

# BRITISH CHEMICAL ABSTRACTS

## B.—APPLIED CHEMISTRY

JAN. 17 and 24, 1935.\*

### I.—GENERAL ; PLANT ; MACHINERY.

**Systemisation of chemical technology.** H. H. FRANCK (Chem. Fabr., 1935, 8, 467).—An introduction to Hoppmann's paper (cf. following abstract), pointing out the desirability of reducing the science of works-scale production to a systematic scheme. C. I.

**Systemisation of chemical technology.** H. HOPPMANN (Chem. Fabr., 1935, 8, 468—477).—The subject is classified under 3 heads: (I) materials and yields, (II) operation, (III) apparatus. Under (I) sub-heads include (a) optimal chemical use of raw materials, (b) production of definite compounds, and (c) question of yields and by-products. Under (II) are included (d) movement of materials, (e) prep. for, and carrying out of, reactions, (f) control, measurement, etc. Under (III) sub-heads are: (g) apparatus for exo- and endo-thermic reactions, (h) electrolytic apparatus for solutions and molten electrolytes, (j) design and erection of plant. A final general heading covers questions of H<sub>2</sub>O supply and liquid and gaseous effluents. All these are tabulated in considerable detail. C. I.

**Corrosion in refrigeration plants.** W. NOLCKEN (Ice and Cold Storage, 1935, 38, 7).—Elimination of H<sub>2</sub>O from MeCl assists in preventing corrosion. CaCl<sub>2</sub> containing a small amount of CaO is used. SiO<sub>2</sub> gel is less satisfactory than CaCl<sub>2</sub>. CH. ABS. (e)

[Plant for] textile-finishing trades.—See VI. Monel metal in chemical equipment.—See X. Plastics in industry.—See XIII. Diffusion battery.—See XVII.

### PATENTS.

**Furnaces.** T. T. BROWN, J. W. MITCHELL, and SWINNEY BROS. LTD. (B.P. 437,258, 26.6.35).—A furnace front for liquid fuel operating with natural, induced, closed-stokehold, or forced draught, also permitting exhaust gases from oil engines to enter the furnace, is described. B. M. V.

**Gas-fired furnaces.** E. PLAYER and W. HIND (B.P. 437,070, 22.11.34).—A furnace of the type in which the atm. comprises a mixture of circulated old and new combustion gases is described. B. M. V.

**Heat-treating furnaces.** W. E. BLYTHE, Assr. to DRIVER-HARRIS Co. (U.S.P. 1,992,466—7, 26.2.35. Appl., [A] 26.1.33, [B] 12.5.33. Renewed [B] 11.7.34).—Live rolls within and driving means outside the furnace are described. B. M. V.

**Ovens and furnace for heat-treating metals and other articles.** E. E. LUCAS (B.P. 437,426, 3.5.35).—In a muffle furnace the gases of combustion, after

passing in a circuitous course around the muffle, are passed vertically upwards in front to form a screen for the mouth. B. M. V.

**Furnace tuyères.** W. MILLS, LTD., and J. F. PAIGE (B.P. 437,046, 8.5.35).—A hollow, annular, H<sub>2</sub>O-cooled tuyère is provided with a partition near the outer end of the H<sub>2</sub>O space forming an inlet bus chamber from which a no. of pipes extend to near the nose of the tuyère, and through which a single outlet pipe is led, preferably at the highest point. B. M. V.

**Automatic control of furnace temperatures.** INTERNAT. COMBUSTION, LTD., and H. MEAD (B.P. 437,215, 12.6.34).—Linkwork by which the max. and min. adjustments of fuel and air may be varied by hand independently of the thermo- or pressure-stat control through a motor is described. B. M. V.

(A) **Handling of materials.** (B) **Apparatus for treating materials.** H. O. SWOBODA and W. F. METZGER, Assrs. to H. O. SWOBODA, Inc. (U.S.P. 1,994,838—9, 19.3.35. Appl., [A] 19.9.30, [B] 4.8.31).—(A) Asphalt or the like is melted by electrical resistors directly exposed to it in the bath and is delivered through pipes the metal walls of which also form resistors. (B) An electric-resistance furnace and dry-quenching means for the tempering of, e.g., steel strip are described. B. M. V.

**Carrying-out of molecular associations and transformations.** A. O. JAEGER and K. F. PIETZSCH, Assrs. to AMER. CYANAMID & CHEM. CORP. (U.S.P. 1,993,886, 12.3.35. Appl., 29.6.28).—Crude o-C<sub>6</sub>H<sub>4</sub>(CO)<sub>2</sub>O (I) (e.g.) is vaporised in a still and caused to mingle with its own condensed vapour in a catalyst, the total reflux dropping back into the still. Condensable, polymerisable, and isomerisable impurities are rapidly transformed into non-volatile compounds and accumulate in the still, whence pure (I) is eventually distilled off. B. M. V.

[High-vacuum distillation] **treatment of solids.** IMPERIAL CHEM. INDUSTRIES, LTD. (B.P. 437,895, 7.5.34. Holl., 9.5.33).—Solids which would remain solid under the desired temp. conditions are dissolved or suspended in a suitable liquid (not necessarily non-volatile) and subjected to high-vac. (10<sup>-2</sup>—10<sup>-5</sup> mm. Hg), short-path distillation in an apparatus comprising a heated, vertical, inner tube over which the liquid is caused to flow in a film, surrounded by the cooled wall of an outer tube which is pierced by drains at intervals to collect fractions. B. M. V.

**Rotary kilns.** M. VOGEL-JØRGENSEN (B.P. 437,512, 26.6.35).—A drying zone at the upper end of the kiln is provided with helical baffles having no free space at the centre and also with radial perforated baffles which

prevent the passage of grinding bodies but permit the countercurrent flow of gas and comminuted material.

B. M. V.

**Dryer.** F. D. BROWN and R. J. MUSSER, Assrs. to C. ALAN, F. M. GOLDSBERRY, and F. D. BROWN (U.S.P. 1,994,083, 12.3.35. Appl., 30.7.32).—Several tapering drums with horizontal axes are arranged in a vertical zigzag series. Hot gases are passed outside the drums downwardly and then inside countercurrent to the material, travel of which is claimed to be due to centrifugal force and the conicity of the drums. B. M. V.

**Drying of materials.** J. H. COLTON and A. G. LANG (U.S.P. 1,992,520, 26.2.35. Appl., 11.11.33).—A rotary cylindrical shell is formed with openings near each end and provided with stationary ends. Hot, dust-laden gases (*e.g.*, from a kiln burning the slurry after drying) heat the outside of the kiln to  $> 120^\circ$  and then pass through it. The slurry is distributed on, and prevented from adhering to, the interior by a rotating agitator. B. M. V.

**Apparatus for drying material.** S. KIESSKALT, Assr. to B. SCHILDE MASCHINENBAU A.-G. (U.S.P. 1,993,062, 5.3.35. Appl., 22.10.32. Ger., 2.11.31).—In a dryer comprising a forced circulation of air over the goods and a heater in a substantially closed chamber, fluctuations of pressure are created by the continual operation of a rotary damper in the path of the circulation, whereby the passage of moisture from the inner parts of the material is accelerated. B. M. V.

**Antifreeze solution.** R. W. CAIRNS, Assr. to FIRESTONE TIRE & RUBBER Co. (U.S.P. 1,992,469, 26.2.35. Appl., 11.2.33).—To  $H_2O$  is added tetrahydrofurfuryl alcohol and, if desired, glycerin and/or  $[CH_2 \cdot OH]_2$ . B. M. V.

**Jaw crushers.** NORDBERG MFG. Co. (B.P. 437,504, 4.5.35. U.S., 19.5.34).—A crusher of the type in which a double-faced swing jaw oscillates between two fixed jaws is described; different sizes of material separated by previous screening may be fed to each crushing zone. B. M. V.

**Ore crusher.** R. LINN, Assr. to EUREKA MACHINERY Co. (LTD.) TRUST ESTATE (U.S.P. 1,994,224, 12.3.35. Appl., 14.1.33).—A pair of swing jaws facing each other are formed with recesses which together accommodate a round, tapering mass which is rotated by the same shaft that operates the swing jaws, the shaft passing through holes in the jaws. B. M. V.

**Crushing machine.** H. H. RUMPEL, Assr. to SMITH ENG. WORKS (U.S.P. 1,993,900, 12.3.35. Appl., 28.7.32).—A crusher comprising a substantially spherical ( $<$  a hemisphere) gyratory head co-operating with a substantially conical concave is described. B. M. V.

**Pulp or fibrous-mass breaker.** W. F. TRAUDT (U.S.P. 1,992,261, 26.2.35. Appl., 12.10.33).—Brewers' filter mass is drawn together with  $H_2O$  from a tank through a centrifugal pump and returned. B. M. V.

**Method of grinding.** R. L. CAWOOD (U.S.P. 1,992,290, 26.2.35. Appl., 6.1.30).—A pebble mill with heating jacket, suitable for printers' inks and the like, is described. B. M. V.

**Production of powdered substances.** DUNLOP RUBBER Co., LTD., D. F. TWISS, and A. S. CARPENTER (B.P. 436,944, 22.3.34).—An emulsion is made of a non-solvent and a solution of material in a solvent. The solution being initially the continuous phase, the mixture is agitated with an increasing proportion of non-solvent and a hydrophilic colloid until the solution becomes the discontinuous phase. The solvent is then driven off, without agglomerating the particles of material, either by evaporation or by mixing in an additional fluid agent in which solvent and non-solvent are both sol. but the material is insol. *E.g.*, a solution of 25 pts. of chlorinated rubber in 45 pts. of  $C_6H_6$  is emulsified in  $H_2O$  (rising to 300 pts.), the  $C_6H_6$  being evaporated by pouring into boiling 2% alum solution. B. M. V.

**Machines for mixing concrete and other substances.** F. PARKER, LTD., and F. W. PARKER (B.P. 437,153, 5.1.35).—A  $H_2O$ -measuring tank is tilted simultaneously with the charging hopper for solid materials. B. M. V.

**Mixing, agitating, and like machines.** B. GOLDMAN (B.P. 437,466, 2.7.34. Ger., 1.7.33).—In a tank containing rotating impellers and stationary baffles which rise and fall with the liquid, the latter are provided with helical guides. B. M. V.

**Mixing-drum gate.** A. E. MASON, Assr. to N. K. DAVIS, INC. (U.S.P. 1,992,959, 5.3.35. Appl., 24.2.31).—A closure for a horizontal rotating drum which is discharged without tilting is described. B. M. V.

**Coating of granular materials with powder.** T. HUTCHISON, and SCOTTISH AGRICULTURAL INDUSTRIES, LTD. (B.P. 437,036, 23.4.34).—A star or brush feeder wipes across the mouth of a hopper for the main constituent (*e.g.*, grain) and across the opening of a smaller container for the minor constituent (*e.g.*, Hg compounds), the container being preferably provided with a piston capable of being advanced at a slow regular rate. The mixing is completed in a tumbling barrel. B. M. V.

**Apparatus for treating finely-divided material.** O. LELLEP, Assr. to LEPOL, INTERNAT. PATENTVERWERTUNGS-GES.M.B.H. and N.V. "SOLOPOL," INGENIEUR-BUREAU TOT EXPLOIT. VAN HET SYSTEM POLYSIUS (U.S.P. 1,994,718, 19.3.35. Appl., 23.8.34. Ger., 15.12.27).—Powdered material is tumbled in a drum and discrete drops of  $H_2O$  are sparsely distributed over it, each drop forming a nucleus for a nodule. The smaller nodules are discharged over an annular weir and the larger through a peripheral opening. B. M. V.

**Extraction of liquid from material such as sludge or slurry.** W. R. THOMSON (B.P. 437,892, 7.5.34).—Apparatus of the type in which sewage sludge is pressed between two pervious conveyor belts and subjected to air currents is described. *Inter alia*, the supporting drainage belt is provided with transverse grooves the openings into which are smaller than the main part of the groove, to avoid choking. B. M. V.

**Rotary filters.** INTERNAT. COMBUSTION, LTD., and F. M. BRUCE (B.P. 436,975, 7.6.34).—An external, rotary-drum, vac. filter of the type in which the cells are open to the interior of the drum is provided with an internal device to remove or reverse the vac. from/at

those cells which are opposite the "doctor" or other discharging device. B. M. V.

**Liquid filter and mixer.** W. W. POTTER (U.S.P. 1,994,867, 19.3.35. Appl., 2.5.32).—A mixing valve for hot and cold H<sub>2</sub>O with a quickly detachable filter is described. B. M. V.

**[Bed] filters.** F. P. CANDY (B.P. 437,275, 23.4.34).—A filter bed is cleaned by simultaneous upward washing with H<sub>2</sub>O and air, the former being admitted through perforated pipes surrounded by coarse gravel at a low level, and the latter through more finely-perforated pipes surrounded by sand at a higher level. B. M. V.

**Emulsifiers.** J. D. DEAN (B.P. 437,752, 7.5.34).—An emulsifier of the pump-with-restricted-outlet type rests upon a receiver for the emulsion, and the reservoir for the feed mixture (embodied in the apparatus) is provided with stirring devices operated by the pump piston. B. M. V.

**[Radiant] heating of fluids, particularly hydrocarbon oils.** UNIVERSAL OIL PRODUCTS CO., Assees. of J. G. ALTHER (B.P. 437,543, 16.7.34. U.S., 10.8.33).—Tubes are arranged in two staggered rows so that each side of each tube receives radiant heat nearly equally. The tubes of each row are in series and the rows in parallel; additional units, each having its own burner, may be connected in series or in parallel. B. M. V.

**Apparatus for gas scrubbing or the like.** D. W. BOWERS (B.P. 437,811, 1.5.34. U.S., 13.3.34).—The liquid is spread in a film over a bladed impeller and leaves the ends of the blades in the form of large drops spreading across the gas flow, which is between the impeller and a surrounding wall. B. M. V.

**Apparatus for separation of dust from gases.** SULZER FRÈRES SOC. ANON. (B.P. 437,508, 30.5.35. Switz., 2.6.34).—In a separator comprising spiral passages surrounding the runner of a centrifugal fan, the inlets to the passages where the heavy, dusty air is skimmed off are both in the vertical plane passing through the axis of the fan, and the ducts are so shaped that the dust never has to flow upwards. B. M. V.

**Quantitative gas analysis.** E. W. GILLILAND and S. D. PRICE, Assrs. to MINE SAFETY APPLIANCES CO. (U.S.P. 1,992,747, 26.2.35. Appl., 14.9.31).—Continuous catalytic determination of CO or other combustible constituent is effected by two bodies of material, one being a catalyst and the other not, but both having the same physical properties and being thermally insulated from one another; the catalyst surrounds the hot and the non-catalyst the cold junction of a thermocouple. B. M. V.

**Device for testing the specific gravity of gases.** C. GRAY (B.P. 437,979, 17.7.34).—Gas is allowed to flow out of a H<sub>2</sub>O-sealed gasholder through a very small hole, the rate of descent of the holder being a measure of *d*. B. M. V.

**Device for controlling the specific gravity of a gas mixture.** W. A. DARRAH (U.S.P. 1,994,755, 19.3.35. Appl., 15.3.28).—A sample of the mixed gas is caused to flow at const. temp. and pressure around a float which is coupled to a displacement float in a liquid; the pressure variation due to displacement of

liquid by the latter causes regulation of the proportions of the constituents of the mixture. B. M. V.

**Porous filling masses for reservoirs for containing gases.** W. GELDBACH (W. GELDBACH, FABR. F. BERGWERKSBEDARF), Assec. of C. THIMM (B.P. 437,448, 30.4.34. Ger., 29.4.33).—Hair, with or without asbestos, peat, plant fibre, or other fibrous material, is pre-felted and fed into the container a little at a time; felting is then finished *in situ* and, if desired, a solvent added. B. M. V.

**Refrigeration. [Conditioning of air.]** F. R. BICHOWSKY, Assr. to GEN. MOTORS CORP. (U.S.P. 1,992,177, 26.2.35. Appl., 31.8.31).—H<sub>2</sub>O is removed from air by Li halide solution in several stages of concn., the most dil. solution being removed from one end, evaporated and cooled without production of solid salt, and returned to the other end. The dry air is adjusted to the comfort zone by H<sub>2</sub>O sprays. B. M. V.

**Turbidity control.** A. L. HOLVEN and T. R. GILLET (U.S.P. 1,994,768, 19.3.35. Appl., 19.1.32).—A photoelectric device is operated by the light reflected 90° from a main beam by suspended particles. B. M. V.

**Spanner devices, particularly for centrifugal machines.** J. STONE & Co., LTD., and A. W. EMPSON (B.P. 437,030, 23.4.34).

**Burning materials.**—See IX. Gas generator. Electrostatic precipitator. Pptg. particles from gases.—See XI. Treating liquids.—See XXIII.

## II.—FUEL; GAS; TAR; MINERAL OILS.

**Drying of washed coal.** ANON. (Inst. Min. Eng., 1935, Memo. No. 18, 6 pp.).—The disadvantages of wet coal are discussed and a description is given of the removal of moisture by drainage, de-watering screens, or centrifuges, and of the use of thermal dryers.

E. L. S.

**Flotation of coal sludge and coal dust.** J. N. FOMIN (Koks i Chim., 1934, No. 2, 56–59).—Coal tar, wood tar, solutions of tar in creosote, 25% solutions of Na and K xanthates, and especially kerosene and crude oil are recommended as flotation agents (1 kg. per ton of treated sludge). Addition of CaO to settling tanks is advantageous. The yield of refined sludge was 90% (> 8% of ash). The removed material contained < 75% of ash. CH. ABS. (e)

**Determination of moisture in coals and cokes.** M. M. KEFELI and E. R. BERLINER (Koks i Chim., 1934, 4, No. 3, 66–67).—10–15 g. of coal or coke ground to 1–3 mm. are weighed into a U-tube suspended in an oven at 105°, and dried in a stream of dry, preheated air. CH. ABS. (e)

**Determination of moisture in wood fuel.** B. GROTH (Tek. Tid. Uppl., C, Kemi, 1935, 65, 5–7, 9–15, 21–23).—Reliable results were obtained by drying at 105° for 2–3 hr. with air circulation. CH. ABS. (e)

**Determination of nitrogen in coal by the Kjeldahl method, using selenium as catalyst.** H. E. CROSSLEY (J.S.C.I., 1935, 54, 367–369 T).—Further investigation of the application of Se to Kjeldahl N determinations showed that the rate of heating during combustion was very important, max. N figures being obtained with the

min. rate to give the min. "clearing" time. With this optimum rate the presence of even 5% of  $H_2SO_4$  had no effect on the necessary digestion time; less rapid heating led to a greatly increased "clearing" time (increased still further by addition of  $H_2O$ ) and low N figures. The temp. of the solution varied only from  $332^\circ$  to  $310^\circ$  with different rates of heating. The boiling period after "clearing" can be shortened from 2 hr. to 1 hr., without affecting the N figure, by increasing the amount of  $K_2SO_4$  from 9 to 20 g. No cause was found to justify the withdrawal of the original recommendation of Se (B., 1932, 823).

**Simultaneous determination of ash and sulphur in coals.** M. M. KEFELI and E. R. BERLINER (Koks i Chim., 1934, 4, No. 7, 62—65; cf. B., 1934, 659).—A 0.25-g. sample is burned in a porcelain boat, the products being absorbed in 3%  $H_2O_2$  and titrated with 0.02N- $Na_2CO_3$  (Me-orange) to determine S. The ash is weighed. CH. ABS. (e)

**Total dissolution in benzene of the fundamental material of coal.** A. GILLET and A. PIRLOT (Bull. Soc. chim. Belg., 1935, 44, 504—512).—Coal is partly dissolved by treatment at  $330^\circ$  with anthracene oil containing 60—75% of olein (I). The ppt. obtained by addition of light petroleum consists of 60% of (I) and 40% of coal material, and when this is treated with  $C_6H_6$  a stable solution containing 70% of the original coal is obtained. After washing for 10 hr., the ppt. loses fatty acid and becomes insol. in  $C_6H_6$ . The results suggest that the coal is rendered sol. by chemical combination with (I). Prolonged treatment results in a diminution in solubility, which is attributed to polymerisation. R. S.

**Technology of peat utilisation.** H. SEGEBERG (Chem.-Ztg., 1935, 59, 961—963).—The composition and  $H_2O$  status of peat are described, and processes of drying, distilling, and coking are discussed. A. G. P.

**Practical solution to Salt Lake Valley smoke nuisance.** S. C. JACOBSEN and G. W. CARTER (Ind. Eng. Chem., 1935, 27, 1278—1283).—An experimental low-temp. carbonisation retort consisted of a steel cylinder 5 in. in diam. and 8 feet long. Dust-free lump coal was treated therein with superheated steam at  $538$ — $740^\circ$ , the steam passing downwards. When the vapours leaving the retort reached  $400^\circ$  the superheated steam was replaced by saturated steam. The products obtained were a dense coke without expansion cracks and still containing 14—17% of volatile matter, 1500—4000 cu. ft. of gas (of about 1000 B.Th.U. per cu. ft.) per ton, and about 250 lb. of crude oil per ton. This oil after cracking gave a yield of about 6 gals. (per ton) each of petrol, kerosene, and fuel oil. The coal tested was Utah coal containing about 40% of volatiles, and it is contended that its replacement for domestic use in that area by low-temp. coke prepared in this way will solve the local smoke problem. C. I.

**Reduction of iron oxides in the formation of ferro-coke.** A. S. BRUK and K. E. ISTOMINA (Koks i Chim., 1934, 4, No. 11, 66—69).—77% of the Fe oxides in blast-furnace dust is reduced to Fe in the coking process.  $H_2O$ -quenching has no marked influence on the Fe content in ferro-coke. CH. ABS. (e)

**Liberation of gas during coking.** N. A. BAKUN (Koks i Chim., 1934, 4, Nos. 5—6, 112—117).—The decomp. of volatile matter at high temp. forms graphite, which is deposited and acts as a binder. To avoid this, the distillation products must be directed artificially towards the cold side of the retort. If this is done the tar formed has a lower  $d$  and contains more phenols and paraffin hydrocarbons. Laboratory tests are described. CH. ABS. (e)

**Gas micro-analysis for following the course of oxidation of hydrocarbons.** E. A. ANDREEV and M. B. NEIMAN (J. Appl. Chem. Russ., 1935, 8, 1100—1106).—Apparatus serving for the determination of  $O_2$ ,  $CO_2$ ,  $CO$ ,  $C_2H_4$ , and  $C_2H_2$  in 0.3—0.4 ml. of gas is described, in which  $H_2O$  is absorbed by  $CaCl_2$  or  $P_2O_5$ ,  $CO_2$  by  $KOH$ ,  $CO$  by active  $Ag_2O$ ,  $O_2$  by yellow P,  $C_2H_4$  by  $H_2SO_4$ , and  $C_2H_2$  by  $CuCl$ -aq.  $NaOH$  paste. The error is  $\gt 0.4\%$ . R. T.

**Viscosity of road tars.** J. G. MITCHELL and A. R. LEE (J.S.C.I., 1935, 54, 407—411 T).—The relation between  $\eta$  and temp. for road tars and pitches conforms to  $\eta T^n = a$  ( $\eta$  = viscosity,  $T$  = temp.  $^\circ F.$ , and  $n$  and  $a$  are const.).  $n$  has been termed the logarithmic temp. coeff. and is defined as  $(\log \eta_1 - \log \eta_2)/(\log T_2 - \log T_1)$ ; for tars of various  $\eta$  obtained from the same source  $\eta \propto \log a$  at  $25^\circ C.$  The  $n$ - $\log \eta$  line can be employed to compare the log temp. coeffs. of tars of different  $\eta$ . In some low-aromatic tars the relation between  $\log \eta$  and  $\log T$  ( $^\circ F.$ ) is given by two straight lines meeting at a slight inclination at  $30$ — $32^\circ C.$  An approx. linear relationship up to  $10^5$  poises has been found between loss of oil by distillation and  $\log \eta$ . Distillation in vac. did not affect the total amount of  $C_1$  or the ratio  $(C_1 + C_2)/C_1$ . A similar relation found for the effect of adding oil to pitch forms the basis for determining the amounts of oil required to produce specified  $\eta$ .

**Capillary resolution of tars.** A. LÉAUTÉ (Compt. rend., 1935, 201, 556—557).—Certain tars and bitumens separate into layers during their ascent in a capillary. The phenomenon is probably related to their stability and road-making potentialities. T. G. P.

(i) **Pressure hydrogenation of tar and oil products.** (ii) **High-pressure hydrogenation of naphthalene.** J. VARGA (Math. nat. Anz. ung. Akad. Wiss., 1934, 50, 386—406, 408—426; Chem. Zentr., 1935, i, 1642).—(i) Results are given for the catalytic hydrogenation, with a  $MoO_3$  catalyst, of various crude and intermediate products of the Hungarian coal and oil industries.

(ii)  $FeI_3$  is a much better catalyst in the hydrogenation of  $C_{10}H_8$  than are chlorides of Al, Fe, or the alkaline-earth metals, and resists the action of  $H_2S$  at  $475^\circ$ . Reduced activity is observed at higher temp., when conversion into  $Fe_2S_3$  occurs.  $MoO_3$  was 3 times as effective a catalyst at  $520^\circ$  as was  $WS_3$ . The product in each case was sol. in conc.  $H_2SO_4$  and contained very little decahydronaphthalene. H. J. E.

**Propane and butane as industrial fuels.** E. A. JAMISON and W. H. BATEMAN (Iron Steel Eng., 1935, 12, 209—214).—Properties are tabulated. Advantages over fuel oil are discussed. CH. ABS. (e)

**Benzine synthesis from water-gas as a source of Germany's supply of motor fuel.** F. FISCHER (Oel u. Kohle, 1935, 11, 782—785; cf. B., 1935, 179).—The process and the types of products obtained are briefly described. A. B. M.

**Production of mixed gas for benzine synthesis by simultaneous interaction of coke-oven gas and coke with steam in a gas producer.** III. F. FISCHER, H. PICHLER, and H. KÖLBEL (Brennstoff-Chem., 1935, 16, 401—404; cf. B., 1935, 1079).—Full-scale trials with a gas producer of 100-cu. m./hr. output show that it is possible by passing coke-oven gas and steam simultaneously through the incandescent coke to produce a "mixed gas" containing CO and H<sub>2</sub> in the ratio 1:2. With an air blow to gasifying time ratio of 1:4 the gas produced contained also 0.6% of CO<sub>2</sub> and 0.4% of CH<sub>4</sub>, whilst the corresponding figures for a ratio of 1:6 were 0.9% of CO<sub>2</sub> and 1.1% of CH<sub>4</sub>. No difficulties due to deposition of C were observed. A. B. M.

**Thermal conversion of heavy oil from the benzene synthesis into unsaturated and aromatic hydrocarbons.** H. PICHLER (Brennstoff-Chem., 1935, 16, 404—406; cf. B., 1933, 135).—The oil (initial b.p. 240°; 70% over at 320°) was passed at atm. pressure through an inclined tube, 8 or 17 mm. internal diam., heated electrically. No diluent gas was used. At reaction temp. of 550—700°, 50—75% of the oil was converted into gaseous olefines and low-boiling unsaturated and aromatic hydrocarbons, the remainder of the product consisting of saturated gaseous hydrocarbons, unchanged oil, and aromatic tar; by suitably controlling the reaction time no appreciable C deposition occurred. The yield of gaseous olefines rose from 20% at 550° and 0.4 sec. to 62% at 700° and 0.14 sec. reaction time. A. B. M.

**Composition of gasoline from shale tar.** G. L. STADNIKOV (Chim. Tverd. Topl., 1934, 5, 379—380).—Tschelincev and Sivertzev's determinations of unsaturated compounds in the gasoline fractions of shale tars (cf. *ibid.*, 1933, 4, 573) are vitiated by the presence of O compounds. CH. ABS. (e)

**Wide-range boiling-point conversion chart for hydrocarbons and petroleum products.** E. S. L. BEALE and P. DOCKSEY (J. Inst. Petroleum Tech., 1935, 21, 860—870).—From published data on hydrocarbons and from results obtained using a special b.-p. apparatus by which the pressure at various temp. of narrow cuts of high mol. wt. from Iranian crude were determined, a chart was constructed for converting observed b.p. at reduced pressures to b.p. at 760 mm. From this chart a nomogram was constructed. The chart is reasonably accurate over a boiling range of about 60°, but is not applicable to residues and distillates of wider boiling range. C. C.

**Coking of petroleum residues.** D. G. JONES (J. Inst. Petroleum Tech., 1935, 21, 895—906).—Laboratory and larger-scale tests were carried out on the coking of Kellogg residue from Comodoro Rivadavia crude. The Atlantic, Knowles, and other processes for coking are described. A new experimental plant in which the prod-

ucts of coking are continuously removed without interrupting the coking process is discussed in detail. C. C.

**Cyclic constituents of petroleum ceresin.** J. MÜLLER and S. [VON] PILAT (J. Inst. Petroleum Tech., 1935, 21, 887—894).—Paraffins pptd. from asphalt by solvent-extraction processes and purified by crystallisation from C<sub>5</sub>H<sub>5</sub>N, benzol, and Et<sub>2</sub>O were divided into 4 fractions by crystallisation from C<sub>6</sub>H<sub>6</sub>. The H content decreased from fraction to fraction with decrease in m.p., but *n*, *d*, and  $\eta$  increased simultaneously. This suggests a more marked cyclic constitution of the compounds from fraction to fraction. Further support for such a theory is afforded by the fact that an increase in slope of the  $\eta$ -temp. curve occurs with decreasing H content. It is concluded that the solid hydrocarbons pptd. from petroleum asphalt are partly of cyclic composition. Similar methods applied to Boryslaw ozokerite revealed no cyclic constituents, although ceresin obtained from Boryslaw crude by fractionation with CH<sub>4</sub> at low temp. was shown to consist of a mixture of paraffinic and cyclic hydrocarbons, probably consisting mainly of polymethylene rings. C. C.

**Naphthenes in fuel oils vary pour-point tests.** B. H. MOERBEEK and A. C. VAN BEEST (Oil and Gas J., 1935, 33, No. 42, 33—34).—The pour point depends on the temp. to which the sample has been subjected. A small amount of asphaltenes added to an oil which is insensitive to the temp. of pretreatment renders it sensitive. A modified cold test in place of the A.S.T.M. test is described. CH. ABS. (e)

**Berginisation of crude naphthalene by means of coke-oven gas.** E. I. PROKOPETZ and A. V. PAVLENKO (Koks i Chim., 1934, 4, No. 7, 58—61).—C<sub>10</sub>H<sub>8</sub> is converted completely into tetralin by treatment with coke-oven gas (58% of H<sub>2</sub>) in presence of MoS<sub>3</sub>. The optimum temp. and pressure were 420°/250—260 atm. CH. ABS. (e)

**Hydrogenation of mineral oils.** R. FUSSTEIG (Oesterr. Chem.-Ztg., 1935, 38, 170—174).—By heating an oil (b.p. 154—293°, olefine content 63%) with H<sub>2</sub> under pressure (initial 100 atm., max. 280 atm.) at 250° for 45 min. in presence of various catalysts, e.g., Fe<sub>2</sub>O<sub>3</sub>-Ni, Ni<sub>2</sub>O<sub>3</sub>-MnO, MnS-Co<sub>2</sub>O<sub>3</sub>-MoO<sub>3</sub>, mixed with a silicate earth, the olefines were completely hydrogenated; the aromatic content of the oil (7%) remained unchanged. The same catalysts when not mixed with the silicate earth were less effective (olefine content of product 10—14%). In experiments on the hydrogenation-cracking (450°, 250 atm. of H<sub>2</sub>) of a saturated hydrocarbon oil the yield of benzene (boiling to 200°) ranged from 30.5% with Ni-Co to 61.2% with MnS-Mo (+ silicate earth). The yield of benzene fell with increasing mol. wt. of the initial oil. A 2-stage (liquid- and vapour-phase, respectively) process for the hydrogenation-cracking of heavy oils and a process for the production of lubricating oil from low-grade heavy oils are suggested. A. B. M.

**[Production of] transformer oils from Russian heavy-oil distillates by the Edeleanu process.** N. CALANTAR (Erdöl u. Teer, 1934, 10, 447—450; Chem. Zentr., 1935, i, 1646).—Treatment of the distillates with SO<sub>2</sub> is described. H. J. E.

**Preparing synthetic oils from the kerosene fractions of low-temperature carbonisation tars.** N. I. TSCHERNOSHUKOV and N. E. BARMAKOV (Chim. Tverd. Topl., 1934, 5, 641—651).—The lubricating-oil yield from Barzas and Zorin kerosenes increased when high-boiling kerosenes were used. Stable lubricating oils could not be prepared from humic kerosenes.

CH. ABS. (e)

**Toronto method of reclaiming oil.** W. R. McRAE (Elec. Traction and Bus J., 1935, 31, 9).—The oil is treated with activated clay and heated to 345°. From 190° to 345° the oil is intermittently jetted with steam, then cooled quickly to 205°, and filtered. The cost of reclaiming is  $\frac{1}{3}$  that of new oil.

CH. ABS. (e)

**Synthetic lubricating oils.** A. D. PETROV (Chim. Tverd. Topl., 1934, 5, 632—641; cf. B., 1934, 229).—Polymerisation by  $AlCl_3$  differs from that by the electric discharge in that the latter occurs with paraffins, naphthenes, and aromatic compounds, as well as with olefines.

CH. ABS. (e)

**Lubrication and corrosion.** P. F. THOMPSON (J. Proc. Austral. Chem. Inst., 1935, 2, 50—54).—Addition of lanoline to a mineral lubricating oil lowers its surface tension, and increases its effectiveness in preventing the corrosion by  $H_2O$  of metal parts of refrigerating machines.

CH. ABS. (e)

**Viscosity and stability of drilling fluid.** C. W. WOOLGAR (J. Inst. Petroleum Tech., 1935, 21, 825—837).—The  $\eta$  of drilling mud and its relation to  $d$  and shear point have been studied, using the Stormer viscosimeter. Details for calibrating this instrument are given. For viscous muds, shear-point vals. are of more importance than is  $\eta$ . A mud should possess an appreciable yield point. The latter was measured by the intercept of the shearing rate-applied force curve on the stress axis.  $\eta$  vals. at 600 r.p.m. follow the yield-point curve closely so that this arbitrary  $\eta$  gives some indication of the suitability of a mud.  $d$  at the bottom portion of a settled mud was independent of the length and diam. of the column, so that the stability of a mud is less important than has been hitherto supposed.

C. C.

**Refractory materials.**—See VIII. **Peat ash for cement.** **Bituminised cement.** **Tar-stone mixtures.** **Road binders.** **Bitumen for roads.** **Wood preservatives.** **Creosote-treated wood.** **Treated sleepers.**—See IX. **Black paint from peat.**—See XIII. **Survey of River Tees.**—See XXIII.

## PATENTS.

**Production of colloidal fuel.** E. BLUENNER (B.P. 436,380, 10.4.34).—A suspension of coal in oil is heated to cracking temp. by bringing it in a thin layer in contact with a heated surface, and is simultaneously subjected to the action of centrifugal force at a speed sufficient to separate gases and vapours from the suspension but insufficient to separate the coal from the oil. The suspension is preferably subjected to continuous trituration while being heated.

A. B. M.

**Coke ovens.** DR. C. OTTO & Co., G.M.B.H. (B.P. 435,842, 23.3.35. Ger., 2.10.34).—The oven is con-

structed of clay-bound chamotte bricks containing  $\frac{1}{2}$  10% of binding clay. Difficulties due to expansion during heating up are avoided. The bricks preferably contain equal parts of only coarse- and fine-grained chamotte.

A. B. M.

**Process and oven for low-temperature carbonisation in retorts.** "INTERTRUST" COMP. GEN. DE DISTILLATION ET COKÉFACTION À BASSE TEMP. ET MINÈRE, SOC. ANON., ASSEES. OF INTERNAT. HOLDING DE DISTILLATION ET COKÉFACTION À BASSE TEMP. ET MINÈRE (HOLCOBAMI) SOC. ANON. (B.P. 436,373, 4.4.34. Fr., 4.4.33).—Coal etc. is carbonised in vertical, tapered retorts so designed that the hot gases leaving the combustion chamber (C) surrounding the retorts pass through a heat exchanger (E) to an external circuit including a fan, from which part of the gases are returned *via* E to mix with the combustion gases leaving the burners at the inlet to C, the mixed gases then being distributed uniformly throughout the cross-section of C.

A. B. M.

**Carboniser.** R. J. HILLSTROM (U.S.P. 1,983,801, 11.12.34. Appl., 1.12.28).—A vertical shell (A) contains a carbonising chamber (B) having a no. of alternately expanded and contracted portions.  $\Lambda$ -shaped hoods fixed within the expanded portions cause the coal to take a zig-zag path as it descends under gravity through B. The space between A and B forms a combustion chamber containing burners which are placed adjacent to the contracted portions of B. The lower portion of B is water-jacketed. Coal is fed into the top of B from a hopper while coke is withdrawn at a controlled rate through a discharge valve at the bottom.

A. B. M.

**Carbonisation of carbonaceous materials.** W. W. ODELL (U.S.P. 1,983,943, 11.12.34. Appl., 17.12.29).—Carbonisation is effected in a vertical chamber in which a relatively deep column of the granular material (coal, shale, etc.) is maintained in a state of motion analogous to that of a boiling liquid by passing up therethrough a rapid current of air, admixed, if desired, with steam and/or combustible gas. The carbonised residue may be withdrawn continuously, or, *e.g.*, when treating a coking coal, the combustion process may be discontinued and the residue withdrawn intermittently.

A. B. M.

**Manufacture of carbon black.** E. B. SPEAR and R. L. MOORE, ASSTS. TO THERMATIC CARBON CO. (U.S.P. 1,987,643—4, 15.1.35. [A] Appl., 16.8.28. Renewed 7.1.33. [B] Appl., 4.2.33. Can., 18.8.28).—(A) A hydrocarbon gas is mixed with  $\frac{1}{2}$  twice its vol. of a diluent gas and the mixture is passed through a chamber packed with chequerwork preheated to 1200—1400°, the C particles formed being separated from the gaseous decomp. products. C deposited on the chequerwork is periodically burned off. (B) C black having the following characteristics is manufactured: (1) bulk  $d$  (uncompressed) 12—25 lb./cu. ft., (2) oil absorption no. (Gardner method) 35—50 c.c. of linseed oil per 100 g. of C, and (3) imparts an ultimate tensile strength of 5000 and a modulus of the order of 2000 at 500% elongation to rubber when incorporated therewith according to the formula: smoked sheet rubber 100, C 40, ZnO 5, S 3.5, and diphenylguanidine 1.25 pts.

A. B. M.

**Gas producer.** A. C. WOLFE, Assr. to COOPER-BESSEMER CORP. (U.S.P. 1,983,687, 11.12.34. Appl., 25.5.32).—The side wall and the ash-receiving pan can be rotated in unison, and an independently-mounted ash-ejecting member is caused to rotate relatively to the side wall and pan (and therefore relatively to the fuel bed) by being attached to a motion-retarding device. A. B. M.

**Generating a mixed gas from solid and liquid fuels.** R. FALCONER and E. COLLIGNON (B.P. 435,976, 25.3.35).—Oil is fed into the hot fuel bed of a producer through a vertical pipe, open at the lower end, which projects down into the fuel bed to a level just above the reduction zone. A. B. M.

**Manufacture of carburetted water-gas.** SEMET-SOLVAY ENG. CORP., Assees. of R. P. OLIVEROS (B.P. 435,727, 28.12.34. U.S., 5.1.34).—The plant is so operated that oil is introduced on to the fuel bed during the steam back-run, which, however, is subdivided into two stages, during the first of which a reduced amount of steam and the major portion (or all) of the oil are introduced, whilst during the second an increased amount of steam is introduced and little or no oil. A. B. M.

**Manufacture of non-poisonous fuel gas.** NON-POISONOUS GAS HOLDING CO., LTD. (B.P. 435,838, 28.12.34. Ger., 28.12.33).—The gas, admixed with H<sub>2</sub>O vapour, is passed over a catalyst to remove CO and is then treated with adsorbent material, *e.g.*, active C, to remove C<sub>6</sub>H<sub>6</sub>, H<sub>2</sub>S, etc. The treatment may be followed by a CH<sub>4</sub> synthesis if desired. A. B. M.

**Manufacture of oil gas.** C. O. RASMUSSEN (B.P. 436,542, 13.4.34).—An oil-gas retort and a superheater for the oil gas generated therein are disposed, in positions at which the temp. are suitable, in the recuperator system of a horizontal retort setting or other coal-carbonisation plant. A. B. M.

**Purification of gases containing hydrogen sulphide from hydrogen sulphide.** G. H. HULTMAN and C. W. PILO (B.P. 436,218, 3.4.34. Swed., 7.4.33).—The gas is washed with aq. Na<sub>2</sub>CO<sub>3</sub>, whereby the H<sub>2</sub>S is absorbed (Na<sub>2</sub>CO<sub>3</sub> + H<sub>2</sub>S = NaHS + NaHCO<sub>3</sub>). The solution is then treated with CO<sub>2</sub> until the bulk of the Na<sub>2</sub>CO<sub>3</sub> has been converted into NaHCO<sub>3</sub>. By subjecting the solution to vac., at slightly raised temp. if necessary, the H<sub>2</sub>S is removed without any substantial evolution of CO<sub>2</sub>, and can be converted into S in a Claus kiln, or otherwise utilised. The solution is subsequently heated to remove the CO<sub>2</sub> (which is re-used as above) and to regenerate the aq. Na<sub>2</sub>CO<sub>3</sub> used for the initial washing. A. B. M.

**Absorption process for gases. [Ethylation of sulphuric acid.]** K. E. STUART, Assr. to HOOKER ELECTROCHEM. CO. (U.S.P. 1,993,421, 5.3.35. Appl., 18.4.32).—In (*e.g.*) the ethylation of H<sub>2</sub>SO<sub>4</sub> to about 1.25 mols. of C<sub>2</sub>H<sub>4</sub> per mol. of SO<sub>3</sub> by gases containing originally 30% of C<sub>2</sub>H<sub>4</sub> and 70% of inert material, 3 towers are used, not in exact countercurrent cycle, but the feed gas is passed in parallel through 2 towers containing acid of which the degree of ethylation increases (per mol. of SO<sub>3</sub>), respectively, 0–0.4 mol. and 0.9–1.3 mols., and the exit gases from both towers

are mixed and passed through acid the ethylation of which rises 0.4–0.9 mol. in the third tower. On reaching the upper limits the towers are changed round, new acid being substituted for the fully ethylated acid. B. M. V.

**Phenol recovery [from gas liquor].** C. L. BURDICK, Assr. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,986,320, 1.1.35. Appl., 11.12.31).—PhOH is extracted from gas liquor by means of a H<sub>2</sub>O-immiscible alcohol, in particular with a mixture of synthetic alcohols (approx. b.p. 130–210°) obtained by catalytic hydrogenation of CO under pressure (cf. U.S.P. 1,820,417; B., 1932, 505). The solution is then treated with aq. NaOH and the NaOPh subsequently converted into PhOH. A. B. M.

**Manufacture of bituminous emulsion.** J. C. ROEDIGER, Assr. to PATENT & LICENSING CORP. (U.S.P. 1,988,336, 15.1.35. Appl., 4.8.32).—Bitumen is dispersed in H<sub>2</sub>O, using as emulsifying agent 3–8% of "B"-resin soap containing 10–20% of unsaponifiables, the emulsion containing 0.1–0.5% excess of free alkali. The emulsion is stable to alternate freezing and thawing. A. B. M.

**Treatment of [bituminous] dispersions.** H. LIMBURG, Assr. to PATENT & LICENSING CORP. (U.S.P. 1,984,023–4, 11.12.34. Appl., [A] 20.2.29, [B] 23.7.30).—(A) A small proportion of an alkali salt of an amphoteric element, *e.g.*, Na aluminate, zincate, or plumbate, is added to an aq. bituminous emulsion. The salt decomposes on atm. exposure of the emulsion, yielding a product, *e.g.*, Al(OH)<sub>3</sub>, which accelerates coagulation. (B) The emulsion is treated with a small proportion of a volatile alkali reagent and a potential coagulant, *e.g.*, an NH<sub>3</sub> solution of Cu(OH)<sub>2</sub>, NH<sub>4</sub> naphthenate, etc., so that on atm. exposure of a film of the emulsion the alkali evaporates and then the whole coagulates. A. B. M.

**Bituminous saturant [for waterproofing fabric].** R. R. THURSTON, Assr. to TEXAS CO. (U.S.P. 1,987,085, 8.1.35. Appl., 9.2.33).—A base comprising 50–90% of steam-reduced cracked residuum and 50–10% of air-blown asphaltic mixing stock is cut back with 2–10% of relatively light asphaltic residuum. A. B. M.

**Purification of tar acids.** BARRETT Co., Assees. of C. E. HARTWIG (B.P. 436,320, 11.7.34. U.S., 19.7.33).—The crude tar acids, either in alkaline aq. solution or acidified with a mineral acid, are treated with a small amount of a metal, *e.g.*, powdered Zn, which evolves H<sub>2</sub> on contact with aq. acids or alkalis. The tar acids subsequently recovered are free from offensive odour and are stable on storage. A. B. M.

**Manufacture of refined hydrocarbons and hydrocarbon mixtures.** H. D. ELKINGTON. From N. V. DE BATAAFSCHE PETROLEUM MAATS. (B.P. 437,864, 22.2.35).—Vapours of light hydrocarbons, rich in unsaturateds and aromatics, *e.g.*, cracked benzene, crude motor benzol, mixed with steam, are brought into continuous contact, in absence of H<sub>2</sub>SO<sub>4</sub>, with a sulphonic acid (I) (of a simple hydrocarbon < C<sub>10</sub>, halogenated if desired) dissolved or suspended in an inert org. medium [the latter containing > 10% (< 5%)

of (I)] at a temp. sufficiently high to prevent any intensive hydration of (I). C. C.

**Hydrocarbon compositions.** STANDARD OIL DEVELOPMENT Co. (B.P. 437,934, 10.5.34. U.S., 6.6.33).—Cracked hydrocarbons, b.p. 49° (21° to 40°) containing isobutylene obtained by cracking, destructive distillation, or hydrogenation, are polymerised by an active halide at < 38° (< 27°) to highly viscous plastic solids, mol. wt. > 800 (> 2000, 4000—10,000). 0.5—5 wt.-% of this product is added, e.g., to lubricating oil. C. C.

**Dewaxing a wax-bearing oil to produce a lubricating oil of low pour point.** A. H. STEVENS. From TEXACO DEVELOPMENT CORP. (B.P. 437,779, 15.2.35).—Aromatic hydrocarbons, e.g., C<sub>6</sub>H<sub>6</sub>, PhMe, C<sub>10</sub>H<sub>8</sub>, anthracene, phenanthrene, or fluorene, are condensed in presence of a Friedel-Crafts catalyst (AlCl<sub>3</sub>), and the oily product is separated and vac.-distilled. The residue, b.p. > 300°/10 mm., when added to wax-bearing oil prior to chilling modifies the crystals so that separation of the wax by centrifuging or settling is facilitated. A solvent and filter-aid may be added. C. C.

**Apparatus for heat-treatment of wax and wax mixtures.** BURMAH OIL Co., LTD. From H. L. ALLEN (B.P. 437,053, 15.6.34).—A vessel, in addition to a jacket, contains a no. of (horizontal) pipes of small diam. provided with fins, gills, or the like, and may be used for the crystallising and washing of wax from oil. B. M. V.

**Fuel for pyrophoric lighters.** A. DUNHILL, LTD., and V. DUNHILL (B.P. 437,065, 13.9.34).—To petrol is added 0.25—2.0 oz. of paraffin wax per gal. B. M. V.

**Handling [asphaltic] materials. Carrying out mol. associations. Radiant heating of oils. Gas analysis.**—See I. Purifying C<sub>3</sub>H<sub>8</sub>.—See III. NH<sub>4</sub> salts from gas liquor.—See VII. Bituminous materials.—See IX. Gas generator.—See XI.

### III.—ORGANIC INTERMEDIATES.

**Recovery of the vapour-gas mixture evolved in the production of benzyl chloride.** E. V. ALEXEEVSKI and S. F. KRASAVIN (J. Chem. Ind. Russ., 1935, 12, 838—840).—Mixtures of HCl 84.5, Cl<sub>2</sub> 10.9, and PhMe 4.6% undergo adsorption on birch-C to form a mixture of isomerides of C<sub>6</sub>H<sub>4</sub>MeCl (I), C<sub>6</sub>H<sub>3</sub>MeCl<sub>2</sub> (II), and C<sub>6</sub>H<sub>4</sub>Cl·CO<sub>2</sub>H, on SiO<sub>2</sub> gel to yield only (I) and (II), and on Al(OH)<sub>3</sub> to form chiefly C<sub>6</sub>H<sub>2</sub>MeCl<sub>3</sub>. Analogous results are obtained with air-Cl<sub>2</sub>-PhMe mixtures. R. T.

**Preparation of aniline hydrochloride.** B. P. FEDOROV (Trans. Inst. Chem. Tech. Ivanovo, 1935, 162—165).—98.8—99.6% NH<sub>2</sub>Ph·HCl is obtained in theoretical yield by atomising NH<sub>2</sub>Ph in a chamber through which HCl is being passed. The process presents numerous advantages over other existing ones. R. T.

**Composition of nitrating acid for production of mono- and di-nitrotoluene.** I. E. MOISAK (Trans. Butlerov Inst. Chem. Tech. Kazan, 1934, No. 2, 73—80).—By lowering the [HNO<sub>3</sub>] in mixed acids the spent acids can be utilised more fully without the addition of fresh H<sub>2</sub>SO<sub>4</sub>. CH. ABS. (r)

**Hydrogenation of C<sub>10</sub>H<sub>8</sub>, C<sub>3</sub>H<sub>8</sub> and C<sub>4</sub>H<sub>10</sub> as fuels. Berginisation of crude C<sub>10</sub>H<sub>8</sub>.**—See II. Prep. of CH<sub>3</sub> and thymol iodide. Pr<sup>β</sup>NO<sub>2</sub>.—See XX. Determining (CH<sub>2</sub>)<sub>2</sub>O.—See XXIII.

See also A., Dec., 1462, **Electro-reduction of PhCHO.** 1526, **Prep. of org. peroxides and peroxidogens.** 1541, **Butyl and acetone fermentations.**

### PATENTS

**Purification of propane.** K. KINGMAN, Assr. to UNION OIL Co. OF CALIFORNIA (U.S.P. 1,988,740, 22.1.35. Appl., 21.8.33).—Normally gaseous hydrocarbons, with or without prior distillation at < 40°/ > 1 atm., are freed from H<sub>2</sub>O by liquefying, mixing with a dehydrating agent (I), e.g., H<sub>2</sub>SO<sub>4</sub>, CaCl<sub>2</sub>, soda-lime, and separating from (I) by, e.g., distillation. A. W. B.

**Preparation of alkylenes.** H. T. BÖHME A.-G. (B.P. 436,345, 15.1.35. Ger., 17.3.34).—*sec.*-Amines, containing at least one aliphatic chain of > C<sub>3</sub>, e.g., C<sub>17</sub>H<sub>35</sub>·NHPh, C<sub>11</sub>H<sub>23</sub>·NHPh, NHPh·CH(C<sub>17</sub>H<sub>35</sub>)<sub>2</sub>, are heated, e.g., at 300°, with acidic compounds, e.g., HCl, H<sub>3</sub>PO<sub>4</sub>, ZnCl<sub>2</sub>, NiCl<sub>2</sub>. A. W. B.

**Treatment of unsaturated [aliphatic] polyhalides.** N. V. DE BATAAFSCHE PETROLEUM MAATS., Asses. of H. P. A. GROLL and G. HEARNE (B.P. 436,357, 15.4.35. U.S., 28.4.34).—The polyhalide is treated in H<sub>2</sub>O with a hypohalogenous acid or ester or an aq. halogen. Compounds containing the group ·C(Hal):C(Hal)· or >C:C(Hal)· add halogen, whilst those containing the groups ·CH:CH·C·C<sup>+</sup>, ·C:C(C):C·C<sup>+</sup>, or ·C·C(C):C·C<sup>+</sup>, C<sup>+</sup> being *tert.* or quaternary, yield halogenohydrins. E.g., (CH<sub>2</sub>Cl)<sub>2</sub>C:CH·CH<sub>2</sub>Cl and aq. Cl<sub>2</sub> give tetrachloro*tert.*-amyl alcohol; CH<sub>2</sub>:C(CH<sub>2</sub>Cl)<sub>2</sub> and BuOCl give *s*-trichloro*tert.*-butyl alcohol, b.p. 90°/4 mm.; [CH<sub>2</sub>:C(CH<sub>2</sub>Cl)·CH<sub>2</sub>]<sub>2</sub> and HOCl give [OH·C(CH<sub>2</sub>Cl)<sub>2</sub>·CH<sub>2</sub>]<sub>2</sub>; C<sub>2</sub>HCl<sub>3</sub> and aq. Cl<sub>2</sub> give C<sub>2</sub>HCl<sub>5</sub>; and CH<sub>2</sub>:CMe·CHCl<sub>2</sub> and HOBr give OH·CMe(CH<sub>2</sub>Br)·CHCl<sub>2</sub>. (Cf. B., 1935, 1129.) H. A. P.

**Production of isopropyl alcohol from propylene.** W. H. SHIFFLER, M. M. HOLM, and W. P. ANDERSON, Assrs. to STANDARD OIL Co. OF CALIFORNIA (U.S.P. 1,988,611, 22.1.35. Appl., 22.8.30).—Propylene, liquefied by pressure, e.g., 125 lb. per sq. in., is absorbed in H<sub>2</sub>SO<sub>4</sub>. This permits the use of H<sub>2</sub>SO<sub>4</sub> at < 85 (70)% concn., which eliminates polymerisation and simplifies concn. after the hydrolysis. Apparatus is described. A. W. B.

**Purification of esters.** R. B. LEBO and C. M. BEAMER, Assrs. to STANDARD ALCOHOL Co. (U.S.P. 1,988,801, 22.1.35. Appl., 6.11.30).—The mixture obtained after causing an alkaline-earth salt of a monocarboxylic fatty acid to interact with the acid liquor obtained on treatment of olefines with H<sub>2</sub>SO<sub>4</sub> is distilled, returning the distilled ester, until H<sub>2</sub>O-free. The dry ester vapour is then treated with steam, washed with H<sub>2</sub>O, condensed, and separated for final drying. Apparatus is described. A. W. B.

**Preparation of glyoxal [from acetylene].** S. LENHER, Assr. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,988,455, 22.1.35. Appl., 24.7.30).—C<sub>2</sub>H<sub>2</sub> (slight excess), O<sub>2</sub>, H<sub>2</sub>O (4—5%), and HNO<sub>3</sub> or a N



oxide (NO; 4–5%) are passed through a tube at 170° rising to the explosion temp. At 230° for 2 min. 21–23% of (CHO·CHO)<sub>3</sub> and small amounts of CH<sub>2</sub>O and HCO<sub>2</sub>H are formed.  
H. A. P.

**Manufacture of (A) amines, (B) *tert.*-amines of high mol. wt.** (A) J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B) I. G. FARBENIND. A.-G. (B.P. 436,214 and 436,414, [A] 28.3.34, [B] 14.9.34. Ger., [B] 16.9.33).—(A) Aldehydes, ketones, or Schiff's bases are heated with H<sub>2</sub>, NH<sub>3</sub>, and a catalyst consisting of an O or S derivative of a metal of  $d > 5$ , e.g., Cr, Mo, W, Fe, Co, at  $> 1$  atm. E.g., COMe<sub>2</sub>, NH<sub>3</sub>, and H<sub>2</sub> in presence of Ni sulphotungstate at 320°/200 atm. give NH<sub>2</sub>Pr<sup>3</sup> and NHPPr<sup>3</sup> (9:1). (B) Alcohols or carboxylic esters, or aldehydes or ketones + H<sub>2</sub>, are caused to interact with *sec.*-amines (or substances yielding them) and a hydrogenating catalyst, at least one component having  $\leq C_8$ . E.g., *n*-C<sub>12</sub>H<sub>25</sub>·OH, NHEt<sub>2</sub>, and CuO–Al<sub>2</sub>O<sub>3</sub>–BaO at 250°/220 atm. give C<sub>12</sub>H<sub>25</sub>·NEt<sub>2</sub>; octadecanediol, NHEt<sub>2</sub>, and Co at 230°/40 atm. give tetraethyldiamino-octadecane and some diethylamino-octadecyl alcohol; and COMe·C<sub>11</sub>H<sub>23</sub>, NHMe<sub>2</sub>, H<sub>2</sub>, and CuO–MnO–bleaching earth give  $\beta$ -*dimethylaminotridecane*, b.p. 160–162°/22 mm.  
H. A. P.

**Preparation of thiocyanate complex of *p*-phenylenediamine and similar amines.** M. BATTEGAY, Assr. to CALCO CHEM. CO. (U.S.P. 1,988,826, 22.1.35. Appl., 12.10.29. Fr., 4.3.29).—*p*-C<sub>6</sub>H<sub>4</sub>(NH<sub>2</sub>)<sub>2</sub>, in aq. solution in presence of an acid, e.g., HCl, is treated with a (H<sub>2</sub>O-sol.) thiocyanate, e.g., NH<sub>4</sub>CNS; the solution is neutralised, e.g., with NH<sub>3</sub>, and (after evaporation) an addition compound separates, of m.p. 193°, after H<sub>2</sub>O-recrystallisation. It forms salts with acids, is decomposed by alkalis, and gives no FeCl<sub>3</sub> or Lauth's violet reaction. The product is of particular interest in the prep. of oxidation dyestuffs; analogous amines are claimed to behave similarly.  
A. W. B.

**Manufacture of (A) naphthylamine derivatives, (B) naphthalene derivatives.** IMPERIAL CHEM. INDUSTRIES, LTD., and (A) W. B. MCKAY, (B) R. P. LINSTAD and E. F. BRADBROOK (B.P. 436,805 and 436,661, [A] 18.4.34, [B] 16.4.34).—(A) The Bucherer reaction is applied to 1:5-C<sub>10</sub>H<sub>6</sub>(OH)<sub>2</sub> (I) and primary hydroxyalkylamines. E.g., (I) is heated with NH<sub>2</sub>·C<sub>2</sub>H<sub>4</sub>·OH and aq. NaHSO<sub>3</sub> at 110–115° (autoclave, 5 hr.) or at the b.p. (10 hr.) to give 5- $\beta$ -hydroxyethylamino- $\alpha$ -naphthol and 1:5-bis- $\beta$ -hydroxyethylaminonaphthalene (II). Formation of (II) is repressed, if desired, by adding it to the starting materials. (B) 1:2-Dicyanonaphthalene, m.p. 190°, is prepared by heating Na or K 1-cyanonaphthalene-2- or 2-cyanonaphthalene-1-sulphonate with NaCN or Na<sub>4</sub>Fe(CN)<sub>6</sub> (or the K salts) at 250–500° in an inert gas (CO<sub>2</sub>).  
H. A. P.

**Manufacture of naphthylaminesulphonic acids.** E. I. DU PONT DE NEMOURS & Co. (B.P. 436,464, 11.4.34. U.S., 11.4.33).—In the manufacture of  $\beta$ -naphthylamine-1-, -6-, and -8-sulphonic acid from  $\beta$ -C<sub>10</sub>H<sub>7</sub>·OH, the amination stage is conducted without isolation of the C<sub>10</sub>H<sub>6</sub>(OH)·SO<sub>3</sub>H; higher yields are obtained.  
A. W. B.

**Arylation of peri-acid.** W. J. COTTON, Assr. to NAT. ANILINE & CHEM. Co., Inc. (U.S.P. 1,988,719,

22.1.35. Appl., 26.10.29).—Peri-acid is heated with  $> 5$  (6.5–7.5) mols. of a primary arylamine (I), in absence of an inorg. salt of (I) and  $< 0.5$  (0.5–2) mols. of H<sub>2</sub>O at 145–185° for *T* hr., where  $T = 173 - t$ , *t* being the temp. Apparatus is claimed.  
A. W. B.

**Carrying out mol. associations.**—See I. Ethylation of H<sub>2</sub>SO<sub>4</sub>. PhOH recovery.—See II. Polymethine-dye intermediates.—See IV. [EtCO<sub>2</sub>H from] fermentation products. BuOH.—See XVIII.

#### IV.—DYESTUFFS.

**Hyposulphite method of azo-dye analysis.** V. I. MINAEV and V. N. KISELNIKOV (Trans. Inst. Chem. Tech. Ivanovo, 1935, 59–65).—25 c.c. of 20% Na K tartrate are added to 100 c.c. of a 0.1% solution of the dye, and the mixture is heated, and titrated in a CO<sub>2</sub> atm. with 0.34% Na<sub>2</sub>S<sub>2</sub>O<sub>4</sub> (I). (I) is standardised against Orange II, and should contain 40 c.c. of 0.1N-NaOH per litre, when the titre remains const. for  $\geq 9$  days, in an atm. of H<sub>2</sub>.  
R. T.

**Lakes and pigments.**—See XIII.

See also A., Dec., 1499, Dichlorobenzanthrones. 1506, Dyes derived from acridic acid.

#### PATENTS.

**Manufacture of ethylene azo dyes.** I. G. FARBENIND. A.-G. (B.P. 435,449, 16.2.34. Ger., 16.2.33).—An  $\alpha$ -diarylethylene, CAR<sub>2</sub>:CHR, where R = H or a substituent and Ar = aryl carrying  $\leq 1$  OMe, OH, NH<sub>2</sub>, NMe<sub>2</sub>, or NHPH-group, or an acid additive product thereof, is coupled with a diazo compound, to give dyes CAR<sub>2</sub>:CR·N<sub>2</sub>·Ar'. Examples are:  $\beta$ -naphthylamine-6:8-disulphonic acid  $\rightarrow$  4:4'-tetramethyldiaminodiphenylethylene (bordeaux-red on wool from alkaline bath, developed to blue by acid); *p*-NO<sub>2</sub>·C<sub>6</sub>H<sub>4</sub>·NH<sub>2</sub>  $\rightarrow$  di-*p*-anisylethylene.  
C. H.

**[Manufacture of mono]azo dyes.** IMPERIAL CHEM. INDUSTRIES, LTD., and A. H. KNIGHT (B.P. 435,807, 28.3.34).—An *o*-mononitroaniline is diazotised and coupled with the *N*-sulphatoethyl derivative of a *p*-coupling aniline. Examples are: *o*-NO<sub>2</sub>·C<sub>6</sub>H<sub>4</sub>·NH<sub>2</sub>  $\rightarrow$  *N*-sulphatoethyl-*m*-toluidine, m.p. 182° (orange on acetate silk, wool, silk, or Sn-weighted silk); 4-chloro-*o*-nitroaniline  $\rightarrow$  *N*-sulphatoethylcresidine, m.p. 192° (reddish-orange).  
C. H.

**Manufacture of mordant [azo] dyes.** DURAND & HUGUENIN A.-G. (B.P. 435,513, 27.12.34. Ger., 27.12.33).—1-Chloro-2:4-dinitrobenzene (I), or other unsulphonated C<sub>6</sub>H<sub>6</sub> derivative having replaceable halogen, is condensed (a) with Ar·N<sub>2</sub>:Ar·NH<sub>2</sub> or Ar·N<sub>2</sub>:Ar''·N<sub>2</sub>:Ar'''·NH<sub>2</sub>, or (b) with 1 NH<sub>2</sub> of Ar'(NH<sub>2</sub>)<sub>2</sub> or NH<sub>2</sub>:Ar''·N<sub>2</sub>:Ar'''·NH<sub>2</sub> and the product diazotised and coupled with a salicylic acid; Ar = aryl of the C<sub>6</sub>H<sub>6</sub> series carrying OH and CO<sub>2</sub>H *ortho* to one another, Ar' = sulphonated arylene, Ar'' and Ar''' = aryl groups, at least one being sulphonated. Examples are: *p*-nitroaniline-2-sulphonic acid  $\rightarrow$  salicylic acid (II), reduced, condensed with (I) (chrome-printing reddish-yellow); *m*-phenylenediamine-4-sulphonic acid condensed with (I),  $\rightarrow$  (II) (chrome-printing yellow); *m*-nitroaniline-4-sulphonic acid  $\rightarrow$  *m*-toluidine, reduced, condensed with (I),  $\rightarrow$  (II) (chrome-printing

yellowish-brown); 5-aminosalicylic acid  $\rightarrow$  Cleve acid, condensed with (I) (chrome-printing brown). C. H.

**Production of water-soluble basic azo dyes.** DEUTS. HYDRIERWERKE A.-G. (B.P. 435,249, 7.2.34. Ger., 7.2.33).—A diazo compound free from  $\text{SO}_3\text{H}$  and  $\text{CO}_2\text{H}$  is coupled with a  $\beta$ -ketocarboxylic arylamide carrying in the arylamide group a quaternary  $\text{NH}_4$  grouping. Examples are: benzidine  $\rightarrow$  2 mols. of  $p\text{-COMe}\cdot\text{CH}_2\cdot\text{CO}\cdot\text{NH}\cdot\text{C}_6\text{H}_4\cdot\text{NMe}_3\cdot\text{SO}_3\text{Me}$  (I) (yellow);  $p'\text{-NH}_2\cdot\text{C}_6\text{H}_4\cdot\text{CO}\cdot\text{NH}\cdot\text{C}_6\text{H}_4\cdot\text{NMe}_3\cdot\text{SO}_3\text{Me}$  ( $p$ )  $\rightarrow$  (I) (yellow). The products are fixing agents for acidic direct dyes or tanning agents. C. H.

**Manufacture of water-insoluble azo dyes [pigments and ice colours].** A. CARPMAEL. From I. G. FARBENIND. A.-G. (B.P. 435,711, 27.3.34).—An *o*-hydroxycarboxylic arylamide is coupled in substance or on the fibre with a diazotised *m*- or *p*-aminoacylaniline in which the acyl group is aliphatic and carries as substituent an alkoxy-, alkoxyalkoxy-, aralkoxy-, or hydrogenated aryloxy-group, both components being free from  $\text{SO}_3\text{H}$  and  $\text{CO}_2\text{H}$ . Examples are: 4-methoxyacetamido-2:5-dimethoxyaniline  $\rightarrow$  2:3-hydroxynaphthoic 2:5-dimethoxyanilide (reddish-blue); 3-methoxyacetamido-4:6-dimethoxyaniline  $\rightarrow$  *p*-chloroanilide or 4-methoxy-2-methylanilide (violet); 4- $\beta$ -methoxybutyramido-2:5-diethoxyaniline  $\rightarrow$   $\alpha$ -naphthylamide (navy-blue). C. H.

**Manufacture of pigment dyes.** A. CARPMAEL. From I. G. FARBENIND. A.-G. (B.P. 435,817, 29.3.34).—A 3-aminophenylsulphone, carrying in position 4 H, alkyl, alkoxy, aralkoxy, aryloxy, or halogen, and in position 6 H, alkyl, or halogen (but excluding 4:6-dihalogeno-compounds), is diazotised and coupled with a 2:3-hydroxynaphthoic anilide carrying  $\leq$  2 alkyls or a tetramethylene substituent in the anilide group. Examples are: 3-amino-4-methyl-diphenylsulphone  $\rightarrow$  *p*-xylidide (reddish-orange); 3-amino-4-methoxy-diphenylsulphone  $\rightarrow$  3-*o*-xylidide (bluish-red). C. H.

**Manufacture of [polymethine] sensitising dyes and intermediates therefor.** KODAK, LTD., and L. G. S. BROOKER (B.P. 435,252, 16.1.34. U.S., 16.1.33).— $\text{C}_5\text{H}_5\text{N}$  is condensed with an alkyl halide of a 2-iodopyridine or -quinoline, and the resulting quaternary salt is condensed with a quaternary cyclammonium salt, e.g., ethiodides etc. of 2-methylbenz-thiazole or -selenazole, or 2-methylthiazoline, to give tricarbocyanines. C. H.

**Thiocyanate complex.**—See III.

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

**Qualitative analysis of textiles.** G. S. RANSHAW (Silk & Rayon, 1935, 9, 746, 748—749).—Selected methods for identifying rayons, wool, linen, cotton, and silk are described. Naphthylamine 4B stains viscose and cuprammonium rayons pale reddish-grey and dark bluish-grey, respectively. Stains produced on all fibres are described in detail. A. J. H.

**Determination of small amounts of copper in fabrics.** G. DURST (Melliands Textilber., 1934, 15, 568; Chem. Zentr., 1935, i, 1638).—The nitroso-chromotropic acid method is less suitable than the iodometric titration using  $0.001N\text{-Na}_2\text{S}_2\text{O}_3$ . A. G. P.

**Record of the count of thread by the Viviani method.** G. COLOMBO (Annali Chim. Appl., 1935, 25, 451—459).—The theory of the working of Viviani's Hg capillary apparatus for measuring the count of rayon is explained. T. H. P.

**Calculations for a viscose plant.** G. TOCCO (Boll. R. Staz. Sperim. Ind. Carta Fibre Tess., 1935, 30, 646—649).—Methods of calculating quantities of materials to be used and yield of viscose are given. D. R. D.

**Stenation of viscose silk by treatment with formaldehyde and other aldehydes.** V. I. MINAEV and S. S. FROLOV (Trans. Inst. Chem. Tech. Ivanovo, 1935, 166—173).—Increase in the tensile strength of wet viscose fibres after treatment with  $\text{CH}_2\text{O}$  (vapour or  $\text{COMe}_2$  solution) is confirmed;  $\text{MeCHO}$  has a similar, but feebler, effect. R. T.

**Mechanical properties of mixed cellulose nitrate films.** A. I. MEDVEDEV (Trans. Inst. Chem. Tech. Ivanovo, 1935, 204—213).—At room temp. the elasticity of cellulose nitrate films is increased by incorporating polyvinyl acetate (I) or glyptal resin (II). At  $50^\circ$  addition of (I) decreases, and of (II) increases, elasticity. R. T.

**Spectrographic exposures with coloured Cellophane.** R. HALLER and L. WYSZEWIANSKI (Melliands Textilber., 1935, 16, 41—42; Chem. Zentr., 1935, i, 1619).—Cellophane films 0.03 mm. thick are transparent to ultra-violet light. When dyed, they form a convenient way of studying the light absorption of the dyestuff used. H. J. E.

**Viscose pulp and viscose-pulp woods.** VI. **Microbiological decay of Japanese beech.** M. SHIKATA and I. TUTIYAMA (J. Agric. Chem. Soc. Japan, 1935, 11, 730—733).—Soda-pulp from the rotting beech (*Fagus sieboldi*, Endl.) is serviceable, but poorer in quality than that from sound beech, if the rot has not been too extensive. W. McC.

**Pulping treatment and fibre properties.** G. A. RICHTER (Paper Trade J., 1935, 101; T.A.P.P.I. Sect., 276—280).—Various new types of wood pulps developed during the past decade or so are described. H. A. H.

**Degree of polymerisation of the cellulose as a characteristic of the pulp.** A. NOLL (Papier-Fabr., 1935, 33, 377—380).—The possibility of employing in the technical laboratory the degree of polymerisation (or mol. wt.) of cellulose, as determined by Staudinger, as a method for characterising pulp is explored. It offers no advantages because it indicates the same properties as ordinary cuprammonium or xanthate  $\eta$  determination, to which it bears a logarithmic relation. Furthermore, it is more sensitive to the presence of impurities in the pulp, and is more difficult to carry out in practice. It has no relation to any other chemical properties of the pulp ( $\alpha$ -cellulose content, Cu no., etc.), and is affected only by very prolonged beating, indicating that under ordinary conditions of beating no mol. destruction takes place. D. A. C.

**Sulphate-pulp quality control: sampling and testing of individual digester cooks.** C. FAHLSTROM (Paper Trade J., 1935, 101; T.A.P.P.I. Sect., 301—302).—By withdrawing samples of pulp towards the end of

the cooking period, and testing for permanganate no. by Wiles' method (B., 1934, 396), satisfactory control is ensured. A means of tapping the digester for samples is described. H. A. H.

**Paulson process for spent sulphite[*-*cellulose] liquor utilisation.** S. D. WELLS (Paper Trade J., 1935, 101; T.A.P.P.I. Sect., 280—282).—Recent refinements to the process are outlined. H. A. H.

**Factors of importance in the drying of paper.** F. C. CLARK (Paper Trade J., 1935, 101; T.A.P.P.I. Sect., 273—275).—The importance of efficient control of the moisture content of paper is emphasised. Under const. humidity conditions and with a given fibre furnish, the moisture content varies with the amount and nature of loading present. H. A. H.

**Fireproofing of fibre boards.** M. PLUNGUAN and E. C. JAHN (Proc. 5th Pacific Sci. Congr., 1934, 5, 3923—3939).—The most effective materials are  $MgCl_2$ , borax (I), and  $K_2Cr_2O_7$ ; (I) and K H tartrate;  $C_6H_4Me \cdot SO_3NH_4$  (II) and  $(NH_4)_2B_2O_7$ ; and  $ZnCl_2$ , (I),  $NH_4Br$ , (II), and  $NH_4Cl$ . Chlorinated lignin derivatives and related org. compounds were not effective at low concns. (8—9%). CH. ABS. (è)

**Viscose-latex.**—See VI. **Mould growths in moist groundwood.**—See IX. **Monel-metal screens [for rayon etc.].**—See X. **Lake colours and paper. Resinoid plastics.**—See XIII.

See also A., Dec., 1459,  $\eta$  of  $C_6H_6$  solutions of ethyl- and benzyl-cellulose. 1475, Colour analysis and specification. 1485, Hemicellulose from oat hulls. 1502, Methylation and acetylation of lignin. Lignin Et ether.

#### PATENTS.

**Machine for removing water from wood pulp, cellulose, and the like.** O. QVILLER (U.S.P. 1,995,011, 19.3.35. Appl., 26.6.34. Swed., 6.7.33).—The pulp is strained through a partly immersed drum sieve and the part of the circumference above the feed-bath extending around to the doctor or other removal device is subjected to  $>$  atm. pressure. B. M. V.

**Spinning centrifuge.** O. BOCHMANN, Assr. to AMER. BEMBERG CORP. (U.S.P. 1,992,602, 26.2.35. Appl., 2.11.31. Ger., 3.11.30).—Means to impart reciprocating motion to a thread guide is described. B. M. V.

**Production of tubular structures from cellulose derivatives.** A. H. STEVENS. From E. BERL (B.P. 437,817, 9.5.34).—A solution of cellulose ester is distributed on the outside or inside of a (rigid) tube, the feeding means and/or the tube being rotated and preferably given relative axial movement also. Solidification may be effected by chemical or physical means, and, if the former, the reagent may be applied before or after the ester solution. B. M. V.

**Manufacture of agglutinated fibrous sheet material.** UNITED COTTON PRODUCTS Co. (B.P. 437,526, 4.5.34. U.S., 29.5.33).—A no. of plies of material such as that delivered by carding rolls are delivered against gentle air currents on to a conveyor and the sheet is further tied together (without felting) by means of a series of rolls, giving a no. of reversals of curvature

without substantial pressure. The material is then impregnated with rubber latex or the like and, if desired, a finishing coat (e.g., artificial leather) is applied to one or each side. B. M. V.

**Impregnation of felted cellulosic fibrous materials [for artificial leather manufacture].** E. I. DU PONT DE NEMOURS & Co. (B.P. 435,728, 26.3.34. U.S., 1.4.33).—See U.S.P. 1,944,906—7; B., 1934, 957.

**Boiler etc. lagging.**—See I.

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

**Rational utilisation of the bleaching properties of sodium hypochlorite.** V. I. MINAEV (Trans. Inst. Chem. Tech. Ivanovo, 1935, 174—180).—88% bleaching of cotton is attained in 2 min. at room temp. in a bath containing 2—4 mols. of  $NaHCO_3$  per mol. of  $NaOCl$  (available Cl = 1 g. per litre) and 0.2% of wetting agent ( $\alpha$ -Nekal or carboxylic acids). The expenditure of Cl is 33% of that usually required, and the product contains  $\approx$  0.2% of oxycellulose. R. T.

**Padding [cotton fabric] with dispersions of unreduced vat dyes.** C. W. NELSON (Dyer, 1935, 74, 486—487).—Suitable and unsuitable dyes are specified and typical recipes given for dyeing fabric by padding with a liquor containing the vat dye (unreduced) and Prestabilt Oil V (I.-G.), followed by simultaneous reduction and fixation of the dye by treatment in a liquor at 50° containing  $NaOH$ ,  $Na_2CO_3$ , and  $Na_2S_2O_4$ ; the method allows excellent penetration of thick fabrics. A. J. H.

**Optimum conditions of adsorption of leuco-indigo on cotton fibre.** V. I. MINAEV and P. V. MORIGANOV (Trans. Inst. Chem. Tech. Ivanovo, 1935, 181—195).—The velocity of adsorption increases with greater dispersion of the particles of leuco-indigo (I). Increasing the  $[NaOH]$  progressively decreases the dispersion of (I), but increases the stability of the sols. The amount of (I) adsorbed on the fibres is the same for each immersion in the vat, indicating that a greater depth of coloration is obtainable by repeated short immersions than by one more prolonged one. The amount of (I) adsorbed is greater when the vat contains 0.1% of gelatin, and the dye is more firmly fixed on the fibres. The velocity of adsorption in presence of  $NaHCO_3$  (1 mol. per mol. of  $NaOH$ ) is 6 times as great as in its absence. R. T.

**Pressure dyeing of silk and rayon fabrics.** J. BRANDWOOD (Silk & Rayon, 1935, 9, 734—735).—A machine is described in which delicate woven fabric wound on a perforated beam is subjected to a through-flow of dye liquor under a moderate pressure, then washed with  $H_2O$ , and finally freed from excess liquor by a current of compressed air; level dyeing without damage to the fabric is claimed. A. J. H.

**Selection of acid shading colours for chrome dyes on woollen and worsted piece goods.** H. W. WALSTONER (Dyer, 1935, 74, 531—532).—Suitable dyes and methods are described. A. J. H.

**[Dyeing with] indigosol dyes.** L. CABERTI (Boll. R. Staz. Sperim. Ind. Carta Fibre Tess., 1935, 30, 652—654).—Practical instructions are given. D. R. D.

**Textile-finishing trades from a chemical engineering viewpoint.** J. E. HOWARTH (Inst. Chem. Eng., Preprint, Dec., 1935, 8 pp.).—Selected machines for scouring, kiering, dyeing, drying, and finishing textile materials are described. A. J. H.

**Finishing dyed and printed flannelette.** L. CABERTI (Boll. R. Staz. Sperim. Ind. Carta Fibre Tess., 1935, 30, 654—658).—Practical notes are given. D. R. D.

[Application of] viscoso and latex. H. FREUNDLICH (Dyer, 1935, 74, 541).—Recent patented processes for impregnating fabrics and making viscoso-rubber threads are reviewed. A. J. H.

**Knitting problems and their repercussions in dyeing.** W. DAVIS (Dyer, 1935, 74, 481—482). A. J. H.

## PATENTS.

**Laundry and textile drying machines and the like.** V. and S. W. LISTER (LISTER BROS.), and L. F. BROAD (B.P. 437,735, 30.4.34).

**Waterproofing fabric.**—See II.

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

**Influence of external factors on lead corrosion in sulphuric acid production.** V. PERSCHKE and V. IGNATIEVA (Chimstr., 1935, 7, 38—40).—Local disintegration of Pb linings of H<sub>2</sub>SO<sub>4</sub> chambers and towers is due to formation of a galvanic element. The rôle of HNO<sub>3</sub> in the corrosion process is discussed. Pb(NO<sub>3</sub>)<sub>2</sub> was detected in the corrosion products. Corrosion can be countered by a preliminary exposure of the Pb lining to SO<sub>2</sub>. CH. ABS. (e)

**Production of boric acid in the U.S.S.R.** L. E. BERLIN (J. Chem. Ind. Russ., 1935, 12, 821—828).—Datolite, containing 3—5% of B<sub>2</sub>O<sub>3</sub>, is treated with a 5% excess of 20% H<sub>2</sub>SO<sub>4</sub>, the mass is dried at 100° to a H<sub>2</sub>O content of 30%, suspended in H<sub>2</sub>O, the liquor filtered, and H<sub>3</sub>BO<sub>3</sub> allowed to crystallise from the conc. filtrate + washings; the mother-liquors are returned to the first stage of the process. The temp. should be < 80° at any stage except that of crystallisation. R. T.

**Preparation of silica gel from silicon tetrachloride.** B. P. BRUNS and E. A. KOSTINA (J. Appl. Chem. Russ., 1935, 8, 1004—1013).—SiCl<sub>4</sub>, a waste product of the prep. of Al from kaolin, yields SiO<sub>2</sub> sol (I) with H<sub>2</sub>O at > 6°. The rate of formation of SiO<sub>2</sub> gel (II) from (I) rises with temp. and with concn. of (I); the heat of activation of the reaction rises with diminishing [H<sup>+</sup>] of the medium. The HCl produced is utilisable to obtain further quantities of (II), by adding slightly less Na silicate than is required to neutralise the solution, when the gel contains 85% of H<sub>2</sub>O, as compared with 95.5% for (II) prepared from SiCl<sub>4</sub> and H<sub>2</sub>O alone; the H<sub>2</sub>O content can be reduced to 63 and 59% by filtering under pressures of 200 and 700 atm., respectively, no more H<sub>2</sub>O being eliminated in each case by raising the pressure above these vals. The washed, pressed gel affords non-friable granules, which when dried are extremely active adsorbents. Their adsorptive

capacity is greater for saturated than for dil. vapours, and raising the temp. of drying accentuates this property. R. T.

**Diaphragms for dialysing alkaline solutions.** V. S. BURLAKOV (Iskuss. Volokno, 1934, 5, No. 8, 38—45).—Common parchment paper is the most suitable membrane. Its mechanical strength is more affected by dialysis of NaOH at 10° than at 15° or 25°. CH. ABS. (e)

**Interaction of sodium sulphate and pyrites.** V. F. POSTNIKOV, A. C. BRONNIKOV, and I. P. KIRILLOV (Trans. Inst. Chem. Tech. Ivanovo, 1935, 68—72).—The reaction Na<sub>2</sub>SO<sub>4</sub> + 2FeS<sub>2</sub> + 5O<sub>2</sub> → Fe<sub>2</sub>O<sub>3</sub>.Na<sub>2</sub>O + 5SO<sub>2</sub> does not proceed to any significant extent at 1100°, the product consisting chiefly of unchanged Na<sub>2</sub>SO<sub>4</sub> and FeS<sub>2</sub>, together with FeS and Fe<sub>3</sub>O<sub>4</sub>; Na<sub>2</sub>SO<sub>3</sub> and Na<sub>2</sub>S were not formed. R. T.

**Rapid determination of assimilable phosphoric acid in freshly prepared superphosphates.** N. V. ILJIN and V. F. TSCHAPIGIN (J. Chem. Ind. Russ., 1935, 12, 819—820).—2.5 g. of superphosphate are triturated with 20 ml. of H<sub>2</sub>O, the liquid is decanted and filtered, and the process repeated a further 3 times with the residue, which is finally washed on the same filter, to yield 200 ml. of combined filtrates + washings; these are made acid with HCl or HNO<sub>3</sub> and diluted to 250 ml. The residue is shaken with 100 ml. of Peterman's solution, heated at 70° for 45 min., and the suspension cooled, made up to 250 ml., and filtered. 50-ml. portions of this and the preceding filtrate are made neutral with aq. NH<sub>3</sub>, and 10 ml. of 50% NH<sub>4</sub> citrate, 25—30 ml. of alkaline magnesia mixture, and 15—20 ml. of 25% aq. NH<sub>3</sub> are added to each portion. The solutions are shaken for 30 min., filtered, the residue is washed with 2.5% aq. NH<sub>3</sub>, ignited, and weighed. Assimilable P<sub>2</sub>O<sub>5</sub> (%) is given by 127.58a, where a is the wt. of the residue. R. T.

**High-quality chloride of lime.** M. E. POZIN (J. Chem. Ind. Russ., 1935, 12, 810).—A product containing 45% of active Cl is obtained by adding Ca(OH)<sub>2</sub> to the aq. HOCl formed when Cl<sub>2</sub> is passed into an aq. suspension of HgO at 0°. Alternatively, Cl<sub>2</sub> is passed into an aq. suspension of CaCO<sub>3</sub> at 0—5°, the 2—3% aq. HOCl so formed is extracted with CCl<sub>4</sub> at 0°, and the extract is shaken with CaO and filtered, when the residue contains 51% of active Cl. R. T.

**Conversion of animal refuse into cyanide derivatives.** V. F. POSTNIKOV and T. I. KUNIN (Trans. Inst. Chem. Tech. Ivanovo, 1935, 87—89).—The material (leather, hoofs, etc.) is subjected to dry distillation at 800° and the gases are heated at 1000°, when 5% of the original N content is recovered as HCN and 50% as NH<sub>3</sub>; other products, apart from animal C, are an oily condensate and combustible gases, utilisable for heating the retorts. R. T.

**Preparation of calcium cyanamide by the action of carbon monoxide and ammonia on calcium oxide or carbonate.** V. F. POSTNIKOV, T. I. KUNIN, and N. A. EREMEEVA (J. Chem. Ind. Russ., 1935, 12, 795—802).—A mixture of CaCO<sub>3</sub>, 81.5, C 17, and Al<sub>2</sub>O<sub>3</sub> 1.5% reacts at 800—850° with a mixture of N<sub>2</sub> 60, CO

30, and  $\text{NH}_3$  10% to yield  $\text{CaCN}_2$  containing 28% N, the reaction being practically completed after 1–2 hr.; the amount of  $\text{NH}_3$  taken should be 6 times the theoretical. 8.4% of the  $\text{NH}_3$  undergoes dissociation, 15% is used to form  $\text{CaCN}_2$ , 5% to form HCN, and 72% is unchanged. If CaO (containing  $\text{Al}_2\text{O}_3$  3 and C 10%) is used in place of  $\text{CaCO}_3$ , the optimum temp. is 750–800°, and the gas should contain  $\text{N}_2$  50, CO 40, and  $\text{NH}_3$  10%; the product contains  $\text{N}$  26.8%. The cost per ton of combined N is 23.6% < for the  $\text{CaC}_2$  process. R. T.

**Preparation of sodium ferrocyanide from calcium cyanamide.** V. F. POSTNIKOV, T. I. KUNIN, and A. C. BRONNIKOV (Trans. Inst. Chem. Tech. Ivanovo, 1935, 77–86).—39% of the N of  $\text{CaCN}_2$  is recovered as NaCN by heating a mixture of  $\text{CaCN}_2$  43.1,  $\text{Na}_2\text{CO}_3$  24.1, NaCl 24.1, and C 8.6% at 860° for 10 min., and cooling the melt in  $\text{H}_2\text{O}$ . The NaCN is converted into  $\text{Na}_4\text{Fe}(\text{CN})_6$  by adding a small excess of  $\text{FeSO}_4$  to the aq. solution, and no difficulties arise owing to the simultaneous crystallisation of  $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$ . Crude  $\text{Na}_2\text{CO}_3$  is applicable to the process. R. T.

**Utilisation of potassium cyanide production waste to replace alkalis.** V. F. JUFEREV and N. P. PODKOPAEV (Trans. Inst. Chem. Tech. Ivanovo, 1935, 90–94).—The residue after extraction of  $\text{K}_4\text{Fe}(\text{CN})_6$  contains  $\text{K}_2\text{O} + \text{Na}_2\text{O}$  8, CaO 4.5,  $\text{Fe}_2\text{O}_3$  11.5, and  $\text{SiO}_2$  10.9%; black glass having satisfactory physical properties is obtained by firing a mixture of this residue 100, sand 59, chalk 17, and  $\text{Na}_2\text{CO}_3$  4.3 pts., using an oxidising flame. R. T.

**Substitution of sodium carbonate for potassium carbonate in the preparation of ferrocyanide.** T. I. KUNIN (Trans. Inst. Chem. Tech. Ivanovo, 1935, 73–76).—Substitution of  $\text{Na}_2\text{CO}_3$  for  $\text{K}_2\text{CO}_3$  in the prep. of  $\text{Fe}(\text{CN})_6^{4-}$  from blood involves lower yields, and renders it difficult to obtain a product uncontaminated with  $\text{Na}_2\text{CO}_3$ . Addition of NaCl renders the mass more fusible and largely eliminates crystallisation difficulties, but does not increase the yield. R. T.

**Zinc oxide.** T. S. REMINGTON (Paint Manuf., 1935, 5, 238–241, 262–265, 306–309, 355–357).—A review of the history, manufacture, and general properties of ZnO and its application in paints, enamels, and leaded Zn whites ( $\text{PbSO}_4\text{-ZnO}$ ). Photomicrographs are given.

S. M.

**Determination of lead dioxide.** IV. A. V. PAMFILOV and E. G. IVANTSHEVA (Trans. Inst. Chem. Tech. Ivanovo, 1935, 56–58).—0.2 g. of  $\text{PbO}_2$  is boiled for 5 min. with 25 c.c. of 0.2N- $\text{FeCl}_2$  and 5 c.c. of conc. HCl, and the cooled solution is titrated with standard  $\text{K}_2\text{Cr}_2\text{O}_7$  ( $\text{NHPh}_2$  indicator), adding 5 c.c. of 25%  $\text{H}_3\text{PO}_4$  towards the end of the titration. R. T.

**Detection of traces of iron in mercury salts.** L. KULBERG (J. Appl. Chem. Russ., 1935, 8, 1090–1091).—0.7–1.6 g. of  $\text{NH}_4\text{CNS}$  are added to the solution of Hg salt (0.1–0.3 g. of Hg), followed by 0.3 g. of  $\text{ZnSO}_4$ , when Fe ( $\leq 10^{-6}$  g.) is indicated by a pink ppt. R. T.

**Utilisation of gases from nitric acid factories for preparation of nitrogen and nitrogen-hydrogen mixtures.** F. IVANOVSKI, M. KORSCH, and E. KRISCHTUL

(J. Chem. Ind. Russ., 1935, 12, 803–809).—The gas, containing  $\text{N}_2$  96–97,  $\text{O}_2$  2.5–3, and NO 0.2–0.6%, is passed, together with sufficient  $\text{H}_2$  to combine with the  $\text{O}_2$  and reduce NO to  $\text{N}_2$  and  $\text{H}_2\text{O}$ , through a fireclay catalyst containing Ni 3 and Cu 2%, at 500–600°. The resulting gas contains  $\text{N}_2$  0.0025% of NO and 0.0001–0.003% of  $\text{O}_2$ , and costs 2.5–5 times < that obtained by the Linde process. The catalyst is stable provided that S compounds are excluded. R. T.

**NaOCl as bleaching agent.**—See VI. Bottle glass.—See VIII. Monel-metal valves for  $\text{Cl}_2$ .—See X. Plastics in industry.—See XIII. Stability of  $\text{H}_2\text{O}_2$  preps.—See XX. Determining HCN.—See XXIII.

See also A., Dec., 1467, Prep. of D. Hydrates of  $\text{LiClO}_4$ . 1470, Prep. of phosphorescent substances.

## PATENTS.

**Apparatus for production of ammonium salts by distillation of concentrated gas liquor.** P. PARRISH (B.P. 437,681, 30.5.34).—For the treatment of liquid containing 12–20% of  $\text{NH}_3$  suitable apparatus comprises a preheater, a still of the flash type, saturator, and an external steam boiler fed with the  $\text{NH}_3$ -free liquor. All is arranged to avoid gas locks, and the preheater is heated by the waste gases of the saturator.

B. M. V.

**Loading of containers with solid radioactive materials.** RADIUM-CHEMIE A.-G. (B.P. 437,247, 7.5.35. Ger., 8.5.34).—Radioactive material is suspended in a liquid and charged into, e.g., a Pt needle by centrifugal force.

B. M. V.

**Removing  $\text{H}_2\text{S}$  from gases.**—See II. Electrolytic cells.—See XI.

## VIII.—GLASS; CERAMICS.

**Bottle glass.** V. F. JUFEREV and V. P. USPENSKI (Trans. Inst. Chem. Tech. Ivanovo, 1935, 101–109).—The possibilities of applying natural silicates, alkaline waste products of the chemical industry, and  $\text{Na}_2\text{SO}_4$  to the production of bottle glass are discussed. R. T.

**Preparation of glasses of equal coefficients of expansion.** V. P. USPENSKI (Trans. Inst. Chem. Tech. Ivanovo, 1935, 98–100).—The formula  $x = k(3\alpha_1 - 3\alpha_2)$  is given, in which  $x$  represents the % of  $\text{Na}_2\text{O}$  which should be added to equalise the coeffs. of expansion,  $3\alpha_1$  and  $3\alpha_2$ , of two glasses, and  $k = 0.078$  for Na- and 0.0866 for K-glass. R. T.

**Calculation of the m.p. of glass on the basis of its chemical composition.** V. F. JUFEREV (Trans. Inst. Chem. Tech. Ivanovo, 1935, 95–97).—The m.p. is given by  $T = 1700^\circ + 435a + 370b + 2825k + 3000k^3$ , where  $k$  represents g.-mols. % of  $\text{Na}_2\text{O} + \text{K}_2\text{O} + \text{MgO} + \text{CaO} + \text{Fe}_2\text{O}_3$ ,  $a = [\text{Al}_2\text{O}_3] - [\text{FeO}]$ , and  $b = [\text{CaO}] + [\text{MgO}] - [\text{K}_2\text{O}]$ . R. T.

**Replacement of boric acid in enamel.** R. ALDINGER (Glashütte, 1935, 65, 31–32; Chem. Zentr., 1935, i, 1601).— $\text{B}_2\text{O}_3$  serves chiefly as a flux, and so can be replaced by alkalis, BaO,  $\text{CaF}_2$ ,  $\text{Na}_3\text{AlF}_6$ ,  $\text{Na}_2\text{SiF}_6$ , PbO, ZnO,  $\text{Na}_3\text{PO}_4$ , and fusible glasses without detriment to the thermal expansion. J. S. A.

**Borax problem in manufacture of enamels and glazes.** F. H. ZSCHACKE (Keram. Rundsch., 1934, 42, 644—645; Chem. Zentr., 1935, i, 1601).— $B_2O_3$  lowers the expansion and increases the fusibility of enamels without lowering their resistance to hydrolytic attack, and so cannot readily be completely eliminated. J. S. A.

**26th Rept. of the Refractory Materials Joint Sub-Committee.** (A) Refractoriness-under-load test. II. Effect of variation in height of test-piece. III. Maintained-temperature test. F. H. CLEWS, H. BOOTH, and A. T. GREEN. (B) Action of alkalis on refractory materials. IV. Action of potassium chloride vapour on refractory materials at 1000° in presence of water vapour and air. F. H. CLEWS, A. CHADEYRON, and A. T. GREEN. (C) Effect of hydrocarbon gases on refractory materials. I. Preliminary study of effect of methane on refractory materials. E. ROWDEN and A. T. GREEN. (D) Behaviour of sillimanite mixes on being pressed (contd.). F. H. CLEWS and A. T. GREEN. (E) Jointing cements. IV. Certain mixtures of possible application as jointing cements for firebrick. F. H. CLEWS, H. BOOTH, and A. T. GREEN. (F) High-porosity silica bricks. II. F. H. CLEWS and A. T. GREEN. (G) Tridymitisation of silica bricks. T. R. LYNAM and W. J. REES. (H) Reversible thermal expansion of refractory materials. G. R. RIGBY and A. T. GREEN. (I) Research and refractory materials, 1933—4. F. H. CLEWS and A. T. GREEN. (J) Texture of refractories. I. Non-regularity of texture of gas-works fireclay refractories and its possible effect on durability. T. F. E. RHEAD and R. E. JEFFERSON. II. Pictorial methods of recording the texture of refractories and similar materials. T. F. E. RHEAD, J. N. SHORROCK, and C. L. EVANS (Inst. Gas Eng., 1935, Comm. No. 124, 96 pp.; cf. B., 1934, 1099).—(A) With materials which undergo plastic deformation (e.g., fireclay), a variation in height of from 1 to 3.5 in. caused a fall in apparent softening temp. of 40°, whilst with materials undergoing collapse by shear (e.g.,  $SiO_2$  brick) there was no variation outside experimental error. The point of initial collapse was, in all cases, ill-defined. The limits of usefulness of the "maintained-temp." test are discussed and illustrated.

(B) The presence of air +  $H_2O$  vapour is necessary to bring about appreciable interaction of KCl and  $SiO_2$  products at 1000°, and greatly accelerates interaction with other types of material.

(C) Fireclay, but not  $SiO_2$ , materials were disintegrated by the action of a slow (0.008 cm./sec.) stream of  $CH_4$  at 800°, due to the deposition of C at the "Fe spots." The soot-like deposit consisted of a magnetic mixture of C, an Fe compound, and some carbide.

(D) The relation between applied pressure and the porosity is logarithmic and there is a limit to the useful increase in the pressure. Imperfect transmission of the pressure through the mass causes the porosity to vary according to (i) the degree to which the filling is tamped previous to pressing, and (ii) the thickness being pressed. Fine-grained materials tend to give greater porosity. Mixtures having a greater packing  $d$  give a lower porosity after pressing. Crushing of the larger particles occurs during pressing.

(E) Measurements of the under-load strength up to 1300° and the cold mechanical strength of a series of aluminous cements are described. Crushed (cone 31) firebrick, commercial sillimanite, and calcined refractory clay-A were each bonded with Stourbridge fireclay, bentonite, and Na silicate. Casein and sulphite lye were also used to give "cold-setting" qualities. Many good, workable mixtures are described.

(F) Bricks having a porosity of 66.8% were made by admixture of anthracite, but were mechanically weak.

(G) A series of mixtures of  $SiO_2$ , CaO, and  $Fe_2O_3$  were examined for their capacity for tridymitising the  $SiO_2$ . Certain of the slags richest in tridymite were used as "seeding" agents to develop the max. amount of tridymite in  $SiO_2$  bricks. Porosity, thermal expansion,  $d$ , and microstructure examinations are reported.

(H) A review of present knowledge.

(I) A review of progress.

(J) See B., 1935, 949.

J. A. S.

**Disintegration of firebrick linings in iron blast furnaces.** C. E. NESBITT (Crucible, 1935, 19, 54).—Bricks made of clay, free from  $Fe_2O_3$ , and Fe compounds which yielded oxides on heating, withstood the action of 90% CO at 420—470°. Addition of 0.25—1.5% of Fe compounds gave results varying from slight cracking to complete disintegration in 6—10 hr. Bricks containing Fe, fired at high temp., resist the action of CO but cannot withstand temp. fluctuations.

CH. ABS. (e)

**Magnesium silicates; steatite.** II, III. S. NAGAI and K. FUKAI (J. Inst. Silicate Ind., 1934, 42, 472—479; 43, 56—63).—II.  $Na_2SiO_3$  and borax do not have a good effect on burning or other physical properties. The compressive strength of the products  $\propto$  the moulding pressure. The compressive or transverse strength of steatite decreases 50—60% on heating for 30 min. at 1200° and cooling quickly, the  $d$  and porosity increasing.

III. Results of tests on moulding and firing conditions are recorded. Quick cooling lowers the strength and increases the porosity.

CH. ABS. (e)

**Utilising KCN waste [in glass-making].**—See VII. **Cast-Fe abrasives.**—See X. **Lattice structure of clays.**—See XVI.

See also A., Dec., 1477, **Sealing metals to glass.**

#### PATENTS.

**Manufacture of glass and similar products.** G. DELPECH, Assr. to SOC. ANON. DES MANUF. DES GLACES & PROD. CHIM. DE ST.-GOBAIN, CHAUNY & CIREY (U.S.P. 1,992,994, 5.3.35. Appl., 1.2.33. Fr., 5.2.32).—The 4 zones, viz., feeding, melting, quiescent, and drawing, are vertically in line without separating baffles, the comminuted silicious material being continuously and uniformly scattered over the surface of the pool upon which flames or electric arcs impinge also. The lower zones are heated also by induction coils.

B. M. V.

**Preparation of fused materials [enamels, glass, etc.].** W. HOGENSON, Assr. to CHICAGO VITREOUS ENAMEL PRODUCTS Co. (U.S.P. 1,993,964, 12.3.35. Appl., 12.12.32).—A reverberatory furnace is provided with two hearths at different levels, and above the upper

hearth is a perforated inner arch upon which the new charge is melted; after running down to and accumulating on the upper hearth it is tapped through a bridge wall to the lower hearth for refining. B. M. V.

**Production of tempered glass sheets.** PILKINGTON BROS. LTD., and J. WILSON (B.P. 437,123, 28.4.34).—A strip of glass is formed by drawing or rolling and while plastic is caught between metal pallets forming a die and punch for cutting the glass into sheets and serving to cool the glass quickly. B. M. V.

**Manufacture of ceramic ware.** A. E. R. WESTMAN, ASSR. to ONTARIO RES. FOUNDATION (U.S.P. 1,993,047, 5.3.35. Appl., 14.2.33).—A plastic mass of clay and  $H_2O$  is pressed in a permeable mould with sufficient pressure "to overcome the surface-tension forces of the mass." B. M. V.

**Manufacture of permeable ceramic material.** H. E. JOHNSON, ASSR. to JOHNS-MANVILLE CORP. (U.S.P. 1,992,916, 26.2.35. Appl., 17.8.31).—A mixture is made of argillaceous and cementitious slip, a material that will evolve gas on agitation in the cold (whiting and alum, or dolomite and  $H_2SO_4$ ), a comminuted combustible (sawdust  $\geq 20\%$ ), and  $H_2O$ . After moulding it is burned to develop a ceramic bond. B. M. V.

**[Sloping firebars for] potters' ovens and the like.** W. ROYALL (B.P. 437,901, 9.6.34).

Coke ovens.—See II.

## IX.—BUILDING MATERIALS.

**Peat ash as an ingredient in the manufacture of cements.** V. F. JUFEREV and V. I. SERDIUKOV (Trans. Inst. Chem. Tech. Ivanovo, 1935, 116—131).—Fresh peat ash cannot be introduced into cement mixtures, owing to its C and FeO content, which leads to instability as a result of oxidation. Fully oxidised ash yields satisfactory cements. R. T.

**Thermal characteristics of cements.** E. MARCOTE (Mem. Soc. Ing. Civ. France, 1935, 88, 337—356).—The heat developed in mass concrete can be reduced by reduction in cement content, by placing more slowly and in smaller amounts at a time, and by use of suitable cements. The methods for testing the heat development in cements and the results obtained in France, England, and America are described. The thermal characteristics for a cement during the first 24 hr. are const. at a given initial temp. of cement and mixing  $H_2O$ . The greater part of the heat is liberated in the first 3 days and arises mainly from the  $3CaO, SiO_2$  and  $3CaO, Al_2O_3$  in the cement. T. W. P.

**Hardening of cement mortars.** S. A. MIRONOFF (Zement, 1935, 24, 521; Road Abs., 1935, 2, No. 585).—The formation of Ca silicate gel is slow at low temp. and subsequent crystallisation is delayed. The longer period of gel formation should produce better hydraulic qualities. The strength developed on thawing cement mortars after an initial freezing is  $>$  that by ordinary curing. T. W. P.

**Cause of the effect of added substances on the rate of hardening of gypsum cement.** IV. Y. YAMANE (Bull. Inst. Phys. Chem. Res. Japan, 1934, 13,

1518—1523).—Measurements are recorded on the rate of hardening of gypsum cement in presence of EtOH, sucrose, and gelatin (retarders), and of  $MgSO_4$ ,  $CuSO_4$ ,  $NH_4Cl$ , NaCl, and  $NH_4NO_3$  (accelerators).

CH. ABS. (e)

**Bituminised cement.** G. KNAPP (Schweiz. Z. Strassenw., 1935, 21, 265—268; Road Abs., 1935, 2, No. 576).—The prep. and properties are described. Initial failures in the use of the material in cement-grouted macadam were due to premature drying. The application of a dil. bitumen emulsion as a thin surface film is the most effective protection during curing. T. W. P.

**Cements in solutions injurious to concrete.** W. WITTEKIND (Tonind. Ztg., 1935, 59, 677—678, 690—693; Road Abs., 1935, 2, No. 581).—Tests on the action of distilled  $H_2O$  and 0.5% solutions of  $MgSO_4$ ,  $Na_2SO_4$ ,  $(NH_4)_2SO_4$ ,  $CuSO_4$ , and  $MgCl_2$  on normal, rapid-hardening, aluminous, trass, Fe-Portland, and Portland blast-furnace cements are described. Increase in wt. of the specimens after exposure was least in the specimens least attacked, i.e., in the last three. T. W. P.

**Ageing of coal-tar road binders.** SABROU and RENAUDIE (40me Congr. de Chim. Industr., Paris, 1934, Comm., 1—25; Road Abs., 1935, No. 565).—Ageing is not caused by polymerisation, but is due mainly to evaporation of volatile constituents together with a slight and very slow oxidation. The rate of volatilisation varies with atm. conditions and the physical and chemical composition of the binder. For comparison of tars for surfacing, a suitable "ageing coeff." can be obtained from the ratio of increase in  $\eta$  to loss in wt. on exposure to ultra-violet light at 30°. For improving road tars, the method of blowing air through the material is less satisfactory than the usual dehydration process. Good results are obtained by incorporating carbonaceous fillers. T. W. P.

**Ageing of tar in mixtures with stone.** K. MOLL (Teer u. Bitumen, 1935, 33, 219—224, 231—235; Road Abs., 1935, No. 566).—From examination of tars extracted from tarred chippings and from specimens 10 and 47 years old it is concluded that increase in consistency is due to evaporation, oxidation, and polymerisation, and is negligible in proper manufacture. French tars contain a higher content of volatile oils than German, because of the use of relatively soft limestone in the former case, and only after ageing do they correspond to normal German tars. The Sabrou and Renaudie ageing coeff. (cf. preceding abstract) is not applicable to German tars. An account is given of the difficulties and sources of error in examining tar-stone mixtures. T. W. P.

**Behaviour of bitumen cut-backs in practical road construction, and laboratory investigations into probable causes of failure.** R. WESTMEYER (Strassenbau, 1935, 26, 123—129, 185—187; Road Abs., 1935, No. 567).—The construction of certain "Einstreudecke" surfacings, begun in winter and left until summer before applying the sealing coat, is described. Examination of some failures which occurred showed that for successful practice (a) the content of volatile solvents in bitumen cut-backs must not be too high, (b) any marked reduction of the ductility and agglomerating power of

the original bitumen by the solvents must be avoided, and (c) cut-backs must have sufficient resistance to the effects of  $H_2O$ . Tar-oil solvents gave more uniformity than petroleum distillates.

T. W. P.

**Report of Committee IV on [wood] preservatives.** H. E. WATERMAN *et al.* (Proc. Amer. Wood Pres. Assoc., 1934, 41—62).—Revised specifications for creosote and creosote-coal-tar solution are given. The  $C_6H_6$ -insol. matter in the creosote increases with use. Two types of insol. matter are described, the first being removable by direct filtration, whilst the second must first be pptd. with  $C_6H_6$ .

CH. ABS. (e)

**Experiments with Falkamesam [wood] preservative.** A. V. V. IYENGAR (Indian Forester, 1934, 60, 607—608).—The total As content of acacia wood treated by the Falkamesam process (Popham and Kamesam, *ibid.*, 1932, 58, 191) was approx. 37% > that of wood preserved by the ordinary treatment with As. The As losses on leaching with  $H_2O$  were 5.62 and 38.45% of the total As, respectively, for the two processes.

CH. ABS. (e)

**Manual of preservative treatment of wood by pressure.** J. D. MACLEAN (U.S. Dept. Agric. Misc. Publ., 1935, No. 224, 123 pp.).—The nature, prep., use, and action of wood preservatives are reviewed.

A. G. P.

(A) Creosote treatment of green beech, birch, and maple ties. J. F. HARKON. (B) Creosote plus phosphatide for production of non-bleeding creosoted pine poles. J. A. VAUGHAN. (C) Creosote permanence-toxicity relationships. E. O. RHODES, J. N. ROCHE, and H. E. GILLANDER (Proc. Amer. Wood Pres. Assoc., 1934, 346—355, 188—201, 65—79).—(A) Penetration equiv. to that obtained in air-seasoned ties was obtained by either a preliminary hot oil bath or by the boiling-under-vac. process. Beech ties check severely after treatment in the green condition, and should first be air-seasoned.

(B) Creosote with 0.5—2% of phosphatide penetrates the sapwood of pine poles more readily than creosote alone. More uniform distribution and a reduced tendency to bleed result.

(C) Exposure tests with two creosotes are described.

CH. ABS. (e)

**Results obtained with experimental treated sleepers laid in the Indian railways between 1911 and 1916.** S. KAMESAM (Forest Bull., 1934, No. 85, 35 pp.).—The cost of creosote and crude oil treatment was high, but results were satisfactory. Treatment with As and Cu compounds and with crude oil was cheaper and equally effective.

CH. ABS. (e)

**Polymerisation of phenol-aldehyde resins within timber as an anti-corrosive measure.** I. J. KLINOV and V. P. SCHISCHKOV (J. Appl. Chem. Russ., 1935, 8, 1043—1048).—The wood is impregnated with bakelite-A ( $60^\circ$ ; 4—5 hr.), and the product heated at  $120$ — $140^\circ$  to complete polymerisation of the bakelite; under these conditions birch, beech, and ash take up an equal wt. of resin, whilst pine and larch take up > 50%. The "bakelited" wood so obtained is resistant to the corrosive action of numerous solutions and gases, with the exception of aq. NaOH. In general, the resistivity

rises with the resin content, which for most purposes should amount to 30—50% of the wt. of the product.

R. T.

**Decay in structural timbers.** E. A. RUDGE and H. LEWIS (J.S.C.I., 1935, 54, 385—387  $\tau$ ).—In a specimen of "dry rot," considered representative of most mild cases of decay in structural timber, it is shown that the extent of decay, estimated by degree of chemical degradation, is inversely  $\propto$  intensity of fungus growth. In the area of greatest decomp. there is evidence of extensive mineral infiltration, whereas mycological examination indicates that fungus is virtually absent. It is concluded that fungus is parasitic, and cannot be held responsible for the full extent of chemical degradation; consequently the example adds support to the infiltration theory of decay. Several structural recommendations are given.

**Inorganic infiltration theory of wood decay.** W. G. CAMPBELL (J.S.C.I., 1935, 54, 372—374  $\tau$ ).—The recent data of Rudge and Lewis (B., 1935, 1045) in support of the inorg. infiltration theory of wood decay are criticised in detail. The chemical changes induced in spruce wood at  $65^\circ$  in presence of  $CaCO_3$ ,  $CO_2$ , and  $H_2O$  can be explained on the basis of published work (Campbell *et al.*, B., 1933, 468) on the effect of moderate heat on wood.

**"Inorganic infiltration" theory of wood decay.** E. A. RUDGE (J.S.C.I., 1935, 54, 374  $\tau$ ).—A reply to Campbell (cf. preceding abstract).

**Mould growths in moist groundwood.** W. SCHMID (Papier-Fabr., 1935, 33, 380—382, 387—389).—Recent literature, mainly Scandinavian, is reviewed, and the various direct and indirect sources of mould infection and their methods of prevention are discussed. The possibility of removing objectionable moulds by the development of colourless antagonistic organisms is indicated.

D. A. C.

**Determination of fat in the ether extract of conifers.** C. G. SCHWALBE and G. JUST (Wochenbl. Papierfabr., Spec. No., 1934, 10—11; Chem. Zentr., 1935, i, 1638).—The extract is evaporated on a clock glass. Resins form a clear ring encircling the turbid mass of fat. The latter is removed by an  $Et_2O$ -soaked cloth and the approx. wt. of fat determined by difference.

A. G. P.

**Resolution of tars [and road-making].**—See II. **Refractory materials.**—See VIII. **Durability of paint on wood.**—See XIII.

PATENTS.

**Production of paths, road surfaces, floorings, and the like.** D. KOMLOS (B.P. 437,808, 6.3.34).—Various aggregates (including fibrous or granulated metal) are mixed with a drying oil (e.g., 3—5% of cheap linseed) and a drier comprising a metal oxide or hydroxide; the mixture is laid under pressure, covered with sand or other insulator, and allowed to cook by its own exothermic heat, provided that the surface may be preheated to  $150^\circ$  in winter. Kerbs may be performed of the same material to retain the sand.

B. M. V.



**Apparatus for burning [cementitious] materials.** O. LELLEP (U.S.P. 1,992,705, 26.2.35. Appl., 3.11.32. Ger., 4.11.31).—In a rotary kiln, heat exchangers for transferring the heat in the clinker to the air for combustion and, at the other end, for preheating the charge comprise rotary drums (attached to the kiln if desired) provided with transverse plate baffles entirely closing the passage except for staggered apertures near the circumference. B. M. V.

**Materials for use as mortar, cement, wood substitute, or the like.** C. B. GORDON (B.P. 436,993, 4.10.34).—The composition comprises comminuted wood 3 pts. (by vol.) and powdered shellac 1 pt., optional additions being a solvent for the shellac and a sol. pigment. B. M. V.

**Treatment of cement and similar materials.** O. LELLEP, ASSR. to LEPOL INTERNAT. PATENTVERWERTUNGS-GES.M.B.H. and N.V. "SOLOPOL" INGENIEUR-BUREAU TOT EXPLOIT. VAN HET SYSTEEM POLYSIUS (U.S.P. 1,992,704, 26.2.35. Appl., 18.10.29. Ger., 15.12.27).—The material, *e.g.*, cement slurry, is nodulised while damp, dried, and pre-burned while on a foraminous conveyor by gases at various temp. B. M. V.

**Manufacture of bituminous compositions.** S. S. SADTLER, ASSR. to HEPBURNITE CORP. (U.S.P. 1,992,240, 26.2.35. Appl., 3.1.31).—A mixture is made of (1) bituminous cement, (2) a resinous ingredient, (3) finely-divided material, and (4) aggregate. (2) in small quantities (0.5—1.0%) reduces the surface tension of (1), but does not reduce H<sub>2</sub>O-resistance; (3) has an electrical charge opposite to (4); (1)—(3) are premixed. B. M. V.

**Bituminous composition for use in sea walls.** L. R. MASON, ASSR. to UNION OIL CO. OF CALIFORNIA (U.S.P. 1,987,151, 8.1.35. Appl., 19.12.32).—A composition made by incorporating > 35% of a finely-divided filler, *e.g.*, diatomaceous earth and/or rock dust, in an asphalt having m.p. 43.5—54.5°, penetration 40—90, and ductility > 100 at 25°, is used for filling the voids between the massive stones used in constructing breakwaters and sea walls. A. B. M.

**Production of bituminous emulsions.** F. V. LISTER (B.P. 436,494, 18.3.35).—An emulsion which does not flow at high, and is plastic at low, room temp. is made by incorporating about 30% of an alkaline clay paste (containing, *e.g.*, 15% of bentonite, 78% of H<sub>2</sub>O, and 7% of a 7% aq. NaOH solution), and about 5% of aq. Na silicate in a bituminous emulsion. A. B. M.

**Production of bituminous paving material.** J. F. CARLE (U.S.P. 1,985,718, 25.12.34. Appl., 15.7.31).—A bituminous binder which is plastic at room temp. is mixed with a granular aggregate at 65—175° and the mixture, after being cooled to a temp. near the softening point of the bitumen, is treated with an aq. suspension of Ca(OH)<sub>2</sub>, CaCO<sub>3</sub>, or similar calcareous material, whereby this suspension is adsorbed on to the bituminous surface of the granular particles. The material can be handled and stored cold, and laid by application of pressure, with or without preheating. A. B. M.

**Electrothermic process of shaping wood.** I. H. DERBY, ASSR. to P. C. REILLY (U.S.P. 1,994,607, 19.3.35.

Appl., 28.1.33).—Instead of being steamed, the wood is heated by high-tension currents passed through either from flat to flat or edge to edge to such an extent that free moisture is substantially eliminated before bending. The heat may be localised. B. M. V.

**Production of moulded [concrete] articles.** F. C. FLACK (B.P. 436,953, 16.4.34).

**Drying materials. Mixing concrete etc.**—See I. Bituminous compositions.—See II.

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

**Determination of small amounts of nickel and cobalt in iron ores.** E. N. DEITSCHMAN (J. Appl. Chem. Russ., 1935, 8, 1096—1099).—The ore is treated with 20—40 ml. of aqua regia, the solution is diluted and filtered, 2—3 g. of NH<sub>4</sub>Cl are added to the filtrate + washings, and the whole is heated to the b.p. and Fe pptd. therefrom by aq. NH<sub>3</sub>. The suspension of Fe(OH)<sub>3</sub> is filtered off, and the residue is twice redissolved in HCl and repptd. The combined filtrates are conc. to 250 ml., and Ni is determined colorimetrically [dimethylglyoxime (I)] in 5 ml. The same procedure is followed for Co, except that the conc. filtrates are made alkaline with aq. NH<sub>3</sub>, 1 ml. of aq. 1% (I) is added to ppt. Ni, excess of (I) in the filtrate + washings is destroyed by boiling with 4—5 ml. of aq. KClO<sub>4</sub>, the cooled solution is made neutral with aq. NH<sub>3</sub> and then diluted to a definite vol., and the coloration given by 20 ml. with 2 ml. of K tartrate and excess of 1-nitroso-β-naphthol is compared with that of a series of standards. R. T.

**Chlorine treatment of roasted cupriferous pyrites.** D. M. TSCHISHIKOV and S. S. MARGOLINA (J. Chem. Ind. Russ., 1935, 12, 811—819).—The material, containing Fe 55, Cu 1.4, Zn 0.7, Ag 0.00062, and Au 0.00015%, is heated at 100° for 2 hr. with sufficient Cl<sub>2</sub> to convert Cu and Zn into chlorides, when 95% of these metals is extractable with H<sub>2</sub>O (30 min. at room temp., using 2 vols. of H<sub>2</sub>O per vol. of chlorinated product); > 1% of the Fe is extracted under these conditions. The residue is suitable for the production of Fe. Cu is separated from the extract by cementation, and purified electrolytically, when Au is recovered from the sludge, and Zn and Fe are pptd. from the Cu-free solution by CaO, the hydroxides are chlorinated, ZnCl<sub>2</sub> is volatilised, and dissolved, and Zn isolated electrolytically. R. T.

**Distribution of phosphorus between metal and slag in puddled iron.** N. COLLARI (Annali Chim. Appl., 1935, 25, 432—447).—The high P content of puddled Fe is normally distributed between the metal and the occluded slag, and hence is useless in judging of the strength of the Fe. The methods of determining the distribution of the P are discussed. T. H. P.

**Transformation points of nickel steels.** M. SAUVAGEOT and E. ROUSSEAU (Compt. rend., 1935, 201, 611—613).—Andrew and Dickie's observation (*cf.* B., 1927, 486) was confirmed. A Ni steel (C 0.62, Ni 6, Cr 0.5, Mo 0.42%) shows a transformation point at 50—150° when heated in the region of the Acl point, cooled, and examined dilatometrically. This point occurs at a higher temp. and has a smaller intensity

the higher is the temp. to which the steel has been raised. The origin of the transformation point is discussed. A steel containing 2.5% of Mn shows a similar phenomenon at approx. 0°. H. J. E.

**Abnormality in nickel-chromium carburising steels.** I. N. GOLIKOV (*Metallurg*, 1934, 9, No. 7, 36—57).—Abnormalities are due to dissolved CO and CO<sub>2</sub>, which react with Fe during cooling, depositing carbides on the existing centres of crystallisation. Elements such as Cr and Mn, which readily form carbides, reduce abnormality. CH. ABS. (e)

**Rapid determination of nickel in 18-8 and other high-chromium steels and alloys.** F. P. PETERS (*Met. & Alloys*, 1935, 6, 278—279).—Various known methods are critically reviewed. In the method given in detail, the Cr is oxidised to Cr<sup>VI</sup> by means of KClO<sub>4</sub>, and the AgNO<sub>3</sub>-KCN titration performed directly, after diluting and neutralising free acid. A sharp end-point is readily distinguishable. E. H. B.

**Fabrication of monel metal in chemical equipment.** S. NAKAMURA (*Japan Nickel Rev.*, 1935, 3, 602—610).—Monel metal is used largely in centrifugal separators, acid pumps (except HNO<sub>3</sub>), etc., both as sheet and as castings. The latter are of electric furnace-melted metal, to which Si may be added, deoxidised with Mg. Sheet metal is fully annealed at 760—980° and strain relieved at 300°. Welding is generally carried out in the at.-H flame or electric arc. E. H. B.

**Monel-metal chemical screens.** M. TSUNEKAWA (*Japan Nickel Rev.*, 1935, 3, 627—631).—Monel-metal screens and filter-cloth for the rayon, paper, etc. industries are described. The metal is somewhat less readily attacked by 3% aq. H<sub>2</sub>SO<sub>4</sub> at 80° than is Oda metal (Ni 38, Cu 62, Fe + Mn 2%). E. H. B.

**Monel metal in chlorine-handling valves.** K. NISHINO (*Japan Nickel Rev.*, 1935, 3, 620—623).—Monel metal is used for the valves and a special Cu-Pb-Ni-Sn alloy or Cu-Ni alloy for the valve body. Casting difficulties are discussed. E. H. B.

**K-monel.** W. A. MUDGE and P. D. MERICA (*Japan Nickel Rev.*, 1935, 3, 506—512).—This metal contains 3% Al in addition to Cu, Ni, and impurities and is hardened by tempering at 500—600° after quenching to > 325 Brinell. The alloy finds application in pumps etc. operating under corrosive conditions, and in aeroplane instruments. E. H. B.

**Manganese and copper additions to "18-8" Armstrong metal.** L. C. GRIMSHAW (*Met. & Alloys*, 1935, 6, 264—266).—Addition of 4—6 of Mn and 2.9% of Cu to 18% Cr-8% Ni austenitic steel produces an alloy which may be hardened by tempering, but not markedly by cold-work; it is more resistant to attack by H<sub>2</sub>SO<sub>4</sub>, and to intergranular corrosion after heat-treatment at 650°. E. H. B.

**Metallurgical aspects of the radio-tube[valve] industry.** S. UMBREIT (*Met. & Alloys*, 1935, 6, 273—277, 279).—Metals used in the industry and their properties are discussed. Photographs illustrate various processes of valve manufacture. E. H. B.

**Determination of antimony in white metals.** A. E. W. SMITH (*J.S.C.I.*, 1935, 54, 372 τ).—The determination of Sb by I and KMnO<sub>4</sub> methods is discussed. The importance of correct conditions, especially tartaric acid content, in the former, and the effect of Cu and Fe as impurities in the alloys, are considered.

**Lead and its uses in the mineral industries.** F. E. WORMSER (*Min. & Met.*, 1935, 16, 493—497).—A review.

**Gallium and its extraction from Chilean sand.** F. OBERHAUSER and P. RIPOLL (*Anal. Fac. Filos. Univ. Chile*, 1934, 1, 45—76).—A review. F. R. G.

**Corrosion of aluminium in breweries.** R. DE WILDE (*Ann. Zymol.*, 1934, 1, 365—387; *Chem. Zentr.*, 1935, i, 1613—1614).—Measurements of the corrosion potential of Al in 2% aq. KCl and NaCl are recorded. The val. rises as corrosion proceeds. Similar data are recorded for Al electrodes in solutions undergoing fermentation. The protective film on Al is attacked during the course of the fermentation. Corrosion of cold-formed Al electrodes is > that of heat-treated Al. The latter is preferable in practice, and should be < 99.6% pure. H. J. E.

**γ-Series aluminium alloys.** E. ITAMI (*Suiyokw.*, 1934, 8, 343—366, 519—532, 585—615).—Alloys containing Cu 3—5, Ni 1—2, and Mg 1—1.5% gave the best results on tensile testing. Those with Cu 3, Ni 1—2, Mg 1—1.5% are recommended for forged materials. The effect of heat-treatment is discussed. CH. ABS. (e)

**Properties of wrought aluminium alloys at elevated temperatures.** F. M. HOWELL and D. A. PAUL (*Met. & Alloys*, 1935, 6, 284—288).—Nine Al alloys, some in two states of heat-treatment, have been heated for prolonged periods at 300°, 400°, 500°, 600°, and 700° F. Periodical tests made at the heating temp. have shown that the initial fall in strength does not continue; figures are given for the "stable" vals., and also for the properties at room temp., of similarly-treated material. At the lower temp. the age-hardened alloys attain stable strength vals. > those of the annealed materials. The materials most retentive of strength are "24S-T" (Cu 4.2, Mn 0.5, Mg 1.5%); "Y-alloy" (Cu 4.0, Mg 1.5, Ni 2.0%); "17S-T" (Cu 4.0, Mn 0.5, Mg 0.5%); and "14S-T" (Cu 4.4, Si 0.8, Mn 0.75, Mg 0.35%). E. H. B.

**Electrolytic burnishing of iron.** G. S. VOZDVI-SHENSKI, A. I. SIVOUCHIN, and M. D. TSCHULAKOV (*Trans. Butlerov Inst. Chem. Tech. Kazan*, 1934, No. 2, 23—28).—Commercial electrolytic burnishing of Fe can be effected by anodic oxidation in 20—40% NaOH (c.d. 1—6 amp./sq. dm., 1—2 volts, 60—70°). CH. ABS. (e)

**Electrochemical degreasing of metals. III. Degreasing by means of aqueous phosphates and silicates.** M. S. GOLOMBIK, A. M. SHAVORONKOVA, J. S. LEV, and N. N. PETIN (*J. Appl. Chem. Russ.*, 1935, 8, 994—1003).—Max. velocity of degreasing of Fe articles is obtained by immersion in aq. Na silicate (I) in concn. corresponding with 0.25% of Na<sub>2</sub>O, together with 0.5% Na<sub>3</sub>PO<sub>4</sub>(II) at 80°, with a current of 0.01—0.03 amp./sq. cm., reversed every 1—2 min. At 18°/0.03 amp. the combined effect of (I) and (II) is < that of each alone,

whilst at 18°/0.01 amp. and 80°/0.01—0.03 amp. it is considerably greater. R. T.

**Electrometric determination of vanadium in (A) high-chromium steels, (B) slags.** S. M. GUTMAN and T. V. PIRADJAN (Repts. Centr. Inst. Met., 1934, No. 16, 190—193, 194—195).—(A) A 1-g. sample of the steel (Cr 14.54, V 0.33%) is dissolved in H<sub>2</sub>SO<sub>4</sub> + H<sub>3</sub>PO<sub>4</sub>, the solution made up to 200 c.c. with hot H<sub>2</sub>O, 5 c.c. of 2.5% Ag<sub>2</sub>SO<sub>4</sub> are added, the solution is heated to boiling, and 30—35 c.c. of 50% (NH<sub>4</sub>)<sub>2</sub>S<sub>2</sub>O<sub>8</sub> are added. Ag is then pptd. with 5 c.c. of 5% NaCl and the solution boiled for 5—10 min. to decompose (NH<sub>4</sub>)<sub>2</sub>S<sub>2</sub>O<sub>8</sub>, cooled, and titrated with KMnO<sub>4</sub>.

(B) A 1-g. sample is fused in an Fe or Ni crucible with 7—8 g. of Na<sub>2</sub>O<sub>2</sub>, the melt dissolved in H<sub>2</sub>O, boiled for 10 min. to decompose H<sub>2</sub>O<sub>2</sub>, neutralised with 2 : 3 H<sub>2</sub>SO<sub>4</sub>, and 30 c.c. excess are added. To the hot solution 5% H<sub>2</sub>C<sub>2</sub>O<sub>4</sub> is added slowly until a faint pink colour appears, excess KMnO<sub>4</sub> being decomposed by a few drops of 5% H<sub>2</sub>C<sub>2</sub>O<sub>4</sub>. The solution is cooled and titrated with Mohr's salt. CH. ABS. (e)

**Electrolytic tin plates.** V. L. CHEIFETZ and J. V. VAINER (Repts. Centr. Inst. Met., 1934, No. 16, 165—180).—In the cyanide and oxalate baths passivity of the anodes occurs, and the [Sn] changes during electrolysis. The sulphate bath does not change and has a better throwing power. Addition of cresolsulphonic acid and glue to an electrolytic Sn bath prevents change in composition, gives good throwing power, and permits the use of high c.d. CH. ABS. (e)

**Regeneration of cyanides [used in gold extraction].** M. A. KOSHUCHOVA and B. S. STOLJARSKI (Sovet. Zolotoprom., 1934, No. 5, 42—43).—The liquor contains 1.02 kg. of NaCN per ton (average). This excess NaCN is due to CuO in the ore. It is recovered from an acid solution as Ca(CN)<sub>2</sub> by means of FeCl<sub>3</sub>. CH. ABS. (e)

**Corrosion in refrigeration plants.**—See I. Ferro-coke.—See II. Firebrick linings for blast furnaces.—See VIII.

See also A., Dec., 1455, **Systems Mg-Li, Al-Zn, Fe-Cr-N, Li-Zn, Pt-Tl, and Li-Hg.** 1456, **Fe-Ni, Pd-Mn, Pr-Cu, and Pd-Ag-H alloys.** 1458, **Flotation of sulphide minerals.** 1463, **Electrolytic deposition and dissolution of Ga.** 1467, **Anodic behaviour of alloys.** Ni deposition. 1469, **Oxidation of Cu, brass, Al-brass, Al-bronze, Mg and its alloys.** 1470, **Purification of Ga.** Extraction of Ge and Ga from germanite. 1473, **Electro-determination of Ag.** Determination of S in pyrites and slags. 1477, **Sealing metals to glass.**

#### PATENTS.

**Rotary gold concentrator.** D. B. CAVE, Assr. to A. P. FURGASON, E. F. OZENBAUGH, E. OVERTON, and P. V. ASHTON (U.S.P. 1,992,288, 26.2.35. Appl., 27.1.34).—The Au is caught in a bed of gravel in a tank in which a rotary cylindrical screen is submerged in H<sub>2</sub>O. B. M. V.

**Treating materials [steel strip]. Ore crusher.**—See I. **Smelting furnaces.** **Welding electrode.** **Electrolytic apparatus.** **Battery plates.** **Magnetic separators.**—See XI.

## XI.—ELECTROTECHNICS.

**Conductivity of solid dielectrics. I. Electrolysis of varnish films.** F. QVITNER and V. PRUSCHNINA (Physikal. Z. Sovietunion, 1935, 8, 41—58).—The conductivity ( $\kappa$ ) of films of bakelite and nitrocellulose varnish is purely electrolytic, Faraday's laws being obeyed; the variation of  $\kappa$  with temp. follows van't Hoff's law. The effect of metallic impurities in the films is examined, and the results are discussed.

A. J. M.

**Viviani's thread count.**—See V. **Cl<sub>2</sub> treatment of pyrites.** **Salt bath for tool steels.** **Ni-Al steel.** **Radio-valve industry.** **Burnishing Fe.** **Degreasing metals.** **Determining V in steels and slags.** **Sn plates.**—See X. **Electrical resistance of pork and bacon.** **Eliminating Pb from foodstuffs.**—See XIX. **Argentometer.**—See XXI. **H<sub>2</sub>O purification.** **Determining p<sub>H</sub> of H<sub>2</sub>O.**—See XXIII.

See also A., Dec., 1456, **Pd-Ag-H alloys.** 1458, **Electro-osmosis.** 1462, **Electro-reduction of PhCHO.** 1463, **Electrolytic deposition and dissolution of Ga.** 1467, **Prep. of D<sub>2</sub>.** **Hydrates of LiClO<sub>4</sub>.** **Anodic behaviour of alloys.** **Ni deposition.** 1470, **Prep. of phosphorescent substances.** 1473, **Determination of Ag.**

#### PATENTS.

**Electric furnace.** MICHIGAN STEEL CASTING CO., Asses. of G. E. BLAGG (U.S.P. 1,992,465, 26.2.35. Appl., 25.7.34).—Cooling means embedded in the walls and roof of, e.g., a 3-phase electrode furnace are described. B. M. V.

**Electric [arc]-furnace system.** N. R. STANSEL, Assr. to GEN. ELECTRIC CO. (U.S.P. 1,992,784, 26.2.35. Appl., 12.1.33).—A system of electrical voltage control prevents the electrodes from being lowered too far when a non-conducting new charge (e.g., of CaO) tends to obstruct the arc. B. M. V.

**Electric smelting furnaces.** A.-G. BROWN, BOVERI & CO. (B.P. 437,333, 29.3.35. Switz., 3.5.34).—For charging, the electrodes and cover are raised and the lower part of the furnace, including the crucible, is run out horizontally on half-speed rollers. Safety devices are incorporated. B. M. V.

**Welding electrode.** J. M. WEED, Assr. to GEN. ELECTRIC CO. (U.S.P. 1,992,792, 26.2.35. Appl., 28.1.32).—Coatings of TiO<sub>2</sub> and/or felspar with binders are described. B. M. V.

**Electric primary cells.** C. J. GORDON (B.P. 437,821, 12.5.34).—Means for supplying H<sub>2</sub>O vapour to a no. of cells comprising a battery and having CaCl<sub>2</sub> as electrolyte are claimed. J. S. G. T.

**Cells for alkali chloride electrolysis.** P. PESTA-LOZZA (B.P. 438,009, 23.5.35. Ital., 23.5.34).—The cathode is arranged approx. horizontally beneath the anode, and a gas screen of asbestos fabric supported on a woven wire network extends across the entire electrolysis chamber. J. S. G. T.

**Electrolytic apparatus.** R. A. WILKINS, Assr. to INDUSTRIAL DEVELOPMENT CORP. (U.S.P. 1,993,726, 5.3.35. Appl., 30.8.30).—A metal is continuously deposited on, and stripped in sheet form from, a rotating

cathode comprising a conducting cylinder with non-conducting ends extended to form annular flanges. The electrolyte is caused to flow rapidly through a trough-like insol. anode, provision being made to keep the depth of immersion const. and to damp out waves.

B. M. V.

**Electrolytic gas generator.** M. Y. ECK (U.S.P. 1,994,125, 12.3.35. Appl., 12.4.34).—An apparatus for generating refrigerating gas from aq.  $\text{NH}_3$  or the like, or "heating gas" from EtOH,  $\text{H}_2\text{O}$ , and  $\text{NH}_4$  salts, by means of a.c. is described.

B. M. V.

**[Plates for] electric secondary batteries.** A. N. HAZLEHURST (B.P. 437,948, 2.5.34).—Plates of Pb or Pb alloy are covered with ebonite having apertures.

J. S. G. T.

**Apparatus for electrical precipitation of suspended particles from gases.** LODGE-COTTRELL, LTD. FROM SIEMENS-LURGI-COTTRELL-ELEKTROFILTER-GES.M.B.H. F. FORSCHUNG U. PATENTVERWERTUNG (B.P. 437,626, 16.11.34).—A no. of electrodes are arranged in one vertical plane and suspended from their upper ends; their lower ends hang freely in slots formed in a no. of jarring rods in line, each group of one rod and several electrodes being free to move in the plane and act as anvil for its neighbour when an end rod is moved and allowed to swing back.

B. M. V.

**Electrostatic precipitator.** R. C. THOMPSON, ASSR. TO THOMPSON ENG. CO. (U.S.P. 1,992,974, 5.3.35. Appl., 18.3.31).—A no. of metallic plates of alternate polarity are assembled abreast and d.c. of the order of 10,000 volts is applied, *i.e.*, insufficient to produce a corona,  $\text{O}_3$ , etc., the apparatus being therefore suitable for air ventilation. The plates are covered with fibrous material which will "stand out" on electrification, and with an intermediate layer of high-resistance material which prevents excessive flow of current through a humid atm. without substantial effect on the electrostatic attraction of the dust.

B. M. V.

**Magnetic separators.** ELECTROMAGNETS, LTD., and W. E. Box (B.P. 437,897 and 438,059, 12.5.34).—(A) The material is caused to flow in a trough over a series of electromagnets of alternate polarity, and the magnetic material is collected on the sharp edges of a no. of adjustable induction bars (of special shape, described) above or in the upper part of the bed of material. (B) A drum-type separator is provided with feed shoots on both sides of the vertical plane through the axis; the internal stationary magnets preferably have an odd no. of poles, those at or near the horizontal plane being alternate and strong, those at the crown alternate and weak, and those at the lowest part of the drum alike so as to afford "positive expulsion" of the ferrous particles.

B. M. V.

**Manufacture of space-discharge device.** V. O. ALLEN, ASSR. TO RADIO CORP. OF AMERICA (U.S.P. 1,993,767, 12.3.35. Appl., 4.4.30).—A getter for an electron-emissive device comprises a stable salt (carbonate) of an alkaline earth and a reducing agent (org. C), and is heated apart from the cathode, the CO forming a useful flushing gas prior to the final clean-up.

B. M. V.

**Material for discharge-tube anodes.** H. J. SPANNER and C. J. R. H. VON WEDEL, ASSRS. TO ELECTRONS, INC. (U.S.P. 1,995,017, 19.3.35. Appl., 17.1.28).—In an ionisable atm. is placed a non-emissive anode of high electrical conductivity and positive conductivity/temp. coeff., *e.g.*, BeO and W, with ZrO if desired. The core of the anode may be of C and Mg or Sr carbide.

B. M. V.

**[Control of current through] gas or vapour electric-discharge devices [by electrical means].** ELECTRICAL EQUIPMENT & CARBON CO., LTD. FROM "ELIN" A.-G. F. ELEKTR. IND. (B.P. 437,660, 3.5.34).

**Apparatus for treating materials. Water softening apparatus. Turbidity control.**—See I. Glass manufacture.—See VIII. Shaping wood.—See IX. Producing diffraction patterns.—See XXI.

## XII.—FATS; OILS; WAXES.

**Acidic components of wool grease.** E. E. U. ABRAHAM and T. P. HILDITCH (J.S.C.I., 1935, 54, 398—404 T).—The acidic components of wool grease (fresh neutral; recovered from waste liquors; obtained by solvent extraction of merino wool) have been separated and, as Me esters, submitted to fractional distillation in vac. The acids in the distilled Me ester fractions and residues have been intensively crystallised. The results confirm those of earlier workers in showing that the chief component acid is a wax-like solid, m.p. 73—75°, which is not "cerotic" (*n*-hexacosic acid, but is of similar formula ( $\text{C}_{26}\text{H}_{52}\text{O}_2$  or  $\text{C}_{27}\text{H}_{54}\text{O}_2$ , less probably  $\text{C}_{25}\text{H}_{50}\text{O}_2$ ). Several other acids are also present, most of which are very difficult to separate from the rest in the pure state. There is evidence of the presence of a series of acids  $\text{C}_{15}\text{H}_{30}\text{O}_2$  (I),  $\text{C}_{15}\text{H}_{30}\text{O}_3$ ,  $\text{C}_{20}\text{H}_{40}\text{O}_2$ ,  $\text{C}_{20}\text{H}_{40}\text{O}_3$  (or  $\text{C}_{20}\text{H}_{38}\text{O}_3$ ),  $\text{C}_{30}\text{H}_{60}\text{O}_4$  (II), and  $\text{C}_{30}\text{H}_{60}\text{O}_3$  (or  $\text{C}_{30}\text{H}_{58}\text{O}_3$ ) (III). The acid of lowest m.p. (about 22°) and greatest solubility (impure, approx.  $\text{C}_{14}\text{H}_{28}\text{O}_2$ ) was not susceptible to purification. (I), (II), and (III) are respectively identical with "lanopalmic acid," "lanoceric acid," and "lanoceric acid lactone" (Darmstädter *et al.*, A., 1896, i, 192, 346, 522; 1897, i, 180; 1898, i, 245, 470). Evidence of "lactone" or internal anhydride formation was observed when the wool-grease acid fractions of high mol. wt. were boiled with dil. mineral acid. Normal aliphatic acids (myristic, palmitic, stearic, etc.) are not present in wool grease. It is suggested that the acids of sterol waxes secreted in sebaceous and similar glands are probably derived from an isoprene or terpene foundation rather than from an unbranched chain of C atoms.

**Some African oil seeds.** ANON. (Bull. Imp. Inst., 1935, 33, 271—293).—The oils extracted by light petroleum from the seeds (or fruits, where so stated) of the under-mentioned plants have been examined, figures for  $d_{15}^{15}$ ,  $n_D^{20}$ , acid val., sap. val., I val. (Wijs, 3 hr.), and unsaponifiable matter being quoted in the above order in each case. Po-yok (vals. for 7 samples), definitely identified as *Afrolicania elaeosperma*, Milbr. (N. O. Rosaceae): 0.9535—0.9690, 1.5020—1.5110, 0.4—17.4, 188.0—192.3, 139.9—150.9, 0.3—1.0%; some (but not all) samples gelled on heating for 16—20 min. at 300°. *Balanites aegyptiaca*, Del.: 0.9220, 1.4640,

0.9, 191.6, 98.0, 0.3%; f.p. of fatty acids 36.0°. The residual meal contains 48.8% of proteins and a saponin. "Wild olive," *Ximenia americana*, Linn. (from S. Africa): 0.9362, 1.4700, 2.6, 169.7, 93.7, 2.4% (rubbery); an oil extracted with  $\text{CO}_2$  had 0.9227, 1.4688, 0.7, 173.4, 94.9, 0.6 and was practically free from the objectionable rubbery substance. The meal is rich in proteins but unsuitable for cattle feed. *Sterculia foetida*, Linn.: the botanical description of the seeds given in Colonial Repts. Misc. No. 88, 1914, 495 is amended. The oils from the middle layer of the seed-coat (formerly referred to as "fruit-coat") and the kernel, respectively, had: 0.8652 ( $d_{15}^{100}$ ), 0.9281, 1.4615, 1.4650, 4.5, 0.6, 198.1, 191.1, 84.5, 83.6, 0.7%, 0.6%. Both oils gave positive reactions in the Halphen test, and the kernel oil polymerised to a sticky gel on heating at 245° for 6½ min. Analyses of both meals are given. *Lophira alata*, Banks: the fat (m.p. 24.5°) had: 0.8604 ( $d_{15}^{100}$ ), 1.4610, 7.0, 187.9, 73.2, 1.3%; the meal contains a saponin. *Ochna pulchra*: vals. for oil from whole fruit: 0.8606 ( $d_{15}^{100}$ ), 1.459, 18.2, 196.8, 66.7, 1.2%. (Figures for previous samples of separate pericarp and kernel oils and analyses of the meals are given.) Shea kernels and butter (*Butyrospermum Parkii*, Kotschy) from Sudan (vals. for 3 mixed fats prepared in Sudan) and for fat prepared in Imperial Institute, respectively: 0.8631, 0.8592 ( $d_{15}^{100}$ ), 1.462, 1.461, 10.4, 15.4, 184.6, 187.0, 64.7, 62.8, 3.0%, 2.6%. *Salvadora persica*, Linn.: the fat (m.p. 34.8°) from whole fruit had 0.8669 ( $d_{15}^{100}$ ), 1.4500, 1.3, 247.5, 7.6%, 0.9%. Earlier analyses are compared and the commercial val. of the oils (fats) and meals is discussed in each case. E. L.

**Wheat-germ oil.** W. CIUSA (Annali Chim. Appl., 1935, 25, 417—423).—Pressure treatment of wheat germ yields 70% of the total oil in much purer form than that extracted by either light petroleum or EtOH. The usual consts. are given for the 3 oils. The expressed oil is of pleasant flavour and shows pale yellow fluorescence in Wood's light. In a half-filled, corked bottle in the dark, the acidity (as oleic acid) rose from 2.25 to 2.71 in 15 months, whereas with oils extracted by light petroleum and EtOH the increases were from 26.11 to 52.34 (14 months) and 11.28 to 19.74 (12 months), respectively. The extracted oils, but not the expressed oil, gradually deposits solid matter. T. H. P.

**Oiticica oil—its chemical composition and the advantages and disadvantages in comparison with tung oil resulting therefrom.** C. P. A. KAPPELMEIER (Verf. kroniek, 1935, 8, 279—283).—A comprehensive review of work on the composition of oiticica oil, the structure of the couepic (licanic) acids, and the possible applications of the oil in the manufacture of paints and varnishes. Owing to its tendency to polymerise to a gel on keeping, even at room temp., and the lower resistance of its dried film to  $\text{H}_2\text{O}$  and alkali (due to the hydrophilic CO group), it cannot be regarded as a satisfactory substitute for tung oil. It might, however, yield useful synthetic resins by condensation of its CO group with other compounds. D. R. D.

**Economising linseed oil in the production of oilcloth.** A. V. PAMFILOV and E. G. IVANTSHEVA (Trans. Inst. Chem. Tech. Ivanovo, 1935, 139—142).—

50% of the linseed oil may be replaced by Ca naphthenates, applying the formulæ given. R. T.

**African beeswax.** ANON. (Bull. Imp. Inst., 1935, 33, 294—303).—Two samples of beeswax from Gambia had the usual characters of African beeswax. Specimens of filtered wax from Tanganyika and of filtered and refined waxes from Kenya had, respectively:  $d_{15}^{15}$  0.9609, 0.9671, 0.9674; m.p. (open tube) 62.3°, 63.7°, 63.4°;  $n_D^{20}$ —, 1.4546, 1.4554; acid val. 19.1, 19.8, 20.2; sap. val. 94.4, 95.7, 95.4; ester val. 75.3, 75.9, 75.2; ratio no. 3.9, 3.8, 3.7; I val. (Wijs, 3 hr.) 15.7, 10.1, 8.3; hydrocarbons 13.6, 11.8, 11.3%; Salamon and Seaber's turbidity test 57.4°, 58.0°, 57.4°. Tests for adulterants were negative and the waxes were of marketable quality, the figures being within or close to the recorded vals. for E. African waxes. An earlier sample of refined wax from Kenya having  $d_{15}^{15}$  0.9707, acid val. 13.1, ester val. 87.1, ratio no. 6.6 appears to have been prepared from an unadulterated but abnormal wax. E. L.

**Degreasing metals.**—See X. **Flavour of butter. Detecting butter adulteration.**—See XIX. **Stability of emulsions.**—See XX.

See also A., Dec., 1458, **Detergent solutions.** 1482, **Polymerisation of Et linolenate and linoleate.** **Highly unsaturated acids of sardine oil.** 1521, **Liver oil of *Barbus brachicephalus*.** 1545—7, **Vitamins.** 1550, **Acids from seeds of *Butea frondosa*.** 1551, **Constituents of wheat-germ oil.**

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

**Critical oil content of [raw] linseed oil and linseed oil-stand oil paints.** H. L. MATTHIJSEN (Verf. kroniek, 1935, 8, 284).—A reply to criticism (B., 1935, 1004). The breaks are more probably due to experimental error. D. R. D.

**Black paint from peat.** A. V. PAMFILOV (Trans. Inst. Chem. Tech. Ivanovo, 1935, 158—161).—Peat semi-coked with 5% of NaCl at 600—800° yields a residue utilisable as a low-quality substitute for lampblack. R. T.

**Processes increasing the viscosity of ground paints.** A. V. PAMFILOV, E. N. ROSLIAKOVA, A. S. CHUDJAKOV, and A. A. BLAGONRAVOVA (Trans. Inst. Chem. Tech. Ivanovo, 1935, 143—157).—No general explanation can be given of the processes leading to rise in  $\eta$  of ground paints, as these depend on the special properties of the individual components. Thus, in ZnO enamel paint, the process is ascribable to catalytic hydrolysis of the oil, with formation of Zn soaps, which by imparting a structure to the mass increase its rigidity. An artificial red-ochre paint, containing  $\text{Fe}_2\text{O}_3$ ,  $\text{CaCO}_3$ ,  $\text{CaSO}_4$ , and  $\text{SiO}_2$ , with the usual oils, coagulated with time as a result of interaction of the  $\text{CaSO}_4$  with the  $\text{H}_2\text{O}$  present to form gypsum. R. T.

**Durability of paint on wood treated with zinc chloride.** F. L. BROWNE (Proc. Amer. Wood Pres. Assoc., 1934, 410—430).—Exposure tests are described. For interior surfaces as much as 1.5 lb. of  $\text{ZnCl}_2$  per cu. ft. in boards 1 in. thick does not affect the behaviour of paint. On exterior surfaces ordinary linseed oil paints are less durable on  $\text{ZnCl}_2$ -treated than on untreated wood. When

ZnCl<sub>2</sub>-treated wood is primed with Al paint before applying ordinary white paint the durability is greatly improved. CH. ABS. (e)

**Comparison of the adhesion of a film of the same paint to different surfaces.** H. L. MATTHIJSEN (Verf. kroniek, 1935, 8, 276—278).—The SiC abrasion (B., 1934, 286) and accelerated weathering tests indicate superior adhesion of paints to anodically roughened, as compared with untreated, duralumin. Using grey paints containing ZnO, the adhesion with different media decreased in the order: varnish medium > stand oil > raw linseed oil. D. R. D.

**Nature and characteristics of lakes and pigments.** H. SAMUELS (J. Oil Col. Chem. Assoc., 1935, 18, 375—393).—A general résumé is given of inorg. and synthetic org. pigments, the latter being classified as H<sub>2</sub>O-sol. acid dyes (including resorcinol colours), H<sub>2</sub>O-sol. basic dyes, sparingly sol. azo acid dyes with lake-forming properties, insol. dyes with no lake-forming properties ("pigment dyes"), and mordant dyes. S. S. W.

**Lake colours and paper.** N. HOLT (Oil and Col. Trades J., 1935, 88, 1249—1250).—The difficulties encountered in the production of surface-coloured papers, using glue and casein media, are discussed. D. R. D.

**New European practices in varnish manufacture.** W. KRUMBHAAR (Oil and Col. Trades J., 1935, 88, 1256—1257).—Notes on a tour of European varnish works. D. R. D.

**Importance of tung oil to the varnish industry.** H. A. GARDNER (Amer. Paint J., 1935, 20, No. 2, 18, 48—50).—The merits and demerits of drying oil prepared by dehydration of castor oil, cellulose derivatives, other drying oils, and alkyd resin finishes (particularly those containing added PhOH-CH<sub>2</sub>O resins) as substitutes for tung oil are discussed. D. R. D.

**Phenolic resin varnishes. Influence of linseed oil on film properties.** V. H. TURKINGTON, R. J. MOORE, W. H. BUTLER, and R. C. SHUEY (Ind. Eng. Chem., 1935, 27, 1321—1325; cf. B., 1931, 127).—Triangular 3-component diagrams are given to show the effect of varying the resin content and the proportion of tung to linseed oil on the general properties of the varnish. The resistance to checking on exposure increased with the resin content. Substitution within limits of the tung oil by linseed oil improved the durability but reduced the alkali-resistance, whilst the action of boiling H<sub>2</sub>O was unaffected; the elongation after ageing was also increased, probably by increasing the amount of liquid phase (cf. B., 1928, 718), but the tensile strength was reduced. Comparatively small amounts of metal were sufficient for drying, which could be reduced to 1 hr.; Co reduced both the chemical and weather-resistance, but reasonable amounts of Pb had little effect. To prevent overcooking, which also reduces the durability, the product should be sol. in COMe<sub>2</sub>. S. M.

**Substitutes for Canadian balsam from the galipot of *Abies sibirica*.** P. A. JAKIMOV, M. V. VELISTIVA, and N. P. PENTIN (Lesoch. Prom., 1934, 3, No. 11, 8—15).—The galipot is dissolved in Et<sub>2</sub>O, C<sub>6</sub>H<sub>6</sub>, or pine oil, filtered, and the filtrate washed with distilled H<sub>2</sub>O and refiltered. C<sub>6</sub>H<sub>6</sub> and part of the turpentine are removed by steam-distillation. The balsam is then

heated in vac. to > 100°. The product (m.p. 65—72°) is superior to Kahlbaum's balsam. CH. ABS. (e)

**Natural resins for the varnish industry.** C. L. MANTELL, C. H. ALLEN, and K. M. SPRINKEL (Ind. Eng. Chem., 1935, 27, 1369—1373).—An account is given of their sources, classification, properties, and pretreatment. The origin of various commercial grades of Manila resins is shown. S. M.

**Copal resin from the Congo. I. Separation of *n*-nonacosane.** F. TROST (Annali Chim. Appl., 1935, 25, 470—472).—By fractional vac. distillation, or distillation in superheated steam, or saponification, cryst. *n*-nonacosane (about 0.25 g.) has been isolated from this resin (1 kg.). T. H. P.

**"Fatty" acids in stump rosin.** N. V. TUCHOVITZKI (Lesoch. Prom., 1934, 3, No. 9—10, 10—13).—The material contained rosin 63.98, turpentine 21.12, dirt 0.43, and H<sub>2</sub>O 14.47%. The products of fractionation of the unsaponifiable components are described. The resinic acids, after recrystallisation from EtOH, had m.p. 145—147°, acid val. 181.2, sap. val. 189.4, and mol. wt. 312. The material contained 6.99% of "fatty acids," removal of which by vac. distillation or by superheated steam improved the quality of the rosin. CH. ABS. (e)

**Synthetic resins, with special reference to phenolic products.** A. J. NORTON (Off. Digest, 1935, No. 148, 316—320).—A review. D. R. D.

**Plastics in chemical industry.** L. W. TARR (Ind. Eng. Chem., 1935, 27, 1284—1286).—Examples are given of the use of laminated bakelite products for conveying hot NaCl, dil. NaOAc, and ZnCl<sub>2</sub> solutions, and of asbestos-filled products (cf. B., 1934, 156) for the construction of acid absorption towers, evaporator pans, and acid digesters. S. M.

**Practical problems in manufacture of resinoid plastics. I—VI.** ANON. (Brit. Plastics, 1935, 6, 499—502, 529, 546—549; 7, 25—26, 67—68, 70, 72, 112, 114—115, 214—217, 262—265).—A crit. discussion is given of (a) effect of variation in temp. and duration of heating, presence of org. bases in the phenol used, and variation in the composition of commercial formalin in the production of uniform phenol-CH<sub>2</sub>O resins; (b) effect of varying the type of phenol on the speed of curing; (c) effect of varying the acid used as catalyst on the rate of condensation; (d) various methods for determining the plasticity of the moulding material, the m.p., free phenol, flow, and volatile matter of the finished product, and the significance of these data in the control of the process; (e) use of wood-flour, asbestos, cotton fibre, and chopped rag as fillers; (f) production of spirit-sol., heat-reactive resins for the manufacture of laminated paper, "straight" and tung oil-modified resins for friction linings, "straight" and rosin-modified oil-sol. resins for varnishes, and fast-stoving resins for lamp-capping cements. S. M.

**ZnO.**—See VII. **Anticorrosive agents for timber.** See IX. **Electrolysis of varnish films.**—See XI. **Oilcloth.**—See XII.

See also A., Dec., 1502, **Determination of urushiol in lacquer.**

## PATENTS.

**Manufacture of [non-penetrating] paint.** P. H. PENNELL and C. H. DRAPER, Assis. to ARMSTRONG CORK Co. (U.S.P. 1,988,959, 22.1.35. Appl., 25.11.31).—The gel obtained by polymerising a mixture of drying oils, including tung oil, is regenerated to a flowable condition by treatment with a peptiser, *e.g.*, PbO, Pb(OAc)<sub>2</sub>, in quantity insufficient to destroy the colloidal structure of the gel, and is then heated to approx. 288° with synthetic resin, *e.g.*, PhOH-CH<sub>2</sub>O-ester gum, of acid val.  $\geq$  20. An unstable dispersion of an oil-resin complex in the original liquid phase is thus formed, into which pigment is finally incorporated to give a non-penetrating paint suitable for application to porous surfaces. S. S. W.

**[Catalysts for synthetic resin] varnishes.** HOWROYD, McARTHUR & Co., LTD., and R. B. CROAD (B.P. 436,308, 1.5.34. Addn. to B.P. 411,828; B., 1934, 726).—The use of Zn(OAc)<sub>2</sub> and/or basic Al acetate and/or Mg(OAc)<sub>2</sub> used as catalyst(s) in place of NaOAc of the prior patent gives resins more readily sol. in oil at low temp. If desired, metallic Al is dissolved in the phenolic substance, *e.g.*, cresylic acid, mixed xylenols, and then caused to react with AcOH. S. S. W.

**Testing of protective coatings.** I. G. FARBENIND. A.-G. (B.P. 436,873, 19.4.34. Ger., 19.4.33).—The coating is covered with a solution of a compound which is removed after some time, and a second compound is applied which yields a colour with the first; *e.g.*, a diazo compound is followed by a coupling component or a leuco-base by an oxidising agent. Flaws are revealed by coloured areas. S. M.

**Preparation of solid or liquid solutions containing hardenable phenol-aldehyde resins and air-drying fatty oils.** F. SEEBACH, Assr. to BAKELITE GES.M.B.H. (U.S.P. 1,988,465, 22.1.35. Appl., 29.10.30. Ger., 25.11.29. Cf. B., 1931, 1019).—A solution of a Novolak resin in a fatty oil is heated to approx. 300° (at which temp. the phenol constituent begins to distil), cooled to 80–100°, and a hardening agent, *e.g.*, (CH<sub>2</sub>)<sub>6</sub>N<sub>4</sub>, is added in amount  $\leq$  sufficient to form a resole; heating is then continued at 140–150° to the stage of a liquid or solid solution of resole in oil, which is sol. in all proportions in turpentine. S. S. W.

**Manufacture of articles from synthetic resinous compositions.** F. W. JONES, JUN. (B.P. 436,716, 14.3.34).—A liquid resinous composition which solidifies readily, *e.g.*, a PhOH-CH<sub>2</sub>O alkaline condensation product, mixed with glycol and HCl, is poured into a heated mould (length 1–6 ft.); when setting commences, the plug is removed and the mixture moved so that setting is completed during its passage through the mould. S. M.

**Grinding [of inks].—See I. Pigment dyes.—See IV. Wood substitute etc.—See IX.**

## XIV.—INDIA-RUBBER; GUTTA-PERCHA.

**Hydrazines as rubber softeners.** I. WILLIAMS and C. C. SMITH (Ind. Eng. Chem., 1935, 27, 1317–1321).—Many substituted hydrazines soften rubber or cause a

great decrease in  $\eta$  of its solutions, the effect in the latter case at least being dependent on the concurrent or previous action of O<sub>2</sub>. The effect of NH<sub>2</sub>·NHPH (I) on the  $\eta$  of rubber dissolved in gasoline is  $\leq$  that in C<sub>6</sub>H<sub>6</sub>. Rubber softened with (I) shows a modulus and tensile strength after vulcanisation = that of rubber comparably softened by milling, but the rate of vulcanisation may be affected. Of the various substituted hydrazines, aliphatic ones, such as pentamethylenehydrazine, are probably the most active, but monoarylhydrazines are almost equally effective. NHPH·NHPH and N<sub>2</sub>Ph<sub>4</sub> produce a stiffening action. Certain compounding ingredients, *e.g.*, C black, S, and some clays, interfere with the softening action. It is believed that the softening effect is brought about by the chemical activity of the hydrazine causing a decrease in the attraction between the rubber mols. D. F. T.

**Chlorinated rubber. A review from 1859 to the present day.** E. F. SMITH (Oil and Col. Trades J., 1935, 88, 1251–1255). D. R. D.

## PATENTS.

(A) Treatment of balls, particularly golf balls, during a predetermined time interval. (B) Carrying out processes involving the presence of gas or vapour, particularly of a noxious or dangerous nature. DUNLOP RUBBER Co., LTD., H. WILLSHAW, D. F. TWISS, S. N. GOODHALL, and F. A. JONES (B.P. 437,106–7, 24.3.34).—(A) The balls roll down through a gas chamber and are released one at a time at predetermined intervals by a detent. (B) An apparatus as in (A) is enclosed in an outer chamber in which a draught is maintained; the balls themselves may seal the entrance. B. M. V.

**Articles [spinning pots] made of ebonite[-coated textile fabric].** INDIA RUBBER, GUTTA PERCHA & TELEGRAPH WORKS Co., LTD., and H. L. HARDING (B.P. 438,136, 12.5.34).

**Powdered substances [chlorinated rubber]. Friction material.—See I. C black.—See II.**

## XV.—LEATHER; GLUE.

**Detection and determination of sulphite-cellulose waste extract in vegetable-tannin extracts.** C. VAN DER HOEVEN (Collegium, 1935, 471–481).—The sample of tanning extract is washed with boiling EtOH and then with Et<sub>2</sub>O, dried, refluxed with EtOH-H<sub>2</sub>SO<sub>4</sub> mixture, and distilled. The distillate is tested for MeOH by means of SO<sub>2</sub>-decolorised fuchsin, and the amount determined colorimetrically by the same method, using a Lovibond colour scale for the purpose. Results are quoted to show the effect on the readings of admixtures of different amounts of sulphite-cellulose waste extract and various tannin extracts. D. W.

**Modified shake method of tannin analysis.** G. BALDRACCO (Boll. Uff. Staz. Sperim. Ind. Pelli, 1935, 13, 281–283).—75 c.c. of infusion and 6.5 g. of dry chromed hide powder are placed in a Darmstadt apparatus and shaken for 15 min., the solution is removed on a vac. pump, another 75 c.c. of infusion are poured on to the powder, the mixture is shaken for 20 min.,

and the completely detannised solution is thus obtained, in which the non-tannin content is ascertained.

D. W.

**Construction and operation of an experimental rocker section [for tanning].** W. P. DOELGER (J. Amer. Leather Chem. Assoc., 1935, 30, 568—572).—An apparatus for giving slight continuous movement to a no. of pieces of hide suspended in tan liquors in glass jars is described.

D. W.

**Physical chemistry of tanning.** S. I. SOKOLOV and G. E. KOLJAKOVA (J. Appl. Chem. Russ., 1935, 8, 1058—1069).—The electrokinetic potential of oak and fir tannins is negative in aq. solutions, and attains a max. val. in dialysed solutions; it falls with increasing  $[H^+]$  to zero at  $p_H$  1. The tannins behave as weak acids, with a first dissociation const. of  $10^{-5}$ , probably relating to  $CO_2H$  groups, and a second of  $10^{-8}$  (oak) or  $10^{-10}$  (fir), due to phenolic groups.

R. T.

**Rate of combination of vegetable tannins with hide substance.** F. STATHER and R. LAUFFMANN (Collegium, 1935, 470—471; cf. B., 1935, 1008).—The previous results (*loc. cit.*) are modified. The rate of combination is expressed by  $K \log 2t$ , where  $K$  is a const. and  $t$  the time of tannage.

D. W.

**Effect of non-tans on properties of vegetable-tanned leathers.** F. STATHER and H. HERFELD (Collegium, 1935, 463—470; cf. B., 1935, 1008).—Pelt was tanned with pine bark, valonia, quebracho, oak-wood, and sumac extracts, respectively, containing 1, 2, and 4 times the normal amount of non-tans. The thickness of the leather was increased by increasing the non-tans used, the tensile strength was unaffected, the degree of stretch of the grain was unaffected, and the shrinkage temp. and resistance to hot  $H_2O$  were lowered. All these effects were removed by washing the leather. The  $H_2O$  absorbed by the leathers and their readiness to wet back both before and after washing increased with increasing content of non-tans in the extracts used.

D. W.

**Action of acid on vegetable-tanned leather.** A. MIEKELEY (Collegium, 1935, 456—463).—The effect of  $H_2SO_4$  on vegetable-tanned leathers depends on the tannage. The resistance to acid hydrolysis by leathers of different tannages as shown by sol. N compounds, loss in tensile strength, and stretch was: quebracho (untreated) > quebracho (sulphited) > chestnut > sulphite-cellulose > pine bark > oak bark.

D. W.

**Protection of vegetable-tanned leather against deterioration by acid.** G. ORTO (Collegium, 1935, 449—455).—The natural protective buffering salts, which protect such leather against acid rot, are retained when the leather is tanned with a mixture of vegetable and synthetic tannins. Leathers tanned with vegetable tanning materials and Tanigans FC and O, respectively, retained their original buffering properties even after they had been allowed to remain for 2 years in an acid atm., whereas leathers tanned with vegetable tannins alone had completely lost their buffering properties and contained sol. N matter after remaining 2 years. The large mols. of the tanning sulphonic acids tend to make the hide substance lose its capacity to absorb acid gases, and sulphite-cellulose waste liquors exercise the same

property to a smaller degree on leathers on which they are used. The buffering properties of the leather can be ascertained from titration curves determined by the quinhydrone electrode, which gives results in agreement with those obtained when using the glass electrode, for  $p_H$  vals. < 5.7.

D. W.

**Comparative wear of chrome, vegetable, and retanned sole leather.** R. C. BOWKER and W. E. EMLEY (J. Amer. Leather Chem. Assoc., 1935, 30, 572—576, and J. Res. Nat. Bur. Stand., 1935, 15, 363—367).—Practical wear tests on boots were carried out on a no. of different leathers tanned with Cr salts and retanned with different amounts of vegetable tanning materials. The durability of the product was greater as the % hide substance and Cr content, respectively, were greater, diminished with increasing  $H_2O$ -sol. matter, but was unaffected by grease content or the insol. ash.

D. W.

**Study of keratin.** L. MICHAELIS (J. Amer. Leather Chem. Assoc., 1935, 30, 557—568).—A lecture and summary of results of work already noted.

D. W.

**“Tick marks” on calfskins and goatskins.** W. HAUSAM (Collegium, 1935, 481—484).

**Cyanide derivatives from animal refuse.**—See VII.

## PATENT.

$H_2O$ -sol. basic azo dyes.—See IV.

## XVI.—AGRICULTURE.

**Pedology of French soils. III (i). Azonal soils.** V. AGAFONOFF (Ann. Agron., 1935, 5, 335—372).—Formation, analyses, and profile characteristics are described.

A. G. P.

**Microbiology of podsol soil profiles. II. Laur-entian soils.** P. H. H. GRAY and C. B. TAYLOR. **III. Bacteria found in separate horizons.** P. H. H. GRAY (Canad. J. Res., 1935, 13, 251—255, 256—262; cf. A., 1933, 803).—II. Biological activity in different podsol horizons is dependent on org. matter relationships, and is highest in  $A_2$ -horizons. Bacterial nos. in illuvial horizons were somewhat > in eluvial horizons. In a spruce soil the org. matter had a low nitrifying capacity.

III. Organisms able to decompose cellulose,  $PhOH$ , and  $C_{10}H_8$  were generally distributed. Of N-fixing organisms *Azotobacter* were absent, but anaërobic *B. amylobacter* occurred in all horizons.

A. G. P.

**Importance of lattice structure of the clays for the study of soils.** C. E. MARSHALL (J.S.C.I., 1935, 54, 393—398  $\tau$ ).—The clays may be classified into two groups according to their larger lattice structures. Kaolinite, dickite, nacrite, and halloysite have lattice units consisting of one Al and one Si layer. Pyrophyllite (I) has two Si layers to one Al layer. The base-exchange clays have structures similar to that of (I) but the lattice units are separated by a variable spacing containing  $H_2O$  mols. and the exchangeable cations. They form a series with the following predominant replacements: Al for Si, beidellite (II); Mg for Al, montmorillonite (III); Fe for Al, nontronite. The exchangeable cations balance negative charges on the lattice framework arising by the replacement of Al for Si and Mg for Al. Some non-exchangeable cations are also incorporated in



the framework, the relationship between exchangeable and non-exchangeable cations being governed both by electrical and geometrical factors. The non-homogeneous character of the clay fractions makes the  $\text{SiO}_2/\text{R}_2\text{O}_3$  ratio inadequate for their characterisation. A consideration of the replacements in the (II)–(III) series shows that no useful correlation is to be expected between the base-exchange capacity and the  $\text{SiO}_2/\text{R}_2\text{O}_3$  ratio. It is shown that P probably forms part of the lattice framework by replacement of Si and that possibly Ti may replace Al.

**Mechanism of the aëration of soil.** L. G. ROMELL (Ann. Agron., 1935, 5, 373–384).—Simple diffusion is the principal factor controlling soil aëration. A. G. P.

**Volumenometer for determining soil contraction.** J. GOLLAN (An. Soc. cient. Santa Fe, 1933, 5, 9–13; Chem. Zentr., 1935, i, 1606).—A 3-tube Hg volumenometer is described. A. G. P.

**Conversion of fermented molasses residue into a powdered fertiliser.** D. STROHAL (Bull. Soc. Chim. Yougoslav., 1935, 6, 131–138).—The residue after distillation of EtOH is evaporated to dryness, mixed with 1.5 pts. of  $\text{CaCN}_2$ , dried at 100–110°, and powdered, when the product contains N 12.2,  $\text{K}_2\text{O}$  3.2, CaO 38.2,  $\text{P}_2\text{O}_5$  0.35, and org. matter 30.5%. R. T.

**Rapid colorimetric method for determining nitrate-nitrogen in grass.** F. L. ASHTON (J.S.C.I., 1935, 54, 389–390 T).—A rapid method of determining  $\text{NO}_3$ -N colorimetrically by  $\text{OH}\cdot\text{C}_6\text{H}_3(\text{SO}_3\text{H})_2$  in  $\text{H}_2\text{O}$  extracts from grass is described. The extracts are cleared and decolorised by means of  $\text{Al}_2\text{O}_3$  cream, Pb subacetate, and a little  $\text{H}_2\text{O}_2$ . The danger of  $\text{H}_2\text{O}_2$  oxidising other forms of N is avoidable with proper precautions.

**Colorimetric determination of phosphoric acid in grass and similar materials by the Fiske and Subbarow method.** A. W. GREENHILL and N. POLLARD (J.S.C.I., 1935, 54, 404–406 T).—The technique described is accurate, rapid, easy of manipulation, and is suitable when the sample is so small as to preclude the use of the usual volumetric and gravimetric methods.

**Chemistry of grass crops.** A. I. VIRTANEN (Chem. & Ind., 1935, 1015–1022).—A lecture. A. G. P.

**Quizápu and its volcanic ash.** F. OBERHAUSER (Anal. Fac. Filos. Univ. Chile, 1934, 1, 77–85).—The ash contains a high % of  $\text{SiO}_2$  and in thick layers is harmful to vegetation, but in thin layers its alkali content renders it an excellent fertiliser. F. R. G.

**Fertiliser studies with Jonathan apples on Euphrata fine sandy loam.** F. L. OVERLEY and E. L. OVERHOLSER (Washington Agric. Exp. Sta. Bull., 1935, No. 319, 34 pp.).—Trees receiving N alone or with P and K produced greater terminal growth, a larger % of set fruit, a higher proportion of "thinnings," and a greater yield of fruit, somewhat larger in individual size but less highly coloured, than did those receiving P and K separately or together. Fertiliser treatment had no definite influence on alternate bearing tendencies.

Factors other than manuring were the more directly responsible for the occurrence of breakdown. A. G. P.

**Effect of lucerne and farm manure on yields of irrigated crops in the great plains.** S. H. HASTINGS (U.S. Dept. Agric. Tech. Bull., 1935, No. 483, 40 pp.).—Yields of sugar beet and potatoes were increased by manuring and (less consistently) by including lucerne in the rotation. Oats were less definitely affected.

A. G. P.

**Browning root rot of cereals. III. Phosphorus-nitrogen relations of infested fields. IV. Effects of fertiliser amendments. V. Preliminary plant analyses.** T. C. VANTERPOOL (Canad. J. Res., 1935, 13, 220–250).—Appearance of browning is associated with relatively low P and high  $\text{NO}_3$  contents in soil. Manuring with  $\text{PO}_4$  and farmyard manure or (less effectively) with straw permits normal growth. Diseased plants contain less total P, more  $\text{H}_2\text{O}$ -sol. N, and less protein-N than do healthy plants. Unbalanced metabolism of seedlings with predisposition to fungal attack is discussed in relation to cultural and manuring practice.

A. G. P.

**Downy mildew of peas caused by *Peronospora pisi* (De B.), Syd.** L. CAMPBELL (Washington Agric. Exp. Sta. Bull., 1935, No. 318, 42 pp.).—Among numerous fungicides examined, only Bordeaux–Penetrol preps. afforded good protection against mildew infection.

A. G. P.

**Review of phytopharmacy.** M. RAUCOURT (Ann. Agron., 1935, 5, 385–406).—Recent developments in the use of Cu compounds, oils, and various substitutes for arsenicals in parasiticides are discussed. A. G. P.

**Determining  $\text{PO}_4$  in superphosphates.**—See VII.

See also A., Dec., 1548, Growth-substances for plants.

#### PATENTS.

**Coating granular materials [grain].—See I. Fused material from refuse etc. Treating ooze.**—See XXIII.

#### XVII.—SUGARS; STARCHES; GUMS.

**Design and construction of an experimental diffusion battery.** M. J. PROFFITT (Ind. Eng. Chem., 1935, 27, 1266–1272).—A 20-cell experimental battery for the extraction of polysaccharides from Jerusalem artichokes has a capacity of 1 kg. of cossettes per cell. Behind each cell is a surface heater or calorimeter. The inlet and outlet are connected to three manifolds, for flux, solvent, and efflux. It can be operated with either integral continuous flux or with local recirculation. An auxiliary circulating system may be used to provide for a preheating section of the battery through which flux may be reduced almost to zero. This may also serve for treating the cossettes in different groups of cells with different reagents. C. I.

**Determination of starch in pulps.** H. TRYLLER (Z. Spiritusind., 1935, 58, 367).—The pulp, after disintegration in a simple ball-mill in presence of  $\text{KH}_2\text{PO}_4$ , is mixed with  $\text{H}_2\text{O}$  and boiled; after cooling, the solution is treated with malt extract and maintained at 40°

for 45 min. The cooled solution is cleared by  $\text{Pb}(\text{OAc})_2$  treatment, and the clear filtrate used for sugar determination (a) by the Soxhlet method, the end-point being found potentiometrically (cf. B., 1935, 223), (b) polarimetrically. The method of calculation is indicated. The results by the two methods provide a mutual check, variations in diastatic action causing these to change in opposite directions.

I. A. P.

**Fermented molasses residue as fertiliser.**—See XVI. **Determining saccharides in feeding-stuffs.**—See XIX.

See also A., Dec., 1484, **Titrimetric determination of sugar. Determination of glucose in presence of disaccharides.** 1485, **Determination of maltose. Caramel and molasses colloids.** 1550, **Isolation and determination of starch in plant tissue.**

### XVIII.—FERMENTATION INDUSTRIES.

**Foam [of beer].** H. LÜERS and W. MONINGER (Woch. Brau., 1935, 52, 385—391).—The nature of foam and the effects of salts, tannins, etc. on its stability are discussed. Alcohols, esters, and acids in beer contribute to foam formation, but a most important part is played by beer colloids, including proteins and their derivatives, and the bitter principles of hops and their products of transformation; the  $\alpha$ -resins are of especial significance. The importance of these considerations in beer-manufacturing processes and with respect to beer quality is discussed.

I. A. P.

**Separation and determination of organic acids in wine.** F. KONEK and E. WETTSTEIN (Math. nat. Anz. ung. Akad. Wiss., 1934, 51, 305—322; Chem. Zentr., 1935, i, 1629—1630).—The mixed acids are heated with  $\text{BzCl}$  at  $150^\circ$  and the product is digested with hot  $\text{H}_2\text{O}$ . The insol. Bz derivatives of malic and tartaric acids are removed, hydrolysed, and determined after extraction of residual  $\text{BzOH}$ . In the aq. solution  $\text{AcOH}$  and succinic acid are determined by customary methods.

A. G. P.

**Slime formation in the preparation of vinegar, and its prevention.** W. BERWERTH (Deuts. Essigind., 1934, 38, 411—412; Chem. Zentr., 1935, i, 1629).—Slime formation occurs when preserving agents, sugar, starch, dextrin, tartaric acid (I), or other similar materials which are harmful to the bacteria are present. After pptn. of (I) with  $\text{CaCO}_3$ , no slime formation from wines with  $< 7$  vol.-% of  $\text{EtOH}$  occurs.

H. J. E.

**Al corrosion.**—See X. **Fermented molasses residue as fertiliser.**—See XVI.

See also A., Dec., 1540, **Flavour of Shōyu.** 1541, **Butyl and acetone fermentations.**

#### PATENTS.

**Preserved and dried yeast.** H. RILEY (U.S.P. 1,991,629, 19.2.35. Appl., 1.11.32).—Undried yeast (1 lb.) mixed with  $\text{H}_2\text{O}$  (5 oz.) is incorporated with a highly aerated cream prepared by whipping together 4—5 oz. of  $\text{H}_2\text{O}$  and 1—1½ oz. of, e.g.,  $\text{CaSO}_4$ . The mixture is poured into moulds and exposed to a dry,

unheated atm.  $\text{H}_2\text{O}$  is thus rapidly lost, giving a stable dry product. Maize meal, dried milk, chocolate, etc. may be added to the mixture before drying.

I. A. P.

**Production of butyl alcohol [by fermentation].** COMMERCIAL SOLVENTS CORP., Asses. of (A) D. A. LEGG and H. R. STILES, (B) J. C. WOODRUFF, H. R. STILES, and D. A. LEGG (B.P. 437,120—1, [A, B] 27.4.34. U.S., [A, B] 12.6.33; cf. B.P. 415,311—2; B., 1934, 939).—(A) *Clostridium inverto-acetobutylicum* (I) is used for fermentation of a mash containing inverted carbohydrates (e.g., inverted molasses) and other nutrients. (B) A carbohydrate mash (e.g., containing molasses) with other nutrients is fermented by means of *C. saccharobutylicum* (II). (A, B) Regulation of the final  $p_{\text{H}}$  of the fermented mash is important, and is achieved by adding a substance, e.g.,  $\text{CaCO}_3$ , to the unsterilised mash to neutralise free acidity and give an excess of 3—10% of  $\text{CaCO}_3$  on the wt. of sugar; the desirable end  $p_{\text{H}}$  vals. are 5.0—6.5 for (I), 5.0—6.2 for (II). The temp. of fermentation is  $25$ — $36^\circ$  for (I), or  $24$ — $40^\circ$  for (II). Suitable nutrients include protein derivatives ( $\text{NH}_3$ ,  $\text{NH}_4$ ; urea, as in yeast  $\text{H}_2\text{O}$  etc.), and  $\text{PO}_4'''$ , such additions being made as are required. The solvent products of fermentation are mainly  $\text{BuOH}$  and  $\text{COMe}_2$ , with a little  $\text{EtOH}$ , total solvents representing (A) 28—32%, (B) 28—36%, of the sugar. Gaseous products are  $\text{CO}_2$  (2 pts.) and  $\text{H}_2$  (1 pt.). The occurrence, isolation, and morphological and physiological characters of (I) and (II) are described.

I. A. P.

**Producing products of fermentation.** C. H. WERKMAN, C. H. RAYBURN, and R. M. HIXON, Assrs. to IOWA STATE COLL. OF AGRIC. & MECH. ARTS (U.S.P. 1,991,993, 19.2.35. Appl., 10.10.30).—The fermentation of glucose and xylose syrups to  $\text{EtCO}_2\text{H}$  is carried out in a closed vessel fitted with a stirrer and means of inlet of an inert gas; an outlet tube is fitted with a valve, and drains the liquid at the close of fermentation through a filter bed, contained in the fermenting vessel, and composed of an upper layer of  $\text{CaCO}_3$ , a middle layer of sand, and a lower layer of crushed rock. The filtration causes the absorption of bacteria on the  $\text{CaCO}_3$ . Fresh sterilised syrup can then be added from above to the fermenting vessel, and the process repeated. Repeated fermentations are thus possible, the no. of bacteria increasing till finally the fermentation occupies  $< 24$  hr. Appropriate laboratory and technical apparatus is figured.

I. A. P.

**Fibrous-mass breaker.**—See I.

### XIX.—FOODS.

**Wheat varieties, area of cultivation, and quality.** F. SCHNELLE and F. HEISER (Mühlenlab., 1935, 5, 169—174).—The results of a series of tests, including baking tests (loaf vol., grain of loaf, and dough and loaf yields), and determinations of hectolitre wt., gluten content, swelling factor, and degree of softening on the quality of German wheat varieties, are tabulated both according to wheat variety and area of cultivation. There is no justification for the commercial use of the hectolitre wt. as a criterion of the intrinsic quality of wheat varieties. The swelling factor appears to be

correlated with the grain (pore formation) of the crumb. In the different areas of cultivation, within one and the same variety, there is a strong correlation between degree of softening (in the Farinograph) and gluten content when arranged according to the Holdefleiss method (Kühn-Arch., 1925, 9, 53). Whether there is any correlation between softening and moist gluten or swelling factor cannot be determined from the mean vals. for the different varieties. E. A. F.

**Gluten extensibility. Method of measurement and behaviour in wheat conditioning.** W. KRANZ (Mühlenlab., 1935, 5, 161—166).—The Berliner-Koopmann gluten-swelling test, whilst indicating the elasticity and strength of gluten, furnishes no information as to its extensibility or as to when a wheat has been treated at too high a temp. ("over-conditioned"). A simple, accurate method is described for determining gluten extensibility, and the results of this test and of the swelling test are used for determining the optimum conditioning temp. for (German) spring (42°) and winter (45°) wheats. E. A. F.

**Inheritance of and relation between kernel texture and protein content in several spring-wheat crosses.** O. S. AAMODT and J. H. TORRIE (Canad. J. Res., 1935, 13, 202—219).—The expression of genetic factors governing protein content is readily influenced by environmental conditions. Vitreous kernel texture and high protein content show a strong positive relation. The heritable nature of the two characteristics is important in connexion with baking quality. Kernel texture is probably the better index of baking val. A. G. P.

**Fermentable carbohydrates in wheaten flours in relation to bread-making.** R. GEOFFROY (Bull. Soc. Chim. biol., 1935, 17, 1351—1371).—The vals. for preformed reducing sugars, sucrose, and levosine in wheaten flours found by other workers are too high owing to the failure to prevent fermentation during the determination. Glucose and maltose are identified and determined in the aq. extract of several varieties of flour. Since the enzymic activity of flours is  $\propto$  the carbohydrate content it is an important factor in the assessment of the baking val. A. L.

**Application of the Schiff-Sørensen reaction to determination of the protein substances of milk.** C. NUTI (Annali Chim. Appl., 1935, 25, 482—488).—This reaction gives excellent results for the total crude protein (total N  $\times$  6.37) of milk, but does not determine the casein. T. H. P.

**Milk casein and [wheat] gluten.** H. KÜHL (Mühlenlab., 1935, 5, 165—168).—The protein mass separated from milk and dry skim milk by addition of dil. lactic acid or aq. NaCl is similar in general composition to wheat gluten; its use as a baking improver has been patented. E. A. F.

**Nutritional value of milk products.** S. VISCO (Quad. Nutriz., 1934—5, 1, 453—491).—A review, dealing mainly with cheese. NUTR. ABS.

**Preparation of a non-desiccated sodium caseinate sol, and its use in ice cream.** E. W. BIRD, H. W. SADLER, and C. A. IVERSON (Iowa Agric. Exp. Sta. Res.

Bull., 1935, No. 187, 178—208).—Skim milk is coagulated with HCl in proportion sufficient to produce  $p_H$  4.6. The curd is washed with HCl ( $p_H$  4.8), drained in bags, treated with aq. NaHCO<sub>3</sub> to give  $p_H$  6.0—6.1, and heated (60—65°) until peptisation is complete. The sol improves the body and texture of ice cream.

A. G. P.

**Composition of commercial dried whey.** W. L. DAVIES (J.S.C.I., 1935, 54, 338—341 T).—Analyses of 19 samples of commercial dried whey are reported. The moisture content in most samples was  $<$  9%; the average fat content was 1.2%. The ash content varied only slightly from 7.54%, of which 2.3% was NaCl. Ca and P were very variable. Dried whey contained 12.5% of crude protein of which 64% was true protein and 33% was denatured protein. The titratable acidity averaged 2.4% lactic acid.

**Flavour of butter.** H. M. LANGTON (Food, 1935, 5, 98—100).—A review.

**Detection of acetic esters added to butter to mask adulteration.** S. BEZZI and S. SACCONI (Annali Chim. Appl., 1935, 25, 407—417).—The method is based on the different volatilities in steam of AcOH and the volatile acids normally present in butter. 10 g. of the fused, filtered butter are saponified by heating in a 400-c.c. flat-bottomed flask with 40 g. of glycerin and 4 c.c. of *N*-NaOH. The liquid is cooled to 90°, treated with 180 c.c. of boiled, distilled H<sub>2</sub>O and 100 c.c. of dil. (Reichert) H<sub>2</sub>SO<sub>4</sub>, and distilled in the standard Reichert apparatus, four 55-c.c. fractions being collected, each in 10 min., and filtered. 50 c.c. of each filtrate are titrated with 0.1*N*-NaOH in presence of phenolphthalein. If the operations have been properly carried out, the ratio of the sum of the titration vals. to the Reichert val. is about 2.02. With genuine butters, the separate titration vals. are related as 0.373:0.285:0.205:0.138. If an acetic ester has been added, the first and second of these terms will be lower and the last two higher than above. From the extent of the divergences the amount of the addition may be judged. T. H. P.

**Electrical resistance of pork and bacon. I. Method of measurement.** F. H. BANFIELD. II. **Electrical resistance of salt in solutions, gels, minced pork and bacon.** III. **Penetration of salt into muscular tissue during curing.** F. H. BANFIELD and E. H. CALLOW (J.S.C.I., 1935, 54, 411—413 T, 413—417 T, 418—421 T).—I. The electrical resistance was measured by means of a special probe, together with the high-frequency generator and thermionic valve rectifying circuit of Callan and Horrobin (*ibid.*, 1928, 47, 338 T). A simple curve is given relating electrical resistance of bacon with the % concn. of salt present. A robust instrument of the Megger type suitable for work in the factory (the Salinity Tester) is also briefly described.

II. The relation between electrical resistance and salt concn. in salted pork or bacon was more complicated than in simple gel systems such as gelatin or agar-agar. The electrical resistance of minced pork was shown to be decreased by the addition of salt, saltpetre, or H<sub>2</sub>O and increased by the presence of fat or by lowering the temp. The electrical resistance of minced pork containing

salt was found to be slightly < that of intact pieces of salted pork or of bacon containing the same amount of salt.

III. Before being cured, the muscular tissue (lean meat) of a very fat side had a resistance > that of a very lean side. In all sides the electrical resistance of muscular tissue near the shoulder was > that from near the tail, which suggests a greater concn. of fat in muscular tissue near the head than near the tail. Banfield's method (see above) was used to study the penetration of salt during curing. Penetration was shown to be very rapid and the electrical resistance 2 in. from the surface was affected within 24 hr. An initial injection of pump-pickle caused the salt to penetrate more rapidly into the deeper-seated parts of the sides. Tank-curing gave a more rapid rate of penetration than dry-salting, even when the sides had previously been injected with pump-pickle. Chemical analyses of the final matured bacon showed that there was a definite gradient in the concn. of both salt and H<sub>2</sub>O in the meat. The outer layer of lean meat which had been in contact with the tank-pickle or salt had the most salt and least H<sub>2</sub>O even in sides previously injected with pump-pickle. There was practically no difference in the concn. of salt in a very fat side and a very lean side, both of which had been injected with pump-pickle and tank-cured.

**Application of electrolysis to elimination of lead from foodstuffs.** A. SCHMUK, G. ILJIN, and A. CHARIN (J. Appl. Chem. Russ., 1935, 8, 1082—1086).—Pb in jam is removed electrolytically by heating in a Cu vessel (cathode) at 35—50°, with a C anode (70—80 milliamp./10 volts) for 48 hr. Dissolution of metal from containers in which food is being cooked can be prevented by the same method. R. T.

**Chemical and biological processes in ensilage.** F. EICHHOLTZ and W. KEIL (Chem.-Ztg., 1935, 59, 1033—1036).—A survey.

**Ground flax and other protein supplements with maize for fattening calves and pigs.** ANON. (S. Dakota Agric. Exp. Sta. Bull., 1935, No. 293, 30 pp.).—Comparative feeding trials are recorded. Flax seed tends to produce soft pork. A. G. P.

**Determination of soluble saccharides in feeding-stuffs.** L. BRIART (J. Pharm. Belg., 1934, 16, 841—847, 869—876, 896—903, 919—924, 937—944, 961—967, 987—991, 1011—1018; Chem. Zentr., 1935, i, 1632).—Methods and data for calculation of results of analysis of glucose, fructose, lactose, maltose, sucrose, and dextrin are considered. A. G. P.

**African oil seeds.**—See XII. **Grass.**—See XVI.

See also A., Dec., 1524, **Standardisation of the methylene-blue reduction test. Reductase-time of milk.** 1540, **Flavour of Shōyu.** 1545—7, **Vitamins.**

#### PATENTS.

**Milling of grain.** S. F. TATTON-HIBBS (B.P. 437,111, 20.4.34).—Apparatus is claimed. B. M. V.

**Storage of eggs.** H. W. VAHLTEICH and J. L. SCHILLE, Assrs. to BEST FOODS, INC. (U.S.P. 1,992,263, 26.2.35.

Appl., 23.7.30).—The whole egg is mixed with 13 wt.-% of NaCl and 10% of sugar and stored at —18° to —20°. It may be embodied in mayonnaise at room temp.

B. M. V.

**Preservation of eggs, meat, fish, vegetables, or other victuals by means of carbonic acid or another indifferent gas.** G. MÖLLER and P. PETERSON (B.P. 437,495, 22.2.35).—The food is placed in H<sub>2</sub>O<sub>2</sub> of 0.5—30.0 (5)% concn. which completely fills the vessel; the H<sub>2</sub>O<sub>2</sub> is then displaced with CO<sub>2</sub> and the goods are stored therein. B. M. V.

**Dried yeast.**—See XVIII.

#### XX.—MEDICINAL SUBSTANCES; ESSENTIAL OILS.

**Stability of solid pharmaceutical hydrogen peroxide preparations.** G. SCHNEIDER and R. FOLGNER (Pharm. Zentr., 1935, 76, 733—737).—Freshly-prepared samples of CO(NH<sub>2</sub>)<sub>2</sub>.H<sub>2</sub>O<sub>2</sub> (35.3—35.7% H<sub>2</sub>O<sub>2</sub>) lost 0.8—3.4% of H<sub>2</sub>O<sub>2</sub> after keeping for 1 year in the dark. Exposure to diffused daylight or addition of a stabiliser (citric acid) had no appreciable effect. Four commercial samples (30.6—35.2% H<sub>2</sub>O<sub>2</sub>) lost 1.2—3.5% of H<sub>2</sub>O<sub>2</sub> in the dark and 3.7—6.7% in the light. The H<sub>2</sub>O<sub>2</sub> compound with anhyd. Na<sub>4</sub>P<sub>2</sub>O<sub>7</sub> (31.5% H<sub>2</sub>O<sub>2</sub>) lost 4.1 and 8.3% and the Na<sub>4</sub>P<sub>2</sub>O<sub>7</sub>.10H<sub>2</sub>O compound (17.1% H<sub>2</sub>O<sub>2</sub>) lost nearly all its H<sub>2</sub>O<sub>2</sub>. E. H. S.

**M.p. of chloral formamide.** C. T. BENNETT and N. R. CAMPBELL (Quart. J. Pharm., 1935, 8, 398—400).—Commercial samples had vals. of 114—125°. Recrystallisation of these and other preps. gave products of m.p. 123—126°, a val. recommended in place of 114—115° given by the B.P. Codex, 1934. F. O. H.

**Preparation and properties of iodoform and thymol iodide.** N. GLASS (Quart. J. Pharm., 1935, 8, 351—360).—B.-P. methods of assay of CHI<sub>3</sub> and thymol iodide (I) are discussed. CHI<sub>3</sub> is sol. in 7 vols. of C<sub>6</sub>H<sub>6</sub>, 13 of CHCl<sub>3</sub>, and 60 of 95% methylated spirit, the resulting solutions liberating I on exposure to light. Conditions for the prep. of CHI<sub>3</sub>, and its cryst. state, are described. The direct iodination method of preparing (I) gives a product differing from that when NaOCl is used as intermediary; the latter product has a low I content and contains Cl. F. O. H.

**isoPropyl nitrite.** C. L. M. BROWN (Quart. J. Pharm., 1935, 8, 386—389).—The prep. of Pr<sup>o</sup>NO<sub>2</sub> on a laboratory scale and extemporaneously (with measures, a bottle, and glass syringe) is described. The latter method yields a prep. of Pr<sup>o</sup>NO<sub>2</sub> in Pr<sup>o</sup>OH of stability > that of sweet spirit of nitre. F. O. H.

**Glycols. Use of propylene glycol as a pharmaceutical solvent.** C. L. M. BROWN (Quart. J. Pharm., 1935, 8, 390—397).—The use of Et<sub>2</sub>O or CHCl<sub>3</sub> for extraction in the assay of preps. containing OH·CHMe·CH<sub>2</sub>·OH (I) necessitates dilution with H<sub>2</sub>O (> ½ vol.) for complete separation. Certain alkaloids in (I) solution are not pptd. on dilution with H<sub>2</sub>O, whilst picric and tannic acids do not produce ppts. (I) is a good solvent for phenolphthalein, Na and K halides, dyes, and volatile oils and is a suitable menstruum for tinctures. Volatilisation of EtNO<sub>2</sub> in EtOH is > that in (I). F. O. H.

**Assay of glyceryl trinitrate tablets.** W. SMITH (Quart. J. Pharm., 1935, 8, 370—374).—The trinitrate (from 5 tablets) is distilled from aq.  $H_2SO_4$ - $Na_2SO_4$  into 0.1N-NaOH and the distillate is evaporated to dryness. The residue is reduced ( $Fe-H_2SO_4$ ), made alkaline, and liberated  $NH_3$  distilled off, the distillate being nesslerised. Low results are partly due to deterioration of the tablets.

F. O. H.

**Assay of glyceryl trinitrate tablets.** H. O. MEEK (Quart. J. Pharm., 1935, 8, 375—377).—Tablets equiv. to 1 mg. of trinitrate are extracted with AcOH, the extract is filtered, treated with phenoldisulphonic acid and  $NH_3$ , and the resulting colour is compared with suitable standards (pure trinitrate or  $AgNO_3$ ). Tablets with lactose or glucose base are fairly stable, whilst those with a chocolate base containing appreciable amounts of  $H_2O$ -sol. alkali decompose to an extent of approx. 50% in 6 months.

F. O. H.

**Stability of emulsions.** J. B. PARKE (Quart. J. Pharm., 1935, 8, 484—489).—Formation of emulsions of  $C_6H_6$  or PhMe and  $H_2O$  with K or Na oleate as emulsifier indicates that mechanical homogenisation of an emulsion with > 74 vol.-% (the theoretical packing space of a uniform disperse phase) of disperse phase produces partial breakdown. With agitation alone the disperse phase must be > 74% in order to prevent "creaming." The use of gelatin and sulphonated fish-oil soaps is described and examples of complex emulsions are given (cf. A., 1934, 26, 959).

F. O. H.

**Analysis of some complex ointments of the B.P. Codex.** D. C. GARRATT (Quart. J. Pharm., 1935, 8, 472—478).—Methods are given for compound BzOH, Me salicylate, and simple and compound resorcinol ointments.

F. O. H.

**Step-photometric measurements of tinctures.** P. W. DANCKWORTT (Arch. Pharm., 1935, 273, 467—475).—Photometric readings are given for 10 tinctures, new and aged in the light and dark. The absorption of belladonna tincture is particularly characteristic.

R. S. C.

**Alcohol content and specific gravities of tinctures of the B.P. Codex, 1934.** C. T. BENNETT and F. C. L. BATEMAN (Quart. J. Pharm., 1935, 8, 406—408).—The *d* and % EtOH (vol./vol.) of tinctures prepared by official methods are tabulated and compared with those given in the B.P. Codex, 1934 specification. Alterations in the specified limits are suggested for 10 tinctures.

F. O. H.

**Behaviour of drugs at high oxidation potentials. Tillmans' chloramine value.** C. A. ROJAHN (Arch. Pharm., 1935, 273, 496).

R. S. C.

**Preparation of sterile solutions.** II. H. DAVIS (Quart. J. Pharm., 1935, 8, 361—369; cf. B., 1935, 252).—In presence of contaminating spores, heating at 80° for 1 hr. on three successive occasions (tyndallisation) does not always produce sterility. In absence of spores and with clean and sterile containers, parenteral preps. are sterile after the first heating. The germicidal actions of some common medicaments and preservatives on *Staphylococcus aureus* are tabulated and discussed.

F. O. H.

**Polymorphism of luminal.** A. KOFLER and R. FISCHER (Arch. Pharm., 1935, 273, 483—487).—By microsublimation and -crystallisation luminal gives a stable form, m.p. 174°, and unstable forms, m.p. 156—157° and 166—167° respectively. Crystallographic data and photomicrographs are given.

R. S. C.

**Homœopathic preparations. X. Analysis of preparations containing coumaric acid derivatives.** A. KUHN and G. SCHÄFER (Pharm. Ztg., 1935, 80, 1253—1255; cf. B., 1934, 348).—The properties of coumarin, umbelliferone, daphnin, fraxin, and scopolin are described together with fluorescence characteristics and capillary pictures (in ordinary and ultra-violet light) of tinctures and essences containing them. A characteristic colour reaction (Fe salt) for the group is given.

E. H. S.

**Effect of hot solvents on ergot and of storage on its activity.** R. F. CORRAN and F. E. RYMILL (Quart. J. Pharm., 1935, 8, 337—339).—Boiling  $Et_2O$ ,  $C_2H_2Cl_2$ ,  $C_2HCl_3$ , and  $C_6H_6$ , but not light petroleum, extract most of the alkaloid from powdered ergot. With  $C_2H_2Cl_2$  and  $C_6H_6$  extraction is not accompanied by decomp. Prepared ergot, B.P. (defatted or normal), retains its alkaloidal activity for < 18 months.

F. O. H.

**Extractives of capsicum.** H. BERRY (Quart. J. Pharm., 1935, 8, 479—483).—The appearance, solubility, and degree of pungency of "oleoresins" of capsicum extracted by  $Et_2O$ ,  $COMe_2$ , and 60 and 90% EtOH are described.

F. O. H.

**Percolation of cinchona and belladonna root. Rate of alkaloid extraction and effect of degree of comminution.** A. W. BULL (Quart. J. Pharm., 1935, 8, 378—385).—Percolation (80% EtOH) of moderately fine powder (44/85) of cinchona (I) or belladonna (II) affords an extraction > that of fine (85) or coarse powder (22/60). Optimum extraction is obtained when the finest fractions of powder are uppermost in the percolator. The relative % of alkaloids to other solids in successive fractions of percolate increases with (I) and diminishes with (II).

F. O. H.

**Deterioration of atropine eye ointments on storage.** N. L. ALLPORT (Quart. J. Pharm., 1935, 8, 429—434).—Deterioration of atropine (I) eye ointments (B.P., 1932 and B.P. Codex, 1923) occurs most rapidly when (I) is present as base and storage is in glycerogelatin capsules. Yellow eye ointment with (I) (B.P. Codex, 1923) loses its (I) concn. rapidly, whilst the prep. with HgO of the B.P., 1932, loses 20% of its val. in approx. 1 month and then remains const. The  $CHI_3$ -(I) prep. of the B.P. Codex, 1934 is satisfactory.

F. O. H.

**Relative merits of maceration and percolation for the preparation of tincture of Digitalis.** H. BERRY and H. DAVIS (Quart. J. Pharm., 1935, 8, 443—446).—Simple maceration of standardised *Digitalis* leaf is as effective as percolation in removing the active principles, although the latter process yields the greater amount of total solids.

F. O. H.

**Stability of aqueous solutions of ouabain and k-strophanthin.** H. BERRY (Quart. J. Pharm., 1935, 8, 464—471).—Ouabain (I) solutions (in  $H_2O$  or 0.9%

NaCl) are stable to routine autoclaving at  $p_{\text{H}}$  6 (approx.), but not at  $p_{\text{H}}$  2.0 or 9.0. *k*-Strophanthin solutions are stable over a smaller range of  $p_{\text{H}}$ , and in order to autoclave at 115° for  $\frac{1}{2}$  hr. without loss of activity it is necessary [unlike with (I)] to buffer at  $p_{\text{H}}$  6.5 (approx.) and to avoid alkalinity due to glass containers. F. O. H.

**Assay of quinine in iron-quinine citrate and quinine salts.** J. S. TOAL and A. J. JONES (Quart. J. Pharm., 1935, 8, 401—405).—Gravimetric determination of quinine (I) in Fe-quinine citrate preps. gives vals. differing from those by titration methods owing to changes in basicity of (I) during manufacture (e.g., drying as scales). Similar changes occur during assay on excessive heating ( $> 2$  hr. at 100°). The titration val. is also diminished by incomplete dehydration at 100° and presence of traces of  $\text{CHCl}_3$  in the residue. The relative merits of  $\text{Et}_2\text{O}$  and  $\text{CHCl}_3$  for extraction are discussed and a method of standardisation is suggested. F. O. H.

**Rapid determination of quinine in dragées, tablets, and ampoules and of quinine salts.** A. PETZETAKIS (Praktika, 1934, 9, 172—177; Chem. Zentr., 1935, i, 1587).—An  $\text{Et}_2\text{O}$ -extraction method is described. H. N. R.

**Determination of alkaloids in vinegar of sabadilla [Acet. Sabadillæ, Ph. Dan., 1933].** A. JACOBSEN (Dansk Tidsskr. Farm., 1935, 9, 302—306).—Potentiometric titrations of cevadine and of the crude sabadilla alkaloids show that Me-red is a suitable indicator for use in determinations of the alkaloid content of Acet. Sabadillæ. When prepared according to the Danish Pharmacopœia, 1933, the alkaloid content of this prep. remains const. for at least 2 years. M. H. M. A.

**Determination of ferrous iron in presence of organic matter by Heisig's method.** G. J. W. FERREY (Quart. J. Pharm., 1935, 8, 344—350).—The  $\text{IO}_3^-$  method of Heisig (A., 1928, 861) is applicable to saccharated Fe compounds (B.P. and B.P. Codex).  $\text{Fe}^{++}$  lactate, and  $\text{Fe}^{++}$  in presence of aq. glucose, acacia, tragacanth, sucrose, invert sugar in small amounts (large amounts produce a small error), fructose, lactose, glycerol, and lactic and citric acids, but not of liquorice, marshmallow, and aq. extracts of cochineal. F. O. H.

**Determination of lead in official [B.P.] compounds and preparations.** S. WETHERELL (Quart. J. Pharm., 1935, 8, 453—463).—The method of the B.P., 1932, is inaccurate owing to the non-quant. liberation of  $\text{H}_2\text{C}_2\text{O}_4$  (I) from the  $\text{PbC}_2\text{O}_4$  ppt.; this occlusion of (I) is not prevented by preliminary dissolution of the ppt. in  $\text{HNO}_3$ . More accurate results are given by determination of excess (I) in the filtrate. With suppository of Pb with opium or Pb plaster, Pb is extracted by dil.  $\text{AcOH}$  and pptd. (by  $\text{K}_2\text{Cr}_2\text{O}_7$  at the b.p.) and weighed as  $\text{PbCrO}_4$ , the max. error being 0.5%. F. O. H.

**Determination of mercury content of mercurochrome.** R. F. CORRAN and F. E. RYMILL (Quart. J. Pharm., 1935, 8, 340—343).—Commercial preps. of mercurochrome examined by the B.P. Codex, 1934,

method show a Hg content  $<$  the required standard. The method shows considerable experimental variation and appears to be inferior to the alkaline  $\text{KMnO}_4$  oxidation method, which gives lower but more consistent results (cf. B., 1935, 254). F. O. H.

**Determination of the essential oil content of drugs.** T. T. COCKING and G. MIDDLETON (Quart. J. Pharm., 1935, 8, 435—442).—A modified type of apparatus (B., 1932, 1137) and its use are described and data thus obtained from various drugs, herbs, and spices are tabulated. The powdered prep. occasionally gives yields  $<$  those from the whole prep. F. O. H.

**Methoxyl number of fennel oil.** P. ROM (Pharm. Mh., 1934, 15, 287—288; Chem. Zentr., 1935, i, 1588).—The analysis of the oil is discussed in detail; good samples contain 63.6—76.8% of anethole (I), fore-runnings do not solidify in a freezing mixture and contain 18—24% of (I), whilst residual fractions have f.p.  $> 12^\circ$  and contain  $> 83\%$  of (I). H. N. R.

**New essential oils from wild-growing Central Asiatic plants.** T. K. GAPONENKOV (J. Appl. Chem. Russ., 1935, 8, 1055—1057).—The essential oils of *Ruta silversii*, Fisch. (0.05—0.117%), of *Echinophora sibthorpii*, Guss. (2.23—3.8%), and of *Matricaria disciformis* (0.46%) are of no commercial val., whilst those of *Prangos pabularia*, Linde (0.26%), and of *Trichanthemis nobilis* (0.09—0.12%) are of possible technical importance. R. T.

**Variations in the yield and composition of the essential oils of nutmeg sage in relation to meteorological conditions, time of collection, and state of the material to be distilled.** T. K. GAPONENKOV and S. S. ALESCHIN (J. Appl. Chem. Russ., 1935, 8, 1049—1054).—The highest content of essential oils is found when the plants are in full bloom, when the content varies from 0.6% dry wt. in the afternoon to 1.5% at night. The content of esters is greatest towards the evening, and least at night. The yields are lower in windy, dry weather than at other times. The essential oil content falls by 33% after storage for 3 hr. in the shade, and by 55% after 6 hr., whilst in the sun it falls by 62% after 6 hr. The material should therefore be collected at night, and immediately distilled. R. T.

**Phytopharmacy.**—See XVI.

See also A., Dec., 1488, Hypnotic arylalkylcarbamides. 1492,  $\beta$ -Arylethylamines. 1493, Synthesis of ephedrine derivatives. Halogen derivatives of novocaine. 1500, Testicular hormone. 1506, Antimalarial derivatives of 8-methylquinoline. Synthesis of plasmoguin-like derivatives. 1507, Alkyl-5-barbiturylacetanilides. S-containing barbiturate hypnotics. 1510, Cryst. vitamin-B. 1512—4, Alkaloids. 1515, Reactions of bismuthiol. 1516, Determination of  $\text{C}_5\text{H}_5\text{N}$  in presence of nicotine. 1531, Determination of cardio-active glucosides. 1545—7, Vitamins. 1549, Alkaloids of *Cytisus caucasicus*. Characteristics of *Nicotiana* species. 1550, Constituents of tobacco. Point fern (Engelsüss) as medicinal plant. Isolation of pyrethrin-II.

## PATENT.

**Combination of salicylic acid and a calcium salt.** M. WODLINGER (B.P. 438,222, 21.7.34).—See U.S.P. 1,969,998; B., 1935, 749.

## XXI.—PHOTOGRAPHIC MATERIALS AND PROCESSES.

**Preparation and treatment of [photographic] plates of silver bromide entirely free from colloids.** G. OLLENDORF (Bull. Soc. Franç. Phot., 1935, 22, 226—228).—Glass plates are coated with a layer of rubber, by pouring on a 1% solution of rubber in  $C_6H_6$  and evaporating the solvent. AgBr is deposited on this adhesive layer by sedimentation from a mixture of 250 c.c. of 0.1N-KBr solution and 150 c.c. of 0.1N-AgNO<sub>3</sub> solution at 18°, sufficient for four 9 × 12-cm. plates, during 16—18 hr. These plates give good results with a genol developer, without fogging. The AgBr adheres firmly to the rubber, which is entirely inert and has no effect on the AgBr. J. L.

**Method of testing [photographic] papers to be used for copying by contact with reflected light.** L. LOBEL (Bull. Soc. Franç. Phot., 1935, 22, 217—221).—Documents and other black and white images can be copied (cf. Breyer, 1889) by placing photographic paper face downwards on them and illuminating from above. With suitable exposure a general light fog is produced with darker images, where the light has been reflected from the white parts of the document; a negative print is produced. The emulsions should preferably be very contrasty. Papers are tested for such use by making prints over test-pieces of white and black paper of known reflexion densities, and measuring the densities of the print by transmitted light; the difference of these densities gives the max. contrast obtainable. The test images had a density difference of 1.15; the max. contrast obtainable in a print on contrasty paper was 0.8, and for ordinary bromide or chlorobromide papers 0.3—0.4. J. L.

**Keeping properties of photographic images on paper.** R. E. LIESEGANG (Phot. Ind., 1935, 33, 1032—1033).—Causes of deterioration are described. The effect of the combined toning and fixing bath on AgCl papers is discussed; citric acid in the emulsion decomposes the fixing solution. Blanquart-Evrard's method of physical development followed by sulphide toning gives very permanent results. A clearing bath of AcOH between development and fixing is not good, but the effects are removable by a dil. Na<sub>2</sub>CO<sub>3</sub> bath after fixing. It is essential to allow a sufficient time of washing of the prints. J. L.

**Stability of certain solutions of infra-red sensitizers.** G. SEMERANO (Annali Chim. Appl., 1935, 25, 473—481).—EtOH and aq. solutions of pinacyanol and of neo-, *allo*-, and rubro-cyanines, with and without NH<sub>3</sub> or an acid, have been tested in the light and dark. Solutions in EtOH prove the most stable and the stability diminishes in the order given above. NH<sub>3</sub> stabilises aq. solutions. Sensitisers with the methine chain in the *o*-position to the quinoline N atom are more stable than those with a *p*-methine chain, and the presence of large

substituents in the methine chain helps to increase the stability of the mol. T. H. P.

**Controllable sepia tones by redevelopment.** J. V. LEWIS (Amer. Phot., 1935, 29, 30—32).—The colour of sepia-toned prints can be controlled by bathing for a short time in a much diluted ordinary developer after the normal ferricyanide-bromide bleach. The prints are subsequently sulphided. CH. ABS. (e)

See also A., Dec., 1468, **Determining colour temp. of flashlights.** Negative photocatalysis.

## PATENTS.

**Production of diffraction patterns.** T. M. HAHN (U.S.P. 1,993,058, 5.3.35. Appl., 15.5.31).—A hollow, conical, divergent beam (especially of X-rays) is formed by passage through the annular space between two conical, opaque bodies and is then passed through the specimen, which is in sheet form in a holder with arcuate windows. The rays which are diffracted in the form of convergent cones of different angles are received on a sensitised film in an axial plane of the apparatus, forming patterns thereon characteristic of the crystals in the sample. A no. of spectrograph units may be assembled around a single source of rays. B. M. V.

**Sensitising dyes.**—See IV.

## XXII.—EXPLOSIVES; MATCHES.

## PATENT.

**Manufacture of bullets.** A. G. SCHURICHT, Assr. to WESTERN CARTRIDGE Co. (U.S.P. 1,992,244, 26.2.35. Appl., 29.7.27).—The Pb slug is plated with Cu in an alkaline bath and simultaneously burnished.

B. M. V.

## XXIII.—SANITATION; WATER PURIFICATION.

**Determination of fumigants.** II. Improved vacuum apparatus for measurement of gas concentrations. A. B. P. PAGE. III. Micro-determination of ethylene oxide and hydrogen cyanide. O. F. LUBATTI (J.S.C.I., 1935, 54, 421—424 T, 424—426 T).—II. An earlier apparatus (cf. B., 1933, 94) is modified. Three sampling vessels, reduced in size, are mounted in one container. Assembly is facilitated and handling simplified. A correction for the condensation of H<sub>2</sub>O vapour in the vessels is determined.

III. Micro-methods and technique for the determination of (CH<sub>2</sub>)<sub>2</sub>O and HCN with the above apparatus are described. Liquid (cf. B., 1933, 94) and gaseous (CH<sub>2</sub>)<sub>2</sub>O react similarly with acidified salt solutions. An acid solution containing 50 g. of MgBr<sub>2</sub> per 100 c.c. gives theoretical results.

**Effect of lead on pyrethrum extracts.** Deleterious effects of lead cap liners and solder in containers on pyrethrum fly sprays. L. S. BAKE (Soap, 1935, 11, 111, 113).—Extracts may be stored without decomp. in contact with Sn, Al, Fe, or Ni. In presence of Pb or solder rapid decomp. of pyrethrins occurs. A. G. P.

**Nature and amount of colloids present in sewage.** VII. Effect of bubbles of gas and agitation on sewage liquors. E. WILLIAMS (J.S.C.I., 1935, 54,

355—361 T; cf. B., 1935, 976).—The effect of passing bubbles of gas through domestic sewage on the coagulation or flocculation of the dispersed matter has been studied at 0°, 10°, 25°, 37°, and 80°. Temp. is shown to have a large effect on the amount of coagulation produced. Experiments in which the sewage samples were agitated by glass paddles out of contact with air showed that coagulation of dispersed matter takes place under these conditions.

**Survey of the River Tees. II. The estuary—chemical and biological.** W. B. ALEXANDER, B. A. SOUTHGATE, and R. BASSINDALE (Dept. Sci. Ind. Res., Water Pollution Res., 1935, Tech. Paper No. 5, 171 pp.).—A 7-mile central section of the estuary receives untreated sewage from 280,000 people and numerous industrial effluents, the most important of which are from coke ovens. The tar acids present are less toxic than the cyanides, which latter are considered to be mainly responsible for the destruction of migratory fish. In this section the liquors are carried to and fro by the tides and the cyanides are only slowly decomposed, but when mixed with estuarine H<sub>2</sub>O the decomp. is more rapid. Modifications in works practice have been suggested with a view of reducing the amount of such polluting liquor. C. J.

**Vienna spring water and [effect of] lead piping.** F. X. MAYER (Abh. Gesamtgeb. Hyg., 1934, 16, 1—39; Chem. Zentr., 1935, i, 1598).—Dissolution of Pb from soft piping and the influence of the presence of Sb, Cd, Sn, and Na in the metal are examined. A. G. P.

**Electro-osmotic purification of water.** O. N. GRIGOROV, A. V. MARKOVITSCH, I. I. SHUKOV, and B. P. NIKOLSKI (J. Appl. Chem. Russ., 1935, 8, 965—980).—A cell is described in which the catholyte is separated from the central chamber by a diaphragm consisting of a textile fabric coated with regenerated viscose cellulose, and the anolyte by bakelite paper (paper impregnated with bakelite lacquer, heated at 80° for 6 hr., and washed with 3*N*-HCl for 24 hr.); the membranes are, respectively, negatively and positively charged, and are resistant to strong acids and to Cl<sub>2</sub>. The rate of elimination of different ions from the central chamber increases in the order Mg<sup>++</sup> < Ca<sup>++</sup> < Na<sup>+</sup>, and SiO<sub>3</sub><sup>''</sup> < CO<sub>3</sub><sup>''</sup> < SO<sub>4</sub><sup>''</sup> < Cl<sup>'</sup>. The apparatus is not adapted to elimination of colloidal org. substances, which are deposited in the pores of the membranes of the last cells of the series, necessitating their frequent replacement; hence the org. solutes of natural H<sub>2</sub>O should be removed by coagulation before electro-osmosis. H<sub>2</sub>O containing > 7—15 mg. of solutes can be prepared electro-osmotically with a fuel expenditure 1/5 of that required in the distillation procedure. R. T.

**Mechanism of electro-osmotic purification of water. I. Influence of hydrogen- and hydroxyl-ion concentration in the electrode chambers in the course of the process.** I. S. KATZEN and A. V. VIRVO (J. Appl. Chem. Russ., 1935, 8, 952—964).—The rates of flow of H<sub>2</sub>O in the anode and cathode chambers should be varied for each individual salt, depending on the relative concns. of the acid and base formed from the salt during electrolysis. Thus, in the case of Na<sub>2</sub>SO<sub>4</sub>, the rates should be as 5:1 in the anode and cathode

chambers, respectively, whilst in that of Ca(HCO<sub>3</sub>)<sub>2</sub> the corresponding ratio is 1:5, and in the case of tap-H<sub>2</sub>O it should rise from 4.5:1 in the first cell to 7.6:1 in the last. R. T.

**Determination of the p<sub>H</sub> of water.** E. and K. NAUMANN (Gas- u. Wasserfach, 1935, 78, 901—903).—The importance of the p<sub>H</sub> of H<sub>2</sub>O in its relation to H<sub>2</sub>O analysis and purification is stressed. The determination of p<sub>H</sub> by the colorimetric method, using indicators, is described. The limits of accuracy of this method are given and certain difficulties in the method stated. These latter are overcome by measuring p<sub>H</sub> potentiometrically. This method (with suitable apparatus) is described and discussed. E. L. S.

**Spent sulphite-liquor utilisation.**—See V.

See also A., Dec., 1472, **Determining silicic acid in H<sub>2</sub>O and mineral waters.**

#### PATENTS.

**Treatment of liquids.** J. G. THOMAS (U.S.P. 1,994,055, 12.3.35. Appl., 23.11.32).—Sewage or the like is passed in series through a no. of units comprising tanks containing refractory granular material having such large interstices that no true straining action takes place. The raw sewage enters the cleanest mass and the treated sewage the foulest mass; the latter is, at intervals, with its vessel, lifted by crane and dumped into a dryer and incinerator. B. M. V.

**Sewage aëration.** F. A. DOWNES, A. J. FISCHER, and N. B. LUND, Assrs. to DORR CO., INC. (U.S.P. 1,994,887, 19.3.35. Appl., 30.12.30).—The bottom of the aërating tank is formed as two parallel troughs with a low wall between; air is admitted through suitable disseminating means at the top of that wall and is carried downwards and outwards by rotating paddles which also keep the sewage in gentle vertical rotation. B. M. V.

**Composition for water [or sewage] purification.** B. F. TIPPINS, Assr. to ACTIVATED ALUM CORP. (U.S.P. 1,993,761, 12.3.35. Appl., 12.9.32).—A composition for the purification of sewage and the like watery materials consists chiefly of a dry coagulant, e.g., FeSO<sub>4</sub> or Al<sub>2</sub>(SO<sub>4</sub>)<sub>3</sub>, with a small proportion of activated C. B. M. V.

**Sewage treatment.** C. C. HAYS (U.S.P. 1,991,896, 19.2.35. Appl., 15.10.31).—The screened and detritus-free sewage is passed through a succession of upward-flow filters in which aërobic conditions are maintained by means of compressed air introduced beneath a false bottom. An intermediate settlement tank is introduced to remove coagulated solids which would retard the nitrifying action which takes place in the later filtration compartments, and the purified sewage is passed through a final humus tank. C. J.

**Treatment of ooze.** W. LEETZ (B.P. 437,320, 5.9.34).—The ooze is partly dried, then frozen, and finally dried by heat, which treatment causes it to break up into lumps suitable for spreading on fields. B. M. V.

**Bed filters. Extracting liquid from sludge.**—See I.