

# BRITISH CHEMICAL ABSTRACTS

## B.—APPLIED CHEMISTRY

AUGUST 2 and 9, 1935.\*

### I.—GENERAL; PLANT; MACHINERY.

**Heat-transmitting surfaces in apparatus construction.** R. SAMESREUTHER (Chem.-Ztg., 1935, 59, 476—478).—For indirect heating with high-pressure steam or hot H<sub>2</sub>O apparatus is now available with an external coil welded to the inner vessel, or with an outer wall provided with numerous perforations the edges of which are welded to the inner wall. Both of these constructions provide good heat transmission and strength to withstand internal pressure or vac. A. G.

**Grain size in grinding.** P. ROSIN and E. RAMMLER (Ber. deuts. keram. Ges., 1934, 15, 399—416; Chem. Zentr., 1935, i, 456—457; cf. B., 1934, 480).—The % of the material with grain size  $> x$  is given by  $R = 100e^{-bx}$ ,  $b$  and  $n$  being consts. The expression holds for a variety of materials and for grain sizes  $< 1$  mm. H. J. E.

**Grinding ores.**—See X. **Pptn. of dust.**—See XI.

### PATENTS.

**Rotary-hearth furnaces.** METALLGES. A.-G., Assees. of F. (BARON) VON SCHLIPPENBACH (B.P. 428,967, 14.4.34. Ger., 25.4.33).—A furnace comprising an annular shelf above an annular rotating hearth, especially for the prep. of Pb by roast-reaction, is completely surrounded by a conical hood in which are only small openings for inspection and the operation of a mechanical rabble. B. M. V.

**Apparatus for drying, calcining, or roasting material such as cement, lime, and other slurry, ore, or the like.** E. ALLEN & Co., LTD., and H. ANDREWS (B.P. 428,230, 9.11.33).—The material is tumbled together with loose heat-transmitting bodies in a mill composed of a wide belt of chain links rotating between end walls, the whole being inserted in a flue carrying the necessary hot gases. B. M. V.

(A) **Plate heat exchangers for fluids.** (B) **Heat-exchange apparatus for fluids and elements or plates therefor.** R. SELIGMAN, H. F. GOODMAN, and W. E. CROSBY (B.P. 428,631 and 428,634, [A] 9.12.33, [B] 20.12.33).—(A) Hydraulic or pneumatic means for opening and shutting the press and resilient means for permitting expansion in use are described. (B) The plates are formed of pressed metal; the claims relate mainly to the formation of the rims to secure stiffness and to accommodate packing rings. B. M. V.

**Compositions for fluid transmission of power.** AUTOMOTIVE PRODUCTS Co., LTD., and W. P. SMITH (B.P. 429,175, 18.11.33).—The mixture comprises castor oil 50, triacetin 25, and either Bu carbitol 25% or, more generally, an acetate of a polyhydric alcohol with

optionally a lubricating oil and an agent to increase their mutual solubility. B. M. V.

**Production of cold and heat.** A. F. LEBRE (B.P. 429,172, 18.9.33).—In order to render useful a source of heat at low temp. (100—200°) for production either of a smaller quantity of heat at higher temp. or of cold, and without needing much mechanical energy to effect the change of grade: one gas is operated in an input cycle as in B.P. 427,957 (B., 1935, 609), the compression and expansion being approx. isothermal (*i.e.*, in stages with heat exchange) and the max. pressure being preferably atm.; another gas, *e.g.*, flue gas or air heated by it, is operated in an output cycle in which further heating is effected after adiabatic compression to atm. pressure and cooling is effected after adiabatic expansion. The changes in vol. due to the opposite courses of the two gases are compensated by actual transfer of gas in an apparatus also described in the prior patent. B. M. V.

**Production of cold.** ELECTROLUX, LTD., Assees. of PLATEN-MUNTERS REFRIGERATING SYSTEM (B.P. 428,058, 30.10.33. Ger., 1.11.32).—Cooled exhaust gas itself (of an internal-combustion engine), or another gas set in circulation thereby by means of an ejector or the like, is passed through a heat exchanger (*A*) and expanded adiabatically to produce useful cold, the used but still cool exhaust gases being passed through *A*. B. M. V.

**Temperature- or pressure-control apparatus.** W. HALL (B.P. 428,854, 14.9.33).—A no. of remote heat-sensitive devices are connected to individual diaphragms (*D*) at a central point, and any *D* will operate the single heat-control device. B. M. V.

**Impact pulverisers.** W. DREW and M. T. EDGE (B.P. 428,221, 9.11.33).—A swing-hammer pulveriser having a comparatively long shaft is provided with hammers which are longest at the centre of the length of the shaft and shortest at the ends, the perforated screen or grid encircling the lower arc being correspondingly shaped. B. M. V.

**Pulverising mills for reduction of mineral ores or the like.** F. C. HORTON. From ISHERWOODS, LTD. (B.P. 428,474, 14.11.33).—In a mill comprising edge runners rotating on stationary axes in a rotating pan (*P*), in addition to stationary scrapers near the bottom of *P*, jets of H<sub>2</sub>O are provided to agitate the pulp and project the ground material through screens in the wall of *P*. B. M. V.

**Beater mills.** ALLGEM. ELEKTRICITÄTS-GES. (B.P. 428,651, 11.6.34. Ger., 9.6. and 20.8.33).—The beaters are secured between circular plates one only of which is attached to the shaft, the other being formed with a central aperture for the entry of material. The space

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



between the beaters and the fixed element gradually increases in the direction of rotation. B. M. V.

**Grinding, crushing, and mixing mills.** J. WASS (B.P. 428,237, 20.11.33).—The pan (*P*) of an edge-runner mill is rotated at centrifugal speed and air-separation of grit and dust is effected between the edge of *P* and an outer casing, the necessary draught being produced by a fan below *P*. Either or both of *P* and the runners (*R*) are conical, and the shafts of *R* may be either inclined so as to give no theoretical slip between *P* and *R* or horizontal so as to produce relative slip. B. M. V.

**Rotary [pneumatic] apparatus for separation of powdered or granular material.** E. COPPÉE & Co. (B.P. 428,754, 12.9.34. Belg., 25.11.33).—A feed hopper superposed on a centrifugal disc feeder is provided with adjustable outlet orifices part way up the sides in addition to normal outlet ports around the bottom. B. M. V.

**[Pneumatic] classifiers.** H. A. CUPPY (B.P. 429,035, 24.11.33).—Material of successive degrees of fineness is collected from (1) a separator of the whirling, upward-current type, (2) a cyclone, and (3) a bag-filter. Most of the air is returned from (3) to (1). B. M. V.

**[Flotation] apparatus for treating materials.** W. DE COURSEY (U.S.P. 1,958,035, 8.5.34. Appl., 11.4.27).—Claim is made for a froth-flotation plant in which the cells are rotated to expel the froth over the rims while the tailing pulp is removed from the top of the central portion of the cells. A. R. P.

**Filters.** J. W. and T. D. WHITFIELD (WHITFIELD BROS.) and H. CHAPMAN (B.P. 428,519, 2.10.34).—An edge-filter element especially suitable for sewage is constructed of strips of polished rigid material (*e.g.*, glass) assembled in a perforated tray or having a rim of depth approx. = the width of the strips. They are either disposed with a capillary space between each, or are interleaved with strips of felt. B. M. V.

**Filters.** LINEN INDUSTRY RES. ASSOC., J. A. MATTHEW, C. P. BLACK, and R. J. B. KEIG (B.P. 428,962, 23.3.34).—The filter proper (*F*) is in the form of a bag and is loosely filled with sawdust which is kept in motion by the prefill and scours the surface of *F*. B. M. V.

**Filtering apparatus.** M. VOGEL-JØRGENSEN (B.P. 428,796, 20.11.33).—Groups of vac-filter leaves are attached to a chain conveyor, always project from it, and are carried by it through the various stages of the process. B. M. V.

**Filtering apparatus for liquids.** R. BOSCH A.-G. (B.P. 428,191, 20.10.34. Ger., 21.10.33).—A pile of annular discs of felt or the like to be operated with radial flow is threaded on a perforated tube and kept under axial compression by a spring to take up contraction on wetting. B. M. V.

**Selective separation of liquids from other commingled liquids, suspensions, sludges, dispersions, and the like.** P. DAVIE, Assee. of L. CAMMEN (B.P. 429,093, 18.10.33. U.S., 18.10.32).—A pack filter operating mainly by surface tension is described, the apertures being  $< 0.020$  in. wide and their length in direction of flow  $< 4$  times the max. diam. B. M. V.

**Fluid-straining apparatus.** ANDALE Co., Assees. of D. R. McNEAL (B.P. 428,210, 29.9.33. U.S., 20.2.33).

—A rotary strainer suitable for insertion in a pressure conduit (*A*) comprises a pocketed disc which passes during a minor part of a revolution between minor supply and exhaust conduits (*B*) for producing a back-wash, the flexible packing of the division having to resist only the difference in pressure between *A* and *B*. B. M. V.

**Prevention of damage to centrifuges.** BERGEDORFER EISENWERK A.-G. ASTRA-WERKE (B.P. 428,188, 16.10.34. Ger., 20.12.33 and 17.3.34).—In a bowl-type centrifuge provided with a conveying device (*A*) for continuously removing the solids (*S*), increased resistance to *A* due to accumulation of *S* causes the supply of pulp to be shut off, the supply of any flushing liquid to be increased, and, at the limit, the driving mechanism of *A* to be disconnected. B. M. V.

**Aërotors or agitators [for pulp].** L. H. LOGUE and H. V. WALLACE (B.P. 428,457, 8.11.33. U.S., 8.11.32).—In a tank, a propeller below a main down-cast conduit (*D*) produces a circulation downwards in the middle and upwards in the main part of the tank back to the upper end of *D*, which is just below the surface of the pulp (*P*). A no. of satellite upcasts operated by air-lifts draw *P* from the bottom of the tank and deliver it through side apertures into *D*. B. M. V.

**Controlling the viscosity of liquids.** PEABODY, LTD. From PEABODY ENG. CORP. (B.P. 428,431, 13.10.34).—The liquid (or a by-pass flow of it) is, after heating, caused to flow under const. pressure-drop (*P*) through a coil having wall friction, and the rate of flow is caused to regulate the heating medium by means of the *P* produced in a Venturi throat or sharp-edged orifice. The const. *P* may be determined by a syphon valve. B. M. V.

**Indicating and/or recording the quantity of suspended matter in fluids.** J. O. SAMUEL, and EMLYN ANTHRACITE COLLIERY, LTD. (B.P. 428,464, 11.11.33).—The fluid, *e.g.*, used coal-washery  $H_2O$ , is passed in a thin layer between glass plates at right-angles to a beam of light passing from a lamp and condensing lenses to a Se cell or like device. B. M. V.

**Cell for optically examining or testing liquid.** F. J. MAW (B.P. 429,242, 7.11.34).—Two transparent plates are closed together like a book at a predetermined distance apart, the means for escape of excess liquid comprising radial grooves and a surrounding gutter. B. M. V.

**Water softeners of the zeolite type.** I. G. PERRETT (B.P. 428,959, 13.2.34).—In a portable or other small apparatus, *inter alia*, the zeolite is restrained in both directions by plates which are perforated with a burr, the burrs pointing against the flow of  $H_2O$ . B. M. V.

**Rotary-drum film evaporator.** J. F. DIETRICH (B.P. 429,048, 10.1.34).—The internal surface is the effective one, operation being on the batch system with continuous make-up feed as long as possible. The semi-dry material is scraped off the wall on the descending side and rolled back on the ascending side by a resilient roller until the batch is finished. Vac. is provided for. B. M. V.



**Vacuum-distillation apparatus.** F. E. BANCROFT, and ASSOCIATED ELECTRICAL INDUSTRIES, LTD. (B.P. 428,719, 28.2.34).—In an apparatus, *e.g.*, for mineral oils, comprising a condensing surface (*C*) inside the still situated at a distance from the vaporising surface (*V*) which is  $\gt$  the mean free path of the mols., *C* and *V* are vertical and co-axial and the claims relate mainly to a distributor above *V* to produce a uniform film of liquid. B. M. V.

**Centrifugal apparatus for separating and collecting dust or other solid particles from air and gases.** C. H. W. and C. H. CHELTNAM (B.P. 429,028, 20.11.33).—In a cyclone separator, means are provided to add air to, or subtract air from, the dust-education pipe, to modify the conditions of separation. B. M. V.

**Gas-conditioning apparatus.** C. R. DOWNS (B.P. 429,066, 23.5.34. U.S., 23.5.33).—The gas is passed in successive contact with (1) hygroscopic liquid, (2) deliquescent solid in a no. of zones. The drainage from (2) is transferred to (1), and cooling is effected certainly in (2) and optionally in (1). B. M. V.

**Apparatus for controlling the humidity and temperature of air.** T. ANDREW (B.P. 428,319, 12.2.34).—The temp. of hot H<sub>2</sub>O for sprays is controlled by a thermostat, and a hygostat starts and regulates an air heater or the H<sub>2</sub>O pump according as the humidity is too high or too low. B. M. V.

**Apparatus for use in gas analysis.** H. W. BLANCHE (B.P. 428,568, 17.7.34. Austral., 20.7.33).—The various elements of an absorption apparatus, including an exploder, are connected to a capillary tube by means of T-cocks. B. M. V.

**Model for demonstration of crystal forms and the like.** S. SMITH, and W. & J. GEORGE, LTD. (B.P. 428,082, 8.11.33).—Telescopic rods are connected, three at a point, by means of universal joints. B. M. V.

**Foam generation for fire-extinguishing purposes.** C. W. SÖDERBERG (B.P. 428,103, 12.1.34).—In a system utilising (1) pressure-H<sub>2</sub>O, (2) pressure-gas or -air, and (3) a foam-producing agent, the straight flow of (1) is converted into a whirling motion before addition of (3) and after formation the foam is agitated by an idle propeller or the like. B. M. V.

**[Boiler] furnaces [for fuel of high moisture content].** R. VON MATTEKOVICH (B.P. 428,558, 26.1.34).

**[Underfeed mechanical stoker for] furnaces.** E. O. WATERLOW (B.P. 429,836, 1.12.33).

**Expansion joints.**—See IX. **Liquid-filtering means.** **Drying vegetable material.**—See XIX.

## II.—FUEL; GAS; TAR; MINERAL OILS.

**Ash content of coals and its removal.** M. F. BERTRAND (Rev. univ. Mines, Mét., 1934, [viii], 10, 537—544; Chem. Zentr., 1935, i, 180).—Belgian practice in ash removal is discussed. J. S. A.

**Improvement of briquette quality by the use of higher coal temperatures.** H. PIATSCHCK (Braunkohle, 1934, 33, 721—726; Chem. Zentr., 1935, i, 336).—

For Helmstedt-Oschersleben coal a rise in the coal temp. from 10° to 75° increases the strength by 235%. H. J. E.

**Examination of coals for production of blast-furnace coke.** J. L. LAMBERT (Gas World, 1935, 102; Coking Sect., 16—18).—An apparatus and experiments are described designed to show the swelling propensities of coal in order to assess its suitability for coking. Great importance is attached to giving the samples identical drying exposures in order to obtain comparable results, since heating for 48 hr. at 105° caused the agglutinating index of a coal to drop from 23 to 14 and its nett expansion of 321% to be completely lost. It was also necessary to place all coals on a common ash basis. There is no definite ratio between agglutinating index and % nett expansion. Expanding coals had C limits between 88.4 and 84.9% and C/H ratios between 17 and 19. Cokes giving  $<$  25% nett expansion with ash  $\gt$  7% are generally of no use for blast-furnace coke without blending. Tests carried out in an experimental oven were used in connexion with the experiments, and confirmation was obtained in high-temp. SiO<sub>2</sub>-brick ovens. D. M. M.

**Changes in the vapour pressure of lignitic brown coal with rising temperature.** V. SKUTL (Braunkohle, 1934, 33, 705—709, 726—730; Chem. Zentr., 1935, i, 503).—Data for the v.p. at varying temp. with const. H<sub>2</sub>O content are recorded. Physical changes during dehydration are discussed. H. J. E.

**Combustion of coke.** R. A. MOTT (Gas World, 1935, 102, Coking Sect., 37—43).—The influence of pore surface on the combustion under different conditions has been investigated. Since the penetration of O<sub>2</sub> to burn on the internal surface is limited to a depth of  $\frac{1}{8}$  in. (approx.), it follows that the proportion of internal surface taking part in combustion is the greater the smaller is the screen size of the coke, and therefore erroneous conclusions may be reached from laboratory experiments using coke  $<$   $\frac{1}{8}$  in. size;  $\frac{1}{2}$ -in. samples are preferable. External surface influences combustion considerably, hence the smaller sizes are the more reactive and should be used at low rates of combustion and low temp. Max. temp. attained in a coke bed depends on the rate of air supply, and when the rate of combustion is  $\gt$  15 lb./sq. ft./hr. temp. above the fusion point of the ash are obtained; but as rates in domestic appliances give max. temp.  $<$  this the ash should be removed as powder. In open grate, resistance to air passage is important, due to low draught available, and limits the extent to which reactivity can be increased by decreasing size, on account of high resistance of small coke to air passages. Therefore sp. reactivity is here important and influences the time required to obtain a bright fire. D. M. M.

(A) **Thermal decomposition of wood with superheated steam.** P. A. BOBROV. (B) **Influence of circulation of incondensable gases and tar on destructive distillation of wood.** S. P. NASAKIN, S. N. VSHIVTSEV, and M. F. SANENKOVA (Trud. Tzent. Nauch.-Issl. S.S.S.R., 1934, 5, 3—41, 78—108; cf. B., 1934, 233).—(A) Data are given for the products of destructive distillation of various types of wood with



superheated steam. Under normal conditions of decomp. with steam no gases or resins are formed, the chief products being H<sub>2</sub>O-sol. substances found in the distillate and non-volatile residues from the vac. distillation of the latter. Compared with destructive distillation without steam, the yield of MeOH is the same and that of acids is increased 100%.

(B) A discussion. Data on the forced recirculation of heated decomp. gases and tar in the distillation of birch wood are given.

CH. ABS. (e)

#### Content of non-volatile carbon in charcoal in relation to conditions of carbonisation and coking.

V. N. KOZLOV and A. D. MISHIN (Trud. Tzent. Nauch.-Issl. S.S.S.R., 1934, 5, 42—77).—Results on the coking of pine, birch, and spruce charcoals under various conditions are given.

CH. ABS. (e)

**Properties of activated charcoals.** K. SMOLENSKI and W. ERO (Prace Centr. Lab. Cukrown. Lat., 1932—33, 1934, 64—95).—Charcoals are grouped into 3 classes: (a) those of high adsorbing and decolorising power, (b) those of less adsorptive power (*A*) but permitting rapid filtration, and (c) those of low *A* but highest speed of filtration. The last-named adsorb cations but little. Chemically prepared samples have high *A*, whereas physical processes confer the property of rapid filtration.

CH. ABS. (p)

[Regeneration of] active charcoal. LAUWERS (Bull. Assoc. anc. Elèves Inst. supér. Fermentat. Gand, 1934, 35, 233—240; Chem. Zentr., 1935, i, 125).—A review. Active C used for decolorising sugar, molasses, etc. may be regenerated by fermentation.

J. S. A.

**Water vapour content of natural gas.** L. E. WOODRUFF (Oil and Gas J., 1934, 33, No. 27, 39, 42).—An apparatus for determining the dew point is described.

CH. ABS. (e)

**Production of gases by the electric arc or hot filament.** F. PEŤRÍK (Chem. Obzor, 1934, 9, 43—46; Chem. Zentr., 1935, i, 181).—A gas rich in H<sub>2</sub> is produced by the arc or spark in H<sub>2</sub>O vapour, using Zn electrodes. C electrodes yield very pure water-gas. With EtOH a mixture of H<sub>2</sub>, CH<sub>4</sub>, CO, and hydrocarbons is formed; highly calorific gases are formed also from petroleum.

J. S. A.

**Local use of compressed gas for vehicle operation.** J. J. POLLOCK (J. South African Inst. Engrs., 1934, 33, 109—114).—The use of compressed sludge-gas (CH<sub>4</sub> 72, CO<sub>2</sub> 28%) is described and discussed.

CH. ABS. (e)

**Iron carbonyl, its formation and effect in town's gas.** L. KAATZ and H. E. RICHTER (Gas- u. Wasserfach, 1935, 78, 361—365).—Deposits of Fe<sub>2</sub>O<sub>3</sub> on the gas mantles and stoppages of the by-passes to the burners were traced to the presence of Fe(CO)<sub>5</sub> (I) in town's gas, which had been formed during storage of the gas in a holder previously used only for water-gas. The formation of (I) in town's gas under usual storage conditions is slight because the walls of the holder are protected by a thin layer of C<sub>10</sub>H<sub>8</sub> or other hydrocarbons. The possibility of (I) in long-distance transmission systems is slight also because a protective layer is rapidly formed; its formation in compressed gas used as fuel for motor vehicles may, however, give rise to

difficulties due to deposits on the sparking plugs. The possibility of the formation of COS and CS<sub>2</sub> during storage of gas due to interaction of CO with H<sub>2</sub>S in presence of Fe is also briefly discussed.

A. B. M.

**Ignition temperatures of gases.** K. BUNTE and A. BLOCH (Gas- u. Wasserfach, 1935, 78, 325—329, 348—354).—The gas and air (or O<sub>2</sub>) were passed through an electrically-heated SiO<sub>2</sub> tube, the gas passing through a concentric inner tube and the air through the surrounding annular space so that they could be heated nearly to the ignition temp. (*I*) before being allowed to mix. Mixing was facilitated by interposing a short length of capillary tube between the preheating and the combustion tube. *I* vals. were read by means of a suitably placed thermocouple. The following are typical vals.: H<sub>2</sub>-air (dry) 608° for all mixtures from 10% to 70% of H<sub>2</sub>; H<sub>2</sub>: air (moist) 612—616°; CO-air (dry) 719°, 685°, and 699°, and (moist) 652°, 628° and 631°, for 20, 65, and 80% of CO, respectively; CH<sub>4</sub>-air (dry) 745° and 797°, for 6 and 14% of CH<sub>4</sub>, respectively; CH<sub>4</sub>-O<sub>2</sub> 655° (14%); C<sub>2</sub>H<sub>4</sub>-O<sub>2</sub> 572°, 539°, and 485°, for 7, 15, and 60% of C<sub>2</sub>H<sub>4</sub>, respectively; coal gas-air 630° (12—30%). The *I* vals. of the gases, with the exception of CO, were little affected by the presence of moisture. The replacement of the N<sub>2</sub> of the air by CO<sub>2</sub> raised *I*.

A. B. M.

**Distillation of coke-oven tar.** L. SCHUMANN (Chem. Obzor, 1934, 9, 123—124, 140—142; Chem. Zentr., 1935, i, 504).—The mean sp. heat of the tar (*s<sub>m</sub>*) = *a* + *b* × [(*t*<sub>1</sub> + *t*<sub>2</sub>)/2], where *b* = 0.001 and *a* is 0.24—0.45 (mean 0.38). Latent heat data calc. from Trouton's rule and calc. vals. for heat used in distilling at 760, 350, and 150 mm. are recorded.

H. J. E.

**Conversion of creosote into motor spirit.** J. G. KING (Gas Eng., 1935, 52, 15—17).—A comprehensive review and discussion of the hydrogenation of creosote in a small-scale, continuous, experimental plant for vapour-phase cracking, operated at the Fuel Research Station.

CH. ABS. (e)

**Catalytic conversion of peanut oil into light spirit.** K. PING (J. Chinese Chem. Soc., 1935, 3, 95—102).—Light spirit (I), b.p. range 40—250° (30% yield), is obtained by heating the oil with 1 wt.-% of AlCl<sub>3</sub> up to 400°. The residue on cracking yields a further 20% of (I).

F. N. W.

**Determination of octane number of light motor fuels.** R. HEINZE and M. MARDER (Angew. Chem., 1935, 48, 335—338).—The C<sub>8</sub>H<sub>18</sub> no. of hydrocarbons is inversely ∝ the parachor over the b.p. range 90—150°. It may be determined from measurements of *d*, surface tension, and b.p.

E. S. H.

**Thickening of wash oil.** H. WINTER and G. FREE (Glückauf, 1934, 70, 1028—1031; Chem. Zentr., 1935, i, 504).—H<sub>2</sub>S and O<sub>2</sub> in the gases are responsible for thickening. Hydrogenation of the exhausted oil under pressure lowers *η* and *d*, but the tendency for resinification and asphaltisation remains.

H. J. E.

[Electrical] conductivity of oils and waxes. A. GEMANT (Nature, 1935, 135, 912; cf. A., 1932, 676; 1934, 585).—The increase in conductivity of heavy oils and of paraffin wax near the m.p. with fall in temp. may be due



to progressive crystallisation with a fall in temp., the substances behaving as 2-phase systems. L. S. T.

**Chlorinated hydrocarbons as transformer oils. Prevention of fire and explosion risks.** FREITAG and H. A. LÜHL (Maschinenschaden, 1934, 11, 160—161; Chem. Zentr., 1935, i, 338).—A mixture of pentachlorodiphenyl and  $C_6H_3Cl_3$  ("Pyranol") is non-combustible and is suitable for use in transformers. H. J. E.

$C_3H_8$ .—See III. **Road construction.**—See IX. **C black and rubber vulcanisation.**—See XIV. **Liquids for smoking meat.**—See XIX. **Purifying the Elbe.**—See XXIII.

#### PATENTS.

**Concentrating tables for washing coal and the like.** L. W. NEEDHAM (B.P. 428,614, 15.11.33 and 15.12.34).—A wet shaking table is operated with a limited amount of liquid so that the bed is always in a viscous condition. B. M. V.

**Fuel briquettes.** C. J. LORD (B.P. 428,982, 6.7.34).—Coal, coal slack, peat turf, turf mould, and/or sawdust are comminuted and bound with cement ( $C$ )  $\leq$  20% and sand ( $S$ )  $\leq$  10%,  $C + S$  being  $\geq$  45%. B. M. V.

**Coal-dust mills and the like.** A.-G. BROWN BOVERI & Co. (B.P. 428,573, 8.8.34. Ger., 8.8.33).—A power plant fired by pulverised fuel comprises both steam ( $S$ ) and gas turbines ( $G$ ), either being the principal engine as desired. In either case the comminuting means, either a mechanical pulveriser itself, or an air compressor for a pneumatic impact pulveriser, is driven by a  $G$ , as is also the compressor for the air required for any combustion in any  $G$ . The waste gases from  $G$  pass under a boiler which is pressure-fired with all or some of the comminuted fuel. B. M. V.

**Coke ovens.** H. DREHSCHMIDT (B.P. 427,549, 22.9.33).—Each regenerator ( $R$ ) of a chamber oven has two distributing channels ( $C$ ) through which cold air or gas can be supplied to  $R$ , or combustion products withdrawn therefrom. The openings from  $C$  into  $R$  are graduated in size to ensure a uniform distribution of flow of air or gas thereto. One of the  $C$  is provided with a valve or damper so that a part of the gas and air supply to the  $R$  can be shut off without interfering with the proper distribution of air and gas in the  $R$  when it is desired to operate the oven at a medium instead of a high temp. A. B. M.

**Construction of carbonising chambers, retorts, and like apparatus for heat treatment of carbonaceous materials.** GAS CHAMBERS & COKE OVENS, LTD., and F. RITSON (B.P. 428,268, 22.9.34).—The brickwork of retort settings etc. is supported by buckstays tied together by means of hollow tie-rods through which cool air is passed, e.g., by leaving one end open to the atm. and connecting the other to a source of draught. The rod may be enclosed in heat-insulating material in such manner as to leave an annular space between the rod and the material, through which also a current of cool air may be passed. A. B. M.

**Carbonisation of coal.** PITTSBURGH COAL CARBONIZATION Co., Assees. of C. E. LESHER (B.P. 427,849, 28.6.34. U.S., 20.7.33).—Coal is heated in contact with air in a

roaster in order to modify its agglutinating properties, and is then transferred to a rotary retort wherein it is carbonised under such conditions that it is formed into balls of semi-coke suitable for use as a domestic fuel (cf. B.P. 275,602; B., 1928, 436). For the better control of the pretreatment the roaster is so designed that a bulk of coal is continuously recirculated therein; from this a regulated amount is withdrawn for transfer to the retort, a corresponding amount of fresh coal being continuously added. A. B. M.

**Production of carbon black.** SOC. FRANÇ. DU CARBONALPHA ET DE SES DÉRIVÉS, Assees. of G. BONAME (B.P. 427,396, 14.10.33. Fr., 17.10.32).—A current of gas rich in CO is preheated and passed upwardly through a reaction chamber ( $R$ ) at a speed (e.g., 5 cm./sec. at 400°) slightly  $<$  that at which the C formed is carried away as fast as it is produced; the speed is subsequently accelerated to above this crit. val. to remove the accumulation of C from  $R$ . The C in  $R$  is maintained in agitation, either mechanically or by causing the pressure of the gas current to fluctuate. A. B. M.

**Reactivation of adsorbents.** GAS LIGHT & COKE Co., R. H. GRIFFITH, and R. S. CHAPLIN (B.P. 428,413, 11.4.34. Addn. to B.P. 374,597; B., 1932, 831).—Coal gas, town's gas, or other industrially available gas is used as the hydrogenating agent after removal of  $H_2S$  and benzol. B. M. V.

**Destructive hydrogenation of carbonaceous materials.** R. HOLROYD, C. COCKRAM, and IMPERIAL CHEM. INDUSTRIES, LTD. (B.P. 427,883, 29.7. and 30.12.33).—The process is carried out in presence of a compound, e.g.,  $CCl_4$ , which forms a H halide under the reaction conditions, in an amount such that  $\leq$  0.1% (calc. on the solid carbonaceous material) of the H halide is formed in excess of that required to neutralise the basic constituents in the ash. The coal etc. is preferably cleaned to reduce the ash content before treatment. A. B. M.

**Treatment of carbonaceous materials with hydrogenating gases and apparatus therefor.** H. E. POTTS. FROM INTERNAT. HYDROGENATION PATENTS Co., LTD. (B.P. 427,435, 22.12.33).—The process is carried out in apparatus provided with a thin lining of Ta, or alloys of Ta with Cr or Ni steels, etc. Corrosion is prevented when working with reagents containing HCl,  $NH_4Cl$ , etc. A. B. M.

**Manufacture of hydrocarbon gases.** H. DREYFUS (B.P. 427,798, 26.10.33 and 13.7.34).—Unsaturated hydrocarbon gases, e.g.,  $C_2H_2$ , are produced by causing C to react with  $CH_4$  and/or  $H_2$  at  $>$  1000° (1300—2000°), heat being supplied to the reactants by combustion of part of the gas; e.g., finely-divided C may be blown through a flame of burning  $CH_4$  and/or  $H_2$ . A. B. M.

**Conversion of gases into another substance by partial oxidation.** F. B. DEHN. FROM BELLAS PROCESSING CORP. (B.P. 428,406, 19.2.34).—A mixture of  $CH_4$  and air is introduced into a partial-combustion gas engine ( $E$ ) provided with means for varying the size of the compression chamber, the air:gas ratio (without involving throttle control), and the exhaust while the  $E$  is running. The  $E$  is started and operated



for a short time as an ordinary internal-combustion *E*; the size of the combustion chamber is then reduced, the ignition discontinued, and the air:gas ratio altered so that the adiabatic compression of the mixture brings about the desired reaction, *e.g.*, oxidation of  $\text{CH}_4$  to  $\text{MeOH}$  or  $\text{CH}_2\text{O}$ .

A. B. M.

**Gaseous fuel mixtures.** S. H. WHITE (B.P. 427,624, 24.7.33).—A gaseous mixture suitable for burning (with air or  $\text{O}_2$ ) in a blow-pipe of the  $\text{O}_2$ - $\text{H}_2$  type is made by adding 2–10% of  $\text{C}_3\text{H}_8$  to producer gas, water-gas, coal gas, or other similar commercially available gas.

A. B. M.

**Gas battery.** J. D. and M. K. DOYLE (B.P. 428,933, 24.10.34).—The active material (*M*), *e.g.*, positive NiO and negative Fe oxides, is contained in box-like members, which may in some cases also be formed of *M* and are supplied with  $\text{H}_2$  and  $\text{O}_2$  and separated by porous material, *e.g.*, wood pulp.

B. M. V.

**Production of materials containing bitumen and tar or mixtures of different tars for roads and underground construction.** F. JACOBSON (B.P. 427,777, 25.9.34. Ger., 30. and 31.10.33).—The covering and binding power of bitumens, tars, etc. is increased by heating them at  $\geq 130^\circ$  in a current of  $\text{O}_2$  or air in presence of  $\geq 3\%$  of conc.  $\text{H}_2\text{SO}_4$ . If desired, small quantities of oxidising agents, *e.g.*, a persulphate, or of fatty oils, resin soap, or drying agents may also be added.

A. B. M.

**Manufacture of [bitumen] emulsions.** F. B. DEHN. FROM INTERNAT. BITUMEN EMULSIONS CORP. (B.P. 427,720, 26.7.33).—A bitumen emulsion that can be mixed with aggregates etc. without premature breakdown is produced by adding aq.  $\text{Na}_3\text{PO}_4$  to an already formed emulsion which is soap-free and quick-breaking, or which has been rendered so by addition of aq.  $\text{CaCl}_2$  or similar alkaline-earth metal salt.

A. B. M.

**Treatment of ammonia liquor for separation of impurities or other constituents therefrom.** KÖRPERS CO. OF DELAWARE, ASSEES. OF FIDELITY TRUST CO. (B.P. 427,890, 20.10.33. U.S., 20.10.32).—The liquor is divided into portions which are treated simultaneously in separate stages. Steam is passed in series through all the stages, removing  $\text{NH}_3$  and phenols from each portion of the liquor. The phenols are removed from the steam after each stage, by washing with aq.  $\text{NaOH}$ , but the  $\text{NH}_3$  is carried through all the stages. The separate portions of liquor are recombined, and treated with  $\text{Ca}(\text{OH})_2$  and steam to remove fixed  $\text{NH}_3$ . This same steam can be used subsequently for the treatment of the separate portions of liquor as above described.

A. B. M.

**Distillation of materials containing hydrocarbons.** E. W. BROCKLEBANK and W. B. MITFORD (B.P. 427,960, 19.10.33).—The process of B.P. 393,602 (B., 1933, 738) is carried out at  $> 500^\circ$ . A high-boiling fraction of the volatile product is mixed with a low- $\eta$  oil, *e.g.*, creosote, and used to prepare a further mixture of coal and oil for distillation.

A. B. M.

**Cracking of hydrocarbons, oils, tars, and coal-oil suspensions.** E. BLUEMNER (B.P. 427,558, 26.10.33).—The material (I) to be cracked ascends an annular

space [formed by the outer walls of a cylindrical insert vessel (II) and the inner walls (III) of an associated heated outer container] before passing into (II). (I) is also caused to move, *e.g.*, spirally, over the surface of (III), *e.g.*, by slowly rotating (II). A no. of the vessels may be connected in series or parallel.

C. C.

**Recovery of volatile hydrocarbons from gases and regenerating the wash oil.** N.V. MACHINERIE-EN APPARATEN FABRIEKEN "MEAF" (B.P. 427,598, 24.7.34. Ger., 24.7.33).—Wash oil containing volatile hydrocarbons (I), *e.g.*, benzol, recovered from gases, is indirectly heated for a few min. in a tube heater at  $<$  the highest b.p. of (I). Vapours are separated in a separator chamber and fractionally condensed.

C. C.

**Motor fuel.** T. H. ROGERS and V. VOORHEES, ASSRS. TO STANDARD OIL CO. (U.S.P. 1,970,339, 14.8.34. Appl., 20.8.30).—Vapour-phase-cracked hydrocarbon distillates, which normally tend to deteriorate, losing anti-knock properties and developing gum, on storage are preserved by adding 0.05–0.1% of an antioxidant, *e.g.*, *o*-, *m*-, or *p*- $\text{C}_6\text{H}_4(\text{OH})_2$ , pyrogallol, nicotine pyrogallate, an alkyl (amyl) gallate.

A. W. B.

**Stabilisation of liquid hydrocarbons, especially motor fuels.** H. E. POTTS. FROM INTERNAT. HYDROGENATION PATENTS CO., LTD. (B.P. 427,632, 19.10.33).—Hydrocarbons, particularly motor fuels, which tend to form gum are stabilised by treatment in the vapour phase at  $200$ – $400^\circ$   $\ll$  1–30 atm. with gases containing  $\text{H}_2$  in contact with catalysts resistant to S poisoning, *e.g.*, oxides, sulphides of heavy metals of group VI, supported in some cases on carriers such as siliceous earths. The time of contact is  $\geq 50$  sec.; the partial pressure of the oil vapour is 40–80% of the total pressure and of the free  $\text{H}_2$  is  $\ll 20\%$ .

C. C.

**Manufacture of briquettes from normally non-coherent substances, in particular from coal dust, lignite dust, and the like.** MAATS. TOT EXPLOIT. VAN "TEN BOSCH OCTROOIEN N.V." (B.P. 427,969, 31.10.33. Holl., 30.8.33).

**Incandescence gas mantles.** SOUTH METROPOLITAN GAS CO., and A. J. PRESTAGE (B.P. 428,813, 15.10.34).

**Heat-treatment of hydrocarbon oil.** W. F. SIMS and V. U. CLOER, ASSRS. TO PANHANDLE REFINING CO. (U.S.P. 1,981,572, 20.11.34. Appl., 9.4.30).

**Heat-treatment of [hydrocarbon] oil.** E. B. PECK and C. E. KLEIBER, ASSRS. TO STANDARD OIL DEVELOPMENT CO. (U.S.P. 1,981,826, 20.11.34. Appl., 19.6.31).

**Heating system [for the cracking of oil].** E. BLANCKENBURG, ASSR. TO PETROLEUM CONVERSION CORP. (U.S.P. 1,977,617, 23.10.34. Appl., 17.10.30).

**Apparatus for heating and cracking oils.** (A) L. L. REBBER, A. S. CROSSFIELD, and E. G. RAGATZ, (B) E. W. GARD and P. SUBKOW, ASSRS. TO UNION OIL CO. OF CALIFORNIA (U.S.P. 1,979,639 and 1,980,330, [A] 6.11.34, [B] 13.11.34. Appl., [A] 2.1.29, [B] 17.2.30).

**Treatment [cracking] of hydrocarbon oils.** R. PYZEL, ASSR. TO UNIVERSAL OIL PRODUCTS CO. (U.S.P. 1,982,150, 20.11.34. Appl., 12.6.31).



**Cracking of hydrocarbon oils.** U. S. JENKINS, Assr. to JENKINS PETROLEUM PROCESS Co. (U.S.P. 1,975,549, 2.10.34. Appl., 9.6.30). J. B. WEBRE, Assrs. to TEXAS Co. (U.S.P. 1,980,839, 13.11.34. Appl., 18.2.31). E. F. NELSON, Assr. to UNIVERSAL OIL PRODUCTS Co. (U.S.P. 1,978,593, 30.10.34. Appl., 26.11.30). G. EGLOFF, Assr. to UNIVERSAL OIL PRODUCTS Co. (U.S.P. 1,982,469, 27.11.34. Appl., 3.4.30).

**Cracking of heavy [hydrocarbon oil] stocks.** P. C. KEITH, JUN., Assr. to GASOLINE PRODUCTS Co., INC. (U.S.P. 1,981,842, 20.11.34. Appl., 27.3.31).

**Hydrocarbon cracking-reaction chamber.** J. C. BLACK (U.S.P. 1,975,071, 2.10.34. Appl., 22.5.33).

**Cracking of hydrocarbons.** (A) T. DE C. TIFFT, (B) E. C. HERTHEL, Assrs. to SINCLAIR REFINING Co. (U.S.P. 1,981,128 and 1,981,914, [A] 20.11.34, [B] 27.11.34. Appl., [A] 24.4.31, [B] 29.6.29).

**Cracking of petroleum vapours.** A. M. WOOD (U.S.P. 1,980,462, 13.11.34. Appl., 14.1.31).

**Combination reaction chamber and scrubber [for converting hydrocarbon oils].** E. W. BEARDSLEY, Assr. to PETROLEUM CONVERSION CORP. (U.S.P. 1,981,852, 27.11.34. Appl., 30.1.31).

**Hydrocarbon oil conversion.** (A) N. G. DE RACHAT, (B) L. C. HUFF, (C) J. G. ALTHER, Assrs. to UNIVERSAL OIL PRODUCTS Co. (U.S.P. 1,979,532, 1,980,204, and 1,982,462, [A] 6.11.34, [B] 13.11.34, [C] 27.11.34. Appl., [A] 26.1.31, [B] 30.3.31, [C] 13.12.30).

**Conversion of hydrocarbon oils.** O. BEHMER, Assr. to TEXAS Co. (U.S.P. 1,978,072, 23.10.34. Appl., 6.8.20). J. B. HEID, Assr. to UNIVERSAL OIL PRODUCTS Co. (U.S.P. 1,981,144, 20.11.34. Appl., 28.3.30).

**Conversion of petroleum oils.** J. G. ALTHER, Assr. to UNIVERSAL OIL PRODUCTS Co. (U.S.P. 1,979,521, 6.11.34. Appl., 13.2.22). A. R. WORKMAN, Assr. to DOHERTY RESEARCH Co. (U.S.P. 1,982,091, 27.11.34. Appl., 17.6.29).

**Treatment of [hydrocarbon] oils.** C. P. DUBBS, Assr. to UNIVERSAL OIL PRODUCTS Co. (U.S.P. 1,975,315, 2.10.34. Appl., 22.6.21).

**Treating hydrocarbon oils.** O. BEHMER, Assr. to TEXAS Co. (U.S.P. 1,979,437, 6.11.34. Appl., 10.2.28). W. H. McADAMS and H. C. WEBER, Assrs. to UNIVERSAL OIL PRODUCTS Co. (U.S.P. 1,980,215, 13.11.34. Appl., 19.4.32).

**Treatment [blowing] of hydrocarbon.** S. TIJMSTRA, Assr. to SHELL DEVELOPMENT Co. (U.S.P. 1,975,563, 2.10.34. Appl., 17.1.30).

**Treatment [cracking] of hydrocarbon oils.** H. P. BENNER, Assr. to UNIVERSAL OIL PRODUCTS Co. (U.S.P. 1,978,562 and 1,978,592, 30.10.34. Appl., [A] 6.2.31, [B] 3.3.32).

**Coking of oil.** J. C. MORRELL, Assr. to UNIVERSAL OIL PRODUCTS Co. (U.S.P. 1,980,218, 13.11.34. Appl., 28.12.31).

**Removal of carbonaceous materials from vessels.** L. C. HUFF, Assr. to UNIVERSAL OIL PRODUCTS Co. (U.S.P. 1,979,550, 6.11.34. Appl., 26.1.31).

**Apparatus for refining hydrocarbons.** F. A. APGAR and K. A. BEACH, Assrs. to SINCLAIR REFINING Co. (U.S.P. 1,976,000, 9.10.34. Appl., 19.10.31).

**Petroleum refining apparatus.** E. A. DICKINSON, Assr. to GRAY PROCESSES CORP. (U.S.P. 1,979,734, 6.11.34. Appl., 6.3.29).

**Apparatus for [continuous] distillation [of petroleum oils].** G. B. COUBROUGH, Assr. to LUMMUS Co. (U.S.P. 1,980,612, 13.11.34. Appl., 7.7.31).

**Treating heavy [hydrocarbon oil] residues.** G. A. BEISWENGER, Assr. to STANDARD OIL DEVELOPMENT Co. (U.S.P. 1,978,361, 23.10.34. Appl., 3.5.32).

**[Hydrocarbon] oil absorption process.** H. J. NICHOLS, JUN., and P. E. KUHLE, Assrs. to STANDARD OIL DEVELOPMENT Co. (U.S.P. 1,976,802, 16.10.34. Appl., 17.10.31).

**Manufacture of motor fuel.** R. E. BURK and H. P. LANKELMA, Assrs. to STANDARD OIL Co. (U.S.P. 1,980,380, 13.11.34. Appl., 13.2.30).

**Recovering hydrocarbon vapours.** P. M. RAIGORODSKY, Assr. to PETROLEUM ENG., INC. (U.S.P. 1,977,087, 16.10.34. Appl., 29.12.30).

**Recovering [volatile values from] blended fuels.** R. CARTER (U.S.P. 1,978,984, 30.10.34. Appl., 15.4.30).

**Agglomeration of suspended particles [of water in oil].** M. E. GARRISON and W. F. VAN LOENEN, Assrs. to PETROLEUM RECTIFYING Co. OF CALIFORNIA (U.S.P. 1,980,722, 13.11.34. Appl., 18.3.30).

**Utilising natural hydrocarbon gases.** C. R. WAGNER, Assr. to PURE OIL Co. (U.S.P. 1,976,591, 9.10.34. Appl., 27.3.30).

**Vac.-distillation [of oils].** Suspended matter in fluids. Gas-conditioning apparatus.—See I. Separating substances from partial oxidation products. Alcohols and ethers [from olefines].—See III. Thiosulphates.—See VII. Road surfaces.—See IX. Hydrogenation plant.—See X. Dielectric liquids.—See XI. Polymerised fatty oils.—See XII. Waterproofing composition. Cements [for fuel tanks].—See XIII.

### III.—ORGANIC INTERMEDIATES.

**Practical aspects of propane.** H. N. WADE (Petroleum World, 1934, 31, No. 12, 41—43).—Lacey and Sage's data (A., 1935, 290) are discussed in relation to practical problems. Ch. Abs. (e)

**Industrial manufacture of penthrite.** H. MOLINARI and G. CARTA SATTI (Chim. e l'Ind., 1935, 17, 213—218).—The manufacture of penthrite (I) (pentaerythritol tetranitrate) by the nitration (a) of pentaerythritol and (b) of its sulphonation product, is discussed. The product of (b) is less pure owing to secondary formation of resinous substances during the sulphonation process. By suitable crystallisation it is possible to prepare very stable (I) of high m.p. O. J. W.

**Determination of active base of methyl ethyl and methyl propyl ketones.** A. A. PRIANISCHNIKOV (Lesokh. Prom., 1933, 2, No. 3, 27).—Messinger's method gives high vals.; that of Krajčinovic (B., 1932, 56) is satisfactory. Ch. Abs. (e)



**Production of aromatic amines by hydrogenation. II. Aniline.** K. YOSHIKAWA, T. YAMANAKA, and B. KUBOTA. **III. Aromatic amines except aniline, and hydrogenation of quinones.** T. YAMANAKA, S. YAMADA, B. KUBOTA, and K. YOSHIKAWA (Bull. Inst. Phys. Chem. Res., Japan, 1935, 14, 406—411, 412—423; cf. A., 1935, 854).—II. Production of  $\text{NH}_2\text{Ph}$  by hydrogenation of  $\text{PhNO}_2$  depends on the area of the catalyst [ $\text{Ni}(\text{NO}_3)_2$ ,  $\text{Cu}(\text{NO}_3)_2$ ,  $\text{Al}(\text{NO}_3)_3 = 150 : 75 : 1$ , ignited and poisoned by  $\text{C}_4\text{H}_4\text{S}$ ] and the sectional area of the tubes used.

III. Hydrogenation of  $\text{NO}_2$ - and azo compounds and quinones gives varying yields of the corresponding  $\text{NH}_2$ - and  $\text{OH}$ -compounds. F. R. S.

**Coloration of aniline.** T. YAMANAKA (Bull. Inst. Phys. Chem. Res., Japan, 1935, 14, 396—405).—Coloration of  $\text{NH}_2\text{Ph}$  is caused by O (no coloration in vac.), light, and certain metals, Cu being most effective. F. R. S.

**Determination of phenol in salicylic acid.** K. D. SCHTSCHERBATSCHEV (Khim. Farm. Prom., 1934, No. 5, 37—38).—10 g. of the acid are dissolved in 100 c.c. of  $N$ - $\text{NaOH}$ ,  $\text{CO}_2$  is passed until colourless to phenolphthalein, and the solution distilled with steam. 500 c.c. of distillate are treated with excess of standard  $\text{KBrO}_3$ - $\text{KBr}$  and acid, and excess Br is determined iodometrically after 20—30 min. CH. ABS. (e)

**Separation of *m*-cresol and *p*-cresol.** DESSEIGNE (Mém. Poudres, 1934—5, 26, 134—157).—Full details are given of optimal conditions for separating a 60 : 40 mixture ( $M$ ) of *m*- (I) and *p*-cresol (II). 73% of the (I) in  $M$  is recovered by means of the  $\text{NaOAc}$ - (I) compound. By dissolving  $\text{CO}(\text{NH}_2)_2$  (III) [1.5 mols. per mol. of (I)] in  $M$  at  $< 120^\circ$  and adding petrol (b.p.  $120$ — $160^\circ$ ), with agitation, during cooling, the (I)-(III) compound separates; this is decomposed by  $\text{H}_2\text{O}$  at  $50^\circ$ , the total (I) recovered being 83% of that in  $M$ . Pure (II) is obtained from the residues of the (III) treatment, either directly, or in greater yield by forming the (II)-anhyd.  $\text{H}_2\text{C}_2\text{O}_4$  compound. (I) and (II), 98% pure, are obtained in high yield from technical cresols by these processes. The f.-p. curve of the (I)-(II) system has a max. at 33% of (II) and eutectics of 10—11% and 58% of (II), but since the  $\eta$  of the liquid system varies linearly with composition, the mol. association occurs only in the solid state. J. G. A. G.

***p*-Aminophenol.** G. A. KIRKHOFF and O. P. ALBITZKAJA (Khim. Farm. Prom., 1934, No. 3, 15—16).— $\text{PhNO}_2$  was replaced by *p*- $\text{OH}-\text{C}_6\text{H}_4-\text{NO}_2$ , producing a much better and more readily purified reduction product. KI is a good catalyst. CH. ABS. (e)

**Simplified separation of picric and 2 : 4 : 6-trinitrobenzoic acids.** C. KRAUZ and J. ŠTĚPÁNEK (Chem. Obzor, 1934, 9, 137—138; Chem. Zentr., 1935, i, 446; cf. A., 1925, i, 646).—The trinitrobenzoic acid is pptd. and weighed as its Ag salt, the picric acid being determined in the filtrate with nitron. H. N. R.

**Transformer oils.**—See II.  $\text{COMe}_2$ - $\text{BuOH}$  fermentation.—See XVIII.

## PATENTS.

**Hydrogenation of furfurane [furan] or derivatives thereof.** E. I. DU PONT DE NEMOURS & Co.,

and W. A. LAZIER (B.P. 428,940, 22.11.33).—Furan and alkylfurans are converted into  $\text{H}_4$ -derivatives by heating with  $\text{H}_2$  and a catalyst of the Fe group [ $\text{Ni}-\text{Cr}_2\text{O}_3$ , prepared by reduction of  $\text{NiCrO}_4$  ( $\text{H}_2$  at  $500^\circ$ )] in an org. solvent (e.g., an alcohol or saturated liquid hydrocarbon) at  $100$ — $200^\circ$  ( $150$ — $165^\circ$ )/ $50$ — $250$  atm. H. A. P.

**Separating or extracting substances from partial oxidation products.** J. H. JAMES, Assr. to C. P. BYRNES (U.S.P. 1,970,535, 14.8.34. Appl., 12.3.30).—The more highly oxidised products (I) and, if desired, the aromatic and olefinic substances in liquid hydrocarbon-oxidation mixtures are separated by extraction with liquid  $\text{SO}_2$  at  $< -8^\circ$  ( $-18$  to  $-20^\circ$ ). Separation of the fractions of (I) is effected at lower temp., e.g.,  $< -45^\circ$ ; the  $\text{SO}_2$  is recovered by evaporation. A. W. B.

**Preparation of fluorine derivatives of hydrocarbons.** KINETIC CHEMICALS, INC. (B.P. 428,361, 5.8.33. U.S., 31.8.32. Addn. to B.P. 391,168; B., 1933, 740).—Aliphatic or aralkyl halides other than fluorides (formed *in situ*, e.g., by chlorination of the appropriate hydrocarbon) are heated with HF in presence of a Cu, Ag, Au, Zn, Cd, Hg, V, Mn, Fe, Co, Ni, or Pt halide, preferably on a support, e.g., alundum (I) or C ( $\text{FeCl}_3$ - or  $\text{CuCl}_2$ -C). E.g., anhyd. HF is passed into  $\text{C}_2\text{Cl}_2\text{F}_3$  at  $42^\circ$ , and the resulting vapours are passed over  $\text{VCl}_4$ -(I) at  $500^\circ$  to give HCl,  $\text{C}_2\text{Cl}_2\text{F}_4$ , and  $\text{C}_2\text{ClF}_5$ , b.p.  $-40^\circ$ . H. A. P.

**Preparation of fluorine derivatives of hydrocarbons.** KINETIC CHEMICALS, INC. (B.P. 428,445, 5.8.33. U.S. 10.8.32).—Acyclic hydrocarbons (halogenated) or their aryl derivatives are fluorinated by reaction with HF together with another hydrogen halide (at  $> 1$  atm.) in presence of C (activated); e.g.,  $\text{CCl}_4$  yields  $\text{CCl}_2\text{F}_2$  and  $\text{CCl}_3\text{F}$ ;  $\text{CHCl}_3$  yields  $\text{CHCl}_2\text{F}$  and  $\text{CHClF}_2$ . A. W. B.

**Manufacture of alcohols and ethers.** BRIT. CELANESE, LTD., W. H. GROOMBRIDGE, and R. J. PEEK (B.P. 428,792, 20.11.33).—The acid liquor produced by absorption of olefines in conc.  $\text{H}_2\text{SO}_4$  is diluted with  $\geq$  an equal wt. of  $\text{H}_2\text{O}$  and passed down a column packed with pumice and heated at the base at  $125$ — $130^\circ$ . The temp. at the top of the column is sufficient to effect hydrolysis and distillation of the alcohol and/or ether, the  $\text{H}_2\text{SO}_4$  passing to the base and concentrating on the way. A. W. B.

**Manufacture of derivatives of glycerol. [Acetol.]** E. L. HOLMES (B.P. 428,462, 10.11.33).—Liquid glycerol is heated at  $200$ — $300^\circ$  ( $240$ — $260^\circ$ ) in presence of a dehydrogenating catalyst, which may have also a dehydrating effect (containing Cu), e.g., Cu chromite (cf. A., 1931, 598); a fraction, b.p.  $140$ — $150^\circ$ , is obtained which on refractionation yields practically pure acetol. A. W. B.

**Manufacture of detergent, cleansing, emulsifying, softening, and dispersing agents.** CHEMICAL WORKS, FORMERLY SANDOZ (B.P. 428,520, 29.3.34. Addn. to B.P. 428,156; B., 1935, 619).—The use of  $<$  an equimol. quantity of glycerol, and/or of a quantity of  $\text{H}_2\text{SO}_4$  in the sulphonating agent less in wt. than that of the spermaceti employed, is claimed. A. W. B.



**Catalytic production of acetic acid.** H. A. PATTERSON (B.P. 428,450, 2.10.33. U.S., 4.10.32. Addn. to B.P. 405,282; B., 1934, 312).—An improved catalyst, hydrated  $W_2O_5 \cdot WO_3$ , for the prep. of AcOH from CO and MeOH, is obtained by treating an aq. suspension of a finely-divided tungstate  $[(NH_4)_2WO_4 \cdot 6H_2O]$  at about  $100^\circ$  with an acid ( $HNO_3$ ), the acidity of the liquor being  $\geq 5N$  ( $\geq N$ ), separating, and drying the product at  $\geq 500^\circ$  ( $150$ – $180^\circ$ ); the catalyst is kept in the hydrated state by  $H_2O$  vapour in the reaction mixture. [Stat. ref.] A. W. B.

**Manufacture of diphenylpropane.** W. W. TRIGGS. From RESINOUS PRODUCTS & CHEM. CO. (B.P. 428,944, 24.11.33).—The addition of an inert hydrocarbon (PhMe) to the reaction mixture is claimed to shorten the reaction time, prevent side-reactions, and economise PhOH. H. A. P.

**Manufacture of (A) sec.- or tert.-aromatic [or cycloaliphatic] amines, (B) sec.- and tert.-amines.** J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 428,092—3, [A] 18.12.33 and 3.9.34, [B] 18.12.33).—(A) A primary or sec.-amine is heated with a CO-compound and an alkyl formate ( $HCO_2Me$ ) under pressure at  $100$ – $350^\circ$  ( $210$ – $260^\circ$ ). *E.g.*,  $\alpha$ - $C_{10}H_7 \cdot NH_2$ ,  $COMe_2$  (excess), and  $HCO_2Me$  are heated at  $210^\circ$  for 2 hr. to give 90% of theory of  $\alpha$ - $C_{10}H_7 \cdot NHPr^s$ , b.p.  $185$ – $186^\circ/22$  mm.;  $COPhMe$ , similarly, gives  $\alpha$ - $C_{10}H_7 \cdot NH \cdot CHPhMe$ , b.p.  $233$ – $238^\circ/20$  mm. Other examples include the prep. of cyclohexyl-dodecylamine, b.p.  $171$ – $174^\circ/4.4$  mm. (from  $n$ - $C_{12}H_{25} \cdot NH_2$ ), -piperidine, b.p.  $122$ – $123^\circ/22$  mm., and -isopropylamine, b.p.  $93$ – $94^\circ/64.5$  mm., benzylpiperidine, and dicyclohexylamine. (B) Interaction is brought about between an aliphatic alcohol having  $\leq C_8$  and a primary or sec.-amine having  $\geq C_5$  in any alkyl radical in presence of a dehydrating catalyst at  $200$ – $425^\circ/\leq 50$  atm. ( $300$ – $400^\circ/150$ – $200$  atm.). *E.g.*,  $n$ - $C_{12}H_{25} \cdot OH$  and  $NHMe_2$  are passed over  $Al_2O_3$  gel at  $360^\circ/190$  atm. with formation of  $C_{12}H_{25} \cdot NMe_2$  (90% of theory). The application to alcohol mixtures, *e.g.*, the alcohols from reduction of coconut oil or technical "oleyl alcohol," is specifically claimed. H. A. P.

**Preparation of dispersions.** H. HUNSDIECKER and E. VOGT (B.P. 428,987—8, [A, B] 14.12.33. Ger., 14.12.32. Cf. B.P. 425,188 and 426,508; B., 1935, 449, 589).—The use as dispersing agents of (A) *O*-alkyl- or -aryl-isothiouras and (B) *S*-alkyl- or -aryl-isothiouras, preferably those of higher mol. wt., *e.g.*, the higher *n*-alkyl derivatives, is claimed. H. A. P.

**Manufacture of sulphuric acid derivatives of organic acid amides.** [Textile assistants.] HENKEL & Co. G.M.B.H. (B.P. 428,153, 17.3.34. Ger., 12.5.33).—The sulph(on)ation of amides derived from amines having an aliphatic or cycloaliphatic residue of  $\leq C_6$  and acylated or alkyl- (or aryl)-ated  $OH$ -,  $SH$ -, or  $NH_2$ -acids is claimed. *E.g.*, the amines (I) derived (Hofmann) from coconut oil fatty acids are heated with the lactone of  $\beta$ -hydroxyethoxyacetic acid, and the amide mixture obtained is treated with  $ClSO_3H$  in  $Et_2O$ . Other examples include the sulphonation of phenoxyacetyl-cyclohexylamide, the phenoxyacetyl derivative of (I), butylthiolacetdodecyl- $\beta$ -hydroxyethylamide, anilinoacetdo-

decylamide,  $\beta$ -phenoxyethanesulphonmethyl-dodecyl amide,  $\beta$ -benzylthioethanesulphonhexadecylamide, and bis- $\beta$ -hydroxyethylaminoacetdodecylamide. The products are claimed to be useful as soap substitutes. H. A. P.

**Oxidation of gases.** [Phenols from]  $NH_3$  liquor.—See II. **Org. constituents of black liquor.**—See V. **Solvents from carbohydrates.**—See XVIII.

#### IV.—DYESTUFFS.

##### PATENT.

**Manufacture of nitroarylaminoarylamines.** I. G. FARBENIND. A.-G. (B.P. 428,618, 16.11.33. Ger., 17.11.32).—4-Chloro-3-nitrobenzoic acid, or its amide or Et ester, is caused to react with  $p$ - $NH_2 \cdot C_6H_4 \cdot NHPh$ ,  $p$ - $NH_2 \cdot C_6H_4 \cdot NAcPh$  (I), or homologues, or substitution or hydrogenation derivatives thereof, by heating in presence of an acid-binding agent, compounds derived from (I) or its derivatives being deacetylated after interaction. The products are reddish-brown dyestuffs of good fastness to light, and suitable for dyeing cellulose esters or ethers or, when containing  $SO_3H$  groups, wool. A. W. B.

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

**Influence of twist on shade and dullness of silk hosiery yarn.** W. P. SEEM and T. ANDREW (Text.-World, 1935, 85, 1065).—Tables are given showing the shadow effects of twisted threads in yarns of various counts and twists. A. J. H.

**Micro-Kjeldahl [method] in the analysis of silk thread and textiles.** M. BONICATTI (Boll. Uff. R. Staz. Sperim. Seta, 1934, 4, 35—37; Chem. Zentr., 1935, i, 648).—A semi-micro-method is described. H. N. R.

**Oiling of wool.** C. H. S. TUPHOLME (Amer. Dyestuff Rep., 1935, 24, 1—2, 25).—To ensure uniformity, the  $H_2O$  and oil must be used as an emulsion. The amount of free fatty acid indicates the probable scouring properties and the risk of metal stains. The Mackey test determines the temp. rise of an olein-treated fabric in a given time; any appreciable rise shows the presence of unsaturated acids and its unsuitability for textile work. CH. ABS. (e)

**"Frosted wool."** E. H. BARKER (Text. World, 1935, 85, 1085—1088).—"Frosted wool" (*W*) is grease (raw) wool freed from the usual impurities, particularly pitch, tar, paint, and natural fats, by passage through a refrigerating chamber (diagram given) maintained at  $-20^\circ$ . The low temp. makes the oil and fat impurities brittle so that they are dusted out together with the vegetable and earthy impurities. *W* retains its normal physical properties, especially as regards milling and dyeing, but is whiter than when the impurities are removed solely by scouring with soap. A. J. H.

**Resistance to tearing and breaking of chemically treated wool.** H. MARKERT (Mschr. Text.-Ind., 1934, 49, 229—230; Chem. Zentr., 1935, i, 331).—Data are recorded for the mechanical properties of acid- and alkali-treated wool. H. J. E.



**Preparation of fibre candles [in textile microscopy].** G. H. HOTTE (Text. World, 1935, 85, 1063—1064).—Details are given for building up fibre candles (suitable for the cutting of cross-sections without their deformation) by means of successive layers of embedding materials the hardness of which decreases from the fibre core to the outer layer. A. J. H.

**Moisture content of raw jute and jute yarns.** P. KRAIS and W. LÜDICKE (Mschr. Text.-Ind., 1934, 49, 122—123, 146—147, 169—170, 193—194, 217—218; Chem. Zentr., 1935, i, 331).—Conditioning is carried out at 45—63° and at 105—110°. Additions to the dry wt. for various grades of yarn are suggested for use instead of the Pfuhl no. H. J. E.

**Determination of lignin. I. Errors introduced by the presence of certain carbohydrates. II. Errors introduced by the presence of proteins.**

A. G. NORMAN and S. H. JENKINS (Biochem. J., 1934, 28, 2147—2159, 2160—2168).—I. Pentoses, fructose, and sucrose yield an insol. residue (*R*) in contact with 72% H<sub>2</sub>SO<sub>4</sub>, and increase the apparent lignin (I) content when added to plant materials (*P*). *R* may arise from furfuraldehyde alone, or by its condensation with (I), to yield a phenol-furan resin. Since most *P* contain xylose-containing hemicelluloses, the (I) content found by the standard method, using 72% H<sub>2</sub>SO<sub>4</sub> for 16 hr. at < 20°, may be much too high. It is recommended that the time of contact with acid be reduced to 2 hr. (cf. B., 1932, 593), or that a preliminary hydrolysis with boiling 1% H<sub>2</sub>SO<sub>4</sub> (or 3—5% H<sub>2</sub>SO<sub>4</sub> for more resistant *P* such as straw) for 1 hr. be carried out in order to remove xylans. The effect of the latter treatment on the chemical composition of (I) is not known, but is probably slight. The true (I) contents of numerous *P* are recorded.

II. Proteins alone give no ppt. with cold 72% H<sub>2</sub>SO<sub>4</sub>, but increase the apparent (I) content when added to *P*, the effect being probably due to combination of protein fission products with (I). The error cannot be calc. from the N content of the (I). Xylose and protein similarly treated yield an appreciable ppt. only when the protein concn. is small, the sparing effect of larger amounts of protein being observed also with *P*. Hydrolytic pretreatment of *P* (cf. *supra*) minimises the effect of both protein and pentose, and, if the *P* is rich in N, should be followed by treatment with 72% H<sub>2</sub>SO<sub>4</sub> for 16 hr. rather than for 2 hr. The resulting (I) still contains a little N for which no reliable correction can be made. A. E. O.

**Bagasse for manufacture of Celotex (Artex). I. Changes in the constituents of a pile of the bagasse.** S. TANAKA (J. Agric. Chem. Soc. Japan, 1934, 10, 1053—1058).—On piling the bagasse for a year in the open air, first the sugar and pectin, and then starch and pentosans, were decomposed by fermentation. The decomp. was most rapid deep in the pile, where the temp. was highest. CH. ABS. (e)

**Heat of acetylation of cellulose.** K. ATSUKI and I. KAGAWA (J. Cellulose Inst., Tokyo, 1935, 11, 128—133).—The heat of acetylation of cellulose (I) by a mixture of 107 g. of Ac<sub>2</sub>O, 159 g. of AcOH, and 1 g. of H<sub>2</sub>SO<sub>4</sub> is 5 kg.-cal. per mol. of reacting AcOH, after

allowing for the heat of reaction of the H<sub>2</sub>O content of the (I). The degree of acetylation has little effect.

A. G.

**Properties of cellulose nitrates as a function of the composition of the nitrating baths.** BRISSAUD (Mém. Poudres, 1934—5, 26, 158—170).—Cotton, after contact during 1 hr. with baths (I) containing 21.3—90.2% of HNO<sub>3</sub> and 71—9.4% of H<sub>2</sub>SO<sub>4</sub>, contained 13.55—13.75% N. The higher N content is correlated with larger % of HNO<sub>3</sub> in (I) and greater solubility of the cellulose nitrates (II) in Et<sub>2</sub>O—MeOH. The quantity of HNO<sub>3</sub> passing into the H<sub>2</sub>O during 100 hrs.' stabilisation is > that of H<sub>2</sub>SO<sub>4</sub>, and the quantity of acids thus removed increases as [H<sub>2</sub>SO<sub>4</sub>] in (I) is raised. The (II) are whiter, less voluminous, and swell less during stabilisation in proportion as the [HNO<sub>3</sub>] in (I) is raised. The  $\eta$  of 1—2% solutions of (II) in COMe<sub>2</sub> pass through a max. when (I) has 30% of H<sub>2</sub>SO<sub>4</sub>. No correlations were observed in the stability test at 110°. By stabilising with 1% aq. H<sub>2</sub>SO<sub>4</sub>, the (II) lose larger and more nearly const. quantities of HNO<sub>3</sub>, whilst with only 36 hrs.' stabilisation the  $\eta$  of (II) in COMe<sub>2</sub> is much higher.

J. G. A. G.

**Gelatinisation of cellulose nitrate by amides and ketones.** MÉDARD and FRIEDERICH (Mém. Poudres, 1934—5, 26, 126—133).—The gelatinising power, *P*, of the fatty amides decreases with increasing mol. wt., concomitant with increasing discoloration of the product; that from NH<sub>2</sub>Ac is hygroscopic. The *P* of NPh<sub>2</sub>Ac is good, but that of acetylcarbazole is nil, showing that constitutional factors are involved. The *P* of CHPh:CHAc and furfurylidene acetone (I) is good and (I) affords a product of suitable stability. Aliphatic diamides, furoin, and furfurylamide gave unsatisfactory results. J. G. A. G.

**Effect of age on viscosity of collodion.** MÉDARD (Mém. Poudres, 1934—5, 26, 123—125).—4—6 months after prep., the  $\eta$  of 5% wt./vol. solutions of cellulose nitrate in EtOH—Et<sub>2</sub>O, -dioxan, -methylfuran, and -methylal mixtures are approx. 0.74—0.61, 0.86, 0.88—0.76, and 0.68—0.78, respectively, of their initial vals. The factor decreases from approx. 0.88 to 0.6 as the EtOH—cineole ratio increases. J. G. A. G.

**Agglomeration of artificial silk fibrils.** A. JAUMANN (Kunstseide, 1934, 16, 401—403; Chem. Zentr., 1935, i, 648).—The agglomeration is chiefly dependent on humidity; methods for its prevention are discussed. H. N. R.

**Artificial silk.** W. WELTZIEN (Deuts. Färber-Ztg., 1934, 70, 501; Chem. Zentr., 1935, i, 647—648).—Steeping in H<sub>2</sub>O relieves strain in artificial silk; linseed oil coatings are disadvantageous since they are not permeable to H<sub>2</sub>O, but H<sub>2</sub>O-sol. warp dressings are not objectionable. Non-uniform dyeing is attributed to differences in tension or to irregular bleaching.

H. N. R.

**Southern [American] pine for rayon [manufacture].** C. H. HERTY and R. H. RASCH (Rayon and Melland Text. Month., 1935, 16, 107—109).—Cellulose satisfactory for viscose-rayon manufacture ( $\eta$  in cuprammonium solution 26.8,  $\alpha$ -cellulose 87.6%, Cu no. 1.35) can be produced, by a short, high-temp. cooking process,



from pine trees growing on cut-over land (cf. B., 1935, 398) much more cheaply than from spruce. Details of production costs are given. A. J. H.

**Pulping of seed flax straw.** M. V. RĚSH and MARKOV (Tzent. Nauch.-Issl. Inst. Bumazh. Prom., 1934, No. 2, 87—106).—Optimum results were obtained by maceration with 2% NaOH or NaOH + Na<sub>2</sub>S at 100°, with mechanical reworking (rod mill), draining, and cooking for 2 hr. at 6 atm. or for 6 hr. at 4 atm. Rosenberg's method (B., 1934, 753) is recommended for pulping the straw. CH. ABS. (e)

**Economic possibilities of pulping timber growth of the Coastal Plain.** E. E. RANDOLPH and W. L. BELVIN (J. Elisha Mitchell Sci. Soc., 1934, 50, 47—48).—Pulping tests by the soda process are described for 9 species of hardwood. Black gum may be used as a pulp wood where great strength and permanence are not required. Red gum, sycamore, and beech are satisfactory as fillers for newsprint. The use of other types of timber is also discussed. CH. ABS. (e)

**Heats of wetting of cellulose and wood pulp.** G. H. ARGUE and O. MAASS (Canad. J. Res., 1935, 12, 564—574).—Using an adiabatic calorimeter, the heat of wetting ( $H$ ) has been determined of (a) cotton cellulose (I) containing 0—0.8 g. of H<sub>2</sub>O per g., and (b) of (I) containing 0.015—0.07 g. of H<sub>2</sub>O per g. left as a result of partial desorption;  $H_a < H_b$  owing to an increase in internal surface due to adsorption of H<sub>2</sub>O. The heat of adsorption of H<sub>2</sub>O vapour on (I) is approx. 12—13 g.-cal. per g. for wood pulp and 18—20 for wood meal.  $H_a = 10.16$  g.-cal. per g. for the wetting of dry (I). Beating of wood pulp only slightly influences  $H$ , since the internal surface is not greatly affected. For xanthate solutions of the pulps that with the largest  $H$  has the smallest  $\eta$ .  $H$  for (I) containing 5% of H<sub>2</sub>O wetted with 2% aq. NaOH is 12.6 g.-cal. per g. of dry (I), and increases with [NaOH].  $H$  for (I) wetted with 95% MeOH = 6.2 g.-cal. per g. The micellar structure of (I) is discussed. R. S. B.

**Recovery of heat and sulphur dioxide in sulphite pulping.** N. N. NEPENIN and P. V. KHVILJUZOV (Tzent. Nauch.-Issl. Inst. Bumazh. Prom., 1934, No. 2, 3—26; cf. B., 1934, 667).—A discussion. CH. ABS. (e)

**Metal corrosion in sulphite pulping.** D. M. FLJATE and N. P. BELUIKH (Tzent. Nauch.-Issl. Inst. Bumazh. Prom., 1934, No. 2, 107—134).—Data are tabulated, showing low-C steels and cast irons containing Cr and Mn to have a satisfactory resistance to acid corrosion. Additions of W and Si gave increased resistance, and Cu improved the mechanical properties. CH. ABS. (e)

**Relative permanence of papers exposed to sunlight.** I, II. G. A. RICHTER (Ind. Eng. Chem., 1935, 27, 177—185, 432—439).—I. A large no. of commercial and hand-made papers were exposed to sunlight in Florida for from 100 to 400 hr., their physical deterioration being determined by decrease in their folding-endurance ( $F$ ), and chemical deterioration by increase in their Cu no. In most cases  $F$  and Cu no. showed the same tendency. Papers containing purified rag or wood fibres showed the highest retention of  $F$  after exposure

(up to 65% after 100 hr.), whilst sulphite papers and newsprint are rendered practically strengthless. The presence of size or alum aids deterioration, and size particularly aids discoloration. Decrease in  $F$  of glue-sized papers progressed steadily with exposure time, but their resistance to ink penetration showed a sudden decrease. Comparison of the effects of natural sunlight, an ultra-violet ray lamp, and ageing at 100° showed a tendency for sunlight to have the most drastic action. Vulcanising or mercerising a wood-fibre bond paper produced a marked increase in  $F$ , although the paper was very sensitive to sunlight, but  $F$  of the treated paper was always  $>$  that of the untreated, even after exposure. Similar behaviour is shown by a waterleaf wood-fibre paper sized with glue in presence of plasticisers, but when treated with viscose the high  $F$  is partly maintained. Compared with Cellophane and waterproofed Cellophane, glass covering is the best protector of purified wood-fibre papers against sunlight, giving an 82% retention of  $F$ ; newsprint, however, under these conditions is very unstable.

II. On exposure to sunlight of purified wood-fibre ( $W$ ) and sulphite papers ( $S$ ), and unused newsprint, the addition of surface sizing with various waxes, sol. starches, and a neutral mineral oil in no case produced increased stability. Some inorg. salts, particularly Fe salts and Na molybdate, accelerated deterioration, whereas Na stannate appeared to have real protective effects. Exposure under glass in an atm. of H<sub>2</sub> caused no deterioration of  $W$ , but a slight deterioration of  $S$  which indicates activity of the visible rays of the spectrum. Moist O<sub>2</sub> under similar conditions is the most active, giving with  $W$  78% and with  $S$  38% retention of  $F$ ; moist air similarly gives 90% and 58%, respectively. Deterioration of unhydrated cellulose is shown not only by changes in its chemical consts., but also, since it never reaches its max. strength, on beating,  $F$  particularly being affected. Papers varying from rag filter to groundwood produced 1—2% loss of wt.

D. A. C.

**Influence of separate factors on parchmentisation and properties of paperboard.** F. I. KORCHEMKN and M. E. POMORTZEV (Tzent. Nauch.-Issl. Inst. Bumazh. Prom., 1934, No. 2, 197—214).—Rise in the impregnation temp. for aq. ZnCl<sub>2</sub> ( $d^{25}$  1.96) from 25° to 80° results in a board with greater  $d$ , in an increased mechanical interception (I) of aq. ZnCl<sub>2</sub>, necessitating longer calendering, and in a decreased penetration of the paper. With increase in  $d$  to 2.01 the (I) is decreased. Prolonged impregnation increases (I). With rising temp. of the forming cylinder, the time of calendering is reduced, and the  $d$ , width, length, and resistance to tearing of the paperboard are decreased. CH. ABS. (e)

**Sulphite cooking acid.**—See VII.

#### PATENTS.

**Dissolution of cellulose.** N. U. BERCHIN, Assr. to T. G. GREGORY (U.S.P. 1,970,270, 14.8.34. Appl., 14.3.31).—Cellulose (1 pt.) is mixed with dil. HCl (3—6 pts.) and then with conc. H<sub>2</sub>SO<sub>4</sub> (4—8 pts.) to form a syrupy liquid. F. R. E.

**Manufacture of cellulose derivatives.** BRIT. CELANESE, LTD. (B.P. 428,666, 3.10.34. U.S., 7.10.33).—



After distributing bubbles of gas throughout the esterification solution by addition of  $\text{Na}_2\text{CO}_3$  or  $\text{NaHCO}_3$ , the ester is pptd. by slowly introducing an amount of  $\text{H}_2\text{O}$  just insufficient for permanent pptn., and then a large excess rapidly.

F. R. E.

**Preparation of halogenated fatty acid esters of cellulose.** C. J. MALM and C. R. FORDYCE, Assrs. to EASTMAN KODAK CO. (U.S.P. 1,969,468, 7.8.34. Appl., 3.10.31).—Cellulose (I) or partly esterified (I) is treated with a halogenated fatty acid anhydride or chloride in presence of a *tert.* org. base, e.g.,  $\text{C}_5\text{H}_5\text{N}$ , preferably diluted with an org. solvent. The products are fireproof and resistant to most org. solvents.

F. R. E.

**Preparation of ethanolamine salt of cellulose esters containing dicarboxylic acid radicals.** C. R. FORDYCE, Assr. to EASTMAN KODAK CO. (U.S.P. 1,969,741, 14.8.34. Appl., 12.9.32).—Dicarboxylic acid esters of cellulose, e.g., phthalate, succinate, containing free  $\text{CO}_2\text{H}$  groups are converted into  $\text{N}(\text{C}_2\text{H}_4\cdot\text{OH})_3$  (I) salts by adding them to (I) in solvents in which the salts are insol., e.g.,  $\text{COME}_2$ . The products are  $\text{H}_2\text{O}$ -sol. and sol. in alcohols and plasticisers, e.g., Me phthalate,  $\text{Bu}_3\text{PO}_4$ , and are useful dye carriers for backing photographic films to prevent halation.

A. W. B.

**Treatment [viscosity reduction] of cellulose esters [nitrate].** R. K. ESKEW, Assr. to DU PONT VISCOLOID CO. (U.S.P. 1,968,882, 7.8.34. Appl., 2.12.30).—The undissolved material is treated in a conc. aq. solution of  $\text{NaCl}$  with  $\text{HNO}_3$  and  $\text{H}_2\text{SO}_4$  at  $> 100^\circ/1$  atm.

F. R. E.

**[Manufacture of] artificial silk.** H. T. CLARKE and C. J. MALM, Assrs. to EASTMAN KODAK CO. (U.S.P. 1,969,454, 7.8.34. Appl., 29.8.31).—An artificial filament resistant to boiling  $\text{H}_2\text{O}$ , soap, and washing alkalis is composed of cellulose acetate propionate containing 10–30% (15%) of  $\text{COEt}$  groups.

F. R. E.

**Manufacture of [dull-lustre] artificial filaments.** T. H. BYRON, Assr. to NORTH AMER. RAYON CORP. (U.S.P. 1,969,689, 7.8.34. Appl., 26.4.32).— $\geq 4\%$  of an insol. oxalate of Ti [ $\text{Ti}_2\text{O}_3(\text{C}_2\text{O}_4)_2 \cdot 12\text{H}_2\text{O}$ ] is incorporated in the solution to be spun.

F. R. E.

**Manufacture of artificial staple fibres.** L. J. SHONE (B.P. 428,368, 1.11.33).—The spinning solution is extruded from the nozzles intermittently in the form of short fibres of any desired length by interrupting the flow by means of a valve and mechanically raising the pressure at suitable intervals.

F. R. E.

**Cell for use in spinning cellulose acetate in the dry process.** U. MANCINI, Assr. to RUTH-ALDO CO., INC. (U.S.P. 1,970,384, 14.8.34. Appl., 21.4.28. It., 23.3.28).—The spinning cell is composed of 3 superimposed chambers [A (uppermost), B, C]; in A, containing the orifice, the air is stagnant and saturated with solvent vapour (V), in B there is an upward countercurrent of air flowing with the same velocity at all cross-sections, and in C the air is stagnant with only a slight concn. of V.

F. R. E.

**Manufacture of artificial wool.** G. M. ROSSATI (B.P. 427,888, 25.9.33).—Synthetic fibres of the viscose type or natural vegetable fibres are cut to length, treated with cold caustic alkali of mercerising concn., dried until they begin to crinkle, bleached, neutralised,

impregnated with a sulphonated fatty acid from wool grease, and dried. The various impregnating, washing, and dehydrating steps involved are preferably carried out in centrifuges equipped with removable perforated or sieve baskets, and drying is effected in a heated rotary tumbler.

F. R. E.

**Manufacture of artificial threads, filaments, fibres, ribbons, and like products.** BRIT. CELANESE, LTD., G. H. ELLIS, R. W. MONCREIFF, and F. B. HILL (B.P. 428,224, 9.11.33).—Materials composed of org. derivatives of cellulose, stretched if desired, are partly or wholly hydrolysed, uniformly or locally, by treatment with an aq. solution of a strong mineral alkali (I), e.g.,  $\text{NaOH}$ , containing an org. substance which is an  $\text{NH}_2$ -acid (II), a salt (III) of (II) with (I), or can be decomposed to produce (II) or (III), e.g., a colloid or albuminous substance such as gelatin, leucine, aspartic acid, proline, etc.

F. R. E.

**Manufacture of films and foils.** G. FRENKEL (B.P. 428,663, 25.9.34).—The operation of pouring the solution of plastic material (cellulose derivatives, resins, etc.) is separated from the slower one of stripping the film, the two processes being performed at speeds independent of and correlated to each other.

F. R. E.

**Manufacture of transparent film.** T. F. MENZEL (U.S.P. 1,970,388, 14.8.34. Appl., 8.6.31).—An aq. solution of gelatin, glycerin,  $\text{HCO}_2\text{H}$ , and glucose is applied to a supporting surface, dried, and waterproofed with trioxymethylene gas.

F. R. E.

**Production of materials, decorative articles, and protective linings or the like, by transformation of fibrous cellulose materials.** V. BOSSO, N. SILVESTRI, and F. SACCHI, Assrs. to G. BOTTA (U.S.P. 1,970,273, 14.8.34. Appl., 9.7.32. Fr., 16.11.31).—A suspension of cellulose fibres containing a linseed decoction is sheeted on a paper machine, the wire of which is vibrated sufficiently to produce an irregular accentuated distribution of the fibres in order to obtain marbling, veins, etc. The sheet is then treated with an astringent solution, rapidly dried to cause shrinkage, and wound and twisted to form a no. of zones having a smaller resistance to liquid penetration. It is afterwards treated first in a gumming bath composed of gelatin and Na silicate, and then in a fixing bath containing  $\text{CH}_2\text{O}$  and castor oil.

F. R. E.

**Bleaching pulp and other lignified materials.** G. H. TOMLINSON (U.S.P. 1,970,065, 14.8.34. Appl., 28.9.31).—In a continuous 3-stage process (i) the pulp is treated in acid solution with aq.  $\text{Cl}_2$  in amounts slightly  $>$  that required to remove all the lignin, the time required being 1–5 min.; (ii)  $\text{CaCO}_3$  is added sufficient to neutralise all the  $\text{HCl}$  formed during (i), the period of contact with the  $\text{CaCO}_3$  being approx. 4 min.; and (iii) the mixture is treated in alkaline solution in presence of excess  $\text{Ca}(\text{OH})_2$  for 10–30 min. The pulp is then washed and, if desired, may finally be treated with alkaline bleaching powder.

D. A. C.

**Paper-making.** H. L. LEVIN, Assr. to PATENT & LICENSING CORP. (U.S.P. 1,970,426, 14.8.34. Appl., 9.11.32).—Fibrous material treated with rubber or asphalt, linoleum scrap, untreated wood, bagasse, etc.,



containing  $\geq 10\%$  of  $H_2O$ , is dry-disintegrated, then pulverised together with its binding agent (*B*) and/or additional *B* (e.g., bitumen) in an impact hammer mill, and screened. Small quantities of Na silicate, clay, or soap solution are added during pulverisation to prevent blockage of the screens. The material may then be compacted into any desired shape with or without addition of more *B*. D. A. C.

**Recovery of organic constituents present in black liquor in making paper by the caustic soda process.**

R. H. MCKEE (B.P. 427,894, 28.10.33).—Conc. black liquor is fused with KOH at  $200-230^\circ$  for 2 hr., extracted with  $H_2O$ , and  $Na_2C_2O_4$  (I) removed by crystallisation. The liquor is then treated with  $H_2C_2O_4$  to separate cryst.  $KHC_2O_4$  (II) and finally distilled to recover AcOH. The residual liquor and also (I) and (II) are treated with  $Ca(OH)_2$  to yield  $CaC_2O_4$  and NaOH or KOH for re-use. F. R. E.

**Manufacture of paper.** MEAD CORP., Asses. of H. P. CARRUTH (B.P. 428,974, 23.5.34. U.S., 18.12.33. Addn. to B.P. 396,063; B., 1933, 861).—A suspension of filler (*F*) is sprayed through the wire of the paper machine on to the underside of the web of paper as it leaves the suction boxes. *F* consists of 6% of coating clay or  $CaCO_3$  mixed with 5–7%, on the wt. of *F*, of starch. The paper should retain  $2\frac{1}{2}$  wt.-% of *F*. D. A. C.

**Paper sizing and composition therefor.** G. A. RICHTER, Assr. to BROWN Co. (U.S.P. 1,969,856, 14.8.34. Appl., 11.9.31).—Paper is tub-sized with a solution containing 1–3% of mechanically gelatinised cellulose and 4–10% of glue. It is claimed that the bursting strength and folding-endurance are increased without decreasing the tear. D. A. C.

**Manufacture of water-repellent papers of high wet strength.** G. A. RICHTER and M. O. SCHUR, Assrs. to BROWN Co. (U.S.P. 1,971,274, 21.8.34. Appl., 2.9.32).— $\frac{1}{2}$ –2% of viscose is incorporated in the paper, on the paper-machine wire, at the presses, or after drying. It is then rendered  $H_2O$ -resistant by coating with wax. D. A. C.

**Impregnated sheet products.** G. A. RICHTER, Assr. to BROWN Co. (U.S.P. 1,972,055, 28.8.34. Appl., 28.7.32).—Unbleached wood pulp (kraft), which has been refined with an alkali so that it contains  $\leq 93\%$  of  $\alpha$ -cellulose, is used, in a substantially unbeaten state, to form porous and bulky paper, which is then run through a bath of molten asphalt at  $150-175^\circ$ . The paper is said to imbibe up to 300 wt.-% of asphalt. D. A. C.

**Sheet material.** A. G. MATTHEWS and T. E. LLOYD (B.P. 429,191, 27.11.33).—Paint having a larger proportion of oil than usual is applied in a thick coat to a horizontal polished surface, e.g., glass, and when dry is backed by a non-textile material, e.g., glue. The sheet after detachment may be applied with additional adhesive to any desired surface, especially where contours are to be sharply defined. B. M. V.

**Packaging method.** R. L. CHURCHILL, Assr. to EASTMAN KODAK Co. (U.S.P. 1,969,453, 7.8.34. Appl., 16.1.33).—The article is wrapped in a non-self-shrinking sheet of cellulose org. ester material, e.g., acetate, free

from  $H_2O$ -sol. compounds, and then treated with an org. swelling agent, (EtOH 2 pts.,  $COME_2$  1 pt.), which is allowed to evaporate, whereby the wrapper shrinks uniformly. F. R. E.

**Manufacture of artificial board.** C. J. STROBEL, Assr. to ST. CLAIR RUBBER Co. (U.S.P. 1,955,984, 24.4.34. Appl., 25.1.32).—Claim is made for a board comprising a layer of fibrous material, e.g., Celotex, to one side of which is attached a facing of thin vulcanised fibre with an intermediate layer of rubber, the various layers being attached to one another with casein glue. A. R. P.

**Artificial leather manufacture.** M. O. SCHUR, Assr. to BROWN Co. (U.S.P. 1,956,179, 24.4.34. Appl., 1.9.32).—Dry felt or web is treated with a rubber coagulant, impregnated with rubber emulsion, and dried so as to obtain uniform distribution of the coagulated rubber through the fabric. A. R. P.

**Obtaining fibre from flax or other fibrous plants.** J. H. GILLESPIE (B.P. 429,342, 29.11.33).

**Machines for spinning and after-treating artificial silk.** FELDMUHL A.-G. VORM. LOEB, SCHOENFELD & Co. (B.P. 429,485, 23.11.34. Switz., 30.7.34).

**Apparatus for [carrying along the film in the] manufacture of artificial yarns.** G. F. J. BOUFFE (B.P. 428,746, 15.11.33).

**Agitators for pulp.**—See I. Wallboard.—See IX. Cellulosic cements.—See XIII. Paper-coating compositions.—See XV. Esters of carbohydrates.—See XVII. Cellulose-splitting enzymes.—See XVIII. Shot-shell.—See XXII.

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

**Bleaching of wool with hydrogen peroxide.** Huc (Halle aux Cuirs [tech.], 1934, 248–249; Chem. Zentr., 1935, i, 496–497).— $SO_2$  is replaced by  $H_2O_2$  in the bleaching of defatted wool. H. N. R.

**[Dyeing] real silk with Naphthol AS dyes.** H. GÖRLICH (Textilber., 1935, 16, 441–443).—Practical details for producing shades fast to most influences are given. The silk is protected from the NaOH used in the Naphthol (I) liquor by addition thereto of 2–2.5 g. of Protectol I (I.G.) (prepared from waste sulphite-cellulose liquors) per litre, which also promotes level absorption of the (I). The diazotised base coupling solution is maintained more acid than usual (with AcOH) to prevent its coupling with the silk fibre itself, with consequent brown discoloration. Suitable combinations of (I) and bases are indicated. A. J. H.

**Nitrobenzene aniline-black.** E. JUSTIN-MUELLER (Melliands Textilber., 1934, 15, 517; Chem. Zentr., 1935, i, 633).—The  $PhNO_2$  is used as an emulsion with  $H_2O$ ,  $CuSO_4$  being the catalyst. Addition of  $p-C_6H_4(NH_2)_2$  accelerates the process and improves the product. H. N. R.

**Textile photochemical investigations. I. Ultra-violet pattern dyeing.** H. FREYTAG and S. PREISS. II. Ultra-violet pattern dyeing of silk textiles. S. PREISS (M Schr. Text.-Ind., 1934, 49, 209–211, 231–233; Chem. Zentr., 1935, i, 476).—I. Benzidine and tolidine,



on irradiation in presence of  $\text{NaNO}_3$ , are oxidised on the fibre to fast dyes.  $\alpha\text{-C}_{10}\text{H}_7\text{OH}$  similarly gives a brown product, which, after treatment with  $\text{NaOH}$ , can be directly coupled with diazonium salts; pyrocatechol behaves similarly.

II. Naphthylamine- and aminonaphthol-sulphonic acids, chromotropic acid, and dihydroxynaphthalenes can be applied to silk by a process similar to the above.

H. N. R.

**Fading of dyeings in radiation of different intensities.** W. D. APPEL (Amer. Dyestuff Rep., 1935, 24, 306—311, 314).—Comparison was made of the progressive fading (change of spectral reflectance at each of 7 different wave-lengths in the visible spectrum) of 7 dyeings (previously found to give anomalous fading when exposed to diffuse and direct sunlight) by exposing them at const. R.H. (75%) and temp. (43°) in an insulated box having a Vita-glass window and placed at two distances from a Fade-Ometer C arc so that the relative intensities of radiation were 10:1. Fading curves are given. It is concluded (in agreement with Harrison; B., 1912, 681) that the fading of certain dyeings [e.g., 1% Brilliant Green Crystals on tannin-mordanted cotton (I), 2% Eosine-Y on silk (II), 1% Primuline NAC developed with  $\beta\text{-C}_{10}\text{H}_7\text{OH}$  on cotton (III), 2% Erio Green extra on wool (IV), and 2% Methylene Blue on silk (V)] is not  $\propto$  the intensity of the incident radiation; the time of exposure to produce a given degree of fading at intensity 0.1 varied from twice to 10 times that required at intensity 1.0. The rate of fading of, e.g., (IV), 0.5% Erio Chrome Cyanine RC on top-chromed wool, (V), and 2% Diazo Brilliant Green 3G developed with Developer Z on cotton was unaffected by a change of R.H. (75—31%), but for other dyeings [e.g., (I), (II), and (III)] the rate was decreased by as much as 50%.

A. J. H.

**Mothproofing materials for textiles.** STÖTTER (Chem.-Ztg., 1935, 59, 473—475).—Eulan New has a strong affinity for wool in an acid bath, and after absorption is fast to washing, light, etc. Eulan NK (NFK extra) is absorbed from a neutral bath, preferably at 70—80°, and is fast; it gives protection from both moths and bacteria. Eulan W extra gives protection from moths and bacteria, but has little affinity, and is used only in special cases, e.g., for horsehair.

A. G.

**Significance of metallic constituents in textile fabrics.** A. H. PETTINGER (Amer. Dyestuff Rep., 1935, 24, 301—303).—Published information relating to the uses and effects of metal stains and mordants is summarised.

A. J. H.

**Imitation crimp effects on rayon cloth.** R. SANSONE (Rayon and Melliant Text. Month., 1934, 15, 614—615; 1935, 16, 94—95).—Plain crimp (crêpe) and stripe-crimp effects are obtained by printing either the face or back of a plain woven-rayon fabric. Suitable coloured printing pastes are described.

A. J. H.

**Examination of finished silk and rayon materials.** ANON. (Amer. Dyestuff Rep., 1935, 24, 325—326).—A scheme of analysis is detailed for the detection of gums, gelatin, starch, various oils, glycerin, and dextrin.

A. J. H.

[Bleaching] artificial silk.—See V. Dispersing agents etc. for Ca soaps.—See XII.

#### PATENTS.

**Dyeing of cellulose acetate artificial silk.** Soc. CHEM. IND. IN BASLE (B.P. 428,767 and 428,841, [A, B] 11.10.33. Switz., 15.10.32).—Mixtures of  $\leq 2$  dyes of similar chemical constitution, one of which has only poor or moderate affinity for the fibre, are used; increased affinity for one or both (all) of the components being claimed. The sp. claims are: (A) 1-arylamino-4-amino-, -arylamino-, or -alkylamino-anthraquinones, e.g., 1-amino-4-anilino-4-p-toluidino-anthraquinone, and (B) *p*-dialkylaminomonoazo dyes, e.g., 1:2:4- $\text{NH}_2\text{C}_6\text{H}_3\text{ClNO}_2$  (I)  $\rightarrow$   $\text{NPhEt}_2$  (prepared by coupling in a single bath).

H. A. P.

**Dyeing of [cellulose derivative] textile materials.** C. DREYFUS (U.S.P. 1,968,819, 7.8.34. Appl., 20.2.31).—Cellulose acetate (etc.) fabric (I) is padded with a dye liquor containing basic, vat, insol. azoic, and certain direct and acid dyes [these normally have no dyeing action on (I)] and a large amount (up to 400 c.c. per litre) of a volatile org. solvent (b.p.  $> 100^\circ$ ) which has a softening effect on (I), followed by drying at 60—90°.

A. J. H.

**Dyeing and printing of textile material.** M. A. DAHLEN and F. ZWILGMAYER, Assrs. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,968,879, 7.8.34. Appl., 3.12.32).—The material is treated with a mixture of an ice-colour coupling component (2:3-hydroxynaphthoic arylamide) (I) and a  $\text{N}_2\text{NH}$ -compound (II) from a diazotised arylamine and a *sec.* sugar amine (e.g., methylglucamine) and developed by action of hot dil. acids ( $\text{AcOH}$ ,  $\text{HCO}_2\text{H}$  +  $\text{Na}_2\text{SO}_4$ ). The method is applicable to printing by separate application of (I) and (II).

H. A. P.

**Manufacture of fireproof [organic fibrous] material.** I. G. FARBENIND. A.-G. (B.P. 428,873, 21.11.33. Ger., 22.11.32).—Fibrous material is impregnated with a mixture of 90—95% of a chlorinated hydrocarbon (I) and 10—5% of a lacquer-forming hydrocarbon of high mol. wt. (II). (I) may be chlorinated  $\text{C}_{10}\text{H}_8$  (40—60% Cl), to which S or resin may be added; (II) may be rubber with 50—73% Cl content.

D. A. C.

**[Metal]-coated fabrics.** L. MARSDEN (B.P. 428,546, 16.11.33).—Woven cotton fabric is metal-coated by spraying on one or both sides, and then further coated with a protective layer of a flexible paint or varnish.

A. J. H.

**[Double-cylinder] apparatus for shrinking fabrics.** A. HEINEN (B.P. 428,812, 8.10.34. Ger., 6.10.33).

Detergents etc. Textile assistants.—See III. Bleaching of pulp etc.—See V.

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

**Calculation of efficiency of contact apparatus for sulphuric acid manufacture.** J. FISCHLER (Przemysl Chem., 1935, 19, 62—63).—The % transformation is given by  $\{20,000(a-c) - 200ae\} / a(200 - 3c - 2e)$ , and % absorption by  $10,000\{200(a-c-e) - e \times$



$(a-2c-2e)/(200-2e)\{100(a-c)-ae\}$ , where  $a$  and  $c$  are %  $\text{SO}_2$  in the gas before contact and after absorption, and  $e$  is %  $\text{SO}_3$  after absorption.

R. T.

**Optimum conditions for producing concentrated [sulphite] cooking acid.** I. L. KAGAN (Tzent. Nauch.-Issl. Inst. Bumazh. Prom., 1934, No. 2, 27—53; cf. B., 1935, 221).—For production of a conc. tower acid from pyrites the optimum conditions are: washing of gases in vertical towers, cooling in apparatus of the Lurgi type, and electrofiltration.

CH. ABS. (e)

**Determination of sulphates in brine.** I. S. ZAKHIEV (Khim. Farm. Prom., 1934, No. 5, 32—37).—Dick's method is better than those of Orlov and of Mindalev and Kőszegi.

CH. ABS. (e)

**Determination of bromine in brine.** I. E. ORLOV (Khim. Farm. Prom., 1934, No. 5, 25—26).—For rapid determination the brine is titrated with 0.025*N*-K<sub>2</sub>OCl. The liberated Br is aspirated, and titration completed when no further yellow colour is produced by the KOCl. For a more accurate determination the sample is treated with  $\text{H}_2\text{SO}_4 + \text{KMnO}_4$  and the liberated Br drawn through aq.  $\text{NaHCO}_3 + \text{Na}_2\text{SO}_3$ . This treatment is repeated, the solution neutralised with  $\text{HNO}_3$ , and the Br' titrated by Volhard's method.

CH. ABS. (e)

**Preparation of sodium persulfate.** S. N. LURIE and M. S. PETROVA (Trans. State Inst. Appl. Chem. U.S.S.R., 1934, 19, 47—57).—Na persulfate is obtained by treating cryst. monosulfate, formed from water-glass in presence of excess of NaOH, with 20—40%  $\text{H}_2\text{O}_2$  in vac. at 55—60°. The product is  $\text{Na}_2\text{SiO}_3 \cdot 2\text{H}_2\text{O}_2 \cdot \text{H}_2\text{O}$  and is not a real persulfate. It decomposes slowly.

CH. ABS. (e)

**Composition of potash fertiliser salts for sale on the American market.** J. W. TURRENTINE (Ind. Eng. Chem., 1934, 26, 1224—1225).—Detailed analysis of samples of crude KCl and  $\text{K}_2\text{SO}_4$  are given.

A G.

(i) **Production of ammonium sulphate from gypsum.** D. S. DOROFEEV. (ii) **Production of ammonium sulphate from solution without evaporation.** A. P. BELOPOLSKI. (iii) **Plant for production of ammonium sulphate from gypsum in Ukraine.** L. S. ASSINOVSKI. (iv) **Separation of phosphogypsum.** L. M. CHERNUI and A. I. LOGINOVA. (v) **Utilisation of gypsum for production of sulphuric acid and Portland cement.** S. M. ROJAK. (vi) **Economics of production of ammonium sulphate from phosphogypsum.** (a) M. I. KRANTZ and P. I. BAZANOV, (b) S. S. PERELMAN, V. A. KORKHOV, and V. A. SOLOVEVA (Trans. Sci. Inst. Fert. U.S.S.R., 1933, No. 101, 33—38, 45—53, 91—98, 125—127, 109—113, 54—61, 62—73).—(i) Use of  $(\text{NH}_4)_2\text{CO}_3$  in much > stoichiometric quantities did not affect the yield of  $(\text{NH}_4)_2\text{SO}_4$  or the time of reaction.  $\text{NH}_3$  reduced the yield.  $\text{NH}_3 + \text{CO}_2$  under pressure acted as  $(\text{NH}_4)_2\text{CO}_3$ . Yields were lowered by use of Fe, but not by Pb vessels.

(ii) A process of salting out with  $\text{NH}_3$  is described.

(iv) Phosphogypsum is enriched by heating in a revolving drum at 300° followed by sieving.

(v) Conditions for production of  $\text{SO}_2$  and cement are examined.

CH. ABS. (p)

**Hermetic containers for calcium carbide.** B. ERLIKH (Neft., 1933, 4, No. 18, 20).—A container is constructed with a trough filled with sand around the upper rim. The lid edges are placed in this rim, giving an airtight seal.

CH. ABS. (e)

**Preparation and analysis of arsenic trisulphide.** L. MICHIELS and B. TOUGARINOV (J. Pharm. Belg., 1934, 16, 507—511; Chem. Zentr., 1935, i, 438).—The prep., assay for pharmaceutical purity, and analysis of  $\text{As}_2\text{S}_3$  are described.

R. N. C.

**Physical chemistry of flotation. V. Flotation of graphite and sulphur by collectors of the xanthate type and its bearing on the theory of adsorption.** I. W. WARK and A. B. COX (J. Physical Chem., 1935, 39, 551—559).—The addition of a frother to  $\text{H}_2\text{O}$  is often sufficient to float graphite (I) or S, but a concn. considerably in excess of that required to produce a good froth is necessary to induce good flotation of (I). Contrary to the general view, collectors of the xanthate type are good collectors for both (I) and S and facilitate flotation. The xanthates are definitely adsorbed at the surface in both cases.

M. S. B.

**Determination of carbon dioxide in air.** Y. KAUKO, J. CARLBERG, and V. MANTERE (Z. anorg. Chem., 1935, 223, 33—44).—A method based on the condensation by liquid air and subsequent weighing (or measurement of pressure after evaporation) of  $\text{CO}_2$  from a dried air stream is described. The results agree with those obtained by Kauko's potentiometric method (B., 1934, 449).

F. L. U.

**[Production of] dilute solutions of hydrogen peroxide by electrolysis.** S. N. LURIE and K. S. GORELIK (Khim. Farm. Prom., 1934, No. 3, 20—27).—With 1%  $\text{H}_2\text{SO}_4$  as electrolyte at 6—8°, and a c.d. of 30 amp. per sq. m., 0.3%  $\text{H}_2\text{O}_2$  was obtained. Stabilisers raised the concn. to 0.6%  $\text{H}_2\text{O}_2$ .

CH. ABS. (e)

**Sulphur.** E. E. AYNSLEY and P. L. ROBINSON (Chem. & Ind., 1935, 392).—Although apparently pure, S usually contains impurities (e.g., bituminous material) which are revealed when the S solidifies after being boiled. Tests in which pure S prepared from (1)  $\text{Na}_2\text{S}_2\text{O}_3$  and (2)  $\text{SO}_2 + \text{H}_2\text{S}$  was heated in (Pyrex) glass, porcelain, and clear fused  $\text{SiO}_2$  showed fairly conclusively that the deposits (probably Si) formed on glass heated in contact with S originate in the glass rather than in the S. To obtain high-quality S the crude product is refluxed (in Pyrex) for several days in an atm. of dry  $\text{CO}_2$ , crushed after solidification, and fractionated thrice in  $\text{CO}_2$ , twice in  $\text{N}_2$ , and finally 5 times in vac.

A. L. R.

**Production of sulphur trioxide and cement from phosphogypsum.** S. I. VOLFKOVITSCH and A. I. LOGINOVA (Trans. Sci. Inst. Fert. U.S.S.R., 1933, No. 101, 113—122).—Phosphogypsum is heated with C at 1150° for 1 hr. and yields 87—88%  $\text{H}_2\text{SO}_4$  (higher than from native gypsum). The rate of decomp. is increased by  $\text{SiO}_2$  and  $\text{Fe}_2\text{O}_3$ . The slag obtained, mixed with an appropriate clay, may be used for manufacture of cement.

CH. ABS. (p)

**$\text{NH}_4\text{Cl}$  for dry cells. Use of  $\text{PbO}_2$  anodes.—** See XI. Fertilisers.—See XVI.  $\text{Na}_2\text{CO}_3$  from Peruvian waters.—See XXIII.



## PATENTS.

**Production of ammonia.** D. PYZEL, Assr. to SHELL DEVELOPMENT Co. (U.S.P. 1,957,849, 8.5.34. Appl., 9.2.32).—The claims are directed to a special arrangement of the purifying catalyst chamber, the main catalyst chamber, compressors, ancillary plant for recovering the  $\text{NH}_3$  in liquid form, and means for circulating the gases through the plant. A. R. P.

**Manufacture of sodium sulphate.** O. V. MARTIN, Assr. to TEXACO SALT PRODUCTS Co. (U.S.P. 1,958,760, 15.5.34. Appl., 16.9.32).—Aq.  $\text{MgSO}_4$  is mixed with  $\text{NaCl}$  and the solution cooled to  $-7^\circ$  to deposit  $\text{Na}_2\text{SO}_4 \cdot 10\text{H}_2\text{O}$ , and the  $\text{MgCl}_2$  mother-liquor is heated with a slight deficiency of  $\text{H}_2\text{SO}_4$  at  $120^\circ$  to expel  $\text{HCl}$  and re-form aq.  $\text{MgSO}_4$  for use again. A. R. P.

**Production of acid disodium pyrophosphate.** C. (BARON) VON GIRSEWALD, H. WEIDMANN, and G. ROESNER, Assrs. to AMER. LURGI CORP. (U.S.P. 1,956,111, 24.4.34. Appl., 9.4.31. Ger., 1.5.30).—Crystals of  $\text{Na}_2\text{P}_2\text{O}_7$  obtained by the reaction of ferrophosphorus with  $\text{NaOH}$  are treated with conc.  $\text{H}_2\text{SO}_4$  sufficient to convert them into  $\text{NaH}_2\text{P}_2\text{O}_7$  (I), and the solution is diluted to  $< 80$  (60) g. of P per litre and cooled to remove  $\text{Na}_2\text{SO}_4 \cdot 10\text{H}_2\text{O}$ . The mother-liquor, containing 105 g. of P per litre, is conc. to 250 g. per litre and cooled to  $20^\circ$ , whereby 65% of the P is recovered as (I); the crystals are converted into  $\text{Na}_2\text{H}_2\text{P}_2\text{O}_7$  by heating at  $190^\circ/100$  mm. A. R. P.

**Manufacture of sodium aluminate.** J. Y. JOHNSON, From PENNSYLVANIA SALT MANUFACTURING Co. (B.P. 427,459, 27.11.34).—Bauxite or  $\text{Al}(\text{OH})_3$  is moistened with 5–10% of  $\text{H}_2\text{O}$  in a steam-jacketed pan and the requisite amount of dry, powdered  $\text{NaOH}$  is added with continuous stirring, whereby a vigorous reaction ensues, much steam is evolved, and a dry, crumbly product is obtained which is converted into  $\text{NaAlO}_2$  by roasting at  $250^\circ$  in a rotary kiln. A. R. P.

**Production of thiosulphate salts.** A. L. WILSON, Assr. to CARBIDE & CARBON CHEMICALS CORP. (U.S.P. 1,956,111, 24.4.34. Appl., 12.2.31).—Solutions of  $\text{N}(\text{C}_2\text{H}_4 \cdot \text{OH})_3$  containing  $\text{S}_2\text{O}_3^{2-}$  from gas-purification systems are regenerated by treatment at  $> 95^\circ$  with an inert gas containing  $\text{H}_2\text{S}$ , which reduces the  $\text{S}_2\text{O}_3^{2-}$  to S. A. R. P.

**Treatment of polyhalite with calcium carbonate.** E. P. SCHOCH (U.S.P. 1,956,930, 1.5.34. Appl., 8.4.32).—The mineral is intimately mixed with  $\text{CaCO}_3$  and the mixture heated with  $\text{H}_2\text{O}$  at  $> 150^\circ$  ( $205^\circ$ ) under pressure, whereby  $\text{Mg}(\text{OH})_2$  is pptd. and the  $\text{K}_2\text{SO}_4$  goes into solution. A. R. P.

**Manufacture of ammonium chloride and calcium sulphate.** T. A. BORRADAILE, Assr. to ALKALINE EARTHS Co. (U.S.P. 1,957,244, 1.5.34. Appl., 12.8.32).—Aq.  $(\text{NH}_4)_2\text{SO}_4$  is treated with aq.  $\text{CaCl}_2$  and the pptd.  $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$  removed. The filtrate is treated with  $\text{BaCl}_2$  to its  $\text{CaSO}_4$  content, the  $\text{BaSO}_4$  removed, and the solution conc. to recover  $\text{NH}_4\text{Cl}$ . The mother-liquor containing  $\text{CaCl}_2$  is returned to the first stage. A. R. P.

**Production of ammonium sulphate.** (A–C) C. J. HANSEN and (D) G. HILLER, Assrs. to KOPPERS Co. OF

DELAWARE (U.S.P. 1,957,265–8, 1.5.34. Appl., [A] 30.6.31, [B] 17.7.31, [C] 24.9.31, [D] 14.12.31. Ger., [A] 3.7.30, [B] 18.7.30, [C] 24.9.30, [D] 13.12.30).—(A) Gases or solutions containing  $\text{SO}_2$  and  $\text{NH}_3$  are mixed in such proportions as to yield a 1:2 mol. mixture of  $(\text{NH}_4)_2\text{SO}_3$  and  $\text{NH}_4\text{HSO}_3$ , the solution of which is heated with S at  $> 60^\circ$  to form aq.  $(\text{NH}_4)_2\text{S}_2\text{O}_3$  and  $(\text{NH}_4)_2\text{S}_3\text{O}_6$  (I), which when autoclaved at  $160^\circ$  affords  $(\text{NH}_4)_2\text{SO}_4$  (II) and S. (B)  $\text{NH}_3$  and  $\text{SO}_2$  are mixed in presence of  $\text{H}_2\text{O}$  to yield aq.  $\text{NH}_4\text{HSO}_3$ , which is treated with  $\text{H}_2\text{S}$  to obtain (I) for conversion into (II). (C) (II) containing traces of Fe and  $\text{NH}_4\text{CNS}$  is decolorised by spraying it with dil.  $\text{H}_3\text{PO}_4$  in a centrifuge. (D) In making (II) from nitrous vitriol and  $\text{NH}_3$  diluted with air a small amount of  $(\text{NH}_4)_2\text{S}_2\text{O}_3$  is added to the air to prevent corrosion of the reaction chamber by the nitrous compounds present. A. R. P.

**Simultaneous manufacture of ammonium phosphate and of other fertiliser substances.** F. MITTEAU, Assr. to SOC. D'ETUDES SCIENTIF. ET D'ENTREPRISES INDUSTRIELLES (U.S.P. 1,956,926, 1.5.34. Appl., 21.8.30. Ger., 27.8.29).— $\text{NaNH}_4\text{HPO}_4 \cdot 4\text{H}_2\text{O}$  is added to the hot, acid mother-liquor (I) from the last stage and the solution is cooled to deposit  $\text{NH}_4\text{H}_2\text{PO}_4$ . After removal of the crystals the solution is acidified with  $\text{HNO}_3$  and evaporated to recover  $\text{NaNO}_3$  and yield (I) for the first stage. A. R. P.

**Manufacture of ammonium thiocyanate.** N. D. SCOTT, Assr. to E. I. DU PONT DE NEMOURS & Co., INC. (U.S.P. 1,958,209, 8.5.34. Appl., 21.6.33).—A mixture of  $\text{HCO} \cdot \text{NH}_2$ ,  $\text{NH}_3$ , and S is heated at  $150$ – $170^\circ/500$ – $200$  lb. per sq. in. in an Al-lined steel bomb and the product is boiled with  $\text{H}_2\text{O}$  to convert any  $\text{CS}(\text{NH}_2)_2$  into  $\text{NH}_4\text{CNS}$ . A. R. P.

**Processing calcium chloride solution.** W. R. COLLINGS, Assr. to DOW CHEM. Co. (U.S.P. 1,958,034, 8.5.34. Appl., 3.7.33).—Moist  $\text{CaCl}_2 \cdot 2\text{H}_2\text{O}$  crystals are mixed with fine material containing  $< 2\text{H}_2\text{O}$ , the mixture is melted and heated to expel  $\text{H}_2\text{O}$  in excess of  $\text{CaCl}_2 \cdot 2\text{H}_2\text{O}$ , and the product cooled on rollers to produce flake crystals which are separated from undersize on a screen, the undersize being returned to the first step. A. R. P.

**Concentration of [calcium] phosphate.** J. T. SINGLETON (U.S.P. 1,958,320, 8.5.34. Appl., 9.1.31).—Natural phosphates are separated from sand by agitating the finely-ground mixture first with  $\text{Na}_2\text{S}$  (0.75 lb. per ton) for 5–10 min. and then with soap (0.75 lb. per ton) and fuel oil (4 lb. per ton), and treating the mixture with an upward current of  $\text{H}_2\text{O}$  in a hydraulic classifier to wash the sand away from the agglomerated phosphate. A. R. P.

**Production of magnesia and nitrogenous fertilisers from dolomite.** KLOCKNER-WERKE A.-G. (B.P. 427,526, 13.9.34. Ger., 2.10.33).—The mineral is dissolved in  $\text{HNO}_3$  and the Mg pptd. as  $\text{Mg}(\text{OH})_2$  by addition of aq.  $\text{NH}_3$ . The filtrate is either evaporated to recover a  $\text{Ca}(\text{NO}_3)_2 + \text{NH}_4\text{NO}_3$  fertiliser mixture, or treated with aq.  $\text{NH}_3$  and  $\text{CO}_2$  to ppt.  $\text{CaCO}_3$  and yield a solution from which  $\text{NH}_4\text{NO}_3$  is recovered by evaporation and crystallisation. A. R. P.



**Separation of minerals [talc from magnesite] by flotation.** GEN. ELECTRIC CO., LTD., and A. B. JACKSON (B.P. 425,362, 12.9.33).—The talc is floated with oleic acid (0.3 lb.) and Pb oleate (0.1 lb. per ton of ore) in presence of a frothing agent, *e.g.*, terpineol.

A. R. P.

**Manufacture of (A) aluminium hydroxide, (B, C) alumina.** A. FLEISCHER, Assr. to KALUNITE CO. (U.S.P. 1,957,766—8, 8.5.34. Appl., 30.6.33).—(A) Basic alum is heated with aq. 10–20% NaOH in amount  $\geq$  5% in excess of the theoretical necessary to combine with the  $\text{SO}_3$  not attached to alkali, whereby  $\text{Al}(\text{OH})_3$  is obtained in granular form. (B) Basic  $\text{NH}_4$  alum (I) is heated with aq.  $\text{NH}_3$  in amount slightly  $<$  that required completely to decompose it, and the washed  $\text{Al}(\text{OH})_3$  is calcined at  $>$  1000° to expel  $\text{H}_2\text{O}$  and the remaining  $\text{SO}_3$ . (C) (I) is heated at 400–700° in a current of  $\text{NH}_3$  to give a light  $\text{Al}_2\text{O}_3$ .

A. R. P.

**Increasing the strength of salt solutions.** F. EICHELBERGER, Assr. to KALUNITE CO. (U.S.P. 1,957,764, 8.5.34. Appl., 30.6.33).—A hot solution of a salt having a max. solubility  $\geq$  25% of the wt. of solution at room temp. is divided into 2 portions (*a*, *b*); (*a*) is cooled to recover crystals of the salt, and these are then dissolved in (*b*). The process is utilised in the recovery of alum from alunite.

A. R. P.

**Production of highly-active alkali-carbon briquettes for the preparation of alkali cyanides.** F. BARTLING, Assr. to ALTERUM KREDIT A.-G. (U.S.P. 1,957,129, 1.5.34. Appl., 24.3.31. Ger., 14.4.30).—An intimate mixture of finely-divided coke and  $\text{NaHCO}_3$  is pressed into briquettes, which are heated at 300–400° to expel  $\text{CO}_2$  and form a porous mass which readily absorbs  $\text{N}_2$  to form  $\text{NaCN}$  at a high temp.

A. R. P.

**Preparation of a catalyst.** N. E. OGLESBY and H. V. WRIGHT (Assee.) (U.S.P. 1,956,585, 1.5.34. Appl., 17.1.29).—Porous material, *e.g.*, charcoal, is impregnated with a solution obtained by treating Cu in aq.  $\text{NH}_3$  with  $\text{CO}_2$  and air; the impregnated material is then dried and heated at 150° to expel  $\text{NH}_3$  and  $\text{CO}_2$  for re-use and leave a residue of C containing CuO.

A. R. P.

**Precipitation of titanium compounds.** W. J. CAUWENBERG, Assr. to TITANIUM PIGMENT CO., INC. (U.S.P. 1,957,528, 8.5.34. Appl., 29.10.32).—In the production of  $\text{TiO}_2$  by hydrolysis of aq.  $\text{Ti}(\text{SO}_4)_2$  a small part of the solution is hydrolysed by boiling with  $\text{NH}_2\text{Ac}$ ,  $(\text{CH}_2)_6\text{N}_4$ ,  $\text{NH}_2\text{CHMe}\cdot\text{OH}$ , or the like and is then returned to the remainder so that the pptd.  $\text{Ti}(\text{OH})_4$  particles act as nuclei for the main hydrolysis.

A. R. P.

**[Hydrolysis of] titanium [sulphate] compounds.** TITAN CO. A./S. (B.P. 427,339, 23.10.33. Addn. to B.P. 392,194; B., 1933, 626).—The  $\text{H}_2\text{SO}_4$  solution of ilmenite is hydrolysed by heating with an org. compound which liberates  $\text{NH}_3$  by hydrolysis, *e.g.*,  $\text{NH}_2\text{CHMe}\cdot\text{OH}$ ,  $\text{NH}_2\text{Ac}$ , or  $(\text{CH}_2)_6\text{N}_4$ .

A. R. P.

**Stabilisation of [hydrogen] peroxide solutions.** J. S. REICHERT, Assr. to E. I. DU PONT DE NEMOURS & CO., INC. (U.S.P. 1,958,204, 8.5.34. Appl., 2.11.31).—The solution is treated with  $\text{Na}_2\text{SnO}_3$  (5–100 mg. per litre) and  $\text{Na}_2\text{H}_2\text{P}_2\text{O}_7$  to give  $p_{\text{H}}$  3.5–6 (4–5).

A. R. P.

**Absorption of nitrogen oxide gases mixed with oxygen or air.** F. BARTLING and A. MEIER, Assrs. to ALTERUM KREDIT A.-G. (U.S.P. 1,957,130, 1.5.34. Appl., 7.12.31. Ger., 16.1.31).—The gases are passed upwards through coarse, solid  $\text{NH}_4\text{HCO}_3$  (I) at 40–50°, the  $\text{CO}_2$  evolved being used to make more (I). The liquid resulting from the reaction is utilised for a preliminary scrubbing of the  $\text{N}_2\text{O}_3$  gases to neutralise its remaining (I) content.

A. R. P.

**Plastic [sulphur].** W. A. HAMOR and W. W. DUECKER, Assrs. to TEXAS GULF SULPHUR CO. (U.S.P. 1,959,026, 15.5.34. Appl., 5.10.32).—A mixture of S with P 3–5,  $\text{P}_2\text{S}_3$  2–8, or  $\text{P}_2\text{S}_5$  10–25% is heated at 440° and sprayed into  $\text{H}_2\text{O}$  at 0–60°. The product retains its plasticity almost indefinitely.

A. R. P.

**Calcining CaO etc.**—See I.  $\text{NH}_3$  liquor.—See II. Constituents of black liquor.—See V. Accumulator material. Regenerating pickle liquor.—See XI. Fungicide.—See XVI.

## VIII.—GLASS; CERAMICS.

**Glass-melting with potash containing phosphate.** J. LÖFFLER (Glastechn. Ber., 1934, 12, 332–334; Chem. Zentr., 1935, i, 610–611).— $\text{P}_2\text{O}_5$  lowers the m.p. A mixture of potash, soda, phosphate, sulphate, and chloride, or a mineral potash containing phosphate, may be used.

H. J. E.

**Grey cast iron as a material for glass moulds.** O. BORNHOFEN (Glastechn. Ber., 1934, 12, 339–345; Chem. Zentr., 1935, i, 611).—A fine-grained cast Fe (I) is generally most suitable. The influence of Ni, Cr, and Mo is discussed. (I) with a high Cr or Al content have excellent heat-resistance, but are unsuitable as they cannot be worked.

H. J. E.

**Influence of the mould on the strength [of moulded glass articles].** K. H. BORCHARD (Glastechn. Ber., 1934, 12, 334–339; Chem. Zentr., 1935, i, 611).—Data are given for the influence of shape, method of manufacture, and cooling on the strength of glass flasks etc.

H. J. E.

**Physical properties of glass.** W. M. HAMPTON (Chem. & Ind., 1935, 387–391).—The properties (*P*) are classified as those which vary with founding temp. (1) slightly, *e.g.*, *n*, (2) rapidly, *e.g.*,  $\eta$ , and those which at const. temp. are (3) almost exactly reproducible and capable of exact measurement, (4) not strictly controllable, and subject to substantial and inevitable variations in measurement. Variations in *P* found in measurements on a large range of nominally similar glasses are due to (*a*) errors of measurement, (*b*) unavoidable slight changes in composition, and (*c*) inconstancy of the *P* even for the same composition. A further subdivision of (3) and (4) is suggested as (*A*) where *a* and *b* are the only variables (*e.g.*, in the case of *n*), (*B*) where *a*, *b*, and *c* operate (*e.g.*, tensile strength, most of the relatively large variations found in which are due to some inherent *P* of the glass). The *P* required of heat-absorbing glasses (I) are discussed; the ratio light transmission/heat transmitted is an unsatisfactory criterion of the efficiency of (I), the only method of com-



parison at all suitable being to plot the variation of heat and light transmission with variation in thickness of the (I), and in relation to some sub-standard (e.g., FeO glass). Results obtained with a special (I) ("Calorex") and an ordinary roofing glass are compared.

A. L. R.

**Determination of absorption coefficients of filter-glasses in the ultra-red up to 4.1  $\mu$ .** K. KAISER (Glastechn. Ber., 1934, 12, 198—202; Chem. Zentr., 1935, i, 112).—Data are given for commercial filters.

J. S. A.

**Variation with heat-treatment of the coefficient of expansion of glass.** (MLLE.) N. KLEIN (Compt. rend., 1935, 200, 1320—1321).—Data, measured at room temp., for the coeff. of expansion and for  $n$  were obtained for specimens of glass subjected to heat-treatment at various temp. in the range 300—1000°.

N. M. B.

**Differentiation of sheet glasses according to method of production and subsequent grinding and polishing.** F. H. ZSCHACKE (Glastechn. Ber., 1934, 12, 227—233; Chem. Zentr., 1935, i, 130).—Superficial etching with H<sub>2</sub>O 100, HF 10, and H<sub>2</sub>SO<sub>4</sub> + K<sub>2</sub>Cr<sub>2</sub>O<sub>7</sub> 5 pts. shows whether, and by what process, the surface has been worked.

J. S. A.

**Barium and zinc oxides as enamel-forming oxides.** K. KAMP (Glashütte, 1934, 64, 715—717; Chem. Zentr., 1935, i, 287).—ZnO or BaO in enamel lowers the m.p., BaO increasing the expansion. On replacing ZnO by BaO the Na<sub>2</sub>O must be adjusted.

H. J. E.

**Borax-free ground[ing enamel].** VIELHABER (Emailwaren-Ind., 1934, 11, 345—347; Chem. Zentr., 1935, i, 129).—Enamels low in or free from B<sub>2</sub>O<sub>3</sub> are more resistant to chemical attack than those containing the oxide.

J. S. A.

**Borax-free enamels.** VIELHABER (Emailwaren-Ind., 1934, 11, 356—357; Chem. Zentr., 1935, i, 287).—In absence of B<sub>2</sub>O<sub>3</sub> the constituents must be chosen to give a sufficiently fusible enamel with a low expansion.

H. J. E.

**Expansion relations in sheet-iron enamel.** A. DIETZEL and K. MEURES (Glashütte, 1934, 64, 37—38, 50—51; Chem. Zentr., 1935, i, 457).—The expansion of the ground enamel is raised by dissolution of Fe oxides (especially FeO). The significance of expansion in practice is discussed.

H. J. E.

**Production of lead-fast lead glazes not injurious to health.** H. HARKORT (Sprechsaal Keram., 1934, 67, 621—623, 637—639; Chem. Zentr., 1935, i, 129).—The % of PbO dissolved out of a glaze at 100° by 4% AcOH is decreased by the presence of alkaline earths and increased by Na<sub>2</sub>O and B<sub>2</sub>O<sub>3</sub>.

J. S. A.

**Chemistry of coloured glazes.** W. WEYL (Ber. deuts. keram. Ges., 1934, 15, 369—374; Chem. Zentr., 1935, i, 457).—A discussion.

H. J. E.

**Influence of the glass phase in glazed ceramic materials.** B. LONG (Céramique, 1934, 37, 227—232; Chem. Zentr., 1935, i, 458).—Thermal expansion data are recorded for a glaze with SiO<sub>2</sub> 69.5, B<sub>2</sub>O<sub>3</sub> 3.80, Al<sub>2</sub>O<sub>3</sub> + Fe<sub>2</sub>O<sub>3</sub> 7.00, CaO 5.00, Na<sub>2</sub>O 14.25, and K<sub>2</sub>O 0.20%.

H. J. E.

**Relation between various physical, chemical, and technical properties of clays.** H. SALMANG and J. KIND (Ber. deuts. keram. Ges., 1934, 15, 331—357; Chem. Zentr., 1935, i, 132).—"Fat" clays possess the highest sorption capacity ( $S$ ). Hygroscopicity appears not to depend on the distribution of particle sizes, but runs parallel to  $S$  for cations. Plasticity, dry strength, and shrinkage are generally low for clays with low  $S$ , and *vice versa*. No definite relation exists between physical properties and particle size.

J. S. A.

**Causes of changes in porosity of ceramic bodies on burning.** P. KOCH (Tonind.-Ztg., 1934, 58, 927—928; Chem. Zentr., 1935, i, 289).—Factors responsible for porosity changes are the formation of O<sub>2</sub> by dissociation of Fe<sub>2</sub>O<sub>3</sub> and the liberation of adsorbed H<sub>2</sub>O.

H. J. E.

**Artificial teeth of ceramic material.** R. POHL (Keram. Rund., 1934, 42, 408—409; Chem. Zentr., 1935, i, 131).—A mixture of feldspar 75, SiO<sub>2</sub> 22, and kaolin 3%, which requires no glaze, is recommended.

J. S. A.

**Permeability of refractory materials for hydrogen.** W. BAUKLOH and A. HOFFMANN (Ber. deuts. keram. Ges., 1934, 15, 424—433; Chem. Zentr., 1935, i, 289).—A glass tube of 1 mm. wall thickness was impermeable to H<sub>2</sub> (100—300 mm. Hg pressure) up to 500°. SiO<sub>2</sub> was more permeable. Sintered corundum was permeable at room temp.; at 1100° the val. had fallen to  $\frac{1}{2}$ . Diffusion through porcelain was similar to that through SiO<sub>2</sub>, and varied little with temp. (500—1300°).

H. J. E.

**Gas-permeability, compressive strength thermal conductivity, thermal expansion, specific heat, and cracking tendency of refractory stones as related to porosity.** H. HERBST (Feuerungstechn., 1934, 22, 115—116; Chem. Zentr., 1935, i, 132).—All properties of a material containing Al<sub>2</sub>O<sub>3</sub> showed a sharp alteration between 30 and 45% porosity.

J. S. A.

**Ceramic moulding material.**—See XI.

## PATENTS.

**[Cream-coloured] opaque glass.** J. C. PARKINSON, Assr. to PITTSBURGH PLATE GLASS Co. (U.S.P. 1,956,176, 24.4.34. Appl., 22.10.30).—The glass is made by fusing together sand 885, Na<sub>2</sub>CO<sub>3</sub> 306, feldspar 675, cryolite 90, CaF<sub>2</sub> 50, NaNO<sub>3</sub> 30, (As or Sb)<sub>2</sub>O<sub>3</sub>.Fe<sub>2</sub>O<sub>3</sub> 4—10, Na<sub>2</sub>U<sub>2</sub>O<sub>7</sub> 2—7, and Se 0.125—0.625 lb.

A. R. P.

**Manufacture of (A) rubber-bonded abrasive articles, (B) abrasive article.** (A) R. C. BENNER, G. H. PORTER, and C. S. NELSON, (B) R. C. BENNER, Assrs. to CARBORUNDUM Co. (U.S.P. 1,970,834—5, 21.8.34. Appl., [A] 19.11.29, [B] 31.1.31. Can., [B] 2.10.30).—(A) A mixture of abrasive grains and a vulcanisable rubber bond is vulcanised in a mould, different pressures being applied during the period of heating. (B) For the attachment of a bonded abrasive article to a backing member, particularly of metal, an adhesive is employed containing rubber and a synthetic resin, together possibly with an isomeride of rubber.

D. F. T.

**Sheet material.**—See V. **Furnaces for glass.**—See XI.



## IX.—BUILDING MATERIALS.

**Quaternary system  $\text{CaO-Al}_2\text{O}_3\text{-SiO}_2\text{-Fe}_2\text{O}_3$  in relation to cement technology.** F. M. LEA and T. W. PARKER (Dept. Sci. Ind. Res., Building Res., Tech. Paper No. 16, 1935, 52 pp.; cf. A., 1935, 448).—From the phase relationships, the compounds in Portland cement are  $3\text{CaO}\cdot\text{SiO}_2$ ,  $2\text{CaO}\cdot\text{SiO}_2$ ,  $3\text{CaO}\cdot\text{Al}_2\text{O}_3$ , and  $4\text{CaO}\cdot\text{Al}_2\text{O}_3\cdot\text{Fe}_2\text{O}_3$ , with the possible presence of  $5\text{CaO}\cdot 3\text{Al}_2\text{O}_3$  and  $\text{CaO}$ . Glass may be formed if arrested equilibrium occurs in the burning process. Formulæ are given for calculation of the amounts of these compounds and glass present, assuming arrested equilibrium, with results different from those given by the Bogue method. Correction formulæ to apply to this latter method are given. A  $\text{CaO}$ -limit formula and the amount of liquid formed in burning clinker are derived from the phase relationships and agree with practice. No relationship exists between the amounts of liquid and free  $\text{CaO}$  in the clinker, but when the former is  $< 22\%$ , the latter is high. T. W. P.

**Determination of the rational composition of Portland cement.** V. DI S. SARDOFONTANA (Cemento, 1934, 6, 295—296; Chem. Zentr., 1935, i, 612—613).—A method of calculating the composition in terms of  $2\text{MgO}\cdot\text{SiO}_2$ ,  $2\text{CaO}\cdot\text{Fe}_2\text{O}_3$ ,  $2\text{CaO}\cdot\text{Al}_2\text{O}_3$ ,  $2\text{CaO}\cdot\text{SiO}_2$ , and  $3\text{CaO}\cdot\text{SiO}_2$  is described. H. J. E.

**Constitution of Portland cement.** A. TRAVERS (Ciment, 1934, 39, 211—213, 230—234, 265—268; Chem. Zentr., 1935, i, 289—290).—A discussion. H. J. E.

**Alite.** K. KOYANAGI (Zement, 1934, 23, 633—635; Chem. Zentr., 1935, i, 289).—After fractional sedimentation of Portland cement the fraction 10—25  $\mu$  consisted mainly of  $3\text{CaO}\cdot\text{SiO}_2$  (alite). By using  $\text{CaF}_2$  or  $\text{CaSO}_4$  as flux a clinker consisting almost entirely of alite was obtained. Its properties are described. H. J. E.

**Control methods for puzzolana cement.** G. MALQUORI (Ric. sci. Prog. tecn. Econ. naz., 1934, 2, 140—153; Chem. Zentr., 1935, i, 460).—1 g. of material is twice evaporated to dryness with 20 c.c. of 1 : 1 HCl. 100 c.c. of dil. (1 : 3) HCl are added to the residue, heated, filtered, and 100 c.c. of boiling 5% NaOH are added. The ppt. is filtered, ignited, and weighed. For puzzolana the residue is  $< 14\%$ . H. J. E.

**Preparation of road concrete.** O. GRAF (Zement, 1934, 23, 610—613, 626—628; Chem. Zentr., 1935, i, 459).—A crit. discussion. H. J. E.

**Determination of the resistance of concrete to corrosive solutions.** A. POGÁNY (Zement, 1934, 23, 639—643; Chem. Zentr., 1935, i, 291).—The current strength for different concns. of corrosive solution is measured by inserting two Zn electrodes in the specimen to be examined. This measures the penetration of conducting liquid into the specimen. H. J. E.

**Adhesion between the mineral and binding agent in bituminous road construction.** W. GEISSLER (Bitumen, 1934, 4, 191—197; Chem. Zentr., 1935, i, 505).—Binding agents (I) adhere well to hydrophobic, and poorly to hydrophilic (II), minerals. Laboratory tests of adhesion are described. In the case of (II)

minerals mixed with (I) considerable swelling occurs in  $\text{H}_2\text{O}$ . H. J. E.

**Dolomite lime as a constituent of mortar.** L. HOLLECK (Tonind.-Ztg., 1934, 58, 1093—1095; Chem. Zentr., 1935, i, 290).—Dolomite ( $\text{CaO } 34.3$ ,  $\text{MgO } 17.4\%$ ) shows a max. strength as a mortar for a burning temp. of  $850^\circ$ . In this product the  $\text{CaCO}_3$  was partly converted into  $\text{CaO}$ . H. J. E.

**Application of microchemical tests in assessing the quality of ash timber.** S. H. CLARKE (Nature, 1935, 135, 910).—A phloroglucinol-HCl solution differentiates strong from abnormally weak types of timber. In the former the whole of the fibre walls are stained red. L. S. T.

**Cements from gypsum and phosphogypsum.**—See VII. Cement sludge.—See XI. Acid-proofed wood.—See XIII.

## PATENTS.

**Aggregates for concrete or other cementitious masses.** W. W. TRIGGS. From W. F. MACGLASHAN (B.P. 429,015, 18.8.33).—In the manufacture of light-weight aggregates by the heating to fusion of ceramic materials ( $M$ ) which will evolve gas, sticking of the small bodies of  $M$  (in, e.g., the rotary kiln) is prevented either by dusting them previously with material of higher m.p. or forming the layer from  $M$  itself by oxidation of Fe compounds, C being incorporated to keep the core fusible and the kiln atm. maintained oxidising to form the refractory layer. B. M. V.

**Production of hydraulic cements or binding agents and working up of the same in street and road construction.** K. HALBACH (B.P. 428,130, 4.10.33).—Hydraulic cements are well hydrated to a gel-like paste, dried, ground, and intimately mixed with untreated cement. Fillers or cement clinker may be added. T. W. P.

**Production of waterproof cement and mortar masses.** B. HEIMANN (B.P. 428,192, 22.10.34. Ger., 21.10.33).—As addenda to the mortar or cement, compositions of  $\text{BaSO}_4$ ,  $\text{CaO}$ , glass-grinding sand, Al silicate, powdered water-glass, colloidal  $\text{H}_2\text{SiO}_3$ , a fluosilicate (preferably of Mg), and/or a fatty acid salt of Al or other metal are claimed. B. M. V.

**Material suitable for expansion joints for concrete and for other purposes.** W. L. MILLER, and H. V. SMITH & Co., LTD. (B.P. 428,149, 11.11.33).—Granulated cork is moistened with  $\text{H}_2\text{O}$  and treated with bitumen at  $> 100^\circ$ , then rolled into slabs or strips or other convenient form. B. M. V.

**Production of [adherent] bituminous surfaces on roads, pavements, and the like.** C. A. AGTHE (B.P. 428,334, 25.6.34. Ger., 24.6.33).—The hard base of the road is prepared for the bituminous wearing surface by coating with an oil of high b.p. which has been thickened by a solution of pitch, asphalt, a resin, or wax, applied, if desired, as an aq. emulsion, in which case a small proportion of a  $\text{H}_2\text{O}$ -sol. salt of a fatty or resin acid should be caused to be present, e.g., by addition of a soap or alkali. B. M. V.

**Plastic-elastic binding material for road surfaces, floors, tiles, etc.** W. W. TRIGGS. From N.V. TOT



VOORTZETTING DER ZAKEN VAN P. SCHOEN & ZOON (B.P. 428,182, 1.9.34).—The material consists of slightly coloured, clear, tar-distillation products (*e.g.*, coumarone resins, phenanthrene oils, anthracene oils, etc.) and colophony, together with an aliphatic bitumen and chlorinated rubber. Vegetable or animal oils with anti-oxidising agents may be added. T. W. P.

(A) Wallboard. (B, C) Manufacture of wallboard. A. W. PARFITT. From GYPSUM, LIME, & ALABASTINE, CANADA, LTD. (B.P. 429,084 and 429,379—80, [A—C] 7.2.34).—(A) A core of quick-setting cement is sandwiched between paper liners, and  $\sphericalangle$  2 edges are tapered. In (B) and (C) methods of bevelling are described. B. M. V.

Drying cement etc.—See I. Road tars.—See II. Artificial board.—See V.

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

Use of burned limestone in the blast furnace. I. V. SHMANENKOV and L. V. ZVEREV (Min. Suir., 1934, 9, No. 10, 16—19).—Coke consumption can be reduced 15—20% by the use of burned limestone (*cf.* B., 1934, 720). CH. ABS. (e)

Regulation of the heat development and distribution in annealing and heating furnaces with divided air supplies. E. SENFTER (Arch. Eisenhüttenw., 1934—5, 8, 427—431).—Several types of furnaces for the heat-treatment of steel are described and the distribution of the heat supplies throughout them is discussed mathematically. A. R. P.

Grinding of iron ore in single- and multi-compartment mills. G. G. BRING [with S. ANESTAD] (Jernkont. Ann., 1934, 118, 136—255; Chem. Zentr., 1935, i, 619).—Comparative results and data on the influence of various factors are given. H. J. E.

Equilibrium in the removal of phosphorus from electric pig iron. M. MUKOYAMA (J. Electrochem. Assoc. Japan, 1934, 2, 359—366).—The relation between the heating time and [P] in pig Fe (I) has been studied at 1250—1450° for varying acidity. The [P] in (I) changes with varying [P<sub>2</sub>O<sub>5</sub>] in the slag, even though the temp., pressure of CO, and acidity are const. The equilibrium vals. for P/P<sub>2</sub>O<sub>5</sub> have been determined for a definite acidity after heating for 2 hr. at 1300—1500°. By contact of molten (I) rich in P with slag poor in P, the P content in (I) decreases with falling temp. and decreasing acidity of the slag. About 97% of P is eliminated under favourable conditions. CH. ABS. (e)

Heat-resistant cast iron. A. DAWANS and L. DENOËL (Rev. univ. Mines, Mét., 1934, 10, No. 8, 572—585; Chem. Zentr., 1935, i, 296).—A discussion of the deterioration of Fe on heating. Mg, Al, Si, Ti, and Cr increase the heat-resistance of cast Fe. H. J. E.

Hardening of cast iron. T. KROGVIK (Gjuteriet., 1934, No. 2, 20).—Cast Fe is hardened by rapid cooling from 800°. Small additions of Ni or Cr increase the hardness. After hardening the metal is annealed at 400° to decrease the brittleness. CH. ABS. (e)

Influence of the arrangement of the sample on results of the Epstein test [for sheet iron].

F. WEVER and H. LANGE (Mitt. Kaiser-Wilh.-Inst. Eisenforsch., 1934, 16, 155—158; Chem. Zentr., 1935, i, 622).—The results are influenced by the conditions of the test. Data are recorded. H. J. E.

Dephosphorisation of Bessemer steel with liquid slags. F. AGALETZKI and S. ZAIKOV (Stal, 1934, 4, No. 8, 21—29; *cf.* B., 1933, 830).—Bessemer steel immediately after blowing was poured into a ladle containing molten slag (SiO<sub>2</sub> 7—10, CaO 39—51, FeO 17.5—22, P<sub>2</sub>O<sub>5</sub> 0.14—0.34%). By thoroughly intermixing, the P content in the steel was reduced from 0.07—0.08 to 0.02—0.04%. The C, Si, and Mn contents were also greatly decreased. CH. ABS. (e)

Properties of Bessemer steel prepared by Tochinski's method. M. ARONOVITSCH (Stal, 1934, 4, No. 8, 70—91).—Steel thus prepared (*cf.* preceding abstract) has a slightly decreased tensile strength and greatly increased elongation, reduction of area, and impact-resistance. Average slag inclusions were 0.0159%. CH. ABS. (e)

Al transformation range in abnormal steels. H. CORNELIUS (Arch. Eisenhüttenw., 1934—5, 8, 461—462).—Determinations of the Acl and Ar1 temp. of pure crucible and carbonyl steels with 0.1—1.7% C have confirmed Duftschmid and Houdremont's statement (B., 1932, 346) that the development of abnormal structures is a property of pure Fe and is not due to the effects of impurities. In pure steels the rate of diffusion of C is very high, so that the Acl and Ar1 temp. are lower and there is a smaller gap between them than is the case with ordinary steels. Hence the cementite (C) tends to collect around the first particles pptd. and produce globular areas of C in a ground-mass of ferrite, even in hypereutectoidal steels. A. R. P.

Influence of structure on durability of steel. W. ENDERS (Mitt. Kaiser-Wilh.-Inst. Eisenforsch., 1934, 16, 159—167; Chem. Zentr., 1935, i, 297—298).—The optimum durability (D) was found in coarse-grained steels. Globular cementite (I) produced a lower D than lamellar pearlite. (I) deposited at the grain boundaries had little effect on D. Parallel changes were, in general, observed in the tensile strength at room temp. and in D at 500°. H. J. E.

Factors determining impact-resistance of hardened carbon steels. H. SCOTT (Trans. Amer. Soc. Metals, 1934, 22, 1142—1164).—Complete dissolution of ferrite is essential for max. impact-resistance. When impact data were plotted against hardness, all fully-hardened, medium-C steels fell in one of two widely separated groups, *viz.*, low- and high-impact groups. Additions of Al and V increased the impact vals. consistently in the high-impact group. Highly purified steels need additions which will restrain grain growth. CH. ABS. (e)

Influence of pretreatment and subsequent rolling on properties of cold-rolled band steel. H. LASSEK (Mitt. Forsch.-Inst. Verein. Stahlwerke, Apl., 1934, 4, 23—28; Chem. Zentr., 1935, i, 145—146).—The effect of previous stretching (I) is most marked with steels afterwards subjected to  $\gt$  10% deformation by rolling (II). The optimum for (I) is 30%. Ageing, and the



development of brittleness diminish as deformation by both (I) and (II) is increased. J. S. A.

**Importance of grain size of sheet steel for deep drawing.** R. L. KENYON (Trans. Amer. Soc. Metals, 1934, 22, 1099—1114).—A discussion of factors influencing drawing quality. CH. ABS. (e)

**Welding of hard steels.** J. MÜLLER (Z. Ver. deuts. Ing., 1934, 78, 1293—1294; Chem. Zentr., 1935, i, 300).—A review and discussion of factors influencing welding. H. J. E.

**Sulphur prints and sulphide inclusions [in steel].** L. NORTHCOTT (Metallurgist, 1935, 11, 7—10).—The inclusions (I) which produce dark spots on acidified photographic paper are FeS, MnS, and duplex (I), such as silicates if they are associated with FeS. The intensity of the dark spots is also dependent on the acid content of the paper. W. P. R.

**Influence of alloy elements on the behaviour of steels in case-hardening.** E. HOUDREMONT and H. SCHRÄDER (Arch. Eisenhüttenw., 1934—5, 8, 445—459).—Alloy elements in steel may be divided into two groups as regards their effect on case-hardening (*H*): (I) elements which have a high affinity for C, e.g., Cr, Mo, W, V, and Ti, and (II) elements which have little or no affinity for C, e.g., Al, Ni, Co, Cu, and P. (I) increase the C content of the outer layer (*O*), whereas (II) reduce it; on the other hand, (II) permit a more rapid penetration of C into the metal than do (I). Although Mn, Ni, Cu, Cr, Mo, and W reduce the depth of penetration of the C into the steel, they increase the depth of the hardened layer owing to their own hardening action in presence of C. On the other hand, Co by reducing the hardness of the metal and V and Ti by combining with the hardening C reduce the depth. Case-hardened steels containing (I) have a structure in which *O* has a network of carbides of (I), whereas in steels containing (II) the cementite of *O* decomposes into ferrite and graphite. Sometimes Mo and W steels and to a smaller extent Ni and Cu steels display an abnormal structure after *H*. With Mn, Ni, Co, Cu, and Si steels, and to a greater extent with Mo, W, V, and Ti steels, a high *H* temp. produces grain-refinement, whereas Cr and Al steels are much less sensitive to over-heating during *H*.

A. R. P.

**Wear of iron alloys on emery paper and their hardness.** W. TONN (Arch. Eisenhüttenw., 1934—5, 8, 467—470).—Satisfactory and comparative results are obtained by wear tests on a rotating disc covered with a standard emery paper if the specimen is held against it with a 1-kg. load and is slowly moved diametrically across the surface while the disc rotates; the curves obtained for various steels and Fe alloys after different heat-treatments resemble those obtained by the Spindel wear test. The wear of plain steels is greatest after quenching and decreases with rising tempering temp. With C steels wear decreases rapidly with increase of C to 0.9% and thereafter very slowly with a further increase, whereas the Brinell hardness ( $H_B$ ) varies almost parabolically with the C content, reaching a max. at 0.9%. For Ni-Fe alloys wear decreases with increase in Ni to 30%, then remains const. up to 70% Ni, and thereafter increases slightly, whereas  $H_B$  rises sharply

to a max. at 12% Ni and returns to its original val. at 30% Ni. For Fe-W alloys wear decreases in a smooth, flat curve up to 20% W. Cold-rolling has no effect on the wear. A. R. P.

**Effect of nitrogen on high-chromium steels.** BABSKY (Aciers spéc. Mét., Alliages, 1934, 9, (10), 207—212; Chem. Zentr., 1935, i, 144).—For optimum mechanical properties (I) the N content of high-Cr and Cr-Ni steels should be  $\geq 1\%$  of the Cr. Presence of N in Cr-Ni steels of medium C content, especially corrosion-resistant and non-magnetic steels, raises the elastic limit and improves (I) at high temp. and the working quality of the steel. J. S. A.

**Rôle of manganese in steels.** E. LACHMEYER (Metallbörse, 1934, 24, 1242—1243, 1275; Chem. Zentr., 1935, i, 144).—A review. A thermal analysis of the system Fe-Mn is recorded. J. S. A.

**Occurrence of a high crystallising force in the formation of iron-zinc alloys.** E. SCHEIL (Z. Metallk., 1935, 27, 76—77).—When some varieties of steel are immersed in Zn at 450—480° very rapid growth of a hard alloy layer occurs; this layer is free from FeZn<sub>3</sub> and consists almost entirely of FeZn<sub>7</sub>. The force of crystallisation of this layer is  $> 6$  kg./sq. mm. at 450°, which is much  $>$  that of any substance for which it has yet been measured. A. R. P.

**Potentiometric determination of molybdenum and titanium in steel, ferro-alloys, slags, and ores in presence of iron and other metals.** P. KLINGER, E. STENGEL, and W. KOCH (Arch. Eisenhüttenw., 1934—5, 8, 433—443).—The method depends on the reduction of Mo<sup>VI</sup> to Mo<sup>III</sup> and of Ti<sup>IV</sup> to Ti<sup>III</sup> by means of granulated Zn in 1:1 HCl, a few drops of aq. CrCl<sub>2</sub> being added to complete the reduction. The reduced solution is titrated with aq. K<sub>2</sub>Cr<sub>2</sub>O<sub>7</sub>, potential jumps occurring at the complete oxidation (a) of CrCl<sub>2</sub> to CrCl<sub>3</sub> and (b) of Ti<sup>III</sup> to Ti<sup>IV</sup> and of Mo<sup>III</sup> to Mo<sup>V</sup>. In using the method for steels and metallurgical products, W is removed as WO<sub>3</sub> by evaporation with HNO<sub>3</sub> and HCl and the filtrate evaporated with H<sub>3</sub>PO<sub>4</sub> to remove HNO<sub>3</sub>. V does not interfere since it exists as VCl<sub>3</sub> at stage (a), and this is not further oxidised until the potential jump at (b) occurs. Details of the analytical procedure for certain products are given in full. A. R. P.

**Potentiometric determination of molybdenum in ores and rocks.** F. KRÜLL (Centr. Min. Geol., 1934, A, 331—348).—The sample is fused with Na<sub>2</sub>CO<sub>3</sub> and, if necessary, Na<sub>2</sub>O<sub>2</sub> or KClO<sub>3</sub>, molybdate is extracted from the melt with 5% aq. NaOH, and the solution filtered. The filtrate is acidified with HCl, aq. FeCl<sub>3</sub> added, and the boiling solution poured into excess of hot 10N-aq. NH<sub>3</sub>. The ppt. of Fe, P, and As compounds is collected and washed. NaOH is added to the filtrate, NH<sub>3</sub> boiled off, and HCl added until acid. More FeCl<sub>3</sub> is added, a part reduced by boiling with Na<sub>2</sub>SO<sub>3</sub>, and the solution poured into excess of hot 25% NaOH. The ppt. is washed with 5% NaOH. The filtrate is acidified with HCl, and an aliquot part titrated with SnCl<sub>2</sub> at 70° in a CO<sub>2</sub> atm. An equal vol. of conc. HCl and a little H<sub>3</sub>PO<sub>4</sub> are added to prevent interference of W.

CH. ABS. (e)



**Chemical reactions in a copper blast furnace.**

K. WANI (Suiyokwai-shi, 1934, 8, 477—512).—Data are recorded for the reaction of coke, charcoal, and sugar charcoal with  $\text{SO}_2$  at 690—1000°. The reactions are  $\text{SO}_2 + \text{C} \rightleftharpoons \text{CO}_2 + \text{S}$ ;  $\text{C} + \text{CO}_2 \rightleftharpoons 2\text{CO}$ ;  $\text{SO}_2 + 2\text{CO} \rightleftharpoons 2\text{CO}_2 + \text{S}$ .  $\text{SO}_2$  is very rapidly reduced by (sugar) C. The thermal decomp. of pyrite (I), chalcopyrite (II), and cupiferous pyrite (III) in an atm. of  $\text{N}_2$  was studied by thermal analysis. (I), (II), and (III) show thermal changes at 345°, 567—583°, 650—775°; 500—550°; and 520°, 720—755°, respectively. The degree of desulphurisation of (I) is 6% at 608°, 42% at 800°, and 45% of the original S at 1000°. Vals. for (II) are 5.7% at 600° and 16% at 1000°. CH. ABS. (e)

**Sulphatising roasting of cupric oxide.** K. WANI (Suiyokwai-shi, 1934, 8, 513—518).— $\text{CuO}$  was roasted in a stream of  $\text{SO}_2$ , the effect of various factors on the  $\text{CuSO}_4$  yield being studied. Sulphatisation begins at 390° and is a max. at 600°. Complete conversion into  $\text{CuSO}_4$  is difficult without agitation, due to basic sulphate formation. CH. ABS. (e)

**Rapid determination of small quantities of bismuth in copper.** M. GARINO and R. CATTO (Chimica e l'Ind., 1935, 17, 218—220).—A current is passed, under carefully standardised conditions, through the system Cu anode (+ Bi)|cloth soaked in 10%  $\text{HNO}_3$  (I)|cloth soaked in cinchonine iodide (II)|Al cathode. An orange-red stain, the intensity of which is  $\propto$  % Bi in the Cu sample, is formed on the side of (I) facing (II). Up to 0.01% Bi, differences of the order of 0.002% can be readily detected. O. J. W.

**Casting of commercial zinc.** J. KLÄRDING (Z. Metallk., 1935, 27, 93—94).—In casting Zn slabs for rolling into sheets the best conditions are a casting temp. ( $T_c$ ) of just above the m.p., e.g., 430°, and a mould temp. ( $T_m$ ) of 300—350°. The structure so obtained is fine-grained and homogeneous, whereas that obtained at higher  $T_c$  and lower  $T_m$  is very coarse and columnar. The difference is attributed to the greater no. of crystallisation nuclei present under the first-named conditions. A. R. P.

**Properties of very pure zinc compared with those of other samples of zinc.** L. BOUCHET (Compt. rend., 1935, 200, 1535—1536).—The attack of pure Zn (vac.-distilled) by 15% aq. HCl, 20% aq.  $\text{H}_2\text{SO}_4$ , or by  $\text{H}_2\text{O}$  was very much < that of other Zn specimens (I). Pure Zn was more readily attacked by conc.  $\text{HNO}_3$  than were (I). H. J. E.

**Applications of zinc alloys.** ANON. (Metallurgist, 1935, 11, 1—2).—Zn alloys with 5—10% Al and traces of Sb, Mg, or Ti are more resistant to corrosion than is pure Zn, and it is suggested that Fe pipes and tanks (for  $\text{H}_2\text{O}$  storage) coated with such alloys are more quickly covered with a protective layer of hydrated carbonate than is ordinary galvanised Fe. W. P. R.

**Crystal orientation in drawn tin vessels.** L. HERMANN and G. SACHS (Metallwirts., 1934, 13, 745—752; Chem. Zentr., 1935, i, 146—147).—Pronounced orientation (O) of crystallites occurs even where the deformation (D) is low. O was investigated by X-rays and correlated with the direction of D. J. S. A.

**Production of ductile tantalum by the growth method in a stream of hydrogen.** K. MOERS (Metallwirts., 1934, 13, 640—643; Chem. Zentr., 1935, i, 147—148).—Ductile Ta may be rapidly deposited from  $\text{TaCl}_5$  vapour on a W wire at 1200—1450° in a stream of  $\text{H}_2$ . Nb may be similarly deposited but is less ductile. J. S. A.

**Micro-determination of gold and silver in alloys.** J. DONAU (Mikrochem., 1935, 17, 174—185; cf. B., 1933, 791).—A Zn-Cd alloy with 87% of Cd is used for inquartation, giving a lower fusion temp. and a more rapid and quant. separation of the Au from other metals. J. S. A.

**Alloys formed in solid solutions of aluminium and magnesium.** G. CHAUDRON and R. DANDRES (Compt. rend., 1935, 200, 1324—1326).—Curves are given for the breaking strain and elongation of Al-Mg alloys (0—15% Mg). The effect of impurities and of the formation of crystals of  $\text{Al}_3\text{Mg}_2$  in the alloys is discussed. N. M. B.

**Separation of components from supersaturated light-metal alloys.** E. SCHMID and G. SIEBEL (Metallwirts., 1934, 13, 765—768; Chem. Zentr., 1935, i, 469—470).—X-Ray observations are recorded of the separation in homogeneous supersaturated alloys of Zn-Mg (Zn 10, 4.7%), Al-Mg (Al 13.4, 7.8%), and Mg-Al (Mg 18.0, 11.5, and 9.8%) on annealing at 218° and at 156°. The effect of annealing on physical properties was studied. H. J. E.

**[Uses of aluminium-plated aluminium-zinc alloys.]** J. F. KESPER (Obst- u. Gemüse-Verwertg.-Ind., 1934, 21, 547—549; Chem. Zentr., 1935, i, 298).—These alloys have a high corrosion-resistance and good mechanical and working properties, and finished articles can be rendered strong by heating for several hr. at 150—300°. They are suitable for the preserve industry. H. J. E.

**Sintering of metal powders.** W. D. JONES (Metallurgist, 1935, 11, 10—13).—Methods of producing metallic powders are reviewed. Control over grain size is important, since, in general, the finer powders are the more easily compressed. Sintering is usually carried out at approx.  $\frac{2}{3}$  the m.p. of the metal. In preparing sintered alloys the time of sintering is greatly increased to ensure complete diffusion. The method allows mixtures of metals and non-metals to be made, and bronze bearings containing graphite can be made which will absorb 30—40 vol.-% of oil. W. P. R.

**Irregular impact figures [on metals].** R. H. GREAVES (Metallurgist, 1935, 11, 2—3).—Irregularity in notched-bar impact tests does not necessarily imply lack of homogeneity in the material, but may be caused by the operation, to various degrees, of alternative modes of failure. W. P. R.

**Theory and practice of chromium-plating.** I, II. N. D. BIRYUKOV, S. R. MAKARIEVA, and A. A. TIMOKHIN (Vestn. Metallo., 1934, 14, No. 4, 118—134; No. 5, 103—120; Chim. et Ind., 1934, 32, 1353, 1354).—I. When a 3-mol.  $\text{CrO}_3$  solution (0.3—0.6 g. of  $\text{H}_2\text{SO}_4$  per 65 c.c.) is electrolysed, the Cr yield shows a const. max., which is reached after a time  $\propto$  the acid concn.,



and depending on  $[\text{Cr}^{\text{III}}]$ . The three cathodic processes are: (1) evolution of  $\text{H}_2$ , (2) deposition of Cr, and (3) reduction of  $\text{CrO}_3$  to  $\text{Cr}_2\text{O}_3$ . The total amount of reduction decreases at the first electrolysis, even when  $[\text{H}_2\text{SO}_4]$  is const. For every part of Cr deposited an approx. equiv. amount of  $\text{CrO}_3$  is reduced to  $\text{Cr}_2\text{O}_3$ .

II. Towards the end of the electrolysis of a  $\text{H}_2\text{CrO}_4 + \text{H}_2\text{SO}_4$  bath under a high c.d., decomp. reactions occur between  $\text{Cr}_2(\text{SO}_4)_3$  and  $\text{Cr}_2(\text{CrO}_4)_2\text{SO}_4$ , with liberation of  $\text{H}_2\text{SO}_4$  and formation of  $\text{Cr}_2(\text{Cr}_2\text{O}_7)_3$ . When there is equilibrium between oxidation and reduction processes in the electrolyte, the rate of  $\text{H}_2$  evolution depends on the condition of the surface, changes in which are discussed. On dull Cr the H overvoltage is smaller. CH. ABS. (e)

**Mechanical strain in electrolytic plates as a cause for peeling [of chromium plate].** S. FÖLDES (Vegy. Ipar, 1934, 33, No. 18—19, 2—3).—Good adherent Cr deposits are readily obtained with an undercoat of Ni, the latter being deposited under controlled conditions and with not too high a  $p_{\text{H}}$ . CH. ABS. (e)

**Tin-plating from an alkaline bath.** M. SHIMADA (J. Electrochem. Assoc. Japan, 1934, 2, 367—371).—Sn-plating of Cu, brass, Zn, Pb, hard Pb, Fe, steel, and Al can best be carried out at 0.15—0.5 volt in alkaline aq.  $\text{SnCl}_2$ , or in alkaline aq.  $\text{Na}_2\text{SnO}_2 + \text{NaCl}$ , with 0.12—0.2 g. of gelatin per litre. A Sn anode (anode c.d. 0.45—1.6 amp. per sq. dm.) can be used. The cathode c.d. is 0.2—1.5 amps. per sq. dm. The max. and min. concns. of the bath are 50 g. of Sn salt for 2 mols. of NaOH and 12 g. for 1 mol., respectively. CH. ABS. (e)

**Influence of hydrogen and oxygen on the critical voltage phenomena at the critical current density of spongy copper deposition.** K. HIRAKOSO (J. Electrochem. Assoc. Japan, 1934, 2, 313—324).—Electrolysis of 3 different solutions containing Cu 4%,  $\text{H}_2\text{SO}_4$  150 c.c. per litre (1) without  $\text{H}_2$ , (2) saturated with  $\text{H}_2$ , (3) saturated with  $\text{O}_2$ , shows no marked influence of these gases on the crit. c.d. for spongy Cu deposition. Data are recorded. The crystals from (1) and (2) are tetrahedral or needle-shaped, and those from (3) somewhat rounded. CH. ABS. (e)

**Sulphite pulping and corrosion.**—See V. **Cast Fe for glass moulds.** **Sheet-Fe enamel.**—See VIII. **Induction furnaces.** **Eloxal process.** **Tramway cables.**—See XI. **Sugar-factory evaporators.**—See XVII.

## PATENTS.

**Fractional retort. [Ore-roasting furnace.]** J. A. MCKINNON, ASSR. to FRACTIONAL RETORT, INC. (U.S.P. 1,957,347, 1.5.34. Appl., 24.11.31. Renewed 2.9.33).—The apparatus comprises a horizontal tube fitted with an internal screw conveyor and arranged above a no. of fire-boxes in tandem, each box having its own domed roof, flue, and vertical damper. A. R. P.

**Removal of gases from molten metals and alloys.** H. M. RIDGE and S. C. HUNN (B.P. 425,369, 19.10.33).—The metal is siphoned from a furnace through a heated chamber wherein a low pressure is maintained and from which it falls in a thin stream to a collecting crucible. A. R. P.

**Coating mould [for casting pig iron].** A. H. FOSDICK, ASSR. to BETHLEHEM STEEL CO. (U.S.P. 1,956,552, 1.5.34. Appl., 11.12.31).—The mould is coated with an aq. emulsion of 80% of burnt dolomite and 20% of tar prior to each casting. A. R. P.

**Manufacture of steel.** SOC. D'ELECTROCHIM., D'ELECTROMÉTALLURG., ET DES ACIÉRIES ELECTR. D'UGINE (B.P. 427,466, 19.7.33. Fr., 25.8.32).—Steel containing 0.03—0.07% P and sufficient FeO to oxidise the P is poured from a height into a molten, fluid, basic slag in such a way as to produce an efficient mixing of the two layers, whereby the P content is reduced to < 0.015%. A. R. P.

**High-speed steel.** FIRTH-STERLING STEEL CO., ASSEES. OF G. J. COMSTOCK (B.P. 427,484, 21.10.33. U.S., 5.12.32).—Part or all of the W, Mo, Cr, V, Ta, Nb, Zr, Ti, or U is added to the molten steel in the form of carbide. A. R. P.

**Steel alloy.** G. CHARLTON, ASSR. to WILCOX-RICH CORP. (U.S.P. 1,958,985, 15.5.34. Appl., 7.2.30).—Steel with a high resistance to wear in the hot or cold state and capable of being hardened by slow cooling contains C 1.9—2.5 (1.9), Si 0.9—1 (0.99), Mn 1.61—2.67 (1.61), Cr 13—14.41 (13.7), Ni 3.05—3.4 (3.05), Mo 0.57, and Co 0.37%. A. R. P.

(A) **Ferrous alloy [chromium steel].** (B) **Compounding of corrosion-resisting forgeable ferrous alloys.** R. C. LANGENBERG, ASSR. to UNITED STATES PIPE & FOUNDRY CO., and CRUCIBLE STEEL CO. OF AMERICA (U.S.P. 1,956,645—6, 1.5.34. Appl., [A] 19.1.31. [B] 4.9.31).—(A) The steel contains Cr 7—35 (12.7), C 0.21, Mn 0.2, Si 0.18, S 0.07—2 (0.12), and Mo 0.1—5 (0.31)%. The S is > sufficient to combine with all the Mn, and the Mo > sufficient to combine with the excess S. (B) The S is added to the molten-steel bath as FeS and the Mo then added to cause pptn. of finely-divided  $\text{MoS}_2$  throughout the molten metal. The steel has a high resistance to corrosion and good machining properties and is free from red-shortness. A. R. P.

**Manufacture of articles [hydrogenation plant] from steel alloys.** F. KRUPP A.-G. (B.P. 427,585, 19.3.34. Ger., 20.3.33. Addn. to B.P. 420,567; B., 1935, 235).—The steel contains Cr  $\geq$  10, Mo  $\geq$  3, Nb or Ta  $\geq$  2, C < 0.4%, and no V; it is immune from decarburisation by  $\text{H}_2$  at high temp. and pressure. A. R. P.

**Manufacture of magnet cores.** I. G. FARBENIND. A.-G. (B.P. 425,442, 6.7.34. Ger., 20.7.33).—A 50 : 50 mixture of Fe and Ni powders produced from the carbonyls is kneaded to a plastic mass with a suspension of kaolin in dil. aq.  $\text{Na}_2\text{SiO}_3$ , the mass is pressed or extruded into cores, and these are annealed at < 600° (550°) for 5 min. A. R. P.

**Manufacture of a coated steel article [wire or strip].** NAT. STANDARD CO., ASSEES. OF E. C. DOMON (B.P. 425,297, 7.6.33. U.S., 10.4.33).—Steel wires for reinforcing steel-tyre beads are coated with Zn (0.00009—0.00025 in. thick) by hot-dipping, then electroplated with Cu (0.000016 in. thick), and finally coated with rubber by vulcanising at a temp. at which the Cu diffuses into the Zn. A. R. P.



(A) **Composition [pickle] for treating [ferrous] metal.** (B) **Treatment of metal surfaces and solution therefor.** O. L., H. L., and C. E. PETERSON, ASSRS. to DELANEY CHEM. CO. (U.S.P. 1,954,743—4, 10.4.34. Appl., [A] 3.2.32, [B] 7.6.32).—Claims are made for (A) 1%  $\text{H}_2\text{SO}_4$  containing 1% of a 10:10:80 mixture of  $\text{CuSO}_4$ ,  $\text{Al}(\text{OAc})_3$ , and  $\text{NaCl}$ , and (B) a solution containing  $\text{CuSO}_4$  50—60,  $\text{NaNO}_3$  30—35, and  $\text{H}_2\text{C}_2\text{O}_4$  5—10 g. per litre. A. R. P.

**Production of copper from copper sulphide ores.** F. L. DUFFIELD (B.P. 428,378, 11.11.33).—The ore is desulphurised in a multihearth roaster, C is added to the hot roast, and the mixture smelted in a rotary kiln. B. M. V.

**Heat-treatment furnace [for brass and copper].** S. M. BEROLZHEIMER and S. LE B. GAMBLE, ASSRS. to DIAMOND BRAIDING MILLS (U.S.P. 1,957,932, 8.5.34. Appl., 25.9.30).—Claim is made for means for superheating steam and supplying it to bright-annealing furnaces for Cu and brass. A. R. P.

**Treatment of copper and other metals.** C. E. HOLLEY (U.S.P. 1,958,754, 15.5.34. Appl., 23.2.32).—Steam or  $\text{H}_2\text{O}$  and air or oil are blown through molten Cu through an Fe pipe immersed in the metal to oxidise, reduce oxides in, or vaporise impurities from it, the  $\text{H}_2\text{O}$  serving to keep the pipe relatively cool. To remove As and/or Sb aq.  $\text{Na}_2\text{CO}_3$  may be blown through the metal, while an aq. suspension of C serves to volatilise S and Bi. A. R. P.

**Copper alloys [resistant to sea-water corrosion].** W. B. PRICE, ASSR. to SCOVILL MANUF. CO. (U.S.P. 1,956,251, 24.4.34. Appl., 6.4.33).—The alloys contain Si 1—3.25 (3), Sn 0.5—1.5 (1), Fe 0.75—1.27 (1), and Pb 0—2 (1)%. A. R. P.

**Manufacture of a composition. [Copper bearings.]** A. D. ATKIN (U.S.P. 1,456,553, 1.5.34. Appl., 23.5.32).—Treatment of molten Cu with a mixture of borax,  $\text{NH}_4\text{Cl}$ , and  $\text{NaCl}$  is claimed to purify the metal and make it more suitable for bearings. A. R. P.

**Manufacture of bearing brasses.** G. BÜHLER (B.P. 427,414, 21.10.33. Addn. to B.P. 379,155; B., 1932, 988).—The final anneal is omitted so that the crystal structure shows well-defined gliding lines. Mechanical details in the drawing operation also are claimed. A. R. P.

**[Sulphide] ore separation [by flotation].** J. P. RUTH, JUN., ASSR. to RUTH CO. (U.S.P. 1,955,978—9, 24.4.34. Appl., 23.8.32).—(A) Ores containing galena (G), blende (B), pyrites (I), and pyrrhotite (II) are ground wet, aerated to inhibit flotation of (II), treated with  $\text{Zn}(\text{CN})_2$  to inhibit flotation of B and (I), and floated with aërofloat in an alkaline circuit to obtain a G concentrate. (B) Similar ores free from (II) are agitated with  $\text{Zn}(\text{CN})_2$  in absence of air, floated as in (A) to remove the G, and then treated with  $\text{CuSO}_4$  to cause the B to float. A. R. P.

(A) **Purification of lead, tin, and lead-tin alloys.** (B, C) **Refining of white-metal scrap.** (A) E. F. KERN, (B) E. H. SHEAFF, and (C) G. E. BEHR, JUN., ASSRS. to NAT. LEAD CO. (U.S.P. 1,957,837, 1,957,852, and 1,957,930, 8.5.34. Appl., [A] 28.6.27, [B] 19.7.30).—(A) The metal is

heated to  $>$  the m.p. of Al and sufficient Al added to form  $\text{CuAl}_2$ , AlAs, and AlSb; after cooling to just  $>$  the m.p. of Pb or Sn the separated scum is removed and pressed. Alternatively, the Al-treated metal is cast into pigs which are liquated. (B) The Al mush is converted into a dry scum by stirring it with wood chips and pressing while gases are being evolved, thereby assisting in removing the still-liquid Sn and/or Pb. (C) The metal is melted, covered with flat pieces of Al, heated until the Al dissolves, and then stirred with sawdust while cooling, to cause the impurities combined with the Al to float to the top as a dry scum. A. R. P.

**Pretreating smooth cast pieces, in particular, centrifugally-cast tubes manufactured in chilled moulds, for coatings of paint and other coatings.** H. GONSCHESKI (B.P. 429,220, 17.4.34. Ger., 18.4.33).—An intermediate coating of sintering material, e.g., pebble powder, founder's black, or P salts, is burned on. B. M. V.

**Melting and/or refining of magnesium and its alloys prior to casting.** L. G. DAY, and BRIT. MAXIUM, LTD. (B.P. 427,316, 21.9.33).—The use of a flux of  $\text{MgCl}_2$  (50—80) and  $\text{MgF}_2$  (50—20%) is claimed. A. R. P.

**[Die]-casting of magnesium and its alloys.** L. G. DAY, and BRIT. MAXIUM, LTD. (B.P. 427,557, 26.10.33).—A plug of steel wool is inserted at the bottom of the runner to retain suspended impurities and effect an even filling of the die. A. R. P.

**Protection of light metals [magnesium and aluminium] against corrosion.** P. PRIER (U.S.P. 1,957,354, 1.5.34. Appl., 26.4.32. Fr., 27.4.31).—The articles are immersed in a solution containing  $\text{K}_2\text{TiF}_6$  2,  $\text{CeF}_3$  1, and  $\text{NaF}$  0.5 g. per litre, more  $\text{TiF}_4$  being added as required, to regenerate the solution. A. R. P.

**Inhibiting the nitridation of magnesium.** E. O. BÄRSTOW, ASSR. to DOW CHEM. CO. (U.S.P. 1,956,971, 1.5.34. Appl., 14.12.32).—The metal is heat-treated and hot-worked in an atm. of burnt gases containing 1—10% of S vapour. A. R. P.

**Magnesium-base alloys.** M. E. BROOKS, ASSR. to DOW CHEM. CO. (U.S.P. 1,957,934, 8.5.34. Appl., 21.4.32).—The resistance to corrosion of Mg and its alloys containing  $>$  75% of Mg is improved by addition of 0.01—5 ( $<$  1)% of As. A. R. P.

**Aluminium alloy [free from stress-cracking under corrosive conditions].** L. J. WEBER, ASSR. to ALUMINUM CO. OF AMERICA (U.S.P. 1,955,991, 24.4.34. Appl., 21.9.32).—The alloy contains Mg 5—15 and Cu 0.05—0.2%, the Al used containing  $<$  0.4% of impurity. A. R. P.

**Free-cutting [aluminium-base] alloy.** L. W. KEMPF and W. A. DEAN, ASSRS. to ALUMINUM CO. OF AMERICA (U.S.P. 1,959,029, 15.5.34. Appl., 18.9.33).—Al or an Al alloy is heated with Pb, Bi, or Tl at a temp. at which only one liquid phase exists, stirred vigorously for 5—30 min., and cast into a  $\text{H}_2\text{O}$ -cooled mould so that it solidifies rapidly and retains the Pb, Bi, or Tl as a fine dispersion. The temp. of heating for Pb alloys varies from 675° (1% Pb) to 955° (20% Pb). A. R. P.



**Electrolytic deposition of cobalt.** H. M. J. BERGER (B.P. 427,458, 23.11.34).—The electrolyte contains  $\text{CoCl}_2$  40—150,  $\text{MHF}_2$  ( $M = \text{K}, \text{Na}, \text{or } \text{NH}_4$ ) 10—40,  $\text{NH}_4\text{Cl}$  15—60, and  $\text{Co}(\text{OAc})_2$  15—60 g. per litre. Bright plates free from porosity are obtained under normal operating conditions. A. R. P.

**Production of a protective coating on aluminium and its alloys.** P. J. WHITE (B.P. 427,308, 20.7.33).—The metal is anodically oxidised in  $\text{H}_2\text{SO}_4$  ( $d$  1.22) containing trihydroxymethylanthraquinone (5 g. per litre) or other product of hydrolysis of glucosides, *e.g.*, frangulin, barbaloin, or baptisin. A. R. P.

**Spot-welding.** BRIT. THOMSON-HOUSTON CO., LTD., ASSEES. OF ALLGEM. ELEKTRICITÄTS GES. (B.P. 425,371, 9.10.33. Ger., 8.10.32).

[Spot-]welding [sheet material]. E. G. BUDD MANUFG. CO., ASSEES. OF J. P. TARBOX (B.P. 429,459, 28.8.34. U.S., 28.8.33).

**Rotary-hearth furnaces [for Pb]. Roasting ores etc.**—See I. Rectifier. **Welding. W contacts. Regenerating pickle liquors.**—See XI. **Varnishing wires etc. Coatings for metal foils.**—See XIII.

## XI.—ELECTROTECHNICS.

**Induction furnaces.** P. BUNET (Mém. Soc. Ing. Civ. France, 1935, 87, 902—924).—The general principles of Fe-cored and coreless induction furnaces used in ferrous and non-ferrous metallurgy are described. W. P. R.

**Ammonium chloride for dry cells.** S. MAKINO and S. TAKIZAWA (J. Electrochem. Assoc. Japan, 1934, 2, 420—423).—Tests with Japanese  $\text{NH}_4\text{Cl}$  have established its satisfactory quality. CH. ABS. (e)

**Life of dry cells, especially in case of discharge through constant resistance.** N. KAMEYAMA (J. Electrochem. Assoc. Japan, 1934, 2, 380—384).—The life ( $T$ ) for a const.-resistance discharge is related to the wt. of mixture for the dry cell ( $W$ ) by:  $\log T = K - (n + 1) \log (I/W)$ , where  $I$  is the average current and  $K$  and  $n$  are consts. CH. ABS. (e)

**Alkaline storage battery. VII. Alkali zincate storage battery with mercury cathode. VIII. IX. Alkali zincate storage battery with nickel-mesh cathode.** S. TANAKA and K. YOSHIMOTO (J. Electrochem. Assoc. Japan, 1934, 2, 240—247; 3, 350—358; 4, 385—393).—VII. Zn in amalgam solidifies during charge when a definite concn. (approx. 2.3 g. of Zn per 100 g. of Hg) is attained, and the decrease in [Zn] results in a sudden rise in e.m.f. to 2.6 volts. This occurs more readily at high c.d. If the battery is charged at a c.d. sufficiently low to prevent this voltage rise, discharge of  $\text{H}^+$  and  $\text{K}^+$  does not occur, and the Zn amalgam is stabilised. Large surface area of Hg and small depth of electrolyte are necessary to attain the theoretical val. of the amp.-hr. efficiency at high voltage discharge.

VIII. A Ni mesh (130 meshes per sq. cm.) washed with  $\text{H}_2\text{SO}_4$  was used. The optimum conditions were: a 7.5-cm. layer of electrolyte (7N-KOH; ratio KOH:  $\text{ZnO} = 12$ ; 136 c.c.), and 184 sq. cm. of cathode area for 100 c.c. of electrolyte solution.

IX. Current-e.m.f. curves are plotted for the above solution under varying conditions. With a Ni-mesh cathode covered with Hg, chemical dissolution occurs slowly, and the mean discharging voltage is lower.

CH. ABS. (e)

**Working up of accumulator sludge.** E. T. RICHARDS (Metallbörse, 1934, 24, 565—566; Chem. Zentr., 1935, i, 146).—Current technical procedure is described. J. S. A.

**Electrolytic destruction of direct-current tramway-feeder cables.** W. WEGENER (Korros. u. Metallschutz, 1934, 10, 213—217; Chem. Zentr., 1935, i, 150).—Electrolytic corrosion of a Pb cable sheath is described. J. S. A.

**Electrical precipitation of dust.** T. UEMOTO (J. Electrochem. Assoc. Japan, 1934, 2, 248—251).—Tests on a method combining centrifuging with electrical pptn. gave satisfactory results. CH. ABS. (e)

**Production and properties of caesium photoelectric cells.** P. V. KISELEV and S. Y. LUKIJANOV (J. Tech. Phys. U.S.S.R., 1934, 4, 1560—1571).—The optimum  $\text{Ag}_2\text{O}$  layer is 150 mols. thick and has a yellowish-green colour. It is made by about 70 discharges at 600 volts in 1 mm. of  $\text{O}_2$ . The Cs, in 3-fold excess for the reaction  $2\text{Cs} + \text{Ag}_2\text{O} = \text{Cs}_2\text{O} + 2\text{Ag}$ , is distilled on to the  $\text{Ag}_2\text{O}$  film, and the latter heated at 170—190° to "activate" the photo-element.

CH. ABS. (e)

[Production and use of] lead peroxide anodes. Y. KATÔ and K. KOIZUMI (J. Electrochem. Assoc. Japan, 1934, 2, 309—312).—Electrolysis of 30% aq.  $\text{Pb}(\text{NO}_3)_2$  containing hydrophilic colloids (*e.g.*, gelatin, gum arabic) at 80° and a c.d. of 100 amp. per sq. dm. at 10 volts gives a compact deposit of  $\text{PbO}_2$  on graphite or Ni etc. used as an anode. Such  $\text{PbO}_2$  has an  $\text{O}$  overvoltage in aq. NaOH at 25° of 0.5 volt and an electrical conductivity 10% of that of Hg.  $\text{PbO}_2$  and Pt have been compared as anodes in preparing  $\text{NaClO}_4$  by the electrolysis of  $\text{NaClO}_3$ . The wattage necessary for the prep. of the same amount of  $\text{NaClO}_4$  is approx. equal for Pt and  $\text{PbO}_2$ . CH. ABS. (e)

**Technical possibilities for application of the Eloxal (anodic oxidation) process.** H. SCHMITT and L. LUX (Aluminium, 1934, 17, 191—195).—Hardness and adhesion of Al oxide films produced anodically in the Eloxal process are extremely good. The chemical resistance of the originally somewhat porous hydrated oxide film becomes good after heat-treatment.

CH. ABS. (e)

**Errors in  $p_{\text{H}}$  measurements and their importance in the Wiegner effect.** A. UNMACK (Kem. Maanedssbl., 1934, No. 10, 133).—The  $p_{\text{H}}$  of a solution (when the buffer content is small, as with soil suspensions) varies if it has been in contact with air, glass, the electrode, or a filter. Experiments on these sources of error are recorded. The Wiegner effect (A., 1934, 960) was not observed when errors are eliminated. Different  $p_{\text{H}}$  vals. were found with a quinhydrone electrode in cream and in skim milk, due to a difference in distribution coeffs. for quinone and quinol in fat and  $\text{H}_2\text{O}$ . CH. ABS. (e)

**Resistance viscosimeter for ceramic moulding material and cement sludge.** K. ENDELL and H.



FENDIUS (Tonind.-Ztg., 1934, 58, 870—872; Chem. Zentr., 1935, i, 459—460).—The  $\eta$  is deduced from the current taken by an electric motor in driving a stirrer in the material under study. H. J. E.

Gas production in electric arcs. Conductivity of oils and waxes.—See II. Dil.  $H_2O_2$  by electrolysis.—See VII. Determining corrosion-resistance of concrete.—See IX. Determining Mo and Ti in steel etc. Determining traces of Bi in Cu. Cr- and Sn-plate. Spongy Cu.—See X. Insulating varnishes.—See XIII. Sugar-juice carbonatation control. Refining raw sugars.—See XVII. Determining ash in flour.—See XIX.

## PATENTS.

Electric furnaces [for melting and treating glass]. P. RICHALLET (B.P. 427,514, 23.6.34. Belg., 30.6.33).—In glass-melting tanks provided with immersion resistance heaters ( $R$ ) the  $R$  are provided with protuberances for agitating the liquid and are rotated about their own axes during the melting operation. A. R. P.

Electric current rectifier. E. RUPP, Assr. to GEN. ELECTRIC Co. (U.S.P. 1,956,544, 24.4.34. Appl., 16.3.33. Ger., 14.11.31).—A sheet of W is heated at  $> 900^\circ$  in a mixture of CO and  $CO_2$  to coat it with a blue film of  $W_2O_5$ , which is subsequently coated on one side with a film of Bi. A. R. P.

Cooling and insulating dielectric liquids for use in electrical apparatus. WESTINGHOUSE ELECTRIC & MANUFACTURING Co., Asses. of H. M. ELSEY (B.P. 425,324, 30.9.33. U.S., 8.10.32).—Claim is made for a (1:1) mixture of a mineral insulating oil with a chlorinated cyclic hydrocarbon, e.g.,  $C_6H_3Cl_3$ , preferably saturated with  $\beta-C_{10}H_7-OH$ . A. R. P.

Electrolytic condenser. J. E. LILIENFELD (U.S.P. 1,954,636, 10.4.34. Appl., 19.6.30).—The condenser is made up of anodised Al electrodes immersed in a  $H_3BO_3$  electrolyte and retained in position by rubber gaskets. A. R. P.

[Copper alloy spot] welding electrode. E. H. HORSTKOTTE, Assr. to GEN. ELECTRIC Co. (U.S.P. 1,957,214, 1.5.34. Appl., 31.8.33).—Claim is made for electrodes tipped with a hard, wear-resisting alloy of Cu with Co 2.6 and Be 0.4%. A. R. P.

Arc-welding. W. E. STINE, Assr. to LINCOLN ELECTRIC Co. (U.S.P. 1,958,649, 15.5.34. Appl., 17.6.30).—In arc-welding with a C electrode,  $H_2O$  is allowed to drip on the work near the C to form a reducing atm. of water-gas around the seam. A. R. P.

Electrical make-and-break [tungsten] contacts. (A) C. B. GWYN, JUN., and (B) J. A. WEIGER, Assrs. to P. R. MALLORY & Co., INC. (U.S.P. 1,958,338 and 1,958,357, 8.5.34. Appl., [A] 18.7.31, [B] 8.12.31).—(A) The metal is annealed at  $> 2000^\circ$  to produce a relatively large but not equiaxed grain and is then etched anodically in a solution of NaOH (40) and  $Na_2WO_4$  (4 g. per litre) to remove material in the grain boundary. (B)  $WO_3$  is made into a paste with aq. Na silicate ( $WO_3 : SiO_2 = 200 : 1$ ), the mixture is dried, heated at  $1100^\circ$  for 1 hr., and reduced in  $H_2$ . The resulting W is pressed into a bar which is sintered at  $3000^\circ$ , swaged

to rod, and annealed at  $2400^\circ$  for a short time to obtain a regular but not equiaxed structure. A. R. P.

Storage battery. K. NISHIKAWA (B.P. 429,547, 31.5.34. Jap., 23.6. and 21.10.33).—The battery comprises a cathode composed of Zn-Cd alloy, amalgamated, if desired, an anode of  $PbO_2$ , and an electrolyte of dil.  $H_2SO_4$  containing 0.01—0.16% of gelatin. J. S. G. T.

Production of active material for alkaline electric accumulators or primary cells. SVENSKA ACKUMULATOR AKTIEB. JUNGNER (B.P. 429,513, 19.12.33. Swed., 20.12.32).—Active material composed of metal oxides and/or hydroxides and a conducting graphite or metal sol adsorbed by such compounds is claimed. Thus, e.g., colloidal Ni hydroxide is emulsified in a colloidal solution of graphite, Ni, Co, Au, or Ag and is then coagulated. J. S. G. T.

Manufacture of an electron-discharge tube. P. KNEPEN, Assr. to ALLGEM. ELEKTRIZITÄTS-GES. (U.S.P. 1,958,967, 15.5.34. Appl., 21.10.32. Ger., 22.10.31).—The electrodes are sprayed with  $ZrH_4$  paste, dried, inserted in the tube, and heated during evacuation so that the  $H_2$  is evolved and leaves a porous film of Zr which is an effective getter. A. R. P.

Electric-discharge tubes filled with metal vapour. N.V. PHILIPS' GLOEILAMPENFABR. (B.P. 429,568, 5.11.34. Ger., 6.11.33).—A narrow, longitudinal coating, e.g., of Ag, is applied to a portion of the tube wall and/or the wall of the envelope, so that dissipation of heat thereat is reduced. J. S. G. T.

Electrical precipitation of matter suspended in gases. WHESSOE FOUNDRY & ENG. Co., LTD., A. G. GRANT, A. E. TAYLOR, ENGLISH ELECTRIC Co., LTD., and W. DONNELLY (B.P. 428,471, 14.11.33).—The majority of the vertical electrodes ( $E$ ) are of wire stretched between upper and lower frames, and to give sufficient rigidity to prevent swinging at least one other  $E$  is formed of X or other rolled section in a correspondingly larger collecting tube. B. M. V.

Apparatus for [electrical] treatment of air for healing purposes. H. E. WITZ (B.P. 429,352, 28.11.33. Ger., 29.11.32, 6. and 9.3.33).—Apparatus for producing two streams of differently-conditioned air, one being used for respiration and the other for treatment of the body of the patient, is claimed. Conditioning consists in cooling, dehydrating, reheating, and ionising. J. S. G. T.

Body [electrode] for use in electrolysis. O. CONRADTY (U.S.P. 1,957,940, 8.5.34. Appl., 4.6.29. Ger., 23.11.28).—A composite electrode is claimed, comprising a graphite leading-in rod screwed into a graphite slab, the threads being lubricated with a mixture of ceresin and graphite powder. A. R. P.

Electrolytic regeneration of [ferrous sulphate] pickle liquor. J. R. CAIN (U.S.P. 1,954,664, 10.4.34. Appl., 24.10.32).—Spent liquor from pickling Fe is evaporated to recover  $FeSO_4 \cdot H_2O$  (I) and  $H_2SO_4$  (II) which are separated in a centrifuge. The (I) is dissolved in  $H_2O$  and the solution boiled with scrap Fe to neutralise most of the acid, the remainder being neutralised with CaO, then passed to the cathode chamber (C) of



an electrolytic cell. The anode chamber (*A*) is filled with diluted (II) to a lower level than the liquid in *C* and contains a Pb or other insol. anode. The acid which accumulates in *A* is continuously returned to the pickling tank for re-use.  
A. R. P.

**[Double-walled] electrodes of electrolytic cells.** A. E. KNOWLES (B.P. 429,633, 10.1.34).

**Manufacture of containers for storage batteries, electric accumulators, and secondary cells.** K. A. HILLYERS (B.P. 429,885, 6.12.34).

**[Container for wet] galvanic battery.** OLDHAM & SON, LTD., and H. HOLT, JUN. (B.P. 428,374, 9.11.33).

**Suspended matter in fluids.** See I. **Magnet cores.** Coated wire etc. **Co-plating.** Coating Al. See X. **Insulation.**—See XIII. **Improving alcoholic liquids.**—See XVIII. **Milk irradiation.**—See XIX.

## XII.—FATS; OILS; WAXES.

**Cereals and seeds inhibit rancidity in lard.** S. MUSER (Food Ind., 1935, 7, 167—168).—Soya flour, crushed sesamé seed, and oat flour may be added to lard to inhibit development of rancidity. The antioxygenic effect is not related to the kind or quantity of oil, nor to the lecithin or colouring matter. The effect persists when the flour is removed from the melted lard after 30 min. by filtration, but it is greater if the flour is allowed to remain in the fat. The effect claimed is considerable.  
E. B. H.

**Titre of solid fats and their mixtures.** A. KOSS (Przemysł Chem., 1935, 19, 75—85).—Finkener's method, consisting in determining the f.p. of the acids obtained by hydrolysis of fats, is the most trustworthy. A modified apparatus is described, together with detailed directions for its use. The f.p. varies with time elapsing after prep. of the acids, in particular when these are exposed to damp air, and falls, even when atm. influences are excluded, with repeated fusion.  
R. T.

**Kaufmann's thiocyanogen method for determination of degree of unsaturation and composition of fats [and oils].** A. KRAEFF (Verfkroneik, 1935, 8, 159—161).—The method of deducing the composition of the oil from its I val., CNS val., and % of saturated acids is described.  
D. R. D.

**Volumetric determination of fatty acids in soaps.** W. STRÜWE (Chem.-Ztg., 1935, 59, 468—469).—The sample is weighed into a flask with a narrow graduated neck, decomposed with HCl or H<sub>2</sub>SO<sub>4</sub>, diluted to bring the fatty acids into the neck, and their vol. read off. In the case of solid acids, a weighed amount of oleic acid is added to dissolve them. NaCl may be added to break emulsions. Factors for converting vols. into wts. are given. Volatile fatty acids are not lost as in extraction methods.  
G. H. C.

**Dispersing and regenerating agents for lime soaps.** R. HART (Rayon and Mellind Text. Month., 1934, 15, 616—618; 1935, 16, 104—106).—The stability of a no. of industrial agents towards hard H<sub>2</sub>O and also their Ca-soap dispersing powers are compared. Stability was determined by the vol. of 0.18% aq. CaCl<sub>2</sub> which can be added (2 drops at a time) to 20 c.c. of a 1%

solution of the agent in a glass beaker (5 cm. diam.) until the resulting turbidity just obscures newsprint pressed to the outside of the beaker, the dilution of the reaction mixture being 40—41 c.c. at the end-point. Dispersability is determined by the difference in titrations effected as for stability with 20 c.c. of 1% olive oil soap with and without the addition of a suitable amount of the agent. Higher vals. are obtained in determining stability as the dilution and temp. of the reaction mixture are increased and lowered, respectively.  
A. J. H.

**Vitamin-A content of New Zealand ling-liver oil. Seasonal variations in the vitamin and general characteristics of the oil.** F. B. SHORLAND (New Zealand J. Sci. Tech., 1935, 16, 313—316).—Analytical data are recorded. No definite cycle of variation in the vitamin-A content of the oil was observed. The oil has a high proportion of unsaponifiable matter and low I val. Stearine is deposited from many samples at 20°. At 0° the whole solidifies and no liquid can be separated by centrifuging. The -A content averaged 3450—7700 p.p.m.  
A. G. P.

**Changes in composition of pilchard oil on hydrogenation.** F. CHARNLEY (Progress Repts. Pacific Biol. Sta. and Fisheries Exp. Sta., 1934, No. 19, 7—10).—In hydrogenation with a Ni catalyst the I val. decreased. In the interval between I vals. of 120 and 60 the last trace of fatty acids with < 3 double linkings disappeared, as well as all those containing double linkings. The average no. of double linkings in the unsaturated acids of pilchard oil is approx. 2.8.  
CH. ABS. (e)

**Potentiometric determination of iodine values.** K. DREWski (Przemysł Chem., 1935, 19, 63—75).—1 g. of fat is dissolved in CCl<sub>4</sub> (to 25 c.c.), 3 c.c. of solution are added to 15 c.c. of 0.2N-ICl (I) in AcOH, and the redox potential is compared with that found for CCl<sub>4</sub> alone, and for a solution of known I val. The method is rapid (5 min.) and accurate, and may be applied to micro-analysis. Greater accuracy is given when 2% of the oxidising power of the (I) solution is represented by I.  
R. T.

**Light spirit from peanut oil. Conductivity of oils and waxes.**—See II. **Fatty acid softeners for rubber.**—See XIV. **Copra.**—See XVI. **Cod-liver oil and animal feeding.** **Passion-fruit [oil].**—See XIX.

## PATENTS.

**Improved drying oils and their application.** IMPERIAL CHEM. INDUSTRIES, LTD., A. HILL, and E. E. WALKER (B.P. 428,864, 15.11.33).—Polymerised fatty acids (or their alkyl esters) prepared by heating the fatty acids from drying or semi-drying oils, or by saponifying the polymerised oils, are distilled in vac. to remove volatile unpolymerised constituents, and the residue is esterified directly, or by alcohol-interchange, with glycol, glycerol, or higher polyhydric alcohols (pentaerythritol etc.); resin acids or polycarboxylic acids (anhydrides) may be added before the esterification to yield mixed esters.  
E. L.

**Polymerisation of fatty oils.** N.V. DE BATAAFSCHE PETROLEUM MAATS. (B.P. 428,993, 28.8.34. Holl., 29.8.33).—The highly viscous products obtained by



polymerising rapeseed, soya-bean, whale oils, etc. at suitable temp. (100—200°) in presence of small amounts of  $\text{BF}_3$  as catalyst have flat  $\eta$ -temp. curves, and impart this property to admixed mineral lubricating oils, with which they are entirely miscible. E. L.

**Amines. Textile assistants. Detergents etc.**—See III.

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

**Romance in the paint trade.** W. KRUMBHAAER (Oil and Col. Trades J., 1935, 87, 1675—1682).—A review of recent developments. D. R. D.

**Critical oil content of linseed oil and linseed stand oil paints. II.** H. L. MATTHIJSEN (Verfkoniek, 1935, 8, 135—138, 156—159).—The elastic properties of dried films of the paints described previously (B., 1934, 369) show, in general, no sudden change when the pigment/oil ratio passes through the crit. val. The addition of boiled linseed oil to raw linseed oil paints containing  $\text{ZnO}$  (I) increases the film strength, but decreases it with  $\text{Fe}_2\text{O}_3$  (II),  $\text{Pb}_3\text{O}_4$  (III), and white-lead (IV) paints. The addition of linseed stand oil has little effect with (I) and (IV), but strengthens the film in the case of (II) and even more so with (III). D. R. D.

**Development of tungstate and molybdate [lake] pigments.** A. B. PORTMAN (Amer. Ink Maker, 1935, 13, No. 6, 37—43).—A historical review. D. R. D.

**Recent developments in printing ink driers.** A. R. THORNTON (Amer. Ink Maker, 1935, 13, No. 5, 19—21).—A review. D. R. D.

**News inks.** B. BERCKMANS (Amer. Ink Maker, 1935, 13, No. 4, 17—19).—An analysis of the factors affecting colour and spreading properties is made. D. R. D.

**Printing ink.** B. EYTON (Oil and Col. Trades J., 1935, 87, 1605—1607).—The composition and manufacture of printing inks and routine tests to be applied to the components and to the finished product are described. D. R. D.

**Storage of [printing] inks.** R. F. BOWLES (Amer. Ink Maker, 1935, 13, No. 4, 13—15; Penrose's Ann., 1935, 111—114).—Variations in the consistency of inks on storage are discussed. D. R. D.

**Insulating varnishes.** P. KÜSTNER (Farben-Chem., 1935, 6, 208—211).—A review is given of the necessary properties, testing, prep., and application of such varnishes for various uses. Synthetic resins are usually to be preferred. The development of green substances inside an impregnated Cu coil is attributed to the action of (a) acids formed from linseed or tung oil during stoving, (b) atm.  $\text{H}_2\text{O}$ , (c)  $\text{NO}$ , which in contact with  $\text{H}_2\text{O}$  produces  $\text{Cu}(\text{NO}_3)_2$ . S. M.

**Acid-proof stain [for wood].** C. F. SCRIBNER (Ind. Finishing, 1935, 11, No. 5, 46).—Two coats of a solution containing  $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$  1 pt.,  $\text{KClO}_3$  1 pt., and  $\text{H}_2\text{O}$  8 pts. are applied, followed by 2 coats of 15% aq.  $\text{NH}_2\text{Ph} \cdot \text{HCl}$ . After thorough drying, raw linseed oil is rubbed in. D. R. D.

**Identification of benzoic and cinnamic acids in microsublimates from balsams and resins. R.**

FISCHER (Pharm. Zentr., 1935, 76, 345—346).—A technique is described for identification of  $\text{BzOH}$  (I) ( $10^{-5}$  g.) and  $\text{CHPh} \cdot \text{CH} \cdot \text{CO}_2\text{H}$  (II) ( $2 \times 10^{-5}$  g.) in mixed microsublimates by reduction of (I) to  $\text{p-CHO}$  (III) with  $\text{Na-Hg}$ -dil.  $\text{H}_2\text{SO}_4$  in one sample, and by oxidation of (II) to (III) by  $\text{CrO}_3$ -dil.  $\text{H}_2\text{SO}_4$  in another, (III) being identified as its *p*-nitrophenylhydrazone. J. W. B.

**Outline of tests applicable to synthetic resin moulding materials, [mouldings,] and laminated boards.** C. WAINWRIGHT (Trans. Inst. Plast. Inst., 1935, 4, 62—87).—Details of various physical and chemical tests are recorded. E. L. H.

**Chlorinated rubber.**—See XIV.

#### PATENTS.

**Waterproofing composition.** G. M. SKINNER, LTD. (B.P. 428,571, 1.8.34. Austral., 17.8.33).—Natural or artificial bituminous material is dissolved in linseed or other oxidisable solvent oil and emulsified in  $\text{H}_2\text{O}$  after incorporation with colloidal clay,  $\text{Ca}(\text{OH})_2$ , and  $\text{CaCl}_2$ . S. S. W.

**Quick-setting [cellulosic] cements.** L. ROSTOSKY (B.P. 428,743, 16.7.34).—Readily volatile org. compounds (ligroin,  $\text{Et}_2\text{O}$ ) are added to mixtures of metal powders (20—30%) and cellulose esters or ethers to give sealing agents for leaky oil-fuel tanks etc. T. W. P.

**Coating of wire or other metallic filamentary material with a viscous liquid like varnish.** A. W. PARFITT. From A. H. ADAMS (B.P. 428,532, 9.11.33).—After, if desired, passing through a bath of priming liquid to remove adsorbed gases, the wire (while still wet) is passed vertically, at a const. speed, through a coating device to which the varnish is supplied at a definitely metered rate. The wire passes on to a baking or other hardening device. B. M. V.

**Production of thick coatings of nitro-derivatives of cellulose on metal foils.** ALUMINIUM-WALZWERKE SINGEN DR. LAUBER, NEHER CO., G.M.B.H. (B.P. 427,864, 26.9.34. Ger., 30.9.33).—A thick ( $< 0.004$ — $0.005$  mm.) coating of nitrocellulose is applied to metal foil, e.g., Al, by pouring an appropriate solution or emulsion thereon, and is dried at  $> 90^\circ$  ( $90$ — $130^\circ$ ) with a gradual rise and fall of temp. in the heating section of a continuous process. S. S. W.

**Protective coverings [for rubber insulation].** BRIT. CELANESE, LTD., and W. H. MOSS (B.P. 427,724, 24.8.33).—In the process of B.P. 362,481 (B., 1932, 237), greater durability is obtained by a top coating which contains a cellulose ester or ether and 100—200% of a non-solvent but compatible plasticiser, e.g., aryl-substituted esters of glycerol (triphenylacetin) or tartaric acid or aryl-substituted aromatic sulphonamides. S. M.

**Conversion of resitols and resites into oil-soluble products.** F. SEEBACH, ASS. to BAKELITE GES.M.B.H. (U.S.P. 1,971,507, 28.8.34. Appl., 21.3.30. Ger., 6.5.29).—Substantially completely polymerised  $\text{PhOH-CH}_2\text{O}$  condensation products are heated with polynuclear phenols, e.g., a dihydroxydiphenyl, in presence of metal oxide catalysts, if desired, e.g.,  $\text{MnO}_2$ ,  $\text{H}_2\text{O}$ ,  $\text{PbO}$ , giving resins sol. in hot fatty oils. S. S. W.



**Preparation of [resinous] condensation products.** F. BITTERICH, Assr. to BAKELITE CORP. (U.S.P. 1,971,476, 28.8.34. Appl., 8.4.31. Ger., 14.4.30).— $o$ - $C_6H_4(CO)_2O$  (1 mol.) is heated for 10–60 min. at approx.  $200^\circ$  with urea (in excess of stoichiometric requirements, e.g., 2 mols.), and, after cooling, an aldehyde, e.g., aq.  $CH_2O$ , is added, in stages if desired, and the mixture heated for 5–60 min. at  $110^\circ$ , after which  $H_2O$  is distilled off; the product is suitable for moulding or as a varnish resin. S. S. W.

**Sheet material.**—See V. **Ti compounds.**—See VII. **Road surfaces etc.**—See IX. **Pretreating cast tubes for coatings.**—See X. **Drying oils.**—See XII. **Adhesives.**—See XV. **Testing plastic materials.**—See XIX.

#### XIV.—INDIA-RUBBER; GUTTA-PERCHA.

**Fatty acid softeners in rubber compounding.** C. M. BLOW and T. L. GARNER (Trans. Inst. Rubber Ind., 1935, 10, 446–472).—The series of acids, lauric, palmitic, stearic (I), shows increasing softening action, as also does the series oleic (II), linoleic (III), linolenic; (I), however, in its softening effect does not fall into position at the commencement of the latter series but follows (II). The Zn salts form similar series with decreasing softening action, and Zn stearate is again abnormal relative to the second series, showing least softening. The Mg and Ba salts were also examined, and also the triglycerides. Ricinoleic acid in softening effect occupies a position between (II) and (III). There is no direct relation between softening action and m.p., and it is suggested that the effectiveness depends on mol. size and on the stability of films of the softener inside the rubber. After a softener has been added, mastication proceeds at a normal rate, the mastication-time curves for rubbers softened, respectively, by a softener and by previous mastication being the same at equal plasticity. Examination of vulcanised mixtures of rubber, S, and C black containing the various softeners showed definite correlation between resistance to abrasion and to flexing, the main underlying factor for each being good dispersion of the C. Rise of temp. resulted in improved abrasion resistance. D. F. T.

**Surface chemistry of carbon black. Effect on vulcanisation of rubber.** F. K. SCHOENFELD (Ind. Eng. Chem., 1935, 27, 571–577).—Heat-treatment of slow-curing C blacks increases the rate of curing ( $r$ ) of rubber, regardless of the physical adsorptive capacity of the blacks. The retardation of  $r$  by C is, in general, due to activated adsorption. The behaviour of commercial black (I), (I) cleaned by heating in  $N_2$  to  $1000^\circ$  and cooling in  $N_2$  (II), and (I) heated in air at  $400^\circ$  (III) has been compared. The acid removed from solution is in the order (III) < (I) < (II), and the alkali removed from solution in the order (III) > (I) > (II), on titrating with HCl and NaOH, respectively. (III) retards  $r$  and (II) increases  $r$  for both acid- and alkali-accelerated rubber stocks. (III) with alkali-accelerated stocks gives low moduli and tensile strength, and with acid-accelerated stocks low moduli but high tensile strengths. BzOH has a similar action. It is inferred that O combines with C to form a complex removable

only at high temp. (activated adsorption) and that the oxygenated black contains acid impurities or adsorbed  $CO_2H$  groups which act on rubber in the same way as does an org. acid retarder. A no. of org. acids can be isolated from black by aq.  $NH_3$ , including a product similar to mellitic acid (which retards  $r$ ). R. S. B.

**Technical control methods used in [rubber] proofing.** R. A. HODGSON (Trans. Inst. Rubber Ind., 1935, 10, 473–480).—A survey of major features. Amongst the points included are tests to indicate the resistance of fabrics to street-mud and to perspiration; appropriate tests are applied also to the rubber, compounding ingredients, solvents, shellac,  $S_2Cl_2$ , and finished material. D. F. T.

**Evaluation of rubber regenerates by analysis.** F. KIRCHHOF (Kautschuk, 1935, 11, 115–118).—Analytical results are given for a no. of samples of regenerated rubber produced by the alkali process and a steam-heat process, respectively. Evidence is adduced demonstrating the importance of the  $CHCl_3$  extract (after a  $CO_2$  extraction) as an index to the physical quality of the regenerate. The regenerating process probably involves a colloid-chemical decomp. of the vulcanised rubber into (a) more sol., S-poorer sol rubber, and (b) less sol., S-enriched, gel rubber. D. F. T.

**Semi-ebonite.** I. P. A. GIBBONS (Trans. Inst. Rubber Ind., 1935, 10, 494–516).—Between the two stable S compounds of rubber, viz., soft vulcanised rubber and ebonite, there is an intermediate, reasonably stable, leathery product, approx.  $C_{10}H_{16}S$ , to which the name semi-ebonite (I) is given. Vulcanisation and ageing experiments indicate that for the formation of (I) the optimum % of S to mix with the rubber is approx.  $22\frac{1}{3}$ –25%. With these proportions and a fixation of S as indicated by the formula  $C_{10}H_{16}S$  the resulting (I) shows a min. of susceptibility to oxidation or further sulphuration. D. F. T.

**Chlorinated rubber.** J. DAVIDSOHN (Farben-Chem., 1935, 6, 205–208).—A review is given of published work on the durability of films containing chlorinated rubber (I), plasticisers, and pigments. (I) has special uses and can to some extent substitute linseed oil products. S. M.

**Theory and application of the parallel-plate plastimeter [for rubber].** II. J. R. SCOTT (Trans. Inst. Rubber Ind., 1935, 10, 481–493; cf. B., 1932, 236).—A mathematical paper showing that by adopting a more accurate basis indicated by Peek (B., 1932, 867), an expression can be obtained furnishing a simple and rapid method for the analysis of experimental results on plastic flow, thereby increasing the utility of the above instrument in research. D. F. T.

#### PATENTS.

**Concentration of rubber latex.** J. E. NYROP (B.P. 428,915, 6.11.34. Denm., 11.11.33).—A mixture of latex and evaporated latex serum is separated centrifugally into a conc. latex cream and a "skimmed latex," which latter is evaporated and wholly or partly returned to the mixture to be separated. The evaporated serum may further be mixed with latex cream and centrifugally separated to give cream and a skimmed conc. latex,



the latter of which may again be mixed with latex and centrifuged. Anticoagulants etc. may be added before the treatment. D. F. T.

**Concentrating aqueous dispersions of vulcanised rubber.** VULTEX CORP. OF AMERICA, and H. B. TOWNSEND (B.P. 429,277, 28.11.33).—See U.S.P. 1,939,635; B., 1934, 850.

**Artificial leather.**—See V. **Coated wire etc.**—See X. **Rubber insulation.**—See XIII. **Adhesives.**—See XV.

## XV.—LEATHER; GLUE.

**Production of lipolytic and depilating enzymes by the *Aspergillus flavus-oryzae* group.** L. S. STUART (J. Amer. Leather Chem. Assoc., 1935, 30, 315—321).—Of 36 strains of *A. flavus-oryzae* examined, only 9 produced good depilating enzymes, 6 loosened the hair on skins slightly, and the rest possessed no depilating properties. All the strains produced lipase, but only 0.0005 Willstätter lipase unit per mg. was produced by the most active strain as compared with 0.0027 unit for the same quantity of pancreatic tissue. D. W.

**Sulphiting pine bark under conditions of tannery-extraction procedure.** P. KONOVALENKO (Kozh.-Obuvn. Prom., 1934, 13, 541—542).—In extracting pine bark in a continuous battery of 10 diffusers, 76.2% of tannides were extracted with H<sub>2</sub>O. Addition of 1.5% of Na<sub>2</sub>SO<sub>3</sub>·7H<sub>2</sub>O raised the factor to 87.1%.

CH. ABS. (e)

**Rationalisation of tanning with vegetable tannides.** N. SMERDOV (Kozh.-Obuvn. Prom., 1934, 13, 539).—Tanning in drums with vegetable tanning substances with the addition of 1.8—2 g. of Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub> (I) per litre gave a satisfactory leather with a tanning factor of 56—57% (tannide consumption 53.7 kg. per 100 sq. m. of hides treated). Emulsified fats, NaCl, and Na<sub>2</sub>CO<sub>3</sub> were used in addition to (I).

CH. ABS. (e)

**Grease stains on [vegetable-tanned sole] leather.** V. **Microscopical study of hide-lipins in their relation to grease stains.** F. O'FLAHERTY and W. T. RODDY (J. Amer. Leather Chem. Assoc., 1935, 30, 290—311; cf. B., 1935, 242).—Hide-lipins (*L*) are forced out of the fat-cells (*C*) by mechanical treatment during the soaking of the hide, but not by any chemical reagent, and by Ca(OH)<sub>2</sub> + NH<sub>2</sub>Me lime liquors to a greater extent than by Ca(OH)<sub>2</sub> + Na<sub>2</sub>S or others. The effect of bating on *L* was small except after NH<sub>2</sub>Me liquors, when it caused *L* to be removed from *C*. Photomicrographs of skin sections are given to show the distribution of *L*. D. W.

**Effect of sulphuric acid on chrome-tanned leather.** E. L. WALLACE, C. L. CRITCHFIELD, and J. BEEK, JUN. (J. Amer. Leather Chem. Assoc., 1935, 30, 311—315).—The tensile strength of a chrome-tanned leather, which had been brought to pH 2.84 with 2.5% of H<sub>2</sub>SO<sub>4</sub> and aged for 24 months at 70° and 65% R.H., was diminished by only 5%, and the basicity was reduced from 66% to 47%. D. W.

**Action of aggressive gases on leather.** I. W. MOELLER (Cuir techn., 1934, 23, 324—327; Chem. Zentr., 1935, i, 507).—Moist or dry Cr-tanned leather was

more strongly attacked by SO<sub>3</sub> and Cl<sub>2</sub> than was moist or dry vegetable-tanned leather. Hydrolysis of the hide substance took place in each case. H. J. E.

**Tannin in wines.**—See XVIII.

## PATENTS.

**Adhesives.** A. H. STEVENS. From MINNESOTA MINING & MANUFACTURING CO. (B.P. 427,701, 22.7.33).—Glue, gelatin, etc. are incorporated with resins made by combining a polyhydric alcohol, e.g., glycol, with a polybasic inorganic acid, e.g., H<sub>3</sub>BO<sub>3</sub>. The product may be modified with glycerin, honey, drying oils, etc. S. M.

(A) **Defoaming [of glue or paper-coating compositions].** (B) **Defoamed product [adhesive].** J. WOLFSON, Assr. to NAT. OIL PRODUCTS CO. (U.S.P. 1,957,513—4, 8.5.34. Appl., [A] 18.10.28, [B] 29.6.33).—(A) Foaming during boiling of glue and the like is prevented by addition of a small amount (2%) of an insoluble soap, e.g., Al stearate, mixed with a wax solvent and a sulphonated (tallow) dispersing agent. (B) Claim is made for the product of (A). A. R. P.

**Adhesives [containing rubber] and adhesive sheets or tapes employing same.** MINNESOTA MINING & MANUFACTURING CO. (B.P. 427,702, 22.7.33. Addn. to B.P. 405,263; B., 1934, 337).—The adhesive contains unvulcanised rubber and a natural resin, together with <math>\leq 1</math> plasticiser or antioxidant such as  $\beta$ -C<sub>10</sub>H<sub>7</sub>·OH, aldol- $\alpha$ -naphthylamine,  $\beta$ -C<sub>10</sub>H<sub>7</sub>·NHPh, and *s*-di- $\beta$ -naphthyl-*p*-phenylenediamine, and may be united to a cellulosic backing with the aid of an interposed film formed from an aq. dispersion of rubber with the addition of resin or of a H<sub>2</sub>O-sol. gelatinous material, e.g., casein.

D. F. T.

**Size for paper. Artificial leather.**—See V.

## XVI.—AGRICULTURE.

**Colloid-chemical aspects of clay-pan formation in soil profiles.** H. JENNY and G. D. SMITH (Soil Sci., 1935, 39, 377—389).—The clay examined failed to produce a pan in sand columns by mere "sieve" action. The presence of electrolytes was necessary. Org. colloids favoured translocation of the clay through sand. Positive Fe(OH)<sub>3</sub> sols give rise to "attraction pans" through adherence of the particles to negative sand grains, followed by mutual flocculation with clay colloids.

A. G. P.

**Soil profile studies. VII. The glei process.** J. S. JOFFE (Soil Sci., 1935, 39, 391—401; cf. A., 1934, 1198).—Current views of glei formation (localised areas of sticky loam coloured greyish-blue by presence of Fe<sup>++</sup> oxides, occurring in swamp soils) are discussed. Analytical data of a glei-podsol (I) are recorded. The (I) in northern countries marks the termination of podsolisation and the initiation of tundra formation.

A. G. P.

**Microbiological method for determining lime requirements of soils variously podsolised.** V. G. OXENTIAN (Trans. Sci. Inst. Fert. U.S.S.R., 1933, No. 108, 30—32).—Determinations of the CaO requirement of soils by the *Azotobacter* method permit an estimate of the degree of podsolisation which has occurred. CH. ABS. (p)



**Microbiological characteristic of soils in some districts of Transcaucasia.** S. I. KUZNETZOV (Trans. Sci. Inst. Fert. U.S.S.R., 1933, No. 108, 33—57).—On red loams, normally high nitrification is stimulated by addition of  $\text{PO}_4'''$ . *B. mycoides* is also stimulated and mineralises more org. N. Denitrification occurs in presence of  $\text{H}_2\text{O}$ -sol. org. matter. CH. ABS. (p)

**Microbiology of soils of the Frunze Zondl Experimental Station.** S. I. KUZNETZOV (Trans. Sci. Inst. Fert. U.S.S.R., 1933, No. 108, 58—67).—In irrigated cotton soils N fixation is high, sometimes leading to denitrification. No loss of N from added urea or  $\text{NH}_4$  salts was observed. Increased N fertilisation causes immobilisation of  $\text{PO}_4'''$ . CH. ABS. (p)

**Microbiology of soils of Italian Somaliland.** O. VERONA (Agric. colon., 1934, 28, 516—523).—The humus and  $\text{CaCO}_3$  contents,  $p_{\text{H}}$ , and the ammonifying and nitrifying powers of virgin forest soils are recorded. CH. ABS. (p)

**Nature of soil deterioration in Egypt.** D. S. GRACIE, M. RIZK, A. MOUKHTAR, and A. H. I. MOUSTAFA (Min. Agric., Egypt, Bull., 1934, No. 148, 22 pp.).—The formation and reclamation of black alkali and gypsum-veined soils are examined. A. G. P.

**Degree of saturation with bases of some New Zealand soils.** F. L. C. SCRIVENER (New Zealand J. Sci. Tech., 1935, 16, 271—277).—The response of these soils to liming is not directly related to the degree of saturation with bases. Climatic factors are probably concerned. Determinations of exchangeable H<sup>+</sup> by Parker's method (B., 1930, 341) probably include the H<sup>+</sup> of acids dissolved in the soil solution. A. G. P.

**Ammonification in soils and *B. mycoides*.** M. G. TIAGNUI-RIADNO (Trans. Sci. Inst. Fert., 1933, No. 108, 143—170).—Inoculation of soil with *B. mycoides* increases ammonification and nitrification. Fertilisers, notably  $\text{PO}_4'''$ , activate the organism. CH. ABS. (p)

**Relation between the ammonia content and reaction of soils.** N. F. VÁSQUEZ (Bol. Soc. Quim. Peru, 1935, 1, No. 3, 47—57).—The examination of 60 samples of soils from New York State showed that the content of total  $\text{NH}_3$  was inversely  $\propto$  the  $p_{\text{H}}$ ; a high  $\text{NH}_3$  content is also generally associated with a low  $\text{CaO}$  content. Probably ammonification of the soil is less affected than nitrification by  $\text{CaO}$  deficiency, thus permitting the accumulation of  $\text{NH}_3$  in acid soils. There was only a low positive correlation between  $\text{NH}_3$  and total N, and none between the  $p_{\text{H}}$  and sol.  $\text{NH}_3$ . Replaceable  $\text{NH}_3$  (in 10 samples) amounts to about 60% of the total  $\text{NH}_3$ . E. L.

**Microbiological processes of the light-chestnut soils at the Valuskaja Agricultural Experiment Station.** G. S. ZACHAROVA (Trans. Sci. Inst. Fert. U.S.S.R., 1933, No. 108, 171—182).—Irrigation of these soils causes denitrification. Leaching of  $\text{NO}_3'$  from the ploughed horizon does not occur unless cracks are formed in the soil. CH. ABS. (p)

**Denitrification in podsol soils.** E. V. LITVINOVA (Trans. Sci. Inst. Fert. U.S.S.R., 1933, No. 108, 71—78).—The relationship established by Zacharova between

denitrification, quantity of  $\text{NO}_3'$ , and sol. org. matter is confirmed. CH. ABS. (p)

**Influence of calcium cyanamide on nitrification in podsol soils.** J. S. BORODULINA (Trans. Sci. Inst. Fert. U.S.S.R., 1933, No. 108, 79—92).— $\text{CaCN}_2$  temporarily depresses nitrification and the activity of *B. mycoides*. CH. ABS. (p)

**Significance of changes occurring during storage of calcium cyanamide in relation to its manurial activity.** E. J. RATNER (Z. Pflanz. Düng., 1935, 38, 257—274).—The apparent decrease in N content of stored  $\text{CaCN}_2$  is almost entirely due to the increased wt. of the material resulting from absorption of  $\text{H}_2\text{O}$  and  $\text{CO}_2$ . Formation of dicyanodiamide (I) is a relatively slow process under ordinary storage conditions. Oats, barley, and maize are unable to utilise (I), but its presence in soil does not affect the assimilation of other forms of N by the plants. Very large proportions of (I) in the fertiliser tend to retard protein formation in the plants and may lead to accumulation of much non-protein N in the straw. Buckwheat and mustard are particularly susceptible to injury by (I). Flax and cotton are more resistant. The ill-effects of (I) are more marked in light, sandy soils than in loams. In soil (I) is gradually converted into plant-assimilable compounds, amounts normally present in the fertiliser becoming available during the first season after application. A. G. P.

**Pot trials with calcium cyanamide.** W. DIX (Z. Pflanz. Düng., 1935, 38, 333—340).—The manurial action of  $\text{CaCN}_2$  (I) relative to that of other N fertilisers is greater in the warmer seasons. Heating during sterilisation of soils causes relatively small crop increases in unmanured samples and in those treated with  $\text{NH}_4\text{NO}_3$ , but very large increases in those receiving (I). In natural soils the temp. attained may be such as to facilitate the direct decomp. of (I). A. G. P.

**Influence of the composition of the sorption complex of soils on the fixation and utilisation of ammonium compounds.** K. NEHRING and H. MÖBIUS (Z. Pflanz. Düng., 1935, 38, 294—332).—The adsorption of  $\text{NH}_3$  by soils and permutits accords with the Freundlich equation. Replacement of H<sup>+</sup> in the soil complex by other cations results in increased  $\text{NH}_3$  absorption to extents which rise in the order H<sup>+</sup>, Ca<sup>++</sup>, Mg<sup>++</sup>, K<sup>+</sup>, Na<sup>+</sup>. The corresponding effect of anions associated with  $\text{NH}_4^+$  is in the order  $\text{CNS}' < \text{NO}_3' < \text{SO}_4'' < \text{OAc}' < \text{C}_2\text{O}_4'' < \text{PO}_4'''$ . The influence of the anions is greater in the more acid soils and decreases with the introduction of cations, notably Na<sup>+</sup> and K<sup>+</sup>. In presence of  $\text{C}_2\text{O}_4''$  and  $\text{PO}_4'''$  treatment of soil with Mg<sup>++</sup> or Ca<sup>++</sup> causes a decline in  $\text{NH}_3$  fixation. Absorption of  $\text{NH}_3$  is directly related to the clay content of soils, but not to the hygroscopicity or heat of wetting. Pot cultures confirm the dominant effect of cations compared with that of anions. Treatment of acid soils with Ca<sup>++</sup> and Mg<sup>++</sup> increases, and that with Na<sup>+</sup> and K<sup>+</sup> decreases, nitrification and the N intake by plants. Addition to soils of  $(\text{NH}_4)_2\text{HPO}_4$  lead to greater nitrification and N intake than did that of  $\text{NH}_4\text{NO}_3$  or  $(\text{NH}_4)_2\text{SO}_4$ . A. G. P.

**Determination of adsorbed bases [in soil] by boiling with ammonium chloride, and utility of**



**the procedure in related soil investigations.** W. M. SHAW and W. H. MACINTIRE (Soil Sci., 1935, 39, 359—375).—Boiling soil with  $N\text{-NH}_4\text{Cl}$  results in complete decomp. of carbonates and replacement of all adsorbed bases by  $\text{NH}_4^+$ . Of the exchanged  $\text{NH}_4^+$ , a portion is liberated during boiling, as a result of hydrolysis of the  $\text{NH}_4\text{-clay}$  complex. The portion fixed by the colloid may be removed by washing the soil residue with  $\text{EtOH}$  and distilling with  $\text{MgO}$ . The filtrate after boiling with  $\text{NH}_4\text{Cl}$  contains the original exchangeable cations. Quant. examination of the liberated and adsorbed  $\text{NH}_4^+$ , supplemented by  $\text{CO}_3^{2-}$  analyses, permits the determination of the total exchangeable base content of soils, including those from which  $\text{Mg}$  is removed only with difficulty by cold-leaching. Boiling with  $\text{NH}_4\text{Cl}$  effects a better pretreatment of carbonated soils for mechanical analysis than does the customary digestion with  $\text{HCl}$ .

A. G. P.

**Azotobacter method for determining potassium requirement of soils.** A. P. KRIUCHKOVA (Trans. Sci. Inst. Fert. U.S.S.R., 1933, No. 108, 23—29).—*A. agile* was more satisfactory than *A. chroococcum* for this purpose.

CH. ABS. (p)

**Effect of secondary salts in potassium fertilisers.** W. U. BEHRENS (Z. Pflanz. Düng., 1935, 38, 274—282).—Presence of  $\text{Mg}$  salts in  $\text{K}$  fertilisers increased crop yields, the effect becoming larger in the second and third seasons. Heavy dressings of kainit decreased the yield of some crops as a result of its high  $\text{NaCl}$  content.

A. G. P.

**Determination of small amounts of potassium in soil solutions.** H. BEUTELSPACHER (Diss., Hohenheim, 1933; Bied. Zentr., 1934, A, 5, 249).—The ppt. of  $\text{K Na cobaltinitrite}$  obtained in the usual manner is treated with an acid solution of indole and the red-violet nitrosoindole is determined colorimetrically. The  $\text{K}$  content of a single aq. extract of soil is not an index of the available  $\text{K}$  present.

A. G. P.

**'Sigmond's method [for determining available nutrients in soil], especially the 'Sigmond-Becker determination of potassium.** G. KARAY (Mezőg. Kutat., 1934, 7, 113—130; Chem. Zentr., 1935, i, 465).—Neubauer's results and those obtained by the 'Sigmond-Becker method for available  $\text{K}$  showed an average ratio of 100:110, with a general tendency for the vals. to approach 100: > 100 in acid and 100: < 100 in alkaline soils. Vals. for  $\text{K}$  and  $\text{P}$  by the two methods agreed to 97 and 96%, respectively.

A. G. P.

**Determination of plant-assimilable nutrients in soils. I. Relation of Mitscherlich and Neubauer methods for potassium and phosphate to field-manuring trials.** G. SUNDELIN, O. FRANCK, and C. LARSON (Medd. Centralanst. Försöks. Jordbruks., No. 419, 30 pp.; Chem. Zentr., 1935, i, 141).—Satisfactory agreement between results of the 3 methods is recorded.

A. G. P.

**Soil phosphates. II. Fixation of phosphate by  $\text{R}_2\text{O}_3$  oxides in sodium- and calcium-clays.** H. O. ASKEW (New Zealand J. Sci. Tech., 1935, 16, 278—295).—Fixation of  $\text{PO}_4^{3-}$  in soils results principally from reaction with sesquioxides. Fixation

by org. matter is small. The amount of  $\text{PO}_4^{3-}$  fixed is not greatly altered by saturation of the soil with  $\text{Na}$  or  $\text{Ca}$ , although vals. were slightly higher in the latter case. Logarithmic adsorption curves for  $\text{Na}$ -clays in presence of  $\text{R}_2\text{O}_3$  compounds consisted of two straight lines intersecting at a point which was dependent on soil type and reaction. Corresponding curves for  $\text{Ca}$ -clays were unbroken straight lines. A high proportion of the  $\text{PO}_4^{3-}$  added in customary dressings of super-phosphate was fixed by the soil examined.

A. G. P.

**Divergent influence of degree of base saturation of soils on the availability of native, soluble, and rock phosphates.** R. L. COOK (J. Amer. Soc. Agron., 1935, 27, 297—311).—Colloidal matter from bentonite or from org. or inorg. material in soil, having its exchange capacity saturated with  $\text{H}^+$ , increases the availability of rock phosphate to low- $\text{Ca}$  crops (oats, maize, millet), but not to high- $\text{Ca}$  crops (buckwheat). Increased base saturation due to liming improves the availability of native soil phosphates and maintains that of added sol. phosphates. Addition of  $\text{CaO}$  to acid soils lowers their ability to fix added sol.  $\text{PO}_4^{3-}$  in an insol. form.

A. G. P.

**Stratified type of distribution of phosphoric acid in soil.** E. RAUTERBERG (Z. Pflanz. Düng., 1935, 38, 282—293).—The distribution of various  $\text{P}$  fertilisers is examined by means of pot-culture experiments and by determinations of the  $\text{PO}_4^{3-}$  extracted by  $\text{Mg}(\text{HCO}_3)_2$ . The influence of other fertilisers, e.g.,  $\text{K}_2\text{SO}_4$ , and of farmyard manure is discussed.

A. G. P.

**Factors influencing phosphate fixation in soils.** P. L. HIBBARD (Soil Sci., 1935, 39, 337—358).—The principal factors are  $p_{\text{H}}$ ,  $[\text{Ca}^{2+}]$ , and the  $\text{SiO}_2$ : sesquioxide ratio of the soil colloids. Phosphates of  $\text{Ca}$  and  $\text{Mg}$  have increased solubility at  $p_{\text{H}} < 7.0$  and those of  $\text{Fe}$  and  $\text{Al}$  at  $< 3.0$ . Fixation by  $\text{Fe}$  and  $\text{Al}$  takes place at  $p_{\text{H}}$  3—8, whereas at  $> 8.0$  hydrolysis occurs and  $\text{PO}_4^{3-}$  (but not  $\text{Fe}$ ) becomes available. Diatomaceous earth, felspar, and  $\text{BaSO}_4$  have no  $\text{P}$ -fixing power (I), but that of talc, mica, kaolin, and impure infusorial earth is considerable. High fixation by soil colloids is associated with high proportions of hydrated  $\text{Fe}_2\text{O}_3$ . Flocculation of the colloid increases the amount of  $\text{P}$  fixed. Addition of  $\text{Na}$  or  $\text{NH}_4$  salts, sol.  $\text{SiO}_2$ , or org. colloids has the reverse effect. The (I) of soils, i.e., the no. of mg. of  $\text{PO}_4^{3-}$  necessary to be added to soil to produce 1 p.p.m. of  $\text{PO}_4^{3-}$  in a 1:1  $\text{H}_2\text{O}$  extract of soil, serves as a soil characteristic. Means for determining this are described.

A. G. P.

**Factors affecting absorption of selenium from soils by plants.** A. M. HURD-KARRER (J. Agric. Res., 1935, 50, 413—427).—Absorption of  $\text{Se}$  from soil treated with  $\text{Na}_2\text{SeO}_4$  (I) was very high in the case of Cruciferae, and increased with the proportion of sand in the soil. Addition of  $\text{S}$  or gypsum to treated soil reduced the amount of  $\text{Se}$  taken up by plants. (I) was not easily leached from soil. Elementary  $\text{Se}$  was not absorbed by plants. Toxicity of (I) was  $>$  that of  $\text{Na}_2\text{SeO}_3$ . Repeated cropping of treated soil with wheat gradually eliminated the injurious effects of (I).

A. G. P.



**Practical significance of the so-called harmony of [plant] nutrients.** W. SCHOLZ (*Z. Pflanz. Düng.*, 1935, **38**, 340—354).—A review with extensive bibliography. A. G. P.

**Blast-furnace slag [as fertiliser].** H. KAPPEN and P. SOLBERG (*Z. Pflanz. Düng.*, 1935, **38**, 355—361).—The slag (I) is as effective as  $\text{CaCO}_3$  (II) in increasing the yield of flax, lupins, and lucerne on acid soil, and is less injurious when applied in excessive amounts. Nitrification of  $(\text{NH}_4)_2\text{SO}_4$  in soil treated with small amounts of (I) is  $<$ , and with larger amounts is  $>$ , when (II) is applied. A. G. P.

**Probable use of gypsum, phosphogypsum, and lime residues as fertilisers.** E. I. RATNER (*Trans. Sci. Inst. Fert. U.S.S.R.*, 1934, No. 101, 128—136; cf. *B.*, 1934, 467).—Gypsum (I) is an effective fertiliser on alkali soils and others requiring no CaO and is a valuable supplement to single or mixed fertilisers. Phosphogypsum behaves similarly. Residues of CaO from the manufacture of  $(\text{NH}_4)_2\text{SO}_4$  from (I) have the additional advantage of containing N and P. CH. ABS. (p)

**Influence of method of distributing fertilisers on quality and yield of wheat grain.** E. G. MININA (*Compt. rend. Acad. Sci. U.R.S.S.*, 1935, **2**, 173—176).—The influence of the manner of distributing K, P, and N fertilisers in pot trials, and of P and N in field trials, on the yield and protein content of wheat is examined. A. G. P.

**Value of oat seed as determined by morphological and chemical analysis.** A. SCHEIBE (*Forts. Landw.*, 1933, **8**, 337—343; *Bied. Zentr.*, 1934, **A**, **5**, 226).—High quality in seed is associated with high wt. per 1000 grain and high sucrose (I) content. Variations in protein (II) and (I) contents are not always similar. Soil and climatic conditions producing physiological dryness in the later stages of ripening of the plants favour sucrose accumulation in the grain. The (II) content is affected by these factors and also by the N status of the soil. A. G. P.

**Relation of moisture content and method of storage to deterioration of stored cottonseed.** D. M. SIMPSON (*J. Agric. Res.*, 1935, **50**, 449—456).—Loss of germinative power (*G*) of cottonseed increased rapidly when the  $\text{H}_2\text{O}$  content of the seed was  $>$  a crit. val., which varied somewhat with type. Appropriately dried seed in sealed containers retained nearly full *G* for  $2\frac{1}{2}$ — $4\frac{1}{2}$  years. A. G. P.

**Stimulative action of soil on the germination of seeds.** C. KASASKY (*Z. landw. Versuchs-Stat.*, Bulgaria, 1933, **14**, 5—29; *Bied. Zentr.*, 1934, **A**, **5**, 197—198).—Germination of seed is stimulated by the action of soil on the colloidal condition of the plasma. This effect varies with different soils, with different horizons of the same soil, and with the seed species. Soil does not influence the germination of buckwheat. A. G. P.

**Nodulation of peanut plants as affected by variety, shelling, and disinfection of seed.** J. F. DUGGAR (*J. Amer. Soc. Agron.*, 1935, **27**, 286—288).—Treatment of unshelled and uninoculated seed with  $\text{CuSO}_4$  (1 in 30) or  $\text{HBO}_3$  (saturated solution) depressed nodulation;  $\text{HgCl}_2$  (1 in 1000) produced variable

effects. Slight charring of the hulls with  $\text{H}_2\text{SO}_4$  and subsequent washing stimulated nodule formation. A. G. P.

**Longleat experiments, 1927—1931.** A. W. LING, W. R. MUIR, and J. D. NUTT (*J. Bath and West and South Counties Soc.*, 1933—34, **8**, 51—77).—Variations in the composition of pasture herbage during the season were less under intensive than under extensive grazing conditions, notably in the decline in protein (I) content during June—July. Intensive grazing alone did not increase the Ca and P contents of the herbage, but when accompanied by treatment with complete fertilisers the total ash,  $\text{SiO}_2$ -free ash, (I), Ca, and, notably, the P contents were raised. Heavy dressings of  $\text{CaCO}_3$  prior to application of fertilisers nullified the effects of the latter on all but the Ca content of pasture herbage. CH. ABS. (p)

**Action of liquid manure on grassland.** C. DUSSERRE (*Landw. Jahrb. Schweiz*, 1933, **47**, 578—582; *Bied. Zentr.*, 1934, **A**, **5**, 182).—Distribution of liquid manure (*M*) over the surface of soils involves considerable losses of  $\text{NH}_3$ -N. Best yields are obtained with only moderate applications. The manurial action of *M* is limited to the season of application. Repeated use of *M* reduces the proportion of legumes in the herbage and increases that of grasses and weeds. The protein content of the grazing declines. A. G. P.

**Composting and manurial trials with dried hop residues.** A. STÖCKLI (*Landw. Jahrb. Schweiz*, 1933, **47**, 214—247; *Bied. Zentr.*, 1934, **A**, **5**, 215—216).—The course of the decomp. of hop residues in composts is examined. Addition of N and P fertilisers and suitable aëration accelerate the process. A. G. P.

**Carbon balance in manuring trials with carbon dioxide.** F. RIEDEL (*Forts. Landw.*, 1933, **8**, 196—200; *Bied. Zentr.*, 1934, **A**, **5**, 222).—Treatment with  $\text{CO}_2$  diminished the "lodging" of cereals, improved the solidity of cabbage heads, increased the dry matter content of root crops, and markedly increased yields. A. G. P.

**Effect on the tomato plant of carbon dioxide produced by combustion.** B. D. BOLAS and R. MELVILLE (*Ann. Appl. Biol.*, 1935, **22**, 1—15).—Increased  $[\text{CO}_2]$  in greenhouses resulted in accelerated growth of tomato seedlings and considerably higher crop yields. A. G. P.

**Effect of inoculated sulphur, lime, and mercury compounds on yield of potatoes.** A. H. EDDINS (*Amer. Potato J.*, 1934, **11**, 295—302).—Application of inoculated S to soils having initial  $p_{\text{H}}$  4.6—5.9 increased the acidity of the soils and lowered the potato yields. Treatment with CaO increased the  $p_{\text{H}}$ , but had no consistent effect in improving yields. Application of  $\text{HgO}$  and  $\text{Hg}_2\text{Cl}_2$  with fertilisers lowered crop yields. CH. ABS. (p)

**Sulphuric acid spraying of potato haulm to prevent late infection of the tubers with blight.** G. H. BATES and L. D. MARTIN (*J. Min. Agric.*, 1935, **42**, 231—235).—Increased yields of "ware" potatoes and a much lowered proportion of "blights" followed spraying with 10%  $\text{H}_2\text{SO}_4$  3 weeks before the normal lifting period. 20% acid gave somewhat superior results. A. G. P.



**Need of plants for boron.** M. J. SCHKOLNIK (Compt. rend. Acad. Sci. U.R.S.S., 1935, 2, 167—173).—Deficiency of B causes death of growing points of seedlings, or in older plants retardation and impoverishment of flower and seed production in a no. of species.

A. G. P.

**Biological treatment of plant residues. III. Propagation of *Azotobacter* and accumulation of nitrogen in the decomposition of plant residues.** I. A. MAKRINOW (Zentr. Bakt. Par., 1935, 92, 34—40).—Inoculation of oat straw with *Azotobacter* (I) and cellulose-decomp. organisms results in a notable increase in the nos. of both organisms and a more complete decomp. of cellulose. The N content of the material is  $>$  that produced in absence of (I). The second stage of decomp. is marked by increased fungal growth, further increase in the nos. of (I), and the decomp. of lignin.

A. G. P.

**Bananas [and soils] in British Guiana.** F. BURNETT and R. R. FOLLETT-SMITH (Agric. J. Brit. Guiana, 1934, 5, 148—165).—Analytical data for typical banana soils are recorded. The tolerance of bananas for sol. salts depends on soil type, crit. concns. varying from 0.03% in sandy loams to 0.07% in heavy clays. The life of a plantation is  $<$  10 years on soils having  $p_H$  6.8 initially, 5—10 years with soils of  $p_H$  6.0—6.7, and  $<$  5 years on those of  $p_H$  4.0—6.0 CH. ABS. (p)

**Fertilisers and reaction of strawberry soils.** R. A. LINEBERRY (J. Elisha Mitchell Sci. Soc., 1934, 50, 39).—Optimum growth of strawberries occurred in soils of  $p_H$  6.0. Many plants died at  $p_H$   $>$  4.5. Heavy applications of K improve the keeping quality of the fruit.

CH. ABS. (p)

**Influence of liming on the reaction of plant saps.** B. MALÁČ (Věstn. czechoslov. Akad. Zeměd., 1934, 10, 426—430; Chem. Zentr., 1935, i, 294).—Liming of soil does not increase the  $p_H$  of plant saps, but increases the titratable acidity. The bactericidal potency of plants is increased by growth on limed soils. A. G. P.

**Influence of boron on growth of sugar beet and other plants.** M. A. BELOUSOV (Arb. Chem. Sektors U.S.S.R., 2, 20—48).—Symptoms of B deficiency may occur in soils having sufficient B but a reaction too alkaline to permit its assimilation by plants. In nutrient solutions 0.5 mg. of B per litre caused heart rot in beet; 5 mg. per litre were more favourable for growth and 50 mg. per litre were injurious. Tomatoes cannot tolerate  $>$  5 mg. of B per litre. CH. ABS. (p)

**Influence of stand, nitrogen, and cultivation on yield and quality of sugar beet.** H. LÜDECKE (Zuckerrübenbau, 1935, 17, 40—48; Internat. Sugar J., 1935, 37, 233—234).—The wt. of the beets increases with the distances between the rows and with addition of nitrogenous fertiliser. Cultivation, limited to keeping the top soil loosened, generally promotes crop growth.

J. P. O.

**Estimation of the maturity of a field of [sugar] cane, using the hand refractometer.** H. H. CROUCHER (Internat. Sugar J., 1935, 37, 230).—Refractometer readings approximating closely to those obtained by testing the juice from the whole cane were obtained by dividing the cane into 3 equal portions,

making determinations on samples from the centre node of each section, and taking the mean of the 3 results. In sampling the standing of a whole field the Queensland method was used, this consisting in selecting one cane of apparently an average degree of purity from a selected stool in each acre of the field.

J. P. O.

**Control of *Anomala orientalis* at the Oahu Sugar Company.** W. WOLTERS (Hawaiian Planters' Rec., 1934, 38, 264—278).—Soil fumigants (chloropicrin,  $CS_2$ ,  $p-C_6H_4Cl_2$ ) were unsuitable. Derris could not be distributed satisfactorily through the soil mass and was not toxic to grubs. Good results were obtained by ploughing-in  $As_2O_3$  (314—365 lb. per acre) alone or with fertilisers, but preferably with 38—44 tons of press mud.  $As_2O_3$  is active over a long period and has no ill effects on sugar cane.

CH. ABS. (p)

**Predisposing factors in *Pythium* root rot [of sugar cane].** C. W. CARPENTER (Hawaiian Planters' Rec., 1934, 38, 279—338).—Excessive use of N fertilisers increased the susceptibility of certain varieties of sugar cane to attack by *Pythium*. Other varieties, not so affected, were rendered more susceptible by  $PO_4^{''}$  deficiency. In culture solutions root rot was serious when the supply of P, Fe, Ca, Mg, K, Mn, or S was insufficient. In soils, excess of Ca (and probably of Mg and Na) or of toxic salts of Fe or Al favoured root rot.

CH. ABS. (p)

**Oil-soluble copper as a fungicide.** E. R. DE ONG (Phytopath., 1935, 25, 368—370).—Use of a solution of Cu resinate in pine-tar oil is described. The oil penetrates stomata and probably epidermal cells of leaves and thus permits fungicidal action of Cu on germ tubes of spores after penetration of tissues. Oil of low oxidisability must be used or plants are injured. Of the Cu thus applied to leaves 20% penetrated the tissue. There was no penetration of Cu from Bordeaux mixture.

A. G. P.

**Growth of *Agaricus campestris* on plots treated with sodium chlorate.** G. M. SHEAR (Phytopath., 1935, 25, 440—442).—Treatment of soils with  $KClO_3$  (1.5 lb. in 1 gal. of  $H_2O$  per 100 sq. ft.) for weed destruction resulted in a markedly increased growth of mushrooms.

A. G. P.

**Field bindweed and methods of control.** J. W. ZAHNLEY and W. F. PICKETT (Kansas Agric. Exp. Sta. Bull., 1934, No. 269, 26 pp.).—Spraying with  $NaClO_3$  (1 lb. per gal.) at the rate of 200 gals. per acre supplemented by intensive cultivation and the growth of smother crops is recommended.

A. G. P.

**Horsetail (*Equisetum palustre*) and the "Durock" poison "equisetin."** H. VON FREYBURG (Bied. Zentr., 1934, A, 5, 180—181).—A review.

A. G. P.

**Destruction of earth worms.** S. L. LELE (Poona Agric. Coll. Mag., 1934, 26, 112—113).—The efficiency of  $NaNO_3$  (300—900 lb. per acre),  $(NH_4)_2SO_4$ , mowha meal, and castor meal was in the (decreasing) order named.

CH. ABS. (p)

**Relation of *Fusarium* and *Helminthosporium* in barley seed to seedling blight and yield.** J. J. CHRISTENSEN and E. C. STAKMAN (Phytopath., 1935, 25,



309—327).—Of various fungicides examined, Ceresan gave best control. A. G. P.

**Control of seed-borne diseases of rice.** T. C. LOH (Lingnan Sci. J., 1934, 13, 603—605).—Seeds are soaked in a vac. for several hr. until all air is expelled, drained, placed in 1% aq.  $\text{HgCl}_2$ , and stirred. After 25—30 min. they are washed several times with sterile  $\text{H}_2\text{O}$ .

CH. ABS. (p)

**Prevention of blight (*Phytophthora infestans*) in seed potatoes.** T. SMALL (Ann. Appl. Biol., 1935, 22, 16—22).—Repeated spraying in May—June with a neutral prep. of  $\text{CuSO}_4$  (I) and  $\text{NaOH}$  prevented field losses. Transmission of the disease in seed tubers is minimised by scorching the haulms with (I) spray or cutting them and then spraying a few days before lifting. Alternatively, seed may be dipped in  $\text{CH}_2\text{O}$  (40% solution diluted 1:100). A. G. P.

**Relation of soil acidity to a seedling disease of lucerne on three Iowa soils.** W. F. BUCHHOLTZ (Phytopath., 1935, 25, 421—425).—The disease, apparently caused by *Pythium* spp., is more prevalent in lucerne, sugar beet, other legumes, and flax when grown on acid soils. Steaming the soil or treating with  $\text{CH}_2\text{O}$  produced favourable effects. A. G. P.

**Attraction of *Necrobia rufipes*, de Geer. (copra beetle), to the fatty acids of coconut oil and to types of copra.** G. H. CORBETT, M. YUSOPE, and A. HASSAN (Malay. Agric. J., 1935, 23, 217—228).—*N. rufipes* is attracted to partly decomposed and mouldy, but not to good dry, copra, to myristic and lauric acids, and to the mixed fatty acids  $>$  to the oils of coconut and palm kernel. *Silvanus advena* is attracted to oleic acid. A. G. P.

**Numbers of *Rhizobium meliloti* and *R. trifolii* in soils, as influenced by soil-management practices.** R. H. WALKER and P. E. BROWN (J. Amer. Soc. Agron., 1935, 27, 289—296).—The nos. of these organisms in soils are influenced by the previous cropping history and the nature of fertilisers applied. Application to soil of crop residues, manure, limestone, or rock phosphates increased the no. of nodule bacteria, more especially if combinations of the treatments were adopted. The amounts of org. matter,  $\text{CaO}$ , and P in soils have a greater influence on the development of these bacteria than has the frequency of growth of the host plants. A. G. P.

**“Little leaf” or rosette of fruit trees in California.** W. H. CHANDLER and D. R. HOAGLAND (Phytopath., 1935, 25, 522).—Conclusions reached by Kozłowski are founded on a misinterpretation of observations. A. G. P.

**Corky-pit of apples. Progress report.** J. D. ATKINSON (New Zealand J. Sci. Tech., 1935, 16, 316—319).—Injection of aq.  $\text{H}_3\text{BO}_3$  into tree trunks prevented the occurrence of  $>$  about 3% of affected fruit. No other substance examined induced such beneficial effects. A. G. P.

**Probable case of sulphur starvation in tobacco.** W. D. VALLEAU (Phytopath., 1935, 25, 430—432).—A form of chlorosis affecting the leaf tips is ascribed to S deficiency. Affected tips had less N, nicotine, ash, P,

Mg, K, and S than the corresponding leaf butts, and these in turn  $<$  the healthy leaves. A. G. P.

**Influence of phosphorus and potassium supply on host susceptibility to yellow tobacco mosaic infection.** E. L. SPENCER (Phytopath., 1935, 25, 493—502).—Susceptibility (S) of plants grown with varying P supply was correlated directly with growth, and was affected more by K supply than by the growth of the plant. Small additions of K increased and larger doses decreased S. A. G. P.

**Physiology of virus diseases in plants. VII. Purification of the virus of yellow mosaic of tomato.** J. CALDWELL (Ann. Appl. Biol., 1935, 22, 68—85; cf. A., 1934, 1050).—The virus is removed from the basic Pb acetate ppt. by elution with a buffer solution having  $p_H < 5.5$ . It retained its activity in substrates of widely varying  $p_H$  (2.0—10.5). No satisfactory separation of the virus from associated protein could be made. A. G. P.

**Virus of tobacco mosaic. III. Rates of inactivation at different hydrogen-ion concentrations.** W. M. STANLEY (Phytopath., 1935, 25, 475—492).—The rate of inactivation of the virus in dil. juice of *Nicotiana tabacum* at 20° or at -14° is negligible between  $p_H$  3 and 8, more rapid at  $p_H$  1.5—2.5 and 9—10, and very rapid at  $p_H$  0.5—1.5 and 11—12. Reactivation of the virus after inactivation at  $p_H$  1, 2, 11, or 12 was not observed. The susceptibility to infection of *N. glutinosa* varied but little between  $p_H$  2.0 and 10.5; that of *Phaseolus vulgaris* was much greater at  $p_H$  9—10.5 than at 0.5—3.0. Tobacco ring spot and cucumber mosaic viruses were much less stable than was tobacco mosaic, and were inactivated at increasing rates as the  $p_H$  changed on either side of 6.0 approx. A. G. P.

**Red-mite control by oil sprays.** W. COTTIER (New Zealand J. Sci. Tech., 1935, 16, 261—270).—Winter eggs of *Paratetranychus pilosus* (I) are more resistant to petroleum oils than are those of *Bryobia praetiosa*. Unstable emulsions are more effective than stable ones. Toxicity to (I) does not necessarily increase with the  $\eta$  of the oil used. A. G. P.

**Rhododendron white fly.** G. F. WILSON (J. Roy. Hort. Soc., 1935, 60, 264—271).—Autumn application of white oil-nicotine (I) emulsions gave more satisfactory results than did (I) alone. Oil improves the wetting of leaves and larvæ. Spray pressure of  $<$  90 lb./sq. in. is necessary. To obviate leaf injury spraying should take place in dull weather. Adult flies on young growth should be dusted with (I). Prior to planting out, leaves of seedling plants may be dipped in oil-(I) or tar-distillate emulsions. A. G. P.

**Action of the principal manure salts on fish.** L. SCHEURING and F. LEOPOLDSIEDER (Arch. Hydrobiol., 1934, 27, 203—220; Chem. Zentr., 1935, i, 615).—Fertiliser sacks which had contained alkali-metal or Ca salts, urea, or “Nettolin” caused no injury to fish, when washed in ponds and streams. Those in which  $\text{NH}_4$  salts (I) had been stored proved injurious. (I) may be washed from manured fields in amounts sufficient to be harmful. A. G. P.



**Fertiliser salts.**  $(\text{NH}_4)_2\text{SO}_4$  etc.—See VII. **Errors in  $p_{\text{H}}$  measurements.**—See XI. **[Manure from] distillery slop.**—See XVIII.

## PATENTS.

**Agent for keeping cut flowers and the like fresh.** O. NEUBERT, Assr. to WINTHROP CHEM. CO., INC. (U.S.P. 1,956,908, 1.5.34. Appl., 16.6.33. Ger., 20.7.32).—Sugar grains (1–2 mm.) are mixed with finely-divided  $\text{AgNO}_3$  and with sugar powder in a fine  $\text{H}_2\text{O}$ -spray and the coated grains are dissolved in the  $\text{H}_2\text{O}$  in which the flowers are kept. A. R. P.

**Drying of grass and other crops.** W. F. CAREY, R. E. SLADE, and IMPERIAL CHEM. INDUSTRIES, LTD. (B.P. 428,698, 17.11.33 and 15.3.34).—Combustion gases (temp.  $\gt 140$ – $180^\circ$  for first contact) are passed upwards through a chamber in which are a no. of superposed trays of grass or the like. A tray with raw grass is inserted at the top or lowest-temp. zone and after partial drying is taken out, tedded, and put back lower down, more trays than the total capacity of the dryer being in use at one time. B. M. V.

**Fungicide.** M. C. GOLDSWORTHY, Ded. to U.S.A. (U.S.P. 1,958,102, 8.5.34. Appl., 16.9.32).—Claim is made for a finely-ground (1 : 2) mixture of  $\text{CuO}$  and  $\text{CaO}$  which may be used as a dry dust or in aq. suspension as a substitute for other  $\text{Cu}$  fungicides. A. R. P.

**Insecticide and insectifuge.** E. W. ADAMS, Assr. to STANDARD OIL CO. (U.S.P. 1,957,429, 8.5.34. Appl., 4.5.31).—Claim is made for an extract of pyrethrum flowers containing a small amount of dibutyl (or diamyl) phthalate. A. R. P.

**Nicotine insecticide.** T. J. HEADLEE, Assr. to TOBACCO BY-PRODUCTS & CHEM CO. (U.S.P. 1,958,407, 15.5.34. Appl., 18.5.29).—Claim is made for a 0.5–2% solution of nicotine in aq.  $\text{Na}$  oleate. A. R. P.

**Fertilisers.**—See VII.

## XVII.—SUGARS; STARCHES; GUMS.

**Pressure loss and dead space in [beet] diffusion batteries.** K. LASSE (Centr. Zuckerind., 1935, 43, 68–70; Internat. Sugar J., 1935, 37, 195).—The chief disadvantage of "dead space" ( $D$ ) is that the amount of  $\text{H}_2\text{O}$  in the battery is increased, thus involving a loss of time, but  $D$  as it generally occurs does not involve dilution of the juice. The quantity of liquid necessary for exhausting the cassettes ( $C$ ) depends only on the packing of the  $C$ , and the velocity of flow within the column of  $C$ , which in turn depends on the chemical conditions and the quality of the  $C$ . J. P. O.

**Colloidal clarification of raw beet juice, and its bearing on the isoelectric point.** C. W. SCHONEBAUM (Tijds., 1934, 29, 155–163; Internat. Sugar J., 1935, 36, 226–227).—It would be incorrect to speak of the existence of an isoelectric point at a certain  $p_{\text{H}}$  of the raw juice, as when the alkaline range is traversed colloids are continuously coagulated, but these will again be peptised. Acidifying the hot juice to  $p_{\text{H}}$  4 (approx.) causes a very heavy flocculation, which can be filtered off, giving a clear and almost colourless liquid. On working in the inverse manner, *i.e.*, adding alkali to bring the heated raw juice to a high  $p_{\text{H}}$ , a quite consider-

able flocculation again occurs, though less than in the acid range. It is questionable, however, whether it is possible to take advantage of this flocculation in practice. It must not be concluded from this that in the factory process flocculation is very incomplete, as there another factor enters into play, *viz.*, the formation on carbonation of a heavy ppt. and its adsorption of non-sugars present in the juice. J. P. O.

**Control of the alkalinity of carbonated [sugar] juices.** T. PIETRZYKOWSKI (Prace Centr. Lab. Cukrow. Lat., 1932–33, 1934, 54–63; Chim. et Ind., 1934, 32, 1176).—A relation has been established between the alkalinity of carbonated juices and their electrical conductivity (I). (I) may be used for controlling carbonation. Automatic control is discussed.

CH. ABS. (e)

**Pre-defecation [of beet juice].** R. SALANI (Ind. Sacc. Ital., 1935, 27, 49–54; Internat. Sugar J., 1935, 37, 234).—Raw diffusion juice from the juice-weighing tank is received in the pre-defecation tank, and simultaneously an amount of first carbonation juice equiv. to 20 wt.-% of raw juice is run in through 3 valves arranged to discharge at different heights, the diams. of these pipes increasing from below upwards. Rapid mixing is promoted by stirring for about 10 min. at about  $50^\circ$ . The juice is then pumped through a series of heaters to raise it to  $85^\circ$ , and discharged into the second liming tank, where it is treated with 1.5% of  $\text{CaO}$ .

J. P. O.

**Sulphurous acid in beet molasses.** H. CLAASSEN (Centr. Zuckerind., 1934, 42, 998; Internat. Sugar J., 1935, 37, 234).— $< 0.35\%$  of  $\text{SO}_2$  in the molasses used in distilleries has no effect either on the alcohol yield or on the  $\text{N}$  content or yield of yeast. Molasses containing  $> 0.35\%$  is undesirable, especially as a high  $\text{SO}_2$  content seems to be paired with a low assimilable  $\text{N}$  content. J. P. O.

**Dilution versus heating in preparing low-grade massecuite for purging.** Viscosity of factory molasses. W. L. McCLEERY (Repts. Hawaiian Sugar Tech. Assoc., 1934, 127–132; Internat. Sugar J., 1935, 37, 198–199).—In using the dilution method very little excess of  $\text{H}_2\text{O}$  should be allowed to come in contact with the massecuite at any time, but it is difficult to judge the correct amount to use. With heating, the control problem is much simpler, the two conditions necessary being avoidance of local overheating and fall of temp. while purging. There should be no increase in the purity of the molasses obtained. Viscosity tests have proved useful in indicating the actual operating conditions in boiling, as well as at the time of purging. J. P. O.

**Boiling [of after-product sugar] during the 1933 campaign.** P. HONIG and W. F. ALEWIJN (Arch. Suikerind. Ned.-Indië, 1934, 42, II, 789–859).—A comprehensive review and discussion, with special reference to electrical boiling control. (Cf. B., 1934, 163.)

CH. ABS. (e)

**Corrosion phenomena in [sugar-factory] evaporators.** M. GARINO and M. PARODI (Ind. Sacc. Ital., 1934, 27, 592–601; Internat. Sugar J., 1935, 36, 195).—Corrosion of the  $\text{Fe}$  tubes depends primarily on the



presence of  $O_2$ , and is accelerated by Cl' in direct proportion to their concn.; other conditions being the same, it increases with temp. Alkalinity tends to diminish the rate, though this effect is of little consequence within the normal limits of alkalinity in sugar-factory juices. A Cu-Ni and an Al-bronze alloy proved resistant to corrosion under the usual conditions prevailing in sugar-juice evaporation, except when in contact with Fe, when both alloys lost wt. very rapidly. J. P. O.

**[Determination of the polarisation and of the reducing sugars content of raw cane sugars.]** (Internat. Sugar J., 1935, 37, 180—181).—The Brit. Nat. Commee. of the Internat. Commission for Uniform Methods of Sugar Analysis report on the clarification of raw cane sugar solutions for polarisation, as follows. Results obtained by a no. of chemists with 5 samples of raw cane sugars show that the use of Pb subacetate (I) solution, prior to making up the solution to vol., gives a higher polarisation (0.06—0.09%) for the sugars tested than that obtained with dry (I). In the case of raw cane sugars both the effect of the vol. of the ppt., and that due to the lævo-rotation of the minor constituents, are rather small, and since they are opposite in sense their nett effect is, in general, negligible. With dry (I) the effect of the vol. of the ppt. is eliminated, but not that due to the lævo-rotation of the minor constituents. The Committee, therefore, recommends that the use of (I) solution for the clarification of sugar solutions prior to polarisation be continued. Work has also been done by the Committee on methods for the determination of reducing sugars. Lane and Eynon's method, or the amplification known as Main's pot method, or other modification based on the use of methylene-blue as internal indicator, is recommended for general use. J. P. O.

**Errors involved in polarisation [of sugar solutions] when other than the normal temperature is used.** L. VAN DER HEIDE (Tijds., 1935, 30, 85—87; Internat. Sugar J., 1935, 37, 191).—If when polarising the same solution of sugar under otherwise the same conditions one chemist makes up the normal solution at 20°, and reads it at 17.5°, and the other reverses these temp., there will be a difference of 100.09—99.88 = 0.21° V. Suppose also that one makes up at 20°, and reads at 17.5°, and the other makes up at 20° and also reads at 20°, then the difference will be 100.09—99.94 = 0.15° V. J. P. O.

**Reliability of the polarisation balance [in the chemical control of cane-sugar manufacture].** J. G. THIEME (Arch. Suikerind. Nederl.-Indië, 1934, 42, I, 638—659; Internat. Sugar J., 1935, 37, 187—188).—Data are produced showing that in the defecation, sulphitation, and carbonatation processes of juice clarification the conditions are such in most factories that the Lobry de Bruyn and Alberta van Ekenstein reaction must certainly take place, and is doubtless a factor in bringing about the unknown losses in the polarisation balance. It is, however, incapable of explaining them entirely, their origin being still insufficiently understood. To overcome the uncertainties of the polarisation balance the results should be checked by the sucrose balance occasionally. J. P. O.

**Improvement of the refining quality of raw sugars, using electrical conductivity control.**

(A) J. C. B. DAVIDSON (Internat. Sugar J., 1935, 37, 222—224). (B) S. B. BEST (*Ibid.*, 224).—(A) Following Alewijn's procedure (B., 1933, 36, 163), it was found that boiling regulated in this way brought about a close control of the grain size ( $G$ ) of low-grade massecuite, and that  $G$  could be varied by increasing or decreasing the amount of sugar dust used for seeding. Improved  $G$  resulted in an increase of 30% on the capacity of the vac. pans and of the centrifugal station. This conductivity method of operating boiling is equally suitable for the commercial sugar pans, and gives a far better insight into the working conditions of the pan than that obtained by the proof-stick.

(B) Working on the same lines, an excellent grain was obtained, which resulted in a sugar of approx. 90% of the standard size. As the position of the electrodes, the purity of the material, and other factors vary the readings, the conditions must be determined for each pan and for each class of massecuite.

J. P. O.

**Viscosity and conductivity of supersaturated sugar solutions.** P. HONIG, P. C. NICOLA, and J. T. CORVER (Arch. Suikerind. Nederl.-Indië, 1934, Meded. No. 29, 1053—1110; Internat. Sugar J., 1935, 37, 232).—In general, the salts investigated (NaCl, KCl, and  $CaCl_2$ ) had a lowering effect on the viscosity ( $\eta$ ), but at higher temp.  $CaCl_2$  had the effect of increasing  $\eta$ . No simple relationship appears to exist between  $\eta$  and conductivity ( $\kappa$ ) on the one hand, and the supersaturation ( $S$ ) of the sugar-salt solutions on the other, nor between  $\kappa$  and  $S$  for either sugar-salt or sugar-molasses mixtures at different purities. At 60° the relation between  $\eta$  and  $\kappa$  with increasing concns. is practically rectilinear for the salts mentioned, but for sucrose-molasses mixtures the relation at higher temp. is curvilinear. The % increase of  $\kappa$  for a change of 0.01 in  $S$  is greater at lower than at higher vals. of  $S$ . J. P. O.

**Production of semi-refined sugar on the plantation.** O. D'HOTMAN DE VILLIERS (Internat. Sugar J., 1935, 37, 183—184).—In the suggested process (claimed to be new), first a high-purity sugar ( $\leq 99.75\%$ ) is produced and this is re-melted. After clarification and filtration, the liquor is re-boiled to 4 strikes with a recovery of nearly 94%. This should give a sugar superior to that at present made by sulphitation or carbonatation processes and of good keeping qualities. About 50% of the output of the factory would thus be obtained, and the balance as raw sugar. An excess of bagasse as fuel for re-boiling is assumed. J. P. O.

**Drying low-grade sugar at higher speeds at Waialua.** W. N. EKLUND and J. H. PRATT (Repts. Assoc. Hawaiian Sugar Tech., 1934, 203—206; Internat. Sugar J., 1935, 37, 184—185).—Factory experiments on centrifuging low-grade massecuite at different speeds showed a gain in drying time of 54% for the 1400-r.p.m. machines and 105% for the 1600 r.p.m., compared with the 1400. The sugars produced at 1150 and 1400 r.p.m. were of about the same purity, but that made at 1600 r.p.m. was slightly lower. In every case the molasses from the 1400-r.p.m. machines was of higher Brix than



that from the 1150, and that from the 1600 was highest of all. J. P. O.

**Bacteriological purity of sugars.** K. D. DEKKER (Arch. Suikerind. Nederl.-Indië, 1934, 42, I, 341—354; Internat. Sugar J., 1935, 37, 187).—Samples of Russian and Belgian refined and Czechoslovakian granulated sugar were all found to contain too many "flat sour" bacteria, and the Belgian refined also too many "hard swell" organisms. Most Javan plantation white sugars (as made by the defecation, sulphitation, and carbonation processes) contained too many thermophilic bacteria which cause trouble in canning. J. P. O.

**Control of the washing-out process in potato-starch manufacture.** III. L. W. JIRAK (Z. Spiritusind., 1935, 58, 165—166; cf. B., 1935, 519).—An analytical method of control, involving determination of pulp quantity, is indicated, and its application described and discussed. I. A. P.

**Regeneration of charcoal.**—See II. Celotex from bagasse.—See V. Sugar beet and cane. Control of *Anomala orientalis*.—See XVI.

#### PATENTS.

**Manufacture of raw [cane] sugar.** W. F. HORNBERGER (U.S.P. 1,956,741, 1.5.34. Appl., 7.3.30).—In a process of automatically controlled continuous liming of raw cane juice, milk-of-CaO is injected into the raw-juice pipe at a rate which adjusts itself to correspond with the rate of flow of the juice. The limed juice is thoroughly mixed in an enlarged portion of the juice pipe, and from a point beyond this mixing chamber a continuous sample passes to a  $p_H$  measuring and recording apparatus, and means are provided for periodic regulation of the liming rate in accordance with the recorded deviations from a predetermined  $p_H$  val. J. H. L.

**[Apple] syrup.** C. W. HAINES (U.S.P. 1,965,286, 3.7.34. Appl., 10.9.31).—A table syrup containing most of its sugar in the form of invert sugar is produced by concentrating a solution of granulated or other sugar in about an equal wt. of cider, at 100—104°, to a H<sub>2</sub>O content of about 28%. J. H. L.

**Treatment of maple syrup.** A. A. LUND and R. S. ANTHONY, ASSRS. to PRODUCTEURS DE SUCRE D'ÉRABLE DE QUEBEC (U.S.P. 1,957,465, 8.5.34. Appl., 2.9.32).—To obtain maple sugar of larger grain than usual, and residual syrup specially suitable for flavouring ice cream etc., raw maple syrup, preferably of the dark, highly flavoured type rich in invert sugar, is conc. to about 80° Brix under < 1 atm., and allowed to crystallise spontaneously during slow cooling, e.g., in 2—3 days. After centrifuging, the mother-syrup may be similarly conc. for a second, and even a third, crop of sugar. J. H. L.

**Production of a concentrate of true maple flavour.** L. SKAZIN (U.S.P. 1,961,714, 5.6.34. Appl., 31.3.33).—Maple sap or syrup, or a syrup of maple sugar, preferably of about 81° Brix, is treated hot with EtOH or other liquid which promotes the crystallisation of sucrose (I) while retaining the flavouring matters in solution. One or more crops of (I) are thus obtained and the mother-liquor is conc. to recover EtOH and

obtain a concentrate suitable for flavouring purposes. J. H. L.

**Production of starch and glutinous materials [from dough].** H. M. WILLIAMS, ASSR. to W. J. BELLINGHAM (U.S.P. 1,964,754, 3.7.34. Appl., 7.6.33. New Zealand, 8.12.32).—Bakers' "proved sponge" (dough which has been allowed to rise to its max. vol.) is well mixed with NaCl solution so as to separate part of the starch (I), which is allowed to subside, while leaving sufficient gas in the gluten (II) to enable this to float. The [NaCl] should be such as to check fermentation and prevent deterioration of the (II). The (II) is used to raise the (II) content of bread or other food-stuffs. If necessary, it may be washed with H<sub>2</sub>O to remove NaCl and remaining (I). J. H. L.

**Manufacture of starch products.** DUINTJER WILKENS MEIUIZEN & Co. N.V., ASSEES. of J. H. VAN DER MEULEN (B.P. 423,286, 3.5.34. Austr., 6.5.33).—Raw starch or starchy material is treated at room temp. with a neutral solution of hypobromite, with or without hypochlorite; the latter alone is ineffective. E.g., 1 kg. of starch mixed with 1500 c.c. of H<sub>2</sub>O is treated with 400 c.c. of N-NaOBr or with 100 c.c. each of N-NaOBr and 4N-NaOCl, for ½ hr. and then washed. The products react normally towards I and Fehling's solution, but with hot H<sub>2</sub>O they yield salve-like or more fluid pastes, or, in presence of a small quantity of peptising agents such as alkalis or Na<sub>2</sub>B<sub>4</sub>O<sub>7</sub> sols. (Cf. B.P. 420,275; B., 1935, 329.) J. H. L.

**Production of fatty acid esters of carbohydrates.** E. J. LORAND, ASSR. to HERCULES POWDER Co. (U.S.P. 1,959,590, 22.5.34. Appl., 22.3.32).—Starch, dextrans, or sugars are heated, e.g., at 90° for several hr., with anhydrides of higher aliphatic acids, or mixtures of higher and lower anhydrides or mixed anhydrides, in presence of catalysts [SO<sub>2</sub>Cl, Mg(ClO<sub>4</sub>)<sub>2</sub>]. Materials such as starch may first be caused to swell, by heating with CH<sub>2</sub>Cl-CO<sub>2</sub>H. The ester products are sol. in C<sub>6</sub>H<sub>6</sub>, COMe<sub>2</sub>, etc., but insol. in EtOH or H<sub>2</sub>O, and may be used for preparing waterproof films, filaments, etc. J. H. L.

**Fermenting carbohydrates.**—See XVIII.

#### XVIII.—FERMENTATION INDUSTRIES.

**Spore formation by yeasts.** J. FUCHS (Woch. Brau., 1935, 52, 165—166).—Artificial culture methods do not give a true idea of the characters of an organism, since they lead to degeneration. If loss of the ability by yeasts to form spores results from prolonged keeping under culture conditions, investigation of their ability to regain this property should include reintroduction to unfavourable growth conditions. Eight cultures of wild yeasts, originally prepared about 1900 and refreshed annually, were found to show little or no spore formation. Cultivations in wort and on gypsum blocks were carried out alternately. The third series of cultures on such blocks showed an improvement in spore formation, with some further improvements in series IV—VI. I. A. P.

**Lüers and von Miller's method for determination of barley extract.** R. OTTO (Woch. Brau., 1935, 52, 191; cf. B., 1935, 603).—Biolase (I) may be



used for bringing about dissolution of maize and wheat starches, the sol. starch produced being accompanied by a small amount of dextrin. (I) would probably, therefore, be suitable for barley starch, in place of the superclastase (II) recommended by Lüers and von Miller (*loc. cit.*), and it is suggested that the method proposed by these workers should be tested, using (I) instead of (II). I. A. P.

**Malting experiments with naked barleys for distilleries.** W. ALMENDINGER (*Z. Spiritusind.*, 1935, 58, 167—168).—As a result of parallel malting of two naked barleys and of normal and polished barleys, it is concluded that the former malt without difficulty. No notable temp. abnormalities were found on the floor with naked barleys, mould growth was not observed, and danger of breakage of the germ did not arise, since the plumule grew up normally under the seed-coat. The green malt from these had a higher diastatic power than that from husked barley, and a corresponding increase was found also in the mashes in which malt from naked barley was used for potato-starch saccharification. I. A. P.

**Extraction of diastase from green malt by addition of sodium chloride.** B. LAMPE and R. DEPLANQUE (*Z. Spiritusind.*, 1935, 58, 171—172, 174—175).—The diastatic activity of an extract of green malt is almost unaffected (dextrinising power) by addition of NaCl after filtration, but is considerably increased if extraction of the malt is carried out in presence of NaCl, or if NaCl is added before filtration. The optimal [NaCl] is approx. 0.3% for a 2% extract, and increases with increasing extract concn. Extracts over a range of concn. (2—10%) show the same diastatic activity when prepared with the appropriate [NaCl]. For 2% extracts using optimal [NaCl], the saccharifying power is increased approx. 55% over aq. extracts, whilst extraction in presence of Witte's peptone gives a further small increase (68% over H<sub>2</sub>O control). I. A. P.

**Assay of papain.** A. K. BALLS, T. L. SWENSON, and L. S. STUART (*J. Assoc. Off. Agric. Chem.*, 1935, 18, 140—146).—Casein is digested at its isoelectric point, and the amount of scission determined by alcoholic titration. The short time of digestion (20 min.) permits little further breakdown by peptidases etc. Specimens of papain so examined may show the same proteinase content but widely differing amounts of subsidiary enzymes. E. C. S.

**Resistance of beer towards *Saccharobacillus pastorianus*.** J. L. SHIMWELL (*J. Inst. Brew.*, 1935, 41, 245—258).—Acidity production (*A*) by *S. pastorianus* (*S*) is due to the presence in beer of residual fermentable carbohydrates, probably simple sugars, the greater part of the reducing substances not being attacked. *A* is independent of the N present, and of the % attenuation. In presence of *S*, added sugar tends to be fermented normally by yeasts present in beer; but in absence of yeast such addition favours *A*. Inoculation of beer with *S* is followed by a lag phase in development and *A*; the initial  $p_H$  of the beer, the preservative constituents of hops, and the [EtOH] appear to act largely in retarding the onset of *A*, and at the end of the lag phase *A* is regulated by the sugar concn. Increase of

original gravity prolongs the lag phase, but is ultimately followed by increased *A*. The morphological characters of *S* are variable, dependent on growth conditions. Pitching yeast has been cleansed repeatedly by 0.1% tartaric acid treatment, without any observed increase in wild yeasts. Aspects of the practical brewing significance of the results are discussed. I. A. P.

**Musts of the dry warm 1934 season in the Biterrois and Saint-Pons regions.** J. COULOUMA (*Ann. Falsif.*, 1935, 28, 224—229).—Analyses are given, and are characterised by high sugar and acid contents. The mean tartaric acid content is usually > the total K, and the total acidity is considerably > the bitartrate. J. G.

**Composition of Malaga wine.** V. HULAČ and J. KOZÁK (*Chem. Obzor*, 1934, 9, 88—90; *Chem. Zentr.*, 1935, i, 166).—Analytical data for original and commercial samples are given. A. G. P.

**Normal composition of [Peruvian] wines.** J. TORMO (*Bol. Soc. Quim. Peru*, 1935, 1, No. 3, 62—68).—Variations in the composition of Peruvian musts and wines are discussed with special reference to the effect of temp. on fermentation, and preservation of the grapes by SO<sub>2</sub> treatment; current official formulæ connecting [EtOH] and dry extract etc. are adversely criticised. The polemical discussion is criticised and extended by F. POZZI-ESCOR (*ibid.*, 69—72), and the official practice of recommending the watering of the must is strongly condemned. E. L.

**Native fermented beverages.** L. TIRON (*Bull. Agric. Congo Belge*, 1934, 25, 128—134).—Palm wine ("malafu") (I) has a high P content. Banana wine (II) has about the same calorie val. and EtOH content as (I), but its mineral content is less except in Fe and Al, which are derived from the H<sub>2</sub>O used in its prep. Unlike (I), (II) is not a wholesome drink and may even be dangerous. In general, the native fruits do not contain enough sugar to yield a wine rich enough in EtOH for storage. By maceration in H<sub>2</sub>O, addition of sugar and also H<sub>2</sub>SO<sub>4</sub> to prevent spontaneous fermentation, and with the use of selected yeasts, a liquid is obtained containing 10—12% of EtOH. Maize beer is rich in P and alkaline salts and also contains Fe and Al; the EtOH content is usually > 5%. NUTR. ABS. (b)

**Suggested scoring system for wines.** W. V. CRUESS (*Fruit Products J.*, 1935, 14, 269—270). E. B. H.

**Determination of tannin in wines.** D. COLLIER (*Ann. Falsif.*, 1935, 28, 208—224).—A modified method is proposed for determining the tannin (I) in terms of the reducing power (*R*), involving defecation by HgSO<sub>4</sub> (cf. B., 1926, 562; 1933, 167), elimination of the preliminary boil in the determination of *R* of the defecated wine, and, to eliminate errors of non-proportionality, the use of dil. solutions, the results being expressed in mg. of Cu/litre. The Laborde-Denigès method [*i.e.*, pptn. of (I) with Hg<sup>II</sup> salts in such a way that the ratio of their mass to that of the HgO = the quantity of Hg pptd. is near 1, and determination of the Hg by the cyano-argentometric method] is considered unsatisfactory. These methods are compared for wines untreated and containing added (I), and for solutions of (I);



sugars, and org. acids in  $H_2O$ . The differences are due to the fact that the masses of reduced  $Cu \equiv 1$  g. each of wine and "œnological" (I) are not the same. The ideal method should therefore determine both the œnological val. of the tannins and their amounts. J. G.

**Acetone-butyl alcohol fermentation.** VIII. **Effect of the colouring matter and tannin of kaoliang on fermentation.** B. ROKUSHO (J. Agric. Chem. Soc. Japan, 1934, 10, 1211—1223; cf. B., 1935, 120).—Extraction of bran of kaoliang with  $H_2O$  at  $50^\circ$  and subsequently with 0.2% aq. NaOH yielded a red colouring matter which retarded fermentation. Tannin from the bran had a similar effect, but apigenin had no deleterious action. Addition of casein and peptone diminished the effect of the pigment. Toxicity of tannin and pigment may result from combination of bacterial protein with the inhibitory materials, and the consequent loss of enzymic activity of the organisms.

## CH. ABS. (p)

**Determination of the yolk content of egg liqueurs.** J. GROSSFELD (Deuts. Destillateur-Ztg., 1934, 55, 552; Chem. Zentr., 1935, i, 643).—The total  $P_2O_5$  is a measure of the egg content. H. N. R.

**Bacteriological purification of distillery slops.** J. A. COSCULUELA (Rev. Cubana Azucar Alcohol, 1935, 1, 60—62; Internat. Sugar J., 1935, 37, 233).—At the Cardenas distillery, the slops are continuously diluted with 4 times their vol. of  $H_2O$  and received in a sedimentation tank (capacity 20 cu. m.) where the liquid is inoculated with a culture of ammonifying bacteria, the optimum temp. being  $37^\circ$ . When all the putrescible matter has been decomposed, the liquid is filtered through beds of foundry slag, charcoal, or gravel, allowing 1 sq. m. of filtering surface per cu. m. of liquid to be filtered. The residue is used as manure, and when dried contains total N 2.01,  $NH_3$  equiv. 2.44, total  $PO_4'''$  1.35, sol. K 3.03,  $H_2O$  8.75%. J. P. O.

**Regeneration of charcoal.**—See II.  **$SO_2$  in molasses.**—See XVII. "Elmocid" disinfection.—See XXIII.

## PATENTS.

**Compressed yeast product.** W. H. BUHRIG, A. SCHULTZ, and C. N. FREY, Assrs. to STANDARD BRANDS, INC. (U.S.P. 1,970,275, 14.8.34. Appl., 23.7.29).—To improve its baking quality (I), compressed yeast may have mixed with it 0.1—5% of relatively inert nitrogenous material, e.g., urea, whilst further admixture with, e.g., 0.1—5% of mucic acid or sufficient acid Ca phosphate to give  $p_H$  4.5—5.5 improves (I) and the keeping quality. A small amount of an oxidising salt may also be added with advantage, whilst all or part of the added N may be omitted and 0.1—2% of a proteolytic enzyme, e.g., papain, substituted. The improved qualities thus obtained in the yeast are retained for an extended period. I. A. P.

**[Cellulose- and hemicellulose-splitting] enzymes.** A. KARRETH (B.P. 429,050, 17.1.34. Ger., 26.1. and 23.12.33).—Mould fungi are allowed to develop beyond the stage of optimum amylase formation, and growth is continued until there is a rich production of spores, the nutrient medium containing mineral salts, proteins, and materials rich in cellulose (e.g., bran). An enzyme

mixture is obtained by extraction with  $H_2O$ , and may be worked up by the usual methods. Purification may be effected by adsorption with, e.g., kaolin followed by alkaline elution; bauxite in acid media adsorbs cellobiase, whilst xylanase and cellulase (I) may be separated by adsorption on animal C in acid solution and eluting the adsorbed (I) in an alkaline medium. Dialysis serves for the removal of inulase, mannanase, and other impurities. The desired product may be pptd. with EtOH, and substances of unpleasant taste removed by washing with dil. EtOH. The dried, tasteless product is suitable for technical or pharmaceutical use. I. A. P.

**Solvent manufacture from fermentation [of carbohydrate].** H. E. HALL (B.P. 428,523, 22.8.33).— $H_2O$ -insol. carbohydrates and starchy materials and/or molasses (especially "black-strap") with suitable added nitrogenous materials are used as sources of solvents, pretreatment of the molasses to remove substances normally toxic to BuOH organisms being unnecessary. Fermentation (F) is carried out aerobically with *B. butacone n. sp.* (I) at  $37^\circ$ , preferably in presence of *B. mesentericus*.  $CO_2$  and  $H_2$  are evolved during F, and the volatile solvents produced include chiefly BuOH and  $COMe_2$ , together with small amounts of EtOH and fatty acids. (I) is isolated from humus; its spores resist boiling temp. for  $< 30$  min. The method of isolation and the characters of (I) are described in detail. I. A. P.

**Preservation of beer.** C. E. FOX (B.P. 428,725, 23.3.34).—When beer is run off from casks etc. it is replaced by  $CO_2$  at approx. atm. pressure, thus avoiding flattening due to admission of air. I. A. P.

**Ageing of whiskey.** C. A. HOCHWALT and C. A. THOMAS (B.P. 428,518, 14.9.34. U.S., 19.12.33).—Undesirable tastes and odours are removed from green whiskey (bourbon, rye) by hydrogenation in presence of Pt-black, finely-divided Ni, or other catalyst, presence of air being avoided. The time required depends on the amount and activity of the catalyst used; 1 g. of freshly prepared Pt-black per 3 litres completes the action in approx. 30 min., and its activity is retained in 14 subsequent similar treatments, after which it may be recovered and reactivated. Ni acts more slowly. The pressure of  $H_2$  used may be atm. (Pt), or higher (Ni). To impart colour and bouquet, the deodorised whiskey (filtered free from catalyst) is treated under reflux for 1—15 hr. (usually  $3\frac{1}{2}$  hr.) with a composite charcoal (1.5 g./100 c.c.) prepared from charred white oak under prescribed conditions. The product has the characters of a whiskey which has aged naturally for many years. I. A. P.

**Effecting a corresponding improvement in the condition of alcoholic liquids to that normally obtained by ageing.** KATADYN-A.-G. (B.P. 428,853, 16.8.33. Ger., 16.8.32 and 4.2.33).—Alcoholic liquors (I) (spirits, liqueurs, wines, perfumes) are aged artificially by being brought in contact with an oligodynamically active metal (II), e.g., Ag, or sparingly sol. salts of (II). Treatment may be carried out in a specially constructed chamber, or the active material (III) may be contained in a filter. In either case the period of contact with (III) is regulated by adjustment of the velocity of flow.



Alternatively, (II) is passed into solution in (I) electrolytically, using an anode of (II), and sol. compounds of (II) may be added to (I). Preferably, any such treatment should be carried out before addition of substances giving aroma or character to the product. Metal passing into solution can later be removed if desired. Perfumes treated as described possess disinfectant properties. I. A. P.

**Baking agent.**—See XIX.

### XIX.—FOODS.

**Comparison of harvesting methods in respect to moisture content and grade of the grain.** R. K. LARMOUR and W. F. GEDDES (Canad. J. Res., 1935, 12, 614—626).—Results for wheat and barley varied considerably in 3 successive years. A. G. P.

**Respiration and heating of damp wheat.** R. K. LARMOUR, J. S. CLAYTON, and C. L. WRENSHALL (Canad. J. Res., 1935, 12, 627—645).—Growth of fungi in stored wheat is prevented by vapour of  $\text{CCl}_4$  or PhMe, and under these conditions wheat containing 25% of  $\text{H}_2\text{O}$  respire slowly and does not heat. No deterioration in quality followed exposure to  $\text{CCl}_4$  for 25 days. A. G. P.

**Reliability of the meal-gluten swelling test. Results of a blind test.** E. BERLINER (Mühlenlab., 1935, 5, 65—66).—A no. of unknown samples of wheat varieties were, with one exception, arranged in the correct order by means of this test. The baking test is now dispensable. E. A. F.

**Apparatus for measuring gas production and expansion in doughs.** R. IRVIN (Cereal Chem., 1935, 12, 146—149; cf. B., 1933, 168).—A simple, sensitive const.-pressure gasometer has been devised which utilises the principle of Mariotte's bottle. E. A. F.

**Ageing of wheat flour and the nature of the process.** N. P. KOSMIN (Cereal Chem., 1935, 12, 165—171).—A brief account of work noted in fuller detail elsewhere (cf. B., 1934, 1079). E. A. F.

**Salt-resistance of wheats.** L. I. SERGEEV (Compt. rend. Acad. Sci. U.R.S.S., 1935, 1, 563—570).—The stomata of varieties of hard wheat immersed in 0.3M-NaCl are open, whilst those of soft varieties and controls are closed. A variation in response to immersion in NaCl solutions occurs in any given variety. Germination in solutions of  $\text{Al}_2(\text{SO}_4)_3$  (1—10 pts. of Al per  $10^6$ ) reduces the dry wt. of the sprouts, but greater resistance is shown by the soft varieties. Addition of an equiv. amount of  $\text{H}_3\text{PO}_4$  lowers the toxicity of Al. In an acid medium ( $p_{\text{H}}$  3.6) the hard varieties give a reduced crop and the soft varieties an increased crop. P. G. M.

**Whole wheat meal fermentation time test.** E. G. BAYFIELD (J. Amer. Soc. Agron., 1935, 27, 241—250).—Cutler and Worzella's test (cf. B., 1933, 601) was unsatisfactory for soft winter wheats. Closer agreement was observed between  $\eta$  data, loaf vols., and protein contents than between fermentation time and other comparative vals. A. G. P.

**Rapid determination of moisture in grain.** W. H. COOK, J. W. HOPKINS, and W. F. GEDDES (Cereal Chem.,

1935, 12, 230—244).—A summary of work already abstracted (B., 1934, 1115; 1935, 121, 249).

E. A. F.

**Utilisation of energy-producing nutriment and protein in white and yellow corn and in diets deficient in vitamin-A, -D, and -B<sub>2</sub>.** W. W. BRAMAN, A. BLACK, O. J. KAHLENBERG, LE R. VORIS, R. W. SWIFT, and E. B. FORBES (J. Agric. Res., 1935, 50, 1—37).—Yellow corn is superior to white corn (I) as regards palatability and gain in body-wt., indicating a higher vitamin-A content, whilst (I) is superior in digestibility of food energy. Rats fed on a -D-deficient diet exceed those fed on a complete diet in their utilisation of food-N and in the % body-wt. increase which is protein (II), whilst the latter group exceed the former in the gain of fat and energy, and the elimination of C in the urine (III). An aq. extract of liver concentrate is a suitable source of vitamin-B<sub>2</sub>, deficiency of which depresses growth, fat and (II) synthesis, and energy storage, and increases the C : N ratio of (III). P. G. M.

**Colloid chemistry of rice starch and rice boiling.** III. I. SAKURADA, T. KITANO, and K. HUTINO (Bull. Inst. Phys. Chem. Res. Japan, 1935, 14, 361—373).—The change  $\beta$ -starch  $\rightarrow$   $\alpha$ -starch has been studied, under varying conditions of temp., dilution, and time, with the aid of X-ray and enzyme observations. R. S.

**Calculation of flour ash.** REIDEMEISTER (Mühlenlab., 1935, 5, 65—70).—Tables are given for converting flour moisture contents to a dry matter basis. E. A. F.

**Sources of error in flour ashing.** G. WEIGELT (Mühlenlab., 1935, 5, 71—72).—Some sources of error in flour ash determinations are indicated, and hints are given as to how to eliminate them. E. A. F.

**Accurate control of [flour] ashing.** R. SCHMIDT (Mühlenlab., 1935, 5, 73—74).—The importance is stressed of conforming to the specifications of the ashing procedure prescribed by the Institut für Müllerei, Berlin. E. A. F.

**Modified method for removal of added ingredients from phosphated and self-raising flours in order to determine the ash content of the original flour.** G. A. SHUEY (Cereal Chem., 1935, 12, 289—294).—Modifications have been introduced into Gustafson's method (B., 1932, 282) with the object of ensuring that: (1) the flour sample (*F*) (particularly when "lumpy") is intimately mixed with the  $\text{CCl}_4$ ; (2) the surface layer of the *F* does not become dry during centrifuging. The modified method is also more economical in regard to time and material. E. A. F.

**Cake and cake-making ingredients.** L. H. BAILEY and J. A. LECLERC (Cereal Chem., 1935, 12, 175—212).—A very full account is given of cake-making (*M*) and cake ingredients (*I*) and their effect on the quality of the product, with particular reference to the history and importance of *M*, types of cake (*C*) and their consumption in the United States, the chemical composition of *C* and *I*, and the effect on cake quality of the formula, procedure, and consumption of *I* (e.g., flour type and granulation, shortening, eggs, sugar, milk, leavening agents, flavouring materials, salt, starch, etc.). E. A. F.



**Rapid determination of ash from the electrical conductivity of aqueous flour extracts.** J. ŽÁKOVÁ and J. ŽÁK (Chem. Obzor, 1934, 9, 85—88; Chem. Zentr., 1935, i, 169).—The  $\kappa$  of the extracts is  $\propto$  the ash content, but dependent on the fineness of grinding ( $F$ ). For a given flour  $F$  may be estimated from  $\kappa$ .

J. S. A.

**Milk pasteurisation.** E. CASERIO (Ann. Ig. sper., 1934, 44, 1013).—The flavour of milk treated by the Stassano method (I) is better than that of milk treated by the A.P.V. (low-temp.) method (II). Cream (III) setting is more rapid with (II), but the quantity of (III) is the same in (I) as in (II). (I) does not differ from (II) as regards effect on cheese-making quality or (complete) destruction of *B. coli aërogenes*. Keeping quality is better with (I) because sterilisation is more complete.

NUTR. ABS. (m)

**Fortification of milk with vitamin-D.** J. H. SCHRADER (Arch. Phys. Therap. X-Ray, Radium, 1934, 15, 709—719).—The val. of irradiated milk for feeding infants is examined.

CH. ABS. (p)

**Composition control of butter.** L. C. THOMSEN (Nat. Butter & Cheese J., 1934, 25, No. 23, 24—26).—Customary methods of sampling and examination are discussed and improvements in technique suggested.

CH. ABS. (p)

**Calcium and phosphorus in cheese.** G. GUITTON-NEAU and R. CHEVALIER (Ann. Falsif., 1935, 28, 198—208; cf. B., 1935, 77).—For a given cheese the Ca and P contents of the dry fat-free extract and the Ca : P ratio of the paste depend only on the method of treating the curds, and a cheese can therefore be classified according to these vals. Thus, if the ratio is approx. 1.5, the cheese has been pressed; if 0.5, it has been obtained by natural drainage. P was determined on the ash by pptn. as  $(\text{NH}_4)_3\text{PO}_4 \cdot 10\text{MoO}_3$ , dissolution in aq.  $\text{NH}_3$ , and repptn. as the Ba salt, and Ca by pptn. as  $\text{CaC}_2\text{O}_4$  at  $p_{\text{H}}$  5 and titration of the calcined ppt. Results are given for 3 samples each of Port-Salut, Cantal, and Comté (firm), and for "à la pie" cheese, Camembert, and Brie (soft).

J. G.

**Nutritive properties of soya bean-egg powder, a substitute for cow's milk in infant dietary.** E. REID (Chinese J. Physiol., 1935, 9, 27—42).—Soya-bean powder, prepared from soya-bean flour (125 g.), sucrose (40 g.), lactose (30 g.), dextrin (20 g.), liquid egg-yolk (50 g.), pea-nut oil (20 g.), Ca lactate (6 g.), and NaCl (2 g.), fed to young rats appears to be adequate for blood and bone formation and to produce no enlargement of thyroid or liver. In general, the growth-promoting power is  $>$  with whole-milk powder, with or without Fe citrate.

W. O. K.

**Preparation of liquids for smoking meat.** A. A. DEREVJAGIN (Lesokhim. Prom., 1933, 2, No. 3, 22—26).—Prep. and use of "tar- $\text{H}_2\text{O}$ ," preferably from oak or beech, is described.

CH. ABS. (p)

**Effect of air movement on growth of moulds on chilled meat.** G. KAESS (Z. ges. Kälte-Ind., 1934, 41, 153—156; Chem. Zentr., 1935, i, 324).—The effect of air-stream velocity on growth of *Penicillium flavoglaucum* and *Mucor racemosus* at 3—6° is described.

H. J. E.

**Effect of fat content of herrings and similar fish on their preserving qualities.** O. BÄHR (Deuts. Fischerei-Runds., 1934, 519—520; Chem. Zentr., 1935, i, 324).—Brisling with low fat content ( $<$  12%) have doubtful keeping qualities.

H. J. E.

**Do fish conserves contain formalin?** G. LUNDE and E. MATHIESEN (Tidsskr. Hermetikind., 19, 205—206; Chem. Zentr., 1935, i, 168).—Fresh and preserved fish products contain (naturally) traces of  $\text{CH}_2\text{O}$  which are too small to exert a preservative or an injurious effect. Many official methods for detecting  $\text{CH}_2\text{O}$  give positive reactions in presence of  $\text{NMe}_3$ .

A. G. P.

**Determination of digestibility of proteins in fish meal etc.** O. WAGNER (Angew. Chem., 1935, 48, 339—340).—Modified technique in the pepsin-HCl procedure is recommended.

E. S. H.

**Effect of sulphurous acid on apple-pulp pectin.** N. V. SABOUROFF and M. I. KALEBIN (Fruit Products J., 1935, 14, 275—277, 280, 283).—High  $[\text{SO}_2]$  causes decrease in jellying power of the pectin during storage.

E. B. H.

**Splitting of cherries in brine.** W. V. CRUICK (Fruit Products J., 1935, 14, 271—272).—Cracking of the skin of Royal Anne cherries stored in  $\text{SO}_2$  solution may be prevented by  $p_{\text{H}}$  adjustment.

E. B. H.

**Passion fruit products.** H. D. POORE (Fruit Products J., 1935, 14, 264—268, 285).—A machine for separating the juice from the pulp and seeds and methods for cleaning the seeds and extracting oil from them are described, together with analyses of juice, shells, seeds, and seed oil. Methods of preservation of the juice and pulp and of manufacture of carbonated beverages, syrups, and jellies are discussed.

E. B. H.

**Chemical preservation of lemonade and of the surface of marmalade.** KOCHS (Obst- u. Gemüse-Verwertg.-Ind., 1934, 21, 597—598; Chem. Zentr., 1935, i, 643).—"Microbin" and glycerol formate ("Antimucor") are recommended, respectively.

H. N. R.

**Changes in physical properties of chocolate due to incorporation of phosphatides.** Y. LEFFÈVRE-LEBEAU (Bull. Off. int. Fabr. Chocolat Cacao, 1934, 4, 333—353; Chem. Zentr., 1935, i, 168).—The effect of small proportions of lecithin on the  $\eta$  of cacao butter-sugar mixtures at various temp. is examined.

A. G. P.

**Effect of adding whey on the chemical and bacteriological composition of silage.** L. A. ALLEN and S. J. WATSON (Le Lait, 1934, 14, 889—895).—Silage (I) made with the addition of whey, as dried powder, watered, in solution, or fresh, with or without inoculation (II) with lactic ferments and (I) made with the addition of molasses and (II), and sampled at regular intervals during two months, shows in each case a predominance of lactic organisms. The advantage of (II) is doubtful. The composition, digestibility, and nutritive val. of all the samples are satisfactory, and compare favourably with the vals. for fresh herbage. Dried, powdered whey is least satisfactory owing to the difficulty of obtaining uniform distribution and complete admixture. The % of volatile acids is much higher in this (I). The %



recovery of dry matter and starch equiv. is high in all cases. NUTR. ABS. (m)

**Ensilage trials with sugar-beet leaves treated with hydrochloric acid.** G. FROLICH and H. LÖWE (Futterkonserv., 1933, 4, 107—115; Bied. Zentr., 1934, A, 5, 185—186).—Addition of HCl (Defu process) to unchopped leaves improved the silage and lowered the fermentation losses. A. G. P.

**Fermentation losses in the hydrochloric acid-sugar process compared with the sugar and ordinary processes of ensilage.** G. FINGERLING and E. EBERT (Futterkonserv., 1933, 4, 93—99; Bied. Zentr., 1934, A, 5, 184—185).—Losses of N-free extractives during the prep. of red clover silage in airtight Fe cylinders were lowest when HCl and sugar were added, slightly greater with HCl alone, considerably greater with sugar alone, and highest when no supplementary chemicals were used. A. G. P.

**Importance of acidification in the preparation of silage.** G. RUSCHMANN (Futterkonserv., 1933, 4, 49—78; Bied. Zentr., 1934, A, 5, 186).—Addition of acid to grass, maize, and sugar-beet leaves checked the secondary fermentation by *B. coli aërogenes* organisms during ensilage, thereby lowering the production of AcOH (I). Formation of (I) cannot be entirely prevented, although inoculation of the material with *B. Delbrücki* and *B. cucumeris fermentati* reduces the amount to 0.2%. The latter is produced by lactic acid bacteria. A. G. P.

**Detoxication of the horsetail.** E. GÜNTHER (Fort-schr. Landw., 1933, 8, 177—179; Bied. Zentr., 1934, A, 5, 182).—Meadows and pastures are drained and the green fodder with the addition of  $H_3PO_4$  is made into silage. A. G. P.

**Nutrient losses due to drainage [in silage].** G. FINGERLING, A. STRIGEL, and E. EBERT (Futterkonserv., 1933, 4, 101—106; Bied. Zentr., 1934, A, 5, 185).—Drainage losses from unsealed silos amounted to 19.9% of the dry matter from red clover and 16.8% from beans. Addition of 5 pts. of aq. HCl to 100 pts. of the green matter does not increase these losses. A. G. P.

**Development of Wiskiauten and Wosegau farms by ameliorative treatment of meadows and pastures and the use of modern methods of fodder conservation.** R. BARTEL and E. ANSORGE (Futterkonserv., 1933, 4, 117—139; Bied. Zentr., 1934, A, 5, 185).—Economic returns following the use of ensilage and the drainage of arable land are recorded. A. G. P.

**Value of the decomposed protein in silage in the nitrogen metabolism of cattle.** W. KIRSCH and H. JANTZON (Futterkonserv., 1933, 4, 79—92; Bied. Zentr., 1934, A, 5, 186).—The amides of silage are fully utilised by milking cows and goats. A. G. P.

**Bonemeal as a mineral supplement for cattle.** R. GIULIANO (Riv. Zootechn., 1933, 10, 2, 70—82; Bied. Zentr., 1934, A, 5, 191).—Use of 3:1 mixtures of salt and bonemeal is recommended. Appropriate methods of administration are described. A. G. P.

**Digestibility studies with ruminants. I. Plane of nutrition and digestibility of hay.** C. J. WATSON, G. W. MUIR, and W. M. DAVIDSON (Sci. Agric., 1935, 15, 476—487).—The digestibility coeff. (I) of a clover and grass hay ration was unaffected by the level of feeding to steers in the range 4.5—9.0 kg. per animal daily. At lower levels (I) decreased slightly. Small variations in (I) among individual animals are examined. A. G. P.

**Variation in milk yield and fat content of milk of cows at pasture and on changing from stall feeding to pasture.** I. JOHANSSON (Svenska Betes-och Vallföreningen, Ann. Rep., 1934, 67—85).—At pasture day-to-day variation in milk yield and fat content, especially during the earlier part of the period, are > during stall-feeding. The rise in fat which follows the change to pasture feeding is attributed largely to fall in yield. Removal of concentrates from the ration prior to the change to pasture causes a fall in yield of about 2 kg. per head per day during the last week. On pasture, milk yield and fat increase. Hence the effect of pasture feeding on milk fat is not due solely to reduction of yield. The differences in fat content of morning, midday, and evening milk are less on pasture than during stall-feeding. NUTR. ABS. (m)

**Composition, digestibility, and nutrient value of various kales.** J. SCHMIDT and M. F. VON SCHLEINITZ (Zuchtungskunde, 1933, 8, 81—87; Bied. Zentr., 1934, A, 5, 188).—Data for a no. of varieties is given. During late autumn growth there is a notable decrease in all nutrient constituents of the plants, except the N-free extractives which increase considerably. In rations adjusted to the same nutrient composition substitution of kale for roots had no effect on the yield or fat content of milk. A. G. P.

**Fish meal in animal feeding.** J. R. MANNING (U.S. Bur. Fisheries Document, 1930, No. 1090, 371—407).—A commentary with bibliography. CH. ABS. (p)

**Bibliography on cod-liver oil in animal feeding.** J. R. MANNING (U.S. Bur. Fisheries Document, 1929, No. 1065, 333—365).—Abstracts of and comments on literature dealing with chemical and nutrient properties are given. CH. ABS. (p)

**Addition of protein and calcium to a ration of small grains for growing pigs.** R. D. SINCLAIR and L. W. McELROY (Sci. Agric., 1935, 15, 445—457).—With a basal ration of wheat, oats, and barley, pigs of 50—200 lb. live-wt. developed "cripples." Supplementary feeding of ground limestone improved growth and bone development and increased the efficiency of utilisation of the ration. Low-Ca diets caused a reduction in blood-Ca without affecting the inorg. P. Abnormal bone formation due to Ca deficiency is associated with larger proportions of blood-phosphatase. Rations containing 0.35% of P and 15% of digestible crude protein sufficed to meet normal requirements. A Ca intake of 2.3 g. per 100 lb. live wt. daily prevented cripples, but was insufficient to ensure max. utilisation of foods. A. G. P.

**Feeding trials with fowls.** L. WEINMILLER (Bied. Zentr., 1934, A, 5, 161—180).—A review of recent work, with extensive bibliography. A. G. P.



**Pb glazes.**—See VIII. **Al-Zn alloys [for preserve industry].**—See X. **Errors in  $p_H$  measurements.**—See XI. **Rancidity in lard.**—See XII. **Egg liqueurs.**—See XVIII.

## PATENTS.

**Treatment of cereal germ.** A. E. CRESSALL (B.P. 428,620, 16.11.33).—The fat content of milled germ is maintained at the original figure by processing for 20 min. in a steam-jacketed cylinder fitted with a worm conveyor, the heated germ being treated with live steam during the last 5 min. After drying and cooling, the germ is mixed with flour for baking. E. B. H.

**Baking agent and improvement of dough.** B. HANACK and E. MERTENS (U.S.P. 1,970,306, 14.8.34. Appl., 6.8.31. Ger., 20.7.29).—The yield, vol., and general characteristics of bread are improved by adding to the fermented dough pasteurised milk which has been thickened by acid-generating bacteria and to which has been added a mixture containing yeast, vitamin-flour, dry albumin, dry yoghurt, malt flour, etc. A proportion of malt extract, glucose, or honey is also added. E. B. H.

**Testing of materials having plastic or fermentative properties.** M. J. E. CHOPIN (B.P. 428,174, 24.7.34. Fr., 11.12.33).—Fermented flour dough or the like, after being formed into a spherical ball by a special tool (described), is placed on a flat plate and allowed to flatten by its own wt. only, at const. temp. in a humid atm. The change of horizontal ( $H$ ) and vertical dimensions ( $V$ ) are recorded on a chart and the properties deduced from  $H^2V$  and  $H^2V^2$ . B. M. V.

**Liquid-filtering means, particularly for filtering milk.** G. H. GASCOIGNE and J. R. KNOX (B.P. 428,554, 22.12.33).—On the conical or dished bottom of a vessel adapted to receive milk straight from the cow is placed a filter element through which the milk flows upwards and then outwards horizontally to a draw-off spigot. B. M. V.

**Devices for irradiation of milk with ultra-violet rays.** HANOVIA CHEM. & MANUFG. CO., ASSEES. OF H. A. TREBLER (B.P. 428,434, 23.1.35. U.S., 15.3.34).—For the spreading of milk in a uniform layer over inclined flat or curved surfaces, a form of feed gutter adapted to trap air bubbles and foreign matter is described. B. M. V.

**Emulsification of butter and milk for production of artificial cream.** A. R. BANNISTER, F. B. DAY, and BRIT. EMULSIFIERS, LTD. (B.P. 428,858, 19.10.33).—A domestic device of the piston and spring-loaded, restricted valve type is described. B. M. V.

**Testing of fluids [e.g., milk from the cow].** J. GOLDING, and BRIT. DRUG HOUSES, LTD. (B.P. 428,073, 6.11.33).—The cow is milked into any one of a no. of filter thimbles ( $T$ ) inserted into the lid of a vessel for receiving milk.  $T$  are composed of muslin, and besides rendering solid matter visible are impregnated with various indicators to measure  $p_H$ , bromocresol-purple being claimed as suitable for the detection of mastitis. B. M. V.

**Preservation of [liquid] eggs.** H. HECKERMANN (B.P. 429,008, 21.7.34).—Liquid egg product is salted

with approx. 0.2% of NaCl, chilled rapidly to  $-15^\circ$ , and stored in the frozen state. B. M. V.

**Drying of vegetable matter.** AKTIEB. SVENSKA FLÄKTFABRIKEN, and H. EDHOLM (B.P. 429,101, 21.11.33).—Very cohesive material, e.g., grass, is formed into strings and drawn down countercurrent to air between  $\Lambda$ -shaped beams which are provided for the admission and exhaust of air and for forming the columns or strings of the grass. The operation is continuous with intermittent charging. Air of higher temp. is sent through the wetter grass. B. M. V.

**Apple syrup. Glutinous materials from dough.**—See XVII. **Destroying objectionable materials.**—See XXIII.

## XX.—MEDICINAL SUBSTANCES; ESSENTIAL OILS.

**Former times in chemistry and related subjects.** F. KAISER (Chem.-Ztg., 1935, 59, 488—489).—Classical and mediæval practices in pharmacy, medicine, and cosmetics are reviewed and related to modern superstitions. J. S. A.

**Killing of spores by mercuric chloride and silver nitrate.** A. BAUER (Arch. Hyg. Bakt., 1934, 113, 65—70; Chem. Zentr., 1935, i, 425).—Spores (anthrax) are killed more rapidly by  $AgNO_3$  than by  $HgCl_2$ . Colloidal  $AgCl$  solutions (0.1%) do not kill spores, but inhibit germination. Addition of  $EtOH$  increases the toxicity of  $AgNO_3$  and lowers that of  $HgCl_2$ . With both substances, toxicity increases with temp. A. G. P.

**Preparation and assay of preparations of cinchona bark.** K. MATOLCSY (Magyar gyóg. Társaság Értes., 1934, 10, 488—524; Chem. Zentr., 1935, i, 595).—Descriptive. R. N. C.

**Preparation of a cinchona fluid extract by fractional percolation.** Z. REKTORIK (Bull. Sci. pharmacol., 1934, 41, 449—460; Chem. Zentr., 1935, i, 271).—100 g. of the powdered bark are moistened with 20 g. of glycerol, 25 g. of  $CaO$ , and 150 c.c. of  $H_2O$ , set aside 1 hr., and covered with 90%  $EtOH$  in a cylindrical percolator. 600 c.c. percolate through the material in 24 hr. and extract 90% of the alkaloids. The tannins, which are fixed as their  $Ca$  salts, are then recovered by percolation with dil. aq.  $H_3PO_4$ . H. J. E.

**Preparation of tinctures.** A. JERMSTAD and O. ÖSTBY (Pharm. Acta Helv., 1934, 9, 129—140; Chem. Zentr., 1935, i, 270).—Various methods are described and their relative merits discussed. H. J. E.

**Determination of tannalbin.** D. S. BELENITZKA (Farm. Zhur., 1934, 178—180).—The  $N$  content of dried samples of tannalbin is approx. 12.5%. The determination is based on that of  $N$  (Kjeldahl). CH. ABS. (e)

**Action of *l*-hyoscyamine on the human eye.** I. Y. BENSHTAIN (Khim. Farm. Prom., 1934, No. 4, 45).—*l*-Hyoscyamine (0.25%) can replace atropine sulphate (1%) in eye treatment. CH. ABS. (p)

**Semi-acetals in perfumery.** A. SVENSSON (Seifensieder-Ztg., 1934, 61, 881—882; Chem. Zentr., 1935, i, 488).—To avoid disadvantageous semi-acetal formation



in perfumes containing an alcohol (I) and an aldehyde (II), (II) is dissolved in the other components before (I) is added. H. N. R.

**Pine oil from a Finnish pine.** G. KOMPPA (Acta Forest. Fenn., 1934, 40, 3—9; Suomen Kem., 1935, 8, B, 20).—The oil of *Pseudotsuga Douglasii cesia*, Schwerin, contains  $\alpha$ -pinene, camphene, borneol, bornyl acetate, and limonene (?), but not geraniol as does *P. D. viridis*, whilst *P. Murrayana*, Engem., is distinguishable by its cadinene content. J. L. D.

**Ethereal oils from *Perovskia scrophularifolia*, Bge.** B. N. RUTOVSKI and V. P. GLUSCHKOVA (Riechstoffind., 1934, 9, 131—133; Chem. Zentr., 1935, i, 321).—The above oil had  $d_{20}^{20}$  0.8940—0.8975,  $\alpha_D$  4.52 to  $-8.07^\circ$ ,  $n_D$  1.4758—1.4796, sap. val. 0—1.26, esterification val. 17.75—34.3 (after acetylation 47.5—57.9). The oil contains  $\alpha$ -pinene and camphene 23—25, cineole 20—25, *l*-borneol and bornyl acetate 10—12%, and minor constituents. The oil from *P. abrotanoides*, Kar., had  $d_{20}^{20}$  0.9144—0.9161,  $\alpha_D$  +9.40—11.40°,  $n_D$  1.4765, sap. val. 0.55—0.69, esterification val. 10.7—7.35 (after acetylation 44.5—44.9). H. J. E.

**Removal of terpenes from essential oils.** G. LOUVEAU (Rev. Marq. Parfum. Savonn., 1934, 12, 204—205, 231—233, 260—261, 293—294; Chem. Zentr., 1935, i, 320).—A review of available methods. H. J. E.

**As<sub>2</sub>S<sub>3</sub>**—See VII. **Tobacco mosaic**.—See XVI. **Applications of infra-red photography**.—See XXI.

#### PATENTS.

**Production of medical and cosmetic preparations and disinfectants.** E. GELINSKY (B.P. 427,723, 14.8.33. Ger., 22.8.32).—Solutions of medicaments, cosmetics, or disinfectants in org. solvents are solidified by addition of bases and higher fatty acids, with or without aldehydes or ketones. The prep. is introduced into tubes preferably provided with filters so that on application of pressure the solution of the active agent is expelled in its original condition. E. H. S.

**Producing a serum for vaccination against trypanosomiasis.** C. SCHILLING (B.P. 429,449, 5.12.33. Ger., 6.12.32).—A new-born foal or calf is subjected to the sting of tsetse flies infected with trypanosomes (I) and is then so treated with a sp. for destroying (I) that an unstable infection occurs and the blood of the apparently healthy animal forms a serum for new-born animals. E. H. S.

(A) **3-Carboxy-4-alkoxydiphenyl and salts thereof.** (B) **4'-Nitro-3-carboxy-4-alkoxydiphenyl.** (C) **3-Carboxy-[2]-alkoxydiphenyl.** (D) **Amino-derivative[s] of carboxyalkoxydiphenyls.** W. G. CHRISTIANSEN and A. W. HARVEY, Assrs. to E. R. SQUIBB & SONS (U.S.P. 1,969,354—7, 7.8.34. Appl., [A] 6.8.32, [B—D] 23.12.32).—(A) An alkali (Na) salt of 1:4:3-C<sub>6</sub>H<sub>3</sub>Ph(OH)·CO<sub>2</sub>H is heated with an alkylating agent in H<sub>2</sub>O (under pressure), and the resulting ester of the desired alkoxy-compound is hydrolysed (NaOH in aq. EtOH). Examples are the prep. of 4-ethoxy- (I), m.p. 141.1—141.8° (corr.) (Et<sub>2</sub>SO<sub>4</sub> at 145°), and 4-*n*-butoxydiphenyl-3-carboxylic acid (II), m.p. 83.5—84.5° (corr.) (BuBr at 130°). (B) The above products are nitrated (HNO<sub>3</sub> in AcOH at 70—90°). The 4'-NO<sub>2</sub>-derivatives

of (I) and (II) have m.p. 143—144° and 102—103° (corr.), respectively. (C) The same procedure as in (A) (above) is applied to 1:2:3-C<sub>6</sub>H<sub>3</sub>Ph(OH)·CO<sub>2</sub>H. Examples are 2-ethoxy-, m.p. 97—98° (corr.), and 2-*n*-butoxydiphenyl-3-carboxylic acid. (D) The corresponding NO<sub>2</sub>-compounds are reduced by known means. Examples are the 4'-NH<sub>2</sub>-derivatives of (I) and (II), m.p. 177.5—178.5° and 163—163.8° (corr.), respectively. H. A. P.

**Manufacture of *l*-ascorbic acid (vitamin-C).** T. REICHSTEIN (B.P. 428,814—5, [A, B] 15.10.34. Switz., [A] 25.10.33, [B] 9.12.33. [B] Addn. to [A]).—(A) *l*-Ketogulonic acid (I) (cf. B.P. 427,286; B., 1935, 606) or one of its esters is treated with alkaline enolising agents; e.g., the Me ester of (I) is treated with NaOMe (1 equiv.) in MeOH in an atm. of N<sub>2</sub>, and the product acidified with HCl, diluted with H<sub>2</sub>O, and evaporated in a vac. The ascorbic acid (II) is extracted from the residue with EtOH, and the extract evaporated to a syrup which, after crystallisation, is ground with COMe<sub>2</sub> and the (II) filtered off. A similar process is applied to (I), using excess of NaOEt and isolating (II) as its Pb salt. (B) (I) or such derivatives as are easily hydrolysed by acids are heated in acid solution. E.g., (I) is heated in H<sub>2</sub>O at 100° for 2 hr., or its (COMe<sub>2</sub>)<sub>2</sub> derivative (*loc. cit.*) is heated with 0.2N-HCl at 100° for 3 hr.; the conversion into (II) in both cases is approx. 10%. H. A. P.

**Manufacture of [oil-soluble] organic bismuth compounds.** [Bactericides.] I. G. FARBENIND. A.-G. (B.P. 428,147, 8.11.33. Ger., 8.11.32).—The prep. by metathesis (in presence of a polyhydric alcohol, e.g., glycerol, mannitol) of Bi salts of hydrogenated endomethylenebenzoic acids is claimed. Examples are the Bi salts of camphenilanic (I), isocamphenilanic,  $\Delta^3$ -tetrahydro-2:5-endomethylene-6-methylbenzoic [from cyclopentadiene and CHMe·CH·CO<sub>2</sub>H (Diels)], and camphanecarboxylic acids, and the BiO salt of (I). H. A. P.

**Air for healing purposes**.—See XI. **Cellulose-splitting enzymes**. **Alcoholic liquids**.—See XVIII.

#### XXI.—PHOTOGRAPHIC MATERIALS AND PROCESSES.

**Properties of modern [photographic] emulsions in relation to their uses.** L. J. G. VAN EWIK (Chem. Weekblad, 1935, 32, 332—333).—The methods of stating the speed, colour-sensitivity, and fineness of grain of commercial plates and films are critically reviewed. D. R. D.

**Significance of the reduction potential of the developer in developing the latent image.** W. REINDERS (Chem. Weekblad, 1935, 32, 322; cf. B., 1934, 813). D. R. D.

**Various factors which influence the behaviour of the photographic developer.** M. C. F. BEUKERS (Chem. Weekblad, 1935, 32, 328—329).—A review. D. R. D.

**Possibility of improving the permanence of photographic prints.** E. WEYDE (Brit. J. Phot., 1935, 82, 376).—The longer is the time of fixing and the more acid the fixing bath, the less easily is "hypo" washed out of prints. If prints are bathed in 1% Na<sub>2</sub>CO<sub>3</sub> solution (for > 1 min., to avoid curling, or deterioration of the base) between fixing and washing, the "hypo" is



easily and rapidly eliminable, *e.g.*, in 10 min. in running  $H_2O$ . J. L.

**Sensitometry based on the addition law.** A. VAN KREVELD (Brit. J. Phot., 1935, 82, 388—389).—The addition law states that the photographic action of mixed radiations = the sum of the actions of the components. Similarly sensitivities may be additive. The applications to sensitometry, filters, darkroom lights, etc. are discussed. J. L.

**New applications of infra-red photography.** J. EGGERT (Naturwiss., 1935, 23, 281—286).—Its uses in the photographic industry, medicine, plant pathology, and microscopy are described. A. J. M.

## PATENTS.

**Manufacture of ferro-prussiate paper and production of prints therefrom.** L. R. HARPER and D. W. POWELL (B.P. 427,746, 25.10.33 and 23.11.34).—Instead of washing blue prints after exposure, they are developed by the application, from rollers, of a thin layer of a developer containing  $(CH_2)_6N_4$  (I) and a metallic salt (II), *e.g.*, salts of Ca, Sr, Ba, Mg, Al, Zr, U, or Ce. In presence of (I), (II) reacts with the sol. ferricyanide in the paper to give an insol. compound which has little or no interaction with unchanged  $Fe^{III}$  salt. An oxidising agent which does not decompose (I), *e.g.*, an alkali,  $(NH_4)_2Cr_2O_7$ , is preferably added to improve the blue colour. Papers containing alkali oxalate may be developed with a Ca salt; fading in such papers is rapidly restored in the dark. Mottling of the blue colour when using Ca is reducible by adding a neutral salt, and also by incorporating an alkali benzoate in the paper. The concn. of (II) should be high, and, to prevent an undue amount of ppt. being formed (the ppt. is redissolved by acid) part of (I) may be incorporated in the paper. Most of the possible developers give yellow lines on the blue background. J. L.

**Production of kinematographic films in natural colours.** Soc. LUMIÈRE (B.P. 430,395, 16.10.34. Fr., 18.10.33).—Finished multicolour pictures are produced on irregular-screen film of a size twice the dimensions of ordinary film, and are copied by reduction projection on to normal-size similar film. Graininess is thus avoided on final projection. J. L.

**Treatment of photosensitive emulsions.** J. D. KENDALL (B.P. 428,222 and 428,360, [A, B] 3.10.33).—The use as photosensitisers of polymethine dyes obtained by condensing (A) a compound having the system  $C=N-CO-CH_2$  as part of a 5-membered ring (or a tautomeride thereof) with a basic org. N compound, and (B) a 5-pyrazolone unsubstituted in the 4-position with  $p-NMe_2-C_6H_4-CHO$  (I), a quaternary salt of an  $\alpha$ - or  $\gamma$ -acetanilidovinyl or -thioether derivative of a heterocyclic N compound. Typical examples are: (A) (I) and homologues or dialkylaminocinnamaldehydes + rhodanic acid (II), and *S*-Me derivatives, or + 2:4-dihydroxy-1:3-thiazole; 1- $\omega$ -acetanilidovinylbenzoxazole ethiodide (III) + (II) or thiohydantoin (IV); and 1-methylthiobenzthiazole metho-*p*-toluenesulphonate or *NN'*-dimethylglutaconaldehydedianilide chloride + (IV); (B) 1-phenyl-3-methyl-5-pyrazolone + (I) or (II). H. A. P.

**Setting media for photographic emulsions.** DEUTS. MAIZENA G.M.B.H. (B.P. 421,608, 26.6.33.

Ger., 28.1.33).—A medium having good casting properties is prepared from a mixture of gelatin and a disintegration product of starch (I) (cf. B.P. 421,593; B., 1935, 649), together with a hardening agent (II), *e.g.*, chrome alum. For the manufacture of the emulsion (I) is boiled in  $H_2O$  and then mixed with (II); the gelatin solution is added to the cooled mixture. J. L.

**Obtaining different gradations in developing silver halide emulsion layers.** R. SCHMIDT, Assr. to AGFA ANSCO CORP. (U.S.P. 1,956,230, 24.4.34. Appl., 9.9.31. Ger., 31.12.28).—The exposed film is soaked for 1—3 min. in 0.5—1% aq.  $Na_2CO_3$  prior to development. A. R. P.

**Polychromatic reproduction and colouring masses, printing plates, and printing machines therefor.** S. TCHETCHONIN (B.P. 430,681, 28.2.34).—A single polychromatic printing plate is prepared by applying (by hand, pencil, brush, or otherwise) various colouring masses containing gum-lac, dextrin, or a natural or artificial tar, as a base for suitable pigments, together, preferably, with soap and glycerin. When printing, a suitable solvent is applied to the surface of the plate, or to the surface printed. Various complex plastic masses are detailed. J. L.

**[Diazotype] photographic processes and materials therefor.** S. G. S. DICKER. From N. V. PHILIPS' GLOIELAMPENFABR. (B.P. 427,732, 16.10.33).—The light-sensitive layer contains  $\ll$  1 benzenediazonium compound (I) convertible by exposure to light in presence of  $H_2O$  into a phenol (II) which is oxidised by (I) to a coloured compound at a rate  $>$  the coupling of (I) with (II), but, during exposure,  $<$  the decomp. of (I) into (II). Suitable amines for the prep. of (I) are heteronuclearly-substituted  $Ph_2$  derivatives, *e.g.*, 5:5':4:4':2:2'- or 4:4':3:3':6:6'- $[C_6H_2(NH_2)(OH)-SO_3H]_2$ , or 3:1:2:5:5'- or 4:1:2:6-NH $_2$ - $C_6H_2Me(OH)-SO_3H$ . Cu salts  $[Cu(NO_3)_2]$  may be added. H. A. P.

**Production of photographic diazotype prints.** W. P. LEUCH, and S. C. & P. HARDING, LTD. (B.P. 427,962, 27.10. and 29.11.33).—The light-sensitive layer (I) contains a diazo compound capable of coupling under neutral or acid conditions, the coupling component (II) being subsequently applied (*e.g.*, by dusting after drying) in such a way that coupling does not occur before development. Development is effected by (dry) steam, aq. gelatin, or by the "semi-dry" method (*e.g.*, 10% aq. NaOAc + 0.2% of tartaric acid), or, alternatively, a hydrated salt, *e.g.*,  $Na_2SO_4 \cdot 10H_2O$ , is incorporated in (I) which is developed by heating. Salts of weak acids, *e.g.*, NaOAc, NaOBz, may also be added with (II) to promote coupling. H. A. P.

**Production of colour[ed] photographic images by development.** M. W. SEYMOUR, Assr. to EASTMAN KODAK Co. (U.S.P. 1,969,479, 7.8.34. Appl., 11.5.31).—An arylhydrazone of an acylacetic ester, or the derived pyrazolone, is used in conjunction with  $p-C_6H_4(NH_2)_2$  or its derivatives as a developer. *E.g.*, an exposed Ag film is developed in the product of mixing 1-phenyl-3-methyl-5-pyrazolone (0.5 pt.) in  $COMe_2$  (10 vols.) with  $p-NH_2-C_6H_4-NMe_2$  (0.5 pt.) in 10% aq.  $Na_2CO_3$  (75 pts.) +  $H_2O$  (175 pts.); after removal of the Ag a rose-red image is obtained.



**Colour photography.** KODAK, LTD.; Assees. of L. D. MANNES and L. GODOWSKY, JUN. (B.P. [A] 427,472, [B—F] 427,516—427,520, 21.9.33. U.S., 21.9.32).—(A) Negative film for 3-colour photography is composed of two superimposed layers consisting of a lower (green-sensitive) emulsion and upper [red- (but not green-sensitive) emulsion, both being, of course, sensitive to blue. The film is exposed in a split-beam, 2-colour camera so that one frame (I) is exposed to yellow (red + green) light, and the other (II) to blue light (the image being thus produced in both layers). After development, preferably with  $C_6H_3(NH_2)_2 \cdot OH$ ,  $Na_2SO_3$ , and  $NaHSO_3$ , and fixing, the "green" record is processed to a red (minus-green) dye image, and the "red" record to a blue-green (minus-red) image. The positive film used has two layers [the lower green-sensitive (a), the upper red-sensitive (b)] on one side of the base, and an infra-red-sensitive emulsion (c) on the other. (I) is printed on to (a) and (b) with yellow light, and (II), in register, on to (c) with infra-red light. (a), (b), and (c) are processed to form blue-green, red, and yellow images, respectively, and the finished product is a 3-colour subtractive picture. The conversion of Ag into dye images may be carried out as described in B.P. 376,838 (B., 1932, 961), or according to the varied method given in (B) by which all the images may be converted into one colour, and then the top image or top two images only is/are bleached and then developed separately, by controlled diffusion, to form different colours. The layers to be developed separately are preferably separated by a thin layer of clear gelatin to aid bleaching control. (c) In the positive film used in (A), the red- and green-sensitive layers are of AgBr emulsion, and the infra-red sensitive layer is of pure AgCl emulsion, which is fixable with aq.  $NH_3$ , which does not affect AgBr. (d) The development or bleaching, by controlled diffusion, of emulsion layer(s) without affecting the layers beneath is facilitated by addition of a  $H_2O$ -sol. loading agent (e.g.,  $Na_2SO_4$ , MeOH) which reduces the rate of penetration of the solution, and/or a layer of clear unsensitised gelatin between the layers to be separated. An  $NH_3$ ,  $NH_2OH$ ,  $N_2H_4$ , or cold (0—5°) acid stop-bath may also be used. (E) For the positive film, (a) is sensitised to the region 510—590  $m\mu$  with, e.g., erythrosin, and (b) for the region 600—700  $m\mu$  with, e.g., naphthocyanol; (c), sensitised with neocyanine, is coated with a water-proof stripping varnish (e.g., benzylcellulose). The colour development to give the red and yellow printed colours is carried out with diethyl-*p*-phenylenediamine hydrochloride (III), coupled with bromothioindoxyl and  $CH_2BzAc$ , respectively. Acetoacetic esters may also be used as yellow couplers. (F) The negative film used in (A) has the red- and green-sensitive layers similar to those of the positive film. After development and fixing both layers are processed to red dye images; the top layer only is then bleached and redeveloped to blue-green (minus-red) with (III) coupled with 2:3:4-trichloro- $\alpha$ -naphthol. The bleacher may be a solution of  $CrO_3$  and HBr with a high concn. of MeOH. In the various patents (A—F) full details of the various processes, formulae, and procedure are given. J. L.

**Photographic colour process.** L. D. MANNES and L. GODOWSKY, JUN. (U.S.P. 1,969,469, 7.8.34. Appl.,

30.7.32).—Film having two layers, sensitive to red and green (lower layer) light, respectively, both being sensitive to blue light, is exposed in a split-beam camera, one picture ( $P_1$ ) through a yellow and the other ( $P_2$ ) through a blue filter.  $P_1$ , with "red" and "green" images, is colour-developed to give blue-green and magenta images, respectively; the two "blue" images in  $P_2$  develop to the same colours. Positive film similar in type to the negative film is used, the first images being printed by yellow light and developed to similar coloured positive images; the film is then resensitised, or recoated with sensitive emulsion, or sensitised for the imbibition process, and the third image ("blue" record) printed on, and developed to a yellow image. (Cf. B.P. 427,472; preceding abstract.) J. L.

**Copying images on colour-record lenticular films.** OPTICOLOR A.-G. (B.P. 430,503, 21.12.33. Ger., 29.12.32).

**Ethanolamine salt of cellulose esters.**—See V.

## XXII.—EXPLOSIVES; MATCHES.

**Effect of moisture and content of calcium carbonate on stability of guncotton at 110°.** DEMOUGIN (Mém. Poudres, 1934—5, 26, 119—122).—The resistance,  $r$ , of guncotton (I) at 110° is only slightly affected by increments of  $CaCO_3$  when there is < 0.25% of  $H_2O$ , but the  $r$  of (I) decarbonated by treating with HCl is low. By progressively raising the content of  $H_2O$ , increasing increments (or decrements) of  $r$  are observed. With < 0.07% of  $CaCO_3$ ,  $r$  decreases as  $H_2O$  increases, but the reverse occurs with > 0.3% of  $CaCO_3$ . High % of  $H_2O$  accelerates the decomp. of (I) at 110°, but the nitrous fumes are more rapidly absorbed by  $CaCO_3$ , so that  $r$  is const. with 0.1% of  $CaCO_3$  and 0.3—1.8% of  $H_2O$ . J. G. A. G.

**Detonation velocity of dynamites.** K. TRAUZL (Z. ges. Schiess- u. Sprengstoffw., 1935, 30, 173—175).—The detonation velocities of freshly made 65% gelatine dynamite, confined in an Fe pipe of 30 mm. internal diam., were 6060 m./sec., with No. 1 detonator and 5880, 6330 with a No. 10. Tests were repeated at intervals up to 1 year, the final results being 6810 and 6890, and the mean 6420 and 6550 m./sec., with a No. 1 and No. 10 detonator, respectively. Freshly made blasting gelatine and 65% and 20% gelatine dynamites in a pipe of 25 mm. internal diam. gave 1530, 8570, 5710 with a No. 1, and 7810, 5530, 6250 m./sec. with a No. 8. The corresponding results after 12 weeks were 1660, 5420, 5910, and 7540, 6500, 5720 m./sec., the mean results (omitting 8570 and another figure) being 1800, 6100, 5810, and 7600, 6070, 6020 m./sec. The tests show that there is no diminution in detonation velocity owing to long storage and that the use of an intermediate initiator, such as nitropentaerythritol, is unnecessary. W. J. W.

**Moisture content of Hanyang smokeless powder.** Y. Y. C. YEN (J. Chinese Chem. Soc., 1935, 3, 52—55).—The  $H_2O$  absorbed by Hanyang powder  $\propto$  the R.H. and is 2.43% at 100% R.H. at 25°. Different methods of determination lead to varying results for the total moisture content of the powder. J. W. S.

**Penthrite.**—See III. Cellulose nitrate. Collodion. —See V.



## PATENTS.

**Priming mixture.** W. BRÜN, Assr. to REMINGTON ARMS Co., Inc. (U.S.P. 1,971,031, 21.8.34. Appl., 19.10.31).—The combustible and binder consists of a derivative of trinitrobenzoic acid, *e.g.*, Pb dinitrobenzoate nitrate. W. J. W.

**Manufacture of propellant powders.** G. A. MCBRIDE, Assr. to WESTERN CARTRIDGE Co. (U.S.P. 1,955,927, 24.4.34. Appl., 14.11.30).—Powder grains consisting of nitrocellulose with about 15% of nitroglycerin are suspended in an aq. emulsion of a deterrent, *e.g.*, diamyl phthalate or  $C_6H_4(NO_2)_2$ , and dried to produce a film of deterrent on the grains. A. R. P.

**Manufacture of shot-shell.** E. J. JOHNSON, Assr. to CANADIAN INDUSTRIES, LTD. (U.S.P. 1,972,996, 11.9.34. Appl., 18.7.31).—Paper tubes are impregnated with wax, agitated, *e.g.*, by air, while being heated to > the m.p. of the wax, so as to produce a uniform surface, and coated with a lacquer containing pyroxylin, a drying oil, and a resin. W. J. W.

**Flash compositions for use in electric igniters for blasting fuses and the like.** C. E. SOSSON, and IMPERIAL CHEM. INDUSTRIES, LTD. (B.P. 428,872, 21.11.33).—A mixture of 35–95% of finely-divided Zr and Pb 2-mononitroresorcinate or other Pb salt of a nitrophenol in a solution of nitrocellulose is employed. W. J. W.

## XXIII.—SANITATION; WATER PURIFICATION.

**The "Elmocid" process [of disinfection].** F. STOCKHAUSEN (Woch. Brau., 1935, 52, 177–182, 185–191).—The addition of small definite amounts of NaCl to very dil. NaOH solution, which itself may have little antiseptic action, produces a safe disinfectant. The bactericidal action of the "Elmocid" process is far superior to that of pure NaOH solution, and is fully adequate for the needs of brewery practice (*cf.* B., 1931, 225). I. A. P.

**Fountain waters of the canton of Geneva.** P. BALAVOINE (Arch. Sci. Phys. Nat., 1935, [v], 17, 197–212).—Analyses are given for the  $H_2O$  from over 100 public fountains. J. W. S.

**Purifying the Elbe.** H. JORDT (Chem.-Ztg., 1935, 59, 475–476).—To avoid contamination of the Elbe with acid resin from oil refineries, it is proposed to separate the  $H_2SO_4$  from the bituminous pitch, and to use the latter for fuel, for road-making, or for distillation to valuable distillates and coke. A. G.

**Filtering materials for rapid sand filters. IV. Washing rapid sand filters.** J. R. BAYLIS (Water Works Sewerage, 1935, 82, 20–25).—Factors affecting the formation of mud balls in filters are examined. CH. ABS. (p)

**Industrial utilisation of the sodium carbonate present in certain saline waters on the coast of Peru.** F. FUCHS (Bol. Soc. Quim. Peru, 1935, 1, No. 3, 29–46).—Detailed analyses of saline waters and deposits from the Chilca region show that it should be profitable commercially to recover  $Na_2CO_3$  and Na salts from these by simple economical methods of fractional crystallisation etc. The origin of the salt deposits in the Peruvian coastal region is discussed. E. L.

**Comparison of the Winkler and Alsterberg methods of determination of oxygen in river, sea, and distilled waters.** H. PILWAT (Angew. Chem., 1935, 48, 338–339).—The Winkler method is preferred, except for polluted  $H_2O$ , when the Alsterberg method gives the better results. E. S. H.

**Expression of the analytical values of water.** L. SURAN (Papier-Fabr., 1935, 33, 181–182).—The merits of different methods of reporting  $H_2O$  analyses, *e.g.*, mg. per litre, milliequival., and degrees of hardness, are discussed. D. A. C.

**Pbglazes.**—See VIII. Zn alloys [and  $H_2O$  storage].—See X. Distillery slop.—See XVIII. Killing spores.—See XX.

## PATENTS.

**Deodorant [for air in confined spaces].** J. S. BROGDON, Assr. to R. T. JONES, JUN. (U.S.P. 1,957,385, 1.5.34. Appl., 22.4.29. Renewed 14.3.34).—A mixture of granular  $Na_3PO_4$  with pebbles, broken glass, or the like is claimed. A. R. P.

**Manufacture of disinfectants.** I. G. FARBENIND. A.-G. (B.P. 428,295, 10.11.33. Ger., 11.11.32. Addn. to B.P. 389,514; B., 1933, 574).—The prep. by known methods of chlorophenols having a  $C_4$ – $C_7$  *C*-alkenyl or -cycloalkenyl substituent is claimed. *E.g.*,  $\Delta^{\beta}$ - $C_5H_9Br$  is added to *m*- $C_6H_4Cl.OH$  and NaOH,  $Ba(OH)_2$ , or  $Ca(OH)_2$  in  $C_6H_6$  at the b.p. to give 3-chloro-2- $\Delta^{\beta}$ -pentenylphenol, b.p. 122–124°/4 mm.; this is isomerised to the  $\Delta^{\beta}$ -compound by conc. KOH in MeOH at 130°. 4-Fluoro-2- $\Delta^{\beta}$ -pentenyl-, b.p. 124–126°/11.5 mm., and 4-bromo-2-crotyl-phenol, b.p. 135–137°/5 mm., are similarly prepared. H. A. P.

**Disinfecting and sterilising liquids and the like.** O. ORNSTEIN, Assr. to A.-G. CHEMISCHER WERTE (U.S.P. 1,956,728, 1.5.34. Appl., 12.1.33. Ger., 26.7.29).—The solution is 0.1–0.06N with respect to NaCl and to NaOH, having  $p_H$  13, or, alternatively, 0.1–0.06N with respect to  $HNO_3$  and  $KNO_3$ , having  $p_H$  1.7. A. R. P.

**Apparatus for purification of water.** SOC. D'ÉTUDE POUR L'ÉPURATION DES EAUX "PROC. G. & B." (B.P. 428,744 and 424,906, [A] 27.7.34, [B] 31.8.34. Fr., [A] 28.7.33, [B] 2.9.33).—(A) The raw  $H_2O$  is atomised over a filter mass containing  $MnO_2$  or other oxidising "catalyst" also containing interspersed perforated tubes through which air is introduced, the perforations in the upper arc being guarded by inverted gutters. (B) In a filter comprising a no. of superposed beds, the top one is in the form of a conveyor and is continuously removed to a dryer and roaster and returned. The other beds are changed at less frequent intervals; *e.g.*, they may be placed in perforated trucks on wheels. B. M. V.

**Destruction of objectionable materials in gaseous emanations from certain industrial processes.** B. WYLAM and D. RONALD (B.P. 428,606, 13.10.33).—Waste gases containing mercaptans and org. bases evolved during the treatment or disposal of animal carcasses or offal are deodorised by treatment with active C,  $SiO_2$  gel, etc. at > 25° (120–180°). The  $H_2O$  content of the gases is adjusted to give optimum reacting conditions. C. J.

**Filters [for sewage].**—See I. Disinfectants.—See XX.