 25.10.30).—Sticky compositions containing rubber or the like of plastic solid consistency are produced by adding a small proportion of a mercaptothiazole, e.g., mercaptobenzthiazole or its Zn salt, and heating, preferably between 50° and 100°, the mixture, if desired, being concurrently exposed to a gaseous medium such as air or O_2 and subjected to mechanical working. D. F. T.

Rubberised and fibrous plastic material un-attackable by oil. LE JOINT FRANÇ. SOC. ANON. (B.P. 370,723, 29.5.31. Ger., 14.6.30).—Material with the tenacity of leather is produced by vulcanising a mixture containing rubber 40—50%, fillers 20—40%, mineral, vegetable, or animal fibres 10—20%, animal glue 2—5%, glycerol 1—2%, and accelerator 0.5—1%, with S 5—12% on the wt. of the rubber used. D. F. T.

Treatment of rubber. NAUGATUCK CHEM. CO., Assees. of L. H. HOWLAND (B.P. 371,276, 29.9.31. U.S., 24.10.30).—Vulcanisation is accelerated by a compound of the general formula $O(CH_2 \cdot S \cdot CS \cdot NRR')_2$, where R and R' are alkyl and aryl radicals respectively or conjointly represent a bivalent radical such as $(CH_2)_5$. Examples are oxydimethylene dimethyldithiocarbamate, m.p. 112—114°, and the oily corresponding diethyldithiocarbamate obtainable by the action of *s*-dichloromethyl ether on the alkali or alkylammonium salt of the appropriate dialkyldithiocarbamic acid. D. F. T.

Vulcanisation of rubber. W. SCOTT, Assr. to RUBBER SERVICE LABS. CO. (U.S.P. 1,825,288, 29.9.31.

Appl., 24.4.29).—Vulcanisation is accelerated by the reaction product of an aldehyde derivative of a Schiff's base and the product obtained by the interaction of a mercaptobenzthiazole and hexamethylenetetramine.

D. F. T.

Manufacture of a vulcanisation accelerator.

H. W. MATHESON, ASSR. to CANADIAN ELECTRO PRODUCTS CO., LTD. (U.S.P. 1,788,773, 13.1.31. Appl., 18.6.26).— C_2H_2 is passed into NH_3Ph in presence of Cu_2Cl_2 at 90° ; the fraction distilling at 200 – 275° ($NHPhEt$, $NHPhBu$, and quinaldine) is condensed with $MeCHO$ or other aldehyde.

C. H.

Substituted aryl antioxidant. [Anti-ageing compounds for rubber.] L. J. CHRISTMANN, ASSR. to AMER. CYANAMID CO. (U.S.P. 1,806,671, 26.5.31. Appl., 20.10.28).—4-Chloro-*o*-aminophenol, chloroquinol, aminocresols, aminosalicic acids, and other dihydric phenols or aminophenols carrying also halogen, alkyl, or CO_2H as third substituent, are used as anti-oxidants for rubber etc.

C. H.

XV.—LEATHER; GLUE.

Action of yeast extracts on the constituents of skin. F. VAN WELDEN (Bull. Assoc. anc. Elèves Inst. Sup. Ferm. Gand, 1931, 32, 27–32, 39–41).—Yeast extracts can be used as a depilatory caustic at p_H 8 and 40° after addition of phosphates and NH_4 salts. Top yeast removes more NH_2 -acid from calfskin than does distiller's yeast, but the latter has a good depilatory action. Addition of active Cl (2 g. per litre) is recommended. Active Cl at p_H 9.30 is a good depilatory which does not attack the hair.

A. A. E.

Action of dichromate on various phenolic substances and on vegetable and synthetic tanning materials. A. DOHOGNE and G. REZABEK (Cuir techn., 1931, 24, 407–412; Chem. Zentr., 1932, i, 1041–1042).—At room temp. about 1 g. of tanning substance is necessary for the reduction of 1 g. of $K_2Cr_2O_7$; at 100° the ratio is 1 : 2.65, and in presence of $8M-H_2SO_4$ 1 : 7.2. All tanning extracts and phenols other than $PhOH$ give a ppt. with $K_2Cr_2O_7$ in neutral solution. Synthetic tanning substances exhibit only a small reducing action.

A. A. E.

Effect of atmospheric moisture on deterioration of commercial and quebracho-tanned leathers containing sulphuric acid. R. C. BOWKER and W. D. EVANS (J. Amer. Leather Chem. Assoc., 1932, 27, 81–88. Cf. B., 1931, 1021; 1932, 198).—The deterioration of the leathers was more rapid at 85% than at 65% R.H. and was more noticeable with greater concns. of acid and longer periods of ageing.

D. W.

Addition of a definite quantity of sulphuric acid to leather. J. BECK, JUN. (J. Amer. Leather Chem. Assoc., 1932, 27, 79–81).—After treatment of leather with a solution containing a fraction, f , of H_2SO_4 , the ratio of H_2SO_4 to dry leather, x , is calc. from the formula $f(r + 0.5h)/(1-h)$, where r is the proportionate increase in wt. of the leather and h the fraction of H_2O in the air-dry leather before treatment. (Cf. B., 1931, 79.)

D. W.

Evaluation of hide- and bone-glue. E. GORBEL (Farben-Chem., 1932, 3, 60–61, 97–98, 142–143;

cf. also B., 1931, 555).—Descriptions are given of the determination of (a) the viscosity of glue solutions with the Engler, Klever (B., 1924, 892), and Vogel-Ossag apparatus; (b) the concn. of glue solutions with a specially calibrated hydrometer.

S. M.

PATENTS.

Tanning of hides and skins. A. HOYT, ASSR. to S. L. WORTHEN (U.S.P. 1,824,549, 22.9.31. Appl., 3.1.30).—Hides or skins are placed in an inner perforated drum which can be revolved in either direction or oscillated about its axis and is fitted into an outer drum containing the tan liquor or degreasing fluid.

D. W.

Waterproof glue [powder]. T. SATOW (U.S.P. 1,824,448, 22.9.31. Appl., 23.1.26).—The powder comprises de-oiled soya-bean flour and a proteolytic enzyme (dried papaya milk); $Ca(OH)_2$, fillers ($CaCO_3$, $BaSO_4$), oxidising agents (K_2CrO_4), and NaF may also be added. The product may be worked up to a water paint by increasing the proportion of filler and adding a pigment.

L. A. C.

Extractor.—See I. Styrene derivatives.—See III. Vat-dye preps. [for leather].—See IV.

XVI.—AGRICULTURE.

Effect of air-drying on the hydrogen-ion concentration of the soils of the United States and Canada. E. H. BAILEY (U.S. Dept. Agric., Tech. Bull., 1932, No. 291, 43 pp.).—Among 327 samples from 64 profiles examined, 31% of the profiles and 13% of the surface horizons showed a change of $> 0.1 p_H$ on drying. In only two cases was the change $> 0.5 p_H$. Changes > 0.1 unit were usually toward acidity. Samples of high org. matter content showed the widest changes. Samples from reddish-brown pedocals and from laterites which showed appreciable p_H changes on drying regained their original vals. after immersion in H_2O for 18–24 hr. For podzols and degraded chernozems 4–7 days was necessary. Org. matter is the prime factor controlling these changes. It is considered that p_H determinations should be made with air-dried rather than fresh moist samples.

A. G. P.

Chemical and bacteriological effects of various kinds and amounts of lime on certain southern Iowa soils. R. H. WALKER, P. E. BROWN, and A. W. YOUNG (Iowa Agric. Exp. Sta. Res. Bull., 1932, No. 148, 59–120).—In the acid soils examined, a close relationship existed between the buffer capacity (by titration curves) and the colloidal matter and org. C contents. Quarry-run limestone was less effective than pure $CaCO_3$ in neutralising soil acidity. The liming factor used in practice is more dependent on the form of the CaO than on the soil type. Both quarry limestone and $CaCO_3$ increased the exchange capacity of soils to a small extent and in proportion to the amounts applied. Finely-ground limestone stimulated nitrification more effectively than $Ca(OH)_2$. $MgCO_3$ decreased the $[H^+]$ of soil more rapidly than $CaCO_3$ in the early stages, but the difference disappeared after a prolonged period. Ca -limestone was more effective than dolomite. Soils treated with mixtures of $CaCO_3$ and $MgCO_3$ attained higher NO_3^- contents than when either substance was used alone.

A. G. P.

Reclamation of alkali soils in Hungary. A. A. J. DE' SIGMOND (Imp. Bur. Soil Sci., Tech. Comm., 1932, No. 23, 26 pp.).—The close connexion between soil dynamics and the reclamation of alkali soils is discussed. Systems of reclamation should be based on the stage of formation of the alkali soil. In the first stage, prior to the alkalisation of the soil complex, leaching suffices. The second stage, characterised by the dominance of Na⁺ in the absorbing complex, is treated by leaching and by the displacement of Na⁺ by Ca⁺⁺. In neutral soils CaCO₃ is effective, but where p_H exceeds 8.0, gypsum, free H₂SO₄ or HCl, or their Al or Fe salts are requisite. To soils in the third stage of formation, i.e., leached soils with > 15% total salts and p_H 8.0 or less, applications of CaCO₃ and org. manures are successful. Similar treatment is applicable to degraded soils.

A. G. P.

Influence of method of shaking on the amount of phosphate dissolved from soil by water. P. L. HIBBARD (Science, 1932, 75, 464–465).—With sandy soils the amount of P₂O₅ dissolved by H₂O varies markedly with the time and the method of shaking; with clay soils and a min. time of 1 hr. the method of shaking has little effect.

L. S. T.

Influence of bedrock on amounts of soluble [plant] nutrients in clays. A. SALMINEN (J. Sci. Agric. Soc. Finland, 1931, 153; Proc. Internat. Soc. Soil Sci., 1932, 7, 24–25).—Sources of essential soil constituents are examined. Chemical and mineralogical composition of Finnish clays is to some extent influenced by the nature of the original rock.

A. G. P.

Absorption and mobilisation of potassium in the calcareous soils of Champagne. E. RADET (Ann. Agron., 1931, N.S., 1, 655–667; Proc. Internat. Soc. Soil Sci., 1932, 7, 28–29).—The adsorptive capacity of soils for K from K₂CO₃ is double that from KCl. The presence of NH₄ and Na salts lowers the adsorptive power for K. In highly calcareous soils of small colloidal content, leaching losses from surface applications of KCl are not serious even in winter, but simultaneous additions of KCl and NH₄ salts during wet seasons should be avoided.

A. G. P.

Fixation, nitrification, and leaching of ammonium sulphate in the soil. F. A. E. ABEL (Pineapple Quart., 1931, 1, 88–94).—Pot and cylinder experiments with soil receiving 100 p.p.m. of N as (NH₄)₂SO₄ showed that in the absence of a growing crop there is no loss of NH₃-N and a small loss of NO₃-N after application of the equiv. of 3 in. of rain to a 3-ft. soil section containing 30% H₂O.

CH. ABS.

Determination of the phosphorus and potassium requirement of soil. J. BECKER (Mezőg. Kutát., 1931, 4, 370–381; Chem. Zentr., 1932, i, 864).—The methods of Lemmermann and Neubauer are not recommended for highly calcareous soils. Sigmond's HNO₃ method for K₂O gives results comparable with those given by Neubauer's method; 100 mg. Neubauer K₂O ≡ 150 mg. HNO₃-sol. K₂O.

A. A. E.

Nutritional-physiological studies on *Aspergillus niger* as the basis for the determination of the potassium requirements of soils. J. TRISCHLER

(Wiss. Arch. Landw., 1931, 7, 39–78; Chem. Zentr., 1931, ii, 3221).—The growth-wt. of *A. niger* after 4–6 days cannot be used for the determination of sol. K, but it shows whether a soil or nutrient is rich or poor in available K. The effect on growth-wt. at const. K content with simultaneous increases in N (added in different ways) and P₂O₅ has been studied. The average K₂O content of *A. niger* mycelium is 0.12% of dry wt. *A. niger* reacts more uniformly to K than to P₂O₅.

L. S. T.

Determination of iodine in soils. J. S. MCHARGUE, D. W. YOUNG, and W. R. ROY (Ind. Eng. Chem. [Anal.], 1932, 4, 214–216).—The soil is heated at about 1100° in an electric combustion-tube furnace and the volatile matter is led through wash-bottles containing 5% K₂CO₃, in which the I is afterwards determined by the usual methods. The results show satisfactory agreement with those obtained by von Fellenberg's method (A., 1925, i, 329).

E. S. H.

Determination of minute accounts of boron in soils. W. W. SCOTT and S. K. WEBB (Ind. Eng. Chem. [Anal.], 1932, 4, 180–181).—A strip of turmeric paper is partly immersed in the soil extract for 3 hr. at 35° and the height to which the red coloration rises in the strip is compared with a series of standards prepared with known solutions. The procedure is suitable for determining 0.1–0.005 mg. B₂O₃ and may be modified to determine 0.1–1.0 mg.

E. S. H.

Efficiency of phosphate fertilisers. S. D. CONNER (Amer. Fertiliser, 1931, 75, No. 13, 13–15).—A review and discussion of methods for the determination of P availability.

CH. ABS.

Effect of phosphoric acid on citrus. I. TAKAHASHI (J. Okitsu Hort. Sci., 1931, 18–30).—Except in the finer portion of the roots the P₂O₅ content of the tree was relatively small; for the whole tree N : P₂O₅ = 100 : 18. The P₂O₅ requirement for growth is half the N requirement, but increase in the P₂O₅ increased the sweetness of the fruit juice. Summer spraying of leaves and fruits with 0.5% P₂O₅ increased the sweetness and decreased the free acid.

CH. ABS.

Factors affecting the availability of phosphate fertilisers as shown by the Neubauer method. S. F. THORNTON (J. Assoc. Off. Agric. Chem., 1932, 15, 163–166).—With neutral sand the Neubauer method gives availability vals. similar to those given by the official method, being low for Ca₃(PO₄)₂, limed superphosphate, highly ammoniated superphosphate, and basic slag. With an acid soil the availabilities of these materials are approx. equal to that of Ca(H₂PO₄)₂. Very insol. phosphates, such as rock phosphate, bone ash, Fe and Al phosphates, and fluorspar basic slag, give low vals. regardless of the conditions. Addition of KCl raises the availability vals. for all phosphates used.

W. J. B.

Cause of and remedy for the incomplete action of superphosphate on acid mineral soils. L. SCHMITT (Landw. Jahrb., 1932, 75, 437–447).—In pot trials with acid soils the efficiency of P fertilisers was in the order basic slag > K₂HPO₄ = (NH₄)₂HPO₄ > superphosphate. After marling the new order was

basic slag > superphosphate > K_2HPO_4 > $(NH_4)_2HPO_4$. CaO increased the action of basic slag and, to a much greater extent, that of superphosphate. Soil factors affecting the solubility of various forms of P are discussed and the prime importance of the CaO status in this respect is emphasised. A. G. P.

Use of brown coal preparations for fertilising purposes. A. NĚMEC (Brennstoff-Chem., 1932, 13, 168—170).—The brown coal prep. "karbohumat" contains about 20.6% of ash and 1% of N, has an alkaline reaction, and is almost completely sol. in H_2O . Addition of karbohumat to the soil increases the formation of nitrate-N. Its addition to soils poor in C increases the intake of H_3PO_4 and of K by the plant, whilst its addition to soils deficient in humus and nutrients increases the crop yield. A. B. M.

Dicyanodiamide as fertiliser. S. DOLDI (Giorn. Chim. Ind. Appl., 1932, 14, 171—175).—Experiments on Karagua maize show that dicyanodiamide is non-toxic to the germinating plant up to 3.3% concn. In sandy soils lacking org. matter the transformation of dicyanodiamide into an assimilable product is slow. In soils rich in org. matter the action is equal to that of $NaNO_3$ and $CaCN_2$. The different behaviour is attributed to the action of soil micro-organisms. O. F. L.

Mineral content of some Canterbury [New Zealand] pastures. M. C. FRANKLIN (New Zealand J. Sci. Tech., 1932, 13, 244—252).—The mineral content of pastures examined was largely influenced by climatic conditions, but could be altered considerably by manuring. Liming decreased the proportion of both clover and weeds. Applications of superphosphate alone or with $(NH_4)_2SO_4$ increased the % of clovers and decreased that of weeds, thereby increasing the total N content of the pasture. This effect was more pronounced with superphosphate alone than with the mixed fertiliser. CaO used in conjunction with fertilisers tended to lower the total ash and N content of the herbage. The Ca content was increased by treatment with superphosphate, but lowered somewhat by superphosphate + $(NH_4)_2SO_4$. A. G. P.

Effect of black locust [tree] on soil nitrogen and growth of catalpa. A. C. MCLINTYRE and C. D. JEFFRIES (J. Forestry, 1932, 30, 22—28).—N-fixing bacteria are associated with the roots of the locust tree. CH. ABS.

Eradication of weeds by chemicals. R. M. WOODMAN and W. A. JONES (Chem. News, 1932, 144, 21—27).—Among numerous herbicides examined, Na_3AsO_3 , As_2O_5 , and chlorates proved most successful. Wild onion plants arising from bulbs are harder to kill than those arising from bulbules, and for this purpose As compounds are preferable to chlorates. A. G. P.

Application of chlorates as weed-killers. II. Effect of sodium chlorate on aquatic plants. M. HESSENLAND and F. FROMM (Chem.-Ztg., 1932, 56, 326; cf. B., 1931, 1067).— $NaClO_3$ is not an efficient weed-killer for the aquatic plants studied, although in some cases amounts up to 1% reduce the no. and vitality of the plants. E. S. H.

Determination of methoxyl, lignin, and cellulose in plant materials. M. PHILLIPS (J. Assoc. Off.

Agric. Chem., 1932, 15, 118—131).—Methods used in such determinations are described and the literature pertaining to these methods is reviewed. W. J. B.

Special applications in methods of agricultural chemical analysis. C. A. BROWNE (J. Assoc. Off. Agric. Chem., 1932, 15, 112—118).—The necessity of extending the scope of the Association's official methods of analysis of agricultural products is emphasised. Methods of determination of cellulose and lignin in forage, cutin in apples, acetylmethylcarbinol in vinegar, rarer org. acids in fruit juices, and nitrogenous bases in beet and cane molasses are suggested for inclusion in future editions. W. J. B.

Fertiliser problems on soils of the South East. A. A. KOMAS (Udobr. Urozhai, 1931, 3, 446—452).

Solvents for phosphates. Determining K in fertilisers.—See VII.

See also A., May, 459, Base-exchange reactions of soil colloids. 485, Sedimentation analysis. 487, Determination of P_2O_5 in fertilisers. 495, Nature of clay. Soil charting in U.S.A. 545, Microbiology of soil. 549, Pasture grasses. Ca and PO_4''' in lucerne. Al intake by plants. Soil processes under clover. Synthesis of humus-nucleus. Growth inhibition of potato sprouts by products from apples. Plant hardness. Effect of hot- H_2O treatment on stored bulbs. 550, Anaesthesia in plants. TI poisoning and soil fertility. Determining total P in plant ash.

PATENTS.

Production of mixed fertilisers composed of ammonium nitrate and ammonium sulphate. RUHRCHEMIE A.-G. (B.P. 370,993 and Addn. B.P. 370,995—6, [A] 9.10.30, [B] 11.10.30, [C] 14.10.30. Ger., [A] 10.10.29, [B] 22.10.29, [C] 4.11.29).—(A) H_2SO_4 , HNO_3 , and NH_3 are brought together in a saturator, constructed, e.g., of ferrosilicon, $PhOH-CH_2O$ condensation products, ceramic ware with a high SiO_2 content, under conditions such that sufficient heat is liberated to evaporate below the b.p. of the solution practically all the H_2O present. (B) The saturator used in (A) is provided with vigorous agitation and a liquor saturated with $(NH_4)_2SO_4$ and NH_4NO_3 and containing the solid salts in suspension is withdrawn in such a condition that a mixed salt of desired composition is obtained direct on cooling. (C) The mixed salts are dried in the saturator until they contain 4—5% of H_2O , and are subjected to further drying in an auxiliary vessel maintained at a temp. above that of the saturator before passing to the final drying apparatus. [Stat. ref. to (A).] L. A. C.

Manufacture of fertilisers. E. URBAIN (B.P. 369,027, 13.4.31. Fr., 4.11.30. Addn. to B.P. 368,559; B., 1932, 523).—Crude $Ca_3(PO_4)_2$ is treated with H_2SO_4 , d 1.71, under the conditions usually employed for the manufacture of superphosphates, and the product, before it sets, is treated successively with $(NH_4)_2HPO_4$ and MgO, as described previously. L. A. C.

Treatment and preservation of cut plants. A. B. HOWELL, Assr. to DRYCE EQUIPMENT CORP. (U.S.P. 1,825,065, 29.9.31. Appl., 30.8.29).—Cut sweet peas,

carnations, roses, etc. are stored at 0–10° in a moist atm. containing 5–90% (preferably 20–40%) of CO₂, and dried plums are restored in a moist atm. containing up to 100% of CO₂. The temp. is reduced and the CO₂ generated by the use of solid CO₂. L. A. C.

Paper for agricultural (etc.) use.—See V.

XVII.—SUGARS; STARCHES; GUMS.

Saturation [of beet juice as measured] by the [hydrostatic] pressure of the froth. K. SCHIEBL (Chem. Fabr., 1932, 121–122).—There is a linear relation between the hydrostatic head of the froth produced in saturation with CO₂ and the CaO content, and regulation by this method is instantaneous. Practical tests showed that it is equal in accuracy to regulation, using thymolphthalein paper, and better than regulation by titration or automatic control by electric conductivity. Apparatus for reading the hydrostatic head and so controlling the CO₂ supply in batch and continuous working is described. C. I.

Determining dry substance.—See I. Quebrachitol from rubber.—See XIV. Analysis of agricultural products.—See XVI.

See also A., May, 486, Colorimetric *p*_H determination. 500, Prep. of 2-methylglucose. Synthesis of 2: 6-dimethylglucose. Hydrolysis of maize starch.

XVIII.—FERMENTATION INDUSTRIES.

Possibilities for the preparation of new drinks in breweries. H. LÜERS (Woch. Brau., 1932, 49, 73–79).—Since breweries possess most of the necessary plant, and staffs trained in microbiology, they are in a position to manufacture drinks of low EtOH content. Examples are quoted in which slight fermentation has been attained in malt worts by the use of organisms such as *Saccharomyces Marxianus* and *Pseudomonas Lindneri* (*Termobacterium mobile*), which ferment glucose and sucrose but not maltose. The manufacture of non-alcoholic drinks from essences, fruit juices, and plant infusions is rendered possible without pasteurisation and loss of flavour by the use of the Seitz filter and special plant for bottling under aseptic conditions. Doubt is expressed regarding the so-called "vitamin beers." F. E. D.

Souring of potatoes in distilleries. J. ACKERMANN (Z. Spiritusind., 1932, 55, 100–101).—The correct degree of steaming of potatoes, which must precede souring, is difficult to determine if the steamer consists of a silo or earth-pit. The product is liable to be brown and to sour badly. Brick pits faced with cement and built half above and below the ground level are better, but for larger quantities the most efficient steamers are constructed of metal and connected to the steam boiler. A wide Cu tube is fitted from which the steamed potatoes are directly run, and behind the exit valve in this tube is inserted a tap from which the H₂O may be run. In the process, the exit valve is closed and steam led in from above at a pressure of $\frac{1}{2}$ atm. The collected H₂O is then run off and steaming resumed at $\frac{3}{4}$ atm. The H₂O is again discharged and the potatoes are finally steamed at 1.2 atm. The prepared potatoes

must be run off without interruption and the pressure must be ≥ 1.2 atm. to ensure that the mash, which is stiff, does not clog the tubes. The whole process takes 23 min. C. R.

Detection of natural and sugared wines. L. LIPKIN (Wein u. Rebe, 1931, 13, 297–298; Chem. Zentr., 1932, i, 886).—The wine is deproteinised with K₄Fe(CN)₆ by Möslinger's method without addition of tannin or gelatin, filtered after 1–2 days, and heated for 3–5 min. with C (15–20 g. per 250 c.c.); the filtrate is shaken with 20 c.c. of Pb(OAc)₂ solution, heated with NaCl (1 g.), filtered, treated with H₂S to remove Pb, filtered, and evaporated. A few drops of 10% HCl are added, and the mixture is shaken for 30 min. with 96% EtOH. With sugared, but not natural, wines a flocculent ppt. forms after 12 hr. If the flocks are incombustible (Ca compounds) the treatment is repeated with more HCl. A. A. E.

Lactic acid in Algerian wines. J. F. FABRE and E. BREMOND (Ann. Falsif., 1932, 25, 157–170).—Typical vals. for lactic acid content, lactic acid/malic acid ratio, volatile acidity, tartaric acid/volatile acidity ratio, and *p*_H in 5 groups of wines are recorded, and the wines are classified. All Algerian wines under test contained 0.027–1.145% of lactic acid, and their volatile acidity (as H₂SO₄) was usually < 0.1%; they had *p*_H 2.9–3.8. It is emphasised that even pure alcoholic fermentations (laboratory) yield 0.1–0.2% of lactic acid, and that such is a normal constituent of all wines. Its determination by Möslinger's method as modified by Bonifazi and Ferré is satisfactory. It is noted that SO₂ plays a part in wine stabilisation (as does *p*_H) and that permitted amounts largely avoid the development of abnormal lactic acid-forming organisms. The formula advised for calculating the initial non-volatile acid prior to malo-lactic fermentation is: H₂SO₄ (initial) = H₂SO₄ (measured) + 0.544 × (lactic acid – 1 g.). H. R. J.

Composition and production of Grecian types of wine. A. MIERMEISTER (Chem.-Ztg., 1932, 56, 371–372).—Statistics, manufacturing details, and analyses (10 samples) are given: EtOH 40.1–45.6 vol.-%, extract 0.31–3.98 g./100 c.c., acidity (as AcOH) 40–520, esters (as EtOAc) 587–1349, aldehydes (as MeCHO) 42–890, furfuraldehyde 0.10 mg., higher alcohols 156–2272 cu. mm. per litre of EtOH. Wine distillates are stored for 3 years in oak-wood barrels, first at about 30° and then at lower temp. J. G.

Volatile acidity of wines. FONZES-DIAON and JAUMES (Ann. Falsif., 1932, 25, 149–152).—It is confirmed that by Blarez' method of distillation up to 4% of the lactic acid of wine may pass over in volatile acid determinations; by the interposition of a rectifying column, even with longer distillations than the normal, the quantity of lactic acid may be reduced to $\frac{1}{25}$ th of that otherwise passing over. The stoppage was complete in the distillation of 100 g. of vapour during 20 min. with a column (45 cm. long) of 7-mm. glass beads. H. R. J.

Measurement of mid-acidity colours of wines. R. GILLES (Ann. Falsif., 1932, 25, 146–147).—The

superiority of phenol-red (for p_H 6.6–8.0) for indicating the neutralisation point of the org. acids of wine, using a strongly ionised base (0.1N-NaOH), is shown. Phenolphthalein (red at p_H 9–10) gives high results, is affected by free NH_3 displaced, and is difficult to judge with a natural red colour. The indicator is used on a spotting-plate. When the wine colour change begins during titration a drop is transferred to the plate and the progress of the p_H easily observed, independent of the wine colour, until p_H 7.4 (red-orange) is reached, when the weakest acids are neutralised. The standard colour at this p_H may often be obtained from town water.

H. R. J.

Influence of sulphur dioxide and carbon dioxide on the determination of total acid in musts and wines. H. ASTRUC (*Progrès agric. vit.*, 1931, 48, 569–570; *Chem. Zentr.*, 1932, i, 886).—On addition of 20 g. of $KHSO_3$ per hectolitre the corresponding titration acidity was increased by 0.15 g. H_2SO_4 per litre; the effect of the non-removal of CO_2 before titration was 0.4 (0.3–0.5) g., and of both acids 0.5. A. A. E.

Determination of free and total sulphur dioxide in red wines. L. BENVENIGNI and E. CAPT (*Mitt. Lebensm. Hyg.*, 1931, 22, 365–368; *Chem. Zentr.*, 1932, i, 886).—In the iodometric titration the sensitivity is increased by passing the light upwards through conc. $K_2Cr_2O_7$ solution and a ground-glass plate into the titration flask. A. A. E.

Examination of decolorising power of carbons for wines. J. VINAS (*Ann. Falsif.*, 1932, 25, 141–145).—The wt. of C required to remove the same quantity of colour as 0.1% of a pure standard C from the same wine is measured. The relation of the colour intensity of the wine is ascertained rather than the relation of the decolorising power of the blacks, which latter is related rather to the quantity of colouring matter removed. A standard wine is advised containing 20 g. of salicylic acid and 100 g. of H_2SO_4 per hectolitre and preserved in the dark. H. R. J.

Analysis of agricultural products.—See XVI. **Enzymes and disease.** **Determination of enzymes.** **Pepsin wines.**—See XX.

See also A., May, 486, **Determination of H_2O by distillation.** 543, [Prep. of] aminopolypeptidase. 544, [Purification of] anti-urease. Yeast nucleic acid. 547, Prep. of cryst. anti-beriberi vitamin from yeast. 550, Catalase in barley.

PATENTS.

Dealcoholisation of wine, cider, beer, and other alcoholic products. A. CORNILLAC, M. G. COUPEAU, and M. DELAVILLE (B.P. 371,671, 17.6.31. Fr., 25.6.30).—The essential oils, ethers, etc. are extracted from wine by agitation with odourless paraffin oil, and the EtOH is removed from the residual liquid by distillation under reduced pressure and at low temp. The essential oils etc. are separated from the paraffin oil by the passage of CO_2 and reincorporated in the dealcoholised liquid by passing the charged gas through it. C. R.

Improving the quality and increasing the alcoholic strength of wines. S. BESPALOFF (B.P. 370,812,

11.9.31. Fr., 19.6.31).—Wine is conc. by freezing and removing the ice crystals from the liquid. The crystals are freed by centrifuging from the adhering alcoholic liquid, which is then returned to the unfrozen portion of the wine. C. R.

XIX.—FOODS.

Iodine test for field corn. J. D. WILDMAN (J. Assoc. Off. Agric. Chem., 1932, 15, 167–168).—In testing for field corn by Heid's method (B., 1928, 283) the degree of maturity of the corn affects the results, the reaction of immature sweet corn often resembling that of field corn. Also as the carbohydrates are not laid down uniformly in the endosperm, two or more tests should be made on suspected kernels. Kernels of soft or watery consistency should not be counted as field corn, and all of questionable reaction should be classed as sweet corn. W. J. B.

Some factors in fermentation tolerance [in flour]. C. O. SWANSON and E. H. KROEGER (*Cereal Chem.*, 1932, 9, 137–146).—The defects in the loaf due to prolonged fermentation have been investigated and improvements resulting from dough break by rolling are substantiated. Suggested causes are: sugar and diastatic deficiency, by-products, and physical. Tests with these factors varied showed the following results. (1) Loaf vol. and texture are impaired by fermentation over the normal optimum (50–80 min.), even with sugar sufficiency. These effects are reduced by a dough break before the last punch. (2) Dough break remedies the vol. impairment caused by sugar admixture after fermentation. Good vol. and textures are obtainable by re-mixing yeast-food additions (sugar), provided dough break is used, and this applies even after $4\frac{1}{2}$ – $13\frac{1}{2}$ -hr. fermentations. (3) Artificial additions of lactic acid up to 0.5 c.c. (per 536 g. of ingredients) may be beneficial, but more is harmful. The mechanism of dough-break rolling is examined. H. R. J.

Quick ashing of flours. J. W. BOWEN (*Cereal Chem.*, 1932, 9, 158–160).—The sample (2–3 g.) is heated for 1 hr. in an open muffle at dull red heat, then removed and cooled, and to the grey ash about 10 drops of HNO_3 (1 : 19) are added with rotation. After cautious drying, ashing is completed in a closed muffle at a dull red heat. H. R. J.

Determination of acidity in flours. A. SCHULERUD (*Cereal Chem.*, 1932, 9, 128–136).—It is postulated that the storage development of acidity is due to fatty org. acids. Other elements increasing the acidity are probably NH_2 -acids and sol. phosphates (split off from phytin by hydrolysis). Flour suspensions in H_2O , with fermentation arrested by an antiseptic, after 24 hr. give a sharper end-point titration (phenolphthalein) and a max. acidity reading—the dissolution of P_2O_5 being then complete. Hence the A.O.A.C. method (water extraction at 40°, 1 hr.) measures chiefly acid phosphates so formed and not original acid, especially as the fatty acid is only slightly sol. The formation of sol. phosphates is avoided and the acids already existing are extracted by using 67% EtOH, shaking 10 g. of flour with solvent to 100 c.c., filtering off an aliquot, and titrating. H. R. J.

Use of selenium oxychloride as a catalyst in determinations of nitrogen by the Kjeldahl method.

C. E. RICH (Cereal Chem., 1932, 9, 118—120).—For quick mill-control work it is shown that the addition of 0.2 c.c. of SeOCl_2 with 0.05 g. of Cu wire, 10.0 g. of Na_2SO_4 , and 25 c.c. of H_2SO_4 per 2 g. of cereal shortens the time of protein decomp. from 35 to 15 min.

H. R. J.

Use of selenium as a catalyst in Kjeldahl digestion with natural gas heat.

R. M. SANDSTEDT (Cereal Chem., 1932, 9, 156—157).—A series of standard N determinations with flour and bran (15.65, 16% protein), with digestion over a hot flame and the use of 0.1 g. Cu or 0.7 g. HgO or 0.1 g. Se as catalysts, showed decomp. to be complete in 45 min. with either Se or HgO , whereas Cu required 60 min. No precipitant is required in distillation with Se.

H. R. J.

Relationships involving crumb texture and colour.

A. E. TRELOAR, R. C. SHERWOOD, and C. H. BAILEY (Cereal Chem., 1932, 9, 121—127).—The following deductions are made for straight unbleached flours. Loaf vol. may be less valuable than are the crumb characteristics in rating flours from hard red spring wheats where the correlation is slight. The relationship of texture and volume is connected with the quantity of protein in the flour. As the protein increases, the crumb texture improves. Although flours of low protein content may give loaves ranging from "very poor" to "excellent" crumb texture, high-protein flours give rise only to best crumb textures. Ash %, diastatic activity, and moisture show no relationships with crumb colour. Relationships are suggested, under const. baking, between fermentation tolerance of doughs, protein in flour, and texture.

H. R. J.

Vitamin-B content of bread. Y. HASHITANI and T. SAKO (Cereal Chem., 1932, 9, 107—117).—Feeding tests on pigeons show a deficiency of vitamin-B in commercial white bread. It is shown that a content of 0.4% of dried yeast (40%) as a baking ingredient, with the usual bakers' yeast, compensated this deficiency, but above 0.5% was excessive. Thermal records of the oven and dough in baking at 200—215° (14 min.) showed that the inner temp. of the dough exceeds 90° for 10—20 min. only, and this, with the p_H 5.5, in addition to the feeding tests, indicates that vitamin-B is not destroyed in bread during the usual baking process.

H. R. J.

Rope control [in bread]. H. H. BUNZELL and M. KENYON (Cereal Chem., 1932, 9, 161—168).—The best conditions for making the catalase test for detecting this bread infection at the earliest moment have been determined. A dough is inoculated with a bad bread (*B. mesentericus*), and the dried crumb possessing 145 times the catalase activity of a patent flour is used for the tests. Using the Bunzell apparatus, it is established that, for optimum results, 6N- H_2O_2 should be added to the reacting mixture, and wrapped loaves should be developed by incubation at 40° for 16 hr. It was not found possible to adjust to the best p_H (9.2). H. R. J.

Value of the viscosity test for determining some of the properties of cake and pastry flours.

G. L. ALEXANDER (Cereal Chem., 1932, 9, 169—170).—

The MacMichael instrument is considered quite satisfactory for grading flours for cake use. The flour is suspended with 100 c.c. of H_2O and after 1 hr. 5 c.c. of N-lactic acid are added, with 5 mins.' shaking. The suspension is then poured into the viscosimeter bowl and, using a disc bob and no. 28 wire, and 25 r.p.m., a reading is taken at 80—82° F. Three empirical grades are defined, 30—50°, 51—65°, 66—85° (MacMichael), adapted to the various types of cakes. The first viscosity range is suitable for pastries, the last for firm cakes of highest vol.

H. R. J.

Microdetermination of protein in cereal products.

R. J. ROBINSON and J. A. SHELLINGER (Ind. Eng. Chem. [Anal.], 1932, 4, 243).—The substance is heated with conc. H_2SO_4 and a crystal of CuSO_4 and $\text{K}_2\text{S}_2\text{O}_8$ are then added. After decomp. is complete, NaOH is added to the residue and the NH_3 is expelled by distilling in steam and collected in dil. H_2SO_4 .

E. S. H.

Laboratory technique for obtaining skimmed sterilised milk.

M. FOUASSIER (Ann. Falsif., 1932, 25, 155—156).—For research purposes a round-bottomed flask is filled almost to the neck with milk which is neither acid nor freshly pasteurised. A tube is placed therein reaching the bottom and bent over outside with a rubber connexion and a sealed drawn-out glass extension to serve as a siphon. This is held in the neck by a plug of cotton. The whole is sterilised with the usual precautions. Such milk may be left without danger of change. After 15—20 hr. (for the rising of cream) the siphon exit is filed and most of the underlying portion of the milk is transferred to sterilised tubes.

H. R. J.

Neutralisation and pasteurisation of sour cream.

S. COX (Agric. & Live-Stock India, 1932, 2, 1—5).—To neutralise sour cream for butter manufacture 20% more CaO is required than is indicated by the acidity, thus confirming Hunziker's results.

E. B. H.

Foil-wrapped cheeses. Some deterioration factors.

J. SCOTT (Food. Tech., 1932, 1, 276—277).—Crustless cheeses wrapped in Sn foil and packed in cardboard containers have been found to undergo spoilage through the development of one of the *Ascomycetes* group of moulds, the spores of which were probably present in the adhesive used on the label, around which deterioration chiefly occurred. The characteristics of this type of spoilage are described with illustrations.

E. B. H.

Vitamins from the viewpoint of the official chemist.

H. C. SHERMAN (J. Assoc. Off. Agric. Chem., 1932, 15, 103—112).—The present knowledge of the vitamins is reviewed and its bearings on food-control problems are discussed.

W. J. B.

Deterioration of the fat in foodstuffs.

W. L. DAVIES (Food Tech., 1931, 1, 141—143, 181—183, 269—270).—Fatty acid rancidity and oxidative rancidity are described, together with the effect of "pro-oxygens" and "anti-oxygens" on the period of induction. The influence of heavy metals and of micro-organisms on oxidative rancidity and of various moulds on ketonic rancidity is discussed. Other forms of fat deterioration, e.g., "mustiness" and "fishiness," are considered and methods for controlling the factors favouring oxidation are summarised.

E. B. H.

Use of hygrometers.—See I. Ponceau-2R and -3R.—See IV. Determining NaNO_2 in pickle (etc.) NaCl .—See VII. Pb in preserving cans.—See X. Rancidity in shortenings etc.—See XII. Casein paints.—See XIII. Rubber-seed [meal].—See XIV. Analysis of agricultural products.—See XVI.

See also A., May, 465, Effect of sucrose on skim milk. 533, F.p. of milk and protein coagulation. 548, Irradiated milk. Maize grains. Determination of seed quality.

PATENTS.

Treatment of soya beans. C. C. C. VAN STOLK (B.P. 370,464, 11.10.30).—When the beans are ground in a drum provided with steel balls and cubes, all the cells are broken and no emulsification is necessary when making a batter. E. B. H.

Preservation of eggs and/or other perishables. F. NIERINCK (B.P. 370,930, 9.1.31).—The foodstuff is placed in a container surrounded by an autoclave fitted with a device to equalise automatically the pressure on both sides of the container during evacuation and filling of the system with an inert gas. E. B. H.

Manufacture of a food product [from milk]. C. H. PARSONS, Assr. to SWIFT & Co. (U.S.P. 1,824,496, 22.9.31. Appl., 20.4.28).—A product having a distinctive aroma and taste is prepared from conc. milk, containing 2–4% of an emulsifying salt, by injecting live steam. Caramelisation of the lactose is effected and a large proportion of the protein is hydrolysed. By the addition of Ca lactate a product of good emulsifying properties is obtained. E. B. H.

Preparation of a jelly for use by confectioners, pastrycooks, etc. R. S. POTTER and A. B. WOODCOCK (B.P. 370,939, 13.1.31).—A firm jelly which can be baked without melting is made by mixing cold 100 pts. of a solution containing approx. 60% of sugar, 0.05% of pectin, and 40% of H_2O with $1\frac{1}{2}$ pts. of 50% aq. citric acid. The prep. of the pectin-sugar solution and method of storing for an indefinite period before use are described. E. B. H.

Device for testing the liquid content of withered tea leaf in black tea manufacture. COLOMBO COMMERCIAL Co., LTD. From F. J. WHITEHEAD (B.P. 370,984, 15.1.31).—An apparatus by which juice is expressed from withered leaf under definite pressure and for a definite time into a gauge graduated to read the % total H_2O of the leaf direct is claimed. E. B. H.

Preservation of green fodder. H. TALLGREN (B.P. 371,036, 14.11.30).—Addition of 5–6 litres of 6% HCl (partly replaced by H_2SO_4 or salicylic acid if desired) to 100 kg. of fodder prevents undesirable fermentations, but favours development of lactic acid—the final preserving agent. Suitable means of compression are described. E. B. H.

Preservation of green cattle fodder. A. I. VIRTANEN, and VOINVIENTI-OSUUSLIKE VALIO R.L. (B.P. 370,685, 5.5.31).—The colour, aroma, and feeding val. are preserved unchanged by the addition immediately after cutting of acid (e.g., 8% HCl) until the p_{H} is 3.0–4.0. E. B. H.

Manufacture of fodder products. J. E. NYROP (B.P. 370,926, 6.1.31. Denm., 24.1.30).—A sweet

milk substitute for feeding of calves is obtained by mixing with H_2O or skimmed milk an aq. emulsion of an oil containing vitamin concentrate, easily digestible carbohydrate, and protein. E. B. H.

Curing of fish. R. Cox (B.P. 373,032, 12.9.31).

[Milk-]treating apparatus.—See I.

XX.—MEDICINAL SUBSTANCES; ESSENTIAL OILS.

Stability of aspirin. T. G. STATHOPOULOS (Praktika, 1931, 6, 229–234; Chem. Zentr., 1932, i, 548).—After exposure to light for several months aspirin contained a little salicylic acid, the quantity gradually increasing. Analysis of aspirin should include determinations of acetylsalicylic, salicylic, tartaric, and oxalic acids. A. A. E.

Fixation of iodine by official tinctures as a method of characterisation and evaluation. F. MORVILLEZ and E. LECLERCQ (J. Pharm. Chim., 1932, [viii], 15, 273–280).—The amounts of I absorbed by various tinctures (a) in aq.-alcoholic solution after addition of AcOH , (b) after treatment with dil. AcOH , evaporation, and addition of H_2O , with or without AcOH or NaHCO_3 , and (c) to form I compounds decomposed by $\text{Na}_2\text{S}_2\text{O}_3$, are const. and fairly characteristic for different tinctures, but decrease when the tincture is kept. R. S. C.

Modification and change of composition of quinine iodobismuthate on lixiviation with water. G. VITA and BRACALONI (J. Pharm. Chim., 1932, [viii], 15, 281–286).—In the prep. of amorphous quinine iodobismuthate (B., 1925, 780) four washings with H_2O suffice. The salt is decomposed by prolonged agitation or extraction (at 80–85°) with H_2O thus: $2\text{BiI}_3 \cdot \text{Q} \cdot 2\text{HI} + 2\text{H}_2\text{O} = 2\text{BiIO} + \text{Q} \cdot 2\text{HI} + 4\text{H}$ (Q = quinine). R. S. C.

Determination of nitroglycerin in drug preparations (acid distillation method). E. L. ANDERSON (J. Assoc. Off. Agric. Chem., 1932, 15, 140–145).—Material representing about 0.03 g. of nitroglycerin is mixed with 50 c.c. of saturated aq. Na_2SO_4 and 150 c.c. of H_2O . After being made just acid to litmus with 10% H_2SO_3 the mixture is distilled to dryness (using a trap) into 30 c.c. of 5% NaOH solution. The condenser is washed into the alkali, using 100 c.c. of H_2O , 2.0 g. of Devarda's alloy are added, and the NH_3 formed is distilled into 25 c.c. of 0.02N- H_2SO_4 , using a Kjeldahl flask with boiling H_2O through which the vapours pass as an additional trap. The excess acid is titrated with 0.02N-KOH, using methyl-red as indicator (1 c.c. of 0.02N- $\text{H}_2\text{SO}_4 \equiv 0.001514$ g. of nitroglycerin). W. J. B.

Colour reaction of aloes with nitric acid. G. MIKÓ (Magyar Gyóg. Társ. Ert., 1931, 7, 499–500; Chem. Zentr., 1932; i, 426).—The powdered aloes (0.2 g.) is dissolved in hot H_2O (5 c.c.); to the cold solution are added conc. HNO_3 (1 c.c.) and fuming HNO_3 (0.1 c.c.), when the interface is coloured green. On mixing, a red colour is followed by green. A. A. E.

Enzymes as a protection against disease. M. GHIRON (Giorn. Chim. Ind. Appl., 1932, 14, 176–177).—Hepatic lipases of full-grown and fattened pigs have considerable activity. Lipases from young pigs, calves,

and horses are less active. The remarkable resistance of adult pigs to human tuberculosis might be related to lipase activity.

O. F. L.

Pharmaceutical analysis. XI. Detection and determination of enzymes in pharmaceutical preparations. C. A. ROJAHN and J. A. MÜLLER (Pharm. Ztg., 1932, 77, 381—383, 404—408, 416—418).—Methods most suitable for pharmaceutical preps. containing the following enzymes are described: plant and animal lipases, amylases, and proteases, invertase, maltase, lactase, emulsin, zymase, peroxidase, and catalase.

F. O. H.

Loss in activity and formation of turbidity in pepsin wines. W. BRANDRUP (Pharm. Ztg., 1932, 77, 519—520).—If pepsin wines come in contact with metals, especially Sn, Fe, or Cu, they very quickly develop a turbidity and loss in activity probably due to an alteration in the dispersion of the pepsin. If metal filters or containers are used in their prep. they should not be employed after the pepsin solution has been added, when only paper is suitable for filtration. Contact of the finished wine with talc, asbestos, or enamel is detrimental to the stability. Suitable procedure is outlined.

E. H. S.

Determination of small quantities of morphine in acetylsalicylic acid-morphine mixtures. E. SCHULEK and F. SZEGHÖ (Pharm. Zentr., 1932, 73, 241—243).—1 g. of the mixture (0.5—3% of morphine) is dissolved in 5 c.c. of 10% aq. NaOH and warmed for 2—3 min. on the water-bath. The cooled liquid is titrated with *N*-HCl until just yellow to thymol-blue (p_H 9.15) and washed into a separating funnel. The total vol. (about 10 c.c.) is extracted 5 times with 15 c.c. each time of $Pr^2OH-CHCl_3$ mixture (1:3). The dried, filtered extract is shaken twice with 5 c.c. of 0.8% aq. $NaHCO_3$ each time and the washings are shaken with 3—4 c.c. of $CHCl_3$ which are added to the main extract. The solvent extract is conc. to 5 c.c., 10 c.c. of 0.02*N*- H_2SO_4 are added, the remainder of the solvent is evaporated, and excess H_2SO_4 is titrated with 0.02*N*-NaOH, using methyl-red. With Na salicylate instead of acetylsalicylic acid the initial treatments with NaOH and HCl are omitted.

E. H. S.

New reaction for aconitine and the total alkaloids in aconite. C. BRUGEAS (Ann. Falsif., 1932, 25, 147—149).—A modification of de Monti's test is used to distinguish between aconitine and an extract of total alkaloids of aconite is described. The residue extracted by $CHCl_3$ from alkaline liquors is added to H_2SO_4 (1 c.c.), the mixture heated for 5 min. on a water-bath, a crystal of resorcinol added, with further heating for 20 min. In each case a stable red-violet colour is produced. On transferring to a beaker and neutralising with Na_2CO_3 , aconitine gives a colourless solution with a blue fluorescence, whilst total alkaloids give a purple solution with strong green fluorescence.

H. R. J.

Alkaloid determination in Semen sabadilla. F. GSTIRNER (Pharm. Ztg., 1932, 77, 509).—A method is used similar to that described previously for Solanaceae drugs (cf. B., 1932, 206), which eliminates the necessity for double Et_2O extraction and gives a fat-free alkaloid which is titrated with 0.1*N*-HCl, using methyl-red.

E. H. S.

Toxicological investigation of mercury and lead. L. W. RISING and E. V. LYNN (J. Amer. Pharm. Assoc., 1932, 21, 225—229).—Time is a negligible factor in the disappearance of either Hg or Pb present in animal tissues (stomachs of freshly-killed sheep) at the time of death. Preservation with either $EtOH$, 10% CH_2O , 1% aq. $HgCl_2$, saturated aq. As_2O_3 , or embalmers' cavity fluid, or exposure of the unpreserved tissue to atm. conditions, does not interfere with the recovery of these elements; 92—98% should be recovered. Waldbott's modification of the Reinsch test for Hg is unsatisfactory.

E. H. S.

Determination of mercury in oil preparations of organo-mercurials. E. E. MOORE and E. F. SHELBERG (Ind. Eng. Chem. [Anal.], 1932, 4, 226).—The sample is shaken with light petroleum and conc. HCl, nearly neutralised with NH_3 , and the Hg is pptd. as HgS and weighed. The procedure has proved to be satisfactory for 4-nitroanhydrohydroxymercuri-*o*-cresol.

E. S. H.

Oils from South African Eucalypts. F. J. DE VILLIERS and C. P. NAUDE (Union S. Afr. Dept. Agric., Sci. Bull., 1932, No. 102, 20 pp.).—The characteristics of 58 oils obtained by steam-distillation of many species of South African Eucalypts and their commercial possibilities and applications are described. Medicinal, perfumery, and industrial oils which compare favourably with the corresponding Australian oils are obtained.

E. H. S.

Chalk [for tooth-paste].—See VII.

See also A., May, 480, Photochemistry of ergosterol. 510, Optically active β -keto- α -phenyl-propyl alcohol. 511, Sterols of ergot. 517, Bitter principle of neem oil. 522, Antiseptics and trypanocides. 523, Polymorphism of veronal. 525, Microchemical reactions of mescaline. 526, Synthesis of ricinine. Ergine. 527, Pheanthine. Derivatives of morphine, strychnine, and brucine. 540, Toxicities of local anaesthetics, and of pure nicotine. Barbituric acid hypnotics. Thio- and thiomethyl- NH_4 compounds. 541, Chinese anti-diabetic drugs. Cardiac glucosides of *Cheiranthus cheiri* and related species. Flavone compounds. 544, Yeast nucleic acid and its alkaloid salts. 547, Prep. of cryst. anti-beriberi vitamin. 548, Vitamin-D in irradiated milk.

PATENTS.

Manufacture of quinoline derivatives. I. G. FARBENIND. A.-G. (B.P. 367,952, 8.12.30. Ger., 6.12.29).—4-Aminoquinolines are converted into their *C*-alkylidene or -aralkylidene derivatives; these are also synthesised from corresponding 4-halogeno-compounds. Examples are: 4-chloro-6-ethoxy-2-octenylquinoline from the quinaldine and cœnanthaldehyde; 4-chloro-6-ethoxy-2-cinnamylquinoline, m.p. 129—131°, and the 4-amino-compounds, m.p. 185—187°; 4-chloro-6-ethoxy-2-pentenylquinoline and the 4-amino-compound, m.p. 110°; 4-amino-2-pentenylquinoline, m.p. 160°; 5:7-dichloro-4-amino-2-cinnamyl-6-methylquinoline, m.p. 205—206°; 4-amino-2-cinnamyl-4:6:8-trimethylquinoline, m.p. 228—229°; 4-amino-6-ethoxy-2-cinnamylquinoline, m.p. 221—222°; 4-amino-2-pentenyl-5:6:8-trimethylquinoline, m.p. 184—186°; 4-dimethylamino-6-ethoxy-2-cinnamylquinoline (B,HCl, decomp.

200°). The products are superior to 4-amino-2-styryl-quinolines as bactericides. C. H.

Manufacture of irradiated ergosterol of high antirachitic value. I. G. FARBENIND. A.-G. (B.P. 370,743, 18.6.31. Ger., 2.4.31).—Antirachitically inactive components of irradiated ergosterol are removed by treatment of the irradiated product with either maleic or citraconic anhydride followed by extraction of the additive compounds so formed with solvents in which the vitamin-*D* is insol. The vitamin may be purified by crystallisation from MeOH or COMe₂ and then may be dissolved in a vegetable oil. E. H. S.

Manufacture of [mouthpiece] materials for the cigarette industry. CHEM. FABR. VON HEYDEN A.-G. (B.P. 370,807, 4.9.31. Ger., 15.9.30).—A mouthpiece material consisting of a thin foil of cellulose ester, coloured with a dye, pigment, or metal powder, etc., is treated with alkali to cause superficial hydrolysis on one or both sides of the foil, which can then be united with the cigarette paper by means of a H₂O-sol. adhesive. E. H. S.

Manufacture of 2-oxyacetic acid-benzimidazole-arsonic acids [2-carboxymethoxybenzimidazole-arsinic acids]. I. G. FARBENIND. A.-G. (B.P. 367,708, 22.7.31. Ger., 22.7.30).—A benzimidazole-arsinic acid is condensed with a halogenoacetic acid. The prep. of 2-carboxymethoxybenzimidazole-5-arsinic acid, m.p. 275° (decomp.), and its 1-Me derivative, m.p. 308° (decomp.), is described. C. H.

Surgical dressings. JOHNSON & JOHNSON (GT. BRITAIN), LTD. FROM JOHNSON & JOHNSON (B.P. 371,125, 16.3.31).

Esters of di- and tri-ethylene glycols [for perfumes].—See III.

XXI.—PHOTOGRAPHIC MATERIALS AND PROCESSES.

Photography in explosives.—See XXII.

See also A., May, 444, **Infra-red photography**. 460, **Light-sensitive surface layers**. 479, **Notable sensitisations**. Action of nuclei of AgI at emulsification. Photochemical decomp. of Ag halides. 491, **Recording reactions between electrolytes**.

PATENTS.

Light-sensitive materials. KALLE & Co. A.-G. (B.P. 371,153, 7.4.31. Ger., 4.4.30).—Diazo-type printing papers are protected from dirt and damage by sticking on the sensitive (or on both) sides a thin (0.005 mm.) sheet of cellulose hydrate or other derivative. Solutions of resins may be used as adhesive. The covering has no detrimental effect, and the papers may be developed by the gaseous or wet processes. J. L.

Photochemical production of aluminium printing forms. DR. BEKK & KAULEN CHEM. FABR. G.M.B.H. (B.P. 370,608, 13.3.31. Ger., 17.3.30).—The colloid coating may easily be removed, by 10% aq. H₃PO₄ or HNO₃, from Al printing forms when the latter have been treated before coating with acid-free solutions of salts of trivalent metals, e.g., Al, Cr, or Fe sulphates, and, in particular, alums such as K Al alum etc. Etching may be done with a mixture of H₃PO₄ and conc. (> 70%) FeCl₃ solutions. J. L.

Colour photography. TECHNICAL MOTION PICTURE CORP., Assees. of L. T. TROLAND (B.P. 370,908, 12.1.31. U.S., 1.2.30).—Two (or three) emulsion layers, sensitive to different parts of the spectrum and having differing solubilities, are superimposed on one support, the usual filter dyes being incorporated. After exposure and development a composite positive print is made; the top layer is then dissolved off, and the second ("red") negative left available. Two positives and a negative are similarly obtained in 3-colour work. By subtraction processes, two or three negatives are finally obtained from which complete colour prints are made. The combinations of emulsion layers used are, e.g., collodion (sol. in EtOH or Et₂O), gelatin (sol. in hot H₂O), and hardened gelatin (insol.); or gelatin sol. in warm H₂O, gelatin sol. in hot H₂O, and hardened gelatin. J. L.

Colour photography. W. R. REID and H. V. A. BRISCOE (B.P. 370,999, 18.10.30).—Three-colour photographs made with three images superposed on a single support are produced with isolating layers of celluloid etc. between the images. Such layers are made by coating the celluloid in a solvent upon each image after it has been placed in register. In order to ensure good adherence of the celluloid and the next superposed image the celluloid surface must be coated with a substratum of gelatin in solution in AcOH and MeOH, or alternatively the isolating layer may consist of a mixture of gelatin (20–35%) and celluloid, a suitable solvent, e.g., COMeEt (purified by digestion with Ag halide, and distillation), being added to the emulsion to be superposed. J. L.

Colour photography. G. S. WHITFIELD, and ILFORD, LTD. (B.P. 371,009, 16.12.30 and 10.7.31).—Three-colour photography with two emulsions is obtained by coating the front of a film support with a stripping blue-sensitive emulsion, and the back with a two-colour (red and green) screen, preferably of the linear type, with a panchromatic emulsion on top. The emulsions may be on separate supports bound together. Positives are made from the panchromatic negative by printing through red and green filters respectively. J. L.

Photographic production of pictures. KODAK, LTD., Assees. of J. G. CAPSTAFF (B.P. 371,077, 9.2.31. U.S., 25.2.30).—Two-colour pictures are obtained by coating a film base on each side with a sensitive Ag halide emulsion in hardened gelatin, each emulsion being further coated with sol. gelatin layers, which layers are preferably permanently coloured. After exposure and development the Ag images are bleached in a bath which simultaneously hardens the top gelatin layers differentially corresponding to the images. The Ag salts and sol. gelatin are dissolved in thiosulphate and hot H₂O respectively, leaving the clear two-colour image. J. L.

Packing for photographic plates. I. G. FARBENIND. A.-G. (B.P. 372,925, 27.4.31. Ger., 26.4.30. Addn. to B.P. 333,864).

Electrodeposition of Ag.—See X.

XXII.—EXPLOSIVES; MATCHES.

Testing of explosives. E. AUDIBERT (Safety in Mines Res. Brd., Paper No. 74, 1932, 30–49).—Unstemmed charges of "grisoudynamite couche salpêtrée

à 2%” of const. d (1.30) and const. diam. (30 mm.), but of variable wt., p , and at variable distances, x , from the mouth of the mortar, were fired by direct initiation into an atm. of 8–10% CH_4 . The vals. of the “probability of ignition,” R , tabulated and shown graphically in terms of x and p , show that when x is const. R is a constantly increasing function of p , whilst with const. p it is a first increasing, and then decreasing, function of x . When shots of “grisounaphthalite couche salpêtrée à 5%” and “grisoudynamite couche salpêtrée à 5%” were fired under similar conditions in an atm. containing coal dust, the influence of p and x on R was as before, the surface of equal probability of the equation $Z = R(p, x)$ having qualitatively, at least, the same form as when the shots were fired into CH_4 . Every variation of the diam. of the charge (and of the borehole) necessitates a modification of the positions occupied by the two surfaces of $Z = R(p, x)$, when the atm. contains CH_4 and coal dust, respectively, and it is shown how two “critical charges” for CH_4 and dust may be obtained for every diam. of an unstemmed charge fired directly at a distance x from the mouth of the borehole. These crit. charges should be standardised and should replace the existing charge limits, which represent vals. wrongly attributed to the explosive.

W. J. W.

Investigations on the igniting power of explosives, carried out in the experimental mine at Gelsenkirchen. E. BEYLING (Safety in Mines Res. Brd., Paper No. 74, 1932, 49–64).—Tests with Wetter-detonit-*A* and -*B* and Wetter-Wasagit-*B* in excavated chambers in an atm. containing 8.5–9.5% CH_4 gave no ignitions, even with considerable variation of the free space, when direct initiation was employed, but with intermediate or inverse initiation ignitions occurred, although not invariably. In shot holes of equal depth the probability of ignition increases with increase of charge, notwithstanding a reduction in the size of the flame, so that the flame is not a determining factor. The compression produced in front of a bore-hole was investigated by testing the deformation of Pb plates, placed at various distances. Results were inconclusive, but showed that compression does not vary as the increase of charge and therefore varies in the same way as the flame. A deposit on the plates may bear some relation to the cause of ignitions. Incomplete detonation of unstemmed shots was confirmed by flame photographs of Wetter-detonit-*B* fired in 90% O_2 and air, respectively. The ejection of solid particles was demonstrated by suspending toy balloons filled with a mixture of CH_4 and O_2 (1 : 2) in front of the shot-hole. Ignitions occurred at distances beyond the range of flame or compression, whereas a balloon suspended in the middle of the flame failed to ignite. Photographs with a stationary and a flame-speed camera of the conditions of detonation of Wetter-detonit-*B* in glass tubes confirmed that the explosive flame is produced solely by portions of the charge between the charge and the mouth of the bore-hole.

W. J. W.

Application of Schlieren photography in researches on explosives. W. PAYMAN (Safety in Mines Res. Brd., Paper No. 74, 1932, 65–67).—Supplementing an address by Beyling (cf. preceding abstract), the author declared that such factors as flame, hot

gases, compression, and solid particles may provoke firedamp ignitions, but no particular one is a necessary cause. Flame and Schlieren photographs were shown and described.

W. J. W.

PATENTS.

Priming mixture. J. D. McNUTT, Assr. to WINCHESTER REPEATING ARMS CO. (U.S.P. 1,825,466, 29.9.31. Appl., 28.10.30).—Witherite is partly or wholly substituted for artificially produced BaCO_3 as a stabilising agent, its abrasive properties eliminating the necessity for using ground glass. A suitable composition contains Hg fulminate 35.5, $\text{Ba(NO}_3)_2$ 45, Pb(SCN)_2 16, witherite 3.5, and BaCO_3 0.5%.

W. J. W.

Preparation of explosive charges. O. MATTER (B.P. 370,600, 9.3.31. Ger., 21.5.30).—A solution of the explosive in an org. solvent is run into a moving, non-solvent liquid which is miscible with the former, the pptd. granular product, after washing and drying, being heated so as to avoid complete fusion and to yield a mass with granules in suspension, which is cast into moulds. The processes may be carried out under pressure.

W. J. W.

Manufacture of shot-cartridge cases. IMPERIAL CHEM. INDUSTRIES, LTD. (B.P. 370,506, 14.1.31. Can., 6.3.30).—The cases are first coated with a cellulose ester composition and then impregnated with a waterproofing agent, e.g., paraffin, this being applied to the ends of the cases and absorbed into the interior by capillary attraction. Prior coating with the cellulose ester composition ensures better adherence than if the cases are first impregnated.

W. J. W.

XXIII.—SANITATION; WATER PURIFICATION.

Determination of benzene in air. K. R. DIETRICH (Chem. Fabr., 1932, 5, 11).—In the apparatus described the air is drawn through two columns containing a layer of EtOH superimposed on a layer of 60 c.c. of conc. H_2SO_4 containing 0.02 c.c. of 40% CH_2O . A brown ring forms at the liquid-liquid interface in a given time, when the amount of C_6H_6 vapour in the air exceeds 0.01%, the safety limit.

E. S. H.

Chemical and bacteriological examination of the London waters, Jan.—Dec., 1931. (SIR) A. HOUSTON (26th Ann. Rept. of Metropolitan Water Board, 1932, 40 pp.).—Tabulated results indicate that the quality of the water supply of London has been adequately maintained, the beneficial effect of storage being emphasised. A method is given for the determination of *Streptococcus* in conjunction with *B. coli*. This test is considered of val. in distinguishing between pollution of human and of bird or animal origin, the proportion of *B. coli* to *Streptococcus* being much higher in human faeces than in the excreta of, e.g., gulls. Experimental work on O_3 with a plant capable of dealing with 5120 gals. of water per hr. indicates that, although more expensive than Cl_2 , it gives excellent sterilisation; it improves the water both chemically and physically and has taste-removing properties, even with potentially tasting waters, e.g., those containing traces of PhOH. Attention has also been given to the use of activated C and Krause's oligodynamic method. Excellent results were obtained, but the latter method is considered too

expensive for large-scale work and the water treated must be clear to avoid fouling the deposit and so diminishing its efficiency. An outbreak of paratyphoid fever at Epping due to a portion of the sewage effluent entering the last tributary of the R. Lea above the Board's intake was effectively dealt with by removing the pollution at its source. A suggestion that the high content of *B. paratyphosus* (B) in the sewage effluent was due to its multiplication in the soil of the irrigation plots was shown to be unfounded. C. J.

Elimination of manganese in [water] reservoirs. P. W. FRISK (J. Amer. Water Works' Assoc., 1932, 24, 425—435).—The decomp. of org. matter in a large artificial lake is considered to be the cause of the dissolution of Mn and Fe from the deposited sludge. The Mn was removed by treatment with KMnO_4 and Cl_2 and coagulation with Na aluminate, Na_2CO_3 , and alum. It is hoped to minimise future trouble by drawing off the lower layers of water in the reservoir before the autumn turn-over. C. J.

Selective nature of activated carbon for deodorising the water supply at Rahway, N.J. M. M. GIBBONS (Eng. News-Rec., 1932, 108, 391—392).—Filtration experiments with a 24-in. layer of granular C indicated that at rates > 4 gals. per sq. ft. per min. woody and medicinal tastes and odours could be completely eliminated from water, but a cucumber odour caused by the algæ *Synura* was only reduced in strength. On a full plant scale pulverised C was used and allowed 3 hrs.' contact in the secondary coagulation basins which precede the filters. The cucumber odour was completely eliminated only when prechlorination was applied in conjunction with a dose of 4 p.p.m. of C. Doses of 5 p.p.m. were observed to shorten the filter runs and the C proved difficult to remove from the sand with wash-water velocities up to 24 in. per min. (Cf. B., 1931, 656.) C. J.

Causes of death of salmon and sea trout smolts in the estuary of the River Tees. B. A. SOUTHGATE, F. T. K. PENTELOW, and R. BASSINDALE (Biochem. J., 1932, 26, 273—284).—The main directly toxic substances discharged into the Tees Estuary are tar acids and cyanides from coke-oven effluents. S. S. Z.

Presumptive [*B. coli*] test in water analysis. C. RITTER (J. Amer. Water Works' Assoc., 1932, 24, 413—424).—The addition of 0.8 c.c. of a saturated EtOH solution of basic fuchsin to a litre of standard lactose broth has proved a satisfactory modification of the test for routine use, showing 94.5% of confirmed presumptives as against 57.6% reported by other workers. The selective action of the basic fuchsin is most marked in chlorinated surface-tap effluent samples. A seasonal variation in non-confirming tubes was observed, with a max. from November to May. The possible causes of non-confirming positives may be the masking of the *coli-aerogenes* organisms on the confirmatory plates by *B. pyocyaneus* or *B. fluorescens*, an alteration in their appearance caused by the metabolic activities of other organisms present, or the presence of symbiotic complexes. C. J.

Detection of sulphite waste liquor in sea-water. H. K. BENSON and W. R. BENSON (Ind. Eng. Chem.

[Anal.], 1932, 4, 220—223).—At relatively high concns., the ordinary analytical methods (e.g., for dissolved O_2 , SO_4^{2-} content, and colour) may be used for the approx. determination of sulphite waste liquor, when compared with a reference sample. At low concns., the O_2 consumed and the biochemical O_2 -demand vals., when compared with similar vals. for unpolluted sea-water of the same locality, may be used for detection of sulphite waste liquor. p_{H} vals. ascertained colorimetrically vary in the same manner as the equiv. acid required to give a const. p_{H} beyond the buffering range of sea-water. E. S. H.

Action of sea-water on mild steel.—See X.

See also A., May, 491. **Sensitive reagent for Fe-group metals in mineral waters.** 510, **Substituted phenols and germicidal activity.** 522, **Antiseptics and trypanocides.** 545, **Mono-ethers of dihydric phenols as bactericides.**

PATENTS.

Sewage treatment. Complete sewage-treatment plant with submerged contact aerators. K. IMHOFF (U.S.P. 1,820,976—7, 1.9.31. Appl., [A, B] 9.11.27. Ger., [A] 8.10.27).—(A) In order to delay the acid fermentation of fresh sewage solids, which is undesirable in the digestion process, and thus eliminate the necessity to remove the sludge at frequent intervals with consequent loss of heat in the digester, owing to the excess of H_2O , the freshly deposited solids are scraped from the sedimentation tank into a somewhat deeper basin placed at the inlet end thereof and are there mixed with a proportion of alkaline actively-digesting sludge from an adjacent secondary digestion tank. (B) The sewage is passed through plant arranged in the following order: screens, oil catcher, detritus tank, pre-settlement tank, submerged contact aerators, and final settlement tank, the last two vessels being repeated as required. The settlement basins are fitted with mechanical scrapers, and arrangements are made for the final sludge to be mixed with the incoming sewage and thus be intimately mixed with the pre-settlement-tank sludge before disposal by digestion. C. J.

Digestion of coarse substances left on sewage screens in the sewage treatment. K. IMHOFF (U.S.P. 1,820,978, 1.9.31. Appl., 9.11.27. Ger., 30.9.27).—The coarse screenings are intimately mixed with actively digesting sludge before being placed in the sludge-digestion tank. In this way the solids are broken up and incorporated with the mass of digesting sludge instead of forming a floating layer of undecomposed matter under the gas-collecting hood, as would otherwise occur. C. J.

Prevention of poisoning. LONZA ELEKTRIZITÄTSWERKE U. CHEM. FABR. A.-G. (B.P. 371,196, 27.5.31. Ger., 31.5.30).—Poisonous substances are mixed with capsaicin or chemically related compounds such as the hydroxybenzylamides of fatty acids, either alone or together with bile or its bitter-tasting components. Adherence of these substances may be increased by incorporation of compounds such as acetyl- or nitro-cellulose etc. E. H. S.

Coal carbonisation liquors.—See II.