

FEB. 1 and 8, 1935.\*



## I.—GENERAL; PLANT; MACHINERY.

**Blast furnace as chemical plant.** C. O. BANNISTER (Chem. & Ind., 1934, 991—996).—Examples are given of the use of the Fe blast furnace in producing valuable gases and chemicals. By using an O<sub>2</sub>-enriched blast and passing steam into the furnace N<sub>2</sub>-H<sub>2</sub> mixtures suitable for the synthesis of NH<sub>3</sub> can be obtained after conversion of the CO into H<sub>2</sub> by reaction with steam and a catalyst. KCl, I salts, and ZnO have also been successfully recovered from the fumes carried by the gases. Recently success has been obtained in smelting phosphate rock directly to Ca silicate slag with volatilisation of the P and its recovery as such or as P<sub>2</sub>O<sub>5</sub> or H<sub>3</sub>PO<sub>4</sub>.  
A. R. P.

**Waste-gas temperatures of rotary kilns.** R. FREY (Cement, 1934, 7, 265—278, 323—330, 349—358, 383—390).—A method is described for determining waste-heat losses and for precalculation of the heat consumption of rotary kilns, based on observations on kiln conditions. The data required for the calculation are: dimensions of the kiln and particulars of the interior fittings, daily output (I), analysis of the raw mix, H<sub>2</sub>O content of the raw material (II), and calorific val. of the coal (III). For the kilns examined, the factors influencing a decrease in heat consumption are, in the order of their importance, excess of air for combustion (IV), internal surface of the kiln (V), clinkering temp. (VI), (I), shell losses of the cooler (VII), (II), shell losses of the rotary tube (VIII), (III). The ash content of the coal, heat losses in the flue dust, and changes of operation through caking in the kiln, change of rotation speed, or change of position of the flame in the kiln have no influence. The factors influencing an increase in heat consumption are, in the order of importance, (VI), (IV), (V), (I), (II), and (VII), (VIII), (III). In improving the fuel economy of old-type kilns, 20—25% reduction of heat consumption is obtained by use of a flame with a max. temp. possible for the kiln lining. Other saving is only possible by use of interior fittings (e.g., chains) or auxiliary apparatus. Tables and examples are given from the data on several kilns.  
T. W. P.

**Costing of heat insulation.** O. KREBS (Chem.-Ztg., 1934, 58, 1001).—The method of calculating the relative costliness of different heat-insulating coatings for pipes conveying hot liquids and similar plant, allowing for the differences in heat conductivity and price of material, cost of application, durability, economic loss due to loss of heat, etc., is illustrated by means of examples.  
D. R. D.

**Recent developments in sampling dusts.** H. L. GREEN (Bull. Inst. Min. Met., 1934, No. 362, 21 pp.).—

Methods for determining the no. of dust particles in air have been examined. The modified slit-ultramicroscope, sedimentation cell, and photographic Aitken methods give concordant results for particles 0.2—2 μ diam. For the collection of dust particles from air the Greenburg-Smith impinger has an efficiency of 40%, the circular konimeter 31—46% under direct and 49—64% under dark-ground illumination, and the Owens jet dust counter 41%. A thermal dust sampler with an efficiency of 100%, in which a stream of dust-containing air is passed through a channel opposite sides of which are formed by cover slips between which is a horizontal, electrically heated wire, has been developed. The dust is pptd. on the cover slips. Soot, tar, etc. is removed by igniting the slips, which are then mounted on slides for examination. The instrument has been used for the collection of dust formed in stone masonry and the size-frequency and concn. of some dusts of this kind are given. In the average industrial process with a dust hazard in this country the no. of particles < 0.2 μ diam. is too small to be of practical significance.  
D. K. M.

**Volatile solid filters for dust-sampling.** (Miss) J. W. MATTHEWS and H. V. BRISCOE (Bull. Inst. Min. Met., 1934, No. 362, 12 pp.).—Filters for the collection of dust from air consist of beds of (A) BzOH, (B) C<sub>10</sub>H<sub>8</sub> crystallised from EtOH, (C) anthracene crystallised by slowly cooling a hot CCl<sub>4</sub> solution, C being most suitable. These filters have an efficiency of > 98%; at least a considerable proportion of particles of the order 1 μ diam. are retained. A suffers from the disadvantage of corroding the Zn and brass parts of the filter, whilst B in beds by a process of spontaneous recrystallisation or in contact with EtOH becomes in time too coarse-grained for satisfactory filtration. C is readily volatilised in a current of air at 150—180°, leaving the dust for microscopical or other examination. The use of volatile solid filters for ordinary and micro-analytical filtrations and of solid CO<sub>2</sub> filters for collecting bacteria from air is indicated.  
D. K. M.

**Organic matter in boiler feed-water treatment.** D. K. FRENCH (Ind. Eng. Chem., 1934, 26, 1319—1323).—Large-scale tests show that tannin (I) extract delays the pptn. of CaSO<sub>4</sub> in a boiler, thus preventing blockage of feed-lines, and causes its deposition in a non-cryst. condition. The addition of (I) + NaOH and Na<sub>3</sub>PO<sub>4</sub>, the latter in quantity < equiv. to the hardness of the H<sub>2</sub>O, inhibits scale formation, apparently through the (I) pptg. CaSO<sub>4</sub> before it has reacted. A similar addition softens old scale. Tannates (II) also reduce either by acting as non-electrolytes or by O<sub>2</sub> absorption. Several trials reported confirm the reality of the latter effect.

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



(II) are also beneficial against caustic embrittlement and foaming. C. I.

**Water-jet pumps.** ZIENER (Chem.-Ztg., 1934, 58, 979—981).—The lowest pressure attainable with such pumps is 10—12 mm. Hg. Pumps can be tested for performance with a gas-meter or by determining the time required to exhaust a 1-litre flask with known  $H_2O$  pressure. A pump with 3-mm. nozzle, using 6 litres of  $H_2O$  per min., should reduce the pressure to 10—12 mm. Hg in 4 min. with  $H_2O$  at  $1\frac{1}{2}$  atm., or in 2 min. at 3 atm. Not many pumps will work with  $H_2O$  at 1 atm. without the  $H_2O$  sucking back. In any case a non-return valve should be provided on the vac. line. Design of jet is discussed and illustrated. Glass pumps are cheaper than those of metal, and the non-transparency of the latter is a disadvantage. C. I.

**Pump for delivering liquids at low constant rates.** H. TROPSCH and W. J. MATROX (Ind. Eng. Chem., 1934, 26, 1338).—A laboratory pump designed for delivering 100—400 ml. of petrol per hr. consists of a small Cu bellows operated by a motor, valves formed by stainless-steel balls on ground-glass seats, and a flow equaliser. The last-named is a glass reservoir feeding a capillary. Deviation of rate of flow from constancy is  $\pm 1\%$ . C. I.

**Application of physico-chemical principles to design of liquid-liquid contact equipment. III. Isothermal flow in liquid wetted-wall systems.** R. FALLAH, T. G. HUNTER, and A. W. NASH (J.S.C.I., 1934, 53, 369—379 T).—A wetted-wall tower which can be used for effecting contact of two liquids counter-currently is described, and the hydrodynamics of this system and a single liquid wetted-wall system have been investigated in detail. The wall-liquid (I) layer thickness for isothermal streamline flow of (I) with a stationary liquid or gas core was found to be given by  $m = [3W\mu/g\rho_f(\rho_f - \rho_c)]^{1/3}$ , where  $m$  is the thickness,  $W$  the wt. rate of (I) in g./sec. cm.,  $\mu$  the viscosity of (I), and  $\rho_f$  and  $\rho_c$  the density of (I) and core fluid, respectively. The velocity at the interface between (I) and a stationary fluid core was a max. when (I) was in isothermal streamline flow. Using a stationary air core the change from streamline to turbulent flow of (I) occurred at a val. of Reynolds no. between 1600 and 2000. Using a stationary liquid core this change took place at vals. of 27 and 10 for a modified Reynolds no. with kerosene and reagent white oil cores, respectively. The modified Reynolds no. employed was taken as  $4mv(\rho_f - \rho_c)/\mu$ , where  $v$  is the average velocity of (I) in the (I) layer. The change from streamline to turbulent flow occurred at a const. val. for the film thickness of  $m = 0.05$  cm. for  $H_2O$  flowing down a vertical wall through either a stationary air or liquid core. The core, although stationary, was never completely at rest because of local currents set up in it due to the motion of (I). These local currents could cause a stationary liquid core to become turbulent at quite low rates of flow of (I).

**Washing in filtration.** F. H. RHODES (Ind. Eng. Chem., 1934, 26, 1331—1333).—The washing of a filter cake by  $H_2O$  falls into two stages, viz., (1) displacement washing, during which the concn. of the sol. material

in the effluent is const., and (2) diffusion washing, during which this concn. falls. If  $C'$  is the concn. at the beginning of stage (2),  $F$  the rate of flow, and  $L$  the thickness of cake, then the concn. at any time  $t$  is:  $C = C'e^{-kFt/L}$ .  $k$  is assumed to be const. for a given cake and solvent, and, as determined experimentally, varies but little with  $F$  and  $L$ . C. I.

**Removable protected-bottom strainer.** ANON. (Paint Var. Prod. Man., 1934, 11, No. 6, 10).—The wire cloth is fixed inside the strainer by means of clamps, being thus protected and at the same time easily removable. D. R. D.

**Effect of entrainment on plate efficiency in rectification.** F. H. RHODES (Ind. Eng. Chem., 1934, 26, 1333—1335).—An equation is developed for expressing the effect of a known amount of entrainment ( $E$ ) on the efficiency of a fractionating plate at known reflux ratio on the assumption that  $E$  and the molal rates of vapour and of reflux are const. throughout the column, and further that the vapour leaving each plate is in equilibrium with the liquid in that plate. The latter assumption may be untrue. In this case a const. giving the ratio of the actual to the theoretical composition difference between vapour and liquid is incorporated. Two distillations made with the same liquids in the same column, but having different reflux ratios, enable  $E$  to be calc. Equations are extended to the exhaust section of a continuous still. C. I.

**Laws of evaporation.** MISSENAUD-QUINT (Compt. rend., 1934, 199, 1023—1024).—The quantity of liquid evaporating from unit area of the surface of a liquid in unit time is given by  $M = \beta(F - f)/(H - F)$ , where  $F$  is the v.p. of the liquid,  $f$  its partial pressure in the atm., and  $H$  the total atm. pressure. The coeff.  $\beta$  is related to the convection coeff. ( $\alpha$ ) by the expression  $\beta = \alpha\delta/C$ , where  $\delta$  is the density of the vapour and  $C$  the sp. heat of the atm. at const. pressure. For  $H_2O$  evaporating in air,  $\beta = 2.6\alpha$ . J. W. S.

**Rust formation and stream lines. Boiler-plate corrosion.**—See X.

#### PATENTS.

**Retort.** D. D. SHELTON (U.S.P. 1,950,066, 6.3.34, Appl., 24.8.31).—A retort for cinnabar (*e.g.*) is provided with two furnaces, viz., (1) for preheating air in metal tubes to  $>$  the b.p. of Hg, (2) for heating walls of a metal retort ( $R$ ). The hot air is blown into the ore through apertured walls of  $R$ , and the Hg vapours and  $SO_2$  leave through a louvred wall which is given a continuous vertical reciprocating motion. An adjustable part of the products of combustion is passed through a dehydrator of the shelf-and-rake type directly superposed on  $R$  in which the ore is dried but not heated to the volatilisation point of HgS or Hg. Cinder is removed from the bottom of  $R$  by a screw conveyor having a Hg trap. B. M. V.

**Kiln.** H. M. ROBERTSON (U.S.P. 1,958,448, 15.5.34, Appl., 7.10.31).—An annular tunnel kiln is adapted to treatment of comminuted material which is fed continuously by gravity and removed by a suction nozzle reciprocating across the width of the bed. B. M. V.



**Tube still and furnace construction.** J. S. WALLIS, Assr. to ALCO PRODUCTS, INC. (U.S.P. 1,958,732, 15.5.34. Appl., 9.7.31).—A radiant-heat section of comparatively large tubes is provided above the combustion chamber, the tubes being arranged in vertical banks connected in series; superposed on these is a horizontal bank of smaller tubes, the series being completed by a convection section of small tubes beyond a high firebridge.

B. M. V.

**Storing and using heat [of steam plants].** J. J. GREBE, Assr. to DOW CHEM. CO. (U.S.P. 1,959,286, 15.5.34. Appl., 7.7.30).—At periods of low load a mass of  $\text{Ph}_2\text{O}$  and pigs of Fe ( $M$ ) are heated by stack gases from a main boiler system ( $A$ ). At heavier loads,  $\text{H}_2\text{O}$  at a pressure  $\ll$  that of  $A$  is heated by  $M$  and separated into steam ( $S$ ) and feed- $\text{H}_2\text{O}$  for  $A$ ,  $S$  being superheated by contact with the hottest parts of  $M$  and utilised.

B. M. V.

**Heat-exchange apparatus.** A. ZISKA, Assr. to A. O. SMITH CORP. (U.S.P. 1,959,120, 15.5.34. Appl., 18.2.32).—An inverted pail ( $P$ ) formed with treble walls, the annular spaces serving for heating medium, is rotated in a body of liquid ( $L$ ) to be heated. The small end of  $P$  is constructed as a spider to permit circulation of  $L$ , and scrapers are provided inside and out.

B. M. V.

**Heat-transfer apparatus.** J. E. MACADAMS (U.S.P. 1,958,899, 15.5.34. Appl., 30.6.31).—The heat-receiving liquid is passed upwards between a pair of sheets which at the entrance edge are spaced 0.05–0.10% of their height and gradually diverge upwards to allow for increasing vol. of vapour. The liquid is admitted in such quantity that practically none is left on arrival at the top edge. A no. of these units may be arranged abreast with inlet and outlet bus-pipes at the diagonal corners.

B. M. V.

**Manufacture of combustion and heat-transferring unit.** P. H. SEGNETZ, Assr. to SHALER Co. (U.S.P. 1,958,803, 15.5.34. Appl., 3.3.32).—A composition giving slow, flameless combustion independent of atm. and therefore suitable for tyre-vulcanising plant comprises (by wt.): fine quick-burning C 2 pts., granular slow-burning C 2,  $\text{KClO}_3$  2,  $\text{NaBO}_3$  1 pt. It is mixed dry and pressed with an aq. binder into a metallic dish, through the bottom of which the heat mostly passes, the mass soon becoming covered with a crust of ash.

B. M. V.

**Dryer.** P. R. PERKINS (U.S.P. 1,959,061, 15.5.34. Appl., 16.6.33).—A rotary cylindrical dryer is heated externally at the upper end by combustion gases, which afterwards pass through the shell into internal longitudinal flues and at the lower end diffuse into the material being dried.

B. M. V.

**Drying of sugars and other hygroscopic material.** A. L. JOHNSTON, JUN., and R. T. NORTHCUTT, Assrs. to FOOD CONCENTRATES, INC. (U.S.P. 1,958,702, 15.5.34. Appl., 29.8.30).—The solution is spray-dried in a down-flow of heated gas and cooled by an upflow of dry, cold gas through the deposited particles.

B. M. V.

**Coal, coke, and similar crushers.** BRIT. JEFFREY-DIAMOND, LTD., and H. WOODHEAD (B.P. 420,162,

26.5.33).—A breaker plate for a single-roll crusher is described.

B. M. V.

**Homogenisers.** H. M. DUNKERLEY, and BRUSH ELECTRICAL ENG. CO., LTD. (B.P. 420,437, 27.5.33).—Annular members together forming a "crusher head" through which the fluid is forced under high pressure are forced towards each other by the intervention of a thin-walled tubular part under tension, within which is a rod under compression, whereby "hunting" due to the pulsations of the pump is avoided.

B. M. V.

**Mixing machine.** F. J. BULLOCK, Assr. to PAPEC MACHINE Co. (U.S.P. 1,958,939, 15.5.34. Appl., 12.2.32).—The granular material (*e.g.*, cattle food) is charged to the stem ( $S$ ) of a funnel-shaped vessel and carried up into and circulated within the conical part ( $C$ ) by means of a helical blade extending axially through both, its upper part being surrounded by a sleeve. The mixed material is withdrawn through the wall of the lower part of  $C$ .

B. M. V.

**Apparatus for classifying finely-divided material for size.** H. E. T. HAULTAIN (B.P. 419,875, 25.6.34).—Ball valves are placed between the various collecting chambers ( $C$ ) of an elutriator, with detachable rubber tubes below them so that the  $C$  can be removed to empty them.

B. M. V.

**Grading of finely-divided material [*e.g.*, sand].** R. A. MILLER, Assr. to PITTSBURGH PLATE GLASS Co. (U.S.P. 1,959,212, 15.5.34. Appl., 17.11.31).—The material, *e.g.*, sand for grinding plate glass, is kept in suspension and stratified by upward hydraulic current ( $C$ ) in a conical vessel, and the grade required is withdrawn from the appropriate level by a siphon ( $S$ ) which is counterbalanced automatically to adjust the level for changes in pulp density and in which the initial velocity of flow =  $C$  at that level.

B. M. V.

**Air separator.** T. J. STURTEVANT, Assr. to STURTEVANT MILL Co. (U.S.P. 1,958,726, 15.5.34. Appl., 7.3.31).—A circulation of air is produced up an inner chamber ( $I$ ) and down an outer chamber ( $O$ ), both being annular, by means of a fan in an upper chamber connecting them. The material is centrifugally fed to the lower part of ( $I$ ), the coarse drops out in ( $I$ ) and the fine continues down ( $O$ ) out of the circulation.

B. M. V.

**Apparatus for separation of powdered or granular materials.** J. and J. GREENWOOD, and J. B. HOLTGATE (B.P. 419,964, 29.5.33).—A pneumatic shaking table is in the form of an approx. horizontal screen ( $A$ ) (of silk in the case of flour and middlings) through which the fine heavy material passes and over which the coarse material slides; the fine light ( $L$ ) material is carried away in the air longitudinally of  $A$  and preferably concurrent with the flow of material, the air current being guided by a shield ( $B$ ) and afterwards turning up to an expansion chamber in which  $L$  settles out on the upper surface of  $B$ , from which it is removed by brushes.

B. M. V.

**Mechanism for separating intermixed divided materials.** K. DAVIS, Assr. to PEALE-DAVIS Co. (U.S.P. 1,959,125, 15.5.34. Appl., 13.1.23. Renewed 11.5.29).—A pneumatic shaking table ( $T$ ) is provided with a dust-collecting hood substantially as large as



*T* at the entrance and considerably enlarged at a more remote place to permit settlement of dust. B. M. V.

**Apparatus for dust separation.** C. F. HIRSHFELD (U.S.P. 1,958,577, 15.5.34. Appl., 12.6.30).—Various forms of spiral conduit having skimming devices on the outer wall are claimed, the cross-section of the main conduit being progressively reduced. B. M. V.

(A, B) **Centrifugal separators.** (c) **Centrifugal sludge-separator bowls.** AKTIEB. SEPARATOR (B.P. 417,372—4, [A] 17.5.34, [B, C] 18.5.34. Swed., [A, B] 18.5.33, [C] 18. and 19.5.33).—(A) The parts of the conveying devices and the discharge openings which are exposed to the influence of the solid material are lined with WC to diminish wear. (B) A flanged collar is mounted on the bearing of the spindle which drives the conveying device, forming a small chamber which communicates with the interior of the bowl (B) through a narrow opening and with a chamber surrounding B through channels of comparatively large cross-section. Liquid under treatment is thereby prevented from coming in contact with the bearing. (C) A centrifugal separator having conical discs (C) and a mechanical transporting device (D), by which the sludge is conveyed to the orifices, is provided with a distributing space between C and D. A. B. M.

**Filtering apparatus.** D. TEATINI (B.P. 420,021, 30.6.33. Belg., 12.7.32).—In a filter press, to increase the effective surface and form a uniform cake of limited thickness, the filter medium is corrugated, the corrugations being preferably supported by wire helices wound to a triangular section. Methods of folding the cloth to adapt it to clamping between planar edges of the frames are described. B. M. V.

**Apparatus for decolorising and filtering liquids.** C. TRETIG (U.S.P. 1,957,303, 1.5.34. Appl., 23.4.30. Renewed 13.12.33).—A tank contains the following zones or parts, in order downwards: (1) an agitator, (2) a swirl breaker, (3) a quiet intermediate zone, (4) a sludge rake, (5) a perforated plate or textile protector to (6) a filter bed. A sludge outlet extends centrally through (5) and (6). Superatm. pressure is applied above and/or a vac. below. B. M. V.

**Filtration of liquids.** J. AUSTIN, and BODDINGTONS' BREWERIES, LTD. (B.P. 419,963, 27.5.33).—A filter element (E) is fitted into the plug of a cock (C) in such a manner as to filter the liquid during its withdrawal from a vessel. When C is closed E can be removed without dismantling C. A. WE.

**Manufacture of filter elements.** M. A. GOLDMAN, Assr. to COMMERCIAL FILTERS CORP. (U.S.P. 1,958,268, 8.5.34. Appl., 29.12.30).—Claim is made for the method of laying a yarn on a pervious, tubular core. B. M. V.

**Separators for liquids having different specific gravities.** H. A. THOMPSON (B.P. 419,712, 16.4.34).—The settling chambers are of ovate form and the mixed liquid is admitted to each in a swirling but non-turbulent manner. An automatic valve is described which is controlled by a float slung by a straight-line motion on one end of a lever, at the other end of which is a counterweight having arcuate travel whereby the leverage varies slightly. B. M. V.

**Homogenising [maintaining homogeneity of] aqueous dispersions.** A. SZEGVARI, Assr. to AMER. ANODE, INC. (U.S.P. 1,958,118, 8.5.34. Appl., 18.7.27).—An emulsion is continuously withdrawn from the upper part of a dipping tank (T) or other vessel containing substantially quiet fluid and passed through a filter; fresh supplies are then added to the filtrate and the temp. is adjusted prior to return to the lower part of T. A suitable overflow gutter for T is described. B. M. V.

**Vacuum distillation.** E. H. PAYNE and C. C. MILLER, Assrs. to STANDARD OIL CO. (INDIANA) (U.S.P. 1,958,547, 15.5.34. Appl., 17.4.30).—In a single outer casing in which a vac. is maintained are a no. of double-concentric tubes alternately for heating (A) and cooling (B). The cold feed (e.g., oil) is passed down the annulus and up the inner of B, thence passing as hot feed (H) to the outside of A in film form. Heating fluid is passed up the annulus and down the inner of A; condensates are collected from the outside of B at different levels, and therefore of different b.p. Residuum is recycled with H. B. M. V.

**Apparatus for concentrating liquids under vacuum.** P. C. LEMALE (B.P. 419,511, 9.4.34).—A vac. pan is controlled manually by adjustment of valves in the inlet pipe for liquor, and on the delivery side of the conc.-liquor extraction pump, the latter conduit being also provided with a non-return valve. B. M. V.

**Apparatus for spray evaporation or cooling of liquids and semi-liquids.** SOC. DE RECHERCHES ET DE PERFECT. INDUSTR. (B.P. 420,411, 31.1.34. Ger., 7.2.33).—Liquid is sprayed by a centrifugal rotor and caught on curved blades attached to another rotor of greater diam. rotating at less speed and heated at a suitable temp. B. M. V.

**Film evaporation of liquids.** C. BERGELL (B.P. 419,566, 13.12.33).—The liquid is allowed to flow downwards in a thin but continuous film over a hollow guiding surface (S) and is heated mainly from a surrounding radiating surface (R), though a mild heat may be applied to the interior of S preferably by injection of steam, which afterwards mingles with the vapours in the annular space between S and R. Examples of its use are: a benzine-fat solution is distilled without steam, only the benzine being removed; an edible nut oil is deodorised with steam, little distillation taking place; a bone-fat fatty acid is distilled right down to pitch, using steam at 300–500°, and preheating the feed to 270°, the exit vapours being at 280°. In none of these cases is a vac. necessary. B. M. V.

**Viscosity meter.** W. ALBERSHEIM and H. S. KONHEIM (U.S.P. 1,958,878, 15.5.34. Appl., 17.5.28).—The pressure upstream of a sharp-edged orifice (O) is maintained const. by a bellows valve and the pressure at a point between O and a frictional restriction is measured by a gauge which may be calibrated in terms of  $\eta$ . B. M. V.

**Apparatus for washing gases and bringing gases and liquids into intimate contact.** R. & J. DEMPSTER, LTD., and J. W. SCOTT (B.P. 420,281, 25.6.34).—In combination with other filling devices (e.g., wood wool)



brushes composed of bristles inserted into a rope-like core and bent to any desired shapes are provided.

B. M. V.

**Dissolution and apparatus therefor.** [Scrubbing of gases.] S. P. MILLER, Assr. to BARRETT Co. (U.S.P. 1,958,586, 15.5.34. Appl., 23.7.30).—A gas containing a sol. constituent is moved countercurrent to a solvent (*S*) through a no. of compartments (*C*). *S* is kept at a const. level in each *C* and an intense spray is formed in the gas spaces by rotating rolls. Spray collectors are situated between *C*.

B. M. V.

**Apparatus for scrubbing gas.** R. MACLAURIN, R. & J. DEMPSTER, LTD., I. M. MACLAURIN, and BLAIRS, LTD. (B.P. 419,967, 7.7.33. Addn. to B.P. 386,089; B., 1933, 208).—A centrifugal gas scrubber has brushes (*B*) placed spirally around the outside of each element. The liquor sprayed from any element is deflected by a stationary baffle plate on to *B*, which causes a secondary atomisation.

A. WE.

**Apparatus for separating the constituents of gaseous mixtures.** C. C. VAN NUYS, Assr. to AIR REDUCTION Co., INC. (U.S.P. 1,958,554, 15.5.34. Appl., 14.12.33).—A scheme for separating three gases [viz., (I), (II), (III) in descending order of b.p.] comprises selective liquefaction with back-flow in 2 steps, obtaining mixtures *A* and *B*, and a final complete liquefaction, obtaining *C*. *B* is then rectified with *C*, to give pure gas (III) and liquid rich in (II), which latter is mixed with *A* and rectified to yield (II) as gas.

B. M. V.

**Separation of gaseous mixtures.** I. H. LEVIN (U.S.P. 1,959,030, 15.5.34. Appl., 24.7.30).—A system for the resolution of air (*e.g.*) is described in which the cold losses are made up by a separate refrigerating system acting on part of the feed air.

B. M. V.

**Conversion of gases or gas mixtures at high temperatures.** C. EYMANN, Assr. to KOPPERS Co. OF DELAWARE (U.S.P. 1,957,254, 1.5.34. Appl., 7.9.31. Ger., 8.9.30).—The contact mass is heated by high-frequency currents induced in a conductor wound about its container. Cooling of the converted gas is effected by indirect heat exchange with the ingoing gas; the apparatus is especially suitable for gas (*e.g.*, CH<sub>4</sub>) which needs to be heated and cooled very rapidly.

B. M. V.

**Apparatus for analysing gaseous mixtures.** A. M. KENNEDY, Assr. to MOTO-VITA CORP. (U.S.P. 1,959,242, 15.5.34. Appl., 11.10.28).—Gases, *e.g.*, exhaust gases from an internal-combustion engine, are tangentially admitted to and exhausted from a circular chamber (*C*), forming a vortex which draws in air through an axial inlet. Within *C* are a pair of equal hollow bodies connected to a differential manometer, one of them being covered with a catalyst to promote combustion.

B. M. V.

**Drum with removable head for vapours under pressure.** H. J. KERR, J. PRENTICE, and W. A. JONES, Assrs. to BABCOCK & WILCOX Co. (U.S.P. 1,958,582, 15.5.34. Appl., 16.11.28).—The drum is provided with a head (*H*) that is screwed into the shell (*S*) and made fluid-tight by a weld at the adjoining edges of comparatively thin extensions of *H* and *S* and at such a distance from the screw that different radial expansion will not break the weld.

B. M. V.

**Belt dressing.** J. A. WEBB, Assr. to J. A. WEBB BELTING Co., INC. (U.S.P. 1,958,220, 8.5.34. Appl., 5.2.32).—The dressing comprises blown cottonseed or other semi-drying vegetable oil of viscosity 10–45 min. Saybolt, with, if desired, tar, asphalt, rosin, pitch, or gum.

B. M. V.

**Apparatus for ascertaining temperature of hot bodies.** B. F. ANTHONY (U.S.P. 1,958,879, 15.5.34. Appl., 31.10.29).—A light source illuminated by electric lamps supplied with a variable current through an ammeter (*A*) is viewed simultaneously with and matched to the hot body, both rays passing through a monochromatic filter. *A* may be calibrated in temp.

B. M. V.

[Paper] **heat insulation [for refrigerator cabinets].** C. G. MUNTERS (B.P. 419,637, 23.2.34. Swed., 1.3.33).

**Gravity-concn. apparatus. Distillation of hydrocarbons.**—See II. Tunnel kilns.—See VIII. Brick kilns.—See IX. Boiler-plate steel.—See X. Separating particles from gases.—See XI. Mill-starch treatment.—See XVII.

## II.—FUEL; GAS; TAR; MINERAL OILS.

**Chemistry of coal. VII. German brown coals and Irish peat.** W. A. BONE and L. J. TEI (Proc. Roy. Soc., 1934, A, 147, 58–67).—Four typical German brown coals and an Irish peat, when subjected to heat and C<sub>6</sub>H<sub>6</sub> pressure extraction, behave similarly to other brown coals already studied (B., 1928, 840). Evidence is obtained in support of the conclusion that the main "coking constituent" of bituminous coals have originated in the phenols and phenolic esters of brown coals.

L. L. B.

**Spontaneous oxidation of coal and other organic substances.** F. G. EDMED, F. H. NEWINGTON, and R. C. FREDERICK (Chem. & Ind., 1934, 1048–1049).—The production of CO in the air-drying of boiled linseed oil (Haldane *et al.*, B., 1935, 4) and of large concns. of CO<sub>2</sub> (with almost complete O<sub>2</sub> absorption) by moist (not necessarily green) vegetable matter in contact with a limited supply of air has been long established by earlier papers of the authors.

J. W. B.

**Destructive hydrogenation of coals.** I. B. RAPOPORT, D. B. ORECHKIN, and V. N. CHUFAROVSKI (Khim. Tverd. Topl., 1934, 5, 83–91).—Results are recorded for powdered sapromyxites from Barzas and Moscow coals.

CH. ABS. (e)

**Hydrogen problem in the hydrogenation of fuels.** L. JACQUÉ (Ann. Off. nat. Comb. liq., 1934, 9, 7–38; Chem. Zentr., 1934, i, 3947).—A discussion of sources of H<sub>2</sub>.

H. J. E

**Active charcoals from spruce, pine, and bamboo.** T. H. LIANG, C. F. KI, and L. O. IAO (Bull. Soc. chim., 1934, [v], 1, 1233–1241).—The woods were soaked in 40% ZnCl<sub>2</sub>, 20% H<sub>3</sub>PO<sub>4</sub>, and 35% H<sub>2</sub>SO<sub>4</sub> for various periods before carbonisation at 800–900°, and subsequently washed and in some cases activated in steam at 600–800°. The *d* of the C varies with the wood and the solution used. The absorption of chloropicrin (I) from a current of air by the C was determined. The



absorptive power (II) is not correlated with  $d$ , and activation with steam greatly improved the (II) of C from soaked wood only. There are sp. optimum periods of soaking. Spruce wood soaked for 2 days in 40%  $ZnCl_2$  afforded C of which 1 g. absorbed 0.5 g. of (I) in 22 min. under the conditions described. J. G. A. G.

**Hydrogenation of low-temperature tar and tar products.** F. S. SINNATT (Gas J., 1934, 208, 433—438).

—Work in progress at the Fuel Research Station is described (cf. King and others, B., 1933, 6; 1934, 227). Some details are given of the design and operation of an internally (electrically-)heated continuous converter working at 480°/200 atm. and capable of treating about 1 cwt. of crude low-temp. tar per day, and of an atm.-pressure plant for the reduction of tar acids, e.g., cresylic acid, to hydrocarbons, having a throughput of about 4 litres/hr. The latter plant comprises two vertical converters, 4 ft. long and 5 in. in diam., heated by flue gases; the catalyst (bauxite- $MoO_3$ ) deteriorates rapidly and has to be revived after operation for about 6 hr. by heating at 500—550° in a current of air and steam. A. B. M.

**Gelatinised tars and bitumens.** DA FANO (Asfalti, 1934, 6, 40—43; Chem. Zentr., 1934, i, 3823).—The formation of gelatinous masses from fluid mineral oils by addition of Na stearate is applied to coal-tar and mineral pitches (I). (I) so treated possess a much lower penetration than untreated (I); the drop point of (I) may be raised to 180° without affecting the consistency, hardness, or other properties. J. S. A.

**Rôle of the emulsifier in bitumen emulsions.** A. W. RICK (Teer u. Bitumen, 1934, 32, 113—115; Chem. Zentr., 1934, i, 3823).—The emulsifier remains dispersed in the bitumen (I) after evaporation of the  $H_2O$  as a filiform structure, which can modify the elastic, thermal, and ageing properties of (I); it is, however, too fine to diminish its  $H_2O$ -resistance. J. S. A.

**Rapid determination of the acidity of dark petroleum products.** B. M. RUIBAK and N. S. MAKUSHINSKAYA (Nef. Choz., 1933, 25, No. 9, 42—43).—20 c.c. are shaken with 40 c.c. of neutralised EtOH and the mixture is placed in a bath at 50—60°. The cold EtOH extract is treated with 10—15 c.c. of a mixture of EtOH and  $C_6H_6$  (1 : 4) and titrated with 0.1N-EtOH-NaOH. CH. ABS.

**Determination of sulphur in petroleum products by the lamp method.** G. I. CHERNOV and B. N. SOBOLEV (Nef. Choz., 1933, 25, No. 9, 55—56).—The apparatus described has a closed container for combustion in presence of purified air, and a device for admission of air with  $O_2$ . CH. ABS.

**Desulphurisation of shale gasolines by catalytic hydrogenation at atmospheric pressure.** S. S. NAMETKIN, P. I. SANIN, and A. N. TZUIBA (Goryuch. Slantzui, 1934, 4, No. 2, 40—44).—Metallic and metal oxide catalysts gave better results than metal sulphides. A mixture of  $Cr_2O_3$  and reduced Fe ore was best. CH. ABS. (e)

**Water-tolerance of mixtures of gasoline with ethyl alcohol, isopropyl alcohol, and benzene.**

C. H. BAYLEY and C. Y. HOPKINS (Canad. J. Res., 1934, 11, 505—519).—The  $H_2O$ -tolerance of a mixture at a given temp. is defined as the difference between the actual  $H_2O$  content and the crit.  $H_2O$  content at that temp. Curves are given showing the crit.  $H_2O$  contents at any temp. between 20° and —50° for a wide range of mixtures of three different petrols with EtOH and  $Pr^iOH$  and with EtOH and  $C_6H_6$ . The mixtures contained 60—90% of petrol with varying proportions of the other two constituents.  $Pr^iOH$  causes a marked increase in the crit.  $H_2O$  content, and hence in  $H_2O$ -tolerance, of petrol-EtOH mixtures. If half the EtOH in a given mixture is replaced by  $Pr^iOH$  the crit.  $H_2O$  content at —20° is increased by about 60%. The effect of  $C_6H_6$  on  $H_2O$ -tolerance is too slight to be of practical val. for that purpose. M. S. B.

**Use of mixtures of gasoline with ethyl and isopropyl alcohols in internal-combustion engines.**

M. S. KUHRING (Canad. J. Res., 1934, 11, 489—504).—In engine tests on petrol by the C.F.R. motor method the increase in antiknock val. ( $V$ ) on adding EtOH is  $>$  the increase due to addition of  $Pr^iOH$ , and mixtures of the two obey the mixture rule. When detonation is suppressed there is little further increase in power obtained by raising  $V$  without raising the compression ratio also. Sp. fuel consumption is higher with EtOH- or  $Pr^iOH$ -petrol mixtures than with petrol for some types of petrol, e.g., aviation petrol. Addition of  $PbEt_4$  to the mixtures increases  $V$ , but not to the same extent as when added to petrol alone. M. S. B.

**Relation between degree of refining of motor oils and their behaviour in the engine.**

H. RAMSER and H. KREKELER (Angew. Chem., 1934, 47, 765—768).—A 15-h.p., 4-cylinder, stationary test-engine, in which the crankcase oil is heated to 110° by an electric heater, is used under prescribed conditions to accelerate the ageing of lubricating oils (I). The latter is drained out for examination after 21 hr. or 50 hr. A no. of specially refined (I) prepared from light and heavy lubricating oil distillates by treatment with  $SO_2$ ,  $SO_2$ -benzol, or  $H_2SO_4$ , were compared. The degree of refining (II) of (I) had no marked influence on oil consumption or C formation in the engine, while the physical properties, acid and sap. vals. of the used oils showed no characteristic differences. Sludge formation (III) is governed by (II) and in this respect solvent-refined oils (IV) were superior to acid-refined oils and good commercial motor oils. Earth treatment of (IV) did not lessen (III). No relation was found between (III) and the Conradson vals. of the fresh oils. C. C.

**Petroleum thinners.**—See XIII. Saginaw  $H_2O$  [and oil-field pollution].—See XXIII.

PATENTS.

**Gravity-concentration (A) process and (A, B) apparatus for the wet concentration of coal.** G. J. DE VOOYS (B.P. [A] 420,367 and Addn. B.P. [B] 420,427, 24.5.33. Ger., [A] 4.6. and 26.9.32).—(A) The heavy liquid is a near-emulsion of clay and barytes in  $H_2O$ ; it is supplied to an intermediate level of the separating vessel and withdrawn both from the upper level and from the casing of a bucket elevator (E) which withdraws



the sink. (B) *E* and a rake conveyor for withdrawing the float are described in more detail. B. M. V.

**Production of fuel briquettes.** L. J. J. HAZELZET (B.P. 418,944, 1.1.34. Holl., 2.1.33).—Anthracite dust etc., the ash of which contains  $\text{SiO}_2$  or silicates, is briquetted with a suitable binder, an agent, e.g., borax, capable of forming a fused mass with the ash being added in amount sufficient to produce a coherent but still frangible skeleton of ash when the combustible constituents of the briquettes are completely burned.

A. B. M.

**Manufacture and use of binders for binding aggregates such as briquettes.** L. R. L. SQUIRE and C. J. GOODWIN (B.P. 417,923, 16.1.33).—The material to be briquetted is mixed with a binder made by treating peat containing hydrocellulose (I) with alkali to bring it to the neutral or only slightly alkaline condition, and the mixture is briquetted and dried at a temp., e.g., 100–125°, high enough to render the binder insol. in  $\text{H}_2\text{O}$ , but below that at which the (I) is decomposed. A natural peat derived from sphagnum moss (II) may be used; if a peat deficient in (I) is used a small quantity of (II) may be added thereto.

A. B. M.

**Carbonisation of solid carbonisable material.** I. H. DERBY and H. R. HORNER, Assrs. to P. C. REILLY (U.S.P. 1,948,515, 27.2.34. Appl., 4.1.30).—A vertical retort (*R*) opens at its upper end into a carbonising chamber (*C*) which may be heated either internally or externally. The bottom of *R* is formed by a lift which raises the charge in such a manner that successive portions are brought into *C*, wherein the coking operation is completed. The coke is removed at suitable intervals by means of a ram which shears off the layer of material projecting into *C* and pushes it into an adjacent cooling chamber. The heating gases and volatile products of carbonisation pass down through the charge and are withdrawn from the bottom of *R*. A no. of vertical rods fixed within *R* form channels in the charge to facilitate uniform heating thereof by the gases passing through. By using a carbonising temp. of 700° in *C* coal is converted into a hard but easily ignited coke suitable for use as a domestic fuel.

A. B. M.

**Retort settings for carbonisation of coal and like carbonaceous materials.** F. J. WEST, E. WEST, and WEST'S GAS IMPROVEMENT Co., LTD. (B.P. 418,316, 4.5.33).—A vertical cylindrical casing contains two similar self-contained units, each consisting of a vertical retort with its own gas producer, and combustion and waste-gas circulating chambers. Each unit occupies approx. one half of the cross-sectional area of the casing, the arrangement permitting one unit to serve as a standby for the other.

A. B. M.

**Method of operating retort to produce coke, gas, and oil.** A. W. WARNER (B.P. 417,704, 2.2.34. U.S., 2.2.33).—Coal is fed continuously down a vertical retort (*R*) which is heated internally by the injection thereto at a suitable level either of hot gases or of a combustible gas and air (and, if desired, steam) in such a manner that the plastic layer takes the form of a hollow vertical cone. A central core of coke is fed into *R*, so that the top of the plastic cone is maintained open, i.e., permeable to gases, and the volatile products formed within the cone can

pass freely into the upper part of *R* where they mix with the low-temp. volatiles formed outside the plastic zone. These gases and vapours serve to preheat the fresh incoming fuel and are withdrawn through an offtake at the top of *R*. Steam may be injected at the bottom of *R*, where the coke is continuously withdrawn.

A. B. M.

**Operation of retorts and chamber ovens.** C. STILL GES.M.B.H. (B.P. 418,095, 12.1.34. Ger., 12.1.33).—In the method of operation in which provision is made for withdrawing the distillation products (*A*) produced in the interior of the charge, separately from those (*B*) which collect in the gas space of the chamber, by suction through ducts connected to vertical channels formed in the charge, the whole of *A* and *B* are withdrawn together through the collecting main for *A* during the first few hr. of the coking period. The ducts are then placed in position and *A* and *B* are thereafter withdrawn separately.

A. B. M.

**Vertical chamber ovens for carbonisation of coal.** J. LOWE (B.P. 417,822, 10.1.34).—Each chamber (*C*) is provided with one or more vertical ducts (*D*) in the setting which communicate with the interior of the *C* by means of branch *D* and serve as gas offtakes to relieve gas pressures which may otherwise develop in the lower part of the oven. The upper ends of *D* are connected to the usual upper gas-offtake pipe of the *C*. The arrangement obviates the necessity for a separate bottom-outlet pipe. [Stat. ref.]

A. B. M.

**Degasification of solid fuels in intermittently operated chamber ovens.** CONCORDIA BERGBAU A.-G. (B.P. 419,125, 7.5.34. Ger., 6.5., 17.5., and 24.11.33, 16.1. and 6.3.34).—The ovens are provided with means (*A*) for withdrawing the volatile products rapidly through specially cooled channels, and other means (*B*) for submitting them, when desired, to a prolonged heat-treatment. *B*, e.g., may consist of a horizontal passage above the gas-collecting space, provided with controllable independent heating. By operating with *A* during the first part of the coking period and thereafter with *B* the yield of benzol may be increased.

A. B. M.

**Production of charcoal.** A. PAY and A. R. CLEMENTS (B.P. 418,048, 31.10.33).—Coffee-bean waste, unmalted barley, rye waste, etc. is cleaned and heated in suitable kilns or retorts in a limited supply of  $\text{O}_2$ . A highly porous *C* of low ash content is produced.

A. B. M.

(A, B) **Treatment of carbonaceous material (A) for recovery of volatile constituents and smokeless fuel.** H. T. WRIGHT (B.P. 419,370—1, 11.5.33).—(A) Coal, lignite, etc. is carbonised in a vertical retort (*R*), the heat necessary for the process being obtained by the partial combustion of the material with air, which is introduced into *R* at a level considerably above the grate. The volatile products are withdrawn from the top of *R*. The coke below the fire zone is cooled, e.g., by means of  $\text{H}_2\text{O}$ -jackets, and means, e.g., a cutter bar, are provided for ejecting the coke from the bottom of *R*. (B) A mechanism is described for automatically ejecting the coke and simultaneously charging fresh raw material into *R* at suitable time intervals.

A. B. M.

**Refining liquid products of destructive distillation of coal.** GRAY PROCESSES CORP. (B.P. 418,472, 14.12.33. U.S., 15.12.32).—Light oils derived from the



carbonisation of coal, *e.g.*, crude benzols, are refined by first removing the unstable fraction of b.p.  $< 80^\circ$  and then treating the remainder in the vapour phase with an agent, *e.g.*, fuller's earth or aq.  $\text{ZnCl}_2$ , capable of polymerising the gum-forming constituents. A. B. M.

**Destructive hydrogenation of carbonaceous materials and recovery of oils from the residues of said treatments.** INTERNAT. HYDROGENATION PATENTS Co., LTD., Assecs. of I. G. FARBENIND. A.-G. (B.P. 417,757, 10.2.34. Ger., 29.4.33).—Residues from the destructive hydrogenation of coal etc., to which, if desired, diluents are added, are continuously centrifuged in stages, in such a manner that the oil obtained in the first stage ( $S_1$ ) still contains substantial amounts, *e.g.*,  $> 2\%$ , of solid constituents which are separated from the oil in a second stage ( $S_2$ ). The residue from  $S_2$  is returned to  $S_1$ , and the residue from  $S_1$  is subjected to heat-treatment, *e.g.*, carbonisation at  $500^\circ$  in presence of steam, to recover oils therefrom. A. B. M.

**Manufacture of fuel gas from hydrocarbon oils and steam.** CARBURETTED GAS, INC. (B.P. 417,734, 17.10.33. U.S., 6.6.33).—A generator contains a porous bed of refractory material ( $A$ ) which is heated by burning a mixture of oil and air in the upper part of the generator and passing the hot gases down through  $A$ , and/or by the combustion of  $C$  previously deposited on  $A$ . Oil alone is then introduced to effect a further deposit of  $C$  on  $A$ , and steam and oil are then passed separately or together through the hot bed whereby they are converted into  $\text{CO}$  and  $\text{H}_2$ . When  $A$  has cooled to a temp. at which undesired reactions begin the cycle of operations is repeated. If desired, the gas-making run may be continued until the gas contains a predetermined content of gaseous hydrocarbons. A. B. M.

**Treatment of combustible gas.** W. W. ODELL (B.P. 418,779, 14.9.33).—Combustible gases containing unstable olefine hydrocarbons, *e.g.*, butadiene, are pre-heated to  $150\text{--}425^\circ$ , then admixed with the hot gases obtained by the combustion of a part of the original gas, and the hot mixture, now at  $300\text{--}800^\circ$ , is passed through a bed of solid refractory material ( $M$ ), whereby the unstable hydrocarbons are converted into stable products. The process is preferably carried out under increased pressure, *e.g.*,  $50\text{--}175$  lb./sq. in., and in presence of small quantities of steam,  $\text{O}_2$ , and  $\text{SO}_2$ .  $R$  may be coated with  $\text{Al}_2\text{O}_3$ ,  $\text{Fe}_2\text{O}_3$ ,  $\text{Al}_2(\text{PO}_4)_3$ , or other suitable catalyst. A. B. M.

**Gas purification and the like.** D. K. DEAN Assr. to FOSTER WHEELER CORP. (U.S.P. 1,957,251, 1.5.34. Appl., 1.11.28).—The gas, *e.g.*, petroleum vapour being cracked, is injected into a loose mass of comminuted material ( $M$ ) which is thereby dispersed among it.  $M$  and the absorbed or adsorbed impurities are caught on a permeable wall ( $W$ ) on which previously deposited  $M$  forms a filter medium.  $W$  is preferably an upright cone and the flow is upwards and outwards. A. B. M.

**Removal of hydrogen sulphide from gases.** C. EYMANN, Assr. to KOPPERS Co. OF DELAWARE (U.S.P. 1,957,253, 1.5.34. Appl., 20.8.31. Ger., 21.8.30).—

The gases are scrubbed with (1) a regeneratable aq. suspension of metal (*e.g.*,  $\text{Fe-Zn-Mn}$ ) hydroxides, and (2) an aq. solution of a thionate (I) to remove  $(\text{NH}_4)_2\text{S}$  and the like. The elemental  $\text{S}$  obtained in the treatment by and regeneration of (1) is washed with the solution from (2) to remove metal salts. Some of the  $\text{S}$  from (2) is burned to  $\text{SO}_2$  and used to form  $(\text{NH}_4)_2\text{SO}_4$  and re-form (I). B. M. V.

**Gas calorimeter.** C. GRAY (B.P. 417,856, 15.3.33).—The gas is supplied at a const. rate to a Bunsen burner the air supply to which is adjusted until the mixture "pops" continuously when it comes in contact with a pilot flame. This crit. air supply, which is recorded on a calibrated indicator, gives a measure of the calorific val. of the gas. A. B. M.

**Distillation of tar.** E. A. DAVIES (B.P. 417,652, 7.3.34).—Tar is distilled in a long, narrow, horizontal chamber ( $C$ ) arranged at the side of a gas-retort setting and containing flat, horizontal heating coils through which waste gases from the setting are circulated. The tar flows continuously through  $C$ , passing over sills arranged at spaced distances therein. The vapours are led to a condensing system and the residue is discharged into a tank which may also be provided with heating coils. A. B. M.

(A) **Dehydration, (B, c) distillation, of tar.** S. P. MILLER, Assr. to BARRETT Co. (U.S.P. 1,958,583—5, 15.5.34. Appl., [A] 14.3.27, [B] 29.12.28, [C] 3.5.29. Renewed [B] 7.3.34).—(A) Tar is dehydrated by contact with freshly made coal gases in such quantity and at such temp. ( $160^\circ$ ) that the majority of the volatile oils remain in the tar; after condensation and separation the oil from the vapours may be mixed with the tar. (B) Tar is distilled by a method similar to (A) but with gases at higher temp., precautions being taken to prevent carbonisation of the pitch by heat radiated from the gas-supply pipes. (C) The heat from the gases is transmitted to the tar through a wall, the gas side of which is flushed at intervals with hot tar or pitch to remove deposits. B. M. V.

**Production of aqueous emulsions of bitumen, pitch, or tar.** E. ROUAULT (B.P. 419,358, 5.4.33. Fr., 5.4.32).—An "oil-in- $\text{H}_2\text{O}$ " type of emulsion is prepared by mixing tar, bitumen, etc. with  $\geq 30\%$  of  $\text{H}_2\text{O}$ , using as emulsifying agent either (a) a small quantity of an alkaline phenoxide and of amyloseous material (I), *e.g.*, flour or starch, which has been rendered sol. by treatment with alkali, or (b) a previously prepared mixture of a soap with such (I). The emulsion is stable and has the property of dissolving in oils, tars, etc. to give an emulsion of the inverse (" $\text{H}_2\text{O}$ -in-oil") type. Casein may also be added to the emulsion if desired. A. B. M.

(A) **Converting tar or pitch into coke.** (B) **Coking of tar or pitch.** S. P. MILLER, Assr. to BARRETT Co. (U.S.P. 1,958,277—8, 8.5.34. Appl., [A] 28.9.29, [B] 5.10.29).—Coking is effected continuously in an externally heated rotary drum ( $D$ ) provided with balls or other tumbling agitators and in a current of (A) hot fresh coal gases, with production on condensation of blended oil and tarry matter; and (B) hot combustion



gases, which after leaving *D* are scrubbed with the ingoing tar or pitch, producing clean oils on condensation.

B. M. V.

**Recovery of gasoline from natural gas.** H. S. COLE, JUN., and E. R. COX, ASSRS. to TEXAS CO. (U.S.P. 1,953,043, 27.3.34. Appl., 24.10.30).—Natural gas is passed counter-current to a downward stream of absorbent liquid (I) in a combined absorption and fractionation zone (II), the lower part of which is heated to fractionate the more volatile constituents absorbed. Gases and light vapours are first distilled from the rich (I) and returned to (II), after which gasoline is distilled from (I).

C. C.

**Continuous direct rectification of crude petroleum or other hydrocarbons.** E. A. BARBET (B.P. 419,849, 16.2.34. Fr., 16.2.33).—Crude petroleum or other hydrocarbon (from which light fractions may first be removed) is heated under moderate pressure, e.g., 1 kg./sq. cm., and rectified under the same pressure, each fraction then passing to an expansion chamber, whereby lighter constituents (I) are liberated and condensed while the heavier residues are collected separately. Suitable apparatus is described.

C. C.

**Refining [crude petroleum] oil.** S. E. CAMPBELL (U.S.P. 1,953,336, 3.4.34. Appl., 25.5.31).—The various fractions of crude petroleum are treated in turn with aq.  $\text{Na}_2\text{CO}_3$ , aq.  $\text{NaOH}$ ,  $\text{H}_2\text{SO}_4$ , and finally filtered through adsorbent clay. Lubricating oil stocks are first diluted with a lighter hydrocarbon which is finally distilled off.

C. C.

**Distillation of hydrocarbons etc.** C. G. STUPP, ASSR. to BARRETT CO. (U.S.P. 1,958,450, 15.5.34. Appl., 18.12.28).—Hydrocarbon liquid is sprayed upwards from a pool in the still (*S*) and hot gases, e.g., freshly made coal gas, are admitted also near the surface of the pool. The walls of *S* and the outlet passage are protected from formation of crusts by maintaining a rapidly travelling film of liquid, this motion and the spraying being preferably effected by a longitudinal high-speed rotor, *S* being elongated and connected direct to a no. of gas retorts.

B. M. V.

**Production of hydrocarbons of low b.p. by heat-treatment of mixtures of oils.** J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 420,235, 29.5.33).—Low-boiling hydrocarbons are obtained from hydrocarbon oils poor in H and boiling at  $> 200^\circ$  by passing them with an oil rich in H, together with a finely-divided catalyst (I), through a cracking zone at  $> 400^\circ$  and under pressure. The best types of (I) are metals of groups IV—VIII and their compounds, preferably in conjunction with carriers such as active C, fuller's earth, etc.  $\text{H}_2$  separated from the cracked gases may be added to the splitting zone.

C. C.

**Reducing the pour point of oils and manufacture of oils having a low pour point.** N. V. DE BATAAFSCHE PETROLEUM MAATS. (B.P. 419,820, 12.5.33. Holl., 5.7.32).—The pour point of oils, e.g., lubricating oils, is reduced by the addition of 0.1—1% of org. compounds consisting of 5- and/or 6-membered rings (I) with aliphatic side-chains (II) containing  $\leq \text{C}_{10}$ , such that when 1 ring is present  $> 1$  side-chain occurs and when  $> 1$  ring is present  $\leq 1$  side-chain occurs, while

N and/or O occur(s) in (I) or (II). Examples are: pyrogallol tristearate, rosolyl distearate, distearyl-alizarin, etc.

C. C.

**Treatment of petroleum [acid] sludges.** K. S. RAMAYYA (U.S.P. 1,956,592, 1.5.34. Appl., 9.1.30).—After treatment of lubricating oil with fuming  $\text{H}_2\text{SO}_4$ , sludge containing  $\leq 10\%$   $\text{SO}_3$  and comprising (1) green org. acids, and (2) non-acid org. compounds, is rendered non-acid and separated into (1) and (2) by extraction with an alcohol  $\succ \text{C}_3$ , in 25—75% concn., (1) being relatively sol.

B. M. V.

**Neutralisation [of acid-treated hydrocarbon oils].** L. CALDWELL, ASSR. to CALIFORNIA FIRST NAT. BANK OF LONG BEACH (U.S.P. 1,952,622, 27.3.34. Appl., 9.9.30).—The oils are passed through wet, granular solid material, e.g., a mixture of a mineral containing  $\text{MgO}$ ,  $\text{Mg}(\text{OH})_2$ , or  $\text{MgCO}_3$  and siliceous material, the latter preventing caking of the reactive component (I).  $\text{H}_2\text{O}$ -sol. reaction products are formed which can be removed by washing with  $\text{H}_2\text{O}$ , thus reactivating (I).

C. C.

**Refining of hydrocarbon oils.** R. S. VOSE, ASSR. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,952,616, 27.3.34. Appl., 1.6.31).—Hydrocarbon oils, e.g., lubricating oils, are refined by agitation with 20—30 wt.-% of alkali metal at 100—250° for 5—48 hr. and filtering to separate the reaction products from the refined oil (I) and unused metal (II). (I) is separated from (II) by decantation and the latter used again.

C. C.

**Purification of hydrocarbon oils.** C. P. DUBBS, ASSR. to UNIVERSAL OIL PRODUCTS Co. (U.S.P. 1,952,703, 27.3.34. Appl., 11.7.30).— $\text{H}_2\text{S}$  and  $\text{CS}_2$  are removed from gases and low-boiling distillates (I) from cracking processes by passing through aq.  $\text{Ca}(\text{OH})_2$  (II). Thus, (II)  $\xrightarrow{\text{H}_2\text{S}}$   $\text{Ca}(\text{SH})_2 \xrightarrow{\text{H}_2\text{O}}$   $\text{Ca}(\text{OH})\cdot\text{SH} \xrightarrow{\text{CS}_2}$   $\text{Ca}(\text{OH})_2\cdot\text{CaCS}_3$ . Alternatively, aq.  $\text{NH}_4$  sulphide (III) may be injected into the cracked vapours of (I) mixed with uncondensable gases, whereby (III) in presence of  $\text{H}_2\text{S}$  reacts with  $\text{CS}_2$  forming  $\text{NH}_4$  thiocarbonate.

C. C.

**Treatment of hydrocarbon material to remove carbon disulphide therefrom.** YORKSHIRE TAR DISTILLERS, LTD., S. BILLBOROUGH, and J. S. BELFORD (B.P. 419,312, 22.5.33).—Benzol etc. is freed from  $\text{CS}_2$  and S by treatment with an aq. solution containing  $(\text{NH}_4)_2\text{S}_2$ , aq.  $\text{NH}_3$ , and preferably also  $(\text{NH}_4)_2\text{S}$ .  $\text{NH}_4\text{CNS}$  is recovered from the spent liquor.

**Purification of oil [used in electrical apparatus].** C. J. RODMAN and R. P. DUNMIRE, ASSRS. to BUCKEYEW TWIST DRILL Co. (U.S.P. 1,951,739, 20.3.34. Appl., 9.7.30).—Mineral hydrocarbon oils, particularly oils used for insulation purposes, are purified by heating to 32—71° and spraying at 60—200 lb./sq. in. into a chamber maintained under vac. (28—30 in. of Hg), whereby gases and moisture are released. The degasified oil is cooled to ppt. sol. sludges and filtered.

C. C.

**Treatment of hydrocarbon oils [cracked petroleum].** R. F. DAVIS, ASSR. to UNIVERSAL OIL PRODUCTS Co. (U.S.P. 1,941,251, 26.12.33. Appl., 1.6.31).—The products of low b.p. obtained in the cracking of petroleum are freed from unsaturated compounds by treatment at low temp. with liquid  $\text{SO}_2$  containing  $\text{SnCl}_4$  or  $\text{HgCl}_2$ .

A. R. P.



**Treatment of hydrocarbon oils.** A. LAZAR and J. M. EVANS, Assrs. to ASSOCIATED OIL CO. (U.S.P. 1,953,353, 3.4.34. Appl., 19.8.30).—Liquid non-hydrocarbons, *e.g.*, phenols and naphthenic acids, are removed from uncracked topped crudes or distillates (of sufficiently high boiling range that no loss by distillation will occur) by heating at 1 atm. to 315–370°, at which temp. org. acids are decomposed without decomp. of the hydrocarbons. The product is then refined by usual methods. The process is particularly suited to saturated oils, *e.g.*, those from the Edeleanu process. C. C.

**Treatment of hydrocarbon oils.** (A) W. M. STRATFORD, (B) V. N. JENKINS and W. M. STRATFORD, Assrs. to TEXAS CO. (U.S.P. 1,952,898 and 1,953,612, [A] 27.3.34, [B] 3.4.34. Appl., [A] 25.9.30, [B] 9.7.28).—(A) Hydrocarbon oil is preheated and brought in contact with an  $AlCl_3$  catalyst (I) below the conversion temp., whereby corrosive vapours, *e.g.*, HCl, are liberated and removed. The residual mixture of (I) and oil can now be heated to a temp. suitable for conversion, *e.g.*, by hydrogenation, without risk of corroding the conversion apparatus. (B) Higher-boiling hydrocarbons are converted into lower-boiling products (II), *e.g.*, gasoline, by heating above atm. pressure to about 482° and then adding 2–10% of an  $AlCl_3$  hydrocarbon catalyst, so that the contact time is a min. to effect conversion. (II) are vaporised and fractionated. C. C.

**Heat-treatment of liquid hydrocarbons, asphalt oils, and oils in general, or mixtures of the same, with methyl and ethyl alcohol, or mixtures of such alcohols.** E. LIVRAGHI (B.P. 420,370, 25.5.33. It., 16.9.32).—A plant is described for the continuous heat-treatment of liquid hydrocarbons etc., which comprises an externally heated steel chamber in which a series of perforated discs are arranged transversely to its axis and through which the liquid is rapidly forced and thereby converted into vapour, which is uniformly superheated (the pressure being only slightly > 1 atm.). C. C.

**Manufacture of antiknock motor fuels.** V. VOORHEES, Assr. to STANDARD OIL CO. (U.S.P. 1,951,780, 20.3.34. Appl., 12.5.32).—Motor fuels (I) or narrow-boiling fractions from (I) are separated into fractions of high and low knock ratings by cooling to such a temp. that a portion solidifies. The liquid portion (which has the higher knock rating) is separated from the solid paraffinic constituents. Alternatively, the petroleum distillate may be completely solidified (*e.g.*, by the addition of liquid  $C_2H_6$  as refrigerant and allowing the mixture to expand) and then progressively liquefied, the liquid distillate being collected and the solid residue rejected. C. C.

**Enrichment and burning of gaseous fuels of low heat value.** W. MATHESIUS (U.S.P. 1,958,671, 15.5.34. Appl., 17.4.30).—After an initial preheating to 648° (if necessary) the fuel is enriched with atomised liquid fuel and heated further to produce light cracking before combustion. B. M. V.

**Effecting [steam-hydrocarbon] chemical reactions at elevated temperatures.** J. S. BEEKLEY, Assr. to E. I. DU PONT DE NEMOURS & Co. (U.S.P.

1,959,151, 15.5.34. Appl., 30.9.30).—Steam (S) and  $CH_4$  are reacted in a catalyst mass which is externally heated by combustion of fuel gas and air; the issuing products of combustion are utilised to raise S.

B. M. V.

**Composition for removing carbon deposits [from internal-combustion engines].** C. A. THOMAS and C. A. HOCHWALT, Assrs. to THOMAS & HOCHWALT LABS., INC. (U.S.P. 1,949,588, 6.3.34. Appl., 18.7.30).—The preferred composition consists of equal wts. of highest test gasoline, denatured EtOH, benzol,  $C_{10}H_8Cl$ , and  $\beta\beta'-(C_2H_4Cl)_2O$ . H. A. P.

**Hydrogenation of hydrocarbon oils.** C. T. HARDING, Assr. to STANDARD-I. G. Co. (U.S.P. 1,951,792, 20.3.34. Appl., 30.10.30).—Petroleum fractions are hydrogenated for the production of low-boiling hydrocarbons at 482–595° and > 20 atm. in presence of a suitable catalyst, *e.g.*, oxides or sulphides of metals of groups II, IV, and VI. The heavier fractions (I) of the product are continuously recycled, the fresh oil and (I) being separately preheated to temp. governed by their thermal stability and then mixed in the reaction zone. C. C.

**Controlling the temperature in hydrogenation reactors.** J. CHRIST, Assr. to STANDARD-I. G. Co. (U.S.P. 1,951,725, 20.3.34. Appl., 26.9.30).—Sudden rises in temp. in the reacting mass during catalytic hydrogenation of hydrocarbon oils are controlled by reducing the pressure in the reaction zone at the instant of sudden pressure rise, *e.g.*, from 200 atm. to 135–175 atm. C. C.

**Lining for vessels holding oil.** G. EGLOFF and C. D. LOWRY, JUN., Assrs. to UNIVERSAL OIL PRODUCTS Co. (U.S.P. 1,952,705, 27.3.34. Appl., 18.7.29).—Oil-retaining vessels are protected against corrosion by a cementitious lining (I) to which is applied, before the latter has set, a thin layer of Al foil. For reaction chambers etc. the Al layer is covered with a further (I). C. C.

**Preparation of lubricating oils.** L. S. BONNELL, Assr. to STANDARD-I. G. Co. (U.S.P. 1,953,039, 27.3.34. Appl., 23.6.30).—The pour point of lubricating oils (I) is reduced, *e.g.*, from 0° to –12°, by the addition of 5–15% of hydrogenated cracking-coil tar (II). (II) may be blended with (I) and the mixture hydrogenated. Any light fractions formed during hydrogenation are separated, *e.g.*, by distillation. C. C.

**Lubricating oil.** H. T. BENNETT and LE R. G. STORY, Assrs. to MID-CONTINENT PETROLEUM CORP. (U.S.P. 1,942,636, 9.1.34. Appl., 23.7.28).—A mixture of a lubricating oil having a viscosity of 100–1000 sec. at 38° with 5–15% of naphtha and > 10 (1)% of Al stearate is claimed. A. R. P.

**Chlorination of paraffin waxes.** E. J. BARTH, Assr. to SINCLAIR REFINING Co. (U.S.P. 1,953,286, 3.4.34. Appl., 28.5.32).—Chlorinated paraffin waxes of light colour are obtained by chlorinating over  $H_2O$  containing an insol. carbonate, *e.g.*,  $MgCO_3$ ,  $CaCO_3$ , which reacts with the liberated HCl. C. C.

**Heating [of hydrocarbon] oils.** R. F. DORSCH, Assr. to GASOLINE PRODUCTS Co., INC. (U.S.P. 1,953,395, 3.4.34. Appl., 16.1.28).



Combustion unit. Crushers. Vac. distillation. Scrubbing gases. Analysing gaseous mixtures. Converting gas mixtures.—See I. Chlorination of hydrocarbons. Wetting agents. Dibenzanthrene. Pb organo-derivatives.—See III. Porous fibre products.—See VI. Heat-treating metals.—See X. Soap. Grease.—See XII. Rubber-bituminous composition.—See XIII. [Wood-tar] phenol compounds.—See XX.

### III.—ORGANIC INTERMEDIATES.

Technical recovery of solvent vapours. E. BOYE (Chem.-Ztg., 1934, 58, 1017—1020).—A review.

Pressure synthesis of methyl alcohol from water-gas. VII. B. N. DOLGOV, A. Z. KARPOV and M. V. VELTISTOVA (Khim. Tverd. Topl., 1933, 4, 492—499).—The effect of working conditions on the yield has been studied (catalyst: ZnO 78.1, Cr<sub>2</sub>O<sub>3</sub> 18.3, Fe<sub>2</sub>O<sub>3</sub> 0.3, and S 2.0%). Small amounts of AcOH, EtOAc, MeCHO, allyl alcohol, Ac<sub>2</sub>O, Fe(CO)<sub>5</sub>, S, and H<sub>2</sub>O were also formed.

CH. ABS. (e)

Hex[an]one—a new ketone. ANON. (Paint Var. Prod. Man., 1934, 11, No. 6, 10).—The physical properties of COMeBu<sup>2</sup> are given. It is an excellent solvent for many resins and is a useful constituent of cellulose acetate lacquers, increasing the compatibility of resin plasticisers. It also improves the efficiency of lacquer removers.

D. R. D.

Micro-determination of furfuraldehyde, methylfurfuraldehyde, and hydroxymethylfurfuraldehyde. Furfuraldehyde content of some foodstuffs [and tobacco]. L. BARTA (Biochem. Z., 1934, 274, 212—219).—Furfuraldehyde (I) in neutral solution (< 1:50,000) is determined by adding 3% EtOH solution of NH<sub>2</sub>Ph acetate and comparing the red colour produced with that of a standard. 0.1—3.0 mg. of (I) must be present. No interference is caused by 5 times as much hydroxymethylfurfuraldehyde (II) or 7 times as much methylfurfuraldehyde (III). 0.02—0.5 mg. of (I) in 5 c.c. of EtOH (< 1:250,000) is determined by adding NaOH in aq. EtOH and comparing the red colour produced with that of a standard. (II) at dilutions < 1:250,000 and (III) at < 1:50,000 are also determined thus. The results of such determinations made on bread, maize, and tobacco are tabulated. W. McC.

Conditions of formation of phenol by fusion of sodium benzenesulphonate with sodium hydroxide. R. K. EICHMAN, M. M. SCHEMJAKIN, and V. N. VOSHDAEVA (Anilinokras. Prom., 1934, 4, 461—472).—Formation of tarry by-products (I) in the reaction PhSO<sub>3</sub>H (II) + NaOH → NaOPh + NaHSO<sub>3</sub> + H<sub>2</sub>O commences after 1—1.5 hr. at 315°, 30—45 min. at 330°, and 7—15 min. at > 330°; at > 360° (I) are formed to the exclusion of phenolic by-products (III). At < 320° > 93—94% of the (II) undergoes conversion after 30—45 min.; no advantage is gained by longer heating, owing to conversion of PhOH into (III) [*m*-C<sub>6</sub>H<sub>4</sub>(OH)<sub>2</sub>, *p*-C<sub>6</sub>H<sub>4</sub>Ph·OH, (*o*-C<sub>6</sub>H<sub>4</sub>·OH)<sub>2</sub>]. The highest yields (95%) of PhOH are obtained when the mass is heated for 15 min. at 320—330°, or for 3 min. at 330—335°. The iodometric and acidimetric bromometric methods of determining PhOH give high results in presence of other

phenols and of Na<sub>2</sub>S, which is always present in the melts.

R. T.

Preparation of *p*-nitroaniline sulphates, and of the free base from them. A. A. ANTIPOV and K. K. MOZGOVA (Anilinokras. Prom., 1934, 4, 498—501).—H<sub>2</sub>O is added to the solution obtained by nitrating form-anilide (I) to a final [H<sub>2</sub>SO<sub>4</sub>] of 65%, at > 75°, when *p*-NH<sub>2</sub>·C<sub>6</sub>H<sub>4</sub>·NO<sub>2</sub>·H<sub>2</sub>SO<sub>4</sub> (II) crystallises out in 80% yield on cooling to 0°. (II) is converted into (*p*-NH<sub>2</sub>·C<sub>6</sub>H<sub>4</sub>·NO<sub>2</sub>)<sub>2</sub>·H<sub>2</sub>SO<sub>4</sub> by treating with H<sub>2</sub>O [250—300 c.c. per g.-mol. of (I) originally taken]; the filtrate is used for the succeeding portion of (II), whilst the residue is dissolved in 850 c.c. of H<sub>2</sub>O, neutralised with Na<sub>2</sub>CO<sub>3</sub>, and the ppt. of *p*-NH<sub>2</sub>·C<sub>6</sub>H<sub>4</sub>·NO<sub>2</sub> collected (75% yields). 80% of the HCO<sub>2</sub>H present in the mother-liquors from (II) is recovered by distillation at 50—70°/680—690 mm., and *o*-NH<sub>2</sub>·C<sub>6</sub>H<sub>4</sub>·NO<sub>2</sub> (5% yields) is pptd. by 4-fold dilution of the residual solution.

R. T.

Exhaustive sulphonation of β-naphthylamine. V. V. OFITZEROV (Anilinokras. Prom., 1934, 4, 491—497).—The highest yields of β-naphthylamine-1:5:7-trisulphonic acid (I) from β-naphthylamine-1:5- or -5:7:7 (II)-disulphonic acid are obtained by heating for 15 hr. at 95° with oleum containing a 12% excess of SO<sub>3</sub>; the reaction time may be shortened by increasing the oleum concn. On treating the reaction product with H<sub>2</sub>O the 6:8-disulphonic acid (III) is pptd., whilst (I) remains in solution, and yields (II) on hydrolysis; the max. yield of (II) is 30.5 and of (III) 49.5%. R. T.

Analysis of the sulphonation product in the preparation of peri-acid. A. A. T'SCHUKSANOVA and I. M. BILIK (Anilinokras. Prom., 1934, 4, 488—491).—20 g. of product are dissolved to yield 500 c.c. of solution (I) and H<sub>2</sub>SO<sub>4</sub> is determined as BaSO<sub>4</sub> in 10 c.c. 10 c.c. of (I) are diluted to 250 c.c., 50 c.c. of H<sub>2</sub>O added to 100 c.c. of dil. solution, which is boiled, 30 c.c. of aq. 4% benzidine hydrochloride (II) are added, the ppt. is collected and washed after 1 hr., and then titrated with 0.1N-NaOH; the 1:5-C<sub>6</sub>H<sub>4</sub>(SO<sub>3</sub>H)<sub>2</sub> content is calc. from the difference between the val. obtained and the sum of the H<sub>2</sub>SO<sub>4</sub> and 2-C<sub>10</sub>H<sub>7</sub>·SO<sub>3</sub>H (III) contents. 10 c.c. of (I) are diluted to 25 c.c., boiled, and titrated with 0.1N-NaOH; the 1-C<sub>10</sub>H<sub>7</sub>·SO<sub>3</sub>H content is calc. from the difference between total acidity and the benzidine val. 4—5 g. of product are dissolved in 50 c.c. of H<sub>2</sub>O, 20 c.c. of conc. HCl and 100 c.c. of (II) added, the ppt. is collected after 30 min. and suspended in H<sub>2</sub>O, 20% NaOH added to a neutral reaction, the solution filtered, the filtrate diluted to 50 c.c., 13.5 g. of NaCl are added, and the ppt. of β-C<sub>10</sub>H<sub>7</sub>·ONa is collected, dissolved in hot H<sub>2</sub>O, and (III) determined by benzidine pptn.

R. T.

Indirect volumetric analysis in technical organic chemistry. P. FUCHS (Chem. Fabr., 1934, 7, 430—432).—The simultaneous determination of two similarly reacting substances from a single titration is illustrated by examples relating to the dye, oil and fat, and fermentation industries, and the manufacture of saccharin.

J. S. A.

Ligninsulphonic acids.—See V. Influence of furfuraldehyde on Fe.—See X. COMe<sub>2</sub>-BuOH



fermentation.—See XVIII. Citric acid from makhorka.—See XX.

## PATENTS.

**Chlorination of gaseous hydrocarbons.** G. EGLOFF, Assr. to UNIVERSAL OIL PRODUCTS Co. (U.S.P. 1,950,720, 13.3.34. Appl., 5.2.30).—A mixture of gaseous hydrocarbons and  $\text{Cl}_2$  is passed rapidly through a heated zone (at  $120\text{--}400^\circ$ ), then immediately cooled by addition of a cooling liquid, and finally further cooled to condense liquid chlorination products. Apparatus is claimed. H. A. P.

**Production of esters by catalytic dehydrogenation [of polyhydric alcohols].** W. A. LAZIER, Assr. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,949,425, 6.3.34. Appl., 3.7.31).—Polyhydric alcohols, their esters or ethers are heated with a dehydrogenating catalyst (Cu—Cd—Zn chromite at  $250\text{--}550^\circ/\text{>} 3000$  lb. per sq. in.). The yield of esters is increased by increase in pressure. Thus glycerol at  $330^\circ/1$  atm. gives esters of low b.p. (calc. as  $\text{EtOAc}$ ) 11, aldehydes (I) 26.8, esters (calc. as glyceryl glycerate) (II) 32, and acids of high b.p. (calc. as glyceric acid) (III) 1.9%, and at  $350^\circ/3000$  lb. per sq. in. gives (I) 1.8, (II) 39.0, (III) 39.0, and ketones (calc. as  $\text{COMe}_2$ ) 3.6%. H. A. P.

**Manufacture and application of pyrophosphoric acid esters.** H. T. BÖHME A.-G. (B.P. 419,868, 14.5.34. Ger., 3.7.33).—Alcohols containing  $\text{<} \text{C}_8$  are esterified (at  $90\text{--}110^\circ$ ) with  $\text{H}_4\text{P}_2\text{O}_7$ . The products or their alkali salts are claimed to be superior as detergents to the corresponding alkyl H sulphates. H. A. P.

**[Organic] dithiophosphate compounds.** C. J. ROMEUX and K. D. ASHLEY, Assrs. to AMER. CYANAMID Co. (U.S.P. 1,949,629, 6.3.34. Appl., 17.4.28).—Alkyl dithiophosphates are treated with S halides ( $\text{S}_2\text{Cl}_2$ ). The products are used as vulcanisation accelerators. Thus diisopropyldithiophosphoric acid or its Na salt is treated in  $\text{H}_2\text{O}$  with  $\text{S}_2\text{Cl}_2$  at  $\text{>} 10^\circ$ . H. A. P.

**[Manufacture of] ozonation products of terpene alcohol.** L. P. RANKIN, Assr. to HERCULES POWDER Co. (U.S.P. 1,951,708, 20.3.34. Appl., 24.2.28).—Ozonised  $\alpha$ -terpineol (I) (a pine-oil fraction of b.p.  $215\text{--}220^\circ$ ) is (a) heated at  $75\text{--}130^\circ$  or (b) distilled in steam. In (a) the product may be freed from (I) by heating in presence of a dehydrating agent (I, dil. acids), and distilling off the hydrocarbons formed; in (b) the active product is in the residue. The products are used in the manufacture of nitrocellulose lacquers. H. A. P.

**[Manufacture of] long-chain esters and compositions thereof.** T. F. BRADLEY, Assr. to AMER. CYANAMID Co. (U.S.P. 1,951,593, 20.3.34. Appl., 6.9.30).—Monohydric alcohols having  $\text{>} \text{C}_{15}$  ( $n\text{-C}_{16}\text{H}_{33}\text{OH}$ ) are esterified by heating with a resin acid (colophony) and/or an aromatic carboxylic acid (I) [ $o\text{-C}_6\text{H}_4(\text{CO}_2\text{H})_2$ ], or with (I) and glycerol, at  $250\text{--}290^\circ$ . The products are used as lacquer components. H. A. P.

**Production of carboxylic acids [formic acid].** G. B. CARPENTER, Assr. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,949,825, 6.3.34. Appl., 24.8.31).—CO and  $\text{H}_2\text{O}$  are passed over a heated catalyst comprising acidic oxides of  $\text{<} 2$  elements of groups III—VI (silico-

tungstic acid at  $325^\circ/700$  atm., phosphomolybdic acid at  $325^\circ/200$  atm.). H. A. P.

**Manufacture of acetic acid and its derivatives.** E. I. DU PONT DE NEMOURS & Co., and J. W. LAWRIE (B.P. 419,946, 17.5.33).—Spent fermentation residues (from molasses) from which the glycerol has been removed are calcined at  $300\text{--}400^\circ$  ( $350^\circ$ ), preferably after admixture with a base [ $\text{Ca}(\text{OH})_2$ ,  $\text{CaCO}_3$ ]. The AcOH is conveniently isolated as an ester by heating the residue with an alcohol (EtOH) and  $\text{H}_2\text{SO}_4$ . H. A. P.

**Production of esters [of aliphatic  $\alpha$ -hydroxy-acids].** J. W. C. CRAWFORD, and IMPERIAL CHEM. INDUSTRIES, LTD. (B.P. 419,457, 13.5.33).—A ketone cyanohydrin is heated with conc.  $\text{H}_2\text{SO}_4$  (1—1.3 mols.) at  $\text{>} 100^\circ$ , the product is esterified by heating with an alcohol, an alkali sulphate or  $(\text{NH}_4)_2\text{SO}_4$  is added ( $\text{Na}_2\text{SO}_4$ ; 25—30% of wt. of  $\text{H}_2\text{SO}_4$ ), and the product distilled. Thus,  $\text{OH}\cdot\text{CMe}_2\cdot\text{CN}$  (799 pts.) is added to 98%  $\text{H}_2\text{SO}_4$  (1200 pts.) at  $75^\circ$ , followed by MeOH (600 pts.) and quinol (1 pt.), the product is heated at  $100^\circ$  for 16 hr.,  $\text{Na}_2\text{SO}_4$  (300 pts.) is added, and the mixture is distilled at  $\text{>} 225^\circ$ ;  $\text{OH}\cdot\text{CMe}_2\cdot\text{CO}_2\text{Me}$  (545 pts.) and  $\text{CH}_2\cdot\text{CMe}\cdot\text{CO}_2\text{Me}$  (218 pts.) are produced. (Cf. B.P. 405,699; B., 1934, 313.) H. A. P.

**Vaporisation of formamide.** H. A. BOND, Assr. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,950,875, 13.3.34. Appl., 9.7.31).—Liquid  $\text{HCO}\cdot\text{NH}_2$  is made to flow over a heated metallic (e.g., Al, Cu, Fe, brass, or steel) surface at  $200\text{--}400^\circ$  so arranged that it forms a shallow pool. The surface may have a thin adherent oxide layer. Apparatus is described. H. A. P.

**Manufacture and separation of thiourea from ammonium thiocyanate.** M. DONAUER, Assr. to KOPPERS Co. OF DELAWARE (U.S.P. 1,949,738, 6.3.34. Appl., 31.1.31).— $\text{NH}_4\text{CNS}$  is heated in a vac. at  $\text{>} 140^\circ$  ( $160^\circ$ ), allowed to cool slowly to  $110\text{--}120^\circ$ , and granulated. The cooled product is added to sufficient  $\text{H}_2\text{O}$  at  $\text{<} 25^\circ$  ( $10\text{--}14^\circ$ ) to maintain unchanged  $\text{NH}_4\text{CNS}$  in solution at approx.  $-10^\circ$  (to which temp. the solution is cooled by endothermic dissolution of  $\text{NH}_4\text{CNS}$ ), the undissolved double salt is separated, and crystallised from hot  $\text{H}_2\text{O}$ , from which  $\text{CS}(\text{NH}_2)_2$  alone separates. Apparatus is claimed. H. A. P.

**Manufacture of reaction products of aliphatic amines [with glycide]. [Textile assistants.]** I. G. FARBENIND A.-G. (B.P. 419,588, 2.3.33. Ger., 2.3.32. Addn. to B.P. 358,114; B., 1932, 138).— $\text{H}_2\text{O}$ -dispersible or -sol. compounds for use as emulsifying, wetting, scouring, and dispersing agents are prepared by interaction of primary or *sec.*-alkylamines having  $\text{>} \text{C}_8$  with glycide (I). E.g., condensation of  $n\text{-C}_{11}\text{H}_{23}\cdot\text{NH}_2$  with (I) (2.5 mols.) at  $60\text{--}80^\circ$  gives a  $\text{H}_2\text{O}$ -sol. product. [Stat. ref.] H. A. P.

**[Manufacture of] textile assistants.** IMPERIAL CHEM. INDUSTRIES, LTD., and H. A. PIGGOTT (B.P. 419,942, 420,066, and 420,137, [A] 15.5.33, [B, c] 15.2.33. [c] Addn. to [B]).—(A) The product of interaction (in any order) of a *sec.*-amine, an alkylating agent which introduces an alkyl radical of  $\text{<} \text{C}_6$ , and a benzyl halide is sulphonated, or, alternatively, a sulphonated benzyl halide is used. Examples are the sulphonated products



(ClSO<sub>3</sub>H in C<sub>2</sub>H<sub>2</sub>Cl<sub>4</sub>) of benzyl-dimethylhexadecyl-, dimethyloctadecyl-, and -diethylhexadecyl-ammonium salts. (B) H<sub>2</sub>O-sol. *sec.*- or *tert.*-amines containing an alkyl radical having C<sub>8</sub>—C<sub>20</sub> and a polyhydroxyalkyl radical are condensed with (CH<sub>2</sub>)<sub>2</sub>O, and the products esterified, if desired, with fatty acids or their derivatives. Thus *N*-cetyl-β-β'-tri-hydroxy-*tert.*-butylamine hydrobromide [from cetyl bromide and NH<sub>2</sub>·C(CH<sub>2</sub>·OH)<sub>3</sub> at 160°] and methylcetylglucamine are condensed with an equal wt. of (CH<sub>2</sub>)<sub>2</sub>O at 120°; in the latter case the products are further condensed with stearic acid or its chloride. (c) CO(NH·CH<sub>2</sub>·OH)<sub>2</sub> is condensed with (CH<sub>2</sub>)<sub>2</sub>O (> 10 mols.) and the product esterified (with lauric or stearic acid). H<sub>2</sub>O-sol. products of use as wetting, emulsifying, dispersing, and softening agents are obtained. H. A. P.

**Production of water-soluble substances having capillary-active properties [wetting agents].** L. BECKER and R. MÜLLER, Assrs. to CHEM. FABR. POTT & Co. (U.S.P. 1,950,287, 6.3.34. Appl., 1.2.29. Renewed 1.8.33. Ger., 27.11.28).—Non-aromatic, polymerised, unsaturated hydrocarbons, obtained by dehydration of (*tert.*) alcohols (Bu<sup>o</sup>OH) or from cracked petroleum gases, are treated with an energetic sulphonating agent (ClSO<sub>3</sub>H) and, if desired, a lower aliphatic acid anhydride or chloride. Thus Bu<sup>o</sup>OH (5 pts.) is treated at 100° with conc. H<sub>2</sub>SO<sub>4</sub> (5 pts.), and the oily layer (3.7 pts.) is separated and sulphonated (ClSO<sub>3</sub>H, 3.7 pts., in CCl<sub>4</sub> at room temp.). H. A. P.

**Polymerisation of organic compounds [α-methylacrylonitrile].** TRIPLEX SAFETY GLASS Co., LTD., L. V. D. SCORAH, and J. WILSON (B.P. 419,357, 2.3. and 12.4.33).—Solid elastic products, suitable for use as interlayers in safety glass, are obtained by polymerising a mixture of < 40% (50—75%) of CH<sub>2</sub>·CMe·CN (I) with a plasticiser (II) for its polymeride (III) (COMe<sub>2</sub>, CH<sub>2</sub>Ac·CO<sub>2</sub>Et, cyclohexanone, CHPh·CHAc, *p*-C<sub>6</sub>H<sub>4</sub>Me·SO<sub>2</sub>·NH<sub>2</sub>, acid anhydrides, lactones, lactides, or their homologues). Polymerisation is preferably carried out by heating with a trace of a peroxide (BzO<sub>2</sub>H) in a solvent for (I) and (II), but not for (III), or in aq. emulsion. H. A. P.

**[Manufacture of] aromatic amines.** A. W. CAMPBELL, Assr. to B. F. GOODRICH Co. (U.S.P. 1,950,079, 6.3.34. Appl., 14.3.32).—A triarylmethyl halide is condensed with a (*sec.*) arylamine in presence of AlCl<sub>3</sub>. Thus, CPh<sub>3</sub>Cl with NHPh<sub>2</sub> and AlCl<sub>3</sub> in C<sub>6</sub>H<sub>6</sub> at the b.p. gives 4-*anilino*-4'-*benzhydryl*diphenyl, m.p. 350°. H. A. P.

**Manufacture of salts of diphenylguanidine.** R. L. SIBLEY, Assr. to RUBBER SERVICE LABS. Co. (U.S.P. 1,950,067, 6.3.34. Appl., 17.4.31).—Salts of C:(NH)(NHPh)<sub>2</sub> with acids the dissociation const. of which is < 1 × 10<sup>-2</sup> are prepared by metathesis (*o*-phthalate) or neutralisation of the base (acetate). H. A. P.

**Manufacture of carbolic acid [phenol].** R. L. JENKINS and J. F. NORRIS, Assrs. to SWANN RES., INC. (U.S.P. 1,950,359, 6.3.34. Appl., 22.10.28).—A mixture of PhCl, H<sub>2</sub>O, and (a deficit of) Ca(OH)<sub>2</sub> is continuously distilled through a column which returns PhOH and passed over a catalyst (SiO<sub>2</sub> at 550°), and the products

are condensed and returned to the still (S). When conversion into PhOH is complete the contents of S are neutralised, CaCl<sub>2</sub> is added to form a 40% aq. solution, and the PhOH separated and distilled. H. A. P.

**[Manufacture of] dye intermediates.** IMPERIAL CHEM. INDUSTRIES, LTD., A. W. BALDWIN, R. W. EVERATT, and A. H. KNIGHT (B.P. 419,945, 17.5.33).—A 3-alkylamino-*p*-tolyl alkyl ether in which the 6-position is unsubstituted (the *N*-alkyl group is Me, Et, Pr, or Bu) is condensed with C<sub>2</sub>H<sub>4</sub>Cl·OH in presence of a weak base. The products are coupled with diazotised 2:4-dinitroaniline derivatives free from SO<sub>3</sub>H and CO<sub>2</sub>H to give violet dyes for acetate silk. Thus 3-ethylamino-*p*-tolyl Me ether, b.p. 124—125°/11 mm. (from 3:1:4-NH<sub>2</sub>·C<sub>6</sub>H<sub>3</sub>Me·OMe and EtCl), gives a β-hydroxyethyl derivative, b.p. 146—156°/1 mm. (*picrate*, m.p. 147.5°). H. A. P.

**Preparation of mono- and di-chloro-isomer[ide]s of diphenyl.** J. E. MALOWAN, Assr. to SWANN RESEARCH, INC. (U.S.P. 1,951,577, 20.3.34. Appl., 6.9.32).—Cl<sub>2</sub> is passed at > 40° into Ph<sub>2</sub> in higher chlorinated Ph<sub>2</sub> (*d*<sub>66</sub> 1.259, f.p. < 20°) containing Fe as catalyst. Any 4:4'-(·C<sub>6</sub>H<sub>4</sub>Cl)<sub>2</sub> formed is separated by cooling to 20°, and the 2- and 4-C<sub>6</sub>H<sub>4</sub>PhCl remaining separated by fractional distillation. H. A. P.

**Preparation of anthraquinone derivatives.** A. J. WUERTZ, Assr. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,950,348, 6.3.34. Appl., 14.9.32).—1-Chloro-anthraquinone-2-carboxylic acid is condensed with primary aminoarylcarboxylic acids [*p*-NH<sub>2</sub>·C<sub>6</sub>H<sub>4</sub>·CO<sub>2</sub>H, 1:3:4-NH<sub>2</sub>·C<sub>6</sub>H<sub>3</sub>(OH)·CO<sub>2</sub>H] in alkaline aq. solution (+CuCl<sub>2</sub> at the b.p.) to give products capable of cyclisation to anthraquinoneacridonecarboxylic acids. H. A. P.

**Manufacture of condensation products [dibenzanthrene].** J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 419,062, 31.3.33).—Benzanthrene (I), dihydrobenzanthrene (II), or 1-C<sub>10</sub>H<sub>7</sub>·CH<sub>2</sub>Ph is heated with a difficultly reducible metal oxide (MgO-graphite) at its b.p.—800° (750—780°), a dehydrogenating agent (S, Se, PbO<sub>2</sub> at about 280°), or with a 10-OH-, 10:10-(OH)<sub>2</sub>-, 10-Cl-, or 10:10-Cl<sub>2</sub>-derivative of (I) or (II) under conditions favouring elimination of H<sub>2</sub>O or HCl (e.g., at 200—320° in presence of H<sub>3</sub>PO<sub>4</sub> or "tonsil," and at 100—120° in PhCl, respectively). The product (0.0001%) imparts a persistent green fluorescence to petroleum and lubricating oils. H. A. P.

**Preparation of (A) hydrocarbon, (B) amyl, derivatives of lead.** G. ALLEMAN, Assr. to SUN OIL Co. (U.S.P. 1,949,948—9, 6.3.34. Appl., [A] 18.1.29, [B] 17.1.30).—Mixed alkyl derivatives of Pb are prepared (A) by interaction of a Pb salt (PbCl<sub>2</sub>) with mixed organo-Mg halides or Mg and mixed alkyl halides in an aliphatic ether, and (B) by interaction of Pb and another metal (Pb-Na alloy) with mixed alkyl halides. The prep. of lead dimethyl disec.-amyl is specifically claimed. H. A. P.

**Manufacture of [ester-like] conversion products of casein.** I. G. FARBENIND. A.-G. (B.P. 419,675, 16.5.33. Ger., 17.5.32).—Casein is treated in neutral or weakly acidic (with AcOH or other org. acid) aq. suspension at 40—90° with an alkylene oxide. The



products are insol. in  $H_2O$  and weak aq. alkalis, but sol. in dil. acids, and are used as adhesives, sizing, and finishing agents, and for moulding. H. A. P.

**Azo-dye intermediates. Diaminoanthraquinone-trisulphonic acids.**—See IV. **Ore-flotation reagent.**—See X. **Compositions from cashew nutshell liquid.**—See XII. **(PrCO<sub>2</sub>)<sub>2</sub>Ca.** **Gluconic acid.**—See XVIII.

#### IV.—DYESTUFFS.

**Aniline-black, its characteristics on nitrogenous fibre, and a new method of formation.** E. JUSTIN-MUELLER (Bull. Soc. chim., 1934, [v], 1, 1055—1065).—According to the method of prep. and degree of oxidation,  $NH_2Ph$ -black (I) consists of indaminic (A) (greening) or phenazinic (B) (non-greening) dyes, which may be distinguished by the colorations (greenish or blackish) produced on addition of  $H_2O$  to conc.  $H_2SO_4$  solutions of the dyes. (I) may be produced on wool if excessive oxidation be avoided. Under identical conditions the formation of the dye on cotton reaches only the emeraldine (II) stage, whereas on wool the final stage (IB) is reached, together with mauveines etc. The oxidation proceeds much more rapidly on wool, and (IB) is always produced, except with instantaneous black. Wool impregnated with  $PbCrO_4$  dyes a maroon colour, possibly owing to interaction with tyrosine from the keratin. The dyes in powder form correspond with those similarly produced on cotton. Oxidation of  $NH_2Ph$  with  $PhNO_2 + CuSO_4$  gives (II) very slowly on cotton; further oxidation ( $K_2Cr_2O_7$ ) gives (I). Addition of a little  $p-C_6H_4(NH_2)_2$  accelerates the reaction somewhat, and in  $H_2O$  the production of (I) (powder) fails unless this substance is present. F. S. H. H.

**Preparation of anil-black E.** II. S. F. FILIPPITSCHEV and M. A. TSHEKALIN (Anilinokras. Prom., 1934, 4, 476—487; cf. B., 1934, 1051).—A detailed balance sheet of the substrates taken and the intermediate and by-products obtained indicates that the final yield of anil-black E is  $\approx 65\%$  of theoretical. R. T.

**Action of hot concentrated sulphuric acid on dyes.** R. B. FORSTER (J.S.C.I., 1934, 53, 384 T).—Hot conc.  $H_2SO_4$  gives a nearly colourless solution with azo dyes (or stilbene dyes which contain an azo group) (cold conc.  $H_2SO_4$  gives coloured solutions); boiling usually produces some carbonisation. The test distinguishes between different classes of dyes as each gives a more or less characteristic reaction except the indigo and anthracene dyes, which are anomalous. J. L. D.

**Volumetric analysis [and dyes].**—See III.

#### PATENTS.

**Manufacture of dyes of the triarylmethane series.** I. G. FARBENIND. A.-G. (B.P. 420,307, 29.5.33. Ger., 30.5.32. Addn. to B.P. 387,956; B., 1933, 298).—A triarylmethane dye containing  $\leq 1$  sulphatoalkylamino-group is treated with an alkali sulphite (I), or an intermediate containing such groups is so treated before conversion into the dye. Compounds containing several such groups may be treated with (I) sufficient for partial conversion, or not all the hydroxyalkyl groups may be sulphated. Examples include sulphated dyes from: 2:2'-dichloro-4:4'-di-( $\beta$ -hydroxyethylbutylamino)-

benzhydrol and  $NPhEt_2$ ;  $PhCHO$  and  $\beta$ -hydroxyethylbutylaniline (II); (II) +  $CH_2O$ , oxidised to hydrol, + (II). C. H.

**Manufacture of [direct] azo dyes.** E. I. DU PONT DE NEMOURS & Co. (B.P. 419,736, 17.5.33. U.S., 17.5.32).—An aminoazobenzene,  $Ar \cdot N_2 \cdot Ar' \cdot NH_2$ , in which Ar is free from  $NO_2$  and Ar' from OH, OR, and  $CO_2H$  ortho to the  $NH_2$ , and Ar and Ar' together carry  $\geq 1 SO_3H$  or  $CO_2H$ , is diazotised and coupled with a benzamidobenzoyl-J-acid (I) in which the Bz groups are free from  $SO_3H$ ,  $CO_2H$ ,  $NH_2$ , and OH. Examples are 4-aminoazobenzene-4'-sulphonic acid  $\rightarrow$  (I) (blue-red); sulphanic acid  $\rightarrow m-C_6H_4Me \cdot NH_2$  or *p*-xylydine  $\rightarrow$  (I) (blue-red); *m*-4-xylydine-5-sulphonic acid  $\rightarrow p$ -xylydine  $\rightarrow$  (I) (blue-red). C. H.

**Manufacture of azo dyes.** J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 419,447, 13.4.33).—Compounds containing the ring  $CO \begin{matrix} \diagup CH_2 \cdot CO \\ \diagdown CH \cdot CH \end{matrix} O$  are used as coupling components. Examples are: 6-methylpyrone  $\leftarrow NH_2Ph$  (pale yellow for lacquers, oils, etc.), 6-chloro-*m*-toluidine-4-sulphonic acid (yellow on wool), or S-acid (red-brown on wool; + Cr, blue-red); naphthotetronic acid  $\leftarrow$  6-nitro-*o*-aminophenol-4-sulphonic acid (violet on wool; + Cr, bordeaux). C. H.

**Manufacture of azo dyes.** J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 419,599, 10.5.33).—8-Hydroxyquinaldine (I) and its derivatives, e.g., 8-hydroxyquinophthalone (II), are used as coupling components. Examples are: aniline-3:6-disulphonic acid  $\rightarrow$  (II) (red-orange on wool; + Cr, orange); 4-chloro-*o*-aminophenol-6-sulphonic acid  $\rightarrow$  (I) (yellow-brown; + Cr, brown). C. H.

**Manufacture of azo dyes [for wool].** E. I. DU PONT DE NEMOURS & Co., I. GUBELMANN, and J. B. OESCH (B.P. 419,670, 12.5.33).—Diazotised 2-*m*-aminobenzylbenzoic acid (I), which may carry substituents, except  $SO_3H$ , in the  $CH_2Ph$  group, is coupled with certain naphthols, naphthylamines, or pyrazolones. Examples are: 4'-OMe-derivative of (I)  $\rightarrow$  N.W.-acid (red; + Cr, deeper red), acetyl-J-acid (yellow-red), or 1-(2:5-dichloro-4-sulphophenyl)-3-methyl-5-pyrazolone (golden-yellow). C. H.

**Manufacture of monoazo dyes [of the carbazole series] and intermediate compounds used in their manufacture.** L. S. E. ELLIS. From CHEM. FABR. VORM. SANDOZ (B.P. 419,583, 26.3.34).—*N*-(Aminoarylsulphonyl)carbazoles free from  $SO_3H$  are diazotised and coupled with naphthylamine-, naphthol-, or amino-naphthol-sulphonic acids. *N*-3-Aminobenzenesulphonylcarbazole (I), m.p. 177°, and its 4-Cl- (II), m.p. 174°, 4-NHAc-, m.p. 222°, 4-Me (III), m.p. 135°, derivatives, *N*-2-amino-5-acetamido- (IV), m.p. 212°, and -5-nitro-, m.p. 232°, -benzenesulphonylcarbazoles are described. Examples of azo dyes are: (I)  $\rightarrow$  N.W.-acid (orange on wool); (II)  $\rightarrow$   $\gamma$ -acid (acid; blue-red); (IV)  $\rightarrow$ ,  $\gamma$ -acid (acid; violet-red); (III)  $\rightarrow$  acetyl-H-acid (yellow-red). C. H.

**Manufacture of 1:4-diaminoanthraquinone-2:3-x-trisulphonic acids.** I. G. FARBENIND. A.-G. (B.P. 419,954, 22.5.33. Ger., 23.5.32).—A 2:3-dihalo-gen-(chloro)-1:4-diaminoanthraquinonesulphonic acid



or its salts are treated with a  $H_2O$ -sol. neutral sulphite in  $H_2O$  at 70–100°. The products are blue acid wool dyes. H. A. P.

**Manufacture of colouring matters of the anthraquinone series.** H. RAISTRICK, R. ROBINSON, W. L. CHARLES (legal representative of J. H. V. CHARLES), and IMPERIAL CHEM. INDUSTRIES, LTD. (B.P. 420,362, 30.3.33; cf. A., 1933, 752).—The mycelium of *Cylindro-Helminthosporium* (Nisikado) moulds, grown in suitable media, e.g., Czapek-Dox, contains coloured hydroxylated anthraquinones, e.g., helminthosporin [4:5:8-(OH)<sub>3</sub>-2-Me], m.p. 225–226°, catenarin [4:5:8-(OH)<sub>3</sub>-2-CH<sub>2</sub>-OH], m.p. 246°, cynodontin [1:4:5:8-(OH)<sub>4</sub>-2-Me], m.p. 260°, and triticosporin [1:3:5:8-(OH)<sub>4</sub>-2-CH<sub>2</sub>-OH]. C. H.

**Manufacture of [acid] dyes of the anthraquinone series.** G. B. ELLIS. FROM CHEM. FABR. VORM. SANDOZ (B.P. 419,990, 8.12.33).—A 1-amino- or 1-alkylamino-anthraquinone-2-sulphonic acid, carrying in 4-position an arylamino-group (in which the aryl residue may be linked to further aryl groups), and, if desired, a 5-, 6-, 7-, or 8-substituent, is nitrated to give grey wool dyes. In the examples, the 4-substituent is *p*-NH·C<sub>6</sub>H<sub>4</sub>Me, *p*-NH·C<sub>6</sub>H<sub>4</sub>Cl, *p*-NH·C<sub>6</sub>H<sub>4</sub>·NHAc, *pp'*-CH<sub>2</sub>(C<sub>6</sub>H<sub>4</sub>·NH)<sub>2</sub>, *pp'*-NH·C<sub>6</sub>H<sub>4</sub>·C<sub>6</sub>H<sub>4</sub>·NH. C. H.

**Manufacture of vat dyes [of the dibenzanthrone series].** J. Y. JOHNSON. FROM I. G. FARBENIND. A.-G. (B.P. 419,666, 10.5.33).—Dibenzanthrone, isodibenzanthrone, or their halogeno-compounds are chlorinated or brominated in ClSO<sub>3</sub>H or BrSO<sub>3</sub>H in presence of < 2% of S. Navy-blue vat dyes containing Br 22, Cl 1–3, and combined S 4–12% are described. C. H.

**Preparation of vat dyes of the dibenzanthrone series.** O. STALLMANN, ASSR. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,950,366, 6.3.34. Appl., 10.3.32).—Hydroxydibenzanthrones are converted into their alkali-metal derivatives (e.g., by Na in an inert diluent, evaporation with Na<sub>2</sub>CO<sub>3</sub>, or air-oxidation of an alkaline Na<sub>2</sub>S<sub>2</sub>O<sub>4</sub> vat), which are then heated with an alkylating agent (e.g., C<sub>2</sub>H<sub>4</sub>Cl<sub>2</sub>, *p*-C<sub>6</sub>H<sub>4</sub>Me·SO<sub>3</sub>Pr<sup>6</sup>) in an inert medium. H. A. P.

**Manufacture of vat and sulphur dye preparations for textile printing.** I. G. FARBENIND. A.-G. (B.P. 420,095, 25.5.33. Ger., 26.5.32).—The pastes are made up with pyridinebetaine or a salt thereof, preferably with glycerol, to improve the printing qualities. C. H.

**Manufacture of [solid] sulphur dye preparations.** A. CARPMAEL. FROM I. G. FARBENIND. A.-G. (B.P. 419,817, 9.5.33).—A S dye is mixed dry with alkali sulphide (I) and/or hydrosulphide (II) and a hygroscopic agent, e.g., Na salt of sulphurised phenol, HCO<sub>2</sub>Na, KCNO, or NaOH; or crude S dye is dissolved in aq. NaOH, evaporated to dryness, and mixed with (I) or (II). C. H.

**Dye intermediates.** See III. **Colour photography.**—See XXI.

## V.—FIBRES; TEXTILES; CELLULOSE; PAPER.

**Absorption of acid by wool.** H. J. HENNING (Angew. Chem., 1934, 47, 771–772).—The absorption of HCl by wool washed by the normal technical process

(soap-soda) is identical with that of solvent-purified wool. The data indicate an isoelectric point of *p*<sub>H</sub> 5·8; other vals. given in the lit. (e.g., A., 1933, 227) are discussed. F. O. H.

**Action of halogens on wool.** H. VOM HOVE (Angew. Chem., 1934, 47, 756–763).—Dry halogens, as gases or in inert solvents, have little action on dry wool. Normally moist halogens react slowly with dry wool, forming mainly halogenoamines (I). In  $H_2O$  I is slowly reduced to HI in the interior of the wool. In HO<sub>2</sub>, Cl<sub>2</sub> and Br cause rapid hydrolysis of wool protein through the oxidising action of HOX (X = Cl or Br) and the decomposed (I). The HX and polypeptides formed react further. The superficial swellings produced by aq. halogens are a Donnan equilibrium effect. The increased dye absorption of halogenated wool is due to the destruction of the surface. A. G.

**Action of iodine on Tussah silk.** H. LECUS (Angew. Chem., 1934, 47, 779–782).—When Tussah silk is immersed in aq. KI<sub>3</sub> both chemical combination with reduction (I) and dissolution of I in the silk occur. (I) affects the amorphous constituent (II) of the silk; the X-ray diagram remains unaffected, and (I) is prevented if (II) is removed by pretreating the silk with HIO<sub>3</sub>. A. G.

**Utilisation of bagasse. II. Drying of bagasse board.** H. KATO (J. Cellulose Inst., Tokyo, 1934, 10, 289–293).—Equations for adiabatic parallel flow and isothermic counter-flow are deduced. D. A. C.

**Separation of ligninsulphonic acids from sulphite-cellulose liquors.** O. Y. BORODINA (Tzent. Nauch. Issl. Inst. Koz. Prom. Sborn. Rabot, 1934, No. 4, 98–110).—The free ligninsulphonic acids after dialysing contained 14·32–15·83% of tannides. The prep. of Na ligninsulphonates is discussed.

CH. ABS. (e)

**Cellulose acetate films undeformable by water.** A. CHARRIQU and (MILE.) S. VALETTE (Compt. rend., 1934, 199, 1039–1041).—A film composition has been developed consisting of cellulose acetate [AcOH content 59·5%, plasticiser (Ph<sub>3</sub>PO<sub>4</sub>) 25%] which is deformed only 0·055% on wetting. These films can be rendered completely undeformable by heating for 4 hr. at 100°, by wetting in  $H_2O$  and drying repeatedly, or by treatment for 15 min. in boiling  $H_2O$ . J. W. S.

**Bleaching of wood pulp. II. I. NAKASHIMA and S. OINUMA (J. Cellulose Inst., Tokyo, 1934, 10, 285–289; cf. B., 1933, 862).**—The effect of bleaching on the  $\alpha$ -cellulose (I) content, Cu no., strength, and losses of pulp etc., and the *p*<sub>H</sub> of the liquor are investigated, and tabulated results are given. With increase of available Cl (C) from 1 to 9% the (I) content remains const. up to 2% of C and then steadily falls; the Cu no. is lowest at 2% of C. Rise in temp., duration of bleaching, and pulp concn. all produce degradation of the cellulose. Max. strength was obtained with 2–4% of C and at 35°. D. A. C.

**Bleaching of paper pulp.** O. ROUTALA and I. JAATINEN (Suomen Kem., 1934, 7, 96B).—Dark brown paper pulp can be bleached satisfactorily to a white sulphate-pulp with Cl<sub>2</sub> and bleaching powder. J. W. S.



**Humidity-resistance relations in carbon-coated hygroscopic materials.** L. A. WELO (Nature, 1934, 134, 936).—C-coated hygroscopic materials, such as paper, Cellophane, and human hair, show an increase in electrical conductivity on drying. This is attributed to the closer and more numerous C contacts resulting from shrinkage. L. S. T.

**Nitrocellulose from wood pulp.**—See XXII.

#### PATENTS.

**Moisture-resistant bristles for brushes and the like.** W. K. TELLER, Assr. to WESTERN BOTTLE MANUF. Co. (U.S.P. 1,953,980, 10.4.34. Appl., 12.12.31).—The bristles are first impregnated with an aq. heavy-metal salt [e.g., 1–3% aq.  $\text{Al}(\text{OAc})_3$ ] and then with a  $\text{H}_2\text{O}$ -sol. soap of a fatty acid (e.g., 4% aq. Castile soap). They may also be dipped into a solution of a wax in xylene. D. A. C.

**Manufacture of cellulose derivatives.** H. DREYFUS (B.P. 420,099, 26.5.33).—Cellulosic material is rendered more reactive to esterification by treatment with a medium composed of an org. acid ( $\text{HCO}_2\text{H}$ ,  $\text{AcOH}$ ) with  $\text{H}_2\text{SO}_4$  and/or  $\text{H}_3\text{PO}_4$  and free from org. acid anhydrides. The mineral acid is then partly or completely neutralised without substantial rise of temp., and the material is esterified as usual in presence of mineral acid catalyst. F. R. E.

**Manufacture of cellulose esters.** KODAK, LTD. From EASTMAN KODAK Co. (B.P. 419,763, 18.4.33. Cf. B.P. 402,730 [void]).—In the manufacture by a single-bath acylation of mixed esters of cellulose (I) with  $\text{PrCO}_2\text{H}$  (II),  $\text{EtCO}_2\text{H}$  (III), and  $\text{AcOH}$ , uniformity of composition is improved by pretreating (I) in a bath of (II) and/or (III) (+ $\text{AcOH}$  or  $\text{CH}_2\text{Cl}\cdot\text{CO}_2\text{H}$ ) for, e.g., 4 hr. at 15–65°. H. A. P.

**Production of viscose.** H. H. PARKER, Assr. to DU PONT RAYON Co. (U.S.P. 1,952,604, 27.3.34. Appl., 27.11.31).—To the main bulk of viscose (V) is added a small proportion (1–10%) of a V solution made from cellulose xanthate (I) which has been prepared with a higher  $\text{CS}_2$  to cellulose ratio (viz., < 10 pts. more  $\text{CS}_2$  per 100 pts. of cellulose) than the (I) used for V; the final solution is homogeneous and substantially free from insol. materials. F. R. E.

**Ripening of alkali-cellulose.** I. G. FARBENIND. A.-G. (B.P. 419,585, 28.5.34. Ger., 27.6.33).—Ripening is accelerated by treating the alkali-cellulose with air or a gas containing  $\text{O}_2$  in presence of a sol. sulphide ( $\text{Na}_2\text{S}$ ). F. R. E.

**Apparatus for making artificial silk.** U. MANCINI, Assr. to RUTH-ALDO Co., INC. (U.S.P. 1,952,877, 27.3.34. Appl., 19.11.29).—A cell for dry-spinning is described in which it is claimed that the temp., concn. of solvent in air, velocity of circulation, temp. at which condensation of solvent takes place, and rate of diffusion with external air can be independently controlled. F. R. E.

**Production of artificial filaments and like materials.** H. DREYFUS (B.P. 420,083, 24.5.33).—In the evaporative process, the spinning solution is heated by passing through a filter (F), in series before and in a position removed from the jet, F

being close to the source of heat for the evaporative medium. F. R. E.

**Manufacture of artificial threads by the dry-spinning process.** E. BERL (B.P. 419,527, 12.5.33).—The winding apparatus is situated in the spinning cell (I) and the downwardly-spun filaments are freed from solvent by gas currents (at varying temp.) passed through (I) by means of oppositely-placed openings. F. R. E.

**Simultaneous spinning, twisting, and purification of rayon.** M. T. SANDERS and R. A. HALES, Assrs. to ATLAS POWDER Co. (U.S.P. 1,951,845, 20.3.34. Appl., 1.11.30).—The alkali-coagulated thread spun from cuprammonium cellulose is twisted by collecting in a centrifuge, where the cake of thread is decopperised, while uniformly supported free from tension, by spraying with dil.  $\text{H}_2\text{SO}_4$ ; it is subsequently washed and finished in the usual manner. F. R. E.

**Manufacture of staple fibre.** SOC. CHEM. IND. IN BASLE (B.P. 419,918, 15.3.34. Switz., 29.3. and 2.10.33).—Artificial threads of regenerated cellulose are cut to a suitable length and acylated under conditions whereby their structure is retained and the resulting ester is insol. in org. solvents. F. R. E.

**Manufacture of [matt] artificial silk threads, filaments, and the like.** NORTH BRIT. RAYON, LTD., and A. V. PITZER (B.P. 419,477, 22.9.33).— $\text{Bz}_2\text{O}$  or a halogen derivative (I) is incorporated in the spinning solution (II) (viscose, cellulose acetate solution) in presence of an emulsifying agent, after mixing with a mutual solvent, e.g.,  $\text{EtOH}$ , for (I) and (II). F. R. E.

**Pulping of manila, sisal, or like raw fibrous materials.** G. A. RICHTER, Assr. to BROWN Co. (U.S.P. 1,954,226, 10.4.34. Appl., 27.2.32).—The materials are digested under pressure firstly with a neutral > 2% aq.  $\text{Na}_2\text{SO}_3$  and then with a solution containing < 1%  $\text{NaOH}$ . It is claimed that the pentosan content of the pulp is > 8%. D. A. C.

**Manufacture of chemical pulp.** G. L. M. HELLSTROM (U.S.P. 1,954,625, 10.4.34. Appl., 2.9.32. Can., 4.11.31).—The contents of the digester, i.e., both chips and liquor, are circulated through an external pipe into which steam may be injected to maintain uniform temp. and mixing. D. A. C.

**Apparatus for treating fibrous material.** S. D. WELLS (U.S.P. 1,949,669, 6.3.34. Appl., 20.6.32).—Fresh cooking liquor (L) is continuously introduced into the digester (D) at a rate  $\propto$  its consumption during the cooking process. Flow is maintained by gravity from a tank elevated with respect to D and connected with it so as to maintain the same pressure as in D. L may first flow through a heater (H). Circulation of L is maintained by withdrawing at the middle of D, passing through H, and reintroducing it simultaneously into the top and bottom of D. D. A. C.

**Refined cellulose pulp.** G. A. RICHTER, Assr. to BROWN Co. (U.S.P. 1,949,549, 6.3.34. Appl., 16.8.32).—Kraft or soda pulp is treated at 5–6% consistency with aq. 5–8%  $\text{NaOH}$  at 50°, and washed; the residual alkali may be neutralised with  $\text{H}_2\text{SO}_3$ . If the pulp has a high



residual lignin content it may be subsequently bleached with 1–2% of  $\text{Cl}_2$ . A 50% strength increase and a 93%  $\alpha$ -cellulose content are claimed. D. A. C.

**Treatment of chemical pulp.** R. S. HATCH, Assr. to WEYERHAEUSER TIMBER Co. (U.S.P. 1,951,017, 13.6.34. Appl., 20.7.33).—The pulp, after digestion and coarse screening etc., is diluted to 0.2–0.3% consistency and allowed to flow with occasional spraying over 25-mesh screens (*S*) inclined at 45°. The medullary ray fibres are washed through *S*. D. A. C.

**Manufacture of hard vegetable [wood] fibre product of high strength.** R. M. BOEHM, Assr. to MASONITE CORP. (U.S.P. 1,941,536, 2.1.34. Appl., 18.5.32).—Wood pulp is mixed with 4% of tung oil (calc. on dry fibre) and the moist mass is formed into sheets which are heated at 150° for < 7 hr. under pressure. A. R. P.

**Apparatus for bleaching pulp.** M. F. MCCOMBS, Assr. to NIAGARA ALKALI Co. (U.S.P. 1,953,022, 27.3.34. Appl., 27.12.32).—The pulp is circulated through two vertical, concentric cylinders by an impeller (*P*) placed in an orifice in the centre of the conical bottom of the inner cylinder (*I*). The bottom of *I* is above that of the outer cylinder (*O*), and its walls are shorter so that the pulp circulates downwards through *I* and upwards through the space between *I* and *O*. The charge of pulp is emptied through a hole in the bottom of *O*.  $\text{Cl}_2$  is introduced at a point near *P*. D. A. C.

**Apparatus for bleaching of chemical wood pulp.** D. B. DAVIES (U.S.P. 1,953,076, 3.4.34. Appl., 13.3.33).—Preliminary bleaching is effected by continuously introducing the pulp (at about 3% consistency) together with cooled liquid  $\text{Cl}_2$  into the lower end of a vertical cylindrical cell (*C*), up which the pulp travels, being discharged at the top. Uniform upward flow and mixture of pulp with the  $\text{Cl}_2$  is maintained by withdrawing it from the middle of *C* and circulating to the lower end. Part of the  $\text{Cl}_2$  intake pipe is placed concentrically within the pulp feed-pipe (*P*) and serves to cool the pulp so that its temp. on initial contact with the  $\text{Cl}_2$  is < 0°. A spinner agitator is placed at the discharge end of *P* to disintegrate clots. It is claimed that 30–50% of the total bleaching action is thus effected. D. A. C.

**Preparation of wet-spinning waste for manufacture of paper.** W. W. TRIGGS. From PAPIERFABR. SPECHTHAUSEN A.-G. (B.P. 419,874, 23.6.34).—Wet-spinning waste from flax or hemp is freed from shives by beating, tearing, and treatment in a willow, with, in each case, simultaneous application of suction. D. A. C.

**Paper manufacture.** J. D'A. CLARK and J. E. GRAVES, Assrs. to MEAD CORP. (U.S.P. 1,950,351, 6.3.34. Appl., 7.8.31).—A slotted pipe (*P*) is placed across the under-side of the wire (*W*) and between two series of suction boxes of a Fourdrinier machine. The slot is in close contact with *W* so that it raises it slightly from its normal path of travel. A sufficient quantity of a suspension of filler and size to form finally 1–2 wt.-% of the finished paper is supplied to *P* from a const.-head box, and sprayed through *W* on to the under-side of the sheet. It is claimed that two-sidedness is thereby eliminated. D. A. C.

**Decalomania paper.** J. MACLAURIN (U.S.P. 1,951,620, 20.3.34. Appl., 21.9.31).—A sheet of fairly strong backing paper (*B*) is coated with a  $\text{H}_2\text{O}$ -resistant adhesive (*A*) (e.g., rubber latex) which is allowed to dry. The facing sheet *F* (e.g., tissue paper) is then fixed on to it by heat and pressure. The bond between *F* and *A* is thus considerably weaker than that between *F* and *B*. D. A. C.

**Continuous manufacture of wallboard.** R. B. RESPASS and N. A. ROBBINS, Assrs. to RESPASS, INC. (U.S.P. 1,951,167, 13.3.34. Appl., 4.1.33).—Saw-mill waste is chipped, shredded, and dry-screened into the finished (*F*) and successively coarser grades (*G*) of fibre. *F* is passed with  $\text{H}_2\text{O}$  to a storage tank (*T*), whilst at least one (or all) of *G* is (are) steamed, so as not to remove resins, and each is separately refined. Alternatively, some of *G* may be cooked in presence of chemicals. Finally *G* are mixed with *F* in *T* and converted into boards. D. A. C.

**Manufacture of waterproof fibre board.** E. J. EIMER, Assr. to GAGNIER FIBRE PRODUCTS Co. (U.S.P. 1,953,397, 3.4.34. Appl., 12.6.31).—Stock to which a pulverised waterproofing agent (*W*) (e.g., asphalt, shellac) has been added in the beater is used to form the central sheet in a laminated board (*L*) the two outside layers of which remain untreated. *L* is then saturated with a solvent for *W* so that *W* partly permeates through the untreated layers. D. A. C.

**Production of water-repellent coating on paper or similar material.** A. E. V. WIRT, Assr. to IMPERIAL PAPER & COLOR CORP. (U.S.P. 1,950,279, 6.3.34. Appl., 15.6.33).—Wallpaper is coated with a mixture of clay (*A*) and casein dissolved in borax (*C*) and dried by festooning. A design may then be printed on the coated surface (*S*) with a composition containing *C*, pigments, and *A*, and *S* is finally sprayed with aq. 0.5–5%  $\text{CH}_2\text{O}$  and dried. D. A. C.

**Production of sheets of cellulosic plastic.** J. F. WALSH, Assr. to CELLULOID CORP. (U.S.P. 1,951,853, 20.3.34. Appl., 26.2.29).—A mechanical method is described. D. A. C.

**Manufacture of materials for producing or detecting polarised light.** F. SPROXTON, and BRIT. XYLONITE Co., LTD. (B.P. 419,295, 4.5.33).—Transparent, reflecting, lamellar particles (*I*) are regularly arranged in a sheet of transparent or translucent material (*II*) of different *n*; e.g., a dough of cellulose esters or ethers, natural or artificial resins, etc. containing a small proportion of "pearl essence" or "Essence d'Orient" is extruded through a slot, or (*II*) is dipped in a suspension of (*I*) and allowed to drain. The resulting sheets are then superimposed, pressed into blocks, and cut perpendicular to the plane of the sheets so that the surfaces of (*I*) are inclined to the cut surface of the block at > the crit. angle. F. R. E.

**Manufacture of cellulose esters.** E. I. DU PONT DE NEMOURS & Co. (B.P. 420,092, 25.5.33. U.S., 25.5.32).—See U.S.P. 1,945,310; B., 1934, 956.

**Manufacture of artificial leather.** E. I. DU PONT DE NEMOURS & Co. (B.P. 420,836, 9.6.33. U.S., 9.6.32).—See U.S.P. 1,944,906; B., 1934, 957.



**Drying artificial silk in the form of spun cakes.** ALGEM. KUNSTZIJDE UNIE N.V. (B.P. 420,502, 31.8.34. Ger., 31.8.33. Addn. to B.P. 358,847).

**Manufacture of [patterned cellulose acetate etc.] films or foil.** F. M., LTD., and A. H. CHIVERTON (B.P. 419,893, 26.7.33).

**Filter element.**—See I. **Porous fibre products.**—See VI. **Cellulose derivative solvent. Laminated products. Films etc. from poly-vinyl or -styrene compounds. Resinous composition [for paper].**—See XIII. **Adhesive.**—See XV. **Translucent films.**—See XXI.

## VI.—BLEACHING; DYEING; PRINTING; FINISHING.

**Dyeing blacks on 100% woollen goods.** C. W. NELSON (Amer. Dyestuff Rep., 1934, 23, 665—666).—Fast after-chrome dyes (I) are invariably used for men's suiting fabrics, but acid dyes (II) are used for ladies' cloths since these are subject to less exacting conditions of wear. Non-rubbing dyeings are obtained with (I) by exhausting the dyebath before addition of the  $\text{Na}_2\text{Cr}_2\text{O}_7$  and by subsequent thorough washing with fuller's earth. To avoid a purple appearance in the cut edges of thick and heavily milled dyed fabric (due to imperfect penetration by the  $\text{Na}_2\text{Cr}_2\text{O}_7$ ) about 0.5% of a good penetrating blue-green acid dye (e.g., Patent Blue V) is added to the dyebath. The most suitable (II) are sulphocyanine (III) and  $\text{C}_{10}\text{H}_8$  (IV) dyes. (III) exhaust well from a weakly acid dyebath and give dyeings faster to rubbing but less resistant to wear than (IV), which require a strongly acid dyebath. (IV) leave cotton and viscose-rayon threads a better white. A. J. H.

**Methods of dyeing cellulose acetate.** L. ŠPIRK (Textil. Obzor, 1932, 28, 159).—A review. CH. ABS. (e)

**$\text{NH}_2\text{Ph}$ -black on fibres.**—See IV. **Action of halogens on wool. Bleaching paper pulp.**—See V. **Bleaching solutions.**—See VII. **Preventing ship fires.**—See IX. **Dyeworks effluent.**—See XXIII.

### PATENTS.

**Production of dyeings and printings on fibrous material [with ice colours].** SOC. CHEM. IND. IN BASLE (B.P. 419,366, 10.5.33. Switz., 10.5.32).—Red dyeings fast to kier boiling and  $\text{Cl}_2$  are obtained from diazotised aryl ethers of *o*-aminophenolcarboxylic esters and 2:3-hydroxynaphthoic arylamides. Examples are: 2:1:4- $\text{NH}_2\cdot\text{C}_6\text{H}_3(\text{OPh})\cdot\text{CO}_2\text{Et}$  (I)  $\rightarrow$  2:3-hydroxynaphthoic *o*-anisidide (II),  $\alpha$ -naphthalide (III), and 4-chloro-*o*-toluidide; 2'-Cl-derivative of (I)  $\rightarrow$  2:3-hydroxynaphthoic *p*-anisidide,  $\beta$ -naphthalide (IV), (II), and (III); and 4'-Cl-derivative of (I)  $\rightarrow$  2:3-hydroxynaphthoic *p*-phenetidine, anilide, 2':5'-dimethoxyanilide, 5-chloro-*o*-toluidide, and (IV). H. A. P.

**Treatment with alkaline media of threads, fibres, fabrics, etc. composed of or containing cellulose acetate.** SOC. POUR LA FABR. DE LA SOIE ARTIF. "RHODIASETA" (B.P. 417,978, 13.2.34. Fr., 15.2.33).—Hydrolysis of cellulose rayon is avoided in (vat) dyeing and (discharge) printing processes by using  $\text{Mg}(\text{OH})_2$  instead of  $\text{NaOH}$ . A. J. H.

**Dyeing and colouring of sand and the like.** F. H. CASS and J. C. WEAVER (U.S.P. 1,954,441, 10.4.34. Appl., 2.4.31).—Sand (etc.) is impregnated and then dried with a dye liquor containing glue (or rosin for the production of fast-to- $\text{H}_2\text{O}$  colourings). A. J. H.

**Cleaning composition and processes for using the same.** N.V. KONINKLIJKE VEREEN. TAPIJTFABRIEKEN (B.P. 419,846, 3.1.34. Holl., 1.6.33).—A mixture of a  $\text{H}_2\text{O}$ -sol. alcohol (e.g., 1 pt. of EtOH), AcOH (3 pts. of 5% acid), and a salt of a sulphonated org. compound resistant to acids,  $\text{CaO}$ , and  $\text{MgO}$ , and having a cleansing action (0.08 pt. of Igepon-T), is used. It restores the brightness of coloured carpets without removing their fat or oil content when used in a dil. form. A. J. H.

**Renovating the surface and colour of textile materials.** TRU-TEX, LTD. (B.P. 419,856, 24.3.34. Can., 27.3.33).—Worn garments are dry-cleaned and the "shine" is then removed by brushing with teasels followed by application of a composition consisting of Na salicylate,  $\text{Na}_2\text{B}_4\text{O}_7$ , liquor cresol saponatis, aq.  $\text{NH}_3$ , and  $\text{H}_2\text{O}$ , and further brushing. A. J. H.

**Dressing of artificial silk.** ALGEM. KUNSTZIJDE UNIE N.V. (B.P. 419,119, 18.10.33. Ger., 18.10.32).—Tendering, during storage, of artificial silk dressed with a size containing a drying oil (e.g., linseed oil) is prevented by impregnating the silk, previous to dressing, with a neutralising or buffer-acting,  $\text{H}_2\text{O}$ -sol., non-volatile, org. base [e.g., a hydroxyalkylamine such as  $\text{N}(\text{C}_2\text{H}_4\cdot\text{OH})_3$ ]. A. J. H.

**Dressing and treating [softening and waterproofing] furs.** O. F. MULLER, ASSR. TO NYANZA COLOR & CHEM. CO., INC. (U.S.P. 1,952,137, 27.3.34. Appl., 24.10.31).—Furs are immersed in a warm emulsion consisting of  $\text{Al}(\text{OAc})_3$ ,  $\text{NH}_4$  linoleate, carnauba wax, and  $\text{H}_2\text{O}$ , then hydro-extracted, dried, and finally drummed with sawdust. A. J. H.

**Delustring of fabric.** C. R. WEISS and W. R. BENNETT (U.S.P. 1,942,523, 9.1.34. Appl., 19.9.32).—Shine due to wear of cloth is removed by applying a dil. EtOH solution of  $\text{NH}_4\text{OAc}$  to the surface, followed by a hot iron to rupture the surface of the fibres. A. R. P.

**Manufacture of porous fibrous products.** INTERNAT. LATEX PROCESSES, LTD. (B.P. 419,629, 29.9.33. Hung., 1.10.32).—Loosely-intermingled animal, vegetable, mineral, or artificial fibres are coated either entirely or at certain places with a bonding agent (I) (aq. dispersions of rubber, bitumen,  $\text{PhOH}-\text{CH}_2\text{O}$  resin, cellulose esters or viscose), and the whole is compressed while (I) is still plastic. The final product, in which (I) has lost its plasticity, consists of a permeable network of fibres with substantially no cushioning effect. F. R. E.

**Protection of wool against damage by moths.** J. R. GEIGY A.-G. (B.P. 419,179, 23.1.34. Ger., 23.1.33. Addn. to B.P. 388,936; B., 1933, 299).—Wool is treated with the mordant and tanning agents (sulphonated resins) described in the prior patent (*loc. cit.*). A. J. H.

**Protecting goods against vermin and insects.** G. ALGARD (B.P. 418,942, 16.12.33. Swed., 21.1.33).—The goods are rapidly heated to a temp. (about  $65^\circ$ ) sufficient to coagulate the albumin (with consequent



destruction) of the life infesting them, and then stored at about 0°. A. J. H.

**Drying machine [for laundry purposes].** J. E. MOORE (B.P. 420,088, 25.5.33).

**Textile assistants. Pyrophosphoric esters [as detergents]. Casein products.**—See III. **Printing preps.**—See IV. **Bleaching pulp.**—See V. **Treating leather.**—See XV.

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

**Sulphuric acid—to buy or to build?** A. M. FAIRLIE (Ind. Eng. Chem., 1934, 26, 1280—1283).—Under American conditions it is not usually economic to work a  $H_2SO_4$  plant of < 30 tons per day 80% acid capacity. Many plants built recently in America have been unwarranted economically. C. I.

**Causticisation of soda solutions by granulated lime.** V. E. VORONTSCHICHIN and G. S. PLACHOTNIUK (J. Chem. Ind. Russ., 1934, 10, No. 10, 33—39).—CaO is added as soda-lime (diam. of grains < 1 mm.), prepared by adding 35 c.c. of conc. aq. NaOH per 100 g. of CaO, and keeping for 24 hr. at room temp. with exclusion of air. The suspension of  $CaCO_3$  thus obtained settles at the rate of 8 cm. per min. in 15% NaOH. R. T.

**Heat of the reaction of causticising by Löwig's method.** I. N. GRUDININ (J. Chem. Ind. Russ., 1934, 10, No. 10, 39—46).—The heat of formation of  $Na_2Fe_2O_4$  from  $Na_2O$  and  $Fe_2O_3$  is > 40 kg.-cal. R. T.

**Preparation of soda and sulphur from sodium sulphate.** V. P. ILJINSKI, N. V. MORIN, I. N. OSTROVSKI, A. E. KRUGLIKOV, and A. A. PORET (J. Chem. Ind. Russ., 1934, 10, No. 10, 27—33).— $Na_2SO_4$ -C briquettes are converted by heating into  $Na_2S$ , boiling 18.4% solutions of which are saturated with  $CO_2$  to yield  $Na_2CO_3$  and  $H_2S$  (> 56%  $H_2S$  in the issuing gas),  $H_2S$  is removed from the hot solution by aspirating air for 1 hr., the solution is filtered from  $SiO_2$ ,  $FeS$ , S, and other insol. impurities, and  $CO_2$  again passed in at 20° to convert  $Na_2CO_3$  into  $NaHCO_3$ , which is collected, washed, and calcined. The mother-liquor from the second carbonation is used to dissolve  $Na_2S$ , and the  $H_2S$  is burned in Klaus ovens to  $SO_2$ . The product (85% yield) contains  $Na_2CO_3$  99.3,  $Na_2S_2O_3$  0.17, NaCl 0.15, and  $Na_2SO_4$  0.12%. Directions for conducting the above process on an industrial scale are given. R. T.

**Titanomagnetite as a catalyst for ammonia synthesis.** V. P. KAMZOLKIN and A. V. AVDEEVA (J. Chem. Ind. Russ., 1934, 10, No. 10, 48—50).—The relative activity of different titanomagnetites  $\propto$  the pressure at which the reaction proceeds, and appears to be a function of the cryst. structure of the catalysts. R. T.

**Physical properties of Nitrochalk.** P. A. BARANOV (J. Chem. Ind. Russ., 1934, 10, No. 10, 59—62).—The hygroscopicity of Nitrochalk (I) [ $NH_4NO_3$  (II) 65,  $CaCO_3$  35%] is > that of (II), and (I) eliminates  $NH_3$  fairly rapidly when stored in a damp atm. (I) does not cake to so great an extent as (II) after absorbing  $H_2O$ . R. T.

**Determination of lime in limestone and raw cement by means of permanganate.** A. V. FILOSOFOV (Zavod. Lab., 1933, No. 5, 15).—The material is extracted with hot  $N-HCl$ , the Ca being pptd. as  $CaC_2O_4$ , which is acidified and titrated with  $KMnO_4$ . CH. ABS.

**Reaction between calcium acetate and soda.** V. P. ZEMLJANITZIN (J. Chem. Ind. Russ., 1934, 10, No. 10, 46—48).—Direct prep. of  $NaOAc$  from  $Ca(OAc)_2$  (I) and  $Na_2CO_3$  is feasible when 80% (I) is taken, but cannot compete with the ordinary method when less pure (I) is used, owing to the high cost of adsorbent C necessary for decolorising the product. R. T.

**Preparation of bleaching solutions from chloride of lime.** M. G. ELIASHBERG (Leningrad Dist. Soc. Cell. Paper Ind., 1934, 82—118).—The conditions for pptn. and clarification of aq.  $Ca(OCl)_2$  have been studied. Traces of  $Al_2O_3$  accelerate the pptn. of cold solutions, but larger amounts retard the clarification. CH. ABS. (e)

**Hydrolysis of magnesium chloride during drying of  $MgCl_2 \cdot 6H_2O$ .** I. G. SCHTSCHERBAKOV and L. V. YAMAKOVA (Kali, U.S.S.R., 1933, No. 9, 23—25).—Previous conclusions (A., 1933, 679) are confirmed. CH. ABS.

**Electrolytic preparation of alumina from clay.** V. A. PLOTNIKOV, O. K. KUDRA, D. P. ZOSIMOVITSCH, and I. M. PODORVAN (J. Chem. Ind. Russ., 1934, 10, No. 10, 50—54).—88% of the Al content of kaolin preheated at 750° is extracted by 1%, 91—96% by 4%, and 99.6% by 10%  $H_2SO_4$  at 75°. The solution, containing  $Al_2(SO_4)_3$  (4.5%, using 4%  $H_2SO_4$ ),  $Fe_2(SO_4)_3$ , and  $Na_2SO_4$ , is electrolysed, when  $Al(OH)_3$  is pptd. in the anolyte (A) and  $H_2SO_4$  is regenerated in the catholyte (C). The filtered A, containing  $Na_2SO_4$ , is returned to C, yielding further  $H_2SO_4$ . R. T.

**Preparation of anhydrous aluminium chloride by catalytic chlorination of kaolin.** J. E. SEFEROVITSCH (J. Chem. Ind. Russ., 1934, 10, No. 10, 62—64).—75—80% of the  $Cl_2$  passed at 650° over briquettes of kaolin with 2.5% of NaCl is utilised for  $AlCl_3$  production, the remainder forming  $SiCl_4$ ; the catalytic action of  $Na_2B_4O_7$ ,  $BaCl_2$ ,  $MgCl_2$ , and  $SnCl_4$  is considerably < that of NaCl. R. T.

**Handling chlorine to avoid trouble.** L. L. HEDGE-PETH (J. Amer. Water Works Assoc., 1934, 26, 1602—1620).—Precautions are described which should be observed at all plants handling liquid  $Cl_2$ . Various types of handling equipment and installations are shown and first-aid measures outlined. C. J.

**Blast furnace as chemical plant.**—See I. **Al in industry.**—See X.  **$NaNH_2$ .**—See XI. **Pigments.**—See XIII. **Fertilisers.**—See XVI.

## PATENTS.

**Manufacture of alkali hydride.** A. M. MUCKENFUSS, Assr. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,958,012, 8.5.34. Appl., 28.7.31).—Pure alkali hydride is manufactured by direct synthesis of the elements at elevated temp., the finely-divided metal being distributed in an inert org. liquid, e.g., a paraffin; a suitable temp. for Na or K is 230—400°. B. M. V.



**Coating of chloroamine.** W. F. WILHELM, Assr. to MARSHALL FIELD & Co. (U.S.P. 1,950,956, 13.3.34. Appl., 19.10.31).—Uniformly granulated  $\text{NH}_2\text{Cl}$  (mixed with salts, starch, or chlorinated starch) is coated (sprayed) with a solution of Na stearate (in  $\text{CHCl}_3$ ), and the solvent allowed to evaporate. H. A. P.

**Manufacture of zinc oxide.** B. N. MCCRAVEN, Assr. to NEW JERSEY ZINC Co. (U.S.P. 1,941,569, 2.1.34. Appl., 24.2.30).—Roasted Zn ore is reduced with C and the Zn vapours are condensed in a bath of liquid Zn maintained in a vessel from which the liquid metal is allowed to flow continuously into an electric furnace in which it is distilled into a current of air to yield pure  $\text{ZnO}$ . A. R. P.

**Negatively-charged aluminium gel.** P. H. BREWER and H. R. KRAYBILL, Assrs. to PURDUE RESEARCH FOUNDATION (U.S.P. 1,942,799, 9.1.34. Appl., 26.3.32).—The gel is obtained by adding aq.  $\text{NH}_3$  to aq.  $\text{Al}_2(\text{SO}_4)_3$  to  $p_H$  5, and then an equal amount of  $\text{Al}_2(\text{SO}_4)_3$ , stirring vigorously, settling, and washing the ppt. by decantation until the  $\text{NH}_4$  salts are almost completely removed. A. R. P.

**Preparation of sols for clarifying liquids.** C. Q. M. CAMPBELL (U.S.P. 1,942,507, 9.1.34. Appl., 6.5.30).—A starch emulsion (1%) is added to the suspension, which is then heated to  $50^\circ$  to expand but not rupture the starch cells, and the solids are coagulated by addition of  $\geq 3\%$  NaOH. A. R. P.

**Purification of gases. [Deodorising carbon dioxide.]** F. J. METGZER, Assr. to AIR REDUCTION Co., Inc. (U.S.P. 1,942,485, 9.1.34. Appl., 27.2.32).— $\text{CO}_2$  is compressed to 1000 lb./sq. in. in 3 stages and, without cooling, the hot ( $175^\circ$ ) gas is sprayed with 5% aq.  $\text{KMnO}_4$  containing 5% of  $\text{Na}_2\text{CO}_3$  to oxidise and absorb odorous impurities. The gas is then dried with  $\text{SiO}_2$  or the like, cooled, and liquefied. A. R. P.

**Recovery of sulphur.** L. ROSENSTEIN, Assr. to UNITED VERDE COPPER Co. (U.S.P. 1,941,623, 2.1.34. Appl., 28.11.30).—A mixture of  $\text{SO}_2$  and  $\text{H}_2\text{S}$  is passed through a chamber packed with a mineral gel ( $\text{SiO}_2$  or  $\text{Al}_2\text{O}_3$ ) and down the walls of which a thin film of  $\text{H}_2\text{O}$  is allowed to run. A. R. P.

**Reduction of sulphur compounds to elementary sulphur or hydrogen sulphide.** C. G. MAIER, Assr. to R. S. DEAN and H. A. DOERNER (U.S.P. 1,941,702, 2.1.34. Appl., 7.2.31).— $\text{SO}_2$  is reduced with a 2:1 mixture of  $\text{H}_2$  and CO at  $850^\circ$  in presence of a CaS or bauxite catalyst. A. R. P.

**Condensation of [liquid] sulphur.** E. W. WESTCOTT, Assr. to SULPHIDE CORP. (U.S.P. 1,957,006, 1.5.34. Appl., 5.6.29. Can., 27.4.27).—The condensing surfaces are maintained at a temp. within one of the ranges of mobility of S, preferably the lower one,  $120$ – $150^\circ$  ( $t_2$ ). If the original gaseous mixture comprises S and chlorides of heavy metals it is first diluted with inert gas so that the dew point of S ( $\theta$ ) is lowered below that of the chlorides which are first condensed at a temp. ( $t_1$ ) slightly above  $\theta$ . In an apparatus described, the cooling- $\text{H}_2\text{O}$  in the jackets is maintained at  $t_1$  and  $t_2$  respectively by regulation of its pressure, and the tubes

for the S gases are provided with an internal twisted strip to guide the gases to make contact with the wall.

B. M. V.

**Recovery of halogens from brines.** O. V. MARTIN, Assr. to TEXACO SALT PRODUCTS Co. (U.S.P. 1,956,993, 1.5.34. Appl., 19.8.30).—I and/or Br are/is expelled from brine by means of  $\text{Cl}_2$  and steam, the brine being caused to flow downwards from near the top through a series of contact vessels operated at a pressure  $>$  atm. throughout and increasing downwards owing to the head; the  $\text{Cl}_2$  is admitted lower down, the steam enters at the bottom, the vapours are withdrawn from the top, and the stripped brine is removed from the lowest vessel. B. M. V.

**Separating gaseous mixtures [e.g., air].—See I.  $\text{H}_2\text{S}$  from gases.  $\text{CS}_2$  (etc.) from hydrocarbon material.—See II.  $\text{CS}(\text{NH}_2)_2$  from  $\text{NH}_4\text{CNS}$ .—See III. Ozoniser. Electrolytic cell.—See XI. Pigments. Plastics from urea etc.—See XIII.**

## VIII.—GLASS; CERAMICS.

**Breaking strength of glass.** A. J. HOLLAND and W. E. S. TURNER (J. Soc. Glass Tech., 1934, 18, 225–251  $\tau$ ).—In the determination of the modulus of rupture (I) of drawn sheet glass, the most consistent results have been obtained from commercially annealed glass which has been re-annealed and tested 8 weeks after re-annealing. On testing 1 day after re-annealing the val. of (I) is high with a high coeff. of variation (II), much more consistent vals. being obtained 2 or 3 days later. If the specimens are not re-annealed after cutting, (II) is large. To obtain the true breaking strength the diamond-cut edge of the glass should be ground, polished, and fire-finished, but the most consistent results are obtained with specimens in which the edges have been simply cut by the diamond and tested with the cut edge downwards (in tension), or with specimens in which both edges have been mechanically ground and polished. Even so, (II) for large batches is rarely  $< 7$ – $8\%$  and, in general,  $8$ – $12\%$ . For fire-finished edges (II) is  $< 15\%$ . (I) increases with diminution in the width of the specimen.

M. S. B.

**Implications of the known variation in the strength of glass.** W. M. HAMPTON and C. E. GOULD (J. Soc. Glass Tech., 1934, 18, 194–200  $\tau$ ).—The uncertainty in the determination of impact strength, tensile strength ( $T$ ), and thermal endurance ( $E$ ) of glass is probably due to the unexplained variations of  $T$  for the same type of glass. Hence, no definite statement can be made as to the  $E$  of one glass article; only estimates of the probable % of breakages in a very large no. of articles of the same glass can be made when the temp. are given, and a high safety factor must be used.

M. S. B.

**Influence of temperature on the bursting pressure of bottles.** B. LONGMUIR and W. E. S. TURNER (J. Soc. Glass Tech., 1934, 18, 252–259  $\tau$ ).— $\text{H}_2\text{O}$  was used as the pressure medium at  $15$ – $95^\circ$  and oil at  $25$ – $150^\circ$ . Over the temp. range examined the product of the abs. temp. and the bursting pressure was approx. const.

M. S. B.



**Ferric oxide in the burning of fireclay.** BENINGA (Tonind.-Ztg., 1934, 58, 389—390; Chem. Zentr., 1934, ii, 493).—Thermal dissociation of  $\text{Fe}_2\text{O}_3$  ( $6\text{Fe}_2\text{O}_3 \rightarrow 4\text{Fe}_3\text{O}_4 + \text{O}_2$ ) increases the porosity at approx.  $1500^\circ$ . Sintering occurs at  $1000$ — $1100^\circ$ . H. J. E.

**Enamelled Cu wire.**—See X.

#### PATENTS.

**Tunnel kilns and the like.** T. W. SHOOK (B.P. 419,535, 18.5.33).—A tunnel kiln having the usual 5 zones, viz., (1)  $\text{H}_2\text{O}$ -smoking, (2) preheating and oxidising, (3) firing, (4) rapid initial cooling, (5) slow cooling and annealing, and intended for formed articles of ceramic ware (*W*) is operated with direct firing in (3) without any obstruction (even chequerwork) between the burners and *W*. From (3) the gases are led partly (*a*) in contact with *W* in (2) and partly (*b*) through muffle walls in controllable proportion and with provision for passing *a* into *b* at an intermediate point of (2), auxiliary burners being provided in *a* and *b*. Air for cooling is admitted under controllable pressure at the outlet end of (5) and withdrawn at a no. of points in (4) and (5), some being allowed to pass into (3). B. M. V.

**Transparent heat-resisting borosilicate glass.** R. HADDAN. From CORNING GLASS WORKS (B.P. 420,054, 27.6.34).—Glasses having a low coeff. of expansion [ $(20 - 30) \times 10^{-7}$ ], good resistance to alkalis, low electrical conductivity and power factor (0.0005—0.003), and low softening point ( $840$ — $850^\circ$ ) contain 80—90% of  $\text{SiO}_2$  and F in such amount that the ratio (analytically determined) alkali oxides/F is  $< 4/1$ . The ratio  $\text{SiO}_2/\text{B}_2\text{O}_3$  should be between 6/1 and 12/1 and there should be a min. of alkali oxide and an absence of alkaline-earth compounds. *E.g.*, a batch composition consisting of sand 600,  $\text{H}_3\text{BO}_3$  184,  $\text{Na}_2\text{SiF}_6$  80,  $\text{Al}(\text{OH})_3$  12, NaCl 8 pts. gives a glass containing  $\text{SiO}_2$  81.27,  $\text{B}_2\text{O}_3$  11.35,  $\text{Al}_2\text{O}_3$  2.18,  $\text{Na}_2\text{O}$  4.42, F 1.85,  $\text{Cl}$  0.045%. J. A. S.

**Manufacture of case-hardened glass.** W. OWEN, Assr. to PITTSBURGH PLATE GLASS Co. (U.S.P. 1,959,215, 15.5.34. Appl., 9.2.32).—Glass sheets are supported on a base (*B*) by a framework and surrounded by a heating hood (*H*). When *B* is lowered into a bath of cooling liquid by a hydraulic ram from below, *H* remains suspended and is lifted higher to afford access for changing the sheets. B. M. V.

**Manufacture of laminated glass.** TRIPLEX SAFETY GLASS Co., LTD., L. V. D. SCORAH, and J. WILSON (B.P. 420,073, 19.4.33).—The solvent is extracted from interlayers of a cellulose ester or polymerised org. compound (cf. B.P. 419,357; B., 1935, 93) by passing over them, after removal of enclosed air, the vapour of an org. adsorbent which is inert towards the plastic, *e.g.*,  $\text{CCl}_4$ ,  $\text{CHCl}_3$ . S. M.

**Treatment of [silica] sand.** J. A. CREW (U.S.P. 1,957,579, 8.5.34. Appl., 31.12.31).—The sand (*I*) is heated at a drying temp. and then moistened with dil. acid ( $\text{H}_2\text{SO}_4$ ); evaporation of  $\text{H}_2\text{O}$  is permitted and the acid thus conc. is allowed to remain in the pores of (*I*) for a sufficient time to dissolve impurities that would colour glass; the treated (*I*) is then washed with  $\text{H}_2\text{O}$ . B. M. V.

**Colorable ceramic composition and its utilisation.** A. E. BAGGS and E. LITTLEFIELD (U.S.P. 1,959,149, 15.5.34. Appl., 31.12.31).—Colouring matter for glass or ceramic glaze comprises Cu oxide and SiC in small proportions. B. M. V.

**Continuously decorating brick, tile, etc.** J. RAMSAY (U.S.P. 1,958,837, 15.5.34. Appl., 29.10.31).—The clay is mixed with hot  $\text{H}_2\text{O}$  and extruded hot, the lubricant (*L*) being hot  $\text{H}_2\text{O}$  or steam. Suitable veneer slips (*V*) are applied in splashes and combed into streaks or veins; the extruded column is then cut up and fired. *L* contains a coagulant and *V* a deflocculating agent. B. M. V.

(A) **Manufacture of refractories.** (B) **Refractory.** W. M. CHARMAN and P. R. WARD, Assr. to FERRO ENG. Co. (U.S.P. 1,956,894—5, 1.5.34. Appl., [A] 27.2.32, [B] 23.12.32).—(A) Refractories are formed from  $\text{SiO}_2$  sand and Na silicate solution containing 1  $\text{Na}_2\text{O}$  : 3.25  $\text{SiO}_2$  by wt., baking being effected at  $\geq 260^\circ$ . PbO or ZnO may be added to increase resistance to damp during storage. (B) The proportions of the above ingredients are more definitely claimed, *e.g.*, sand 94, Na silicate 4.7, ZnO 1,  $\text{H}_2\text{O}$  0.40 approx. % dry wt. B. M. V.

**Manufacture of preformed abrasives.** E. S. MERRIAM (U.S.P. 1,956,905, 1.5.34. Appl., 24.8.33).—An abrasive wheel or the like is constructed of a skeleton of  $\text{Al}_2\text{O}_3$  formed *in situ* about a softer medium of less *d*: *e.g.*, Al may be burned among granules of quartz. B. M. V.

**Manufacture of rubber-bonded abrasive articles.** (A) R. C. BENNER, (B) H. C. MARTIN, Assrs. to CARBORUNDUM Co. (U.S.P. 1,953,983—4, 10.4.34. Appl., [A] 23.7.32, [B] 6.1.28. Can., [A] 7.2.28. Renewed [B] 17.1.33).—(A) An abrasive disc, *e.g.*, comprises abrasive granules bonded with a material of the character obtained by coagulating an aq. dispersion of rubber and vulcanising to a friable state. (B) Abrasive particles are mixed into a viscous, stirrable mass of liquid containing rubber obtained, *e.g.*, by adding a coagulant to latex. The mass may then be shaped and vulcanised. (Cf. B.P. 311,104; B., 1929, 598.) D. F. T.

**Laminated glass.** RÖHM & HAAS Co. (B.P. 420,159, 22.5.33. U.S., 1.6.32).—See U.S.P. 1,937,323; B., 1934, 835.

**Manufacture of [grooved articles of] pottery.** STEATITE & PORCELAIN PRODUCTS, LTD. From PORZELLANFABR. KAHLA (B.P. 420,670, 11.5.34).

[Tunnel] kiln. Grading sand.—See I.  $\alpha$ -Methylacrylonitrile [for use in safety glass].—See III. Building units.—See IX. Sealing alloys for glass.—See X. Lamp coating.—See XI.

## IX.—BUILDING MATERIALS.

**Influence of the burning temperature of anhydrite, gypsum, and dolomite on the properties of clinkerless slag cements.** P. P. BUDNIKOV and L. GULINOV (Tonind.-Ztg., 1934, 58, 370—371; Chem. Zentr., 1934, i, 3639).—Glassy, granular, blast-furnace slags ( $\text{SiO}_2$  28.6—32.7, CaO 47.1—50.7%) give satisfactory cements when mixed with 15% of anhydrite



burned at 700—900° or with 10% of dolomite burned at 600—900°. H. J. E.

**Liberation of heat during hydration of concrete.** N. DAVEY (J.S.C.I., 1934, 53, 343—345 T).—Attention is drawn to the considerable difference in the amount of heat liberated by various types of cement (I) during the process of hydration, and the desirability of careful selection of the (I) for the particular class of concrete (II) work in hand is emphasised. In, e.g., mass (II), (I) which evolves a relatively small amount of heat should be selected, so that the tendency to form cracks on subsequent cooling may be eliminated. It is suggested that there should be < 3 specifications to cover the following grades of (I): grade A, for construction work where rapidity of hardening and high early strength are essential; grade B, satisfying requirements similar to those laid down in the British Standard Specification, and for use on general construction work; grade C, for use in mass (II) construction, being a type of (I) which would evolve heat at a slower rate than grade B, but not necessarily inferior to it in other respects.

**Behaviour of the sulphides in [iron] blast-furnace slag in cement mortars and concrete.** H. BURCHARTZ and E. DEISS (Arch. Eisenhüttenw., 1934—5, 8, 181—186).—Tests made with blast-furnace slag (I) ground through a 2-mm. sieve have shown that the use of (I) in cement mortars and concrete leads to no deterioration of the material by oxidation of the sulphides present. Only traces of sulphate are formed even when porous mixtures with a low cement content are left exposed to moist air for long periods. It is concluded, therefore, that (I), whether in lump, sand, or porous granulated form, can be used satisfactorily as a ballast for mortar or concrete. A. R. P.

**Hydration and hardening of calcium aluminates and silicates.** W. WATSON and Q. L. CRADDOCK (Cement, 1934, 7, 371—379).—The data on pure compounds indicate that the 24-hr. strength of Portland cement is due to the aluminates and the later strength to the silicates, but this conclusion may be modified in commercial cements by the existence of solid solutions, or by differences in hardness of the clinker minerals causing an increase in silicate content in the more finely-ground fraction. T. W. P.

**Making of putty plastics. II.** E. PERRY (Paint Var. Prod. Man., 1934, 11, No. 6, 5—6, 34).—Formulae for cements and putties for stone, metal, wood, glass, etc. are given. D. R. D.

**Tests in the Rangoon River on damage by marine borers to various woods, including Burma teak and British Guiana greenheart, creosoted and untreated.** C. W. SCOTT (Burma Forest Bull., 1932, No. 28, 10 pp.).—The teak and greenheart offered approx. equal resistance to the Rangoon teredo, whether creosoted or not. Both were inferior to creosoted kanyin (*Dipterocarpus alatus*). CH. ABS. (e)

**Preventing ship fires.** A. VINOGRADOV (Paint Var. Prod. Man., 1934, 11, No. 6, 16—17).—The fire hazard may be greatly reduced by impregnating all wood and cloth on board with salts such as  $(\text{NH}_4)_2\text{SO}_4$ ,  $\text{NH}_4\text{Br}$ ,  $\text{NH}_4$  phosphate,  $\text{Na}_2\text{WO}_4$ ,  $\text{Na}_2\text{B}_4\text{O}_7$ , or with

$\text{H}_3\text{BO}_3$ . The method of application and experiments demonstrating its efficiency are described. D. R. D.

**Sampling dusts.**—See I. Determining CaO in raw cement.—See VII. Corrosion of metal in wood.—See X. Wood preservation.—See XIII.

#### PATENTS.

**Kilns for burning bricks and the like.** J. KENNETT (B.P. 417,468, 8.4.33).—A no. of kiln chambers are disposed side by side, each having a fire space along both sides and an outlet flue formed as a trench in the floor. The latter is connected by damper-controlled passages to a common duct connected to a chimney, and by other damper-controlled passages to the central parts of the fire spaces on opposite sides of an adjacent chamber. The gases and steam evolved in one chamber during drying are allowed to escape to the chimney, but the hot gases leaving the chamber during the burning operation are passed to adjacent chambers for drying off the bricks therein. A. B. M.

**Manufacture of white Portland cement in a rotary kiln.** J. MERCELIS (B.P. 420,478, 3.4.34. Ger., 25.4.34).—Clinkers poor in Fe and Mn oxides are treated with acids, in the kiln, but after passing the hot zone. Use may be made of  $\text{H}_2\text{O}$  and  $\text{CO}_2$  in the proportions to form  $\text{H}_2\text{CO}_3$ , or of substances producing  $\text{H}_2\text{CO}_3$  by decomp., e.g., carbohydrates, org. acids or their salts. Chlorides or fluorides may be used, mixing them with the raw materials. T. W. P.

**Manufacture of hydraulic binding materials.** V. TRIEF (B.P. 420,217, 31.5.34. Belg., 31.5.33 and 15.5.34).—Granulated blast-furnace slag and sulphatic materials are finely ground by the wet method and Portland cement powder is added to the paste when required for use. T. W. P.

**Manufacture of building units.** E. M. WYATT and K. SLIDELL, Assrs. to AMER. FACE BRICK RES. CORP. (U.S.P. 1,956,607, 1.5.34. Appl., 26.12.30).—Ceramic material is extruded into threads, formed to shape without destroying the voids, and fired while still in that form. B. M. V.

**Manufacture of coloured cement.** J. FINN, JUN., Assr. to F. H. MEYER (U.S.P. 1,958,615, 15.5.34. Appl., 19.10.32).—Portland cement clinker, before or after grinding, is mixed with 0.1—5.0% of S and heated at 426—982° with exclusion of air for a time depending on the colour required, the S being added in two stages if desired. B. M. V.

**Protecting and colouring concrete.** E. W. SCRIPTURE, JUN., Assr. to MASTER BUILDERS Co. (U.S.P. 1,958,397, 8.5.34. Appl., 27.7.31).—A  $\text{H}_2\text{O}$  emulsion of wax coloured with pigment is applied to concrete after it has ceased to be "green," but before any efflorescence has taken place. B. M. V.

**Manufacture of [coloured] asbestos article.** H. GILLET, Assr. to DETROIT STEEL PRODUCTS Co. (U.S.P. 1,956,793, 1.5.34. Appl., 21.12.31).—Asbestos fibres, a pigment, and a binder are felted together, then waterproofed, and air-sealed with a transparent impervious material preferably having a paraffin base. B. M. V.



Wallboard. Coating on paper.—See V. Dyeing sand etc.—See VI. Cold- $H_2O$  paint.—See XIII. Sugar from wood.—See XVII.

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

**Size preparation of iron ores.** T. L. JOSEPH (Bur. Mines, Rept. Invest. No. 3240, 1934, 3—12).—The physical properties of sinter are more important than the chemical in controlling reduction rates. A method of determining Fe silicate (I) in sinter is described. (I) is slowly reduced and forms protective coatings on magnetite. With  $> 10\%$   $SiO_2$  some Fe will reach the hearth as unreduced (I). CH. ABS. (e)

(A) Direct production of iron and steel from ore. R. S. DEAN. (B) Amenability of various iron ores to rigorous concentration. S. R. B. COOKE. (C) Explosion shattering of iron ores. J. GROSS. (D) Reduction of iron ore by natural gas. C. G. MAIER and S. B. THOMAS. (E) Shaft-furnace reduction by the glomerule method. E. P. BARRETT. (F) Preparation of pure iron by heating briquettes of pure iron ore and reducing agent. T. L. JOSEPH and E. P. BARRETT. (G) Direct production of wrought iron. R. S. DEAN. (H) Nitrogen content of sponge iron and of metal obtained by melting sponge iron. E. P. BARRETT and C. E. WOOD. (I) Use of sponge iron in producing high-quality steels in the electric arc furnace. R. G. FITZGERALD and H. FREEMAN. (J) Reduced ferberite as a substitute for ferrotungsten. V. H. GOTTSCHALK and J. D. DOAN (Bur. Mines, Rept. Invest. No. 3229, 1934, 3—5, 7—32, 33—34, 39—47, 47—48, 48—49, 49—51, 53—60, 61—63, 65—70).—(A) A discussion.

(B) Analytical data and concn. tests are recorded.

(C) Explosion shattering gave less finely-divided material than ordinary crushing.

(D) Reduction of Fe oxide by  $CH_4$  was very slow below the sintering point of the reduced Fe. Working details are recorded. The reducibility was increased by treatment with 25% of a suspension of  $Ca(OH)_2$  containing 5% of CaO. Some S is eliminated during reduction.

(E) Glomerules formed from partly wetted ore by tumbling and heating to 1000—1200° are readily reduced in a shaft furnace.

(F) A briquette of magnetite, flour, charcoal, and  $H_2O$  was used. Heated in an induction furnace, it gave a 78% yield of high-purity, low-C steel.

(G) The prep. of wrought Fe from sponge Fe produced at low temp. is described.

(H) Analytical data are recorded. About 95% of the N was removed from sponge Fe (0.064% N) by melting in  $H_2$  in a high-frequency induction furnace.

(I) The prep. of 2 samples of tool steel is described.

(J) Ferberite was 98.5—99% reduced by  $H_2$  at 900—1150°, the product at 900° being a mixture of Fe and W. Annealed at 980° for 48 hr., it developed the structure of  $Fe_3W_2$  and W. CH. ABS. (e)

**Failures in steel and cast-iron mains and provisions for their protection.** E. F. REID (Proc. Inst. Civ. Eng., 1934, Eng. Paper 154, 53 pp.).—Causes of failure of cast-Fe and steel  $H_2O$ -mains may be (a) struc-

tural defects, e.g., subsidence, faulty joints, (b) physical, e.g., frost, (c) chemical, e.g., internal and external corrosion, (d) electrolytic corrosion. Alkaline  $H_2O$  with  $p_H > 7$  tends to inhibit internal corrosion. Incrustation caused by tuberculation is not always accompanied by corrosion. The tubercles thrive in Fe-bearing  $H_2O$ , but colonisation is possible only on exposed Fe. For new mains cement- or bitumen-lined pipes overcome the trouble, but for existing mains treatment of  $H_2O$  at the source is necessary. Valuable information relating to the corroding properties of the soil is derived from its electrical resistivity ( $r$ ); little corrosion occurs in soil having  $r > 1000$  ohms per c.c. Methods of protection include embedding in concrete or gravel, painting with CaO-impregnated pitch, and galvanising. Electrolytic corrosion is caused chiefly by stray currents from electric tramway tracks, but danger from a.c. is only slight. W. P. R.

**Electrical and heat conductivity of cast iron.** E. SÖHNCHEN (Arch. Eisenhüttenw., 1934—5, 8, 223—229).—Curves are given showing the heat ( $H$ ) and electrical conductivity ( $E$ ) of cast Fe containing  $< 5\%$  of C, Si, Cu, Ni, and P. The presence of constituents in solid solution in the ground-mass reduces  $H$  and  $E$ ; cementite has a considerable and temper C a slight effect in reducing these vals. With increasing proportions of graphite ( $G$ ) to total  $CE$  is decreased and  $H$  increased to an extent which is greater the coarser are the  $G$  flakes. Si reduces  $H$  and  $E$  as long as the  $G$  content remains unaltered, but when sufficient Si is added to cause separation of more  $G$   $H$  is increased. Cu reduces both  $H$  and  $E$  up to 1—1.5% Cu, but further additions have the opposite effect. Ni and P reduce both conductivities, but Cr tends to increase  $E$  and reduce  $H$ . Substitution of Ni for Si increases  $H$  and  $E$  to a max., and then decreases them. A. R. P.

**Creep limit of steels as a function of the composition and heat-treatment.** P. GRÜN (Arch. Eisenhüttenw., 1934—5, 8, 205—211).—The tensile strength ( $S$ ), yield point ( $Y$ ), and creep limit ( $L$ ) of steels with a small proportion of alloying elements have been determined at 400° and 500°. At 400°  $S$  and  $Y$  increase rapidly, but  $L$  rises only slowly with increase in C to 0.3% and Cr to 1%, after which all decrease. Small additions of Si, Cu, and Mn are most suitable for increasing  $L$  at 400°, whereas Mo gives the best results at 500°. Increase in % C has no effect at 500°. W and V increase  $L$  considerably at 400°, but are inferior to Mo in this respect at 500°. Simultaneous additions of small quantities of several elements are more beneficial than is an equal amount of a single element. A lamellar pearlitic structure obtained by slow cooling of C, Mn, Cr, and Cu steels gives a better  $L$  than the pptn.-hardened structure obtained by prolonged low-temp. annealing. Curves showing the vals. of  $S$ ,  $Y$ , and  $L$  at 400—500° as functions of the composition and time-elongation curves for steels having a high  $L$  at 500° are given. A. R. P.

**Structures in the transition zone between the quenched and non-quenched parts of 0.22% carbon steel.** J. SEIGLE (Chim. et Ind., 1934, 32, 1033—1040).—By quenching in  $H_2O$  a bar heated at one end to  $>$



the A3 point and at the other end to < the A1 point a series of microstructures are obtained. The study of these structures indicates that there is no abrupt change from the solid-solution condition (austenite) to the pearlite, but that cementite is pptd. with falling temp., in a manner similar to the ppt. of ferrite from the austenite. W. P. R.

**Corrosion problems.** J. JOHNSTON (Ind. Eng. Chem., 1934, 26, 1238—1244).—All additions to Fe for the purpose of reducing corrosion act by rendering the surface film less pervious. Many problems would be solved if the mol. structure corresponding to an impervious film were elucidated. Many advertised rust-resisting steels contain added Cu, and the presence of Cu is the cause of the durability of some of the older wrought Fe. Sometimes a sample of steel will develop a resistant film apparently accidentally. Many claims of resistance are of val. only under the conditions of test, and the belief that "pure" Fe will not corrode is erroneous. Presence of an e.m.f. indicates a tendency to corrode, but gives no information of rate or extent of corrosion. The position of an element in the electromotive series is fixed only when ionic concns. are specified. Over-voltage also affects results. C. I.

**Formation of rust showing the configuration of stream lines.** F. NUMACHI (Tech. Rep. Tôhoku, 1934, 11, 302—306).—The formation of rust on cast-Fe plates can be used to indicate stream lines of flow of H<sub>2</sub>O at the boundary. The method can be extended to study the flow of air by the use of a corrosive gas and a corrodible surface. Photographs are given. F. L. U.

**Effect of colloidal graphite on corrosion of boiler plate.** N. A. IZGARUISHEV and A. S. SMIRNOV (Min. Suir., 1934, 9, No. 3, 43—44).—The corrosion is 30—40% greater in presence of graphite, but is still negligible. Permutit accelerates oxidation. CH. ABS.

**Influence of furfuraldehyde on iron.** Z. N. CHARUKHINA and L. G. RASPOPOVA (Tzent. Nauch. Issl. Inst. Koz. Prom. Sborn. Rabot, 1934, No. 3, 95—100).—Fe containers 6 mm. thick may be destroyed by contact with furfuraldehyde. The corrosion is 3 times that for Cu. CH. ABS. (e)

**Corrosion of metal fastenings in wood treated with zinc chloride.** R. H. BAECHLER (Ind. Eng. Chem., 1934, 26, 1336—1338).—Tests over 5 years of the corrosion of wire nails driven into wood treated with ZnCl<sub>2</sub> showed that if they are driven into the wet wood corrosion is rapid during drying. If the wood is seasoned after treatment and the nails are then driven in, corrosion is not much > with untreated wood, unless atm. humidity is high. Brass screws are not appreciably corroded under any conditions. C. I.

**Reworking of scrap copper.** W. FRÖLICH (Chem.-Ztg., 1934, 58, 920—921).—In remelting Cu scrap, wire and similar small pieces of metal should be cut into 50—60-cm. lengths and bundled in a press; for high-quality castings tinned and soldered parts should be removed. After melting, the metal must be deoxidised with 0.1% of 15% phosphor-Cu (I) before casting. Scrap containing Al and Si should be melted separately and refined by stirring at 1200° with Cu hammer scale under

a Na<sub>2</sub>CO<sub>3</sub> slag; after skimming off the slag the metal is poled and finally deoxidised with (I). Scrap containing Sn, Zn, or Pb should be used only for alloying into brass or bronze. A. R. P.

**Prevention of scaling-off of the enamel on copper wire.** K. SHIRATO (J. Electrochem. Assoc. Japan, 1934, 2, 122—125).—Cu wire covered with CuO is suitable for enamelling and rubber coating; 40% sulphuration of the CuO does not cause the sulphide film to fall off. Sn on Cu also absorbs S, but the SnS scales off more readily than does CuS. CH. ABS.

**Flotation and depression of non-sulphides: calcite, silica and silicates, fluorspar, barite, apatite, and tungsten minerals.** J. B. CLEMMER and R. G. O'MEARA (Bur. Mines, Rept. Invest., No. 3239, 1934, 9—26).—Methods of separating fluorspar, barite, and calcite are given. W ores may be treated by soap flotation (I). Sulphides can be removed by the usual reagents without affecting subsequent (I). The treatment of W ores containing calcite and apatite is discussed and methods of treatment are given. In cleaning sulphide concentrates (OH)<sub>2</sub>-org. acids are powerful depressants for non-sulphides. CH. ABS. (e)

**Flotation of unclassified ball-mill discharge for recovery of the lead and zinc concentrates.** J. E. GARRETT (Proc. Austral. Inst. Min. Met., 1934, No. 92, 475—499).—The sulphide ore at the North Mine at Broken Hill consists of an intimate mixture of argentiferous galena, marmatite, and gangue, and averages Pb 15.2, Zn 12, Fe 5.3, Mn 0.8, Cu 0.1, S 11.1, gangue 55.5%, with Ag 9 oz./ton. Recent practice has been to grind the ore through 40-mesh, classify into fines and granular ore on a rake classifier, and treat each portion separately in the flotation plant; details of the results obtained are tabulated. It has now been found possible to omit the classification and float the ball-mill discharge directly, provided that it contains < 35% of fines passing 200-mesh. The Pb is floated in a 0.002% Na<sub>2</sub>CO<sub>3</sub> solution, using K Et xanthate 0.04, eucalyptus oil 0.02, and Na<sub>2</sub>CO<sub>3</sub> 0.075 lb./ton; the concentrates contain > 72% Pb and < 5% Zn. The tailings from the Pb circuit pass to the Zn cells where the ZnS is floated with CuSO<sub>4</sub> 0.5 and Na aërofloat 0.2 lb./ton. A. R. P.

**Smelting complex type[metal] ashes.** C. C. DOWNIE (Chem. & Ind., 1934, 996—998).—Modern practice consists in smelting briquettes of the ashes with antimonial PbO and type fume bonded with aq. Na<sub>2</sub>SiO<sub>3</sub>. The charge should preferably have a low Sn content since the S present causes high Sn losses due to volatilisation of SnS. The crude type metal produced by smelting is eventually refined by electrolysis after treatment to reduce the As content if necessary. Hints are given for overcoming various practical difficulties in the process. A. R. P.

**Bohn copper-lead bearing.** A. F. DENHAM (Automot. Ind., 1934, 71, 14—16).—The size and location of Cu crystals and the absence of segregated Pb near the surface may be controlled during cooling. Lubricating oils containing fatty acids must be avoided as they form Pb soaps. CH. ABS. (e)

**[Gold ore] tailings treatment at Bendigo.** A. F. S. ANDERSON (Chem. Eng. Min. Rev., 1934, 26, 454—456).—



The quartz-tailing heaps at Bendigo amount to about 4,000,000 tons containing 1.1—1.3 dwt. of Au per ton. By cyanide leaching, 0.9—1 dwt./ton can be extracted with a KCN consumption of 0.5 lb./ton and a CaO consumption of 6.3—27 lb./ton. The tailings thoroughly mixed with CaO are charged into the leaching tanks and sprayed with dil. aq. KCN to produce good aëration; leaching takes up to 36 hr., after which the tailings are washed with H<sub>2</sub>O and the solutions passed through Zn pptn. vats. A. R. P.

**Dissolved oxygen in mill solutions [from cyaniding gold ores].** C. W. BROWN (Chem. Eng. Min. Rev., 1934, 26, 447—450).—The best method of determining dissolved O<sub>2</sub> in aq. KCN used for leaching Au from its ore is titration with alkaline Na<sub>2</sub>S<sub>2</sub>O<sub>4</sub> solution under a layer of kerosene, using aq. Na indigotindisulphonate as indicator. Vals. obtained for the O<sub>2</sub> content (I) at various stages of the leaching, filtering, and pptn. processes at the S. Kalgurli mill are tabulated and discussed. During the agitation of the roasted ore with aq. KCN and compressed air (I) varies from 5 to 25% of the saturation val.; after treatment in the Crowe deaëration unit (I) falls almost to 0, but in the wash-H<sub>2</sub>O from the Merrill filtration plant (I) may rise as high as 80%. Owing to the high (I) of these waters 0.5—1 dwt. of Au per ton of ore may be leached out during washing. The chief consumers of O<sub>2</sub> during leaching, apart from the Au + KCN reaction, are SO<sub>3</sub>'', H<sub>2</sub>, metallic Fe from the grinding units, FeS, and FeSO<sub>4</sub>. A. R. P.

**Cast hard alloys.** N. ZARUBIN and Y. RAIKHLIN (Redk. Met., 1934, 3, No. 1, 31—42).—Cast alloys composed mainly of W carbides are more porous than those made by sintering. The alloy absorbs C while being melted and cast in graphite forms, giving a high C content in the outer layers. CH. ABS. (e)

**Substitution of nickel for cobalt in pressed hard alloys.** V. I. TRETYAKOV and N. D. TITOV (Redk. Met., 1934, 3, No. 1, 24—26).—Powdered WC was mixed with Zn dust in dil. aq. NH<sub>3</sub> and an aq.-NH<sub>3</sub> solution of Ni was added with agitation, the Ni being thus pptd. on the WC. The mixture was washed, dried, and sintered. An alloy with 8% Ni gave better results in cutting tests than WC with a Co binder. During sintering, protection from C is essential as it is absorbed by Ni. CH. ABS. (e)

**Modern extension of the field of technical alloys by the introduction of the rarer metals.** W. GUERTLER (Chem.-Ztg., 1934, 58, 969—970).—The uses of Li, Ca, Ba, Ce, Ti, Zr, Ga, Te, and Be in ferrous and non-ferrous alloys are briefly discussed. A. R. P.

**Aluminium in the chemical industry.** F. C. FRARY (Ind. Eng. Chem., 1934, 26, 1231—1237).—Resistance (*R*) of Al may be increased by adding to the normal coating of Al<sub>2</sub>O<sub>3</sub> by anodic treatment, by sealing treatments, by alloying, or by the use of an inhibitor. In most cases *R* increases with purity, and only Mg, Mn, Cr, and Sb are suitable alloy components. Al salts are non-toxic, e.g., to yeasts, and have no sp. effect on vitamins. Al is the only commercial metal which does not catalyse decomp. of H<sub>2</sub>O<sub>2</sub>, and it is inert to S, H<sub>2</sub>S, SO<sub>2</sub>, and NH<sub>3</sub>. Its principal disadvantages are its corrosion by alkalis, halogens, and halogen acids. Corro-

sion by alkali carbonates is inhibited by Na silicates, and that by NaCl by Na<sub>2</sub>Cr<sub>2</sub>O<sub>7</sub>. Salts of Cu, Sn, and Pb cause corrosion if present as impurities. Certain fruit colours and red wines are bleached by Al, but beer is not affected. Mechanical qualities are discussed and Al plant is illustrated. C. I.

**Determination of potassium formate in used silver baths.** C. LOCHMANN (Metallw.-Ind. Galvano-Techn., 1934, 32, 188; Chem. Zentr., 1934, ii, 506).—A sample is acidified with H<sub>2</sub>SO<sub>4</sub> to ppt. AgCN. The filtrate is made alkaline with NaHCO<sub>3</sub> and warmed to 50° in a stream of CO<sub>2</sub> to remove HCN. After acidifying with H<sub>2</sub>SO<sub>4</sub>, HCO<sub>2</sub>H is distilled off and determined by oxidimetric titration in alkaline solution. H. J. E.

**Application of electrodeposition to printing.** H. E. BOUGHAY (Metal Ind., 1934, 44, 15—16, 141—143).—A detailed description of applications. CH. ABS. (e)

**Protective films on magnesium obtained by electrolysis of sodium silicate and potassium dichromate.** I. V. KROTOV and G. G. IVANOV (Bull. Acad. Sci. U.R.S.S., 1934, 7, 921—929).—Electrolysis of a solution containing 27 c.c. of 33.3% Na<sub>2</sub>SiO<sub>3</sub>, 6 c.c. of 3% K<sub>2</sub>Cr<sub>2</sub>O<sub>7</sub>, and 167 c.c. of H<sub>2</sub>O with a Mg anode and an Fe cathode gives the most stable films. R. S.

**Nickel plating of aluminium.** W. FRÖLICH (Metallbörse, 1934, 24, 405—406, 439, 469—470; Chem. Zentr., 1934, i, 3915).—The pretreatment of the Al surface is discussed. A suitable bath contains NiSO<sub>4</sub>·7H<sub>2</sub>O, MgSO<sub>4</sub>, H<sub>3</sub>BO<sub>3</sub>, and a chloride. The coating is likely to deteriorate, due to differences in the mechanical properties of Al and Ni. This is avoided by prolonged heat-treatment up to 200°. H. J. E.

**Blast furnace as chemical plant.**—See I. **Blast-furnace slag in cement etc.**—See IX. **Pb coating of cables.**—See XI. **Metal vessels for foods.**—See XIX.

#### PATENTS.

**Metallurgy of iron.** A. GUDMUNDSEN, Assr. to A. O. SMITH CORP. (U.S.P. 1,941,983, 2.1.34. Appl., 21.3.32).—A mixture of Fe ore and flux (CaO) is heated to below the sintering temp., mixed with soft coal, and heated at 850—1000° to coke the coal and produce large coked aggregates which can be smelted in the blast furnace. A. R. P.

**Manufacture of (A) ductile cast iron [castings], (B) brake shoes.** F. A. FAHRENWALD, Assr. to AMER. BRAKE SHOE & FOUNDRY CO. (U.S.P. 1,941,671—2, 2.1.34. Appl., 6.1.30).—(A) The metal is cast into a composite sand and chill mould so that the parts in contact with the sand solidify as grey Fe and those in contact with the chill as white Fe. The casting is then annealed at 870—1010° for  $\frac{1}{4}$ —8 hr., cooled rapidly to just < the crit. temp., and maintained between 315° and the crit. temp. for 2—4 hr. (B) The process described in (A) is utilised for making brake shoes with the inner surface of grey Fe and the outer of white Fe, using cast Fe with C 2.2—3.5 and Si 1.75—0.7%. A. R. P.

**[Foundry] mould.** F. D. SNELL, Assr. to ESSEX FOUNDRY (U.S.P. 1,959,179, 15.5.34. Appl., 5.2.32).—



A mould that may be used > once and does not chill the Fe or other metal is composed of zircon,  $\text{SiO}_2$ , and Na silicate or other binder. B. M. V.

**Treatment of steel.** C. I. JUSTHEM (U.S.P. 1,942,173, 2.1.34. Appl., 31.5.32).—The charge is melted in the usual way under a siliceous slag, which is removed and replaced by a carbonaceous shale containing 40–70%  $\text{SiO}_2$ ; this forms a refining slag and introduces nascent Si into the metal bath, which is then deoxidised in the usual way. A. R. P.

**Manufacture of steel.** W. H. LEWIS (U.S.P. 1,941,562, 2.1.34. Appl., 5.2.32).—Steel scrap is melted in a regenerative furnace, pig Fe is added, and, when the temp. reaches  $1590^\circ$  the charge is transferred to a converter and there bessemerised. A. R. P.

**Free-scaling and free-machining steel.** H. J. FRENCH and J. W. SANDS, Assrs. to INTERNAT. NICKEL Co., INC. (U.S.P. 1,941,547, 2.1.34. Appl., 22.12.30).—Claim is made for a steel with 1–7% Ni and sufficient (e.g., 0.4% of)  $\text{ZrS}_2$  to give an S content of 0.05–0.15%. The scale produced on hot-working is readily detached and the metal can be readily machined. A. R. P.

**Alloy steel [for high-temperature boiler plate].** H. J. SCHIFFLER (U.S.P. 1,942,779, 9.1.34. Appl., 3.12.28. Ger., 19.1.28).—A steel which does not scale at  $< 800^\circ$  contains Al 2.7–3.6 (2.8), Cr 0.7–0.9 (0.8), Mo 0.1–0.5 (0.1), and W 0.1–0.5 (0.1)%. The heat-treatment comprises quenching from  $700$ – $1000^\circ$ , and reheating at  $500$ – $750^\circ$  to toughen the metal and refine the grain structure. A. R. P.

**Heat-treatment [case-hardening] of ferrous metals.** J. A. and D. ROBERTSON, Assrs. to G. F. McCANDLESS (U.S.P. 1,942,937, 9.1.34. Appl., 20.6.32).—The metal is heated at  $1010$ – $1065^\circ$  in a mixture of powdered charcoal 40, hardwood sawdust 24, Mn 20, Cr 5, borax 8, and chopped pea plants 3 with free access of air, so that the slow combustion of the carbonaceous material liberates gases which reduce the Si content of the surface layers and opens the grain, to permit penetration of the C, Cr, and Mn into the grain of the metal. A. R. P.

**Hardening of iron, steel, and cast-iron alloys by nitriding.** F. W. O. HENGSTENBERG, Assr. to NITRALLOY CORP. (U.S.P. 1,958,575, 15.5.34. Appl., 29.5.31. Ger., 2.6.30).— $\text{CaCl}_2$  or other halogen compound is disposed in a gas-permeable manner on and about the article being nitrided. B. M. V.

**Ferrous alloy. [Nickel-chromium steel.]** P. A. E. ARMSTRONG (U.S.P. 1,941,648, 2.1.34. Appl., 18.4.28).—The steel contains Cr 5–25, Ni 5–35, C  $< 1.5$ , and Al 0.3–4.5% with  $< 1\%$  Si and  $< 3\%$  Si + Mn. The Ni + Cr is preferably  $> 20\%$  and the Ni + Al + C + Si  $>$  the Cr content. A. R. P.

**[Cobalt-nickel-iron] alloys [for sealing into glass].** H. SCOTT, Assr. to WESTINGHOUSE ELECTRIC & MANUFACTURING Co. (U.S.P. 1,942,260–1, 2.1.34. Appl., [A] 5.7.29, [B] 8.2.30).—(A) The alloy consists of Fe with 43–55% Ni + Co and small quantities of C and Mn such that  $\% \text{Ni} + 2.5(\% \text{Mn}) + 18(\% \text{C}) = 0.55 \times (\% \text{Fe})$ . A preferred composition is Ni 25, Co 23.6, Mn 0.5, C 0.1, and Fe 50.8%. (B) The alloy consists

of Fe with 33–38% Ni + Co together with  $\geq 1\%$  C + Mn. The Co content =  $3 - 9(\% \text{Mn}) + 16(\% \text{C}) + 2 - 8\%$ . The alloy has a coeff. of expansion of  $< 8 \times 10^{-6}$ . A. R. P.

**Production of high-silicon and high-manganese steel.** A. C. JONES, Assr. to LEBANON STEEL FOUNDRY (U.S.P. 1,941,556, 2.1.34. Appl., 7.11.30).—Mild steel scrap is melted in an acid-lined electric furnace, treated with Fe ore to reduce the C to 0.12% and then with  $\text{SiO}_2$  to remove the FeO from the metal, deoxidised with low- (1.5%) -Si pig Fe low in C, and then brought to the desired composition (C 0.2, Si 0.5–3, Mn  $\geq 3\%$ ) by addition of silicomanganese. The resulting castings are free from brittleness and porosity. A. R. P.

**Manufacture of [steel razor-]blade strip.** T. H. FROST (U.S.P. 1,942,025, 2.1.34. Appl., 3.1.31).—A thin strip of steel (C 0.36, Mn 0.5, Si 0.27, Al 1.23, Cr 1.5, Mo 0.18) is plated with Ag or Ni except for a small portion along each edge and then passed continuously under tension  $<$  the elastic limit through a nitrogenising furnace in which an atm. of  $\text{NH}_3$  is maintained so that the edges are case-hardened while the central portion remains soft. A. R. P.

**Metallurgical apparatus [copper converter].** C. R. KUZELL, Assr. to UNITED VERDE COPPER Co. (U.S.P. 1,941,606, 2.1.34. Appl., 19.11.29).—The shell is provided with a monolithic lining made of a mixture of magnesite (M) with 0.5–10% of a binder consisting of molasses, fireclay, and bauxite. Of the M 13–20% passes 80-mesh and most of this is preferably finer than 200-mesh. A. R. P.

**Treatment of copper and its alloys [to prevent tarnishing].** C. E. TRION, Assr. to BATTELLE MEMORIAL INST. (U.S.P. 1,942,923, 9.1.34. Appl., 11.9.32).—The metal is dipped in 2% aq.  $\text{NaN}_3$  or  $\text{NaH}_2\text{PO}_2$ , rinsed, and then immersed in 1% aq.  $\text{Na}_4\text{Fe}(\text{CN})_6$  containing 0.1% of AcOH to produce a film of  $\text{Cu}_2\text{Fe}(\text{CN})_6$ . A. R. P.

**Decomposition of ores.** G. A. MACREADY (U.S.P. 1,941,609–10, 2.1.34. Appl., [A] 7.7.31, [B] 15.12.31).—(A) A mixture of finely-divided ore and coke is blown in a current of  $\text{CS}_2$  vapour through a BaS-lined passage heated at  $1700^\circ$ , whereby the metals in the ore are converted into sulphides; thus bauxite yields  $\text{Al}_2\text{S}_3$ . (B) The mixture of ore and C is blown through a reaction chamber heated at  $500$ – $1000^\circ$  and the solid products are heated in a distillation furnace at  $1000$ – $1800^\circ$  to volatilise the sulphides produced in the first stage. A. R. P.

**[Sulphide] ore treatment.** C. L. KENNICOTT (U.S.P. 1,958,581, 15.5.34. Appl., 18.4.32).—To recover both the metal and acid constituents sulphide ores are first heated to volatilise any loosely-combined S, then melted, subjected to several blasts of different composition, e.g.,  $\text{SO}_2$  and  $\text{O}_2$  several times alternately, and finally treated with  $\text{H}_2$  to desulphurise and deoxidise the metal. B. M. V.

**[Manufacture and use of] ore-flotation reagent.** I. H. DERBY and O. D. CUNNINGHAM, Assrs. to P. C. REILLY (U.S.P. 1,949,956, 6.3.34. Appl., 2.3.31).— $\text{C}_{10}\text{H}_8$  or other polynuclear hydrocarbon is heated with



$P_2S_5$  at  $210^\circ$  to form, *e.g.*, naphthalene-1:8-dithio-phosphoric anhydride; this is esterified with a phenol (tar acids) or hydrogenated phenol, an alcohol having  $\geq C_5$ , or an org. thiol, and the H ester formed is converted into a salt with an org. amine ( $NH_2Ph$ ). (Cf. U.S.P. 1,772,386; B., 1931, 301.)  
H. A. P.

**Cast metallic denture.** C. H. PRANGE, Assr. to AUSTENAL LABS., INC. (U.S.P. 1,958,446, 15.5.34. Appl., 15.3.32).—An alloy having slight shrinkage comprises Co  $> 50\%$ , Cr 10–40%, and Mo or W in unspecified amount.  
B. M. V.

**[Nickel] alloy for surgical needles.** W. ROHN (U.S.P. 1,942,150, 2.1.34. Appl., 30.7.32. Ger., 8.8.31).—Claim is made for a Ni alloy containing Fe  $\geq 25$  (15), Be 0.3–3, Cr 10–20 (15), Mo 2–5, W 3–8, and Co 1–5%. The alloy is worked almost to finished size, annealed at  $800$ – $1000^\circ$ , quenched, cold-worked to finished size, and tempered at  $400$ – $650^\circ$  to induce pptn.-hardening.  
A. R. P.

**Formation of [calcium-lead] alloys.** J. O. BETTERTON, Assr. to AMER. SMELTING & REFINING CO. (U.S.P. 1,941,535, 2.1.34. Appl., 13.4.33. Can., 23.12.32).— $CaC_2$  is vigorously agitated with molten Pb at  $800^\circ$  under a layer of fused NaCl- $CaCl_2$  slag.  
A. R. P.

**Electrochemical recovery of metals [gold and platinum] from ores and other metal-bearing materials.** R. RODRIAN, Assr. to H. H. BUTTERMANN (U.S.P. 1,941,914, 2.1.34. Appl., 27.9.26. Renewed 6.3.33).—The material is electrolysed in aq.  $Na_2CO_3$  to "unlock" the precious metals and the washed residue is digested with  $HNO_3$ , washed, calcined, and extracted with aqua regia to remove the Au and Pt.  
A. R. P.

**Heat-treatment of metals.** ELECTRIC FURNACE CO. (B.P. 419,832, 1.6.33. U.S., 2.6.32).—An atm. containing  $H_2$  7–37,  $CH_4$  0–10,  $N_2$  35–80, CO 5–22, and  $CO_2$  0–10% for use in the oxidising or reduction, carburising or decarburising, treatment of metals is produced by reaction of a suitable hydrocarbon and air in a chamber which is externally heated, is preferably provided with a catalyst, and is separate from the heat-treatment furnace.  
B. M. V.

**[Magnesium] alloy.** R. T. WOOD, Assr. to MAGNESIUM DEVELOPMENT CORP. (U.S.P. 1,942,041, 2.1.34. Appl., 17.11.32).—An alloy of Mg with Sn 0.1–12 (4–6), Al 0.5–6 (3.5–4.5), and Mn 0.1–1 (0.5–0.8) % is claimed.  
A. R. P.

**Rolling magnesium alloy.** R. D. LOWRY and F. L. REYNOLDS, Assrs. to DOW CHEM. CO. (U.S.P. 1,941,608, 2.1.34. Appl., 2.2.33).—Mg-base alloys with  $\geq 8\%$  Al, 2% Mn, 10% Cd, 8% Sn, or 3% Zn are rolled almost to finished size at  $> 315^\circ$  (85–90% reduction), then cold-rolled in numerous passes in each of which only a small reduction is made, and finally annealed.  
A. R. P.

**Manufacture of uniform corrosion [nickel] anodes.** G. F. GEIGER, Assr. to INTERNAT. NICKEL CO., INC. (U.S.P. 1,941,256–7, 26.12.33. Appl., [A] 12.3.30, [B] 28.9.31).—(A) Claim is made for a cast or rolled Ni anode containing S 0.002–0.0075 (0.005) and O about

0.15%. (B) The metal is made by passing air into a molten mixture of Ni and NiS until the requisite amount of O is absorbed, casting into thin ingots, hot-rolling to finished size, quenching in  $H_2O$  containing EtOH, and pickling in 3% HCl to remove the oxide skin.  
A. R. P.

**Preparing and stabilising electroplating solutions, and apparatus therefor.** R. E. CLOSE (B.P. 420,402, 29.9.33).—The use of sol. metallic anodes and of a perforated stainless-steel cathode contained within a porous cylindrical cell is claimed.  
J. S. G. T.

**Chromium-plating [bath].** G. E. BARBER, Assr. to TIMKEN-DETROIT AXLE CO. (U.S.P. 1,942,469, 9.1.34. Appl., 3.10.31).—The  $CrO_3 : SO_4^{''}$  ratio in the bath is  $< 40 : 1$  and the  $Cr^{III} : Cr^{VI}$  ratio  $\leq 1 : 10$ ; *e.g.*, the bath contains  $CrO_3$  240,  $SO_4^{''}$  13 g./litre, and  $Cr^{III} : Cr^{VI} = 1 : 5$ .  
A. R. P.

**Electrodeposition of chromium.** C. G. FINK and C. H. ELDRIDGE, Assrs. to UNITED CHROMIUM, INC. (U.S.P. 1,942,356, 2.1.34. Appl., 9.7.31. Renewed 25.10.33).—The objects to be plated are heated to the temp. of the bath before immersion therein.  
A. R. P.

**Manufacture of a [silver] mirror.** G. F. and W. H. COLBERT, Assrs. to LIBERTY MIRROR WORKS (U.S.P. 1,942,686, 9.1.34. Appl., 19.1.32).—The glass surface is silvered in the usual way, a coating of Cu is then applied electrolytically, a design painted or enamelled on the Cu, and the exposed metal parts are removed by dissolution in  $HNO_3$ .  
A. R. P.

**Metallising with reflecting highly polished surface celluloid in sheets and any other form by chemical means.** K. KIEFER (U.S.P. 1,941,438, 26.12.33. Appl., 3.3.32. Ger., 15.9.31).—The celluloid is washed with a dil. EtOH solution of  $SnCl_2$  and then coated with Ag by the usual  $AgNO_3$ -tartrate treatment.  
A. R. P.

**Electrolytic extraction of pure aluminium.** J. WEBER, A. VON ZEERLEDER, and W. D. TREADWELL (U.S.P. 1,942,522, 9.1.34. Appl., 11.11.27. Ger., 22.11.26).—In the refining of Al by electrolysis in fused chloride baths small quantities of  $NiCl_2$ ,  $FeCl_2$ , or  $PbCl_2$  are added to the bath to prevent treeing of the deposits.  
A. R. P.

**[Cinnabar] retort.**—See I. **Welding electrodes.** Cu sheet and strip. Telephone wire. Ni-Fe alloys. —See XI. **[Alloys for] protective coatings.** Laminated products.—See XIII. **Cleaning moulds.**—See XIV.

## XI.—ELECTROTECHNICS.

**[Electrolytic] preparation of sodamide by the "GIPCh" method.** G. I. VOJNILOVITSCH, B. B. VASILJEV, and E. I. ACHUMOV (J. Chem. Ind. Russ., 1934, 10, No. 10, 54–59).— $NaNH_2$  is deposited in theoretical yield at the cathode during electrolysis of a saturated solution of NaCl in liquid  $NH_3$  ( $-10^\circ$  to  $5^\circ$  at 3–5 atm.),  $NH_4Cl$  and  $H_2$  being obtained as by-products. The cost of prep. of  $NaNH_2$  by this method is  $\frac{1}{2}$  that of the ordinary Kastner method.  
R. T.

**Lead coating of cables.** P. WIEGHARDT (Elektrotechn. Z., 1934, 55, 339–340; Chem. Zentr., 1934, i,



3631).—Processes of etching and microscopical examination are described. H. J. E.

**Al<sub>2</sub>O<sub>3</sub> from clay.**—See VII. **Conductivity of cast Fe. Type-metal ashes. Al in industry. Electrodeposition and printing. Determining HCO<sub>2</sub>K in used Ag baths. Protective films on Mg. Ni-plating Al.**—See X. **Electrotechnic embedment materials.**—See XIV. **Determining moisture in grain.**—See XIX.

## PATENTS.

**[Steel] welding electrode.** A. C. ROOD, ASSR. to UNA WELDING & BONDING Co. (U.S.P. 1,942,364, 2.1.34. Appl., 1.6.26. Renewed 9.5.33).—Claim is made for a steel welding rod coated with a mixture containing C sufficient to give a weld metal of the same C content as that of the metal being welded, and a deoxidising agent consisting of  $\leq 1$  of the following: ferrovanadium (I), ferrotitanium (II), ferrozirconium, ferromanganese (III). The preferred coating contains C 55, (I) 2, (II) 20, and (III) 15%, the remainder being binding material.

A. R. P.

**Resistance-welding electrode.** E. W. BREMER, ASSR. to ELECTROLOY Co., INC. (U.S.P. 1,959,154, 15.5.34. Appl., 14.12.33).—An alloy suitable for all methods of resistance-welding comprises Cu with Be 1—3 (2.25) and, if desired, Ni 0.1—0.025%.

B. M. V.

**[Electric resistance] welding.** W. KREUTZ, ASSR. to F. SCHULL (U.S.P. 1,943,123, 9.1.34. Appl., 9.10.31. Ger., 11.11.30).—The contacting faces are subjected to an electric current without pressing them together, while a carbonaceous flame is passed over the weld to deposit C thereon and reduce the m.p. of the metal at the weld so as to produce a smooth surface without a ridge.

A. R. P.

**Incandescence cathodes.** N. V. PHILIPS' GLOEILAMPENFABR. (B.P. 420,289, 3.9.34. Ger., 7.9.33).—A heating wire, preferably surrounded by an insulator, e.g., porcelain, is arranged within a graphite container (C) coated on the inside and outside with an electron-emitting oxide, e.g., BaO. If desired, C may be coated first with Cu and then with Ni.

J. S. G. T.

**[Electric] lamp coating.** A. F. LINDSTROM, ASSR. to WESTINGHOUSE LAMP Co. (U.S.P. 1,941,990, 2.1.34. Appl., 21.11.28).—The lamp is coated with a paste of kaolin 50, Guignet's green 200, CdS 50, H<sub>3</sub>BO<sub>3</sub> 160 g., and aq. Na<sub>2</sub>SiO<sub>3</sub> (*d* 1.015—1.035) 1000 c.c.

A. R. P.

**Depolarising electrode [for dry batteries].** M. L. MARTUS and E. H. BECKER (U.S.P. 1,941,869, 2.1.34. Appl., 22.7.30).—The electrode consists of a pressed cylinder of granular CuO with a suitable binder, coated on the outside with a sprayed film of Cu or Zn and containing a central rod of Cu forming the terminal, the composite body being annealed before use.

A. R. P.

**Storage-battery separators.** E. W. SMITH, ASSR. to ELECTRIC STORAGE BATTERY Co. (U.S.P. 1,942,667—8, 9.1.34. Appl., [A] 7.3.29, [B] 2.4.29).—The separator comprises a layer of material decomposable by the oxidising action of the positive plate and a superimposed layer of a paste (P) of (A) kieselguhr and aq. Na<sub>2</sub>SiO<sub>3</sub>, or (B) kieselguhr, glass wool, and aq. Na<sub>2</sub>SiO<sub>3</sub>. Under the

action of the acid in the battery the Na<sub>2</sub>O is leached out of P, leaving a porous layer. A. R. P.

**Apparatus for ozonising and sterilising.** J. R. QUAIN and H. HARRISON (B.P. 420,228, 23.5.33).—An ozoniser comprising an outer (O) and an inner (I) cylindrical tube separated by an annular space and having metal or liquid electrodes applied to the outer and inner surfaces of O and I, respectively, is claimed.

J. S. G. T.

**Electrolytic cell.** C. N. WINDECKER and E. W. TUCKER, ASSRS. to DIAMOND ALKALI Co. (U.S.P. 1,957,482, 8.5.34. Appl., 7.7.30).—An alkali-Cl<sub>2</sub> cell comprises: (1) a containing vessel, (2) a cathode connected to (1) but spaced from it and comprising a complete circle (or polygon) of perforated sheet, (3) a diaphragm of asbestos paper or pulp pasted to the interior of (2), (4) a ring of anodes, (5) a luted insulating disc preventing the circular bottom of (1) from acting as a cathode, (6) a luted dome-shaped lid enabling the liquid level to be kept above the top edge of (2).

B. M. V.

**Electrolytic apparatus [for making copper sheet and strip].** R. A. WILKINS, ASSR. to INDUSTRIAL DEVELOPMENT CORP. (U.S.P. 1,941,376, 26.12.33. Appl., 8.11.29).—The cathode consists of a rotating, horizontal, cylindrical drum having an outer surface of Ag coated with a thin film of Ag<sub>2</sub>S impregnated with grease to allow the Cu deposit to be readily peeled off.

A. R. P.

**[Overhead] telephone transmission line.** F. M. CRAPO, ASSR. to INDIANA STEEL & WIRE Co. (U.S.P. 1,942,411, 9.1.34. Appl., 8.6.31).—Claim is made for the use of galvanised steel wire containing 0.25% C.

A. R. P.

**Electrical insulation for magnetic bodies [nickel-iron alloys].** W. C. ELLIS, ASSR. to BELL TELEPHONE LABS., INC. (U.S.P. 1,943,115, 9.1.34. Appl., 24.5.33).—In making dust cores of a Ni alloy with 17% Fe and 2% Mo the particles are coated with a paste of bentonite 0.77, milk-of-magnesia 2.11, and 50% aq. Na<sub>2</sub>SiO<sub>3</sub> 0.64 g. per 100 g. of alloy, the mixture is dried, pressed into shape, and annealed at 650° for 1 hr. in a neutral atm.

A. R. P.

**Electrical separation of suspended particles from gaseous fluids.** LODGE-COTTRELL, LTD. From SIEMENS-LURGI-COTTRELL-ELEKTROFILTER-GES. M.B.H. F. FORSCHUNG U. PATENTVERTWERTUNG (B.P. 420,192, 19.9.33).—The corona current is regulated and flash-over prevented by means of a regulating electrode, arranged outside the electric field between the discharge and collecting electrodes, and operating after the manner of a grid.

J. S. G. T.

**Making [coiled helical] incandescence filaments for electric incandescence lamps or discharge tubes.** N. V. PHILIPS' GLOEILAMPENFABR. (B.P. 420,854, 8.12.33. Ger., 11.1.33).

**Purifying [insulation] oil.**—See II. **Razor-blade strip. Au and Pt from ores. Ni anodes. Electroplating solutions. Cr-plate. Ag mirror. Metallising celluloid. Pure Al.**—See X. **Conserving fats etc.**—See XII. **Insulating bands etc.**—See XIII. **Influencing micro-organisms etc.**—See XVIII. **Remedy containing an emanation.**—See XX.



## XII.—FATS ; OILS ; WAXES.

**Stability of fat emulsions.** A. A. PCHELIN and E. Z. NOVIK-BAM (Tzent. Nauch. Issl. Inst. Koz. Prom. Sborn. Rabot, 1934, No. 4, 111—125).—Alizarin oil ( $p_H$  5—6) gave stable emulsion. For sulphonated train oil (I) ( $p_H$  4.2—5) the stability ( $S$ ) decreased with increasing concn. The  $S$  of a 5% emulsion of a mixture of spindle oil 50, (I) 40, and sulphonated petroleum 10% increases with the  $p_H$ .  $S$  was unaffected by temp. from 20° to 40°.

CH. ABS. (e)

**Utilisation of fish oil. I. Deodorisation of fish oil.** G. MATSUMOTO and H. MATSUI (Repts. Imp. Ind. Res. Inst. Osaka, Japan, 1934, 15, No. 3, 29).—Polymerisation at 200—300° under reduced pressure gave the most efficient deodorisation. Catalysts were also used.

CH. ABS. (e)

**Spontaneous oxidation [of linseed oil].**—See II. **Volumetric analysis [and oils and fats].**—See III. **Butter fat. Fat in cacao beans.**—See XIX.

## PATENTS.

**Conservation of fats, oils, or fatty substances.** "ELACT" GES. F. ELEKTR. APPARATE GES. M.B.H., and O. KARPELES (B.P. 420,471, 6.1.34).—An electric current (c.d. 3—12 milliamp. at 4—40 volts) is passed through the melted fats as they pass between spaced electrodes.

E. L.

**Manufacture of soap.** M. H. ITTNER (U.S.P. 1,951,511, 20.3.34. Appl., 12.2.31).—An odourless soap is obtained by saponifying the crude acid products of the oxidation of petroleum and heating the crude soap in a current of superheated steam ( $CO_2$ , PhMe, etc.) under vac. and at >250°, in order to eliminate the OH groups from the OH-acids, lactones, etc. and to remove unsaponifiable volatile products.

E. L.

**Treatment of alkylolamine soaps and related products.** W. J. HUND and L. ROSENSTEIN (B.P. 420,269, 26.3.34. U.S., 11.4.33).—Free alkylolamines (I) are recovered from their fatty acid compounds, or materials such as the residues from refining of oils etc. with (I) (cf. B.P. 387,962 and 391,658 ; B., 1933, 315, 555), by distillation with excess steam under reduced pressure in presence of small amounts of alkaline substances (alkali soaps, alkali or alkaline-earth oxides, etc.), whereby amidisation is suppressed.

E. L.

**Dehydration of water-containing or water- and oil-containing materials.** GES. ZUR VERWERTUNG FAUTH'SCHER PATENTE M.B.H. (B.P. 420,040, 4.4.34. Ger., 8.5., 6.6., 15.9., and 25.9.33).—The bulk of the  $H_2O$  separates spontaneously in the liquid form from moist materials (e.g., whale flesh, fish offal) in a continuous process whereby the comminuted material is immersed (washed) for a short time in a heat-transferring fluid ( $F$ ) at about 100° ; hot  $H_2O$  may be used as  $F$ , or whale or refined oil if the treatment is conducted in vac. Pre-treatment (1—2 min.) with superheated steam is advantageous with wet soya beans, peanuts, etc.

E. L.

**Grease and method of lubrication.** G. KAUFMAN, Assr. to TEXAS CO. (U.S.P. 1,952,012, 20.3.34. Appl., 12.7.30).—An anhyd. grease ( $G$ ), consisting of a mixture of castor oil and an alkali-metal (Na) soap of castor oil,

is suitable for lubricating pumps etc. handling mixtures of mineral oil and  $SO_2$ , in which  $G$  is insol. and non-reactive.

E. L.

**Candle.** N. J. BAUMER (U.S.P. 1,958,462, 15.5.34. Appl., 5.5.32).—The candle is formed of beeswax (<20%) and cottonseed, rapeseed, olive, or other vegetable oil.

B. M. V.

**Film evaporation.**—See I. **Textile assistants.**—See III. **Resinous composition.**—See XIII.

## XIII.—PAINTS ; PIGMENTS ; VARNISHES ; RESINS.

**Petroleum thinners.** E. M. TOBY (Official Digest, 1934, No. 130, 304—305).—A brief review. D. R. D.

**Development of pigment properties in titanium dioxide.** N. PARRAVANO and V. CAGLIOTI (Gazzetta, 1934, 64, 703—714).—The pigment properties of  $TiO_2$ , obtained by ignition of the hydrolysis products of Ti compounds, are dependent on various factors such as temp. and time of ignition,  $SO_3$  content of the hydrolysed product, and particularly on the conditions existing during the hydrolysis, viz., temp. concn., nature of electrolytes present, and velocity of formation of nuclei. The conditions of hydrolysis which lead to a product with the structure of anatase and consisting of particles of 0.15—0.65  $\mu$  are the most suitable for obtaining a good pigment, whereas the formation of rutile does not produce good pigments.

O. J. W.

**Dry colours of the chromate type.** H. A. REDDY (Official Digest, 1934, No. 130, 328—334).—The results of a detailed practical study of the pigment properties (ease of grinding, hiding powers, suitable media, anti-corrosive action, etc.) of the different types of Pb and Zn chrome-yellows and orange are recorded.

D. R. D.

**Film coverings as applied finishes.** ANON. (Synth. Appl. Fin., 1934, 5, 190—192).—Figures quoted indicate that cellulose acetate is readily permeable to  $H_2O$  vapour, whereas commercial moisture-proof cellulose sheet (I) is not. The mechanical properties of a special heat-sealing (I) are given.

D. R. D.

**Applied finishes for preservation of wood for tropical use.** ANON. (Synth. Appl. Fin., 1934, 5, 213—216).—Methods of protecting wood from insect attack by impregnation with chemicals are reviewed, with special reference to the work of the U.S. Bureau of Entomology. Chlorinated  $C_{10}H_8$  gives the best protection and also stabilises the wood against warping due to changes in humidity. Coal-tar creosote may be used where appearance and odour are of no importance, wood creosote being less efficient.  $ZnCl_2$  and NaF may be employed, but  $HgCl_2$  is too poisonous for safe use. Paraffin wax affords no appreciable protection.

D. R. D.

**Rational selection of pigmented cellulose lacquers and enamels.** ANON. (Synth. Appl. Fin., 1934, 5, 220—230).—Factors to be considered and tests to be applied when selecting pigmented lacquers are discussed.

D. R. D.

**Removal of fumes in varnish-making.** C. R. ELLIOTT (Official Digest, 1934, No. 130, 304—305).—Fumes formed during the addition of thinners may be removed by means of a hood leading to a chimney



containing a fan. Alternatively, the varnish may be made in a closed vessel and the thinners added through a H<sub>2</sub>O-cooled tube.

D. R. D.

**Hexanone.**—See III. Putty plastics.—See IX.

## PATENTS.

**Cold-water plastic paint for textured wall decoration.** H. J. HAIRE and J. D. REYNOLDS, Assrs. to GYPSUM LIME & ALABASTINE, CANADA, LTD. (U.S.P. 1,954,291, 10.4.34. Appl., 26.12.30).—With the normal tinting materials of the "Calsomine" type, *e.g.*, mixtures of whiting, clay, glue, and gypsum, are incorporated plaster of Paris, oil cake, mica, fruit sugar, and ZnSO<sub>4</sub>, the finely-ground and blended mixture requiring the addition of cold H<sub>2</sub>O alone to give a plastic paint for textured finishes.

S. S. W.

**Manufacture of pigments [containing calcium fluoride].** L. PAINDAVOINE (B.P. 420,308, 29.5.33. It., 19.8.32).—CaF<sub>2</sub> is heated at 900° in presence of 1% of HCO<sub>2</sub>Na, Na<sub>2</sub>CO<sub>3</sub>, Na<sub>2</sub>SiO<sub>3</sub>, or Na<sub>2</sub>C<sub>2</sub>O<sub>4</sub>. TiO<sub>2</sub>, MgSiO<sub>3</sub>, etc. may be added before or after the calcination.

S. M.

**Pigment [with protective colloid coatings].** W. J. O'BRIEN (U.S.P. 1,952,886, 27.3.34. Appl., 14.6.32).—0.05—15% of hydrogenated fish or vegetable oil, *e.g.*, menhaden, whale, soya-bean, castor, is added to a warm aq. slurry of a pigment or extender, which is then ground, filter-pressed, dried, and ground dry. The products have improved suspension when made into oil paints, and improved properties as fillers in plastic compositions etc.

S. S. W.

**Printing ink.** J. F. JIROUSEK, Assr. to MIR-A-COL, INC. (U.S.P. 1,954,627, 10.4.34. Appl., 18.4.32).—The following composition is claimed: wax ( $\frac{1}{2}$ — $\frac{3}{4}$ ), inorg. filler (1—6), drying oil (10—14), (copal) resin and its solvent (1—5), pigment (6—9), drier ( $\frac{1}{16}$ — $\frac{1}{8}$ ), and solvents. Rosin oil ( $\frac{1}{2}$ ), CH<sub>2</sub>Ph·OH ( $\frac{1}{2}$ — $2\frac{1}{2}$ ), and kerosene (1—10 pts.) may also be added.

S. M.

**[Fusible] (A) marking composition, (B) transfer.** W. S. LAWRENCE, Assr. to KAUMAGRAPH Co. (U.S.P. 1,954,450—1, 10.4.34. Appl., [A] 20.2.30, [B] 13.8.30).—(A) Colouring matter is incorporated into a fused mixture of an Albertol resin (I), ozokerite, and a blown vegetable oil. (I) may be replaced by "Cumar" resin and OH·CH<sub>2</sub>·CH<sub>2</sub>·OBU added to promote ageing of the product. (B) A dispersion of a dye in an aq. emulsion of a wax, ozokerite, and a soap (prep. described) is applied to a paper base and transferred to a fabric by heat and pressure and the dye fixed by steaming.

S. M.

**Manufacture of pencils and the like.** C. C. GOW, and MORGAN CRUCIBLE Co., LTD. (B.P. 420,368, 24.5.33).—A mixture of long-fibred wood fibres (I) with a solution of a cellulosic plastic material, *e.g.*, a 25% solution of cellulose acetate (II) in COMe<sub>2</sub>, together with plasticisers and resins if desired, is converted into a paste by partial evaporation of the solvent, moulded into sheaths for pencil leads by extrusion through a die, and the remaining solvent is then removed at < 100°. Such finished sheaths should contain 50—70% of (II) and 30—50% of (I).

S. S. W.

**Temporary protective coatings for articles and application and removal thereof.** J. J. V. ARMSTRONG. From COPEMAN LABORATORIES Co., and L. G. COPEMAN (B.P. 420,250, 28.9.33).—Temporary flexible coverings, which may subsequently be peeled off, are applied to finished articles, *e.g.*, motor cars etc., to protect them from damage during shipping etc. They comprise a first coat of a plastic substance, *e.g.*, aq. dispersions of rubber, preferably pure latex, on which, while tacky, is applied a layer of wood flour, cotton dust, ground rubber, plaster of Paris, etc. in quantity sufficient to make the whole mass readily removable in large sheets, a final coat of the plastic material being then applied as sealer and waterproof protection for the system. A multiplicity of such alternate coats of plastic and backing material may be used if desired.

S. S. W.

**Colouring and protective coating.** O. SCHÖBER, Assr. to AMER. LURGI CORP. (U.S.P. 1,953,508, 3.4.34. Appl., 18.10.32. Ger., 1.9.30).—The use of protective coatings pigmented with finely-divided Al-Si alloys containing < 5% (20—60%) of Si, dispersed in a suitable liquid binding medium, *e.g.*, linseed oil, copal, turpentine, and driers, is claimed.

S. S. W.

**Manufacture of liquid saturating or coating material.** I. J. NOVAK, Assr. to RAYBESTOS-MANHATTAN, INC. (U.S.P. 1,952,725, 27.3.34. Appl., 16.9.31).—Cresylic acid (1 mol.), formalin, and aq. NH<sub>3</sub> (0.25—0.5 mol.) are mixed and the reaction product, after removing the supernatant liquor, is heated with about  $\frac{2}{3}$  of its wt. of tung oil at 82—104°. The homogeneous product becomes infusible when heated and may be used for impregnating friction linings etc.

S. M.

**Composition of matter. [Plastic, adhesive, etc.]** M. T. HARVEY, Assr. to HARVEL CORP. (U.S.P. 1,952,313, 27.3.34. Appl., 6.11.30).—Aq. emulsions of cashew nutshell liquid preheated to 316°, an alkali caseinate, and, if desired, a setting material, *e.g.*, CH<sub>2</sub>O, furfuraldehyde, (CH<sub>2</sub>)<sub>6</sub>N<sub>4</sub>, and fillers are claimed.

S. S. W.

**Cellulose derivative solvent and composition.** C. J. STAUD and C. S. WEBBER, Assrs. to EASTMAN KODAK Co. (U.S.P. 1,954,336, 10.4.34. Appl., 31.7.29).—Mixtures of 1:4-dioxan (95—50 pts.) and H<sub>2</sub>O (5—50 pts.) are used as solvents for cellulose esters of acyl content below the min. necessary to confer solubility in COMe<sub>2</sub>, *e.g.*, cellulose acetate (36—20% Ac).

S. S. W.

**Cellulosic composition containing cyclohexanone and o-tolyl p-toluenesulphonate.** T. F. MURRAY, JUN., and C. J. STAUD, Assrs. to EASTMAN KODAK Co. (U.S.P. 1,954,326, 10.4.34. Appl., 12.9.30. Cf. U.S.P. 1,560,542; B., 1926, 48).—The flexibility of cellulose ester films containing o-tolyl p-toluenesulphonate (1 pt.) is increased by addition of cyclohexanone (10 pts.).

S. M.

**Sound record.** G. SCHNEIDER, Assr. to CELANESE CORP. OF AMERICA (U.S.P. 1,954,026, 10.4.34. Appl., 7.11.30).—The sound-reproducing surfaces consist of sheets of cellulosic materials together with suitable plasticisers (*e.g.*, cellulose acetate and Et<sub>2</sub> phthalate, cellulose nitrate and camphor), laminated on to a core



of a rosin composition containing the same plasticiser as is present in the outer layer, are claimed.

S. S. W.

**Manufacture of laminated products.** SOC. CHEM. IND. IN BASLE, Asses. of G. E. LANDT (B.P. 419,901, 16.10.33. U.S., 15.10.32).—A laminated product comprising one or more sheets of fibrous material impregnated with a non-hardening, thermoplastic, synthetic resin, *e.g.*,  $\text{NH}_2\text{Ph}\cdot\text{CH}_2\text{O}$ , and united under heat and pressure with a metal sheet by means of a quick-drying cement, preferably containing rubber, is claimed. A compressible layer of paper, felt, cork, etc. may be interposed between laminated sheet and metal to absorb strains etc., and the composite sheet may be bent without separation of layers or surface cracking.

S. S. W.

**Production of [coloured] laminated material.** H. F. HORNE, Assr. to WESTINGHOUSE ELECTRIC & MANUFACTURING Co. (U.S.P. 1,953,111, 3.4.34. Appl., 16.6.30).—The laminated sheet containing a thermo-hardening resin is covered with a layer of paper or other fibrous material which has been passed through a suspension of the pigment and, preferably, impregnated with a binder, *e.g.*, shellac; the whole is then hot-pressed.

S. M.

**Preparation of composite mica article and cementitious binder.** W. A. BOUGHTON, Assr. to NEW ENGLAND MICA Co. (U.S.P. 1,953,950, 10.4.34. Appl., 19.7.30).—Layers of mica films are bound with a solution of shellac (100) in EtOH to which ZnO (35 pts.) has been added. The solvent is removed and the whole pressed at  $> 250$  lb./sq. in. and  $125\text{--}265^\circ$ .

S. M.

**Preparation of plastic materials derived from urea and formaldehyde [containing sulphur].** FABRIQUES DE PROD. DE CHIM. ORG. DE LAIRE, and R. ARMENAUT (B.P. 420,317, 29.6.33. Fr., 30.6.32 and 13.6.33).— $\text{CH}_2\text{O}$  and urea are condensed in presence of an acid and a sulphide other than  $(\text{NH}_4)_2\text{S}$ ; nascent  $\text{H}_2\text{S}$  is produced in the mixture, the  $p_{\text{H}}$  of which is maintained at 5—7 by addition of, *e.g.*,  $\text{ZnCO}_3$ . Phosphorescent products are formed when a luminous sulphide, *e.g.*,  $\text{ZnS}$ , is retained.

S. M.

**Production of compositions comprising organic polysulphide plastics and synthetic resins.** DUNLOP RUBBER Co., LTD., D. F. TWISS, and A. E. T. NEALE (B.P. 420,386, 28.6.33).—An org. polysulphide plastic of the kind obtainable from reactive halogenated hydrocarbons and an alkali polysulphide is dissolved in one (A) of the parent substances for a synthetic resin, which is then formed by the addition of the remaining necessary parent substance(s) (B). A may be  $\text{PhOH}$ , and B  $\text{CH}_2\text{O}$ , which may be formed *in situ*. Other possible synthetic resins are of the polyhydric alcohol-polybasic acid and the aldehyde-arylamine types.

D. F. T.

**Preparation of phenoplastic.** C. F. PRUTTON, Assr. to DOW CHEM. Co. (U.S.P. 1,950,516, 13.3.34. Appl., 21.6.29).—An aq. solution of a metallic phenoxide, *e.g.*,  $\text{NaOPh}$  (2 mols.), is heated under pressure with a polyhalogenated hydrocarbon, *e.g.*,  $\text{CH}_2\text{Cl}_2$  (1 mol.), to  $> 300^\circ$  in presence of a basic catalyst, *e.g.*,  $(\text{NH}_4)_2\text{CO}_3$ .

S. M.

**Manufacture of films, threads, and the like [from polyvinyl compounds].** J. Y. JOHNSON.

FROM I. G. FARBERIND. A.-G. (B.P. 419,826, 18.5.33 and 6.1.34).—Polystyrene, polyvinyl chloride or acetate, or their mixtures are extruded to threads or films, stretched while hot, and cooled under tension. A volatile solvent, *e.g.*,  $\text{C}_6\text{H}_6$ , ethers of polymerised vinyl alcohols, rubber, plasticisers, and fillers may be added.

S. M.

**Manufacture of [insulating] flexible bands, threads, and foils of polystyrol or like artificial substances.** NORDDEUTS. SEEKABELWERKE A.-G. (B.P. 419,900, 16.10.33. Ger., 24.10.32 and 20.7.33).—To obtain products of improved mechanical properties the polystyrene is forced through a nozzle (I) at  $140\text{--}150^\circ$  and then drawn at a speed  $>$  the outlet speed of (I); in addition, the thickness of the band may be reduced to  $\frac{1}{2}$  by applying a uniform longitudinal and transverse pull.

S. M.

**Rubber-bituminous composition.** A. C. FISCHER (U.S.P. 1,952,706, 27.3.34. Appl., 26.9.30).—A cohesive mass comprising approx. equal wts. of rubber and a bituminous emulsion, and a small amount of a non-absorbent fibrous filler, *e.g.*, sawdust pretreated with oil to prevent impregnation by the other ingredients, is claimed. The composition is compressible and elastic and is suitable as coatings, crack fillers, etc.

S. S. W.

**Manufacture of a composition of matter [for gaskets].** H. H. JORDAN, Assr. to ARMSTRONG CORK Co. (U.S.P. 1,941,437, 26.12.33. Appl., 17.11.31).—A mixture of casein, glycerin, rubber, and triethanolamine is milled to a homogeneous mixture at an elevated temp., plasticised glue and powdered cork (through 50-mesh) are then incorporated by continued mixing, and the product is heated to "tan" the rubber and casein.

A. R. P.

**Treatment of natural resins and gums.** H. L. FRENKEL (B.P. 419,952, 22.5.33).—In place of the normal "running" process, gums (etc.) are heated indirectly in an inert atm. in Al vessels through the jackets of which circulates a liquid heating medium, *e.g.*, "Fenilic liquid," a eutectic mixture of  $\text{Ph}_2$  and  $\text{Ph}_2\text{O}$ , so that fusion takes place with  $> 5\%$  loss of "gum fumes." In recharging the kettle, fresh gum is fed into a pool of molten gum from the previous run, or into a solution of gum in "condensed fume." Esterification with glycerol etc. may also be carried out under similar conditions.

S. S. W.

**Chemical treatment of shellac.** W. A. BOUGHTON, Assr. to NEW ENGLAND MICA Co. (U.S.P. 1,953,951, 10.4.34. Appl., 27.1.32).—Shellac (10—13 pts.) is heated at  $120\text{--}280^\circ$  with substantially anhyd. ZnO (7—10 pts.) in absence of  $\text{H}_2\text{O}$  and, if desired, in presence of a high-boiling, blendable, org. liquid, *e.g.*,  $\text{N}(\text{C}_2\text{H}_4\cdot\text{OH})_3$ ,  $(\text{CH}_2\cdot\text{OH})_2$ ,  $(\text{C}_6\text{H}_4\text{Me})_3\text{PO}_4$ , (5—50 pts.) until a substantial amount of the shellac acids is neutralised. Drying oils, *e.g.*, linseed, tung, or natural or synthetic resins, *e.g.*, rosin, copal, coumarone, chlorinated  $\text{Ph}_2$ , may be incorporated with the Zn-shellac complex if desired. Relatively insol. and highly reversibly thermoplastic resins are obtained.

S. S. W.

**Production of [urea-formaldehyde] resin-like condensation products.** F. POLLAK, Assr. to SYNTHETIC PLASTICS Co., INC. (U.S.P. 1,950,746, 13.3.34.



Appl., 7.8.30. Austr., 27.2.29).—Excess of  $\text{CH}_2\text{O}$  is removed, after condensation of the reactants, with a current of steam or air; the product is then polymerised by heating. S. M.

**Manufacture of urea-aldehyde plasticised resin.** E. E. NOVOTNY and W. W. JOHNSON, Assrs. to J. S. STOKES (U.S.P. 1,951,526, 20.3.34. Appl., 16.6.31).—Urea, furfuraldehyde, and a catalyst, *e.g.*, aq.  $\text{NH}_3$  or  $\text{Na}_2\text{CO}_3$ , are heated together until combination is substantially complete, when  $\text{H}_2\text{O}$  of reaction and other volatile substances are removed. To increase flexibility tung oil is incorporated either in the reaction mixture or after the primary reaction is completed. To accelerate the final reaction and to achieve strong, tough final products other aldehyde substances, preferably containing active  $\text{CH}_2$  groups, *e.g.*,  $\text{CH}_2\text{O}$ ,  $(\text{CH}_2)_6\text{N}_4$ , may be introduced. S. S. W.

**[Phenol-aldehyde] resinous compositions.** BRIT. RESIN PRODUCTS, LTD., and H. E. MABEY (B.P. 419,883, 18.5.33).—A phenol (100) and an aldehyde (100) are condensed until 2 layers separate; the product is heated at  $< 110^\circ$  with a natural resin, *e.g.*, rosin (100), and tung or other fatty oil (6–50 pts.) until a homogeneous resin is formed. S. M.

**Production of [alkyd] resinous complexes.** T. F. BRADLEY, Assr. to ELLIS-FOSTER Co. (U.S.P. 1,952,412, 27.3.34. Appl., 7.5.28).—The flux obtained by heating a fatty oil (tung or menhaden etc., but not castor) with  $(\text{CH}_2\text{-OH})_2$  or other dihydric alcohol and  $o\text{-}(\text{C}_6\text{H}_4\text{-CO})_2\text{O}$  (I) is heated with more (I) and glycerol at about  $300^\circ$ . The products are sol. resins suitable for incorporation with nitrocellulose. S. M.

**Alkyd resinous composition.** F. ZWILGMEYER, Assr. to NAT. ANILINE & CHEM. Co., INC. (U.S.P. 1,950,468, 13.3.34. Appl., 18.4.30).—A polyhydric alcohol (glycerol) which has been partly esterified by a polycarboxylic acid (I), *e.g.*, maleic, is condensed with a partial ester of (I), *e.g.*,  $\text{Pr}^f \text{H}$  succinate. The use of halogen derivatives of these compounds yields resins of increased elasticity. S. M.

**Manufacture of synthetic [glyptal] resins.** E. I. DU PONT DE NEMOURS & Co. (B.P. 419,604, 13.5.33. U.S., 13.5.32).—A polybasic acid or anhydride is heated with an alcohol (I) having  $\leq \text{C}_5$  and 2 or 3  $\text{CH}_2\text{-OH}$  groups attached to a single C atom. Examples of (I), which are, in general, obtained by condensing  $\text{CH}_2\text{O}$  with a CO compound having  $\leq 1$  (2) H attached to an  $\alpha$ -position, are  $\text{CMe}_2(\text{CH}_2\text{-OH})_2$ , 2:2:6:6-tetramethylcyclohexanol,  $\text{CEt}(\text{CH}_2\text{-OH})_3$ , and  $\beta$ -2-quinolylpropane- $\alpha$ -diol (from quinaldine and  $\text{CH}_2\text{O}$ ). Drying oils or the corresponding fatty acids, other monohydric or polyhydric alcohols (*e.g.*, glycerol), natural resins, and other customary glyptal ingredients may be incorporated. H. A. P.

**Manufacture of resinous products.** E. I. DU PONT DE NEMOURS & Co. (B.P. 419,373, 11.5.33. U.S., 16.5.32).—The resistance to  $\text{H}_2\text{O}$  of glyptal resins is improved by acylation of free OH with a keten (*e.g.*, with  $\text{CH}_2\text{:CO}$  in  $\text{COME}_2$  or solvent naphtha at 25– $50^\circ$ ). H. A. P.

**Resinous composition and its application.** T. F. BRADLEY, Assr. to AMER. CYANAMID Co. (U.S.P. 1,953,583,

3.4.34. Appl., 25.11.29).—Compositions of polybasic acid-polyhydric alcohol resins and a waxy ester of a higher monohydric alcohol, *e.g.*, cetyl, ceryl, myricyl, and a higher fatty acid, *e.g.*, stearic, palmitic, oleic, linoleic, or elæomargaric, are claimed for use as coating or impregnating materials for paper etc., rendering it highly  $\text{H}_2\text{O}$ -resistant and substantially grease-proof. The mixture may be applied from PhMe or other hydrocarbon solution, aq. emulsions, or in a molten condition, and may be air-dried or baked. S. S. W.

**Production of resin-acid compositions substituted in the carboxylic group.** E. FONROBERT and F. LEMMER, Assrs. to RESINOUS PRODUCTS & CHEM. Co., INC. (U.S.P. 1,952,367, 27.3.34. Appl., 28.1.30. Ger., 28.8.29).—Natural and acidic synthetic resins, *e.g.*, Congo copal, are esterified without pre-melting by heating with an ester of a monohydric alcohol or acid amide of b.p.  $> 200^\circ$ , *e.g.*,  $\text{Bu}_2$  phthalate; the free acid formed is distilled off. S. M.

**Manufacture of resin, gum, and balsam.** C. ELLIS, Assr. to ELLIS-FOSTER Co. (U.S.P. 1,952,060, 27.3.34. Appl., 10.8.29).—The crude aldehyde mixture obtained by oxidation of mineral hydrocarbons is heated with urea,  $\text{CS}(\text{NH}_2)_2$ ,  $\text{NH}_4\text{CNS}$ , or their mixtures; alcohols are recovered. S. M.

**Manufacture of shaped articles from polyvinyl alcohols.** CONSORT. F. ELEKTROCHEM. IND. GES.M.B.H. (B.P. 420,052, 16.10.33. Ger., 17.10.32. Addn. to B.P. 386,161 and 393,505; B., 1933, 238, 677).—The capacity for being resorbed of polyvinyl alcohols (made into threads, tubes, etc. for medicinal purposes, *e.g.*, surgical sutures) is increased by addition of 5–10% of electrolytes other than borax (cf. prior patents), *e.g.*, oxalic, malic, and lactic acids,  $\text{NHPh-NH}_2\text{HCl}$ ,  $\text{Ni}(\text{NO}_3)_2$ . 5–10% of substances for increasing the strength of the threads etc., *e.g.*,  $\text{KCNS}$ , and bactericidal substances, *e.g.*,  $\text{PrOBz}$ ,  $\text{HgCl}_2$ , may be added. S. S. W.

**Ozonised terpene alcohol [for lacquers].** Long-chain esters [as solvents].  $\alpha$ -Methylacrylonitrile [products]. Casein products.—See III. Azo dyes.—See IV. Wood-fibre products. Coating for paper. Cellulosic plastic.—See V. Rubber etc. plastics.—See XIV. Patent leather.—See XV.

#### XIV.—INDIA-RUBBER; GUTTA-PERCHA.

**Zinc sulphate ammine [vulcanisation] accelerator.** T. R. DAWSON (J. Res. Assoc. Brit. Rubber Manufrs., 1934, 3, 113–126).—A commercial product, approx.  $\text{ZnSO}_4 \cdot 3 \cdot 7\text{NH}_3$ , is examined as to stability and behaviour with rubber. Vulcanisation, with or without additional  $\text{ZnO}$ , commenced near  $98 \cdot 5^\circ$ ; at  $153^\circ$ , 5 pts. of the accelerator are approx. as effective as is 0.5 pt. of  $\text{NH}_2\text{C}(\text{NHPh})_2$ . With the exception of C black, most colouring agents are more or less affected; Prussian blue (I) is completely bleached during vulcanisation, but the colour gradually returns superficially. In mixtures containing  $\text{PbO}$  the accelerator gives no advantage. With (I) or Sb sulphide its activity is adversely affected.  $\text{MgCO}_3$  and "brown substitute" permit a normal acceleration effect. D. F. T.



**Use of glue in rubber mixings.** G. GOLL (Kautschuk, 1934, 10, 174—176, 195—198).—The standard tests for glue (I) give no indication of its relative val. for use with rubber. Of the various forms of (I) (including gelatin), bone-(I) gives the best results in rubber. The vulcanised product has good elasticity, strength, and abrasion resistance. Although the vulcanised product is harder, (I) acts as a softener in the unvulcanised rubber, facilitating the mixing operation and preventing premature vulcanisation during processing. The application of (I) in rubber mixtures for various special purposes is indicated. D. F. T.

**Calcene: a reinforcing ingredient [for rubber].** A. SPEEDY (India-Rubber J., 1934, 88, 684—686).—Calcene is a specially prepared  $\text{CaCO}_3$ ; 98 wt.-% of its particles are  $< 0.5 \mu$  diam. It gives results (illustrated by curves for various mixtures) superior to whitening or clays when incorporated in rubber, the improvement being particularly in tensile strength and resistance to tear. D. F. T.

**New accelerators [of vulcanisation].** S. REINER (Kautschuk, 1934, 10, 187—192).—A mixture of two oxides may give more marked accelerative effect on vulcanisation than would be expected from the individual effects. Tensile results are given for mixtures of rubber 100, S 3, after vulcanisation for a standard time, with various combinations of the following:  $\text{ZnO}$ ,  $\text{MgO}$ ,  $\text{PbO}$ ,  $\text{Al}_2\text{O}_3$ ,  $\text{Fe}_2\text{O}_3$ ,  $\text{HgO}$ ,  $\text{K}_2\text{O}$ ,  $\text{BaO}$ ,  $\text{Li}_2\text{O}$ ,  $\text{Ni}_2\text{O}_3$ ,  $\text{Bi}_2\text{O}_3$ ,  $\text{Co}_2\text{O}_3$ ,  $\text{CdO}$ ,  $\text{Ag}_2\text{O}$ . D. F. T.

**Pulverisation of rubber by the use of soya-bean lecithin and applications of the products.** S. MINATOYA and K. KURAHASHI (J. Soc. Rubber Ind. Japan, 1934, 7, 272—277).—Crude soya-bean lecithin (I) accelerated the vulcanisation of rubber in presence of  $\text{ZnO}$  and S. Milling of rubber with (I) gave particles which adhered in a sponge-cake form. Applications of this material are discussed. CH. ABS. (e)

**Influence of electrotechnic embedment materials on the conductivity of soft rubber.** W. M. H. SCHULZE (Kautschuk, 1934, 10, 143—144).—Vaseline, rosin, beeswax, paraffin wax, and ozokerite, or mixtures of these, when used for impregnating or surrounding rubber-insulated wire, lead after a short time to increased electrical conductivity of the rubber insulation. Montan wax and bitumen are substantially free from this action, which becomes more marked with longer contact, or at higher temp. Rubber vulcanised with tetramethylthiuram disulphide is more resistant than rubber vulcanised in the ordinary manner to the effect; the latter is attributed to the reduction of the  $\eta$  of the rubber by the swelling agent. D. F. T.

**Measurement of plasticity of rubber.** J. H. DILLON and N. JOHNSTON (Kautschuk, 1934, 10, 177—178).—Behre's remarks (B., 1933, 32) are critically reviewed and it is shown that, contrary to the results described therein, mastication at a lower temp. for a definite period leads to greater plasticity (P). The extrusion type of plastometer is more sensitive than the parallel-plate type for measurement of progressive increase in P. D. F. T.

**[Measurement of plasticity of rubber.]** J. BEHRE (Kautschuk, 1934, 10, 178, 199—200).—A reply to

Dillon and Johnson (see above). The discrepancy between the results is attributed to different conditions as to temp. during the plasticity measurements. D. F. T.

**Rubber. II, III.** H. STAUDINGER (Kautschuk, 1934, 10, 170—173, 192—195).—An account is given of the author's views on the mol. magnitude and structure of rubber, balata, and synthetic rubber, and on the nature of their solutions. D. F. T.

#### PATENTS.

**Preparation of a plastic vulcanisable material from rubber, gutta-percha, balata, and the like.** M. J. STAM (B.P. 420,334, 20.11.33).—Non-adhesive, finely-divided, unvulcanised rubber, gutta-percha, etc., obtained by spray-drying latex (cf. B.P. 388,341; B., 1933, 358), is mixed with compounding ingredients and converted into a coherent plastic mass by slight mechanical working or pressure without the usual tearing and masticating action. The process may be facilitated by the addition of a liquid capable of swelling rubber, e.g.,  $\text{C}_6\text{H}_6$ , in which the compounding ingredients may be present in some dispersed form, or of an easily fusible powder, e.g.,  $\text{C}_{10}\text{H}_8$ . The mixture is shaped, with or without the addition of  $\text{H}_2\text{O}$  (which may give latex-like dispersions), and vulcanised. D. F. T.

**Decorating mouldable articles [of rubber].** DUNLOP RUBBER CO., LTD., and J. S. TIDMUS (B.P. 420,330, 12.9.33. Cf. B.P. 389,770; B., 1933, 437).—The decorative rubber media, which are to be applied on a detachable backing to the unvulcanised rubber article, are formed of harder rubber by partial or complete vulcanisation prior to permanent embedment in the surface of the article by vulcanisation. D. F. T.

**Production of articles of rubber or the like.** INTERNAT. LATEX PROCESSES, LTD., and F. W. WARREN (B.P. 420,324, 15.8.33).—Articles with a surface pattern or design are made by contacting with a solution or dispersion of rubber a homogeneous mould or former of porcelain or the like which is produced by known means from a master mould; the latter consists of a basic element of the general shape required, to the surface of which is attached  $\leq 1$  element, e.g., of rubber sheet (I), bearing the desired surface engraving. (I) may be prepared by coating a suitably patterned material, such as metal or paper, with rubber from a rubber-containing liquid. D. F. T.

**Manufacture of cellular rubber and similar material.** J. A. HOWARD (B.P. 420,163, 26.5.33).—A conc. aq. dispersion of rubber (or analogous hydrocarbon) is mixed with a volatile solvent (I) (petrol) and vulcanising agents; the mixture also includes a softening agent (II), e.g., resin oil, in sufficient quantity to enable the hydrocarbon to retain gas in the cells which are formed therein. (I) or (II) may also serve to induce setting, and both may be provided by paraffin oil of low flash point. Cell formation and setting conveniently occur during the initial heating for vulcanisation. D. F. T.

**Making of rubber sponge.** H. LINDEMANN (U.S.P. 1,951,618, 20.3.34. Appl., 6.6.31. Renewed 23.9.33).—A rubber mixture containing gas-producing agents is



subjected to a first stage of vulcanisation by heating it in a mixture of a gas under substantial pressure and steam at the desired vulcanising temp. After partial vulcanisation, reduction of the pressure permits expansion of the mixture while the temp. is maintained, for the completion of vulcanisation, by introduction of steam. D. F. T.

**Fireproofing of rubber and its manufacture.** DUNLOP RUBBER CO., LTD., D. F. TWISS, A. S. CARPENTER, and A. E. T. NEALE (B.P. 420,116, 22.9.33).—Chlorinated drying or semi-drying oils (A), possibly with one or more of the following: chlorinated rubber (B), polymerised chlorobutadiene, chlorinated cyclic hydrocarbons, Se, are incorporated in rubber compositions. The mixture of A and B may be prepared by chlorination of a mixture of the parent materials. D. F. T.

(A) **Integrally united composite bodies.** (B) **Preparation of cement or coating material.** L. MELLERSH-JACKSON. From NAUGATUCK CHEM. CO. (B.P. 419,839—40, 8.9.33).—(B) Two rubber (I) preps., one containing  $\leq$  and the other  $\leq$  15% of combined S, are mixed in solution so that the product contains 10—25% of solids. Unvulcanised (I), vulcanising agents, accelerators, and softeners, e.g.,  $\text{NH}_2\text{Ph}$ , may be added. The product is used for uniting (I) to (I), metal, glass, etc. (A) The cement solution is spread on metal etc. and, after drying, a sheet of (I) is applied and the whole vulcanised. S. M.

**Preservation of rubber-cement coated articles.** H. E. MOYSES (U.S.P. 1,954,219, 10.4.34. Appl. 31.3.30).—The tacky surface of articles, such as tyre-repair patches, is protected by an easily removable dry coating of cellulose acetate, or other cellulose derivative, which is applied in liquid form. D. F. T.

**Cleaning of metal moulds used for vulcanisation of rubber articles.** W. H. CHANDLER (U.S.P. 1,952,417, 27.3.34. Appl. 23.3.32).—The coating which forms inside vulcanisation moulds is removed by the action of a solution of  $\text{H}_2\text{CrO}_4$  (e.g., 10—70% concn. and at 21—107°). The moulds are then rinsed and dried. D. F. T.

**Combustion unit.**—See I. **Dithiophosphate compounds.**—See III. **Porous fibre products.**—See VI. **Rubber-bonded abrasives.**—See VIII. **Temporary protective coatings.** **Laminated products.** **Rubber-bituminous composition.**—See XIII. **Adhesive.**—See XV.

## XV.—LEATHER; GLUE.

**Possibility of refining native [German] tanning materials.** W. MOELLER (Ledertechn. Rundsch., 1934, 26, 13—18, 27—31; Chem. Zentr., 1934, i, 3828).—The extraction of tanning materials (oak bark and wood, pine bark, chestnut wood) with org. solvents instead of  $\text{H}_2\text{O}$  yields extracts sufficiently low in non-tans for use in vat tanning without affecting the quality of the leather. J. S. A.

**Application of fish entrails in preparing enzymic softeners and unhairing substances.** A. M. SIMSKAYA (Tzent. Nauch. Issl. Inst. Koz. Prom. Sborn. Rabot, 1934, No. 3, 69—76).—Fish (carp) entrails may

be employed for softening and unhairing hides. The best preservative is 20 wt.-% of NaCl. CH. ABS. (e)

**Experiments with salt treated to increase its hide-curing ability.** L. S. STUART and R. W. FREY (J. Amer. Leather Chem. Assoc., 1934, 29, 630—645).—Of a no. of different additions of chemicals to NaCl for hide curing,  $\text{Na}_2\text{SiF}_6$  (I) and  $\text{C}_6\text{H}_2\text{Cl}_3\cdot\text{ONa}$  (II) appeared to be the most efficient, but (I) is non-fungistatic. The following mixtures are recommended for further investigation: NaCl + 0.2 wt.-% of (II), NaCl + 2% of (I) + 0.1% of  $p\text{-NO}_2\cdot\text{C}_6\text{H}_4\cdot\text{OH}$ , NaCl + 2% of (I) + 0.1% of (II). D. W.

**Formation of hydrogen sulphide and carbon dioxide in the tail tanning pits.** Z. I. IZRAILSON, A. A. SHMERLING, I. N. ABLIN, and G. K. BAIDAN (Tzent. Nauch. Issl. Inst. Koz. Prom. Sborn. Rabot, 1934, No. 3, 59—68).—De-ashing of the raw hides decreases the amount of  $\text{H}_2\text{S}$  liberated. The residue from quebracho generates more  $\text{H}_2\text{S}$  than that from domestic tanning substances. The contents of  $\text{NH}_3$  and  $\text{CO}_2$  in the air follow the same rules as does the  $\text{H}_2\text{S}$ . CH. ABS. (e)

**Tanning with pretreatment of the hides with buffer solutions.** G. LABZIN (Kozhev.-Obuv. Prom., 1933, 12, 597—600).—Tanning of hides in conc. liquors (I) is accelerated by pretreatment with the tannins dispersed in spent liquors (II). These have lost all activity and are combined with salts and mineral acids. Any (II) which is not salted out in presence of 1% NaCl may be used. After treatment the hides are washed in (II) before treating with (I). CH. ABS. (e)

**Tanning with pine, oak, willow, and chestnut and their combinations in preparing sole leather.** G. K. BAIDAN (Tzent. Nauch. Issl. Inst. Koz. Prom. Sborn. Rabot, 1933, No. 1, 35—44).—The best mixture was obtained from the tannides of willow and of oak (10%). The latter alone gave unsatisfactory leather with dry tissues. The quality was improved by addition of  $\geq$  35% of pine tannides. A pine extract obtained by extraction at  $\geq$  100° followed by sulphiting may be used in pit-tanning. CH. ABS. (e)

**Grease stains on [vegetable-tanned] leather.** III. **Lipins of fresh steer hide.** R. KOPPENHOEFER and J. H. HIGHBERGER (J. Amer. Leather Chem. Assoc., 1934, 29, 598—623; cf. B., 1934, 975).—A method for the fractionation of animal-skin lipins is described, whereby the following have been differentiated. The corium fat-cells contain corium lipins, which are chiefly triglycerides (these being the chief cause of grease staining), and the epidermis contains phospholipin and cholesterol, cholesteryl esters, and a group of esters from which arachyl alcohol, stearic and hydroxystearic acids have been isolated. D. W.

**Effect of temperature on deterioration of leather containing sulphuric acid.** R. C. BOWKER and E. L. WALLACE (J. Amer. Leather Chem. Assoc., 1934, 29, 623—630; cf. B., 1932, 616, 652).—Leathers (L) tanned with quebracho and chestnut extracts, respectively, and subsequently treated with different amounts of  $\text{H}_2\text{SO}_4$  were more deteriorated after 2 years' ageing at 43° than after 2 years at 21°. This temp. effect increased



with the acid content up to 2.3%  $H_2SO_4$  in quebrachotanned *L* and to 1.5% in chestnut-tanned *L*. The  $pH$  of *L* at this point of max. effect was approx. 2.6. The deterioration of *L* by free  $H_2SO_4$  begins at about  $pH$  3.0 for *L* aged at 21° and at  $> pH$  3.0 for *L* aged at a higher temp. D. W.

Glue in rubber mixings.—See XIV.

#### PATENTS.

[Degreasing] treatment of hides, skins, and leather. J. H. CONNOR and M. M. MERRITT, Assrs. to TANNING PROCESS CO. (U.S.P. 1,954,798, 17.4.34. Appl., 16.3.33).—The skins (etc.) are drummed with a mixture of kerosene and a non-drying oil capable of forming an aq. emulsion, e.g., sulphonated oil, and then  $H_2O$  at  $< 35^\circ$  is added to the drum to form an emulsion with the degreasing fluid and skin grease. D. W.

Treatment of leather. IMPERIAL CHEM. INDUSTRIES, LTD., G. S. J. WHITE, and H. A. PIGGOTT (B.P. 419,941, 13.5.33).—Vegetable-tanned leather (excluding furs) is (a) treated superficially or (b) impregnated (by drumming) with a OH-free quaternary  $NH_4$  salt containing a saturated alkyl radical of  $< C_{10}$  (a cetylpyridinium or trimethylcetylammonium halide). In (a) the treated portions generally have a decreased affinity for dyes; in (b) the affinity (for acid dyes) may be increased. H. A. P.

Manufacture of leather. R. PASTERNAK and G. D. CRAGWALL, Assrs. to C. PFIZER & Co. (U.S.P. 1,941,485, 2.1.34. Appl., 29.7.31).—White leather which can be dyed any colour and is similar to Cr-tanned leather in properties is obtained by the use of an Al gluconate bath at 80° prior to tanning. A. R. P.

Manufacture of patent leather. H. H. HOPKINS, Assr. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,954,750, 10.5.34. Appl., 18.12.30).—The leather is treated with an undercoat of japper's oil or a pyroxylin-oil composition and subsequently with a top coat comprising the reaction product of a drying oil, a polybasic alcohol, e.g., glycerol, and a polybasic acid, e.g.,  $o-C_6H_4(CO)_2O$ . The final product is baked. D. W.

Preparation of glue. E. F. CHRISTOPHER and F. L. DE BEUKELAER, Assrs. to SWIFT & Co. (U.S.P. 1,950,483, 13.3.34. Appl., 13.7.31).—Animal glue is mixed with 20–50 wt.-% of urea or biuret, to render it liquid at room temp. D. W.

Adhesive [containing rubber]. W. H. CHARCH, W. L. HYDEN, and T. G. FINZEL, Assrs. to DU PONT CELLOPHANE Co., INC. (U.S.P. 1,953,104, 3.4.34. Appl., 27.1.30).—An adhesive giving a transparent film and capable of joining materials with a surface comprising a cellulose derivative (e.g., regenerated cellulose) to like or different materials contains rubber [e.g., a 45% aq. dispersion (1–50 pts.), a  $H_2O$ -sol. agglutinant (e.g., including maize starch and dextrin, 5–100 pts.), a non-resinous peptising agent such as glycerol, 1–10 pts.; condensed glycerol, 1–17 pts.; or  $N(C_2H_4 \cdot OH)_3$ , 0.5–6 pts.] possibly with a solvent for cellulose (e.g., Et lactate 0–15 pts.). D. F. T.

[Continuous] manufacture of glue films. STOCKHOLMS BENMJÖLSFABRIKS AKTIEB. (B.P. 420,454 and 420,475, 20.6.33. Swed., 5.7.32).

[Liquid] insoluble cement [adhesive]. W. W. TRIGGS. From H. G. HALLORAN (B.P. 420,401, 16.9.33).—See U.S.P. 1,926,943; B., 1934, 548.

Casein products.—See III. Adhesive.—See XIII. Table jellies.—See XIX.

#### XVI.—AGRICULTURE.

Microflora of Kazakstan sands (central Asia). E. E. PAULIE (Soil Sci., 1934, 38, 401–406).—Bacterial nos. are examined, and the distribution of *Azotobacter* is discussed. A. G. P.

Rapid determination of the sand content of soils. L. WOLF, H. SCHLATTER, and W. JUNG (Bodenk. Forsch., 2, 220–231; Chem. Zentr., 1934, i, 3642–3643).—A combination of sieving and centrifuging processes for effecting mechanical analysis is described. A. G. P.

Chemical behaviour of clays in arable soils. L. WOLF and R. KÄCHELE (Verh. 2 Komm. Alkali-Subkomm. Int. Bodenk. Ges., 1933, A, 153–181; Chem. Zentr., 1934, i, 3642).—The nature and hydrolysis of the clay complex of soils and the action of plant roots thereon are examined. A. G. P.

Reclamation of salt and alkali land. E. M. TAYLOR (Allahabad Farmer, 1934, 7, 91–95).—Punjab white alkali soils subjected to continuous leaching are gradually transformed into black alkali types as a result of gradual hydrolysis of Na clay.  $CO_2$  generated by roots of rice convert liberated NaOH into  $Na_2CO_3$  and  $NaHCO_3$  and thus prevents soil becoming impermeable. CH. ABS. (p)

Relation between coloration of alkaline extract of soil and its content of lignin-humic complex. M. STRZEMIENSKA (Polish Agric. Forest. Ann., 1934, 32, 25–33).—Colour in (0.5%)  $Na_2CO_3$  extracts of soil (after washing with HCl) closely  $\propto$  the amount of lignin-humic complex present. CH. ABS. (p)

Manganese compounds in Japanese soils. Relation of manganese compounds to soil fertility. C. ICHIKAWA (J. Agric. Chem. Soc. Japan, 1934, 10, 323–329).—Most of 58 samples contained Mn (max. 0.612% in 10% HCl; 30.67 mg. per 100 g. in 10% KCl extract). In fertile soils KCl-sol.: HCl-sol. Mn is high. CH. ABS.

Importance of certain special elements in the agriculture of S. Florida. R. V. ALLISON (Proc. Florida State Hort. Soc., 1931, 11–21, 163–167).—A discussion of the effects of Cu, Mn, and Zn sulphates. CH. ABS.

Influence of water relationships of a low-ground peat terrain on some biochemical phenomena and crop yield. S. BAC and B. SWIETOCZOWSKI (Polish Agric. Forest. Ann., 1934, 32, 1–21).—Nitrification in peat increased as the  $H_2O$  content declined, with a max. at 69–71% of total  $H_2O$  capacity. CH. ABS. (p)

Soils bearing lime plants in granitic areas. J. WŁODEK, E. RALSKI, and M. WODZICKA (Bull. Acad. Polonaise, 1933, 10, B, 195–211). Soils under



CaO-loving plants have a higher degree of saturation with, and higher abs. contents of, total bases and Ca and larger amounts of H<sub>2</sub>O-sol. bases than those bearing acid-loving plants. The distribution of individual plants and plant families is examined in relation to these characteristics and to soil  $pH$ . A. G. P.

**Ground phosphate rock as substitute for filler in fertiliser mixtures.** P. M. SHUEY (Amer. Fertiliser, 1934, 80, No. 10, 8, 9, 26).—The CaCO<sub>3</sub> content is not sufficient to cause reversion or produce harmful effects. P<sub>2</sub>O<sub>5</sub> is supplied in a form more readily available than that of FePO<sub>4</sub>, AlPO<sub>4</sub>, or other native soil phosphates. CH. ABS.

**Reversion of superphosphate in soil.** W. LUKASZEWICZ (Polish Agric. Forest Ann., 1934, 32, 79—86).—Formation of less sol. PO<sub>4</sub>''' depends on interaction of Ca salts with those of Fe, Al, and Mg. CH. ABS. (p)

**Mobilisation of plant nutrients in cultivated soils.** W. OBST (Kunstdüng. u. Leim, 1933, 30, 304—306; Chem. Zentr., 1934, i, 921).—Treatment of soil with high-Mg limes facilitates utilisation of natural and applied PO<sub>4</sub>''', Mg phosphates acting as intermediates. A. G. P.

**Production of ammonia-nitrate fertilisers from gypsum.** P. A. SOLODOVNIKOV, N. A. KHAIKOVA, and D. I. KOSITZUIN (Trans. Sci. Inst. Fertilisers U.S.S.R., 1933, No. 101, 38—45).—Ground gypsum is mixed with H<sub>2</sub>O, HNO<sub>3</sub> is added with vigorous stirring, and NH<sub>3</sub> and CO<sub>2</sub> are passed into the mixture, the temp. being kept at > 40—50°. The product corresponds with (NH<sub>4</sub>)<sub>2</sub>SO<sub>4</sub>·2NH<sub>4</sub>NO<sub>3</sub>. CH. ABS.

**Water- and pot-culture trials of the action [on plants] of various potassium salts, with special reference to magnesium.** K. SCHARRER and W. SCHROPP (Landw. Versuchs-Stat., 1934, 121, 175—190).—In H<sub>2</sub>O cultures K<sub>2</sub>SO<sub>4</sub> produced higher yields of oats than did KCl. Addition of MgSO<sub>4</sub> to K<sub>2</sub>SO<sub>4</sub> cultures did not increase shoot growth and restricted root development. With increasing supplies of K, the K content of the straw and to a smaller extent the PO<sub>4</sub>''' content were raised, the N intake being unaffected. High proportions of K or Mg in the nutrient were associated with high Ca contents in the straw. KCl increased the K content of roots more effectively than did K<sub>2</sub>SO<sub>4</sub>. Mg increased and large proportions of K decreased chlorophyll formation. In a slightly acid sandy loam K increased the yield and K content of peas and lowered that of straw, SO<sub>4</sub>'' fertilisers being more active in this respect than Cl' fertilisers. High proportions of SO<sub>4</sub>'' in peas are associated with fertilisers of low Cl content, and high proportions of Cl' with those of high Cl content. A. G. P.

**Influence of the form of potassium fertilisation on the chemical composition of plants.** F. TERLIKOWSKI, A. BYCZKOWSKI, and S. SOZANSKI (Polish Agric. Forest Ann., 1934, 31, 123—138).—Application of kainit (I) increased the K, Ca, and Mg and lowered the Na contents of all plants in comparison with high-K fertilisers (II). (II) induced a higher assimilation of cations (notably Ca<sup>++</sup>) and of N by plants, whereas the Cl' and SO<sub>4</sub>'' contents were relatively higher when (I) was used. CH. ABS. (p)

**Combined effect of several factors [on plant growth]; Mitscherlich's theory and Rippell's law.** V. N. PEREGUDOV (Trans. Sci. Inst. Fertilisers U.S.S.R., 1933, No. 93, 258—303).—Correction introduced into Mitscherlich's equation by the Rippell law does not eliminate the error of the method. CH. ABS. (p)

**Value of copper sulphate as a plant nutrient.** R. RUSSELL and T. F. MANNS (Trans. Peninsula Hort. Soc., 1933, 51—57).—In laboratory (Neubauer) and field trials, addition of CuSO<sub>4</sub> to fertilisers (50 lb. per ton) increased the yields of many crops. Larger treatments (200 lb.) depressed growth. Activity of the *B. fluorescens* group of organisms was stimulated by Cu. CH. ABS. (p)

**Rôle of organic matter in plant nutrition. IV. Chemical and biological transformations attendant on the application of cane molasses to swamp soil.**

T. R. BHASKARAN, G. NARASIMHAMURTHY, V. SUBRAMANYAN, and B. A. S. IYENGAR (Proc. Indian Acad. Sci., 1934, 1, B, 155—182).—Decomp. of molasses in suspensions of swamp soils yielded principally CO<sub>2</sub>, lactic acid, AcOH, EtCO<sub>2</sub>H, and PrCO<sub>2</sub>H, and was complete within 4 days. The fermentation causes an increased buffer capacity in the liquid, and higher proportions of dissolved minerals, notably Fe<sup>++</sup> and Al, which may attain toxic proportions. There is a rapid return to normal conditions approx. 4 weeks after treatment. Fe<sup>++</sup> is repptd. as Fe<sup>+++</sup>. Ca and K rendered sol. during fermentation persist for 2 months. The soil residue after treatment has a decreased exchangeable Ca content. Variations in nos. of bacteria, fungi, and actinomycetes occurring during these changes are recorded. (Cf. B., 1935, 38.) A. G. P.

**Fertiliser effect of wood burning in the "Chitemene" system.** H. B. STENT (Ann. Bull. Dept. Agric. N. Rhodesia, 1933, 48—49).—Burning wood on soils for weed destruction increases the total and available P, available K, the total exchangeable bases, CaCO<sub>3</sub> content, and  $pH$  of the surface soil, but does not affect the N content or nitrifying power. CH. ABS. (p)

**Nitrogen in relation to composition, growth, and yield of wheat.** L. D. DONEEN (Wash. Agric. Exp. Sta. Bull., 1934, No. 296, 71 pp.).—Addition of N fertilisers to soils already furnishing a sufficiency of N retarded the vegetative stage of growth of wheat without materially affecting the yield (I) or N content of the grain (II). With restricted supplies of soil-N fertilisers increased both (I) and (II). The N: carbohydrate ratio of plants was not affected by soil, fertiliser, or varietal factors. Treatment of N-deficient soil with NaNO<sub>3</sub> caused a temporary increase in the NO<sub>3</sub>' content of plants and, in the vegetative period, an increase in total and sol. non-coagulable-N constituents. Adaptability to extreme conditions of N supply, after tillering, differed among varieties. Dry wts. and N contents of aerial parts of plants reached maxima at the flowering stage and subsequently declined to extents which were largely influenced by relative H<sub>2</sub>O deficiency. N manuring after tillering caused growth of new tillers, and considerably increased yields without alteration of grain size. A. G. P.



**Two-year field trials of the influence of manuring on susceptibility of cereal plants to rust.** G. GASSNER and K. HASSEBRAUK (Phytopath. Z., 1934, 7, 53—61).—Relative deficiency of K increases and that of N decreases susceptibility to rust. The influence of P is smaller and varies with the N:P:K ratio of the soil. A. G. P.

**Influence of mineral nutrition on sensitivity of standard species used in determining types of cereal rusts.** G. GASSNER and K. HASSEBRAUK (Phytopath. Z., 1934, 7, 63—72).—Susceptibility of species to infection varies with the N:K ratio of the nutrient. A. G. P.

**Nitrogen status of young wheat plants in relation to mineral nutrition.** G. GASSNER and W. FRANKE (Phytopath. Z., 1934, 7, 187—222).—Increased rust-resistance of seedlings induced by K manuring is associated with decreased total, protein-, and sol. N in the plants. N manuring increased all N fractions and susceptibility. K and N fertilisers exhibit antagonistic effects on the N balance (I) of plants. The influence of Na on (I) is much < that of K.  $PO_4'''$  has little effect. A. G. P.

**Absorption of nitrogen, phosphoric acid, and potassium by paddy rice at various stages of growth in sand culture.** Y. ISHIZUKA (J. Agric. Chem. Soc. Japan, 1934, 10, 128—134).—K is required throughout growth. Normal growth results without a supply of N after the 9th or before the 2nd week of fermentation. P is necessary for the first 3 weeks, or for the whole period after the 3rd week. The former is the more profitable. CH. ABS. (p)

**Effect of potassium deficiency on structure and composition of sweet potato.** W. R. ROBBINS (Proc. Amer. Soc. Hort. Sci., 1932, 29, 471).—In sand cultures of sweet potato, insufficient K supplies reduced N assimilation and plants resembled those grown with N deficiency. CH. ABS. (p)

**Influence of soil acidity on relative availability of plant nutrients and crop yields in three coastal plain soils.** J. B. HESTER (Trans. Peninsula Hort. Soc., 1933, 61—66).—In acid soil areas max. yields of beet were obtained by liming to  $p_H$  6.06—6.24. High proportions of org. matter in soil favoured growth in acid ranges. Appreciable amounts of sol. Al appeared in soils with  $p_H$  4.77—5.49. Org. matter prevents dissolution of Al. CH. ABS. (p)

**Interrelation between hydrogen-ion concentration of soil and growth rate of celery.** M. M. PARKER (Proc. Amer. Soc. Hort. Sci., 1932, 29, 455—457).—Optimum growth of celery was obtained by liming to produce  $p_H$  6.0. Root and top injury was apparent at  $p_H$  4.5—4.8. CH. ABS. (p)

**Hydrogen-ion concentration in citrus-grove soils of the ridge section of Florida.** B. R. FUDGE (Proc. Florida State Hort. Soc., 1932, 29—33). CH. ABS.

**Importance of calcium in citrus culture.** G. SINGLETON (Proc. Florida State Hort. Soc., 1931, 7—10).—Improvements effected by spraying with aq.  $Ca(OH)_2$  and fertilisation with Ca compounds are described. CH. ABS.

**Nutrient requirements of apple trees.** F. S. BROWNE (Quebec Pomol. and Fruit-Growing Soc. 38th Ann. Rept., 1931, 75—84).—In mixed fertilisers  $(NH_4)_2SO_4$  averaged 14.8% more effective than  $NaNO_3$  in increasing fruit yields. The incidence of fire blight was unaffected by manuring. CH. ABS. (p)

**Interrelation of leaf area, soil moisture, and nitrogen to fruit growth and fruit-bud formation in the apple.** C. P. HARLEY and M. P. MASURE (Proc. 28th Ann. Mtg. Wash. State Hort. Assoc., 1932, 212—216).— $NaNO_3$  did not affect fruit bud formation, but rendered the trees more resistant to drought and retarded the development of red colour in the fruit if the soil already contained sufficient N and  $H_2O$ . CH. ABS.

**Effect of nitrogen, potassium, and phosphorus on keeping and shipping quality of fruit.** A. L. SCHRADER (Proc. 34th Ann. Meet. Maryland State Hort. Soc., 1932, 93—100).—Use of N and K fertilisers alone, or simultaneously in conjunction with P fertilisers, did not affect storage and shipping qualities of apples, peaches, or strawberries. The firmness of apples was improved by manuring with K Mg sulphate. CH. ABS. (p)

**Fertiliser trials on lawns at Craibstone.** A. HILL (J. Board Greenkeeping Res., 1934, 3, 153—160).—Grass responded more quickly to  $NO_3'$  (Na, Ca,  $NH_4$ ) than to  $(NH_4)_2SO_4$  (I), but was more succulent, less resistant to wear, and more difficult to cut.  $NaNO_3$  favoured growth of moss, whereas (I) checked weeds. Susceptibility to drought was more marked after treatment with (I) and increased with the size and no. of applications. Temporary injury to grass by (I) was increased by treatment immediately after mowing.  $NH_4Cl$  was as effective as (I) in reducing weed growth. CH. ABS. (p)

**Influence of nitrogen fertilisers on the chemical composition of the produce of individual grasses as pasture, hay, and aftermath.** T. W. FAGAN (Welsh Plant Breeding Sta. Bull. [H], 1932, 13, 80—94).—Application of N fertilisers increased the total dry matter yields and N contents of all grasses, as pasture, hay, or aftermath, and, in general, decreased the P and Ca contents. Nutrient vals. of grasses in various stages of growth are recorded. CH. ABS. (p)

**Effect of treatment on composition of grass: Craibstone drain-gauge results.** J. HENDRICK and H. D. WELSH (Trans. Highland and Agric. Soc. Scotland, 1934, 146, 202—223).—Applications of  $(NH_4)_2SO_4$  (I) in March, May, and Aug.—Sept. to pasture receiving K and P reduced the protein, sol. carbohydrate, Ca, and Mg, and increased the  $Et_2O$  extract, fibre, total ash, K,  $SO_4''$ , and  $SiO_2$  contents, of the herbage. The protein in grass was increased, but that of clover markedly reduced, by (I). K fertilisers increased the K content of grass and notably that of clover. Fertiliser treatment had a small and irregular effect on the  $PO_4'''$  of the herbage. CH. ABS. (p)

**Reaction of sheep (live-weight increase) to different species and strains of grasses and clovers: yield and other characteristics of species.** L. I. JONES (Welsh Plant Breeding Sta. Bull. [H], 1932, 13, 95—121).—Applications of "Nitro-chalk" suppressed



growth of moss, weeds, and wild white clover in pastures. Rough-stalked meadow grass increased in amount.

CH. ABS. (p)

[Report on plant] pathology. J. P. MARTIN (Proc. 53rd Ann. Meet. Hawaiian Sugar Planters Assoc., 1933, 24—25).—In soils treated with chloropicrin (I) and subsequently inoculated with *Pythium* sp., Sudan grass, and sugar cane showed depressed growth resembling that in  $\text{PO}_4^{''}$ -fixing soils. Generous treatment with P fertilisers produced normal growth. Improved growth following treatment with (I) results partly from destruction of *Pythium* and partly from temporarily increased  $\text{NH}_3$  formation in soil. With K deficiency plants stored Al (but not Fe) at the nodes. Accumulations were dispersed by injection of K salts. Sugar-cane plants in  $\text{H}_2\text{O}$  cultures grew at  $p_{\text{H}}$  5.0—5.2, but not at 5.8—6.0, since Fe was pptd. from the nutrient. Application to soil of N as dil. aq.  $\text{NH}_3$  produced normal growth of cane.

CH. ABS. (p)

Ensilage trials with grass from irrigated meadows. K. GNEIST (Landw. Versuchs-Stat., 1934, 121, 157—174).—High-protein grass from fields irrigated with sewage effluent produces good silage in airtight silos. Wood-lined pit silos covered with soil are sufficiently permeable to air to permit considerable decomp. in the upper parts.

A. G. P.

Nature of autolytic processes in the silage stage.

A. V. BLAGOVESHCHENSKI, S. R. RISKINA, and R. V. FENIKSOVA (Trans. Centr. Sci. Res. Inst. Sugar Ind. U.S.S.R., 1933, No. 12, 44—52).—Addition of anti-septics, e.g., PhMe, to sugar-beet leaves during ensilage minimised losses of org. matter.

CH. ABS. (p)

Leaf injury by acids and tarry matter. A. WIELER (Phytopath. Z., 1934, 7, 121—144).—Effects of acids and various industrial flue gases are examined.

A. G. P.

Relation of fertilisers to control of cotton root rot in Texas. H. V. JORDAN, P. R. DAWSON, J. J. SKINNER, and J. H. HUNTER (U.S. Dept. Agric. Tech. Bull., 1934, No. 426, 75 pp.).—Indirect control of root rot is obtained by manurial treatment designed to accelerate maturity and increase the vigour of the plant. Combinations of N and P fertilisers give best results in respect of crop yields, and by continued use tend gradually to eliminate the disease.

A. G. P.

Dehulling of barley kernels with sulphuric acid and inheritance of reaction to covered smut, *Ustilago hordei* (Pers.), K. and S. Infection in crosses between Glabron and Trebi barleys. W. H. JOHNSTON (Canad. J. Res., 1934, 11, 458—473).—Use of conc.  $\text{H}_2\text{SO}_4$  for dehulling to induce experimental infection by smut causes changes in seed, especially after mechanical injury, which prevent satisfactory examination of susceptibility to infection.

A. G. P.

Biology and control of the potato nematode (*Heterodera schachtii*, Schmidt). H. GOFFART (Arb. Biol. Reichsanst. Land-Forstwirts., 1934, 21, 73—108).—Control by use of  $\text{CS}_2$ , bone oil,  $\text{NH}_3$ , or  $\text{C}_{10}\text{H}_8$  was unsatisfactory. Certain carbolineum preps. were more effective. Best results were obtained by green manuring with mustard prior to cropping with potato.

A. G. P.

Effect of varying the concentrations and lime: copper ratio of Bordeaux mixture in potato spraying. E. O. MADER (Amer. Potato J., 1934, 11, 111—117).—Best results were obtained with high-Cu preps. (12:12:50 or 12:2.5:50) in the first and second applications, gradually decreasing to 1:1:50 or 1:0.5:50 for the final (7th) treatment. Potato yields were improved by lowering the proportion of CaO used.

CH. ABS. (p)

Experimental [spraying of] orchards. O. P. GOUGHER (Rept. Dept. Agric. Nova Scotia, 1932, 137—139).—Efficiency of CaO-S sprays in controlling apple scab was not increased by addition of  $\text{Al}_2(\text{SO}_4)_3$  (9 lb.) or Fe sulphate (10 lb.) to the spray (100 gals.).

CH. ABS. (p)

Insect control in 1932. E. N. CORY (Proc. 35th Ann. Meet. Maryland State Hort. Soc., 1933, 85—92).—Comparison of various S and As preps. in apple-orchard spraying is recorded.

CH. ABS. (p)

[Control of] sow thistle and Canada thistle. T. A. McDONALD (Rept. Dept. Agric. Nova Scotia, 1933, 72—73).— $\text{NaClO}_3$  (1.5—2.0 lb. in 1.2 gals. of  $\text{H}_2\text{O}$  per 100 sq. ft.) was more effective than  $\text{H}_2\text{SO}_4$ ,  $\text{NH}_4\text{SCN}$ , or  $\text{Na}_3\text{AsO}_3$ . Mid-season treatments gave best results.

CH. ABS. (p)

Non-arsenical stomach poisons for grasshopper and beetle control. W. L. THOMPSON (Proc. Florida State Hort. Soc., 1932, 119—123).—The use of  $\text{Na}_2\text{SiF}_6$  is satisfactory for *Schistocera americana* control;  $\text{Na}_3\text{AlF}_6$ , Cu carbonate, and Bordeaux mixture are less effective, whilst  $\text{HgCl}_2$  and strychnine are ineffective.  $\text{Na}_2\text{SiF}_6$  and  $\text{Na}_3\text{AlF}_6$  are effective for *Macroductylus angustatus*.

CH. ABS.

Ox warble flies. R. S. MACDOUGALL (Trans. Highland and Agric. Soc. Scotland, 1934, 46, 1—90).—Successful use of derris preps. is described. Pyrethrum was less effective. Treatment of cysts with  $\text{H}_2\text{O}_2$  or xylene gave partial control. Injection of tincture of I killed larvæ, but these were retained in hides.

CH. ABS. (p)

Insecticidal properties of indigenous vegetable fish poisons. T. V. SUBRAMANIAM (J. Mysore Agric. and Exp. Union, 1932, 13, 57—60).—Toxic action of extracts of *Mundulea suberosa*, *Pongamia glabra*, *Randia dumetorium* (fruits), and *Lasiosiphon eriocephalus* is examined.

CH. ABS. (p)

[Report on] entomology. C. E. PEMBERTON (Proc. 53rd Ann. Meet. Hawaiian Sugar Planters Assoc., 1933, 14—19).—The efficiency of oiled As dusts deteriorated during storage for several months. As baits compacted with casein served as As dusts in regions of heavy rainfall.

CH. ABS. (p)

Nitrochalk.—See VII.

PATENT.

Manufacture of fertiliser. M. WARD, Assr. to H. R. MORRISON (U.S.P. 1,941,371, 26.12.33. Appl., 21.6.32).—Earth is allowed to fall down a shaft (S) with inclined baffle plates and a smoky fire is burned in the lower part of S so that the earth becomes impregnated with C.

A. R. P.



## XVII.—SUGARS; STARCHES; GUMS.

**Sugar losses in the storage of dry beets.** A. I. OPARIN and K. A. KAMOGOROVA (Trans. Centr. Sci. Res. Inst. Sugar Ind. U.S.S.R., 1933, No. 12, 64—71).—Beets can be stored as shavings containing up to 20% of H<sub>2</sub>O. With > 20% of H<sub>2</sub>O micro-organisms (I) develop in a few days. Loss of sugar occurs with > 10% of H<sub>2</sub>O, due to inversion and subsequent oxidation. This is rapid at *p*<sub>H</sub> 3, but is much retarded by adding aq. NaOH or Ca(OH)<sub>2</sub> to *p*<sub>H</sub> 7. Storage in Ca(OH)<sub>2</sub> is practicable. It also prevents growth of (I).

CH. ABS. (e)

**Preparation of [beet-sugar] strikes and their treatment.** O. SPENGLER (Bull. Assoc. Chim. Sucri., 1934, 51, 433—436).—In Germany the production of factory white sugar and raw sugars intended for consumption after affination only has led to improvements in sugar-boiling practice, which are described. Avoidance of crystal aggregates is important, and a strike should not contain > 10% of small grain. Syrup draughts should be continuous rather than intermittent, and of uniform *d*, and should be 5—10° hotter than the massecuite, so that they cause local ebullition, which assists mixing. The vac. at graining should be ≧ 55—57 cm., to obtain a hard grain. When centrifugal run-offs are drawn in they should previously be diluted to 60° Brix and heated to dissolve any fine crystals present; they should be drawn in only at the end of a strike, and the coils at the bottom of the pan should then be brought into action to improve circulation. With care, 30% of run-offs can be drawn in without detriment to the affining quality of raw sugars. The pan should be emptied as rapidly as possible, and rinsed by steaming. The cooling of massecuites in the mixers can be accelerated by keeping the surroundings at < 25° and by pumping air through the massecuite. The centrifuging temp. should be ≧ 45°, and raw sugar should enter the store at ≧ 30°. Stores should be well ventilated and kept at R.H. 50—60%.

J. H. L.

**Sulphur dioxide in [beet] molasses.** B. DREWS (Z. Spiritusind., 1934, 57, 274, 276, 282, 284—285; cf. B., 1934, 36).—Laboratory experiments were made with 3 molasses containing 0.34, 0.27, and 0.08% of SO<sub>2</sub>. After dilution to about 39° Brix, treatment with Ca(OCl)<sub>2</sub> equiv. to the SO<sub>2</sub> present, at room temp. for 15 min., left 0.142, 0.114, and 0.048% of SO<sub>2</sub> (on molasses); but 2 equivs. of Ca(OCl)<sub>2</sub> left only 0.021, 0.019, and 0.024%. After dilution of the molasses to 18° Brix and slight acidification, treatment with 2 equivs. of Ca(OCl)<sub>2</sub>, followed by heating just to boiling, left 0.013, 0.012, and 0.009%. Aq. Cl<sub>2</sub> was rather less effective. Twice the calc. quantity of NaClO<sub>3</sub> (i.e., 2 mols. per 3 mols. of SO<sub>2</sub>) added to slightly acidified solutions of 18° Brix, with subsequent heating, left 0.026, 0.026, and 0.030% of SO<sub>2</sub> (on molasses). The best results were obtained with H<sub>2</sub>O<sub>2</sub>. The calc. quantity in slightly acidified solutions of molasses at room temp. reduced the SO<sub>2</sub> content in 15 min. to 0.051, 0.038, and 0.015%, and twice the calc. quantity left only 0.020, 0.020, and 0.010% in the respective cases. The costs of single equiv. quantities of Ca(OCl)<sub>2</sub>, Cl<sub>2</sub>, NaClO<sub>3</sub>, and H<sub>2</sub>O<sub>2</sub> per kg. of SO<sub>2</sub> are 0.81, 0.99, 0.28, and 2.48 RM.,

respectively. Neither the spirit yield from the molasses nor the assimilability of the nitrogenous matter by yeast was impaired by any of the treatments mentioned; but the use of Ca(OCl)<sub>2</sub>, or Cl<sub>2</sub>, unless followed by boiling, conferred on the alcohol obtained a slight odour suggestive of Cl compounds.

J. H. L.

**Clarification of sugar solutions [for analysis] with bone charcoal and Carboraffin.** ROSSÉE (Chem.-Ztg., 1934, 58, 931).—The polarisation of a half-normal sucrose solution was lowered from 50° V. to 46.5° and 48.4° V. by treatment for 3 hr. with 1.5 g. of Merck's carbo animalis siccus and 1.5 g. of Carboraffin per 100 c.c., respectively. Similar treatments applied for 24 hr. to half-normal solutions inverted with HCl lowered the polarisation at 20° from —16.1° V. to —15.8° V. in both cases. In the clarification of all solutions containing sugars, before analysis, C should be avoided whenever possible, but if used its effect on the pure sugars should be determined before and after inversion and a correction made.

J. H. L.

**Fermentable sugars and the hydrolysis of carbohydrates.** V. KULIKOV, N. ALYAKRINSKAYA, and A. POPOVA (Mikrobiologiya, 1933, 2, 260—265).—Hydrolysis of wood with dil. (up to 2%) acids under pressure (3—7.5 atm.) yielded max. amounts of 25% reducing sugars and 7% of EtOH.

CH. ABS. (p)

**Cane molasses and swamp soil. [Sugar-cane plant] pathology. [Sugar-beet leaves as] silage.**—See XVI. Saginaw H<sub>2</sub>O [and sugar-beet plant effluents].—See XXIII.

## PATENTS.

**Manufacture of sugar.** L. E. GOUNER, Assr. to PETREE & DORR ENGINEERS, INC. (U.S.P. 1,923,143, 22.8.33. Appl., 18.4.30).—A continuous settling vessel for sugar juices, of upright cylindrical shape with conical ends, surmounted by a small cylindrical reaction chamber (C), is divided into compartments by conical settling surfaces traversed by scrapers which urge deposited sludge to a central opening. Hot, turbid juice, before entering C, passes through a closed annular flash chamber in which a reduced pressure can be maintained to remove excess of steam and gases. In C revolving ploughs remove scums from the surface of the juice. The clear juice outlet from each compartment is at the topmost point and communicates with a vertical manifold, and the sludge descends through central openings at the bottom of each compartment to the main sludge outlet.

J. H. L.

**Preparation of a dry product from glucose syrup.** DEUTS. STÄRKE-VERKAUFSGENOSS. EINGETRAGENE GENOSS. M.B.H. (B.P. 419,248, 7.7.33. Addn. to B.P. 411,308; B., 1934, 981).—Instead of a mixture, a single converted starch liquor containing 28—33% of glucose (calc. for *d* 1.45) is conc. and dried.

J. H. L.

**Manufacture of crystalline sugar from wood-sugar solutions.** HOLZHYDROLYSE A.-G. (B.P. 417,834, 9.4.34. Ger., 7.4.33).—The crystallisation of glucose or xylose from wood-saccharification liquors is carried out in presence of 5—10% of mannose (I) (calc. on total sugars). This enables the mother-liquor to be effectively



separated from the crystal magma, and when the crystal cake is pressed the temp. may safely be raised meanwhile. The optimum proportion of (I) may be obtained by saccharifying suitable mixtures of coniferous and deciduous woods; or part of the more readily hydrolysable hemicelluloses in coniferous woods may be extracted before the main saccharification, and used to make good the deficiency of (I) from deciduous woods. Liquors containing > the optimum quantity of (I) may be crystallised at room temp., the filter-pressed crystal pulp, containing the requisite proportion of (I), being then remelted and recrystallised. J. H. L.

**Polymerisation of monomeric aldehyde sugars (aldoses).** HOLZHYDROLYSE A.-G. (B.P. 418,481, 16.2.34. Ger., 16.2.33).—The aldose, e.g., glucose hydrate (I) or xylose crystals, is heated with < 0.1% of mineral acid, at 120–180°, for 1–30 min. If pure (I) is heated with 0.002% of H<sub>2</sub>SO<sub>4</sub> for 10–30 min. at 175°, about  $\frac{3}{4}$  of the sugar is polymerised, mainly to a dimeric form. Substitutes for glucose syrup may be prepared from the products. J. H. L.

**Manufacture of maize starch.** INTERNAT. PATENTS DEVELOPMENT Co. (B.P. 419,286, 6.4.33. U.S., 22.4.32).—The raw starch suspension (mixed mill-starch) is tabled at a concn. of *d* 1.06–1.116, attained by separation of part of the H<sub>2</sub>O, preferably from the portion derived from the fine-slop treatment, the separated H<sub>2</sub>O being re-used for washing the coarse slop and germs. The pitch of the tables may be increased to compensate for the reduced rate of flow, and the rate of delivery of the mill-starch to the tables may be inversely adjusted to its concn. The overflow from the tables being less than usual, it yields, after deposition of the gluten, less gluten-H<sub>2</sub>O, all or most of which is returned to the maize steep. The tabled starch is washed in the filters with fresh H<sub>2</sub>O, which is re-used as make-up H<sub>2</sub>O in the washing of the fine and/or coarse slop. (Cf. U.S.P. 1,828,334; B., 1932, 746.) J. H. L.

**Mill-starch treatment.** A. PELTZER and A. PELTZER, JUN., Assrs. to MERCOR CENTRIFUGAL SEPARATOR Co., LTD. (U.S.P. 1,923,455, 22.8.33. Appl., 5.4.32).—As a more rapid and efficient substitute for tables in the purification of starch suspensions, a continuously acting centrifugal separator is claimed, in which the heavier layers first separated are recirculated repeatedly and mixed with injected H<sub>2</sub>O and at certain points in their circulation they are subjected to turbulent motion through nozzles to detach gluten from the starch granules. A fraction of the circulating heavier layers, e.g., 10%, is discharged continuously. The lighter layers, containing the gluten and sol. impurities, are discharged without recirculation. J. H. L.

**Drying sugars.**—See I. (PrCO<sub>2</sub>)<sub>2</sub>Ca. **Gluconic acid.**—See XVIII.

## XVIII.—FERMENTATION INDUSTRIES.

**Reactions in the preparation of yeast by the aëration method.** H. CLAASSEN (Chem.-Ztg., 1934, 58, 901–902).—Max. utilisation of org. N by yeast in the aëration method of prep. occurs when the sugar/total N ratio is 150:1. When this val. is 25:1, the rôle of NH<sub>2</sub>-acid-N is changed, the yield of yeast depending on

the amount of assimilated C added as either sugar or NH<sub>2</sub>-acid. The C from these sources together with added NH<sub>3</sub> and NH<sub>2</sub>-acid products form, according to various discussed reactions, the protein which constitutes > 50% of the dried yeast. The influence of the nutrient media on the properties of the yeast produced is discussed. F. O. H.

**Determination of malt extract by washing out spent grain.** J. SATAVA (Böhm. Bierbrau., 1934, 61, 57–61; Chem. Zentr., 1934, i, 3934; cf. B., 1934, 1078).—By leaching the grains and determining the extract by Plato's method, results are approx. 0.5% (dry matter, malt) > those of the corr. proportionality method. Substances undissolved in the mash occur in the grain extract. A. G. P.

**Cucumber fermentation. VI. Factors influencing the formation of ropy brine in cucumber fermentation. VII. *Bacillus nigrificans* n.sp. as a cause of pickle blackening.** W. FABIAN and A. L. NIENHUIS (Mich. Agric. Exp. Sta. Tech. Bull., 1934, No. 140, 1–22, 23–27).—VI. Ropiness (I) produced by organisms isolated from brines is associated with low acidity and salinity in the liquor and increased with rising temp. (I) is controlled by increasing the concn. of brine more rapidly than is customary.

VII. Blackening due to *B. nigrificans* occurs in presence of carbohydrates (e.g., glucose) with restricted proportions of N (peptone) in pickle brines which are neutral or slightly alkaline. A. G. P.

**Distillation [of alcohol] by double effect under vacuum.** E. BARBET (Bull. Assoc. Chim. Sucr., 1934, 51, 437–441).—Not only does the EtOH content of vapours attainable by distillation increase with decrease in pressure, but at the same time the proportion of impurities to EtOH diminishes. E.g., a wine yielded, under atm. pressure, a spirit containing 86% of EtOH, and under vac. a spirit containing 91%; the latter was much milder in flavour than the former, and its contents of acids, esters, aldehydes, and higher alcohols were, respectively, about  $\frac{1}{5}$ ,  $\frac{1}{4}$ ,  $\frac{1}{3}$ , and  $\frac{1}{2}$  as great as in the spirit obtained under atm. pressure. Most of these differences were probably due to azeotropism, but in the case of aldehydes the vac. pump probably eliminated most of the MeCHO as vapour. In the production of potable spirits, vac. distillation offers the two advantages of higher purity and thermal economy by double-effect operation (cf. B.P. 338,569 and 369,623; B., 1931, 177; 1932, 573). In the production of fuel and industrial spirit thermal economy is the main advantage and a somewhat different scheme is used, the alcoholic wash being supplied directly to two similar columns, one of which operates under atm. pressure and the other under vac., the second being heated by the vapours from the first. The output of both columns is about the same, but the second yields a purer spirit than the first. The heat of the vinasses from both columns is recuperated. (Cf. B., 1935, 41.) J. H. L.

**Acetone-butyl alcohol fermentation. VII. Amyolytic and proteolytic action of acetone bacteria.** B. ROKUSHO (J. Agric. Chem. Soc. Japan, 1934, 10, 563–580).—In 5% mashes of unpolished rice (I),



bacteria show amylolytic action after 45—70 hr. (optimum, 45° and  $p_H$  3.9—5.2). Maize (II) starch is less easily saccharified than that of rice or kaoliang (III). Tannic acid retards saccharification and proteolysis of (I). Protein of unpolished (III) was less easily hydrolysed than that of (I), (II), or polished (III). EtOH-sol. protein was less readily hydrolysed than H<sub>2</sub>O-, alkali-, or NaCl-sol. types. Amylolysis and proteolysis reach maxima when organisms produce clostridia or spores. CH. ABS. (p)

**Analysis of imported wines.** F. FILIPELLO (Fruit Products J., 1934, 14, 72).—Analyses of 6 authentic types of French wine are given. E. B. H.

**Volumetric analysis [and EtOH manufacture].**—See III. **Al in industry.**—See X. **SO<sub>2</sub> in beet molasses.** Fermentable sugars.—See XVII. **Natto.** See XIX.

#### PATENTS.

**Manufacture of beer.** A. MEHLITZ (B.P. 420,449, 2.6.33. Ger., 2.6.32. Addn. to B.P. 361,261; B., 1932, 78).—Beer is treated with mould enzymes, using the fungus itself (*e.g.*, *Aspergillus oryzae*), mould extracts, or a nutritive substrate carrying the mould growth. The time of treatment varies from several days to several weeks, depending on the temp. Continuous action in storage casks at normal cellar temp. is possible. High-mol. compounds are thus attacked, and the resultant beer is freed from micro-organisms by filtration through, *e.g.*, a Seitz filter. The product is stable and non-thickening, and is not sensitive to temp. Beers treated thus are particularly suitable for export.

I. A. P.

**Method of influencing technically useful micro-organisms and ferments.** P. LIEBESNY and H. WERTHEIM (B.P. 417,863, 11.4.33. Austr., 12.4.32).—The organisms, preferably in a nutrient medium, are stimulated by irradiation with electromagnetic waves 1.8 mm.—120 m. long, *e.g.*, between the plates of a condenser. Conditions may be so chosen as to stimulate one type of organism and weaken another. Applications to yeast, *Bac. butyricus* and *Delbrücki*, etc. are described. J. H. L.

**Production of calcium butyrate [by fermentation].** H. G. MAISTER (U.S.P. 1,951,250, 13.3.34. Appl., 27.9.30).—A potato is punctured in several places with a blunt pin, is washed, and rendered airtight by dipping in liquid paraffin. After some days, inoculations are made from the liquefied pulp into a medium containing autolysed yeast, the growth being then 4—5 times transferred to further nutrients. Waste molasses slop is mixed with molasses and fermented with yeast at  $p_H$  4.8—5.0. This fermentation is soon checked by adding CaO, the PrCO<sub>2</sub>H (I) organisms from the potato cultures are added, and the temp. is allowed to rise gradually to 45°. Washed chalk is added to maintain the optimum  $p_H$ , and addition of hydrolysed vegetable protein is also beneficial. Fermentation occupies 6—7 days at 45°. The source of much of the (I) appears to be NH<sub>2</sub>-acids derived from autolysed yeast and added protein. The fermented mass is freed from unused chalk, and the fatty acids are separated by adding

mineral acid and steam-distilling, the distillate being exactly neutralised with CaO and CaCO<sub>3</sub> and dried after filtering. I. A. P.

**Preparing gluconic acid.** T. TAKAHASHI (U.S.P. 1,953,694, 3.4.34. Appl., 6.6.30. Jap., 19.7.29).—*Bact. hoshigaki*, var. *rosea*, and *Bact. industrium*, var. *hoshigaki*, are new species of acid-resistant acetic bacteria isolated from fermented dried persimmon, and producing large yields (98—100%) of gluconic acid (I) from glucose. Their morphological and physiological characters are described. Economical production of (I) is obtained by fermentation, alone or in presence of CaCO<sub>3</sub> and with or without addition of inorg. or org. nutrients, of glucose, sucrose, maltose, polyhydric alcohols (*e.g.*, mannitol), *Laminaria*, or fresh or dried sugar-containing fruits (*e.g.*, persimmon). I. A. P.

AcOH and derivatives.—See III.

#### XIX.—FOODS.

**Carbohydrate content of wheat grains and flours.** R. GEOFFROY (Bull. Soc. Chim. biol., 1934, 16, 1297—1305).—The sol. carbohydrates (I) of wheaten flour may be extracted with H<sub>2</sub>O or 60% aq. EtOH after a preliminary fixation in EtOH.  $[\alpha]$  of (I) increases regularly from —14° at the centre of the grain to +15° at the aleurone layer, with a corresponding increase in sucrose and fructose. Examination of several industrial wheaten flours indicates that a high baking val. is not always associated with a correspondingly high sucrose content. The content of sol. gums in flours is const. (0.4%), and their hydrolysis shows them to contain approx. equal amounts of araban and glucosan. A. L.

**Fission of starch in heated wheat.** H. KÜHL (Chem.-Ztg., 1934, 58, 1011).—Wheat roasted at relatively high temp. contains the decomp. products of starch mainly as erythrodextrin (I) and maltose (II), whilst with wheat heated at lower temp. the content of amylo- and achroö-dextrins is > that of (I) and (II).

F. O. H.

**Rapid determination of moisture in grain. II. Calibration and comparison of electrical moisture meters with vacuum oven for hard red spring wheat.** W. H. COOK, J. W. HOPKINS, and W. F. GEDDES (Canad. J. Res., 1934, 11, 409—447; cf. B., 1934, 1115).—Various meters are examined. The electrical conductivity of wheat samples increases with rising temp. The influence of the R.H. varies with the H<sub>2</sub>O content of the sample. A. G. P.

**Hydrocyanic gas penetration in 140-pound bags of flour under atmospheric conditions.** G. SCHENK and G. A. DEAN (J. Kansas Entomol. Soc., 1929, 2, No. 3, 60—66).—Conditions for successful penetration are described. CH. ABS.

**Fat rising in cream.** H. C. TRELOGAN and W. B. COMBS (J. Dairy Sci., 1934, 17, 675—684).—The amount of fat rising in cream declines with the fat content (*F*), is reduced by low-temp. storage, and is slightly increased by pasteurisation. Low *F* and high storage temp. favour the separation of plasma in cream.

A. G. P.



**Colour imported to coffee by cream treated in various ways.** R. WHITAKER (J. Dairy Sci., 1934, 17, 651—658).—The amount of bottled cream required to impart a given colour to coffee increased with the fat and solids-not-fat contents and with homogenisation. The influence of pasteurisation or other heat-treatment, of ageing, and of development of slight acidity was small or imperceptible. A. G. P.

**Relation between hardness of butter and butter fat and the iodine value of the butter fat.** S. T. COULTER and O. J. HILL (J. Dairy Sci., 1934, 17, 543—550).—With standard methods of churning, the hardness of butter (I) and of butter fat (II) are directly proportional. Hardness of (I) is somewhat influenced by the H<sub>2</sub>O content (III). Under standardised conditions the (III) of (I) increases with the I val. of (II). There is high correlation between hardness of (II) and its I val. Hardness of (II) also shows some variation with extreme divergence of Reichert-Meissl vals., and, in samples of the same I val., with the breed of the cow. A. G. P.

**Rôle of lactic bacilli in Dutch cheese.** O. VOITKEVICH and L. STARUGUINA (Mikrobiologiya, 1933, 2, 72—80).—Lactic bacilli assist in the ripening process by conversion of primary products of protein hydrolysis into NH<sub>2</sub>-acids. CH. ABS. (p)

**Determination of fat in cacao beans.** H. FINCKE (Bull. Off. int. Fabr. Chocolat Cacao, 1934, 4, 163—167; Chem. Zentr., 1934, ii, 532).—To obtain satisfactory results the residue from the first extraction of fat must be reground with sand and further extracted for several hr. Theobromine must be removed from the extract by repeated heating of the crude fat with 15—18% HCl; after dilution with H<sub>2</sub>O, the liquid is filtered and the fat washed and dried. A. G. P.

**Mucous substance of "natto," a Japanese food. I. Alcohol-soluble nitrogenous compounds in the mucous substance.** K. ABE (J. Agric. Chem. Soc. Japan, 1934, 10, 545—549).—"Natto," produced by bacterial fermentation of soya beans, contains, in the mucous material, NH<sub>3</sub>, tyrosine, leucine, alanine, valine, glutamic acid, phenylalanine, guanine, arginine, and histidine. CH. ABS. (p)

**Citrus-fruit juices.** A. F. CAMP (Proc. Florida State Hort. Soc., 1932, 60—65).—The keeping quality of orange juice is improved by vac. treatment, saturation with N<sub>2</sub>, and packaging in N<sub>2</sub>. CO<sub>2</sub> causes an undesirable taste to develop. CH. ABS.

**Composition of some commercially canned tomato juice.** C. F. POE, A. P. WYSS, and T. G. McEVER (Fruit Products J., 1934, 14, 80—82, 89).—Full analyses of 16 samples are given, together with tables for correction of various physical consts. when sugar and salt have been added. E. B. H.

**Canned tuna in oils.** Y. MIYAMA and K. SARUYA (J. Imp. Fisheries Inst. Japan, 1934, 29, 1—14).—Cottonseed, soya-bean, olive, and tuna oils alone or mixed showed no change in acid or I vals. during 2 years' storage in sealed tins. Tuna, packed in the oils (sterilised), doubled the acid vals. without affecting the I vals. during 2 years. CH. ABS. (p)

**Comparison of vitamins-B<sub>1</sub> and -B<sub>2</sub> in canned strained foods.** F. HANNING (J. Nutrition, 1934, 8, 449—455).—Data for various vegetables are given. A. G. P.

**Metallic contamination of foods. I. Preparation and storage in tinned-brass vessels.** N. C. DATTA (Proc. Indian Acad. Sci., 1934, 1, B, 31—42).—Fruit and vegetable juices (I) (common to India) readily attack tinned-brass vessels (II), the amount of Sn dissolved being independent of the Pb content of the alloy used and varying with the [H<sup>+</sup>] and not with the titratable acidity of (I). Sn is more readily dissolved than Pb from Sn-Pb alloys. Al vessels are superior to (II). (I) contaminated by storage in (II) diminish the rate of growth of rats and guinea-pigs. F. O. H.

**Feeding trials with wood-sugar yeast for milch cows.** H. BÜNGER [with A. WERNER, J. SCHULTZ, and J. KESELING], W. KIRSCH [with E. WENCK], and K. RICHTER [with J. HERBST] (Landw. Versuchs-Stat., 1934, 121, 191—221).—In comparison with equiv. proportions of soya-bean protein, wood-sugar yeast slightly increased milk yields without affecting the % fat therein, and caused no disturbance of health conditions. A. G. P.

**Furfuraldehyde in bread etc.**—See III. Al.—See X.  
**Fish entrails as unhairing substances.**—See XV.  
**[Nutrient vals. of] grasses. Grass ensilage.**  
**See XVI. Cucumber fermentation.**—See XVIII.

## PATENTS.

**Leavening process.** J. S. REICHERT and W. J. SPARKS (U.S.P. 1,953,567, 3.4.34. Appl., 7.2.33).—H<sub>2</sub>O<sub>2</sub> (I) is used as a leavening agent in place of yeast or baking powder in bread, cakes, biscuits, etc. The max. amount of (I) which can be used is determined by the limit of extensibility of the dough, and is, in general, about 0.5—2.0% of the flour wt. (I) is added with the liquor, and the dough set aside until the undecomposed (I) is > 0.08% of the flour wt., being determined volumetrically on 20 g. of dough. The dough may then be baked immediately, or may proof for a further time (> 2 hr.). E. B. H.

**Manufacture of bread improver.** F. B. BAKER (U.S.P. 1,953,332, 3.4.34. Appl., 10.2.30).—Starch is dextrinised by heating with HCl (I), and lactic acid is also added either at the same time as (I) or on completion of the conversion. NH<sub>3</sub> gas is added to neutralise the converted starch; the finished product is a white, non-hygroscopic powder of good keeping quality. When using the powder in bread the amount of yeast and sugar used may be decreased and the fermentation time shortened. NH<sub>3</sub> is released during fermentation and acts as a yeast stimulant. E. B. H.

**Preparation of curds (casein), fresh cheese, and rennet cheeses from cream, whole milk, or skim milk.** A. VON PLAWENN and G. KERSTEN, Assrs. to R. FEIX and E. SCHEINBERGER (U.S.P. 1,953,734, 3.4.34. Appl., 3.5.33. Ger., 6.3.33).—0.5—3% of a 10% extract of pectin is added to the cream or to the whole or skim milk, before the addition of rennet,



and the whole heated at 10–16°. A very smooth curd, which does not become bitter, is obtained.

E. B. H.

**Reducing the viscosity of a colloidal suspension of proteins.** A. LEIGHTON and A. LEVITON (U.S.P. 1,952,017, 20.3.34. Appl., 2.1.32).—The addition of cane sugar or glucose to skim and/or whole milk with subsequent concn. results in a product from which the lactose (I) crystals can be separated mechanically. The product is used in the prep. of ice cream of low (I) content, thereby avoiding "saindiness."

E. B. H.

**Curing of meat.** L. S. PADDOCK, Assr. to SWIFT & Co. (U.S.P. 1,957,150, 1.5.34. Appl., 13.7.31).—Meat after dry-curing has the lean portions coloured red by soaking in a solution of a nitrite. B. M. V.

**Preservation of meat and fish.** M. STERN, and ETABL. ELKA S.A.R.L. (B.P. 420,253, 19.10.33).—The meat or fish is wrapped in a textile material or paper, previously coated on one or both sides with a preservative mixture, e.g., "smoked" NaCl and tartaric or citric acid. E. B. H.

**Preserving fruit juices in their natural state.** H. W. KELLER, Assce. of I. H. POLK (B.P. 419,481, 7.11.33. U.S., 25.11.32).—After screening to remove coarse solid matter the juice is subjected to a vac. of 28–29 in. and to a temp.  $< 4.4^\circ$ , preferably very near the f.p., firstly while the juice is agitated and afterwards while quiet. After about 15 min. a substantial part of the fruit pulp will have risen, carrying with it the objectionable oily matter; the topmost layer is then skimmed off and the juice and remaining pulp are packaged while still under vac., and preferably quickly refrigerated. B. M. V.

**Treatment of food materials.** H. C. GORE and C. N. FREY, Assrs. to STANDARD BRANDS, INC. (U.S.P. 1,953,754, 3.4.34. Appl., 19.6.29).—The flavour and filterability of malt syrup, apple, grape, and citrus juices is improved by adding about 0.6% of bakers' yeast and allowing action to proceed for 16½ hr. at 30°. The action is stopped by heating at 50° and the product filtered and concn. in vac. E. B. H.

**Manufacture of table jellies.** CHIVERS & SONS, LTD., T. RENDLE, and E. W. BOLTON (B.P. 419,838, 16.3.33).—A table jelly of the crystal type is prepared by dissolving gelatin in a small quantity of H<sub>2</sub>O (and/or fruit juice), and adding dry sugar etc. at 50–85°. The dough-like mass is cooled, dried, and ground to a granular powder. E. B. H.

**Drying of carbohydrate material rich in hygroscopic substances.** R. T. NORTHCUTT and A. L. JOHNSTON, JUN., Assrs. to FOOD CONCENTRATES, INC. (U.S.P. 1,959,301, 15.5.34. Appl., 3.11.31).—Ripe banana pulp is sprayed into hot (162°) air and collected in air at a temp. at which it will not char (60°) and R.H.  $\gt 35\%$ ; it is then conveyed without disturbance to a cooler place ( $< 43^\circ$ ) also at R.H.  $\gt 35\%$ , where it hardens. B. M. V.

**[Chicken] feed.** C. F. SCHNABEL (U.S.P. 1,942,943, 9.1.34. Appl., 15.4.33).—Claim is made for immature

grasses (oats, wheat, or barley) grown in rich soil, cut at a stage of growth where joining has not yet occurred, and dried in such a manner as to retain uninjured the original chlorophyll content. A. R. P.

**Charcoal.**—See II. Casein products.—See III. Dehydrating materials.—See XII.

## XX.—MEDICINAL SUBSTANCES; ESSENTIAL OILS.

**Assay of boric acid ointment.** R. M. LINGLE (Amer. J. Pharm., 1934, 106, 421–423).—H<sub>3</sub>BO<sub>3</sub> is determined by addition of excess 0.1N-NaOH to CHCl<sub>3</sub>-glycerol solutions of the ointment and back-titration (phenolphthalein) with 0.1N-H<sub>2</sub>SO<sub>4</sub>. Completion of the assay within 2 hr. and a blank correction are necessary. F. O. H.

**[Luminescence of pharmaceutical zinc oxide.]** (i) E. BEUTEL and A. KUTZELNIGG (Arch. Pharm. 1934, 272, 849–850). (ii) J. EISENBRAND and G. SIEVERT (*Ibid.*, 850–851).—(i) A reply to Eisenbrand and Sievert's remarks (cf. A., 1934, 474). It is agreed that the nature and intensity of the fluorescence depend on the conditions of measurement.

(ii) A rejoinder.

R. S. C.

**Differences in the alcohol values of pharmaceutical tinctures.** W. MEYER (Deuts. Apoth., 1933, 48, 1089–1091; Chem. Zentr., 1934, i, 3618).—The apparent loss of EtOH in tincture pulps  $\propto$  the dry matter in solution. A. G. P.

**Lead number [of vanilla].** C. S. PURCELL (Spice Mill, 1934, 57, 694–695).—The Pb nos. (I) of successive extracts of vanilla with light petroleum, Et<sub>2</sub>O, abs. EtOH, and H<sub>2</sub>O, when added, give vals.  $\equiv$  the total extractable matter present. Constituents contributing to the (I) of the fractions are examined. The (I) of such extracts are not indicative of their resin contents, nor do they serve as a measure of the flavouring principles (exclusive of vanillin) present in the bean.

CH. ABS. (p)

**Bismuth iodide compounds of antipyrine, pyramidone, and hexamethylenetetramine.** R. DOLIQUE (Bull. Sci. pharmacol., 1934, 39, 418–425, 491–499; Chem. Zentr., 1934, i, 3619).—The prep. and physical properties of the compounds and their rates of hydrolysis are examined. A. G. P.

**Internal-complex salts in medicine.** H. SCHMIDT (Med. u. Chem. Abh. med.-chem. Forschungsstätten I. G. Farbenind., 1934, 2, 93–103; Chem. Zentr., 1934, i, 3878).—Na pyrocatechol-3 : 5-disulphonate (I) is used to prepare complexes for medical use. *Fuadin* [Sb<sup>III</sup>-bis-(I), 7H<sub>2</sub>O] and *selvadin* [Ca-(I), 4H<sub>2</sub>O] are compared with tartar emetic for pharmacological and therapeutic effect. R. N. C.

**Chloretone as preservative for adrenaline solutions.** L. W. VAN ESVELD (Pharm. Weekblad, 1934, 71, 1318–1321).—Chloretone has no effect on the physiological activity of adrenaline solutions, which may be kept in ampoules for  $\leq 3$  months. S. C.

**Strychnine.** III. Effectiveness of sucrose, saccharin, and dulcin in masking the bitterness of



**strychnine.** J. C. WARD, J. C. MUNCH, H. J. SPENCER, and F. E. GARLOUGH (J. Amer. Pharm. Assoc., 1934, 23, 984—989).—At the threshold concn., strychnine (I) requires 14.3 pts. of saccharin, 16.1 of dulcin, and 6790 of sucrose to mask its bitter taste. If the (I) concn. is increased the sweetening agents become relatively more effective. A. E. O.

**Burning qualities of tobacco.** A. S. BOROZELINA (Vsesoy. Inst. Tabacn. Prom. Krasn., 1933, No. 105, 3—11).—Burning is impeded by  $MgCl_2$ ,  $MgSO_4$ , and high protein contents and is favoured by K salts.  $NO_3$  hastens burning, but combustion is incomplete. CH. ABS. (p)

**Indices of quality of tobacco.** A. SCHMUCK (Vsesoy. Inst. Tabacn. Prom. Krasn., 1933, No. 104, 45—49).—Surface tension and conductivity vals. of tobacco extracts are higher in the poorer grades. CH. ABS. (p)

**Standardisation of tobacco by chemical properties.** A. SCHMUCK and A. P. SMIRNOV (Vsesoy. Inst. Tabacn. Prom. Krasn., 1933, No. 104, 51—107).—A discussion. CH. ABS. (p)

**Hydrochloric acid treatment of strong tobacco.** P. K. DOROKHOV and N. L. GONYAK (Vsesoy. Inst. Tabacn. Prom. Krasn., 1933, No. 105, 16—21).—Strong tobacco, containing  $\approx$  13—14% of  $H_2O$ , on treatment with 1.5—2.0% HCl becomes milder and of better quality and retains  $H_2O$  for a long time. CH. ABS. (p)

**Tobacco and makhorka (*Nicotiana rustica*) as material for the extraction of citric acid.** A. SCHMUCK (Vsesoy. Inst. Tabacn. Prom. Krasn., 1933, No. 102, 3—20).—Makhorka contains 5—10% of citric acid and much malic acid. Ca salts of the acids are treated with HCl, neutralised with aq.  $NH_3$ , and heated to ppt. Ca citrate. CH. ABS. (p)

**Denicotinised cigarettes.** P. K. DOROKHOV (Vsesoy. Inst. Tabacn. Prom. Krasn., 1933, No. 105, 22—25).—Activated C and  $SiO_2$  gel are used for the absorption of nicotine. CH. ABS. (p)

**Orange-flower water and "neroli water-oils."** Y. R. NAVES (Parfums de France, 12, 61—69; Chem. Zentr., 1934, ii, 526).—Oil const. and Me anthranilate contents are recorded, and other constituents described (cf. B., 1934, 701). A. G. P.

**Empire production of essential oils for perfumery.** E. W. BOVILL (J. Soc. Arts, 1934, 83, 123—140).—A lecture.

**Furfuraldehyde in tobacco.**—See III.

#### PATENTS.

**Production of [medicinal] compositions containing sulphur in colloidal distribution.** H. KAUFMANN (U.S.P. 1,949,797, 6.3.34. Appl., 11.11.32. Ger., 30.7.29).—H polysulphides dissolved in an org. medium immiscible with  $H_2O$  are decomposed by  $H_2O$ . The medium may be an ointment base or an org. liquid (e.g.,  $CHCl_3$ ) containing a solid (talc) in suspension; in the latter case the S is deposited on the solid. H. A. P.

**Medicinal phenol compounds.** R. P. FISCHELIS, Assr. to MALTBY CHEM. Co. (U.S.P. 1,954,766, 10.4.34. Appl., 2.1.30).—The Mg compounds of wood-tar creosote or the phenols thereof are claimed. E. H. S.

**Manufacture of a remedy containing an emanation.** G. T. ERHARD and G. M. P. SCHAEFER (B.P. 419,528, 12.5.33).—Oil, liquid fat, or  $H_2O$  is treated with radioactive emanation and then incorporated with a solid or semi-solid edible fat. E. H. S.

**Preparation of chondroitin compounds.** L. A. CRANDALL, JUN. (U.S.P. 1,950,100, 6.3.34. Appl., 2.6.32).—Mammalian cartilage is hydrolysed with cold 2—5% aq. KOH or NaOH, the solution is filtered, acidified with AcOH, boiled with Mg or Ca oxide or carbonate (MgO), again filtered, and EtOH (1.25 vols. is added. The salt of chondroitin H sulphate thus pptd. is purified by dissolution in warm  $H_2O$  and repptn. with AcOH ( $\leftarrow$  5 vols.). H. A. P.

**Manufacture of bases derived from benzdioxan.** L. S. E. ELLIS. From SOC. DES USINES CHIM. RHÔNE-POULENC (B.P. 420,078, 19.5., 5.8., and 23.12.33).—Bases having a paralysing action on the sympathetic nervous system are prepared by condensing a 1-halogenomethylbenzdioxan with a primary or sec. alkylamine or a saturated heterocyclic amine. Thus *o*- $C_6H_4(OH)_2$  is condensed with epi- or di-chlorohydrin and aq. KOH at 100° to give 1-hydroxymethylbenzdioxan, b.p. 160°/17 mm., converted by  $SOCl_2$  and  $C_5H_5N$  into the Cl-derivative, b.p. 132°/14 mm., from which the *NHMe*, b.p. 105—106°/0.75 mm., *NEt\_2*, b.p. 117—118° 1.5 mm., *piperidyl*, b.p. 193°/17 mm. (*hydrochlorides*, m.p. 158—160°, 127°, and 229—231°, respectively), and *piperazino*-derivatives, b.p. 205—209°/18 mm. (+ 1HCl, m.p. 180°; + 2HCl), are prepared. H. A. P.

**Self-contained  $pH$ -indicating drug.** G. C. SHIVERS (U.S.P. 1,951,563, 20.3.34. Appl., 20.6.32).—A non-toxic indicator, e.g., bromothymol-blue, is incorporated with a salvarsan drug in an ampoule. E. H. S.

**Manufacture of compounds of acridinium series.** I. G. FARBENIND. A.-G. (B.P. 419,603 and Addn. B.P. 419,632, [A, B] 13.5.33. Ger., [A] 23.5.32).—Inorg. or lower carboxylic acid acridinium salts (from 3:6-diaminoacridine) are treated in  $H_2O$  with  $H_2O$ -sol. salts of (A) acylaminoaryl- (I) and (B) aromatic or heterocyclic-aromatic arsinic acids [excluding (I)]. The arsinic acid is pptd. in a cryst. form. Examples are: 3:6-diamino-10-methylacridinium *p*-glycollylamino-, 5-chloro-3-acetamido-4-hydroxy-, 4-acetamido-2-carboxymethoxy-, and 2:4-dihydroxy-benzenearsinate, and benzoxazolone- and 1-methylbenzimidazolone-5-arsinate, 3:6-diamino-2:7:10-trimethyl- and 3:6-dimethoxy-10-methyl-acridinium *p*-glycollylamino-benzenearsinate, and 3:6-dimethoxy-10-methylacridinium *p*-carboxylamidomethylaminobenzenearsinate. H. A. P.

**Manufacture of neutral, water-soluble (A) derivatives of aminoarylarsono-stibio-compounds and (B) organo-metallic [aminoarylarsono-metalloid] compounds.** I. G. FARBENIND. A.-G. (B.P. 419,458 and 419,607, [A] 13.5.33, [B] 15.5.33. Ger., [A, B] 14.5.32).—



(A) Derivatives of  $\text{AsPh}_3\text{SbPh}$  are prepared containing  $\leq 2$  heteronuclear  $\text{NH}_2$ -groups substituted by a hydroxyalkyl ( $\beta\gamma$ -dihydroxypropyl) group and  $\cdot\text{CH}_2\cdot\text{SO}_3\text{H}$  or  $\cdot\text{CH}_2\cdot\text{SO}_2\text{H}$ , respectively. Thus 3-amino-4-hydroxyphenylarsine acetate (I) is condensed with glycidic (II) (? 1 mol.) in MeOH, the product (III) is treated with 3 : 4 : 1- $\text{NH}_2\cdot\text{C}_6\text{H}_3(\text{OH})\cdot\text{SbCl}_2$ , and the resulting compound condensed with  $\text{CH}_2\text{O}\cdot\text{NaHSO}_3$  (IV). Alternatively, 3 : 3'-diamino-4 : 4'-dihydroxyarsenostibiobenzene is condensed first with (II) in aq. NaOH and then with (IV). Other examples are the  $N\text{-CH}_2\cdot\text{SO}_3\text{Na}$  derivatives of 3-amino-3'- $\beta\gamma$ -dihydroxypropyl-amino-4'-carbonyl-4- and 3'-amino-3-diethylamino-hydroxypropyl-4'-carbonyl-4-hydroxyarsenostibiobenzene. (B) Aminoarsenite-As, -Sb, or -Bi compounds are condensed with an alkylene oxide [(II)] and, if desired, (IV) or  $\text{CH}_2\text{O}\cdot\text{Na}_2\text{S}_2\text{O}_4$  (V), or are synthesised from components similarly treated. Thus (III) is condensed with  $\text{SbCl}_3$  in MeOH at  $-15$  to  $5^\circ$ , and the product further condensed with (IV), (V), or (II) [forming a compound in which (II) : As is  $> 1$ ], or the compounds [3 : 4 : 1- $\text{NH}_2\cdot\text{C}_6\text{H}_3(\text{OH})\text{As}_3\text{X}_2$  (X = Sb, As, or Bi) are condensed with (II) and/or (IV) or (V). Similar products

derived from  $\begin{array}{c} \text{CHMe} \\ | \\ \text{CH}_2 \end{array} \text{O}$  and  $\text{NEt}_2\cdot\text{CH}_2\cdot\text{CH} \begin{array}{c} \text{O} \\ | \\ \text{CH}_2 \end{array}$  are described. H. A. P.

**Manufacture of neutral, water-soluble complex compounds of trivalent antimony.** I. G. FARBENIND. A.-G. (B.P. 419,742, 18.5.33. Ger., 19.5.32).—An arylstibine oxide or chloride (I) is treated with a polyhydroxyaromatic (pyrocatechol-3 : 5-dicarboxylic, -disulphonic, or -diarsinic, gallic, pyrogalloldisulphonic) acid (II) having  $\leq 2$  OH *ortho* to each other, and sufficient base [e.g.,  $\text{NH}_4\text{Et}_2$ ,  $\text{NEt}_2\cdot\text{C}_2\text{H}_4\cdot\text{OH}$ , NaOH,  $\text{Ca}(\text{OH})_2$ ] to give a neutral reaction. The ratio of (I) to (II) need not be stoichiometric. Examples of (I) are  $p\text{-NHAc}\cdot\text{C}_6\text{H}_4\cdot\text{SbCl}_2$ , 3 : 4 : 1- $\text{NH}_2\cdot\text{C}_6\text{H}_3(\text{O}\cdot\text{CH}_2\cdot\text{CO}_2\text{H})\cdot\text{SbCl}_2\cdot\text{HCl}$ ,  $p\text{-NAcEt}\cdot\text{C}_6\text{H}_4\cdot\text{SbO}$ , 4 : 2 : 1- $\text{NHAc}\cdot\text{C}_6\text{H}_3\text{Me}\cdot\text{SbO}$ ,  $p\text{-CO}_2\text{Et}\cdot\text{NEt}\cdot\text{C}_6\text{H}_4\cdot\text{SbO}$ , and benzoxazolone- and *N*-methylbenzimidazole-stibine oxide. H. A. P.

**Production of therapeutical preparations [anti-syphilitics].** M. M. BECKER, Assr. to G. A. BREON & Co. (U.S.P. 1,950,132, 6.3.34. Appl., 23.2.33).—Complex compounds of Bi with a polyhydric alcohol [mannitol (I)] and a OH-acid [e.g., gluconic (II), tartaric, or salicylic acid] are used. Thus  $\text{Bi}(\text{OH})_3$  (180 pts.) is added to an aq. solution of (I) (36 pts.) and KOH (32 pts.), the solution is boiled, and (II) (approx. 87.5 pts.) added until a  $p_{\text{H}}$  of 9–9.4 is produced. H. A. P.

**[Conditioning] treatment of tobacco and the like.** F. S. SMITH (U.S.P. 1,952,781, 27.3.34. Appl., 5.3.28).—The pressure in a cylindrical chamber (C) containing tobacco (I) is partly reduced and then  $\text{H}_2\text{O}$  is admitted to one end of C, which is heated so that (I) is subjected to a continuous current of  $\text{H}_2\text{O}$  vapour under controlled conditions. E. H. S.

**[Maintaining the moisture content of] tobacco.** W. A. WHITAKER (U.S.P. 1,954,109, 10.4.34. Appl., 12.3.31).—Gelatin, agar, or the like is mixed with the tobacco. E. H. S.

**Surgical needles.**—See X. **Shaped articles from polyvinyl alcohols.**—See XIII. **Compositions from cashew nutshell liquid.**—See XXIII.

## XXI.—PHOTOGRAPHIC MATERIALS AND PROCESSES.

**New reflexion densitometer.** W. BOLLMANN (Z. wiss. Phot., 1934, 33, 167–176).—The visual density of a given photographic image (printing paper) is compared with a continuous or stepwise series, from white to black, produced by a rotating sector coated with MgO. The shape of the sector and corrections for possible errors are discussed, and the complete apparatus is described in detail. J. L.

**Sampling dusts.**—See I.

### PATENTS.

**Translucent material [films].** F. W. HOCHSTETTER (U.S.P. 1,951,933, 20.3.34. Appl., 21.7.27).—A transparent aq. cellulose base is treated with a light-sensitive emulsion containing the products of reaction of KBr, KCl, and KI,  $\text{AgNO}_3$ , gelatin, glycerin, starch,  $\text{CuCl}_2$ , citric acid, chrome alum,  $\text{CH}_2\text{O}$ , EtOH, and soap bark, which are compounded in a predetermined manner and in specified proportions so that certain unreacted constituents remain. F. R. E.

**Non-halation film backing.** K. C. D. HICKMAN and C. R. SANFORD, Assrs. to EASTMAN KODAK Co. (U.S.P. 1,950,890, 13.3.34. Appl., 1.8.31).—The back of a cellulose derivative film is hydrolysed with a solution of KOH in EtOH (or MeOH or BuOH) and the non-halation dye solution (containing a colloid, e.g., gelatin, as stabiliser, the dye being, however, in excess) is then applied to the prepared surface. The product is varnished and waxed with a solution of, e.g., gum sandarac and stearic acid in EtOH. J. L.

**Sensitising the colloids employed in processes for photomechanical reproduction.** G. MAILLET (B.P. 419,643, 26.3.34. Belg., 25.3.33).—The colloid, e.g., gelatin, layer is sensitised by incorporation of an org. chromate, e.g.,  $\text{C}_5\text{H}_5\text{N}$  chromate or dichromate. The prep. of this compound by direct action of  $\text{CrO}_3$  on  $\text{C}_5\text{H}_5\text{N}$  is described. Greatly increased light-sensitivity of the emulsion layers is claimed. J. L.

**Superficial coating for photographic elements.** C. J. STAUD, Assr. to EASTMAN KODAK Co. (U.S.P. 1,954,337, 10.4.34. Appl., 1.10.32).—The acid form of cellulose acetate phthalate (I) (one  $\text{CO}_2\text{H}$  only of the phthalic acid is combined with the cellulose) has been found to be sol. in org. solvents, but insol. in and resistant to  $\text{H}_2\text{O}$ . In developers it is converted into the Na salt (II), but does not dissolve, presumably owing to the salting-out effect of  $\text{Na}_2\text{SO}_3$ ; the salt is, however, easily sol. in  $\text{H}_2\text{O}$ . (I) is applied as a coating on top of the emulsion, protecting it from abrasions; or an anti-fogging agent, e.g., KI,  $\text{CH}_2\text{I}\cdot\text{CH}_2\cdot\text{CO}_2\text{H}$ , may be incorporated, which will not affect the emulsion in the dry state, but will dissolve in the developer. (I) may also be used, with incorporation of a suitable dye, as an antihalation backing on the film base; this coating



may be applied in manufacture before the emulsion is coated, and will not suffer damage in subsequent processes. The coating is easily removed after development, by short washing; if the plate is not washed, (II) is reconverted into (I) in the fixing bath, and is then removable by short bathing in, *e.g.*, aq.  $\text{Na}_2\text{CO}_3$  and washing in  $\text{H}_2\text{O}$ . In the developer the coating (II) becomes swollen and easily pervious to  $\text{H}_2\text{O}$ . J. L.

**Treatment of photographic emulsions.** D. K. ALLISON, Assr. to CHEM. & RESEARCH CORP. (U.S.P. 1,954,512, 10.4.34. Appl., 28.11.31).—Solutions in which emulsions are treated, *e.g.*,  $\text{H}_2\text{O}$  for washing, fixing baths, toning baths, etc., are maintained at the isoelectric point of the gelatin of the emulsion (generally about  $p_{\text{H}}$  4.6). By this treatment many properties of the film are greatly improved. Graphs are given showing the effects produced at this  $p_{\text{H}}$ . J. L.

**Stabilisation of photographic emulsions.** I. G. FARBENIND. A.-G. (B.P. 419,579, 12.3.34. Ger., 10.3.33).—A *sec.*- or *tert.*-alkylamine (except  $\text{NPr}_3$ ) having a  $\text{H}_2\text{O}$ -solubility  $\ll$  that of  $\text{N}(\text{C}_8\text{H}_{17})_3$  (di- or tri-*iso*- or tri-*n*-amylamine) is added to the emulsion or to a layer in contact with it. H. A. P.

**Three-colour photography.** P. E. F. LESSERTISSEUX (B.P. 420,356, 25.5.34. Fr., 1.6.33).—Two of the three images are printed from the appropriate colour-separation negatives on to either side of double-coated film, in register, and dyed. The emulsion bearing the blue image is sensitised in an alkaline dichromate bath, and the third image printed on from a positive of the remaining colour record. In order to avoid reaction between basic and acid dyes, reaction of dye with the dichromate, or prevention of penetration of the emulsion by mordanted dye, it is necessary to use only certain specified dyes: blue (Capri Blue G.O.N., Rhoduline Blue 5B); the second face of the film may be either yellow (Thioflavine T or Acridine Yellow) or red (Rhodamine S). The emulsion bearing the blue image is sensitised and the third image printed and dyed, by imbibition, either red (alkaline Carmine solution or Pinatype Red) or yellow (Pinatype Yellow F, Mikado Golden Yellow, or Thiazol Yellow), according to the colour of the second image. The dye solutions should be thickened with, *e.g.*, glycerin, and applied by a roller. J. L.

**Photographic colour process.** J. G. CAPSTAFF, Assr. to EASTMAN KODAK Co. (U.S.P. 1,954,346, 10.4.34. Appl., 8.10.31).—A support is coated with an emulsion (*R*) (sensitive only to red) upon which is coated an emulsion (*G*) sensitive only to green. After exposure to a coloured light image, through a yellow filter, the plate is fully developed, preferably in a process developer. The plate is then exposed to red light, through the support; the Ag images are removed in a dichromate bath, and the plate is redeveloped in an ordinary metol-quinol developer. The final result is then an upper AgBr green positive record and a lower Ag red positive record. The images are suitably dyed by known means. For 3-colour photography emulsion *G* is placed below emulsion *R*, and a blue-sensitive emulsion coated on the back of the support. The extra steps

required to obtain the three coloured images are fully described. J. L.

**Control of contrast with colour developers.** M. W. SEYMOUR, Assr. to EASTMAN KODAK Co. (U.S.P. 1,954,335, 10.4.34. Appl., 29.10.31).—In order to develop the exposed AgBr to completion and yet control the  $\gamma$  of the colour image, the emulsion is developed in two stages: in a colour developer to the required  $\gamma$ , and in an ordinary non-staining developer (*e.g.*, metol-quinol) until the image is completely developed. The developers may also be used in the reverse order. J. L.

**Production of photographic dyestuff images.** B. GASPAR (B.P. 419,810, 14.2.33. Ger., 15.2.32).—Dye or dye-forming substances may be destroyed, at the points of the Ag image, during development if the developer comprises a reducing substance (which is not capable by itself of effecting reduction, *e.g.*,  $\text{Na}_2\text{S}_2\text{O}_4$  or Na formaldehydesulphoxylate in low concn.) together with an acid, *e.g.*, HCl, or acid-reacting substance, *e.g.*,  $\text{NaHSO}_3$ , or accelerating substances such as  $\text{CS}(\text{NH}_2)_2$  derivatives, cysteine,  $\text{TiCl}_3$ , etc. Preferably a restrainer (haze-preventer), *e.g.*, KBr, iminazole compound, is also added. J. L.

## XXII—EXPLOSIVES; MATCHES.

**Pressure wave sent out by an explosion. III. Spark photographs with permitted explosives.** W. PAYMAN and D. W. WOODHEAD (Safety in Mines Res. Bd., 1934, Paper 88, 23 pp.; cf. A., 1931, 947).—The pressure waves from (I) charges of Celmonite and Samsonite No. 3 capable of igniting a 9% firedamp-air mixture, and (II) similar non-igniting charges have been studied by Schlieren photography. The general formation is illustrated by a Cardox cartridge shot. Using a 120-cm. shot hole (III), (I) gave a projectional effect co-axial with the bore of the cannon  $>$  (II), and the gaseous products were nearer to the shock wave (*W*), which was broken up earlier and to a greater extent by solid particles. Shortening (III) was equiv. to increasing the charge. 1-in. clay stemming in the 120-cm. (III) increased the initial separation between *W* and the gaseous products, but was without other effect. Stemming in a 55-cm. (III) produced a prominence in the wave front. Open conical prominences which appear in *W* are due to inert particles overtaking the wave front. Other temporary prominences having an opaque core correspond to smaller particle velocities. They can be ascribed to particles of the charge undergoing decomp., to an agglomerate of inert particles associated with gas, or to a combination of the two. R. S.

**Nitrocellulose from wood pulp.** W. SCHARNBECK (Z. ges. Schiess- u. Sprengstoffw., 1934, 29, 33–37, 67–70, 98–102, 133–137, 196–200, 230–232, 266–269).—The effect of the nature of the cellulose (I) and of its pretreatment on the nitrated product has been investigated with cotton waste, linters, and sulphite- and soda-pulps. The properties of these are tabulated.  $\eta$  of the (I) solution is a function of the (I) content. The  $\eta$  of nitrocellulose is not appreciably affected by the method of drying. Samples from various celluloses tested at



intervals of 1, 3, and 30 days after dissolution showed an appreciable fall in  $\eta$  for the highly viscous solutions. The  $\eta$  of guncotton and collodion cotton from linters, cotton waste, sulphite- and soda-pulps show that an estimate of the  $\eta$  can be obtained from that of the (I). The compositions of mixed acids to give nitrocelluloses (1) of 13.0% N and 10–15% solubility in EtOH–Et<sub>2</sub>O and (2) of 12.2–12.4% N and 95% solubility have been determined. Specifications and tests for the nitrated (I) are given. W. J. W.

## PATENT.

**Priming mixture.** W. BRÜN, ASSR. to REMINGTON ARMS Co., INC. (U.S.P. 1,942,274, 2.1.34. Appl., 19.10.31).—Claim is made for a mixture of basic Pb styphnate 12–50, normal Pb styphnate 0–40, Pb(CNS)<sub>2</sub> 0–8, Pb(NO<sub>3</sub>)<sub>2</sub> 30, abrasive (e.g., powdered glass) 20, guanyl nitrosoaminoguanilyltetracene 0–2%. A. R. P.

## XXIII.—SANITATION; WATER PURIFICATION.

**Disinfection in partial vacuum.** M. A. L. LEPIGRE (Chim. et Ind., 1934, 32, 1263–1277).—Commercial packages, bales, etc. are disinfected (especially for the destruction of insects) by exposure in suitable vessels to air at 100 mm. pressure followed by (CH<sub>2</sub>)<sub>2</sub>O + CO<sub>2</sub> + air, CS<sub>2</sub> + air, or HCN + air, firstly at 100 mm. and then for 1–2 hr. at 750 mm. Repeated evacuation and admission of air or air + insecticide allows thorough permeation and, finally, removal of the insecticide used. F. O. H.

**Improved laboratory apparatus for fumigation experiments.** H. H. S. BOVINGDON (Ann. Appl. Biol., 1934, 21, 704–724). A. G. P.

**Taste and odour troubles in Bulawayo water, with special reference to the use of activated carbon.** A. C. THORNTON (Inst. Civ. Eng., Sel. Eng. Paper No. 156, 9 pp.).—River-H<sub>2</sub>O is impounded by a dam 13 miles away from Bulawayo and after coagulation with Ca(OH)<sub>2</sub> and Al<sub>2</sub>(SO<sub>4</sub>)<sub>3</sub> and rapid gravity filtration it is treated with NH<sub>3</sub>-Cl<sub>2</sub>. Tastes and odours due to small algal infestations have been controlled by the addition of 1.0 p.p.m. of CuSO<sub>4</sub> prior to treatment, but in serious cases the reservoir has been dosed with CuSO<sub>4</sub> and bleaching powder (2 lb. of each per 10<sup>6</sup> gals.) and powdered C has been fed on to the filters, with consequent choking and increase in wash-H<sub>2</sub>O required. It has proved best to add the activated C with the coagulant, as it thus gets adequate contact and is finally carried down by the floc. The relative efficiency of various types of activated C has been estimated by the amount required completely to remove H<sub>2</sub>S from a solution containing 0.2 c.c. of saturated aq. H<sub>2</sub>S per litre—a solution also recommended as a unit for the comparison of tastes and odours. C. J.

**Taste and odour control [in water] at Minneapolis, Minnesota.** A. F. MELLON (J. Amer. Water Works Assoc., 1934, 26, 1720–1723).—Complaints of tastes and odours from the farther portions of the distribution system are believed to be due to the disintegration of plankton. Prechlorination and activated C treatment are recommended as being cheaper and

more efficient than alum, which cannot be relied on to effect satisfactory removal. Old sand filters have acquired a marked capacity for the removal of tastes and odours and also of residual Cl<sub>2</sub>. C. J.

**Taste and odour control at Hackensack Water Company, New Jersey.** G. R. SPALDING (J. Amer. Water Works Assoc., 1934, 26, 1730–1733).—During the summer months for the past 5 years the raw H<sub>2</sub>O has received a continuous dosage of CuSO<sub>4</sub> in addition to subsequent activated C treatment. Seasonal growths of algæ have thus been kept below the point at which they become troublesome, and the H<sub>2</sub>O has been maintained in a condition favourable to rapid sand filtration, with consequent saving in chemicals for coagulation and sterilisation. C. J.

**Taste and odour removal [from water] at Saginaw, Mich.** A. ECKERT (J. Amer. Water Works Assoc., 1934, 26, 1723–1729).—The raw H<sub>2</sub>O contains wastes from the manufacture of chemicals and beet sugar and from an oil-field. It is softened to 100 p.p.m. with Na<sub>2</sub>CO<sub>3</sub> and Ca(OH)<sub>2</sub>, is recarbonated, chlorinated, and treated with 7 p.p.m. of powdered activated C just before reaching the filters. During the sugar-beet season (NH<sub>4</sub>)<sub>2</sub>SO<sub>4</sub> is added with the softening reagents and the dosage of C is increased to 17 p.p.m. The condition of the raw H<sub>2</sub>O is such that it is economically impossible to satisfy the majority of the consumers. C. J.

**Air-dilution method of odour determination in water analysis.** G. M. FAIR and W. F. WELLS (J. Amer. Water Works Assoc., 1934, 26, 1670–1683).—An improved form of apparatus is described (cf. B., 1934, 125) which consists of a glass nosepiece attached to a series of concentric, perforated metal tubes which are marked and can be set to give such dilutions with odour-free air as will yield "threshold vals." from 6 to 0. The estimation is made by sniffing decreasing dilutions until the odour is just perceptible. C. J.

**Coagulation [of water] with iron compounds.** A. P. BLACK (J. Amer. Water Works Assoc., 1934, 26, 1713–1717).—The theory involved in the process of coagulation with Fe compounds and alum is reviewed and results are presented which have been obtained with various types of H<sub>2</sub>O. Coagulation with Fe<sup>III</sup> is effective over a much wider *p*<sub>H</sub> range than with alum, "colour flocs" of high absorptive capacity being obtained in the very acid range where alum may not be used, and true Fe(OH)<sub>3</sub> flocs at *p*<sub>H</sub> 9–10 suitable for the removal of turbidity and Mn. C. J.

**Occurrence and control of iron bacteria in water supplies.** K. W. BROWN (J. Amer. Water Works Assoc., 1934, 26, 1684–1700).—Methods of identification and culture are given of organisms capable of withdrawing Fe from the H<sub>2</sub>O in which they live and of depositing it as Fe(OH)<sub>3</sub>. Attempts to obtain pure cultures of filamentous forms, e.g., *Crenothrix*, were unsuccessful, but those of the bacillus type were isolated and examined. Bacteria producing H<sub>2</sub>S thrive on Fe bacteria and produce disagreeable tastes and odours. The majority of infected waters are from wells, and it is recommended to chlorinate the supply as it enters



the reservoir and dechlorinate with  $\text{SO}_2$  at the outlet. Regular sterilisation and flushing of mains is desirable.

C. J.

**Algal growth raises  $p_{\text{H}}$  of water.** W. C. EMIGH (Water Works and Sewerage, 1934, 81, 275—276).—Algae absorb  $\text{CO}_2$  from  $\text{H}_2\text{O}$  and convert  $\text{HCO}_3'$  into  $\text{CO}_3''$ , with a corresponding increase of  $p_{\text{H}}$ . Addition of  $\text{CuSO}_4$  causes resorption of  $\text{CO}_2$  and change of  $p_{\text{H}}$  to normal.

CH. ABS. (p)

**Germicidal action of chlorine.** C. S. MUDGE and F. R. SMITH (Proc. 19th Ann. Meet. West. Div. Amer. Dairy Sci. Assoc., 1933, 89—97).—Alkaline hypochlorites and  $\text{NH}_2\text{Cl}$  (I) produced similar bactericidal effects, although (I) was more active in presence of proteins. In certain concns.  $\text{Cl}_2$  has a bacteriostatic action only, and dilutions of treated liquids may show no reduction in bacterial nos. in plate counts.

CH. ABS. (p)

**Equipment for chlorination of small water-supplies.** C. R. COX (J. Amer. Water Works Assoc., 1934, 26, 1587—1601).—Details are given of automatic and manually operated types of equipment available for the treatment of very small supplies with hypochlorite (I) or liquid  $\text{Cl}_2$ . The conditions necessary to secure the stability of the (I) solutions have been examined; addition of  $\text{Na}_2\text{CO}_3$  is recommended.

C. J.

**Determination of free chlorine [in water].** D. TARVIN, H. R. TODD, and A. M. BUSWELL (J. Amer. Water Works Assoc., 1934, 26, 1645—1662).—It is recommended to use a more strongly acid *o*-tolidine solution than that specified by "Standard Methods" for this purpose. The new solution develops full colour in 15 min., avoids error due to  $\text{NO}_2'$ , minimises interference from Fe, but is affected by Mn.

C. J.

**Chlorine and the *o*-tolidine test in presence of nitrite [in water].** R. HULBERT (J. Amer. Water Works Assoc., 1934, 26, 1638—1644).—Given sufficient exposure to strong light,  $\text{NO}_2'$  will produce a yellow colour with *o*-tolidine, but the period required is  $>$  with  $\text{Cl}_2$ . It is recommended to carry out the test as far as possible in darkness and to read after 15 instead of 30 min. In absence of  $\text{NH}_3$ ,  $\text{NO}_2'$  is almost instantaneously oxidised by  $\text{Cl}_2$  if in excess and it is possible for the ordinary dose of  $\text{Cl}_2$  to be completely consumed and any  $\text{NO}_2'$  remaining to be mistaken for residual  $\text{Cl}_2$  by the "Standard Methods" test. Under laboratory conditions, when  $\text{NH}_3$  is present approx.  $\frac{1}{3}$  of the  $\text{Cl}_2$  reacts with  $\text{NO}_2'$  and the remaining  $\text{Cl}_2$  and  $\text{NO}_2'$  may co-exist for several days. The advisability of using  $\text{NH}_3$  in summer is doubted as it may be oxidised to  $\text{NO}_2'$  while passing through the system and thus destroy the residual  $\text{Cl}_2$  which it was its function to preserve.

C. J.

***o*-Tolidine test [for free chlorine].** C. A. HOLMQUIST (J. Amer. Water Works Assoc., 1934, 26, 1663—1666).— $\text{NO}_2'$  will produce colour with *o*-tolidine, but contrary to Hulbert's experience (cf. preceding abstract) the reaction proceeds in the dark, the colour is produced by  $\text{NO}_2'$  and  $\text{Cl}_2$  simultaneously, and the reaction is not completed in 15 min. To avoid  $\text{NO}_2'$  trouble, the  $\text{H}_2\text{O}$  should be chlorinated immediately after the  $\text{NH}_3$  has

been thoroughly mixed. The  $\text{NH}_3$  dose should be kept at a min., and when double or split chlorination is practised the  $\text{NH}_3$  also should be added twice in order to avoid biological oxidation in the filters. Errors due to Mn may be reduced by drawing the supply from near the surface of deep reservoirs and taking special precautions during periods of seasonal overturn.

C. J.

**Efficiency of the ammonia-chlorine process [for water purification].** A. E. GRIFFIN (J. Amer. Water Works Assoc., 1934, 26, 1631—1637).—In order to have the same sterilising power with the same period of contact chloroamine (I) residuals must be double those of  $\text{Cl}_2$  alone. Relatively small residuals of either  $\text{Cl}_2$  or (I) will kill 99% of the *B. coli* in natural waters in 15 min., but for complete sterilisation in that period relatively high residuals are required, especially if the  $\text{H}_2\text{O}$  be alkaline.

C. J.

**Review of the status of the ammonia-chlorine process [for water purification].** M. C. SMITH (J. Amer. Water Works Assoc., 1934, 26, 1623—1630).—Experience at 17 plants indicates that though the effectiveness of the process is limited as a means of eliminating tastes and odours (I) caused by the condition of the untreated  $\text{H}_2\text{O}$ , it is successful in preventing the formation of (I) and "red  $\text{H}_2\text{O}$ " in stagnant sections of the mains. Unless used to prevent (I) being formed or increased during the purification process it is becoming more common to use  $\text{Cl}_2$  alone for pretreatment and  $\text{NH}_3\text{-Cl}_2$  after filtration. The  $\text{Cl}_2$  residual indicated by *o*-tolidine is more accurate for  $\text{Cl}_2$  than for chloroamines.

C. J.

**Dyeworks effluent purification.** A. J. HALL (Amer. Dyestuff Rep., 1934, 23, 661—664, 666).—Details are given of the plant and method used successfully for purifying an effluent so that it was suitable for discharge into a small fishing stream. Effluent from prussiate  $\text{NH}_2\text{Ph}$ -black dyeing was freed from ferrocyanides by addition of  $\text{FeSO}_4$  [ $\text{Na}_4\text{Fe}(\text{CN})_6$  was regenerated from the pptd. Prussian-blue by treatment with  $\text{NaOH} + \text{Na}_2\text{CO}_3$  and used again in dyeing] and added to the main effluent (containing dyes, starches, gums, etc.), which was then purified by successive additions of  $\text{Al}_2(\text{SO}_4)_3$  and  $\text{Ca}(\text{OH})_2$  followed by flow through sedimentation tanks (*T*) and "aëration beds." Filtration of the sludge drawn from *T* was assisted by a previous addition of  $\text{Ca}(\text{OH})_2$ .

A. J. H.

**Sampling dusts.**—See I. Handling  $\text{Cl}_2$ .—See VII.

## PATENTS.

**Manufacture and use of compositions. [Germicide from cashew nutshell liquid.]** M. T. HARVEY, ASSR. to HARVEL CORP. (U.S.P. 1,950,085, 6.3.34. Appl. 17.10.30).—The liquid is distilled and the distillate, b.p. 305—400° (mainly 382—388°), is heated with 0.2 pt. of solid  $\text{NaOH}$  at 150°, and again distilled. The residue is dissolved in  $\text{H}_2\text{O}$  and separated from oil, and is a non-toxic germicide comprising Na salts of phenols of high mol. wt.

H. A. P.

**Coated  $\text{NH}_2\text{Cl}$ .**—See VII.