

# BRITISH CHEMICAL ABSTRACTS

## B.—APPLIED CHEMISTRY

JUNE 23 and 30, 1933.\*

### I.—GENERAL; PLANT; MACHINERY.

**Theory of absorption towers. I. Theoretical solution of the general case.** W. HENNEL (Chim. et Ind., 1933, 29, 786—788).—A method is described for calculating from small-scale experiments the height of tower required to absorb a gas in a liquid. A. G.

**Determination of the alkalinity of boiler water.** J. LEICK (Angew. Chem., 1933, 46, 232—234).—The calculation of the caustic alkali content and the carbonate and bicarbonate contents of boiler waters, both in absence and presence of phosphates, aluminates, and silicates, from the phenolphthalein and Me-orange vals., is discussed (cf. A., 1933, 229). A. B. M.

**Hardwood distillation problems.**—See II. **Steel linings for vessels.**—See X. **Sugar-factory evaporators.**—See XVII. **Turbidimeter.**—See XXIII.

### PATENTS.

**Centre-wall furnace.** R. A. WAGSTAFF, Assr. to AMER. SMELTING & REFINING Co. (U.S.P. 1,869,591, 2.8.23. Appl., 30.11.28).—A reverberatory furnace is provided with a wall on the longitudinal centre line of the furnace against which the charge is piled by means of feed hoppers distributed over a large portion of the length of the furnace; the firing means at the sides are also distributed over a fair length and the flames play on the piled material. B. M. V.

**Furnaces for heating fluids.** L. DE FLOREZ (B.P. 390,984, 13.7.32. U.S., 13.7.31. Addn. to B.P. 328,064; B., 1930, 589).—The furnace for the radiant heating of oil etc., described in the prior patent, is provided with an economiser for preheating the oil and an air heater above the combustion space in that order; at the bottom of the furnace the burners are tangential, but are situated in a well so that the flames emerge vertically without undue spreading. B. M. V.

**Tunnel ovens.** J. WEDGWOOD & SONS, LTD., and N. WILSON (B.P. 391,057, 15.6.32).—Sliding doors for the ends of tunnel ovens are described; one of each pair is situated one truck length within the kiln, and slides into a lateral extension of the kiln when open. (Cf. B.P. 390,358, B., 1933, 447.) B. M. V.

**Performance of chemical reactions.** H. DREYFUS (B.P. 390,847, 2.10.31).—Exothermic reactions are carried out in the annular space between two tubes, the space being 0.1—0.5 in. thick and the tubes about 6 in. diam. The inside is cooled, and the outside may be cooled by a separate liquid or by the ingoing fluids in layers as specified above. The apparatus is applicable

to the oxidation of EtOH to MeCHO in the presence of Ag or Cu. B. M. V.

**Filter presses and dialysing apparatus of the filter-press type.** A. J. S. HOOTON, and S. H. JOHNSON & Co., LTD. (B.P. 391,068, 28.11.32).—A no. of rubber strips are secured in slots in the web of a filter frame to give zig-zag flow to the prefilter. B. M. V.

**Filter for liquids and gases.** M. TISCHER (U.S.P. 1,869,589, 2.8.32. Appl., 3.3.30. Ger., 2.3.29).—A pile of surface filter elements (not an edge filter) is pressed together by a spring; when the filter clogs, the elements separate slightly and allow liquid to pass between their rims, the cracks being self-adjusting to a fineness suitable for filtration. B. M. V.

**Concentration of liquids.** G. W. RILEY, and G. SCOTT & SON, LONDON, LTD. (B.P. 390,898, 6.1.32).—Cooling of a conc. liquid, e.g., milk, is rapidly effected by further evaporation under a higher vac. than in the evaporator proper in vessels that are provided with stirrers but have no cooling coils. The high vac. is preferably obtained by a no. of ejectors and condensers in series, the first one being cooled by brine or other very cold liquid (A). The rate of cooling of the milk (etc.) may be adjusted by controlling the rate of agitation and/or the rate of supply of A to the condensers, i.e., the degree of vac. B. M. V.

**Dehydration of liquid material.** J. C. MAC-LACHLAN, Assr. to A. P. HUNT (U.S.P. 1,689,703, 2.8.32. Appl., 25.10.28).—The liquid is sprayed in the lower part of a funnel-shaped chamber in which upward swirling currents of gas are maintained; the deposition of the bulk of the powder takes place in an annular space outside the funnel, and the remainder in cyclone or other separators. B. M. V.

**Dispersion of liquid materials.** (JKHR.) E. F. VAN SUCHTELEN (B.P. 391,038, 10.10.32. Holl., 12.10.31).—An atomising device for spray-driers and the like comprises an injector, in which a strong jet of the liquid draws in a gas and partly disperses itself, attached to a rotating head in which the spray leaves through tangential jets and produces the rotation. B. M. V.

**Filtering of gases and fogs.** W. ZAADNOORDIJK (B.P. 390,828, 8.10.31).—The filter comprises cellulose, wood pulp, sawdust, paper, cotton waste, asbestos, etc., reduced to pass 0.5—0.05-mm. screens. After reduction the material may be partly carbonised and, if desired, activated. B. M. V.

**H<sub>2</sub>O-decomp. cells. Gas purification.**—See XI.

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

## II.—FUEL; GAS; TAR; MINERAL OILS.

**Lignin theory of origin of coal.** F. FISCHER (Brennstoff-Chem., 1933, 14, 147—149).—Polemical. The author briefly restates his grounds for rejecting Berl's theory of the formation of coal from cellulose (B., 1933, 336).  
A. B. M.

**Clarification of brown-coal sludge.** W. PETERSEN (Braunkohle, 1932, 31, 851—854; Chem. Zentr., 1933, i, 346).—The positively charged particles are pptd. by electrolytes having highly charged anions. The stability of brown-coal suspensions is attributed to the peptising effect of colloidal humic acids.  $\text{Fe}(\text{OH})_3$  from the hydrolysis of, or pptd. by  $\text{NaOH}$  from,  $\text{FeCl}_3$  has, like certain oil emulsions, a marked flocculating effect.  
A. A. E.

**DK apparatus for rapid determination of water [in coal].** P. ERIMESCU (Braunkohle, 1932, 31, 868—870; Chem. Zentr., 1933, i, 351—352).—The temp. of the measuring vessel, the size of the coal, the external and internal temp., the R.H., and the age of the tubes affect the results.  
A. A. E.

**M.p. of ashes from several Czechoslovakian brown coals by the Dolch-Pöschmüller method.** J. LUDMILA (Mitt. Kohlenforschungsinstit. Prag, 1931, 82—88).—In this method (Feuerungstech., 1930, 18, 149) the ash is placed on the flattened junction of a Pt/Pt—Rh thermocouple which is heated from below by an adjustable electric arc. Suitable shields are fitted and the ash is observed from above through a microscope. With substances of known m.p. the agreement is within  $10^\circ$  at  $1000^\circ$ . The m.p. of ashes from 24 brown coals are recorded.  
E. S.

**Changes in coalification of lignitic brown coal produced by heating under pressure with water.** M. DOLCH and R. SCHINDLER (Braunkohle, 1932, 31, 801—806; Chem. Zentr., 1933, i, 346).—At  $300^\circ$  the proportion of combustible substance is greatly increased, the calorific val. increasing by 15—18%. The treated coal affords more tar and less gas than does the crude coal.  
A. A. E.

**Low-temperature carbonisation of Lisichanski coal.** G. V. GRITZEVICH (Izvest. Teplotekh. Inst., 1932, 1042—1056).—At  $500^\circ$  the coal afforded 66.35% of coke and 7.4% of tar. The yield of gasoline from the tar and gas was 1.2% (refined, 0.59%), and of kerosene 2.53%, of the coal. The composition of the gas is recorded.  
CH. ABS.

**Chemical engineering problems in hardwood distillation.** R. S. MCBRIDE (Chem. & Met. Eng., 1932, 39, 604—608).—An illustrated description of the process is given.  
D. K. M.

**Active ash-free carbon from sugar.** W. KNOP (Z. Ver. deut. Zucker-Ind., 1933, 83, 125—180).—C from pure sugar, and demineralised C from other sources, were activated by heating in a regulated current of air or  $\text{CO}_2$  at  $900^\circ$  and at  $500^\circ$ . The products obtained at  $900^\circ$  adsorbed mineral acids but not alkalis, whilst those produced at  $500^\circ$  adsorbed alkalis. The less active products from sugar C adsorbed higher fatty acids < lower ones, contrary to Traube's rule. This is attributed to a very close texture of the C particles, the pores of

which are less accessible to large than to small mols. Conformity with Traube's rule was obtained in aq. solutions containing EtOH, which, competing with the fatty acids for adsorption, revealed their true relative affinities for the C. The amount of EtOH or HCl adsorbed from aq. solutions by active C is diminished in presence of an org. acid to an extent proportional to the no. of C atoms in the mol. of the latter. It is concluded that the whole C chain of an adsorbed mol. of an org. acid lies on the surface of the adsorbent C. This applies to BzOH as well as to fatty acids.  
J. H. L.

**Heating value and composition of charcoals.** N. I. NIKITIN and D. V. PALUKHIN (J. Appl. Chem., Russia, 1932, 5, 991—997).—The formula  $Q = 80.51C + 273.4H$ , where  $Q$  is the calorific val., and  $C$  and  $H$  are % C and H, respectively, is trustworthy to  $\pm 0.6\%$ .  
CH. ABS.

**Gasifying the Bokovo-Khrustalni anthracite AK in Thiessen gas producers.** N. V. SHISHAKOV (Izvest. Teplotekh. Inst., 1932, 1056—1060).—Compositions and yields are recorded.  
CH. ABS.

**Control of gas composition.** R. D. KEILLOR (Gas World, 1933, 98, 439—440).—The % CO in gas is a measure of the efficiency of carbonisation, and is approx. inversely proportional to the  $\text{CO}_2$  content. Installation of a continuous  $\text{CO}_2$  recorder is suggested as a method of control of gas composition. The general sources of  $\text{CO}_2$  production are discussed. Although the retort-house governor may register level gauge there is always a vac. at the base of vertical retorts, which leads to further  $\text{CO}_2$  production. During coke discharge, producer gas is formed by air leaking in; this could be prevented by fitting auxiliary sealing arrangements.  
R. N. B.

**Chemistry of road tar and road-tar emulsions.** H. WAGNER (Angew. Chem., 1933, 46, 263—269).—A review.

**Direct recovery of standard road tars and other tar constituents from vertical-retort, coke-oven, and other producing plants.** F. COOKE (Gas World, 1933, 98, Coking Sect., 50—56).—Hot gas passes from the ascension pipes to a slightly inclined collector main joined to the air-cooled foul main. Tar is continuously circulated through the mains, road tar being removed at a point at which the temp. of the gas is above the dew point of the lighter constituents. No dehydration or distillation is needed for the product to conform to the British Standard Specifications. Traces of  $\text{NH}_4$  salts may be removed by washing with wet steam. The road tar has a higher  $d$  and free C content than distilled tar. Purchased crude tar can be treated at negligible cost. Results obtained from coke ovens, continuous vertical retorts, and mechanically-operated producers are described.  
R. N. B.

**Determination of the softening points of tar-pitches and asphalts.** B. G. ŠIMEK (Mitt. Kohlenforschungsinstit. Prag, 1932, 132—136).—Metal instead of glass tubes are recommended in the Kraemer-Sarnow and Barta methods for determining softening points. It is claimed that the results obtained with the metal apparatus agree better than those obtained with the

normal Kraemer-Sarnow test or with the ring-and-ball test. A. H. E.

**Determination of sulphur in asphalts.** K. FÜRST (Petroleum, 1933, 29, No. 17, 1—3).—The Eschka-Rothe method yields low results due to loss of volatile S; for asphalts of low S content, however, the method is often satisfactory. Higher and, in general, sufficiently accurate vals. are given by the Feigl-Schorr method (B., 1923, 1106A). Combustion methods, *e.g.*, that due to Lant-Eckl (B., 1922, 89A), however, are to be preferred.

A. B. M.

**Lowering the auto-ignition temperature of bituminous coal-tar oils.** R. HARTNER-SEBERICH and O. HORN (Brennstoff-Chem., 1933, 14, 141—147).—Ignition temp. (I.T.) were determined under atm. pressure in an electrically-heated steel crucible through which was passed a current of air preheated by passing through channels in the walls of the crucible, and under higher pressures (5—30 atm.) in a specially designed, electrically-heated bomb into which a small measured vol. of the oil could be sprayed. Typical results at atm. pressure were: tar oil (A) 750°,  $C_6H_6$  740—750°, benzine 630°, Diesel oil 550°, PhCHO 305°, PhNO<sub>2</sub> 570°, amyl nitrite < 200°, A + 10% of PhCHO 635°, A + 10% of paraffin oil 670°, A + 10% of amyl nitrite 515°, A + 10% of Fe(CO)<sub>5</sub> 350°. Under increased pressure the I.T. vals. were lower; *e.g.*, under 20 atm., the I.T. of A was 415°, of A + 10% of amyl nitrite 304°, and of A + 5% of Fe(CO)<sub>5</sub> 226°.

A. B. M.

**Cracking of Trinidad oils.** E. F. NELSON and G. EGLOFF (Petroleum, 1933, 29, No. 17, 5—7).—The occurrence, character, and behaviour on cracking of Trinidad oils are briefly described (cf. B., 1924, 776).

A. B. M.

**Cracking of Fergana solar distillates.** L. PIGUSOV (Acta Univ. Asiæ Mediæ, Chem., 1932, 6, No. 5, 1—8).—The solar oil on being cracked at 450°/40 atm. for 1 hr. yielded 30% of gasoline boiling to 200°, of which 31% boiled below 100°. It contained aromatic hydrocarbons 10%, unsaturated hydrocarbons 22.4%, naphthenes 12.7%, and paraffins 54.9%. The aromatic hydrocarbon content was > that of Grosni cracked gasoline and could be further increased by repeated cracking.

A. B. M.

**Preparation of amyl and hexyl formate from cracking oils.** E. SUCHARDA and T. MAZOŃSKI (Przemysł Chem., 1933, 17, 41—46).—The olefines present in the low-b.p. products of cracking of petroleum can be almost quantitatively converted into *sec.*- and *tert.*-amyl and hexyl formates by a process of continuous distillation, whereby the distillate reacts in a side-tube with HCO<sub>2</sub>H in the presence of H<sub>2</sub>SO<sub>4</sub>, and the esters so formed are immediately returned to the distilling flask. Under these conditions, decomp. of esters by H<sub>2</sub>SO<sub>4</sub> and polymerisation of amylenes and hexylenes are reduced to a min.

R. T.

**Improvement of petroleum by catalysis.** E. DEISENHAMMER (Petroleum, 1933, 29, No. 17, 3—4).—By distilling Zistersdorf petroleum with  $\frac{1}{2}$ % of activated C the vol. of distillate boiling to 300° was increased from 11.4% to 45%, the corresponding increase in the yield of benzine (end b.p. 200°) being from 1.4% to

8.1%. Loss due to gas formation was very small. Since the activated C could be used repeatedly it should be possible to apply the process technically to this oil.

A. B. M.

**Separation of mixtures of low-boiling hydrocarbons into their components by means of silica gel.** H. HOFMEIER and H. MEINER (Angew. Chem., 1933, 46, 229—232; cf. A., 1928, 230).—When benzene (olefines 0.2%, aromatic hydrocarbons 9.8%, naphthenes 33.9%, paraffins 56.1%) was allowed to percolate through a column of SiO<sub>2</sub> gel the olefines and part of the aromatic hydrocarbons were adsorbed. The efficiency of adsorption varied markedly with different samples of SiO<sub>2</sub> gel. With the most efficient sample the olefines and about half the aromatic hydrocarbons were adsorbed, the composition of the filtrate remaining const. until a wt. of benzene equal to about 1½ times the wt. of the gel had been treated; thereafter the composition of the filtrate changed rapidly back to that of the original benzene. To recover the adsorbed oil it was necessary to heat the gel to a dull red heat, which caused some decomp. of the oil. The composition of a mixture of naphthenes and paraffins was not affected by treatment with the gel.

A. B. M.

**Formolite reaction [of mineral oils].** V. CERCHEZ and I. IONESCU-MUSCEL (Chim. et Ind., 1933, 29, 781—785).—The formolite val. (A) was determined by adding 10—12 c.c. of conc. H<sub>2</sub>SO<sub>4</sub> drop by drop (30—35 min.), with continual shaking, to a mixture of 10 c.c. of the light hydrocarbon oil under investigation with 5 c.c. of 40% aq. CH<sub>2</sub>O. The product was diluted with H<sub>2</sub>O, the ppt. transferred to a filter, washed with H<sub>2</sub>O and aq. NH<sub>3</sub>, dried at 105—110°, and weighed. A did not depend only on the aromatic hydrocarbon content of the light oil, but varied considerably with the composition of the aromatic hydrocarbons; the vals. for the pure hydrocarbons were in the order  $C_6H_4Me_2 > PhMe > C_6H_6$ . Moreover A for a mixture of aromatic hydrocarbons with hydrocarbons which are themselves inert towards the reaction was > that calc. from the composition of the mixture and the vals. for the pure aromatic hydrocarbons. Determinations of A cannot therefore be used to determine accurately the aromatic hydrocarbon content of light oils.

A. B. M.

**Critical points of solutions of commercial hydrocarbon mixtures in liquid ammonia.** H. TROPSCH and B. G. ŠIMEK (Mitt. Kohlenforschungsinst. Prag, 1931, 62—73).—The crit. solution temp. (C. S. T.) with NH<sub>2</sub>Ph cannot be used as a means of analysing mixtures of hydrocarbons containing > 50% of aromatics, due to the low temp. Liquid NH<sub>3</sub> can, however, be used. The C.S.T. of hydrocarbon mixtures in liquid NH<sub>3</sub> and of acid oils in Divers' solvent (NH<sub>4</sub>NO<sub>3</sub> + liquid NH<sub>3</sub>) are determined. An examination of C<sub>6</sub>H<sub>6</sub>-benzene mixtures shows a close relation between the NH<sub>3</sub> and NH<sub>2</sub>Ph points.

E. S.

**Determination of small amounts of volatile hydrocarbons in presence of water.** H. TROPSCH and V. JELÍNEK (Mitt. Kohlenforschungsinst. Prag, 1931, 58—61).—The H<sub>2</sub>O-hydrocarbon mixture is condensed by cooling to —100° and, after evacuating the apparatus, is evaporated in a current of air, the H<sub>2</sub>O is removed

by  $\text{CaCl}_2$ , and the hydrocarbon by condensation with liquid air. E. S.

**Heavy oil as motor fuel for aviation.** E. SCHÄFER (Brennstoff-Chem., 1933, 14, 149—151).—The advantages of Diesel engines over petrol engines for aviation purposes are discussed. With modern design (*e.g.*, Junkers heavy-oil aëro-engine "Jumo 4") the wt. of the engine is no greater, and may be less, than that of a petrol engine of the same power. A. B. M.

**Detonation in internal-combustion engines and the evaluation of anti-knock properties of fuels.** E. KUZNETZOV (Sgor. Detonat., Aviaavtoizdat, Russia, 1932, 5—23).—Testing methods are discussed. Jentsch's inflammability-limit testing apparatus gives inaccurate results. CH. ABS.

**Relationship between detonation and structure of hydrocarbons present in gasoline.** A. D. PETROV (Sgor. Detonat., Aviaavtoizdat, Russia, 1932, 24—32).—Normal olefines of high and low b.p., respectively, were cracked under high pressure at 320—400°. Olefines of low b.p. are polymerised, liquid isoolefines being formed. Olefines of high b.p. are cracked at medium temp., forming  $\text{C}_6\text{H}_4\text{Me}_2$  and PhMe without any additional formation of  $\text{C}_2\text{H}_4$ . Aromatic compounds are formed from diolefines, the latter being formed from isoolefines arising from *n*-olefines. The gasoline so obtained contains (*iso*)paraffins only in the fractions of lower b.p., whilst above 90—100° naphthenes prevail. CH. ABS.

**Tar constituents as wetting agents.**—See VI. **Steel linings for vessels.**—See X. **Creosote bactericides.**—See XX.

## PATENTS.

**"Seasoning" and drying of peat blocks and the like.** W. F. NELSON (B.P. 390,248, 19.11.31).—Raw peat in the form of blocks is subjected to an upward current of warm dry air ( $> 21^\circ$ ), the blocks being kept in continuous motion by being supported on a structure which rotates about a vertical axis. A. B. M.

**Ovens for heat treatment of fuel.** STETTNER CHAMOTTE-FABR. A.-G., VORM. DIDIER (B.P. 390,337, 7.5.32. Ger., 7.5.31).—A vertical oven is provided with a series of hollow transverse members (*A*), each resembling  $\Lambda$  in cross-section, which are arranged to cause the descending material to take a zig-zag path through the oven. Heating gases are passed into *A* to heat the inclined surfaces thereof, these gases then passing through the material which is thereby heated internally. The underside of *A* is preferably formed by a horizontal wall having regulatable openings to control the flow of heating gas from the member into the material. In another form of the invention *A* are rhombus-shape in cross-section. A. B. M.

**Low-temperature distillation apparatus.** F. PUENING (U.S.P. 1,861,876, 7.6.32. Appl., 7.1.29).—The apparatus comprises a series of vertical, circular, concentric, hanging walls arranged to form annular coking chambers (*A*), and mounted so that they can rotate about their centre. As they rotate they pass first through a zone (*B*) in which they are heated by the passage through them of hot gases from a stationary furnace;

*A* are then charged with coal, which is carbonised by the heat stored in the walls; a coke-discharging device comes into operation at a point in the travel of *A* where carbonisation is complete. While passing through *B* the bottoms of *A* are open; as they enter the carbonising zone (*C*) a closure member moves up into position to form the bottoms of *A*. The portions of *A* in *C* are sealed from the portions in *B* by downwardly flowing streams of coke dust. A. B. M.

**Low-temperature distilling apparatus and method of using the same.** F. PUENING (U.S.P. 1,862,034, 7.6.32. Appl., 28.1.27).—A no. of vertical walls, of Fe or similar material, having transverse projections in the form of troughs for holding the fuel to be carbonised, are suspended from  $\text{H}_2\text{O}$ -cooled bars within a rectangular distilling chamber (*A*). The walls are heated by passing hot combustion gases through *A*. The latter is then charged with fuel by removing the cover, completely filling *A* from above, opening the lower doors to allow the excess fuel not supported on the troughs to fall through, and then closing the doors again. When carbonisation is complete the coke is removed from the troughs by a pusher mechanism. The design of the hanging walls ensures that they always assume their correct alinement. A. B. M.

**Means for enabling the removal of distillation products from the lower part of vertical coke ovens or the like.** R. W. CROWTHER, and W. J. JENKINS & Co., LTD. (B.P. 390,778, 29.11.32).—The oven has a gas offtake mounted on the bottom door and consisting of a framework supporting a no. of horizontal ledges arranged echelon fashion downwardly and outwardly from the centre. The volatile distillation products can pass between the ledges into the central space and thence to an offtake, whilst the ledges are sufficiently wide to permit the material to take up its natural angle of repose thereon without falling through into the central space. A. B. M.

**Production of coal gas.** J. M. RUSBY and W. I. BATTIN, Assrs. to U. G. I. CONTRACTING Co. (U.S.P. 1,861,452, 7.6.32. Appl., 5.12.27).—Bituminous coal is charged into a vertical retort (*A*) from the bottom of which the hot carbonised fuel is conveyed on a travelling grate into the combustion chamber (*B*) of a boiler furnace. The fuel in the lower part of *A* is intermittently air-blasted, the blast gases being passed into *B*. After each air-blasting step coal gas is recirculated through *A*, thereby transferring heat from the lower hot zone to the upper zone of *A* and carbonising the coal therein. The excess coal gas produced is passed to storage. A. B. M.

**Making gas from oil.** L. B. JONES, Assr. to JONES GAS PROCESS CORP. (U.S.P. 1,862,018, 7.6.32. Appl., 15.7.25).—The lower part of a generator (*A*) contains a bed of coke whilst the upper part is filled with refractory chequer work. The fuel bed is air-blasted and the blast gases are burned with secondary air and used to heat the chequerwork. Steam is then passed through *A* to form water-gas, until the temp. has fallen to that suitable for the production of oil gas, *e.g.*,  $870^\circ$ , when oil is admitted to the upper part of *A*. The oil gas is withdrawn from the bottom of *A*, any tar or C produced

being retained on the fuel bed. The cycle of operations is then repeated. A. B. M.

**Method and means in calorimeter for burning gases of relatively low heating value.** E. X. SCHMIDT, Assr. to CUTLER-HAMMER, INC. (U.S.P. 1,869,585, 2.8.32. Appl., 18.8.30).—The gas issues from an inverted burner tip and meets rising air, and the products of combustion pass in heat-exchange relation with the air and gas in concentric tubes before giving up their heat to the  $H_2O$ . B. M. V.

**Distillation of tar.** S. P. MILLER, Assr. to BARRETT Co. (U.S.P. 1,862,494, 7.6.32. Appl., 7.6.27).—Tar is distilled by being sprayed into, or otherwise brought into intimate contact with, hot coke-oven gases. To prevent overheating of the tar the temp. of the process is regulated by introducing tar oils into the hot gases before they come in contact with the tar, or by adding the tar oils to the tar. A. B. M.

**Making bituminous emulsions.** L. KIRSCHBRAUN, Assr. to FLINTKOTE CORP. (U.S.P. 1,869,697, 2.8.32. Appl., 2.1.28).—An argillaceous emulsifying agent is used, with tannic acid as stabiliser; the product is miscible in all proportions with  $H_2O$ . B. M. V.

(A) Preparation of [bituminous] emulsions. (B, c) Production of dispersions. (D) Making bituminous dispersions. (A—D) R. W. LEWIS and (D) A. SAUNDERS (U.S.P. 1,869,379—1,869,382, 2.8.32. Appl., [A] 5.7.24, [B, c] 29.10.30, [D] 4.6.30).—Emulsions of bitumen in  $H_2O$  are made and stabilised by the use of: (a) mineral fillers which act as grinding agents, clay being excluded because it so easily changes its fineness; (b) stabilisers, of which a large no. of substances are mentioned, e.g.,  $Al(OH)_3$ , with a peptiser such as  $AlCl_3$  or tannic acid and soap, basic sulphates of Cu and Fe, insol. phosphates. B. M. V.

**Conversion of heavy hydrocarbons.** P. S. DANNER, Assr. to STANDARD OIL Co. OF CALIFORNIA (U.S.P. 1,869,799, 2.8.32. Appl., 30.4.25).—The hydrocarbons are heated under pressure (100—250 atm.) in the presence of  $AlCl_3$  (suspended in oil or other suitable liquid, so that it may be pumped) and  $H_2$  is bubbled through; from the emitted vapours the heavy hydrocarbons and the  $AlCl_3$  are condensed and returned to the converter, and then the light hydrocarbons are condensed out of the fixed gases. B. M. V.

**Decomposition of organic materials.** R. J. DEARBORN and G. W. GRAY, Assrs. to TEXAS Co. (U.S.P. 1,861,956, 7.6.32. Appl., 20.4.26).—Oil, tar, etc. is submitted to a combined cracking and oxidation in the liquid phase by preheating it to 150—370° and passing it under pressure (250—600 lb./sq. in.) through heat-insulated converters (A) wherein a finely-divided stream of air is passed through the liquid. The vapours formed are passed to a dephlegmator and the heavier constituents condensed therein are returned to A. The lighter constituents are condensed and separated into  $H_2O$ -sol. (alcohols, ketones, etc.) and  $H_2O$ -insol. (motor spirit) fractions. The temp. in A is maintained at < 400° by the heat of the reaction; it is controlled by regulating the rates of supply of air and oil to the apparatus. A. B. M.

**Refining of petroleum oils.** J. C. MORRELL, Assr. to UNIVERSAL OIL PRODUCTS Co. (U.S.P. 1,870,063, 2.8.32. Appl., 9.12.25. Renewed 21.11.30).—The action of  $H_2SO_4$  is moderated by a diluent or "spacing agent" which, being free from  $H_2O$ , does not cause ionisation; examples are glacial  $AcOH$ ,  $(NH_4)_2SO_4$ , or any phosphate. B. M. V.

**Treatment [dechlorination] of oils.** W. H. SHIFFLER, M. M. HOLM, and M. F. MILLER, Assrs. to STANDARD OIL Co. OF CALIFORNIA (U.S.P. 1,869,781, 2.8.32. Appl., 3.6.29).—Combined Cl in distillates which have been formed by cracking with  $AlCl_3$  are heated to 150° for sufficient time to liberate  $Cl_2$ ,  $HCl$ , or other  $H_2O$ -sol. form of Cl, under a pressure to prevent volatilisation of oil and petrol. A catalyst, e.g.,  $FeS$  or  $CaO$ , may be used if desired. B. M. V.

**Apparatus for absorbing gas [in oil refineries].** H. J. NICHOLS, JUN., and P. E. KUHL, Assrs. to STANDARD OIL DEVELOPMENT Co. (U.S.P. 1,869,611, 2.8.32. Appl., 2.5.29).—Apparatus for regulating the gas, absorbing oil, and stripping steam in proportion to each other is described. B. M. V.

**Liquid fuel for metallurgical furnaces.** F. PUENING (U.S.P. 1,869,775, 2.8.32. Appl., 5.8.25).—The fuel consists of high-temp. coke-oven pitch dissolved in low-temp. tar by moderate heat, the proportion of tar being sufficient to maintain the pitch in solution at room temp. B. M. V.

**Lubricating oils.** (A) E. N. ROBERTS, (B) S. H. DIGGS, Assrs. to (A, B) STANDARD OIL Co. (U.S.P. 1,869,779 and 1,869,800, 2.8.32. Appl., 23.4.28).—The drop size of petroleum or compound oils for use in hydrostatic lubricators is adjusted by the addition, in (A), of  $\geq 1$  (e.g., 0.5) % of sperm oil, and, in (B), of  $\geq 1$  (e.g., 0.5 or 0.25) % of oil-sol. Pb soap. B. M. V.

**Preparation of lubricating oil.** C. C. MILLER, Assr. to STANDARD OIL Co. (U.S.P. 1,869,608, 2.8.32. Appl., 21.10.25).—Oils from several sources are brought to a standard colour by the addition of asphaltene-like polymerisation compounds extracted, e.g., by naphtha, from the fuller's earth used in filtration. The Conradson C test of the product should be  $\geq 0.25\%$  C. B. M. V.

**Low-cold-test lubricating oil.** F. W. SULLIVAN, JUN., and W. J. MCGILL, Assrs. to STANDARD OIL Co. (U.S.P. 1,870,074, 2.8.32. Appl., 29.12.28).—At least 20 g./litre of  $C_6H_4Me \cdot NH_2$ ,  $C_6H_3Me_2 \cdot NH_2$ , or other alkyl-substituted  $NH_2Ph$  derivative is added to the oil to reduce its pour test. B. M. V.

**Refining of hydrocarbon [lubricating] oils.** SINCLAIR REFINING Co., Asses. of J. WALSKO (B.P. 390,697, 26.7.32. U.S., 1.8.31).—Petroleum lubricating oils (Saybolt viscosity  $> 70$  sec. at 37.7°) are, if desired, given a mild oxidising treatment prior to being subjected to the simultaneous action of  $PhNO_2$  and  $H_2SO_4$  in single or successive treatments, with separation of sludge between the treatments. H. S. G.

**Gas trap.** E. H. ADAMS, Assr. to TRUMBLE GAS TRAP Co. (U.S.P. 1,887,111, 8.11.32. Appl., 10.12.30).

**Cracking of oil.** G. EGLOFF, Assr. to UNIVERSAL OIL PRODUCTS Co. (U.S.P. 1,887,083, 8.11.32. Appl., 9.12.20. Renewed 23.11.28).

**Making gasoline.** O. BEHMER, Assr. to TEXAS Co. (U.S.P. 1,883,850, 18.10.32. Appl., 6.4.23. Can., 3.12.21).

**Rectification of petroleum oils.** P. C. KEITH, JUN., Assr. to M. W. KELLOGG Co. (U.S.P. 1,883,934, 25.10.32. Appl., 10.7.28).

**Separation and fractionation of [hydrocarbon] oil.** C. R. WAGNER, Assr. to GYRO PROCESS Co. (U.S.P. 1,884,418, 25.10.32. Appl., 13.3.28).

**Apparatus for treating petroleum.** C. P. DUBBS, Assr. to UNIVERSAL OIL PRODUCTS Co. (U.S.P. 1,886,946, 8.11.32. Appl., 1.7.25. Renewed 19.8.29).

**Treating [vapours of] hydrocarbons.** N. H. MOORE, Assr. to TEXAS Co. (U.S.P. 1,887,941, 15.11.32. Appl., 15.1.30).

**Treatment of hydrocarbon oils.** J. D. SEGUY, Assr. to UNIVERSAL OIL PRODUCTS Co. (U.S.P. 1,884,887, 25.10.32. Appl., 10.1.29).

**Treatment of hydrocarbon oils.** A. E. HARNSBERGER, Assr. to PURE OIL Co. (U.S.P. 1,887,018, 8.11.32. Appl., 30.9.29).

**Treatment of hydrocarbon oils.** E. F. NELSON, Assr. to UNIVERSAL OIL PRODUCTS Co. (U.S.P. 1,888,048, 15.11.32. Appl., 22.10.30).

**Treatment of [heavy] hydrocarbon oils.** C. J. GREENSTREET, Assr. to R. F. ADAMS (U.S.P. 1,886,093, 1.11.32. Appl., 24.6.29).

**Treating [cracked, low-boiling, unsaturated] hydrocarbons.** R. C. OSTERSTROM, Assr. to PURE OIL Co. (U.S.P. 1,884,163, 25.10.32. Appl., 17.4.29).

**Production of lubricating oil.** H. T. DARLINGTON, Assr. to OIL CORP. OF AMERICA (U.S.P. 1,884,587 and 1,888,346, [A] 25.10.32, [B] 22.11.32. Appl., [A] 26.5.27, [B] 10.9.28).

**Heating of fluids.**—See I. **Wetting agent.**—See VI. **Colour coat for cement.**—See IX. **Hydrogenation catalysts.**—See X. **Candles.**—See XII. **Resin from bitumen.**—See XIII.

### III.—ORGANIC INTERMEDIATES.

**Detection of acetone in chloroform.** G. D. BEAL and C. R. SZALKOWSKI (J. Amer. Pharm. Assoc., 1933, 22, 223—227).—Of 7 tests examined, the Nessler test was the most sensitive for the detection of small quantities of  $\text{COMe}_2$ , a definite turbidity being obtained with 1 in 200,000 of  $\text{CHCl}_3$ . Other ketones give similar reactions, but the colours are paler. Aldehydes alone and in presence of  $\text{CHCl}_3$  give an orange ppt. immediately. The vanillin test is sp. for  $\text{COMe}_2$  and the salicylaldehyde test gives a colour with all ketones. The furfuraldehyde reaction is not as sensitive as the vanillin test, but it is easier to perform. E. H. S.

**Formates from oils.** Separation of low-boiling hydrocarbons.—See II. **Wetting agents.**—See VI. **Alcohols as lacquer solvents.**—See XIII. **EtOH from grain.**—See XVIII.

#### PATENTS.

**Performing chemical reactions.**—See I. **Decomp. of org. materials.**—See II. **Wetting agent.**—See VI. **EtCO<sub>2</sub>H by fermentation.**—See XVIII.

### IV.—DYESTUFFS.

**Identifying colours on dyed paper.**—See V.

#### PATENT.

**Printing compound.**—See XIII.

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

**Test for chemically damaged cotton fibres.** J. W. LEWIS (J. Text. Inst., 1933, 24, τ 122).—Small pieces of the fibres are treated on a microscope slide for a few min. with Na zincate. When swelling is complete they are washed thoroughly with  $\text{H}_2\text{O}$  and examined microscopically. Perfect or mechanically damaged fibres show definite outline, undamaged cuticle, and dumb-bell-shaped ends. Chemically damaged fibres are very much swollen, the edges and ends are blurred, and some fibres are partly dissolved. B. P. R.

**Naturally-occurring ash constituents of cotton. Distribution of ash constituents as salts and changes resulting from washing in aqueous solutions.** A. C. WALKER and M. H. QUELL (J. Text. Inst., 1933, 24, τ 131—144).—Over 0.4% of the total (1%) raw cotton ash exists as  $\text{K}_2\text{SO}_4$ ,  $\text{K}_2\text{SiO}_3$ ,  $\text{K}_4\text{P}_2\text{O}_7$ , and  $\text{NaCl}$ ; the remaining K (0.364% as  $\text{K}_2\text{CO}_3$ ) results from the ignition of org. K compounds. These are all assumed to be  $\text{H}_2\text{O}$ -sol. since washing removes practically all the K salts. Washing also halves the Mg content, but leaves the Ca, Fe, and Al contents almost unchanged. The K content of purified cotton appears to depend on the concn. of K in the  $\text{H}_2\text{O}$  used. The marked effects of  $\text{CaSO}_4$  or  $\text{MgSO}_4$  in the wash- $\text{H}_2\text{O}$  on the Ca or Mg contents indicate that ionic interchange occurs between Ca and Mg ions. Alkaline-earth salts in the wash- $\text{H}_2\text{O}$  do not appear to aid in reducing the alkali-metal content of the cotton by ionic interchange. B. P. R.

**Influence of ash constituents on electrical conduction of cotton.** A. C. WALKER and M. H. QUELL (J. Text. Inst., 1933, 24, τ 123—130).—Improvement in the d.-c. insulation resistance ( $A$ ) of cotton on washing is accompanied by reduction in the inorg. ash content from about 1% of the dry-cotton wt. to <0.3%. The  $\text{H}_2\text{O}$ -sol. salts in cotton (about 70% of the ash wt.) are chiefly K and Na salts, and by their removal with large vols. of  $\text{H}_2\text{O}$  or with dil.  $\text{CaSO}_4$  or  $\text{MgSO}_4$  solutions  $A$  is improved 50—100-fold, whilst a total improvement of 150—200-fold is secured if the washed cotton is dried under certain conditions. The resistance of material washed with dil.  $\text{HCl}$  is unexpectedly low in view of the fact that its ash content is very low indeed. Ionic interchange occurs when cotton is washed with salt solutions. B. P. R.

**Sulphur content of wool.** IV. Further evidence of the variable sulphur content of wool. J. BARRITT and A. T. KING (J. Text. Inst., 1933, 24, τ 119—121; cf. B., 1929, 846).—The S content is inherently variable, and the method of purification has no great influence on the amount of S found. The variations are found from wool to wool in the same and different groups and also between the base and tip portions of the same sample. B. P. R.

Some factors which affect the determination of acidity in wool. S. R. TROTMAN and G. N. GEE (J. Soc. Dyers and Col., 1933, 49, 132—134; cf. B., 1933, 102).— $\text{Na}_2\text{SO}_4$  does not affect the determination of acidity. The acid groups of some dyes cause higher vals. to be obtained. When free fatty acids are present they are included with the acidity if this is determined by the  $\text{NaOAc}$ -steam-distillation method. The acidity of wool dyed in the presence of org. acids is about the same as it is when  $\text{H}_2\text{SO}_4$  is used. B. P. R.

Mildew attack of cotton and wool. M. NOPITSCH (Textilber., 1933, 14, 139—142).—Methods of examination are described and illustrations given of mildewed cotton and wool. A useful solution (A) for staining mould fungi (not cotton) consists of 10 c.c. of a saturated solution of Cotton Blue (I) and 50 c.c. of a lactophenol solution consisting of lactic acid (20 c.c.),  $\text{PhOH}$  (20 g.), glycerin (40 c.c.), and  $\text{H}_2\text{O}$  (20 c.c.). A simpler solution containing 0.5% of (I) and a small amount of  $\text{AcOH}$  readily stains the mycelium of mould fungi, and although it does not stain cotton it stains residues within the fibre lumen and also unripe fibres. Solution A is useful for detecting damage in wool by acid or alkali attack since the spindle cells are stained blue only when the epithelial scales covering them are disturbed. Treatment of acid-damaged wool with the lactophenol solution itself disintegrates the fibres so that the spindle cells become evident, but this effect is not observed with alkali-damaged wool. A. J. H.

[Young] Georgia pines for sulphite-pulp and newsprint [manufacture]. G. M. ROMMEL (Chem. Met. Eng., 1933, 40, 197—200).—The resin content of slash (*Pinus heterophylla*), loblolly (*P. taeda*), longleaf (*P. palustris*), shortleaf (*P. echinata*), and probably Virginia (*P. virginiana*) pines is no higher than that of spruce until the trees are 25 years old, owing to the absence of heartwood. The resin which exudes when such trees are wounded is formed and secreted instantly, and is not pre-existent. The time required for these pines to attain pulpwood dimensions is very much < that required for Canadian or Russian spruce. Cultivation of the ground induces even more rapid growth. White mechanical pulp can be produced from the green wood, thus simplifying the storage problem. Storage, in fact, is not practicable, owing to fungoid growths in the sapwood. Hitherto unpublished work by W. F. ALLEN on the production of sulphite pulp is described. It is impossible to distinguish between pulps from the various species. H. A. H.

Digestion of wool. I. Influence of period of digestion on strength of sulphite pulp. K. NAKAMURA (J. Cellulose Inst., Tokyo, 1933, 9, 93—97).—The strength of sulphite pulp is reduced by raising the temp. rapidly to  $> 100^\circ$  at the beginning of the boil, by high temp. in the later stages, and by prolonged cooking. A low temp. at the end increases the time necessary, but produces easy-bleaching pulps, which are usually weak. A. G.

Effects of beating on fibrous cellulose. J. H. B. BELL (J.S.C.I., 1933, 52, 109—116 T, 119—130 T).—The physico-chemical changes taking place during the beating treatment of papermaking fibres are studied.

Following a theoretical discussion, a drainage technique for studying the disperse properties of suspensions of beaten fibres is described. Phenomena of ionic coagulation, of reversible coagulation by boiling in  $\text{H}_2\text{O}$ , and of reversible dehydration by the action of graded  $\text{EtOH}$ - $\text{H}_2\text{O}$  mixtures are studied. The cohesion properties of beaten fibre cakes during the drying process are considered. A technique for measuring vol. contraction on drying is described. The alcoholic dehydration phenomena are shown not to occur in the case of beaten asbestos fibres. The vol.-wt. relation during drying is linear for the most part. Beating phenomena are studied in liquids other than  $\text{H}_2\text{O}$ . Methods for determining "bound"  $\text{H}_2\text{O}$  in beaten fibres give negative results. The same questions are regarded from the angle of the strength properties of the resultant sheet of paper. The conclusions are: (1) Beating is necessary, in order to rupture the non-cellulosic membrane surrounding the fibres. This may take place in the absence of  $\text{H}_2\text{O}$ . (2)  $\text{H}_2\text{O}$ -wetting is a necessary condition antecedent to fibre-fibre bonding and strength development during drying. Fibre bonding is presumed to occur through the intermediary of oriented  $\text{H}_2\text{O}$  mols. (3) There is no evidence of special  $\text{H}_2\text{O}$  bonding or hydration in the case of beaten fibres.

Copper number of cellulose. K. ATSUKI and I. KAGAWA (J. Cellulose Inst., Tokyo, 1933, 9, 88—93).—The dependence of the Cu no. (Braidy or Sherrard and Davidson) on the duration of the test, the comminution of the cellulose or cellulose acetate, and the degree of beating agrees with the suppositions that its magnitude depends on the penetration of the reagent into the particles and that this penetration obeys the ordinary diffusion laws. A. G.

Cellulose xanthate and viscose. Soluble or peptised cellulose. Composition of artificial silk. E. PATERNO (Atti R. Accad. Lincei, 1932, [vi], 15, 181—189; cf. A., 1932, 604).—Viscose (I) containing 6.7%  $\text{NaOH}$  shows a f.p. depression considerably < that to be expected from the amount of  $\text{NaOH}$  present, thus supporting the view that (I) contains a true colloidal cellulose xanthate. As (I) matures,  $\text{CS}_2$  is lost, giving probably xanthates containing 2 or 4 cellulose groups. Experiments on the dialysis of viscose are described. It is suggested that the peptisation of cellulose with metallic salts or  $\text{H}_2\text{SO}_4$  may give transformation products. Artificial silk contains but little S; the pentosan content is about the same as in cellulose. It is concluded that artificial silk is probably a mixture of a substance sol. in  $\text{NaOH}$ , oxycellulose, and a form of cellulose not yet defined. Nitration of cotton wool and artificial silk under the same conditions gives identical products. The effects of heating artificial silk to  $200^\circ$  with various reagents are described. E. E. J. M.

Variations in the viscosity of viscose as a function of temperature. R. AIMAUD (Russa, 1932, 7, 1135, 1137).—When viscose solution is heated the viscosity decreases up to  $55^\circ$  and then increases slightly up to the coagulation point ( $67^\circ$ ). Below  $67^\circ$  the change in viscosity is reversible. CH. ABS.

Viscosity and jelly strength of acetylcellulose. T. ARAKI and S. NAGAOMOTE (J. Soc. Chem. Ind., Japan,

1933, 36, 64—65 B).—Various ripened samples of the same cellulose acetate were compared with a variety of standard commercial acetates. In the first case, jelly strength was proportional to viscosity; in the latter, equally viscous acetates did not show the same jelly strength. High-viscosity commercial acetates dehydrated more readily than low-viscosity products, but reduction of viscosity by treatment with superheated steam was less easy than with nitrocellulose. V. E. Y.

**Spinning of viscose silk. XII. Relation between sulphuric acid and cellulose content of cake, and distribution of coagulation-bath liquor in cake.** S. HASE (J. Soc. Chem. Ind., Japan, 1933, 36, 58—59 B; cf. B., 1933, 186).—The cellulose content of cakes spun under standard conditions increases with the  $H_2SO_4$  content. The wt. of coagulation fluid retained by the cake decreases towards the inside. The concn. of  $H_2SO_4$  is almost const. throughout the cake, but by evaporation of  $H_2O$  the  $H_2SO_4$  in the outside increases notably. V. E. Y.

**Proposed standard instrument for classification of papermaking fibres according to length.** G. D. O. JONES, C. ALEXANDER, T. W. ROSS, and H. W. JOHNSTON (Paper Trade J., 1933, 96; T.A.P.P.I. Sect., 211—218).—The fibres are presented broadside-on to a series of standard wire-mesh screens by imparting to a suspension a velocity, parallel to the screen, which is large compared with the velocity of flow through the screen, thus minimising endwise presentation of the fibres. The proposed instrument is described, experimental results underlying its design and operation being given. The strength of mechanical pulp fractions increases with decrease in fibre length. H. A. H.

**Identification of colours on dyed paper.** M. GRUNDY (Paper Maker, 1933, 85, 102—104 TS).—A scheme, based on successive extraction of the paper with boiling  $H_2O$ , EtOH, and aq.  $NH_3$ , to separate acid, basic, and direct colours, is described. For the separation of individual dyes of each class, capillary tests using blotting paper (for acid and direct colours) and acetate silk (for basic colours) are employed, the individual colours then being transferred to a suitable fibre (wool, tanned cotton, etc.) for identification by spot tests and comparison with authentic dyeings. Some anomalies to the general scheme are indicated. Pigments may usually be identified by dry tests. A no. of dyes which exhibit fluorescence under ultra-violet light are listed. H. A. H.

**Oil stains in textiles.**—See VI. **Steel linings for vessels.**—See X. **Fatty oils [from wool washing].**—See XII. **Fibre in potatoes.**—See XIX.

#### PATENTS.

**Cleaning of wool.** R. M. GREENLEAF, ASSR. to FROSTED WOOL PROCESS CO. (U.S.P. 1,866,205, 5.7.32. Appl., 3.3.32).—Wool containing vegetable matter is washed, the surplus  $H_2O$  is removed, and the material is cooled until the foreign matter, but not the wool, is frozen. The frozen mass is combed and beaten, whereby the impurities are removed whilst the wool is left clean and undamaged. The process makes the usual carbonising unnecessary. B. P. R.

**Making silk-fibre sheet.** N. KAWAGUCHI (U.S.P. 1,862,019, 7.6.32. Appl., 9.9.31).—Dried silk cocoons, previously soaked in cold  $H_2O$ , are enclosed in a fabric bag (to preserve the shape of the cocoon) and boiled for 2 hr. in 1.7% aq.  $NaHCO_3$ . After further washing with cold  $H_2O$ , the cocoons are turned inside out one by one, cleaned, and superimposed to give a sheet of the required thickness. This is dried, treated with tincture of benzoin, and finally smoothed with a brush. D. J. N.

**Manufacture of leather substitute and base material therefor.** J. L. CLIFFORD, ASSR. to STEDFAST RUBBER CO., INC. (U.S.P. 1,863,469, 14.6.32. Appl., 10.6.29).—Cotton flannel thoroughly napped on both sides is impregnated with rubber solution, dried, and ironed under tension. This base material is starched on one side and coated on the other with a solution (A) of rubber heavily loaded with cotton flocks. The material is then vulcanised with  $S_2Cl_2$  vapour and treated with  $NH_3$  to neutralise acid. Further coats of A may be superimposed on the first coat. After a further vulcanisation and neutralisation treatment the coated side is finally dressed with, e.g., talc. The finished material shows the "grain and flesh side" characteristics of leather and is porous. D. J. N.

**Digester [for cooking fibrous materials].** C. F. RICHTER, ASSR. to STEBBINS ENG. & MANUFG. CO. (U.S.P. 1,860,477, 31.5.32. Appl., 28.10.31).—The digester is lined with C bricks. These are inert, impervious to cooking liquors, and of low thermal expansion. The type of the bonding cement is determined by the nature (acid or alkaline) of the cooking liquor. D. J. N.

**Manufacture of pulp etc.** L. BRADLEY and E. P. MCKEEFFE, ASSRS. to BRADLEY-MCKEEFFE CORP. (U.S.P. 1,860,570 and 1,860,803, 31.5.32. Appl., [A] 2.7.26, [B] 3.7.26).—(A) A cyclic process is described wherein waste liquor from the  $Na_2SO_3$  process is smelted and converted into a liquor suitable for the sulphate process. The waste sulphate liquor is then smelted and converted into a liquor suitable for the  $Na_2SO_3$  process. (B) A  $Na_2S-Na_2SO_3-NaOH$  liquor is used in which the  $Na_2O$  present as  $Na_2S$  is  $>$  that present either as  $NaOH$  or  $Na_2SO_3$ . The  $Na_2O$  present as  $Na_2SO_3$  is preferably at least one half that present as  $Na_2S$ . Suitable liquors contain  $Na_2S$  50,  $Na_2SO_3$  40—72, and  $NaOH$  5—25 pts. A process for regenerating the spent liquor is described. D. J. N.

**Manufacture of [wood] pulp.** L. BRADLEY and E. P. MCKEEFFE, ASSRS. to BRADLEY-MCKEEFFE CORP. (U.S.P. 1,860,848, 31.5.32. Appl., 3.7.26).—Wood pulp is cooked with non-acid, aq.  $Na_2SO_3$  and the residual liquors are conc., carbonised, and reduced to form chiefly  $Na_2S$ , which is used in another cooking process. The sulphide liquors from the second process are conc. and treated under conditions to eliminate S and give substantially  $Na_2CO_3$ ; this salt is then converted into  $Na_2SO_3$ , which is used again in cooking, thus continuing the cycle of operations. B. P. R.

**Treating mechanical wood pulp.** P. KLEM (U.S.P. 1,865,768, 5.7.32. Appl., 30.11.29. Norw., 30.11.28).—Ground wood is separated into coarse and fine portions,



and these are further treated mechanically before being mixed to give the final pulp. (Cf. B., 1929, 713.)

B. P. R.

**Cyclic process of fibre liberation.** G. A. RICHTER, Assr. to BROWN Co. (U.S.P. 1,864,619, 28.6.32. Appl., 30.9.25).—Raw cellulosic material (wood) is cooked with aq.  $\text{Na}_2\text{SO}_3$ , and the waste liquor is conc. and ignited to give  $\text{Na}_2\text{S}$  and  $\text{Na}_2\text{CO}_3$ . The smelt is dissolved, treated with  $\text{CO}_2$  to give substantially  $\text{Na}_2\text{CO}_3$  (I) and  $\text{H}_2\text{S}$  (II); then (I) is acidified with aq.  $\text{SO}_2$  to give  $\text{Na}_2\text{SO}_3$  and  $\text{CO}_2$ , the  $\text{CO}_2$  is used to produce (I), and (II) is used to produce either  $\text{SO}_2$  or  $\text{Na}_2\text{S}$  for further use in the cycle of operations.

B. P. R.

**Liberation of pulp from raw cellulosic materials.** G. A. RICHTER, Assr. to BROWN Co. (U.S.P. 1,864,620, 28.6.32. Appl., 18.2.31).—Wood is precooked with dil. (1%), substantially neutral, aq.  $\text{Na}_2\text{SO}_3$  and then cooked to complete fibre liberation with a more conc. (10%) solution containing about 1% of  $\text{NaOH}$ .

B. P. R.

**Manufacturing products from fibrous material.** M. SKOLNIK, Assr. to INSOLO HOLDING Co. (U.S.P. 1,865,649, 5.7.32. Appl., 1.6.31).—Apparatus is described for the production of pulp from straw etc. and converting the product into moulded shapes.

B. P. R.

**Extracting water-soluble substances [tanning agents] from raw fibrous materials containing the same, and simultaneously forming the fibrous materials into a web.** H. R. MURDOCK, Assr. to CHAMPION FIBRE Co. (U.S.P. 1,861,933, 7.6.32. Appl., 26.9.30).—The wood is converted into ground wood pulp in the ordinary way, the  $\text{H}_2\text{O}$  used in the grinders and for washing the pulp being circulated in a closed system until it contains  $\leq 2\%$  of solids, at which stage a portion is continuously "bled" from the system to an evaporator. The screened and washed pulp is available for paper-making. The tanning extract thus obtained from chestnut wood is suitable for use in the production of light-coloured tanned hides.

D. J. N.

**Manufacture of composite [fibre-rubber] articles [as insulators].** H. L. WARD, Assr. to WESTERN ELECTRIC Co., Inc. (U.S.P. 1,861,945, 7.6.32. Appl., 9.8.24).—Absorbent paper, preferably made from cotton linters, is impregnated with rubber latex or solution containing a vulcanising agent (S) and an accelerator. The dried sheets (partly vulcanised during drying) are then stacked and cemented together by completing the vulcanisation under heat and pressure.

D. J. N.

**Pulp board.** G. LANDT and H. L. BECHER, Assrs. to AGASOTE MILLBOARD Co. (U.S.P. 1,860,466, 31.5.32. Appl., 13.8.24).—Montan wax (30–50% on the wt. of fibre) is used as the bonding and waterproofing agent. It may be wet-ground and added to the beater, or the board may be impregnated with molten wax.

D. J. N.

**Spinning artificial fibres by dry methods.** BRIT. CELANESE, LTD., H. DREYFUS, E. KINSELLA, J. BOWER, and W. I. TAYLOR (B.P. 390,530, 6.10.31. Addn. to B.P. 300,998, 304,674, 326,232, and 352,922; B., 1929, 203, 353; 1930, 456; 1931, 877).—The whole or a definite part of the evaporative atm. is made to pass through the immediate vicinity of the spinning orifices

while flowing, in the present modification, in the same direction as the filaments etc.

F. R. E.

**Manufacture of artificial filaments and the like.** H. DREYFUS (B.P. 390,860, 1.10.31).—A solution of an org. derivative of cellulose containing high-boiling solvents or diluents is dry-spun into a counter- or co-current of evaporative medium. The filaments in the initial stages of spinning are shielded from the main body of the current to retard evaporation, and are then stretched so that the whole of the stretch does not extend as far as the spinning nozzle.

F. R. E.

**Production of films, foils, sheets, etc.** CELLULOID CORP. (B.P. 390,899, 7.1.32. U.S., 7.1.31).—Solutions of inorg. or org. derivatives of cellulose are deposited on and afterwards stripped from a casting surface composed either of a layer of hardened gelatin or of a no. of layers, viz., a cellulose derivative lacquer priming coat, an intermediate gelatin layer, and a top layer of hardened gelatin, on a wheel, belt, or other casting base.

F. R. E.

**Production of artificial materials from organic derivatives of cellulose.** H. DREYFUS (B.P. 390,541, 13.10.31).—Halogen-substituted cyclic dicarboxylic acids, anhydrides, or esters, e.g., chloro- or bromophthalic or naphthenic acids, are employed as plasticisers.

F. R. E.

**Dehydrated cellulose bung, tube, etc.** W. F. HENDERSON, Assr. to VISKING CORP. (U.S.P. 1,864,244, 21.6.32. Appl., 3.7.29).—Mandrels or forms (A) of the required shape are dipped into a solution of viscose, drained, and the viscose film is dried. A are then dipped into a coagulating bath ( $\text{H}_2\text{SO}_4$  and  $\text{Na}_2\text{SO}_4$ ), and the films are washed, removed from A while wet, further washed, treated with aq. glycerin, and dried. The  $\text{NaOH}$  content of the viscose and the duration of ageing determine the transparency of the products.

B. P. R.

**[Reducing electrostatic difficulties in processing cellulose acetate] textile materials.** BRIT. CELANESE, LTD. (B.P. 390,176, 29.9.31. U.S., 29.9.30).—The retention of electrostatic charges on dry cellulose acetate yarn during knitting, or on acetate staple fibres during spinning with other fibres into yarn, is avoided by first coating or impregnating the fibres with up to 1% of a hygroscopic substance, e.g.,  $\text{MgCl}_2$ ,  $\text{ZnCl}_2$ ,  $\text{NaOAc}$ .

A. J. H.

**Manufacture of paper size.** A. E. MAZE, Assr. to MANSON CHEM. Co. (U.S.P. 1,863,867, 21.6.32. Appl., 10.4.26).—Wood pulp containing a substantial amount of hydrocellulose is beaten with an aq. emulsion of paraffin wax and a hydrocarbon oil (paraffin) which acts as a size and makes the resulting paper translucent and waterproof.

B. P. R.

**Production of [insulating] paper.** D. B. OBLINGER, Assr. to UNION MILLS PAPER MANUFACTURING Co. (U.S.P. 1,864,852, 28.6.32. Appl., 29.10.29).—Paper for high-tension cables is partly calendered, moistened with  $\text{H}_2\text{O}$ , and recalendered. Suitable apparatus is described.

B. P. R.

**Dyed rayon thread.**—See VI. **Light structural material.**—See IX. **Electroplating [of paper].**—See XI. **Non-inflammable nitrocellulose. Sheeted compounds.**—See XIII.

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

**Dyeing cotton-viscose rayon stockings.** G. RUDOLPH (Kunstseide, 1933, 15, 173—174).—Equal depth of shade on both fibres and good penetration of the seams are obtained by dyeing in a boiling bath, no salt being added except for dark shades, with specified selected dyes. A. J. H.

**Piece-loading of natural silk.** J. BRUYAS (Russa, 1932, 7, 729—739, 983—987, 1075, 1077).—Treatment with  $\text{SnCl}_2$  should be effected at 15—18°; the Sn:HCl ratio should be 0.820—0.830 to ensure the absence of free HCl.  $\text{PO}_4$  treatment should be effected with aq.  $\text{Na}_2\text{HPO}_4$  and AcOH such that in the cold 0.6%  $\text{NaH}_2\text{PO}_4$  is present. The Sn content of the bath should be 3—3.5 g. per litre. Sn should be completely removed by washing before  $\text{PO}_4$  treatment, and  $\text{PO}_4$  and OH' should be removed before treatment with  $\text{SnCl}_2$ . CH. ABS.

**Treatment with silicate and dyeing of loaded silk fabrics.** J. BRUYAS (Russa, 1932, 7, 1157—1161).—Treatment with  $\text{SiO}_3$  produces more even dyeing of loaded silk. In a neutral bath at 50°  $\nabla$  20 c.c. of  $\text{SiO}_3$  (d 1.26) per litre should be used; the optimal temp. is 70—75°. Addition of NaOH decreases the yield. CH. ABS.

**Application of phenolic constituents of tars as wetting agents.** G. T. MORGAN, D. D. PRATT, and A. E. J. PETTET (J. Soc. Dyers and Col., 1933, 49, 125—127).—Wetting agents for use in aq. NaOH of mercerising concn. are readily obtained from all low-temp. tars from bituminous coal as well as from wood, peat, lignite, and cannel coal. The most active constituents are contained in the phenolic fraction, b.p. 205—290°. The lower temp. limit of the active fraction varies in different tars on account of the variable ratio of more to less volatile phenols and is adjusted to give a mixture containing approx. 54% of phenols of b.p. < 230°. Vertical-retort, Mond-gas producer, and blast-furnace tars give wetting agents of similar characteristics and equal in efficiency to the low-temp. tar products. Horizontal-retort tar phenols differ from low-temp. products in that the active fraction is very small and has b.p. 235—245°. The wetting power of the agents from all the tars examined is comparable with and in some cases superior to that of well-known proprietary agents. The method of comparing wettabilities is described. B. P. R.

**Comparison of the rosette and flannel-cotton methods of wetting-out or sinking tests.** A. H. GRIMSHAW (Melliand Textile Monthly, 1933, 5, 15—17).—For wetting-out tests rosettes of cotton yarn are easier to use than squares of cotton flannel. A. G.

**Oil stains [in textiles].** I, II. H. R. HIRST (J. Soc. Dyers and Col., 1931, 47, 347—351; 1932, 48, 90—94).—I. Mineral and fatty oils which produce irregular dyeing when present as stains in wool materials differ considerably when exposed to ultra-violet light; the former (e.g., American Spindle Oil D) shows a blue fluorescence up to 60 hr. which then becomes white while the oil becomes viscous and yields a yellow to brown ppt. insol. in light petroleum, whilst the latter (e.g., oleic acid and cotton-seed oil) fluoresce blue at first and then yellow after 12 days. Staining oils

show a brilliant surface glow whereas non-staining oils become luminous to a considerable depth when illuminated with ultra-violet light; this difference forms the basis of an approx. method for determining the staining power of an oil. Exposure to light, but not heat, is able to produce changes in oil stains such that the dyeing properties of the wool are affected; short and long exposures cause light and dark dyeing stains, respectively, with acid dyes. Oil stains are best removed by scouring with a solution containing 0.2% of soap and 0.1% of  $\text{Na}_2\text{CO}_3$ .

II. After exposure to light, fatty and mineral oil stains on wool resist and strongly attract acid dyes, respectively. Staining oils are distinguished from non-staining oils by the dark-coloured mark which they yield when spotted on wool and exposed for a short period in a Fadeometer. A short exposure of wool grease produces a difficultly emulsified substance which resists dyes, but on further exposure it acquires an increased affinity for dyes. Olive oil stains act as resists when exposed in a Fadeometer for 9—12 hr. (equiv. to 3 months' storage in the dark). A. J. H.

**Acidity in wool.**—See V.

## PATENTS.

**Apparatus for the washing and other treatment of artificial silk yarns.** A. BAZZOCCHI (B.P. 390,440, 13.10.32. Italy, 5.11.31).—Bobbins of viscose yarn are washed, desulphurised, bleached, etc., immediately after spinning, in a vat provided with a cover (A) the peripheral edge of which dips into a  $\text{H}_2\text{O}$ -seal, thus preventing the escape of gases and volatile liquids liberated from the silk; the covers for each bobbin are attached to A so that they may be lifted simultaneously. A. J. H.

**[Wetting agent for] treating cellulose fibres with alkaline liquids.** G. E. COLLINS, G. T. MORGAN, and D. D. PRATT (B.P. 390,824, 10.10.31).—Up to 1% is added to mercerising liquors of a phenolic fraction (b.p. 205—290°) obtained from tars produced in the carbonisation of coal, wood, peat, and lignite. A. J. H.

**Manufacture of [dyed] rayon [thread].** G. R. LOCKHART, Assr. to MANVILLE JENCKES Co. (U.S.P. 1,865,701, 5.7.32. Appl., 9.11.28).—Reduced vat or S dyes are intimately mixed with the xanthate solution, which is then spun into an acid coagulating bath in which the dyes are re-oxidised and fixed in the filaments. B. P. R.

**[Unshrinkable] finishing of fabric.** J. ROBERTSON, Assr. to NORTH CAROLINA FINISHING Co., INC. (U.S.P. 1,864,373, 21.6.32. Appl., 12.11.31).—Wet fabric, immediately after bleaching and dyeing, is dried on a stenter under tension in warp and weft (the fabric is then somewhat longer and narrower than the specified finished dimensions), calendered in a blanket machine, moistened by means of steam and  $\text{H}_2\text{O}$  sprays, and then dried without warp and weft tension, stretched in the weft by passage through a belt-stretcher, calendered, and the moistening and drying treatments are repeated. A. J. H.

**Treatment [for increasing heat-resisting properties] of textile materials comprising organic**

derivatives of cellulose. BRIT. CELANESE, LTD., W. A. DICKIE, and F. B. HILL (B.P. 391,105, 17.9.31).—The safe ironing temp. of cellulose acetate etc. silk is raised by impregnation with a mixture of a borate or phosphate and a halide (e.g., bromide) of a volatile base (e.g.,  $\text{NH}_3$ ) combined with a weighting treatment using an insol. compound of Sn (e.g., the phosphate or silicate). For weighting, the silk may be previously partly saponified or made receptive for the weighting substances by treatment with swelling agents. A. J. H.

**Treating [carbonising] animal fibres.** R. FEIBELMANN, ASSR. TO CHEM. FABR. VON HEYDEN A.-G. (U.S.P. 1,864,718, 28.6.32. Appl., 25.10.28. Ger., 11.2.28).—The  $\text{H}_2\text{SO}_4$  usually employed in carbonisation is wholly or partly replaced by an aromatic sulphonic acid, e.g.,  $p\text{-C}_6\text{H}_4\text{Me}\cdot\text{SO}_3\text{H}$  and 1- or 2- $\text{C}_{10}\text{H}_7\cdot\text{SO}_3\text{H}$ . A. J. H.

**Impregnation of thick textile products with [rubber] latex under great hydraulic pressures.** J. DUARRY-SERRA (B.P. 391,031, 30.9.32. Ger., 13.1.32).—Latex, the viscosity of which, together with its resistance to frictional coagulation, has been increased by the addition of the sap of certain cactus plants or of castor-oil soap, is forced into the fabrics in a closed container under a pressure  $> 50$  atm. Penetration may be assisted by the addition of EtOH to the latex and working at 50–70°, whilst the stability of the latex may be increased by adding  $\text{Na}_2\text{SiO}_3$ . Incorporation of  $\text{NH}_4$  carbonate in the latex facilitates eventual drying by heat. D. F. T.

**Machines for treating fibrous materials with liquids.** W. W. L., J. L., and D. L. LISHMAN (B.P. 391,612, 7.5.32).

**Preservative [for textiles].**—See XVIII.

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

**Purification of crude saltpetre.** M. B. DONALD (Chem. and Ind., 1933, 405).—Datta's process (B., 1933, 463) is based on the assumption that the solubilities of NaCl and  $\text{KNO}_3$  are the same in a solution containing both salts as in pure  $\text{H}_2\text{O}$ , which is not true. (Cf. A., 1927, 22; 1929, 1388). D. R. D.

**Detection of silver in bismuth salts.** J. F. REITH (Pharm. J., 1933, 130, 316).—25 p.p.m. of Ag are detectable, almost specifically, by the formation of the red or violet Ag salt of *p*-dimethylaminobenzylidenerhodanine (Feigl, A., 1928, 1108). The test ordinarily reveals 0.02 p.p.m. of Ag, but is here vitiated owing to the moderately conc. HCl in which the Bi salt must be dissolved. W. S.

**Conductivity titrations of basic chromium sulphate solutions.** E. R. THEIS, A. W. GOETZ, and R. G. SNYDER (J. Amer. Leather Chem. Assoc., 1933, 28, 260–274).—Conductometric and potentiometric curves were derived for basic Cr sulphate solutions of different basicities. The former curves showed two equivalence points (A, B): A was obtained after adding a little NaOH to the sulphate solution, and was slightly increased by additions of NaCl, unaffected by  $\text{Na}_2\text{SO}_4$ , and diminished by  $\text{Na}_2\text{C}_2\text{O}_4$ . These points occur as a result of the neutralisation of a strong and

a weak acid, respectively. By determinations of the conductivities of Cr solutions containing NaCl,  $\text{Na}_2\text{SO}_4$ ,  $\text{Na}_2\text{C}_2\text{O}_4$ , and  $\text{H}_2\text{SO}_4$ , respectively, at different concns. and the conductivities of the above electrolytes alone at the same concns. it was shown that either there was a reaction between the added materials (except NaCl) and the Cr, forming an ion or ions of a conductance  $<$  that of the combined conductance of the separate substances, or the added materials were hydrated and the concn. of the Cr solution was thereby altered. NaCl had apparently no reaction on the Cr solution. D. W.

**Inception and development of electrolytic alkali manufacture.** E. A. LESUEUR (Trans. Electrochem. Soc., 1933, 63, 315–322).

**Electrolytic production of chlorates. I. Platinum anodes. II. Graphite electrodes.** I. S. KATZEN and P. I. SOKOLOV (J. Appl. Chem., Russia, 1932, 5, 902–915, 916–928).—I. In the electrolysis of NaCl ( $< 14$ –15%), preferably with a Cu cathode in a cement bath in presence of 1.3%  $\text{K}_2\text{Cr}_2\text{O}_7$  and with c.d.  $> 0.5$  amp. per sq. cm., the current concn. may be  $\geq 8$  amp. per litre; the optimum acidity must be determined empirically. A current efficiency of 90–92% can be obtained with a voltage of 4–4.5.

II. Electrodes containing 60% of graphite may be used; the acidity of the solution must be  $>$  with Pt electrodes. Deterioration of the electrodes increases with increase in c.d. and is faster in solutions of low acidity and at high c.d.; it is greater at 70° than at 50°.

CH. ABS.

**Electrolytic production of hydrogen peroxide from sulphuric acid.** A. I. BRODSKI, A. S. AFANASIEV, and M. G. DIKOVA (J. Appl. Chem., Russia, 1932, 5, 929–945).— $\text{H}_2\text{O}_2$  is produced by electrolysis of aq.  $\text{H}_2\text{SO}_4$  (30–35% commercial), with a Pt anode and Al cathode, at c.d. 200 amp. per sq. in., 30 amp. per litre; the product containing 3–3.5 g. of active O per litre is distilled to give 1–1.5%  $\text{H}_2\text{O}_2$ . Electrolysis and primary distillation can be made continuous with a current efficiency of 45–50%. CH. ABS.

**Assay of nitrogen monoxide.** J. C. KRANTZ, JUN., W. F. REINDOLLAR, and C. J. CARR (J. Amer. Pharm. Assoc., 1933, 22, 218–220).— $\text{N}_2\text{O}$  is absorbed by  $\text{H}_2\text{O}$  at 0° in a nitrometer. Analyses of a series of samples are given. E. H. S.

**Analysis of Bordeaux-Pb arsenate mixtures.**—See XVI. **Fowler's solution.**—See XX. **Detecting CO traces in air.**—See XXIII.

## PATENTS.

**Production of active silicic acid or active mixed gels of silicic acid with metal hydroxides or metal oxides, or mixed gels of silicic acid with active carbon.** "SALVIS" A.-G. F. NÄHRMITTEL U. CHEM. IND. (B.P. 391,322, 21.5.32. Ger., 21.5.31).—0.1–15 wt.-% (calc. on dry  $\text{SiO}_2$ ) of fibres possessing capillaries or leaving them behind on heating, e.g., animal hair, cotton, artificial silk, wood fibre, are added at any stage of manufacture prior to drying of a simple or mixed  $\text{SiO}_2$  gel. If necessary, the product is treated with a current of hot air to char or burn the fibres after or during drying. L. A. C.

Carrying out of operations with ammonia at elevated temperatures. E. I. DU PONT DE NEMOURS & Co. (B.P. 390,809, 7.10.31. U.S., 7.10.30).—To protect the metal surfaces from attack during such operations they are coated with a porous layer of a catalyst active for the decomp. of  $\text{NH}_3$  into its elements; *e.g.*, a paste of aq.  $\text{Na}_2\text{SiO}_3$  with finely-divided  $\text{Fe}_3\text{O}_4$  mixed with 3% each of  $\text{MgO}$  and  $\text{Al}_2\text{O}_3$  is applied to the surface and baked at 600–800°. The layer may be pretreated with  $\text{H}_2$  or gases containing it. L. A. C.

Manufacture of ammonium salts. N. V. DE BATAAFSCHE PETROLEUM MAATS., Assees. of D. PYZEL (B.P. 390,980, 8.7.32. U.S., 8.7.31).— $\text{NH}_3$  and  $\text{H}_2\text{SO}_4$  are introduced into a cylindrical vessel (*A*) maintained under vac. to regulate the temp. and containing aq. liquor which is circulated through external apparatus for removing the larger  $(\text{NH}_4)_2\text{SO}_4$  crystals and reheating the mother-liquor together with the smaller crystals before return to *A*. L. A. C.

Manufacture of ammonium sulphate and iron compounds. W. J. TENNANT. FROM TITAN CO. A./S. (B.P. 391,228, 24.10.31).—A mixture of cryst.  $\text{FeSO}_4$  with Fe oxides, *e.g.*, residues from a previous operation, is treated at 50–100°, *e.g.*, in a worm conveyor with a countercurrent of  $\text{NH}_3$ ;  $(\text{NH}_4)_2\text{SO}_4$  is extracted from the product. L. A. C.

Production of [fertiliser] mixtures of ammonium sulphate and diammonium phosphate. C. J. HANSEN, Assr. to KOPPERS Co. (U.S.P. 1,866,564, 12.7.32. Appl., 4.5.31. Ger., 5.5.30).—To obtain mixtures of  $(\text{NH}_4)_2\text{SO}_4$  (I) and  $(\text{NH}_4)_2\text{HPO}_4$  (II) from a solution of (I) and  $\text{NH}_4$  phosphates, a saturated solution of (I) and (II) is heated and to this is added the solution of (I) and  $\text{NH}_4$  phosphates; the salt which separates out is treated with a saturated solution of (I) and (II) to which  $\text{NH}_3$  is added, and the crystals are removed and dried. S. H. M.

Improving the capacity of sodium nitrate for being stored and scattered. J. Y. JOHNSON. FROM I. G. FARBENIND. A.-G. (B.P. 391,276, 13.2.32).—A  $\text{NaNO}_3$  melt containing 1.5–12% (preferably 3–5%) of another nitrate, *e.g.*,  $\text{KNO}_3$ ,  $\text{NH}_4\text{NO}_3$ ,  $\text{Mg}(\text{NO}_3)_2$ , or of an  $\text{NH}_4$  salt, *e.g.*,  $(\text{NH}_4)_2\text{SO}_4$ , is solidified by spraying. L. A. C.

Alkali iodide composition. J. L. SMITH, Assr. to C. PFIZER & Co., INC. (U.S.P. 1,869,518, 2.8.32. Appl., 1.8.29).—Finely-divided alkali iodide (I) (for admixture with cattle food etc.) is prevented from caking by addition of 2% of an oxide having greater affinity for  $\text{H}_2\text{O}$  than (I), *e.g.*,  $\text{CaO}$ , with, if desired, 8% of  $\text{CaCO}_3$ . B. M. V.

Production of detergents containing alkali silicates. I. G. FARBENIND. A.-G. (B.P. 391,407, 30.12.32. Ger., 20.1.32).— $\text{SiO}_2$  is heated with aq.  $\text{NaOH}$  at a temp. such that the material crumbles to a powder, and subsequently at 250–300° completely to remove  $\text{H}_2\text{O}$ ; the product is freed from insol. material by dissolution and filtration, and the solution evaporated to dryness or conc. to yield cryst.  $\text{Na}_2\text{SiO}_3$ .  $\text{Ca}(\text{OCl})_2$  may be added to the product, or the solution before evaporation may be treated with  $\text{Cl}_2$ . L. A. C.

Treatment of phosphatic rocks. NORSK HYDRO-ELEKTRISK KVAELSTOF-A./S. (B.P. 391,328, 6.6.32.

Norw., 12.5.32. Addn. to B.P. 390,353; B., 1933, 464).—From the solution obtained after removal of the double Ca salt by filtration, the residual Ca and Fe are pptd. as a mixture (*A*) of their phosphates by neutralisation at 100° with  $\text{NH}_3$ .  $(\text{NH}_4)_2\text{HPO}_4$  and  $\text{NH}_4\text{NO}_3$  are subsequently crystallised out by cooling. The mother-liquor and *A* are returned to the process at the neutralisation stage and after the initial decomp., respectively. L. A. C.

Treatment [dehalogenation] of crude phosphates. NORSK HYDRO-ELEKTRISK KVAELSTOF-A./S. (B.P. 391,345, 23.7.32. Norw., 29.8.31).—The phosphates are calcined with  $\text{H}_3\text{PO}_4$  or, *e.g.*, superphosphates, prior to decomp. with acids. L. A. C.

Preparation of calcium chloride [from oil-well brines]. O. V. MARTIN, Assr. to TEXACO SALT PRODUCTS Co. (U.S.P. 1,869,906, 2.8.32. Appl., 14.11.27. Renewed 9.9.31).—The brines are purified by addition of  $\text{CaO}$  and evaporated by waste heat and spraying up to < 15% (preferably to 35%)  $\text{CaCl}_2$ , the  $\text{NaCl}$  being pptd. out. Evaporation after filtration is continued in a kettle up to 60–70%  $\text{CaCl}_2$ , filtering being effected at about 50% concn.  $\text{CaCl}_2$ , aq. crystallises on cooling. B. M. V.

Production of bleaching powder. A. L. MOND. FROM I. G. FARBENIND. A.-G. (B.P. 391,078, 17.12.32).— $\text{Ca}(\text{OH})_2$  is chlorinated to 30–34% available Cl and the product, after drying, is mixed with sufficient anhyd.  $\text{Ca}(\text{OCl})_2$  to raise the available Cl content to < 36–37%. L. A. C.

Burning of pyrites, or iron sulphide, and production of iron oxide, sulphur, and sulphur dioxide. D. TYRER, and IMPERIAL CHEM. INDUSTRIES, LTD. (B.P. 391,136, 15.10.31).—A  $\text{SO}_2$  concn. of < 20% is maintained at the top of or just above the combustion zone (*A*) by introducing into the burner above the air inlets a portion of the exit gases after these have been freed from S, conc. to remove part of the  $\text{N}_2$ , and preheated to a temp. < that of *A*. The combustion air may also be preheated and coke added to the charge. L. A. C.

Manufacture of copper sulphate. P. J. F. SOUVIRON (U.S.P. 1,869,521, 2.8.32. Appl., 5.12.29. Fr., 15.12.28).—Cu is treated with a solution of  $\text{CuCl}_2$  (150 g./litre), containing  $\text{CuSO}_4$  from a previous round, in presence of air; the  $\text{Cu}_2\text{OCl}_2$  formed is allowed to settle and the mud treated with  $\text{H}_2\text{SO}_4$ ,  $\text{CuSO}_4$  being directly crystallised. The mother-liquor is re-used. B. M. V.

Production of [radioactive] luminous compound and luminous objects therewith. H. SCHLUNDT, Assr. to UNITED STATES RADIUM CORP. (U.S.P. 1,866,132, 5.7.32. Appl., 22.3.29).—To protect users of radioactive materials from injury due to Ra-Em and  $\gamma$ -rays, the solution of a Ra salt is de-emanated (*e.g.*, by boiling) and a radioactive-sensitive compound ( $\text{ZnS}$ ) is added. The solution is then evaporated to dryness at 100–110° and the dry mass, after screening, is ready for use, while in a state of temporary inactivity. (Cf. B., 1931, 839.)

Extraction of metal values [beryllium or zirconium salts] from ores. BERYLLIUM DEVELOPMENT CORP., Assees. of H. C. CLAFLIN and D. O. HUBBARD (B.P. 391,369, 13.10.32. U.S., 23.10.31).—Finely-divided beryl is mixed with sufficient  $\text{NaF}$  to give a mol. ratio of  $\text{BeO} : \text{NaF} = 1 : 2$  and the mixture is heated

at 500–1000° in a current of  $\text{SiF}_4$ , whereby sol.  $\text{Na}_2\text{BeF}_4$  is formed and the  $\text{SiO}_2$  and  $\text{Al}_2\text{O}_3$  are rendered insol. In the same way  $\text{ZrSiO}_4$  and  $2\text{KF}$  yield  $\text{K}_2\text{ZrF}_6$  and  $2\text{SiO}_2$ . The  $\text{BeO}$  or  $\text{ZrO}_2$  can be recovered from the solution by treatment with  $\text{NaOH}$  or  $\text{KOH}$  and the resulting  $\text{NaF}$  or  $\text{KF}$  used again in the process or converted into  $\text{SiF}_4$ . A. R. P.

[Catalyst for] production of hydrogen. A. T. LARSON, Assr. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,865,770, 5.7.32. Appl., 21.7.27).—A mixture of steam and  $\text{CO}$  is subjected, under pressure if desired, to the action of a catalyst obtained by reducing (in  $\text{H}_2$ ) a fused mixture of an oxide of a metal of the Fe group and  $\text{CuO}$ . S. H. M.

Production of nitrogen or hydrogen-nitrogen mixtures [from ammonia]. E. H. SALISBURY, and IMPERIAL CHEM. INDUSTRIES, LTD. (B.P. 390,870, 20.10.31 and 21.6.32).— $\text{NH}_3$  is passed through a coiled Fe tube situated in a cylindrical combustion chamber (A) so that at least part of the gas is decomposed into its elements; the mixed gases pass to the lower end of A, where they are mixed with sufficient air for combustion to  $\text{H}_2\text{O}$  (the heat generated being used again in the process), the end-products being pure  $\text{N}_2$  or a  $\text{N}_2\text{—H}_2$  mixture according to the proportions of air admitted. L. A. C.

$\text{H}_2\text{O}$ -decomp. cells.—See XI.

## VIII.—GLASS; CERAMICS.

Selenium glasses. L. SPRINGER (Sprechsaal Keram., 1932, 65, 790–792; Chem. Zentr., 1933, i, 284).—Melts of Na–Ca, K–Ca, and Zn glasses were treated with  $\text{Na}_2\text{SeO}_3$ , Se, and  $\text{As}_2\text{O}_3$ . Se in > a certain quantity does not further deepen the colour; Se has a greater effect than  $\text{Na}_2\text{SeO}_3$ , but the effect of the latter is increased by  $\text{As}_2\text{O}_3$ , apparently owing to separation of Se. Se and  $\text{As}_2\text{O}_3$  give a slight colour, apparently owing to oxidation of Se. K-glasses are more deeply coloured than Na-glasses; CaO–ZnO glasses give only slight colorations. The results of addition of CdS or  $\text{KNO}_3$  on the colours of various glasses are reported. A. A. E.

Effect of barium oxide on the properties of technical glasses. F. H. ZSCHACKE, W. HÖFLER, and A. RIAZA (Keram. Rundsch., 1932, 40, 534–536, 558–561; Chem. Zentr., 1933, i, 103).—In glasses with 10%  $\text{RO}$ , substitution of  $\text{CaO}$  by  $\text{BaO}$  raises the speed of melting. The clarifying velocity at first increases and then decreases; the glasses are “longer.” Pure  $\text{BaO}$  glass is almost colourless; the workability and the lustre are improved by  $\text{BaO}$ . On substitution of  $\text{Na}_2\text{O}$  by  $\text{BaO}$  the melting velocity is at first almost unchanged, but larger quantities reduce it; clarification is more difficult and the colour darker.  $\text{BaO}$  glasses poor in  $\text{Na}_2\text{O}$  readily devitrify. Prolonged melting produces a brown colour due to sulphide. A. A. E.

Testing of ampoule glasses. G. DULTZ (Pharm. Ztg., 1933, 78, 482–483).—In the standard “alkalinity” test (autoclaving the ampoule filled with  $\text{HCl}$ –Me-red solution until the colour changes), no allowance is made for the greater sp. surface exposed by the smaller ampoules. Tables are given showing the concn. of acid which

must be used for the various sizes in order to obtain strictly comparable results. J. A. S.

Influence of chromic oxide and alumina on the formation of tricalcium silicate. S. KONDO and K. MOTEKI (J. Japan. Ceram. Assoc., 1932, 40, 559–564).—The materials were heated at 1530° for 2 hr. Addition of > 0.5%  $\text{Al}_2\text{O}_3$  caused rapid decrease in the free  $\text{CaO}$  and rapid increase in the formation of  $3\text{CaO}\cdot\text{SiO}_2$ . The formation of the silicate was increased by 0.5%  $\text{Cr}_2\text{O}_3$  and decreased by 3%  $\text{Cr}_2\text{O}_3$ .  $\text{Al}_2\text{O}_3$  slightly increased the 28-day strength;  $\text{Cr}_2\text{O}_3$  greatly increased the 3–28-day strength. The results do not support the view that  $3\text{CaO}\cdot\text{SiO}_2$  controls the early strength of Portland cement.  $\text{Cr}_2\text{O}_3$  forms a solid solution with  $3\text{CaO}\cdot\text{SiO}_2$ . CH. ABS.

Tunnel kiln for magnesite burning. ANON. (Feuerfest, 1933, 9, 54–56).—A pressure gas- + oil-fired kiln (capacity 60 tons/24 hr.) for temp. up to 1700° is described. J. A. S.

Ceramic heating elements for electric furnaces. L. LITINSKY (Feuerfest, 1933, 9, 49–54).—The properties and behaviour of C, noble metals (Mo, W, etc.), metal oxides ( $\text{TiO}_2$ ,  $\text{Mn}_3\text{O}_4$ , etc.),  $\text{Al}_2\text{O}_3$ ,  $\text{MgO}$ , nitrides, and carbides, and of a no. of proprietary products, are outlined. J. A. S.

Sidelights on refractories. R. P. SMITH and A. MCKENDRICK (Trans. Ceram. Soc., 1933, 32, 167–184).—The correct use of refractories in the open-hearth furnace (I), and in furnace maintenance and repair, is discussed as an important means of reducing the costs of steel-melting, and details are given of brick consumption and brick trials in (I). Electrically-fused magnesite bricks, tested in the crown and ports, were initially promising, but failed by spalling. Satisfactory results were obtained with roofs built of bricks ground flat and true to size; the suspended roof (constructed so as to allow local renewals to be made) is concluded to be the correct form for the crown of (I). Chrome bricks were most suitable for gas slopes, and chrome–magnesite paste was adopted for repairing gas slopes and for lining ports. Of the ordinary magnesite, steel-cased magnesite, dolomite, and electrically-fused magnesite bricks tested in the back walls of (I), the last-named was most successful, but did not justify discontinuing the use of  $\text{SiO}_2$  bricks. Factors contributing to the economical use of bricks in ladle linings are given. A. L. R.

## PATENTS.

Obtaining colloidal clays from ordinary surface clays. O. E. J. ABRAHAMSON (U.S.P. 1,865,496, 5.7.32. Appl., 30.7.29).—Ordinary clay is mixed with  $\text{H}_2\text{O}$  (to about 33% concn.) and centrifuged to remove particles > 0.0002 in. diam. The remaining suspension is again centrifuged at a greater speed and the smaller particles are recovered in a colloidal state. Careful control of the rate of feed and of rotation is important. S. H. M.

Refractory lining for melting pots. G. R. BROPHY and G. SCORZONI, Assrs. to GEN. ELECTRIC Co. (U.S.P. 1,870,034, 2.8.32. Appl., 26.3.27).—A metallic receptacle is lined with a mixture of  $\text{Ca}(\text{OH})_2$  100, inorg. binder (e.g.,  $\text{MgSO}_4$ , borax,  $\text{Na}_2\text{SiO}_3$ ) 6, vitreous enamel 26, org.

binder 12 pts. This coating is then dried and baked at 500—700°. B. M. V.

Tunnel ovens.—See I.

### IX.—BUILDING MATERIALS.

**Magnesia content of Portland cement.** S. KONDO and S. WADA (J. Japan. Ceram. Assoc., 1932, 40, 769—779).—MgO appears to promote the chemical combination of CaO. With 8% MgO and hydraulic modulus (H.M.) 2.00 the cement had normal strength; with 8% MgO and H.M. 1.77—2.10 the strength was greatest at H.M. 2.10. The latter was also the strongest after curing in H<sub>2</sub>O and heating in an autoclave. For H.M. 2.00 the expansion increased with the Mg content; for MgO 8% it decreased rapidly with increase in H.M. Up to 8% MgO is therefore permissible. Part of the MgO probably reacts with Fe<sub>2</sub>O<sub>3</sub> at first, the remainder forming a solid solution with 3CaO, SiO<sub>2</sub> up to a certain limit. CH. ABS.

**Hydration of alumina cement.** I. K. KOYANAGI (J. Japan. Ceram. Assoc., 1932, 40, 489—499).—On hydration of the cement (SiO<sub>2</sub> 8.80, Al<sub>2</sub>O<sub>3</sub> 39.64, Fe<sub>2</sub>O<sub>3</sub> 8.84, CaO 42.30, MgO 0.56, SO<sub>3</sub> 0.09%) a little Ca(OH)<sub>2</sub> produced by decomp. of Ca silicates present in small quantity reacts thus: Ca(OH)<sub>2</sub> + CaO, Al<sub>2</sub>O<sub>3</sub> + 6.5H<sub>2</sub>O = 2CaO, Al<sub>2</sub>O<sub>3</sub>, 7.5H<sub>2</sub>O. Then the principal reaction, to which the hardening is chiefly due, begins: 2(CaO, Al<sub>2</sub>O<sub>3</sub>) + 10.5H<sub>2</sub>O = 2CaO, Al<sub>2</sub>O<sub>3</sub>, 7.5H<sub>2</sub>O + Al<sub>2</sub>O<sub>3</sub>, 3H<sub>2</sub>O, and is accompanied to a small extent by: 3(2CaO, Al<sub>2</sub>O<sub>3</sub>) + 3H<sub>2</sub>O = 2(3CaO, Al<sub>2</sub>O<sub>3</sub>) + Al<sub>2</sub>O<sub>3</sub>, 3H<sub>2</sub>O and 3CaO, Al<sub>2</sub>O<sub>3</sub> + 3H<sub>2</sub>O = 3Ca(OH)<sub>2</sub> + Al<sub>2</sub>O<sub>3</sub>, 3H<sub>2</sub>O. CH. ABS.

**Calcium aluminates.** III. Microscopical investigation of their hydration. IV. Time of setting and compressive strength. S. KONDO and T. YAMAUCHI (J. Japan. Ceram. Assoc., 1932, 40, 212—233; cf. A., 1932, 822).—III. Three forms of hydrated Ca aluminates were found. The forms produced on hydration of 3CaO, Al<sub>2</sub>O<sub>3</sub>, 5CaO, 3Al<sub>2</sub>O<sub>3</sub>, CaO, Al<sub>2</sub>O<sub>3</sub>, and 3CaO, 5Al<sub>2</sub>O<sub>3</sub> are recorded.

IV. The time of setting, rise of temp. in setting, and small-piece compressive strength of samples obtained by heating mixtures of the above compounds at 1200—1500° were measured, and the relation between strength and microstructure is discussed. In general, curing in air was more favourable than that in H<sub>2</sub>O.

CH. ABS.

**Calorimetric determination of calcium hydroxide in puzzuolana mortars and hardened puzzuolana cements.** C. VITTORI (Annali Chim. Appl., 1933, 23, 88—94).—Bessey's method (B., 1930, 949) has been successfully used for following the gradual fixing of the Ca(OH)<sub>2</sub> in puzzuolana materials. T. H. P.

**Testing concrete in compression.** J. SINGLETON-GREEN (Munic. Eng., San. Rec., 1933, 91, 75—77, 101—103).—The method of preparing and treating the test cubes and of cutting cylinders from laid concrete is described. Variations in core strength found were due to a non-uniform rate of application of the load, error in capping the cores, and the impossibility of eliminating friction between the head of the testing machine and the end of the core. C. A. K.

**Characterisation of woods by the magnetism of their ash.** E. WEDEKIND [with W. REISCHEL] (Forstl. Woch. Silva, 1932, 20, 341—342; Chem. Zentr., 1933, i, 335).—Wood-ash is ferromagnetic, the Fe being present as Fe<sub>3</sub>O<sub>4</sub>; ash of larch is most, and of birch least, magnetic. Accurate differentiation is possible. The ash catalytically decomposes H<sub>2</sub>O<sub>2</sub>. A. A. E.

**Chemical changes in pinewood caused by larvæ of *Hylotrupes bajulus*.** O. HORN (Ges. Abh. Kennt. Kohle, 1930, 10, 23—28; Chem. Zentr., 1933, i, 530).—The wood dust is 12% low in cellulose and correspondingly rich in lignin. The excreta have a similar composition. A. A. E.

**Road-tar emulsions.**—See V. **Formation of 3CaO, SiO<sub>2</sub>.**—See VIII.

### PATENTS.

[Lime] kiln. H. MISCAMPBELL, Assr. to BLAW-KNOX CO. (U.S.P. 1,869,705, 2.8.32. Appl., 18.2.29).—Hollow baffles for building into the walls of a lime kiln are described, the hollows being open at one end to the kiln. B. M. V.

**Manufacture of Portland cement.** E. W. RICE, Assr. to SANTA CRUZ PORTLAND CEMENT CO. (U.S.P. 1,864,935, 28.6.32. Appl., 27.8.29).—Ground calcined gypsum in the form of slurry is added to the clinker and the materials are ground together before the plaster sets. C. A. K.

**Colour coat for cemented surfaces.** W. D. RIAL, Assr. to RICHFIELD OIL CO. OF CALIFORNIA (U.S.P. 1,864,942, 28.6.32. Appl., 5.7.28).—The sludge derived from the H<sub>2</sub>SO<sub>4</sub> treatment of an asphalt-base lubricating oil stock is neutralised in two stages with an alkali and the sulphate salts are washed out. The neutralised sludge is then treated with an alkaline solution to form the colour coat. C. A. K.

**Manufacture of [light] structural material.** W. R. KAPPES, Assr. to ALUMINUM CO. OF AMERICA (U.S.P. 1,865,192, 28.6.32. Appl., 26.3.31).—Light fibrous boards are made from a pulp in which gas bubbles are generated by the reaction between a solid, e.g., powdered Al, and a suitable reagent, e.g., an alkali. C. A. K.

**Treatment of slag wool.** J. C. CARLIN, Assr. to TENNESSEE PRODUCTS CORP. (U.S.P. 1,870,094, 2.8.32. Appl., 9.10.30).—To render the wool dustless it is saturated with a dil. solution of a deliquescent salt (e.g., CaCl<sub>2</sub>), the excess is removed, and the remainder dried. B. M. V.

**Bituminous emulsions.**—See II. **Pulp board.**—See V. **Preservative [for timber].**—See XVIII.

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

**Determination of lead, copper, and zinc in [iron] ores and pyrites cinder.** H. VOIGT (Arch. Eisenhüttenw., 1932—3, 6, 433—436).—The ore is dissolved in HCl, with the aid of KClO<sub>3</sub> if sulphides are present, the solution is evaporated with FeCl<sub>2</sub> to expel As, and the residue collected, treated with HF and H<sub>2</sub>SO<sub>4</sub> to remove SiO<sub>2</sub>, fused with Na<sub>2</sub>CO<sub>3</sub> to decompose BaSO<sub>4</sub>

and  $\text{PbSO}_4$ , and eventually dissolved in  $\text{HCl}$ . The combined  $\text{HCl}$  liquors are treated at  $100^\circ$  with  $\text{Na}_2\text{HPO}_2$  to reduce  $\text{Fe}^{+++}$  to  $\text{Fe}^{++}$ , cooled, treated with aq.  $\text{NH}_3$  in slight excess and then with 3% aq.  $\text{H}_2\text{C}_2\text{O}_4$  until the ppt. is redissolved, and saturated with  $\text{H}_2\text{S}$  to ppt.  $\text{Pb}$ ,  $\text{Bi}$ ,  $\text{Cu}$ , and  $\text{Zn}$ . The washed ppt. is dissolved in  $\text{HNO}_3$ , the  $\text{Pb}$  separated as  $\text{PbSO}_4$ , the  $\text{Bi}$  as basic carbonate, the  $\text{Cu}$  by electrolysis, and the  $\text{Zn}$  by pptn. as  $\text{ZnS}$ .  $\text{Co}$  and  $\text{Ni}$  are not pptd. by  $\text{H}_2\text{S}$  from  $\text{H}_2\text{C}_2\text{O}_4$  solution. A. R. P.

**Distribution of phosphorus between iron and calcareous iron phosphate slags.** W. BISCHOF and E. MAURER (Arch. Eisenhüttenw., 1932—3, 6, 415—421).—Under a  $\text{FeO-P}_2\text{O}_5$  slag the ratio ( $\text{P}_2\text{O}_5$  in slag):(P in metal) = 5—8 when the total P is < 4% of the total Fe; temp. has little effect on this distribution const. (*D*). With addition of  $\text{CaO}$  to the slag a rapid increase in *D* occurs to a max. of 245 at 40%  $\text{CaO}$  and  $1575^\circ$ ; with rise in temp. the max. remains at 40%  $\text{CaO}$ , but *D* decreases rapidly to 130 at  $1675^\circ$  and 55 at  $1775^\circ$  irrespective of the abs. amount of P in the metal and slag phases. A. R. P.

**Effect of nickel on stability of iron carbide and on microscopic structure of white cast-iron compositions.** M. J. STUTZMAN (Metals & Alloys, 1933, 4, 55—58).—The effect of Ni on the time required for the first stage of the graphitisation of cast Fe at  $936^\circ$  (i.e., for complete disappearance of free  $\text{Fe}_3\text{C}$ ) is given by the expression  $t = 12 \cdot 0e^{-0.654N}$ , where *N* is the % Ni in the alloy. For an alloy with 2.3% C and 0.94% Si the addition of 4% Ni reduces *t* from 12 hr. to 1 hr., i.e., 3 times as much Ni as Si is required to effect an equiv. reduction in the time required for the graphitisation of the free  $\text{Fe}_3\text{C}$ . The size of the graphite particles is reduced proportionally with increase in Ni content up to 3%, but at 3.5% Ni there is an abrupt decrease in the size. The  $\text{Ac}_1$  point of Fe-C-Ni alloys containing 0.95% Si falls linearly with increasing Ni to  $700^\circ$  at 7.5% Ni, and the  $\text{Ar}_1$  point falls similarly to  $600^\circ$  at about 7% Ni. Micrographs are included to show that Ni has practically no effect on the microstructure of free  $\text{Fe}_3\text{C}$  in white cast Fe, but changes the matrix to martensite or austenite, refines the ferrite grains, and increases the no. of C nuclei of malleabilised cast Fe. A. R. P.

**Heat effects on tempering quenched carbon steels.** F. STÄBLEIN and H. JÄGER (Arch. Eisenhüttenw., 1932—3, 6, 445—451).—The heat evolved on tempering at  $450^\circ$  plain C steels which have been quenched from above the  $\text{A}_1$  point rises linearly with the C content from 0 to 11 g.-cal. per g. with 0—1% C. The val. for the eutectoidal steel is 10 g.-cal. per g., which is reduced by 1.5 g.-cal. per g. if the steel is cooled in liquid air before tempering; almost half this quantity of heat is due to the decomp. of residual austenite, the heat of transformation of which at  $300^\circ$  is about 30 g.-cal. per g. The heat of dissolution of C in pearlite is about 5—6 g.-cal. per g. A. R. P.

**Invar.** C. E. GUILLAUME (Nature, 1933, 131, 658).—A correction (cf. B., 1933, 470). L. S. T.

**Hardening of austenitic nickel-chromium steels.** P. CHEVENARD (Rev. Nickel, 1932, 3, 91—95; Chem.

Zentr., 1933, i, 294).—The physical properties of steel (Ni 35.2, Cr 11.5, C 0.3%) after tempering or hardening at different temp., and the effect of adding Al (3.65%) on the hardening, are considered. Surface-hardening by nitridation improves the mechanical properties of these alloys. A. A. E.

**Thermal treatment of rustless nickel-chromium steels.** A. MICHEL (Rev. Nickel, 1932, 3, 105—108; Chem. Zentr., 1933, i, 294).—The effect of Ni and Cr on the transformation points of Fe is considered. A. A. E.

**Steels resistant to chemical action.** A. PORTEVIN (Rev. Nickel, 1932, 3, 75—90; Chem. Zentr., 1933, i, 294).—A discussion of acid-resistant Cr, Ni-Cr, Ni-W, and Ni-Mo steels. A skin of Al and oxides, or martensitic Cr steel (13—16% Cr), ferritic Cr steel (25—40% Cr), austenitic Cr steel, or Cr-Fe-Ni steel with addition of Si, Al, Co, and Zr is protective against oxidation and high temp. A. A. E.

**Corrosion of "rustless" steel. Effect of surface condition.** J. COURNOT (Rev. Nickel, 1932, 3, 95—98; Chem. Zentr., 1933, i, 300).—Comparative tests with Fe and steels containing Cr 18, Ni 8%, Cr 10, Ni 23%, or Cr 13% are reported. Highly polished surfaces are best. A. A. E.

**Stainless-steel linings for vessels used in chemical processes.** W. E. JOMINY and R. S. ARCHER (Paper Trade J., 1933, 96; T.A.P.P.I. Sect., 200—207).—Such linings are satisfactory in the oil and general chemical industries, and possess advantages over ceramic linings for sulphite-pulp manufacture. None of the high-Cr steels may be hammer-welded, but a process of welding by rolling has been developed for thin sheets. Arc-welding is possible with some alloys, notably the 18% Cr—8% Ni (I) and 18% Cr—no Ni (II) types. The lower corrosion-resistance of such arc-welds has been overcome by evolving a suitable weld metal, by reducing the C content of the parent metal (thus eliminating  $\text{Cr}_4\text{C}_3$  pptn. at the grain boundaries), and by introducing other elements (Ti). Lining ordinary C steel with stainless steel, to reduce the expense of using solid stainless-steel vessels, is effected by spot-welding. Such spots have a shearing strength of 11,000 lb. per spot for (I) and 15,000 lb. for (II). The lining is not loosened when repeatedly heated and cooled. In regard to sulphite-pulp manufacture, tests of acid-resistance by increasing the cooking time are not practicable, since the concn. of  $\text{H}_2\text{SO}_4$  markedly increases with prolonged cooking, and causes corrosion which would not occur in practice, even after continual use. Under the same conditions of  $\text{CaHSO}_3$  concn., temp., and pressure, the liquor contained 3.70% of  $\text{H}_2\text{SO}_4$  after a 24-hr. cook and only 0.28% after 12 hr. This high concn. of  $\text{H}_2\text{SO}_4$  is not due to catalytic action of the steel, since it also occurs with enamelled linings. A no. of Cr-Ni steels are listed in order of corrosion-resistance. Steels of the 23% Cr—11% Ni group are the best, whilst 16% Cr—no Ni is the poorest. H. A. H.

**Permeability of steel to hydrogen at  $700$ — $1000^\circ$ .** G. LEWKONJA and W. BAUKLOH (Arch. Eisenhüttenw., 1932—3, 6, 453—457).—The permeability of plain steels with 0—1% C to  $\text{H}_2$  at  $700$ — $1000^\circ$  with a pressure

drop of 1 atm. increases with rise in temp. and C content and decreases with increase of thickness and grain size of the specimen. No diffusion occurs at the  $\beta$ - $\gamma$  transformation point in Armco Fe, and ferrite is the least permeable of the ordinary constituents of steels; the diffusion occurs in all cases along the grain boundaries, hence the rate of diffusion of  $H_2$  through a steel slowly decreases as decarburisation and grain growth progress. By coating steels with a layer of Al 0.5 mm. thick by the "alutieren" process complete impermeability to  $H_2$  at 850° may be obtained. A. R. P.

**Potentiometric determination of molybdenum in steel.** P. DICKENS and R. BRENECKE (Arch. Eisenhüttenw., 1932—3, 6, 437—444).—The solution of the steel in HCl is oxidised with  $HNO_3$ , poured into an excess of NaOH, and boiled; an aliquot part of the filtrate is neutralised with  $HNO_3$  (Me-orange), treated with  $HCO_2Na$ , and titrated potentiometrically with  $Pb(ClO_4)_2$  using a Mo sheet as indicator electrode. If the steel contains W this must be removed as  $WO_3$  prior to treatment with NaOH; if V is present part of the  $Fe^{+++}$  must be reduced to  $Fe^{++}$  with  $Na_2SO_3$  before pouring the solution into the NaOH. The Mo may also be determined in the  $Na_2MoO_4$  solution, obtained as above, by adding HCl until the combined liquid contains 50% of conc. HCl and titrating potentiometrically with  $SnCl_2$  in a  $CO_2$  atm. A. R. P.

**Degasification of casting copper by lithium.** A. BURKHARDT and G. SACHS (Metallwirt., 1932, 11, 239—242; Chem. Zentr., 1933, i, 295—296).—Of the substances tested Li and Be (0.01%) had the best effect on the mechanical properties. A. A. E.

**Recovery of copper from foundry waste.** F. VOGEL (Metall u. Erz, 1932, 29, 411—417; Chem. Zentr., 1933, i, 295).—Processes are discussed. Wet processes are considered unsuitable. A. A. E.

**Viscosity of Mansfield copper blast-furnace slags in relation to temperature, composition, and crystallisation.** K. ENDELL, W. MÜLLENSIEFEN, and K. WAGENMANN (Metall u. Erz, 1932, 29, 368—375; Chem. Zentr., 1933, i, 295).—Measurements were made from room temp. to 1400°. At 1130—1400° the viscosity increases considerably with fall in temp.;  $SiO_2$  and  $Al_2O_3$  increase it, whilst  $FeO$ ,  $CaO$ ,  $MgO$ ,  $K_2O$ , and  $Na_2O$  decrease it. At < 1130° the viscosity is increased also by crystallisation. A. A. E.

**Strength of  $\beta'$ -brass.** U. DEHLINGER and F. MENDEL (Metallwirt., 1932, 11, 424; Chem. Zentr., 1933, i, 116).—A body-centred lattice is attained only by heating for 1 hr. at < 460°; the strength then decreases and the elongation increases. It is peculiar to metallic compounds that random distribution of atoms in the lattice can exist, although not always in thermodynamic equilibrium. A. A. E.

**Copper-phosphorus alloys with a high phosphorus content.** A. BURKHARDT, W. LINICUS, and G. SACHS (Metallwirt., 1932, 11, 331—333; Chem. Zentr., 1933, i, 296).—The mechanical properties of Cu containing 0—12% P at —200° to 400° have been studied. The eutectic alloy (8.3% P) is of the greatest use, > 8.3% producing brittle alloys. The alloys have a greater resistance towards hot conc.  $H_3PO_4$ . A. A. E.

**Copper-nickel-silicon alloys.** M. BALLAY and A. LE THOMAS (Bull. Assoc. tech. Fond., 1932, 6, 598—611; Chem. Zentr., 1933, i, 296).—The effect of the Sn content of, and of addition of Si to, the alloys (e.g., Ni 50, Cu 34, Sn 16%), and of the pouring time and temp. on the hardness, has been studied. Cu-Sn-Si and Cu-Ni-Sn-Fe alloys subjected to various heat treatments were also examined. A. A. E.

**Corrosion of copper. Oxide protection in salt solutions.** L. W. HAASE (Metallwirt., 1932, 11, 516, 530—531, 556—557; Chem. Zentr., 1933, i, 300—301).— $NH_4 < K < Na$  promotes the formation of a protective oxide film; the anions, except  $NO_3^-$  and  $NO_2^-$ , play a subordinate part. A. A. E.

**Theory of structure-corrosion.** G. AKIMOV (Korrosion u. Metallschutz, 1932, 8, 197—205; Chem. Zentr., 1933, i, 122—123).—Corrosion in electrolytes is regarded as sp. electrochemical processes determined by p.d. between different crystallographic faces or structure-constituents. The diffusion of atm.  $O_2$  to the cathode determines the overall velocity of the process. Change in the anodic area does not affect the velocity, but increase in the cathodic area proportionally increases it. The behaviour of alloys of Al with Cu, Fe, Mn, Mg, and Si in 3% NaCl solution was studied, alizarin being used to detect the formation of  $Al(OH)_3$ . A. A. E.

**[Electrical] tension-corrosion of metals.** J. MCADAM, JUN. (Assoc. Int. Essai Mat. Congr. Zürich, 1931, 1, 228—246; Chem. Zentr., 1933, i, 496).—A discussion. There is a nearly linear logarithmic relation between the tension and the degree of injury. A. A. E.

**Chemical processes in the roasting of galena with lime.** I. TRIFONOV (Metall u. Erz, 1932, 29, 429—431; Chem. Zentr., 1933, i, 295).—Modern processes are discussed and processes formulated. A. A. E.

**Deoxidation of calcium sulphate in the roasting of galena by the Carmichael-Bradford process.** I. TRIFONOV (Metall u. Erz, 1932, 29, 364—365; Chem. Zentr., 1933, i, 295).—Part of the  $SO_2$  arises from the  $CaSO_4$  and part from the  $PbS$ . The coal causes a partial reduction of  $CaSO_4$  to  $CaS$ , and then the reaction  $CaS + 3CaSO_4 = 4CaO + 4SO_2$  occurs. A. A. E.

**Lead-tin bronzes, their constitution and use as bearing metals.** B. BLUMENTHAL (Metallwirt., 1932, 11, 360—362; Chem. Zentr., 1933, i, 117).—The system Cu-Sn-Pb is discussed with special reference to the determination of miscibility gaps. Alloys in the region of these gaps in the liquid state are fundamentally of technical application, although not yet used. The choice of bearing metals is discussed. A. A. E.

**Heavy metals of low m.p. in lead bearing metals.** K. L. ACKERMANN (Metallwirt., 1932, 11, 292—293; Chem. Zentr., 1933, i, 295).—The effect of Hg, Bi, Tl, and Cd on the mechanical properties of Pb and Pb bearing metals is considered. A. A. E.

**Flotation of mercury ores.** M. VAN DE PUTTE (Congr. Int. Mines, Met.; Sect. Met., 1930, 6, 465—467; Chem. Zentr., 1933, i, 117).—In general, direct roasting of Hg ores is preferred. Concn. by flotation is applicable to material containing  $BaSO_4$  and about 1.5%  $HgS$ . A. A. E.



**Separation-hardening (Aushärtung) [of metals].** O. FEUSSNER (Metallwirt., 1932, 11, 450—451; Chem. Zentr., 1933, i, 120).—Occlusion of  $H_2$  by Pd causes hardening, for which the continued presence of  $H_2$  is not necessary. The diffusion of  $H_2$  through the Pd lattice causes lattice distortion which is associated with the increase in hardness. Similar hardening of alloys from which excess of addendum separates on rapid cooling is analogously explained as due to deformation caused by movement of the addendum before its agglomeration and separation. Two processes are antagonistic: diffusion which increases hardness, and recrystallisation which removes it. A. A. E.

**Energy absorbed in the cold-working of metals.** W. ROSENHAIN and V. H. STOTT (Proc. Roy. Soc., 1933, A, 140, 9—25).—Measurements are made of the work done, and the heat produced, when a considerable length of wire (Al and Cu) is drawn through a die enclosed in a calorimeter. The order of magnitude of the energy differences found by Fraren and Taylor by direct extension of Al and Cu rods (*ibid.*, 1925, A, 107, 422) is confirmed. L. L. B.

**Extensibility of ternary mixed crystals of magnesium.** E. SCHMID and G. SEBEL (Metallwirt., 1932, 11, 577—579; Chem. Zentr., 1933, i, 495).—Mg containing Al 2.8, Zn 0.9%, or Al 5.6, Zn 1.0%, was studied. A. A. E.

**Causes of failure in aluminium alloys.** D. C. E. HANSON (Bull. Assoc. tech. Fond., 1932, 6, 431—444; Chem. Zentr., 1933, i, 297).—The effect on melts of various gases, particularly  $H_2$  and  $H_2O$  vapour, has been investigated. Coke or electric heating is the best, strict control of the conditions being desirable. The possibility of removing gases, *e.g.*, by  $Cl_2$ ,  $N_2$ ,  $TiCl_4$ , and  $BCl_3$ , has been examined. A. A. E.

**Chromium-plating bath with the fluoride ion.** A. PERLENFEIN (Rensselaer Polytech. Inst. Bull., No. 39, 1933, 36 pp.).—NaF may replace the  $H_2SO_4$  in a Cr-plating bath, good results being obtained with 8—12 g. NaF and 125—300 g.  $CrO_3$  per litre at 45° with a c.d. of 15—65 amp. per sq. dm. The c.-d. range within which bright deposits are obtained extends from 3—7 amp. per sq. dm. at 20° to 5—18 amp. at 35°, and 15—>70 amp. at 45° and higher. The current efficiency rises from 15% at 15 amp. per sq. dm. to 27% at 65 amp. per sq. dm. at 46°, and from 15% at 5 amp. per sq. dm. to 35% at 20 amp. per sq. dm. at 20°. Max. brightness of the plate is obtained with 10 g. NaF per litre, but with 15 g. per litre plating is poor at high c.d. and no deposit at all is obtained at low c.d. The fluoride bath gives a brighter plate than the sulphate bath, has a wider plating range, plates more rapidly, and gives a more impervious plate on Fe. A. R. P.

**Refractories.**—See VIII.

#### PATENTS.

**Production of catalysts [finely-divided metals for hydrogenating oils].** W. F. FARAGHER, ASSR. to UNIVERSAL OIL PRODUCTS CO. (U.S.P. 1,865,180, 28.6.32. Appl., 15.6.31).—The oxide of the metal is reduced with activated  $H_2$ . A. R. P.

**Annealing of metal work.** L. L. LEWIS, ASSR. to BLAIR STRIP STEEL CO. (U.S.P. 1,870,126, 2.8.32. Appl., 17.2.30).—The articles are placed in an annealing pot which is not sealed until the beginning of the cooling period. B. M. V.

**Improving the deep-drawing power of sheet metal and steel strip intended for deep drawing.** VEREIN STAHLWERKE A.-G. (B.P. 390,999, 10.8.32. Ger., 19.8.31).—The ductility of the metal is improved without affecting the tensile strength by heating the sheet at 350°—Acl point for 1—3 (preferably 1—2) min.

**Fabrication of corrosion-resistant austenitic steels.** F. KRUPP A.-G. (B.P. 391,062, 23.11.32. Ger., 2.12.31).—To preserve the corrosion-resistant properties of Ni-Cr steels and similar alloys of Fe during working, the alloys are rolled and fabricated at 70—520° (200—450°) instead of at room temp.

**Cleaning and coating of metal [iron, steel, or zinc].** METAL FINISHING RESEARCH CORP. (B.P. 390,834, 24.9.31. U.S., 24.9.30).—The cleaning and coating both comprises a warm solution containing one or more of the salts  $ZnH_4P_2O_8$ ,  $MnH_4P_2O_8$ , and  $FeH_4P_2O_8$  together with  $Cu(NO_3)_2$  or other Cu compound and a sol. nitrate. The bath contains fuller's earth in suspension so as to form a friable coating above the film of phosphate deposited on the metal. [Stat. ref.] A. R. P.

**Metal-coating [of iron or steel articles].** H. W. THEISS (U.S.P. 1,869,784, 2.8.32. Appl., 25.1.28. Renewed 10.12.31).—The articles are lightly galvanised and then coated with Pb saturated with Zn by a similar process, final passes being made through  $ZnCl_2$  flux and a smoothing oil. The coating is stated to be electro-positive to Fe. B. M. V.

**Covering a metallic [white-gold] article with an unworkable alloy.** W. J. WRIGHTON, ASSR. to AMER. OPTICAL CO. (U.S.P. 1,870,081, 2.8.32. Appl., 11.9.28).—A white Au (Au 50, Cu 30, Ni 11, Zn 9%) is rendered untarnishable by plating with Sn and afterwards heating to 240—250° to form a surface alloy. B. M. V.

**Britannia metal or pewter alloy.** J. H. KONIGSBERG, ASSR. to STANDARD ROLLING MILLS, INC. (U.S.P. 1,869,378, 2.8.32. Appl., 14.4.31).—A soft white metal consists of Sn together with 1—15% of hardening metal selected from the Sb-Cu group and 0.005—0.1% of Al or Zn. B. M. V.

**Cobalt-tungsten alloys.** BRIT. THOMSON-HOUSTON CO., LTD., ASSEES. OF W. P. SYKES (B.P. 390,944, 21.3.32. U.S., 24.3.31).—A finely-divided mixture of 80—65% Co and 20—35% W is pressed into bars which are sintered in  $H_2$  at > 1100° (1400—1450°) until complete diffusion has taken place. After cooling, the alloy is aged for several hr. at 600—700° to cause age-hardening by pptn. of a Co-W compound. [Stat. ref.] A. R. P.

**Recovery of metal from coated metal foils.** R. B. DERR, ASSR. to ALUMINUM CO. OF AMERICA (U.S.P. 1,869,844, 2.8.32. Appl., 17.12.31).—Al foil coated with paper and other combustible substances is heated

in a basket in a closed furnace to 425–500°, first in a non-oxidising atm. and, after the volatile matter is removed, in an upward current of mixed flue gases and air, the  $O_2$  being controlled so that the carbonaceous matter burns but the Al does not. B. M. V.

**Manufacture of corrosion-resistant aluminium alloy articles.** E. H. DIX, JUN., Assr. to ALUMINUM Co. OF AMERICA (U.S.P. 1,865,089, 28.6.32. Appl., 22.1.27).—A heat-treatable alloy of Al with 2–6% Cu is cast on to a thin plate of pure Al and the composite ingot is rolled into sheet, which is then hardened by the usual heat treatment. The outer surface of pure Al protects the hard alloy from corrosion to such an extent that no visible attack occurs in a 20% aq. NaCl spray in 8 weeks. A. R. P.

**Preparation and operation of platinum-plating baths.** A. R. POWELL, E. C. DAVIES, A. W. SCOTT, and JOHNSON, MATTHEY & Co., LTD. (B.P. 391,119, 14.10.31).— $Na_2Pt(OH)_6$  (I) is prepared in a finely-cryst., readily sol. form by boiling aq.  $Na_2PtCl_6$  with NaOH and treating the solution with an equal vol. of EtOH or  $COMe_2$ . The plating bath is made up by dissolving (I) in  $H_2O$  to give a 1% solution of Pt and adding  $Na_2SO_4$ ,  $Na_2C_2O_4$ , and 0.2–2% of NaOH. The bath is operated at > 40° (60–85°) at a c.d. of about 20 amp./sq ft. Since the presence of  $SiO_2$  in the bath produces poorly adherent, patchy deposits the salt is prepared in a Ni vessel and a similar vessel is used as the plating vat. Cu anodes plated with Pt may be used satisfactorily instead of the more costly Au or Pt sheets. A. R. P.

**Centre-wall furnace.**—See I. **Liquid fuel for furnaces.**—See II. **Salts from Be or Zr ores.**—See VII. **Lining for melting pots.**—See VIII. **Heat-treating metals. Electroplating non-conductive materials.**—See XI. **Degreasing metal.**—See XII. **Uniting rubber to metal.**—See XIV.

## XI.—ELECTROTECHNICS.

**The electric furnace and its products in the U.S.S.R.** C. H. VOM BAUR (Trans. Electrochem. Soc., 1933, 63, 391–394).

**Conduction of cotton.**—See V. **Conductivity of Cr solutions.  $H_2O_2$  from  $H_2SO_4$ . Chlorates.**—See VII. **Heating elements for furnaces.**—See VIII. **Determining Mo in steel. Cr-plate.**—See X. **Tannery control.**—See XV. **Analysis of Bordeaux-Pb arsenate mixtures.**—See XVI.

### PATENTS.

**Electric furnace.** J. C. WOODSON, Assr. to WESTINGHOUSE ELECTRIC & MANUFACTURING Co. (U.S.P. 1,870,079, 2.8.32. Appl., 6.2.29).—An electric furnace for continuous operation is shaped, in plan, like the eye in a wire rope; the end of the parallel part is open and heating means are situated in the bend only. The goods may be supported on carriers hanging through a slot in the roof. B. M. V.

**Electric [heat-treatment] furnaces.** BIRMINGHAM ELECTRIC FURNACES, LTD., and A. G. LOBLEY (B.P. 390,909, 26.1.32).—A resistance-housing chamber, *A*, surrounds a treatment chamber, *B*, having a charging opening communicating with *A*, and an air-extraction

orifice opens into a voluted casing in which a fan operates, discharging air into a region of *A* remote from that where the air is redelivered to *B* after having passed over the external resistors. J. S. G. T.

**Electric furnace [for salt-bath heat-treatment of metals].** A. E. BELLIS (U.S.P. 1,864,885, 28.6.32. Appl., 27.8.30).—A high resistance is arranged between the furnace electrodes (*A*) with its ends coiled about the lower ends of *A*. (Cf. B.P. 347,238; B., 1931, 682.) J. S. G. T.

**Producing chemical reactions from gases and vapours with the aid of a high-tension electric arc.** SOC. CHEM. IND. IN BASLE (B.P. 389,761, 12.10.32. Switz., 16.10.31).—Gases are driven upwards between parallel bar-electrodes (*A*) arranged transversely to the direction of flow and approx. at right angles to a magnetic field substantially parallel to the plane of *A*. The arc is struck at the centres of *A* and is spread out to form an upwardly-directed surface the foot of which travels from the centre towards the ends of *A*. J. S. G. T.

**[Filling liquid for] electric accumulators.** NEDERL. ELECTROLYT MAATS. (LIGHTNING MIJ.) N.V. (B.P. 389,738, 25.8.32. Holl., 23.7.32).—A solution containing, in addition to Pb,  $SO_4$ , and H ions, at least one alkali ion, one or more of the bivalent ions Mg, Be, Zn, or Cd, together with Al ions and one or more negative org. ions not forming insol. compounds with the metal ions, and, if desired, a polyhydric alcohol, e.g., glycerol, and a pseudo-catalyst, e.g., cochineal, and/or an org.  $NO_2$ -compound, e.g.,  $PhNO_2$ , is claimed. J. S. G. T.

**[Electrolytic] water-decomposition cells having filter-press construction.** L. MELLERSH-JACKSON. From SIEMENS & HALSKE A.-G. (B.P. 391,022, 12.9.32).—The electrodes consist of plain plates framed with soft rubber in which the apertures for liquids and gases are formed; the diaphragms have their edges made impervious and are clamped between the frames, no other packings being used. B. M. V.

**Production of electrolytic cathode-diaphragm structures.** K. E. STUART, Assr. to HOOKER ELECTROCHEM. Co. (U.S.P. 1,865,152, 28.6.32. Appl., 31.1.30).—A suspension of fibrous material in a medium of substantially greater *d*, e.g., asbestos in aq. NaCl or NaOH, is drawn by suction into perforations in the cathode. J. S. G. T.

**Gas purification [by electrical means].** R. HEINRICH, Assr. to WESTINGHOUSE ELECTRIC & MANUFACTURING Co. (U.S.P. 1,865,907, 5.7.32. Appl., 3.2.31. Ger., 10.2.30).—Unidirectional and damped a.c. are alternately supplied to ionising electrodes arranged in a pptn. chamber. J. S. G. T.

**Electroplating of non-conductive materials.** P. R. ZINSER, Assr. to WOODALL INDUSTRIES, INC. (U.S.P. 1,866,283, 5.7.32. Appl., 23.3.28).—The surface of fibrous material, e.g., paper, to be electroplated is sprayed with a mixture of lacquer and metallic powder, and current is passed into a metallic ring making contact therewith. J. S. G. T.

**Rectification of alternating currents.** H. P. HOLLNAGEL and G. A. F. WINCKLER, Assrs. to GEN.

ELECTRIC Co. (U.S.P. 1,866,351, 5.7.32. Appl., 29.1.27).—A thin spacer of insulating material is arranged between sheets made respectively of Te and a metal, e.g., Mg, Al, Zr, Ce, Th, Ca, which has a readily-formed and stable oxide. J. S. G. T.

Insulators. Insulating paper.—See V. Pt-plate. See X.

## XII.—FATS; OILS; WAXES.

Seed fats of *Bassia latifolia* and *Garcinia Morella*. D. R. DHINGRA, G. L. SETH, and P. C. SPEERS (J.S.C.I., 1933, 52, 116—118 T).—The component fatty acids of the two fats are, respectively, myristic 1.0, 0.3; palmitic 16.0, 7.2; stearic 25.1, 42.5; arachidic 3.3, 0.3; oleic 45.2, 43.6; linoleic 9.4, 6.1%. *G. Morella* fat contains 2.7% of fully-saturated glycerides (61% stearic acid and 39% palmitic acid). The non-fully-saturated glycerides (about 95%) consist of about 45% of mono-oleo-disaturated and about 50% of dioleo-monosaturated glycerides. The fatty acids are distributed evenly amongst the glycerol mols. The fatty acid composition of the two fats conforms with the classification of Hilditch. The two fats yield good soaps of fairly good lathering power and of fairly soft texture and are good sources of vegetable stearine.

Reactions for [detecting] rancidification of fats. P. BRUÈRE and A. FOURMONT (Ann. Falsif., 1933, 25, 132—138; cf. B., 1932, 849).—The principle of colour restoration to leuco-dyes is further applied for the detection of decomp. changes in fats and the comparative vals. are used as indexes of the age of the fat or the "degree of freshness" (cf. Davies, B., 1928, 791). Clark's method of pre-rancidity expression is adopted. A simple apparatus for the test is described. H. R. J.

Action of micro-organisms on fats. L. B. JENSEN and D. P. GRETTE (Oil and Soap, 1933, 10, 23—27).—A discussion. CH. ABS.

Manufacture of the soap base for toilet soap by the boiling process. R. KRINGS (Allgem. Oel- u. Fett-Ztg., 1933, 30, 152—158, 194—199).—Full working details are given. E. L.

Character and composition of disinfectant soaps. V. WILLIAMS (Soap Trade Rev., 1933, 6, 106—107).—A short survey. E. L.

Regeneration and recovery of fatty oils. P. TINY (Mat. grasses, 1932, 24, 9483—9485, 9515—9516; Chem. Zentr., 1933, i, 331).—The filtration of oils and the recovery of fats from wool- and tanning-wash H<sub>2</sub>O are described. A. A. E.

Oil and fat analysis by the thiocyanogen method. W. S. MARTIN and R. C. STILLMAN (Oil and Soap, 1933, 10, 29—31).—In a modification of Kaufmann's method the sample is treated in a stoppered flask with 25 c.c. of 0.2N-(SCN)<sub>2</sub> and kept in the dark for 24 hr. at 18—21°; the excess of (SCN)<sub>2</sub> should be 50—60%. KI (1 g., powdered) is added, the flask is rotated for 1.5—2 min., 30 c.c. of H<sub>2</sub>O are added, and the I is titrated with 0.1N-Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub>. CH. ABS.

Fluorescence of olive oils. G. LUNDE and F. STIEBEL (Angew. Chem., 1933, 46, 243—247).—Of 300 samples all the virgin oils gave reddish or yellow colours in ultra-

violet light, with a characteristic fluorescence band at  $\lambda = 6690 \text{ \AA}$ ., which was absent from all the refined (expressed or extracted) oils (cf. B., 1928, 646); qual. examination, however, will not reveal with certainty < 35% admixture of refined oils. The magnitude of the blue component of the fluorescence is the most sensitive indication of the presence of refined oils and the curve showing the relation between the intensity of this blue and the thickness of the oil layer shows a characteristic peak for refined extracted oils, by which admixture of 10% of these to virgin oils can be detected. E. L.

[Detection of tea-seed oil in olive oil.] M. F. LAURO (Oil and Soap, 1933, 10, 36).—Bolton and Williams' method is inaccurate. CH. ABS.

Ether extract method for paste-like samples [olive-pomace pastes etc.]. G. PITMAN (J. Assoc. Off. Agric. Chem., 1932, 15, 299—304).—The paste is placed in 3 layers between sheets of tared filter paper, dried in a vac. oven at 72° for 16 hr., and extracted with light petroleum for 16 hr. H. R. J.

Rotatory power of castor oil and the alteration which it undergoes during prolonged heating of the oil. M. ROY (J. Pharm. Chim., 1933, [viii], 17, 373—378).—Castor oil kept for 200—300 hr. at 120—150° in presence of strong artificial illumination undergoes a slight but definite increase in  $\alpha$ . W. O. K.

Permanent colour standards for U.S.P. cod-liver oil, almond oil, and castor oil. A. TAUB (J. Amer. Pharm. Assoc., 1933, 22, 194—198).—Spectrophotometric examinations of 54 samples of cod-liver oil, 11 of almond oil, and 9 of castor oil and the prep. of permanent colour standards for these oils are described. E. H. S.

[Use of] salt in the refining of oils. K. BANDAU (Allgem. Oel- u. Fett-Ztg., 1933, 30, 191—192, 194).—The use of salt for breaking emulsions formed during refining, and as a valuable filtering agent, is discussed. E. L.

Determining fats in milk. Butter constns.—See XIX.

## PATENTS.

Separation of stearin[e] and olein[e] from mixtures thereof. E. A. MAUERSBERGER (B.P. 391,306, 15.4.32).—The mixed fatty acids are dissolved in an O-free solvent (e.g., petroleum spirit), and H<sub>2</sub>O (or alcohols, ketones, etc.) containing an emulsifying agent if required is added to form a colloidal emulsion before cooling the mixture, whereupon the solid acids crystallise out in a readily separable form. E. L.

Degreasing of materials [especially metal]. W. H. SMITH and IMPERIAL CHEMICAL INDUSTRIES, LTD. (B.P. 391,147, 17.10.31).—The articles (e.g., composite articles of light-gauge metal) are immersed cold in the hot vapours of, e.g., CHCl<sub>3</sub>, and when condensation ceases are conveyed through a cooled zone before returning to the vapour bath, the process being repeated as required. Apparatus is claimed. E. L.

Refining of fatty oils. B. CLAYTON (B.P. 390,805, 7.9.31).—The oil, mixed with 1—2 vol.-% of an alkaline solution, e.g., 12% aq. NaOH, is passed at relatively high velocity through heating coils at progressively

rising temp. and decreasing pressure, and impurities are separated centrifugally. S. S. W.

**Moulding of beeswax candles.** L. W. GELLER, Assr. to WILL & BAUMER CANDLE CO., INC. (U.S.P. 1,866,025, 5.7.32. Appl., 6.5.31).—The inclusion, as moulding agents, of aliphatic glycols or their derivatives, e.g., glycoloxides, polyethylene glycols, ethers or cyclic ethers, carboxylic or halogen esters, or esters of glycol ethers, is claimed. E. L.

**Detergents.**—See VII.

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

**Influence of particle size of pigments on oil absorption.** H. WOLFF (Farben-Ztg., 1933, 38, 876—878).—The relative particle sizes of pigments, similar in chemical and surface properties, can be deduced from their "crit. oil absorptions," on the assumption of cubical packing of "oil-sheathed" particles at this point. Crit. data of samples of ZnO, Pb<sub>3</sub>O<sub>4</sub>, and BaSO<sub>4</sub> illustrating the matter are given, abnormal surface activity being detected by this method. Whilst the physical significance of the exponent  $n$  in the author's viscosity equation ( $V - V_0 = kp^n$ ) is not arrived at, it is shown that though  $n$  increases with particle size for SiO<sub>2</sub> and BaSO<sub>4</sub>, it decreases for ZnO and Pb<sub>3</sub>O<sub>4</sub>. S. S. W.

**Alcohols as lacquer solvents.** R. C. MARTIN (Metal Clean. Finish., 1933, 5, 27—30).—A discussion.

#### CH. ABS.

**Constitution of phenol resins.** M. KOEBNER (Angew. Chem., 1933, 46, 251—256).—Novolak resins (obtained by acid condensation of phenols and CH<sub>2</sub>O) are not uniform compounds of high mol. wt. (cf. B., 1931, 212), but consist of mixtures of compounds formed by linking  $\leq 2$  C<sub>6</sub>H<sub>6</sub> nuclei with  $\cdot\text{CH}_2\cdot$  groups. The di- and tri-nuclear compounds, 2:2'-dihydroxy-5:5'-dimethyldiphenylmethane (I) and 3:5-bis-2-hydroxy-5-methylbenzyl-*p*-cresol (II), were isolated from the condensation product of *p*-cresol and CH<sub>2</sub>O (see also B., 1930, 600). Condensation of (I) and (II) with CH<sub>2</sub>O in the presence of MeOH and NaOH gave the pure dialcohol derivatives. Impure tetra-, penta-, hexa-, and hepta-nuclear compounds were prepared by the acid condensation of (I) and CH<sub>2</sub>O, (I) and *p*-cresol dialcohol (III), (II) and CH<sub>2</sub>O, and (II) and (III), respectively. These compounds retain their OH groups; the Na salts become insol., however, with increase in the mol. wt. A table and curves are given to show the variation in the yield and mol. wt. of resin with varying proportions of PhOH and CH<sub>2</sub>O. (I) is formed only with large excess of PhOH; with decreasing excess formation of polynuclear compounds increases. Only side-chain OH groupings are removed during the successive formation of Resols, Resitols, and Resites by dehydration of the alkaline-condensation products of phenols and CH<sub>2</sub>O; the phenolic groups remain intact. This is shown to be the case since acetylation is possible, and Resites can be made by heating (CH<sub>2</sub>)<sub>6</sub>N<sub>4</sub> with a Novolak, only NH<sub>3</sub> being evolved. Phenols also react with (CH<sub>2</sub>)<sub>6</sub>N<sub>4</sub> to give resins without loss of H<sub>2</sub>O. S. M.

**Identifying colours on paper.** [Resins of Georgia pines.—See V. Podophyllum.—See XX.—Absorption of 3-colour inks.—See XXI.

### PATENTS.

**Manufacture of [aluminium] pigments.** S. R. SHEPPARD (B.P. 391,148, 17.10.31).—The use of Al powder which has been coated by anodic oxidation and coloured (cf. B.P. 359,494; B., 1932, 68) is claimed.

S. M.

**Manufacture of printing compound.** P. YOHNS, Assr. to BUTTERICK PUBLISHING Co. (U.S.P. 1,870,082, 2.8.32. Appl., 29.7.26).—A transfer ink which remains permanently sol. in hot H<sub>2</sub>O after being printed on paper and transferred to the fabric to be marked out comprises acetin, Venetian turpentine, and  $> 14\%$  of a basic dye sol. in such medium when hot. Gum shellac may be added. B. M. V.

**Flat varnish.** G. H. BURGMAN (U.S.P. 1,867,306, 12.7.32. Appl., 3.6.29).—The solid base is a fatty acid salt of one of the heavier metals (e.g., Ca, Ba, Mg) or Al stearate, palmitate, etc., together with suitable pigments; the liquid is a drying oil, or combination of drying oils, to which resins and, as thinners, kerosene and naphthas are added. Definite proportions are specified. S. H. M.

**Production of an unflammable or difficultly inflammable solution of nitrocellulose.** A. EICHENGRÜN (B.P. 390,867, 20.10.31. Ger., 20.10.30).—Degraded (lacquer) nitrocellulose together with suitable plasticisers is dissolved in a mixture of 1 pt. of a known nitrocellulose solvent with  $\leq 2$  pts. of CCl<sub>4</sub>.

F. R. E.

**Raising the impact bending strength of acetylcellulose masses, moulded by injection.** F. SCHMIDT (B.P. 390,977, 4.7.32. Ger., 30.7.31).—The acetylcellulose is worked up in H<sub>2</sub>O with an alkyl (Pr<sub>3</sub>) phosphate or other gelatinising agent, and the product is dried.

S. M.

**Production of (A) mouldable, (B) sheeted, compounds.** J. MURSCH, Assr. to J. GATTI (U.S.P. 1,869,490—1, 2.8.32. Appl., 29.4.31).—(A) Finely-divided dry fibre (e.g., newsprint) is impregnated with a synthetic resin by mixing with C<sub>6</sub>H<sub>4</sub>Me·OH, CH<sub>2</sub>O and NaOH in presence of H<sub>2</sub>O, boiling the mixture, and "curing." In (B) the impregnated fibrous mass (uncured) is caused to flow by addition of H<sub>2</sub>O, then rolled into sheets, dried, and cured. B. M. V.

**Manufacture of [phenol-bitumen] artificial resin.** L. D'ANTAL (B.P. 391,364, 23.9.32. Ger., 3.10.31).—A mixture of phenols and bitumen, e.g., coal tar, is heated, initially under reduced pressure, with vegetable oils or fats and either H<sub>2</sub>SO<sub>4</sub> or the H<sub>2</sub>SO<sub>4</sub> sludge from the purification of mineral oils. After the evolution of gases, which are recovered, aldehydes, siccatives, or resins may be added to control the hardness etc. of the product.

S. M.

**Materials from cellulose derivatives.**—See V.

### XIV.—INDIA-RUBBER; GUTTA-PERCHA.

**Some solutions and dispersions used in the rubber factory.** F. A. MIDDLETON (India-Rubber J., 1933, 85, 543—549).—A review, including the factors controlling the properties of rubber deposited from solution (viz., the degree of mastication, the grade of rubber, and the nature of the solvent), self-vulcanising solutions, and various types of solution used in tyre

manufacture, *e.g.*, for lubricating moulds and beads and for increasing the life of airbags. D. F. T.

**Improving the nerve of [rubber] vulcanisates by rubber-latex concentrates.** R. DITMAR (Chem.-Ztg., 1933, 57, 344).—In a mixture of rubber 25, S 1, chalk 5, ZnO 2½, paraffin oil 1½, diphenylguanidine ½, replacement of 5 pts. of rubber by the equiv. amount of 60% latex, which was added to the powders before mixing on the rolls, resulted in an improvement in the "nerve" of the vulcanised product which could otherwise have been effected only by the addition of approx. 5 pts. of C black. The rate of vulcanisation also was increased. The possibility of such a method would be especially important for light-coloured products. D. F. T.

#### PATENTS.

**Vulcanisation accelerator [for rubber].** G. L. MAGOUN, Assr. to RUBBER SERVICE LABS. CO. (U.S.P. 1,865,265, 28.6.32. Appl., 23.5.31).—Rubber is vulcanised in the presence of a reaction product of a chloroaminophosphine, *e.g.*, piperidylchlorophosphine (1 mol.), and an org. compound containing ·SR, where R is H, an alkali metal, or a salt-forming group, *e.g.*, the Na salt of mercaptobenzthiazole (2 mols.). A basic nitrogenous accelerator, *e.g.*, diphenylguanidine, is also desirably present. D. F. T.

**Manufacture of rubber goods [from latex].** V. J. SPRUNGER, Assr. to AMER. ANODE, INC. (U.S.P. 1,864,621, 28.6.32. Appl., 18.4.31).—In order to ensure uniformity and soundness of the rubber deposits obtained, the dipping former before immersion in the rubber dispersion is successively coated with a suitable coagulant, *e.g.*, with a solution of Ca(NO<sub>3</sub>)<sub>2</sub> in COMe<sub>2</sub>, and exposed for a short time to an alkaline vapour, *e.g.*, NH<sub>3</sub>. D. F. T.

**Plastic composition [containing rubber].** E. B. MILLER, Assr. to SILICA GEL CORP. (U.S.P. 1,864,662, 28.6.32. Appl., 20.11.30).—A vulcanised mixture of rubber and a powdered, highly adsorptive, inorg. gel from the group of oxides of Si, Sn, W, Ti, Al, especially SiO<sub>2</sub> gel, has greater strength and elasticity than one containing an equal wt. of SiO<sub>2</sub> in a different form. D. F. T.

**Uniting compositions of or containing rubber or the like to metal.** DUNLOP RUBBER CO., LTD., D. F. TWISS, J. A. WILSON, and A. E. T. NEALE (B.P. 390,932, 1.3.32).—The adhesion of rubber compositions to metal is increased by an intermediate film of Cu, Hg, Mn, or Fe salts of org. acids containing < 1 reactive group in addition to the characteristic acidic group, *e.g.*, C<sub>6</sub>H<sub>4</sub>(OH)·CO<sub>2</sub>H, C<sub>6</sub>H<sub>4</sub>(SH)·CO<sub>2</sub>H, picric acid. The salts may be applied as such or formed *in situ*. D. F. T.

**Fibre-rubber articles. Leather substitute.**—See V. **Latex-impregnated fabrics.**—See VI.

#### XV.—LEATHER; GLUE.

**Chemistry of liming. VII. Influence of various nitrogen compounds on unhairing [of hides] with calcium hydroxide suspensions.** E. K. MOORE [with R. KOPPENHOEFER] (J. Amer. Leather Chem. Assoc., 1933, 28, 245—259; cf. B., 1933, 437).—The

unhairing of steer hides in Ca(OH)<sub>2</sub> suspensions was accelerated by additions of NH<sub>2</sub>Me, NH<sub>2</sub>Et, NHMe<sub>2</sub>, ethanolamine, ethylenediamine, NH<sub>2</sub>OH, N<sub>2</sub>H<sub>4</sub>, guanidine, aminoguanidine, NMe<sub>4</sub>·OH, and piperidine, respectively, and possibly by additions of NH<sub>2</sub>Pr<sup>n</sup>, NH<sub>2</sub>Bu<sup>n</sup>, NHEt<sub>2</sub>, and piperazine, but not by additions of aromatic N compounds or acid amides. D. W.

**Electrometric control in the tannery.** P. I. SMITH (Ind. Chem., 1933, 9, 171—172).—The use of the Cambridge electrometer-valve type of instrument is recommended for measurements of *p*<sub>H</sub> vals. and for controlling soak liquors, sole-leather tan liquors, fat-liquors, the fat-liquoring of dyed leather, and the pigment finish in connexion with the fastness to wet-rubbing of pigmented leather. D. W.

**Determination of chromium in [tan] liquors and leather by the perchloric acid method.** D. H. CAMERON and R. S. ADAMS (J. Amer. Leather Chem. Assoc., 1933, 28, 274—278).—The use of 5—10 c.c. of 68—70% HClO<sub>4</sub> is recommended in the oxidation of Cr<sup>III</sup> to Cr<sup>VI</sup> in Cr determinations, instead of Na<sub>2</sub>O<sub>2</sub>. (Cf. B., 1930, 417.) D. W.

**Conductivity of Cr solutions.**—See VII. **Fatty oils [from tanning-H<sub>2</sub>O].**—See XII.

#### PATENTS.

**Manufacture of reconstituted skin and leather.** J. S. CAMPBELL (B.P. 390,844, 12.9.31).—Raw skin or integument is treated with a saponifying agent, the mass beaten, incorporated with tanning materials, colour, and borax, the excess H<sub>2</sub>O removed, and the residue digested with rubber latex and a vulcanising agent, with or without gutta-percha; the product is then sheeted, faced with leather dust, and calendered. D. W.

**Manufacture of [waterproof] leather.** A. C. ORTHMANN, Assr. to C. P. VOGEL (U.S.P. 1,865,783, 5.7.32. Appl., 19.9.28).—Leather is coated on one side with an impervious coloured mixture, *e.g.*, pyroxilin lacquer, and subsequently impregnated with a suitable waterproofing compound incapable of modifying the coating. D. W.

**Transparent [gelatin] sheet material.** E. M. KRATZ, Assr. to MARSENE PRODUCTS CO. (U.S.P. 1,866,410, 5.7.32. Appl., 15.8.27).—The material comprises a mixture of gelatin (40—95%), a H<sub>2</sub>O-sol. aliphatic (ethylene) glycol, and a grease-dispersing agent (sulphonated castor oil), with or without glycerin; a hardening or tanning agent (CH<sub>2</sub>O) may be added. D. W.

**Tanning agents from fibrous materials. Leather substitute.**—See V. **Preservative [for leather].**—See XVIII.

#### XVI.—AGRICULTURE.

**Process of solonetz formation in the Golodnaya Steppe, Turkestan.** V. P. KOZLOV (Chem. Social. Agric., 1932, 1, No. 3—4, 61—62).—On irrigation, solonetz was formed. Analytical data are given. CH. ABS.

**Dispersion of soils in mechanical analysis.** ANON. (Imp. Bur. Soil Sci., Tech. Comm., 1933, No. 26,

31 pp.).—Certain modifications of the International method for mechanical analysis are introduced. The substitution of NaOH for aq.  $\text{NH}_3$  improves dispersion and shortens the period of shaking required. In gypseous soils coarse fragments of gypsum are removed after  $\text{H}_2\text{O}_2$  treatment, more conc. acid is used in the subsequent stage, and the soil residue is washed with  $\text{NH}_4\text{OAc}$  prior to dispersion. Treatment with  $\text{H}_2\text{O}_2$  is necessary in all soils containing  $> 1\%$  of org. matter, and preliminary boiling with  $\text{H}_2\text{O}$  permits oxidation with  $2\% \text{H}_2\text{O}_2$ .  $\text{MnO}_2$  may be removed by digesting the sample with aq.  $\text{NaHSO}_4$ . Dispersion of soils rich in  $\text{Al}_2\text{O}_3$  may be effected in slightly acid media.

A. G. P.

**Pretreatment of soils for mechanical analysis.** C. DRAGAN (Bul. Acad. Agric., Cluj, 1931, No. 2; Proc. Internat. Soc. Soil Sci., 1933, 8, 48—49).—Boiling the soil sample with  $\text{H}_2\text{O}$  causes better dispersion if the suspension contains a small amount of electrolyte, to maintain  $>$  the crit. electrical potential on the particles. Except in highly org. soils, HCl treatment following boiling with  $\text{H}_2\text{O}$  is a sufficient pretreatment. The process is facilitated by allowing the sample to remain in  $\text{H}_2\text{O}$  for 24 hr. previously.

A. G. P.

**Mechanical analysis of soils.** J. C. DRAGAN (Bul. Acad. Inalte Stud. Agron., Cluj, 1932, 3, No. 1; Proc. Internat. Soc. Soil Sci., 1933, 8, 50—51).—Experimental data for the sedimentation of quartz globules agree with vals. calc. from Stokes' formula for grains  $< 0.075$  mm. in diam. The effects of the diam. of the sedimentation cylinder and of the presence of electrolytes on the results of mechanical analyses are examined. Comparison of various methods of analysis leads to the following recommendations: separation of particles  $> 0.2$  mm. by means of sieves, elutriation for particles  $0.2$ — $0.02$  mm., sedimentation for fractions  $0.05$ — $0.002$  mm.

A. G. P.

**[Tropical] soil analysis.** ANON. (Mauritius Sugar Cane Res. Stat. Dept., 1931, 23—25; Proc. Internat. Soc. Soil Sci., 1933, 8, 46).—In the pretreatment of samples for mechanical analysis the use of  $\text{H}_2\text{O}_2$ , HCl, and NaOH in the successive stages gave better dispersion than when NaCl was substituted for HCl or aq.  $\text{NH}_3$  for NaOH. Relationships between  $\text{SiO}_2/\text{Al}_2\text{O}_3$  and  $\text{SiO}_2$ /sesquioxide ratios of soils and their clay and combined  $\text{H}_2\text{O}$  contents are examined. For the determination of total org. C in soils (Schollenberger) a mixture of Ag and  $\text{K}_2\text{Cr}_2\text{O}_7$  was more effective than the latter used alone.

A. G. P.

**Soil examination in viticulture.** K. MÖHRINGER (Z. Pflanz. Düng., 1933, 12, B, 152—163).—The optimum nutrient requirement and soil reaction for the growth of vines are discussed.

A. G. P.

**Factors determining the reaction of the soil.**  
IV. **Silicate buffering of arable soil.** H. RIEHM (Kong. Vet.-Landsb. Aarskr., 1932, 21—80; Chem. Zentr., 1932, ii, 3770—3771).—The buffering power was determined electrometrically, and differentiated from that of Al. Quartz has a very small, hornblende a greater, talc a high, and serpentine a low,  $\text{CaCO}_3$  buffering power; albite behaves like hornblende.

Heulandite and natrolite show  $\text{CaCO}_3$  buffering. Determinations with an acid clay are recorded. The clay particles are regarded as large silicate ions neutralised partly by external and partly by internal cations held in electrostatic union.

A. A. E.

**Determination of adsorbed hydrogen ions [in soils].** N. P. REMESOV (Arb. wiss. Inst. Düng., 1930, 77, 80—95; Bied. Zentr., 1932, 3, A, 147).—To the soil sample are added  $N\text{-CaCl}_2$  and a measured quantity of  $0.4N\text{-Ca(OH)}_2$ , the  $\text{pH}$  of the mixture being subsequently obtained by means of a quinhydrone electrode. The amount of  $\text{Ca(OH)}_2$  necessary to produce  $\text{pH}$  7.0 is determined.

A. G. P.

**Determination of the S value, and the exchangeable calcium and magnesium in carbonate-free soils, according to Hissink, by volumetric methods.** K. SCHICK and J. ZAKARIÁS (Z. Pflanz. Düng., 1933, 28, A, 335—339).—The total base displaced by  $\text{NH}_4\text{Cl}$  in Hissink's method is determined as follows. A portion of the extract is evaporated to dryness and ignited at dull-red heat to remove  $\text{NH}_4$  salts. The residue is dissolved in  $\text{H}_2\text{O}$  and evaporated to dryness with HCl. After a repetition of this process the residue is dried at  $120^\circ$  for 1 hr. to remove free HCl. The Cl' equiv. to the residual bases is determined volumetrically with  $\text{AgNO}_3$ . Recorded vals. agree closely with the sum of the bases determined individually in the customary manner. The Ca and Mg in the  $\text{NH}_4\text{Cl}$  extract may be determined together by Winkler's method for hardness of  $\text{H}_2\text{O}$ , and the Ca content by the oleate method.

A. G. P.

**So-called "neutral salt decomposition" by peat and humus.** M. TRÉNEL and M. HARADA (Z. Pflanz. Düng., 1933, 28, A, 298—313).—Neutral salt decomp. by peat is associated, in part, with the presence of  $\text{Al}_2\text{O}_3$ . The latter reacts with KCl, and the liberated alkali combines with org. acids present. The Al content of peat is derived from the accumulation of this element by the living sphagnum. With increasing concn. of neutral salt the titratable acidity and the solubility of practically colourless org. acids in the extracts rise. Repeated treatment with KCl produces a steadily increasing difference between the acidity of the extract and the equiv. of K absorbed by peat. The presence of free org. acids in peat is confirmed by electrodiagnosis. Acidity developed in neutral salt extracts of peat may result from interaction with hydrated  $\text{Al}_2\text{O}_3$  present either in a finely-divided condition or in actual org. combination, increased solubility in salt solutions of sparingly sol. org. acids, or base absorption with liberation of free mineral acid (Kappen).

A. G. P.

**Influence of inorganic iodine compounds on the presence and activity of some important bacteria in soil.** H. KARNAHL (Diss., Leipzig, 1931; Bied. Zentr., 1932, 3, A, 28).—Addition of  $\text{I}^-$  and  $\text{IO}_3^-$  to soils decreased the intensity of respiration of the bacteria, no difference in the effects of the two salts being observed. In soil extracts  $\text{IO}_3^-$  was the more active in this respect. Addition of 1 g. of the I salts per litre to soil extract-agar cultures had a strong inhibitory effect on nitrifying, denitrifying, and urea-decomposing bacteria,  $\text{IO}_3^-$  being

the more injurious. No stimulatory action at any concn. was observed. A. G. P.

**Influence of soil reaction on development of fungal parasites and their behaviour towards host plants.** K. MEYER-HERMANN (Diss., Bonn, 1930; Bied. Zentr., 1932, 3, A, 29).—The growth and/or fructification of soil parasites is more dependent on soil reaction than is the sensitiveness of host plants to infection. Soil reaction influences the incidence of fungal diseases, through its effect on the fungus rather than on the plant. A. G. P.

**Effect of concentration on toxicity of chemicals to living organisms.** E. BATEMAN (U.S. Dept. Agric. Tech. Bull., 1933, No. 346, 53 pp.).—The radial growth of the fungus *Fomes annosus* is proportional to time even in the presence of toxic substances. Within certain limits the change in growth rate due to the presence of a poison is proportional to a parabolic function of the concn. of the poison ( $R = DC^n$ , where  $R$  is the % retardation of growth,  $C$  the concn. of poison, and  $D$  and  $n$  are consts.). The exponent  $n$  is dependent on the chemical constitution of the poison; e.g., it has characteristic vals. for inorg. salts, and for *o*-, *m*-, or *p*-substituted aromatic substances. This principle is applicable to certain insects, bacteria, and higher plants. Stimulation and toxicity may be expressed as different phases of a pair of opposed reactions. The whole range of the action of poisons may be represented by the difference between crossed curves, both of which are parabolic functions of  $C$ . The physiological effect of changes of  $p_H$  may be expressed as the sum of the effects of  $H^+$  and  $OH^-$  each of which follows the above rule. A. G. P.

**Influence of disinfection on the fertility of soil.** G. VERPLANCKE (Natuurwetensch. Tijds., 1933, 15, 75—82).—The time-growth curves of *Elodea canadensis* and *Chara fragili* in various solutions, including Benecke's, Sachs', and special media either containing or free from N, Ca, Mg, K, or  $PO_4^{3-}$ , are recorded. *Elodea* is particularly valuable for studying the val. of fertilisers. The influence of 31 disinfecting agents on the growth of *Elodea* and on the bacterial and protozoal counts in a soil has been studied; there appears to be little direct relationship between the rate of growth and the degree of sterility attained or the presence or absence of protozoa. H. F. G.

**Influence of time on serviceability of rye seed in the seedling method [of soil examination].** H. NEUBAUER (Z. Pflanz. Düng., 1933, 28 A, 368—369).—A rejoinder to Kuke (B., 1933, 163). A. G. P.

**Nutrient content of the forest humus layer in relation to the underlying mineral stratum and its significance in the fertility of the soils.** C. D. CHIRITA (Forstw. Centralb., 1931, 53, 468—478, 499—513; Bied. Zentr., 1932, 3, A, 24).—Electro-ultrafiltration methods are satisfactorily applied to the determination of the sol. nutrients of soils and the rate at which these become sol. Vals. obtained differed considerably on the same soil area with the nature of the forest trees. Except in very strongly acid humus, close relationship was observed between the base content of the humus layer and that of the mineral soil beneath.

The  $p_H$  of the humus layer was unrelated to its base content. The abs. nutrient or Ca content of the humus layer gave no indication of the quality of the soil.

A. G. P.

**Influence of artificial acidification on soils and plant growth.** E. VON OLDERSHAUSEN (Diss., Göttingen; Bied. Zentr., 1932, 3, A, 20).—Depletion of adsorbed cations in acid soils causes a lowering of the nutrient reserve and reduced permeability to  $H_2O$  as a result of the peptisation of the clay. All factors reduce plant growth. In heavily depleted soils CaO alone is insufficient to restore fertility. A. G. P.

**Effect of manuring on the botanical composition of grassland.** J. WARSBERG (Ernähr. Pflanze, 1933, 29, 107—109).—Among single fertilisers K produced the most marked increase in the proportion of leguminous plants, and K-P combinations the best growth of these. N fertilisers and farmyard manure suppress the growth of legumes. Balanced manures with N improved the growth of the better types of grasses more than those of inferior quality and definitely retarded the growth of bent grasses. Weeds were most common on unmanured plots and those receiving N only or farmyard manure. A. G. P.

**Use of animal dung on grassland.** B. WALLIN (Svenskt. Land., 1931, 15, 543—544; Bied. Zentr., 1932, 3, A, 75).—The val. of cattle manure on grassland is associated more particularly with the conservation of soil moisture than with its actual nutrient content.

A. G. P.

**Composition of the spring growth of sweet clover as influenced by previous autumn treatment.** C. J. BADGER and H. J. SNIDER (J. Amer. Soc. Agron., 1933, 25, 105—108).—The cutting of sweet clover for hay in the autumn reduced the vitality of the plants during the winter and the dry matter and N, P, and K contents of the following spring growth. A. G. P.

**Yield and chemical composition of certain pasture crops, fertilised and unfertilised.** M. S. GRUNDER (J. Agric. Res., 1933, 46, 375—386).—With Italian ryegrass, bottom-land mixture, and white clover, cut at 14-day intervals, heavy production in May-June (Washington, U.S.A.) was followed by steadily declining yields later in the season. Applications of fertiliser improved total yield and protein yield throughout the season. The slightly increased % crude protein during autumn is attributable to the greater immaturity of the crop when cut. In a dry period the proportion of clover influenced the protein content of the herbage to a greater extent than a dressing of fertiliser. The fibre,  $Et_2O$  extract, and ash contents of the plants were increased by fertiliser treatment, but the Ca content was not markedly affected. The % Ca and the Ca:P ratio of herbage were largely controlled by the proportion of clover therein. The val. of fertiliser treatment is more closely allied to the increased dry-matter yield than to the rise in protein, Ca, or P content of the crop.

A. G. P.

**Carbon nutrition of plants.** E. FRIEDERICH (Z. Pflanz. Düng., 1933, 12, B, 151—152).—Effects of daily and seasonal changes in temp. and atm. pressure on the respiration of soils are discussed. A. G. P.

**Effect of boron on the germination and early growth of some cultivated plants in sand and water cultures.** K. SCHARRER and W. SCHROPP (Z. Pflanz. Düng., 1933, 28, A, 313—329).—The sensitivity of cereals to  $H_3BO_3$  injury in sand cultures was in the order rye > wheat = oats > barley, and to  $Na_2B_4O_7$  was barley > wheat, oats, rye. Increased yields due to small doses of B were definite only in the case of barley and were small. Buckwheat was very sensitive to B injury, especially in the case of  $Na_2B_4O_7$ . The toxic dose of B for mustard was relatively high, and sub-toxic amounts of  $Na_2B_4O_7$  had a stimulatory action. In  $H_2O$  cultures of maize and potato low concns. of B increased both root and shoot development. A. G. P.

**Influence of chlorate, iodate, perchlorate, and periodate on germination and early development of cultivated plants.** E. SCHMITZ (Diss., Bonn, 1929; Bied. Zentr., 1932, 3, A, 54—55).—In concns. applied (up to 15 kg. per hectare) no injury to germination occurred.  $ClO_3'$  was rather more toxic than  $ClO_4'$ .  $IO_4'$  was injurious even in small concn. Reduction of  $ClO_3'$  and  $ClO_4'$  in soil was slow. No injury to crops due to presence of these salts in Chili saltpetre is to be anticipated. A. G. P.

**Effect of certain mineral elements on the colour and thickness of onion scales.** J. E. KNOTT (Cornell Univ. Agric. Exp. Sta. Bull., 1933, No. 552, 14 pp.).—Applications of superphosphate or  $CuSO_4$  improved the colour and increased the thickness of onion scales. Best results were obtained by use of 200—300 lb. of  $CuSO_4 \cdot 5H_2O$  per acre. A. G. P.

**Residual effect of kainit [in weed destruction] after 5 years.** STÜRBER (Ernähr. Pflanze, 1933, 29, 105—107).—On soil treated with  $9\frac{1}{2}$  cwt. of kainit per acre, to destroy charlock in oats, and subsequently used for other crops, no charlock appeared in a second oat crop sown 5 years later. A. G. P.

**Arsenicals in fruit culture.** VIALA and E. BLANCHARD (Compt. rend. Acad. Agric., France, 1933, 19, 183—186).—Data are given concerning the As residue on fruits sprayed at varying periods during growth. A. G. P.

**Electrolytic method for determination of copper and lead in Bordeaux-lead arsenate mixtures.** C. G. DONOVAN (J. Assoc. Off. Agric. Chem., 1932, 15, 289—292).—A method whereby the interference of As with the electrolytic pptn. of the metals is avoided is described. H. R. J.

**Estimation of catalase in agricultural products.** A. K. BALLS and W. S. HALE (J. Assoc. Off. Agric. Chem., 1932, 15, 483—490).—Detailed technique is given for determining the catalase content of clover and grain extracts etc. by the  $H_2O_2$  method in presence of glycerol and phosphate buffer. W. J. B.

**New pickling method for control of smut in wheat.** G. GASSNER (Phytopath. Z., 1933, 5, 407—433).—Artificial aëration during the customary hot- $H_2O$  treatment of seed wheat reduced the efficiency of the process. Addition of 2—5% of EtOH or methylated spirit to the bath decreased the necessary period of treatment at the appropriate temp. The liquid may

be used repeatedly without deterioration. A similar effect is produced by  $COMe_2$ , cyclohexanone, glycol, glycol esters, MeOH, and, notably,  $Pr^oOH$ .

**Influence of manuring on resistance of grain crops to rust.** W. ACKER and F. KÖNIG (Ernähr. Pflanze, 1933, 29, 101—105).—Rust in winter wheat was reduced in extent by application of fertiliser mixtures containing K, combinations of N and K being the most effective. A. G. P.

**Action of chloropicrin on the pink boll worm of cotton, on cotton seed, on the wheat weevil, and on wheat grain.** BOUVIER and C. R. SHABETAI (Compt. rend. Acad. Agric. France, 1933, 19, 76—79).—Effective control of the insects is recorded, without loss of germinative power of the seed. The diastase activity of the seeds was not affected. A. G. P.

**Treating seed potatoes for control of common scab.** G. B. SANFORD (Sci. Agric., 1933, 13, 364—373).—Customary fungicides employed for control of the disease ( $CH_2O$ ,  $HgCl_2$ , etc.) have no perceptible action in reducing the % scab in crops from treated "seed." A. G. P.

**Control of larvæ on kohlrabi.** CRÜGER (Georgine, 1931, 57, 432; Bied. Zentr., 1932, 3, A, 143).—Dusting of plants with basic slag or powdered CaO, or spraying with soap-oil emulsions or arsenicals, serves to control the larvæ of the turnip-leaf fly. A. G. P.

**Control of the cabbage root fly (*Phorbia brassicæ*, Bché.).** H. Goffart (Z. Pflanzenkr. Pflanzenschutz, 1933, 43, 49—68).—Trials with a no. of proprietary insecticides are described.  $HgCl_2$  and carbolineum were the most effective agents. A. G. P.

**Control of the root-fly with sodium fluoride.** K. R. MÜLLER (Landw. Wochenschr., 1931, 89, 448—449; Bied. Zentr., 1932, 3, A, 143).—Spraying with a solution containing 3—4 g. of NaF and 20 g. of sugar per litre is recommended. A. G. P.

**Resistance of Cruciferæ to club-root (*Plasmiodiophora brassicæ*, Wor.).** E. ROCHLIN (Phytopath. Z., 1933, 5, 381—406).—The resistance of Cruciferæ is associated with the presence in the roots of certain glucosides (sinigrin, gluconasturtiin, glucotropæolin, glucocochlearin) which yield mustard oil on hydrolysis by myrosin. Sinalbin has not this effect. A. G. P.

**Pecan rosette; soil, chemical, and physiological studies.** A. H. FINCH and A. F. KINNISON (Arizona Agric. Exp. Sta. Tech. Bull., 1933, No. 47, 407—442).—The occurrence of pecan rosette was unrelated to the neutral salt content or  $pH$  of the soil. Infected trees produced healthy growth after injection of Zn salts into the trunks. Dipping in, or spraying with, solutions of Zn salts improved the condition of those parts of trees so treated. Diseased leaves and shoots contained less Zn than healthy ones. Topmost parts of healthy trees in areas subject to rosetting had less Zn than comparable trees from areas in which rosetting did not occur. Zn occurred in irrigation waters in healthy areas, but not in those where the disease was common. A. G. P.

**Barium fluosilicate as a control for the tobacco flea-beetle.** F. S. CHAMBERLIN (J. Econ. Entom., 1933,



26, 233—236).—A dust mixture containing  $\text{BaSiF}_6$ , infusorial earth, and tobacco dust (8:2:2) was as satisfactory a control as Paris Green, without the scorching injury of the latter. The infusorial earth may be omitted in some cases. A. G. P.

Comparison of the effectiveness of sustained vacuum and dissipated vacuum in fumigation with hydrocyanic acid gas. S. E. CRUMB and F. S. CHAMBERLIN (J. Econ. Entom., 1933, 26, 259—262).—In trials with the tobacco beetle, a higher % kill was obtained by maintaining the vac. throughout the exposure period of 4 hr. A. G. P.

Chloropicrin as a soil insecticide for wireworms. M. W. STONE and R. E. CAMPBELL (J. Econ. Entom., 1933, 26, 237—243).—Chloropicrin applied to soil as a soap emulsion, either by injection or surface irrigation, gave 100% kill of wireworms and was much more effective than  $\text{CS}_2$  in similar concn. A. G. P.

Experiments with poison baits against wireworms. R. S. LEHMAN (J. Econ. Entom., 1933, 26, 243—252).—Trials with a large no. of substances are recorded. All As baits were repellent.  $p\text{-C}_6\text{H}_4(\text{NH}_2)_2$  was the only efficient poison of suitable attractant power. A. G. P.

Control of slugs. CRÜGER (Georgine, 1931, 73, 525; Bied. Zentr., 1932, 3, A, 144—145).—Dusting during early morning or late evening with powdered  $\text{CaO}$ , kainit, or  $\text{CaCN}_2$  is recommended. Two applications at 15—30-min. intervals should be made. A. G. P.

Extractive efficiency of kerosene on pyrethrum powders of varying fineness. H. H. RICHARDSON (J. Econ. Entom., 1933, 26, 252—259).—By comparative tests of toxicity towards house flies it is estimated that 80% of the active constituents are removed from pyrethrum samples ground to pass 45-mesh and approx. 90% from 200-mesh samples. Pyrethrum seeds which contain a high proportion of pyrethrins are insufficiently crushed by the coarser grinding. A. G. P.

Control of the bitterweed plant poisonous to sheep in the Edwards Plateau region. S. E. JONES, W. H. HILL, and T. A. BOND (Texas Agric. Exp. Sta. Bull., 1932, No. 464, 23 pp.).—Spraying with  $\text{Ca}(\text{ClO}_3)_2$  (12 lb. in 200 gals. of  $\text{H}_2\text{O}$  per acre) was effective during humid weather and most injurious after rain. Sheep are not injured by eating sprayed pasturage. A. G. P.

Copper salt-lick [for cattle]. VON RAMIN (Georgine, 1931, 54, 415; Bied. Zentr., 1932, 3, A, 106—107).—As a preventative of parasitic diseases the following is recommended: pptd.  $\text{CaCO}_3$  40, cattle salt 60, pine tar 2,  $\text{CuSO}_4$  1 pt. The whole is mixed with a little  $\text{H}_2\text{O}$ , kneaded into a cake, and allowed to harden. A. G. P.

Georgia pines.—See V. Pasture plants. Vitamin-C in apples.—See XIX. Indian *Artemisias*.—See XX.

## PATENTS.

Parasiticide. M. L. TOWER, H. W. DYE, and F. L. McDONOUGH, Assrs. to NIAGARA SPRAYER Co. (U.S.P. 1,869,526, 2.8.32. Appl., 18.4.28).—A combined fungicide and insecticide comprises a mixture of light petroleum lubricating oil 18, gum arabic 1, gum ghatti 1,

phenol (if desired) 2 pts., together with a polysulphide, e.g.,  $\text{Na}_2\text{S}_4$  (7—30% of the total). B. M. V.

$\text{NaNO}_3$  for storage. Treating phosphatic rocks. Fertilisers.—See VII.

## XVII.—SUGARS; STARCHES; GUMS.

Best method of liming raw [beet] juice in the cold. O. SPENGLER and S. BÖTTGER (Z. Ver. deut. Zucker-Ind., 1933, 83, 107—124).—The advantages of the method of liming recently described (B., 1932, 363, 1131) can be obtained with a total  $\text{CaO}$  consumption of 0.8—1.1% on beets, by carrying out the main liming (A) as well as the optimum pre-liming (B) at 35—40°, and afterwards heating at 80° for 2—3 min. before carbonatation. A can be carried out with milk-of- $\text{CaO}$  or powder, but not with lumps; 5—10 min. should elapse between B and A, but the interval between A and heating is immaterial. The heating may take place in open or closed heaters. In practice B is best carried out in the juice-measuring vessels, the optimum amount of  $\text{CaO}$  being added during rapid stirring; there is a slight advantage in adding it in several portions, e.g., 5 at  $\frac{1}{2}$ -min. intervals. The quality of the final juice is still further improved if before the heating of the fully-limed juice it is mixed with 100% of hot, unfiltered juice from the first carbonatation (cf. B., 1932, 909). J. H. L.

What occurs on the two sides of the heating surface in [sugar-factory] evaporators. H. CLAASSEN (Z. Ver. deut. Zucker-Ind., 1933, 83, 81—106).—The average velocity of the steam inside the steam chamber (A) of an evaporator with vertical tubes is usually  $< 5$  m./sec. Most of the steam condenses on the upper parts of the tubes, because there the motion of the juice inside the tubes is much accelerated by bubble formation. The steam condenses as a  $\text{H}_2\text{O}$  film, not as drops, even though the tubes are contaminated with oil; the rate of draining-down of this film is not appreciably affected by the low steam velocity in A. Steam containing 0.1% of air is unsuitable for use. The concn. of air increases rapidly during condensation and therefore most rapidly in the upper part of A; it should nowhere be allowed to exceed 1%. The steam inlet is best situated near the top of A, opposite the upper air vent. Forced circulation of juice in an evaporator is considered the most promising means of improving output. Devices to increase the steam velocity inside A are of very doubtful advantage. J. H. L.

Decolorisation of sugar solutions in polarimetry with active carbons. K. ŠANDERA (Z. Zuckerind. Czechoslov., 1933, 57, 293—299).—Normal solutions of beet molasses, clarified with basic Pb acetate solution, were polarised after the addition of 1 g. of active C. "Norit" was found to increase the polarisation by about 0.2°, and "Carboraffin" to decrease it by about 1.7° V. Quite different results were obtained when solid basic Pb acetate and Herles'  $\text{Pb}(\text{NO}_3)_2$  reagents were used for clarification. Active C must be added with discretion, and it is advisable to make 2 or 3 polarisations with increasing amounts to obtain an indication of its effect. J. P. O.

**Formation of froth in sugar solutions.** K. ŠANDERA and A. MIRČEV (*Z. Zuckerind. Czechoslov.*, 1933, 57, 286—290).—An apparatus is described for measuring the amount of froth formed on passing air through solutions of raw sugars and molasses. Froth formation is diminished by the presence of substances causing turbidity; increasing sugar concn. favours it up to a point at which it suddenly diminishes. Froth forms more readily in acid than in alkaline sugar solutions. J. P. O.

**Rapid approximate determination of invert sugar in raw sugar.** P. PAVLAS (*Z. Zuckerind. Czechoslov.*, 1933, 57, 272—274).—The sample (10 g.) is dissolved in 50 c.c. of H<sub>2</sub>O at the b.p., and 1 c.c. of a solution containing 0.5 g. of methylene-blue and 100 g. of Na<sub>2</sub>CO<sub>3</sub> per litre (this mixed solution can be kept for only a few days) is added. The time required for the colour to change to yellow (0—4 min.) is noted, and from it the % invert sugar in the sample can be found from a table. If the sugar is acid, the solution must, before being boiled, be treated with CaCO<sub>3</sub> or NaHCO<sub>3</sub> to prevent further inversion. A narrow-mouthed flask should be used for the reduction, to hinder oxidation of the leuco-dye by air. Impurities normally present in the sugar do not markedly influence the results. H. F. G.

**[Potato-]starch manufacture and weather.** H. TRYLLER (*Z. Spiritusind.*, 1933, 56, 60).—The known influence of weather, and particularly frost, on the working quality of potatoes is described. The prevailing temp. also affects factory operations. A chart showing variations in average daily temp. and in yield of starch for a whole campaign at a small factory 20 years ago shows a very striking similarity between the two graphs, each pronounced rise or fall of temp. producing, usually about a week later, a corresponding rise or fall in yield of starch. Possibly the liberation of starch during pulping of the potatoes is influenced by temp. J. H. L.

**Analysis of starch products.** V. A. P. SCHULZ and G. STEINHOFF (*Z. Spiritusind.*, 1933, 56, 63).—In the determination of starch or dextrin by acid hydrolysis followed by titration of the sugar, hydrolysis is best effected by heating 1 g. of material with 75 c.c. of *N*-HCl in a boiling H<sub>2</sub>O-bath for 2½ hr. in the case of starch or 3 hr. for dextrin. J. H. L.

**Volumetric methods of determining sugar in the analysis of starch products.** G. STEINHOFF (*Z. Spiritusind.*, 1933, 56, 63—64).—The method recommended is to heat 10 c.c. of the sugar solution, containing < 0.1 g. of sugar, with 20 c.c. of Soxhlet's Fehling solution and 20 c.c. of H<sub>2</sub>O in a flask for 20 min. in a boiling H<sub>2</sub>O-bath. The Cu<sub>2</sub>O is determined by treating the hot liquid with 10 c.c. of 10% HCl, neutralising excess of the latter with 10 c.c. of 8% NaHCO<sub>3</sub> solution, adding a measured excess of 0.1*N*-I, e.g., 25 c.c., and, after cooling, titrating excess I with 0.1*N*-Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub>. A table is given. J. H. L.

**Analysis of starch syrup.** G. STEINHOFF (*Z. Spiritusind.*, 1933, 56, 64—65).—A method for determining the glucose (*A*), maltose (*B*), and dextrin (*C*)

present is described. *A* is determined by mixing 10 c.c. of a 1% solution of the syrup with 10 c.c. of Soxhlet's CuSO<sub>4</sub> solution (69.2 g. of CuSO<sub>4</sub>·5H<sub>2</sub>O per litre), 20 c.c. of 50% NaOAc solution, and 10 c.c. of H<sub>2</sub>O in a flask, and boiling for 2 min. or preferably heating for 20 min. in boiling H<sub>2</sub>O. Under these conditions *B* has no reducing action. The Cu<sub>2</sub>O is determined iodometrically (cf. preceding abstract), and the amount of *A* corresponding is found from a table given. The *B* content of the syrup is found by determining its reducing action on ordinary Fehling's solution and allowing for the known content of *A*. The *C* content is found by hydrolysing with acid (cf. Schulz and Steinhoff, *supra*), determining total *A*, and allowing for that originally present and that derived from the *B* present. J. H. L.

**Composition of corn [maize] syrup unmixd.** A. P. BRYANT and R. C. JONES (*Ind. Eng. Chem.*, 1933, 25, 98—100).—The fermentation method of analysing maize syrup, though not free from error, gives approx. vals. for maltose (I), glucose (II), and dextrans; the total carbohydrates contain about 30% of (I) up to the higher conversions, and then less. Total reducing sugars as (II) give approx. (I) + (II); the ratio of (II) to (I) is about 1 : 2 for ordinary and 1 : 1 for higher conversions. H. R. J.

**C from sugar.**—See II. **Sugar cane.**—See XVI. **Determining lactose in bread. Starch in feeding-stuffs.**—See XIX.

#### PATENTS.

**Crystallisation [of glucose].** C. L. SOVEREIGN, ASSR. to INTERNAT. PATENTS DEVELOPMENT CO. (U.S.P. 1,870,030, 2.8.32. Appl., 13.7.28).—The seed crystals (10—20% of the batch) of glucose (derived from starch) are distributed by violent agitation at 43° with the aid of air if desired, and then gentle agitation is maintained to keep the crystals in suspension while growing. B. M. V.

**EtCO<sub>2</sub>H by fermentation.**—See XVIII.

#### XVIII.—FERMENTATION INDUSTRIES.

**Colorimetric determination of the preservative value of hops.** J. M. GUTHRIE and G. G. PHILIP (*J. Inst. Brew.*, 1933, 39, 220—224).—The method of determining the soft resins of hops (cf. B., 1930, 1086) is improved and extended to the examination of crude extractions. 10 g. of hops are extracted with 100 c.c. of distilled industrial methylated spirit for 10 min. and then filtered. 1 c.c. of the extract diluted to 50 c.c. with spirit is added to 0.5 c.c. of *N*-AcOH and 10 c.c. of 1% uranyl acetate in MeOH, and the solution diluted to 100 c.c. with spirit. The soft resin in terms of  $\alpha$ -soft resin is then determined colorimetrically by comparison with a standard. R. H. H.

**Wild yeast infection [in bottled beers].** I. JAN-ENSCH (*Woch. Brau.*, 1933, 50, 130—133).—Cloudiness and sedimentation of a bottled beer were traced to infection by wild elliptical yeasts. The sole source of infection was proved to be a leaky "vat float" fed with infected ice. R. H. H.

**Carbon dioxide in beer.** G. DAMIENS (Petit J. du Brasseur; *Brewers' J.*, 1933, 69, 274—275).—The

laws governing the dissolution of  $\text{CO}_2$  in pure liquid do not hold exactly for colloidal suspensions like beer; hydrated  $\text{CO}_2$  is probably adsorbed on the nitrogenous colloids. The optimum  $\text{CO}_2$  content of beer for head stability and condition depends on the composition of the beer, the temp. of fermentation, and length of storage under pressure. The increase in the  $\text{CO}_2$  dissolved on storage is not unfavourable if the gas is thoroughly "fixed."  
R. H. H.

**Results from the Weinforschungsanstalt of the Moselle, Saar, and Ruhr.** (1) Action of ultra-violet rays on must and wine. (2) Manufacture of wines with high natural carbon dioxide content (Perlwein). (3) Preparation of a natural pure foaming wine. (4) Detection of natural and sugared wine. W. PETRI (Z. Unters. Lebensm., 1932, 64, 177—205).—(1) Exposure of the wine to ultra-violet radiation for 0.6—4 sec. had no effect on the rate of fermentation by yeast, on the production of acid during maturation, or on the vitamin-D content; there was an insignificant increase in vitamin-C content. The impotence of the rays under these conditions may be due to absorption by colloidal matter. (2) A bright, stable, non-foaming wine containing 5.8—8 wt.-%  $\text{EtOH}$ , 0.2—3.3% of sugar, 9.2—11.2% of titratable acidity, and 2.0—3.2%  $\text{CO}_2$  is prepared by adding sugar to the normally-fermented wine, followed by weak fermentation at  $0^\circ$  for 1—4 weeks, and removal of turbidity by filtration into a sterile bottle at such temp. and pressure as to avoid loss of  $\text{CO}_2$ . The influence of sugar content on taste is discussed. (3) Must (5—10%, containing 3.4%  $\text{EtOH}$ , 4.1% of acidity, and 21% of sugars) is added to the wine and fermented with yeast fed on  $\text{NH}_4$  phosphate at a rather higher temp. than normally, the resulting product being fined with gelatin and tannin and filtered. The original and final wines contained 9 and 8% (wt./vol.)  $\text{EtOH}$ , 0.25 and 3% of sugar, and 8.4 and 7.5% of acidity, respectively. (4) Werder's method (B., 1931, 608, 1153) often results in the pptn. of a small quantity of substance not due to sorbitol. Analyses by Lipkin's method (B., 1932, 619) gave vals. ranging from a trace to 1.6 and 1.0 mg. for natural and "improved" wines, respectively. The ppt., which is mainly org. matter with traces of Ca and alkali salts, bears no relation in quantity with the sugar content, and is considered to be derived from the yeast.  
J. G.

**Does treatment with carbon cause analytical changes in spirits?** E. WALTER (Deut. Destill.-Ztg., 1932, 53, 589—590; Chem. Zentr., 1933, i, 519).—Active C causes insignificant increases in the acid and ester vals.; wood C causes none.  
A. A. E.

**Production of industrial alcohol from grain by the amylo-process.** W. L. OWEN (Ind. Eng. Chem., 1933, 25, 87—89).—The culture and development technique of the Calmette amylo process and modified Boulard method for producing  $\text{EtOH}$  from grain mastics are summarised. The superiority of mucors-B and -G and of *Rhizopus Delemar* to *Amyloces Rouxii* is due to increased  $\text{EtOH}$  tolerance. The great vigour and saccharifying power of mucor Boulard 5 permits saccharification and fermentation in open vats. The conjoint use of

such yeasts as *Sacc. anamensis* or Boulard 21—30, increases efficiency. A max. acidity equiv. to 2—5 c.c. of 0.1N-NaOH per 20 c.c. of mash is specified, and the optimum temp. is 35—38°. The cost of  $\text{EtOH}$  by the amylo process is < that by British malting methods.

H. R. J.

**Catalase in agricultural products.**—See XVI. **Tea-cider.**—See XIX.

#### PATENTS.

**Malting of rice.** P. J. DAX, Assr. to CANADA MALTING Co., LTD. (U.S.P. 1,865,680, 5.7.32. Appl., 20.9.29).—Brown rice is allowed to germinate by placing it in a perforated drum and submerging it in a stream of  $\text{H}_2\text{O}$ . The drum is rotated periodically to release gases and prevent matting.  
R. H. H.

**Production of propionic acid by fermentation.** COMMERCIAL SOLVENTS CORP., Assees. of H. R. STILES (B.P. 390,769, 8.11.32. U.S., 29.6.32).—A mash containing a fructose-yielding carbohydrate, e.g., sucrose or molasses, is fermented by lactic acid, mannitol, and  $\text{EtCO}_2\text{H}$  bacteria (strain "b," "c," or "rubrum"). The last-named produce  $\text{EtCO}_2\text{H}$  (I) from the end-products of the two former, and from glucose or fructose which remains unfermented. The process gives a more rapid fermentation, and the ratio (I) :  $\text{AcOH}$  is higher, than that given by earlier methods.  
R. H. H.

**[Preservative for] preventing growth of micro-organisms, particularly mould and yeast, in perishable goods.** A. I. VIRTANEN, and VOINVIENTI-OSUUSLIKE, VALIO, R.1 (B.P. 391,331, 13.6.32).—The preservative, consisting of alkylthiocarbimides (allyl, Et, Bu, Ph), used separately or mixed, is dissolved in  $\text{EtOH}$  or emulsified with  $\text{H}_2\text{O}$ , and mixed with or sprayed on the article to be preserved in the proportion 0.01—0.0001% of its dry wt. The preservative is recommended for textiles, leather, timber, fodder, etc. and is physiologically harmless.  
R. H. H.

#### XIX.—FOODS.

**Rye and wheat gliadins.** H. KÜHL (Chem.-Ztg., 1933, 57, 333—334).—Wheat gliadin was separated into protein-I (not pptd. from a 60%  $\text{Et}_2\text{O}$  solution by an equal vol. of  $\text{COMe}_2$ ), protein-II (pptd. from the  $\text{Et}_2\text{O}$  solution by  $\text{COMe}_2$ ; insol. in  $\text{H}_2\text{O}$ ), and protein-III (sol. in  $\text{H}_2\text{O}$ ). The filtrate left after pptg. the  $\text{Et}_2\text{O}$  extract of rye and wheat gliadins with  $\text{COMe}_2$  contained 2 types of proteins: (a) sol., (b) insol., in 5% NaCl, but the strength of the biuret reactions varied in each case. Both gliadins are characterised by a very strong adsorptive power. The aq.- $\text{Et}_2\text{O}$  extracts contain traces of fat. The differences between rye and wheat gliadins may be due to isomerism, not to differences in chemical composition. The presence of non-proteins was demonstrated by the biuret reaction.  
E. A. F.

**Change of crude lipins of wheat on storage.** B. SULLIVAN and C. NEAR (Ind. Eng. Chem., 1933, 25, 100—103).—The amounts of extracts from wheat stored under different conditions, and their N and P contents, varied widely, owing probably to enzymic hydrolysis leading to increased  $\text{H}_2\text{O}$  content and acidity. The N : P ratios of all extracts were > 1 : 1,

indicating the presence of N-containing lipins other than lecithin. H. R. J.

**Determination of lactose in bread.** W. MEYER (Chem. Weekblad, 1933, 30, 317—318).—Snethlage's method, in which glucose and maltose in a sterilised extract of the bread are destroyed by *Sacc. cerevisia*, leaving the lactose unchanged, may be disturbed by growth of *B. mesentericus*. In the method recommended, 100 c.c. of the extract are treated with 10 c.c. of 0.2%  $\text{HgCl}_2$  solution, and evaporated to 50 c.c. (in 45 min.).  $\text{NH}_4$  sulphide is added to remove the Hg, the solution is boiled, and 5 c.c. of 1% peptone solution are added; the solution is then evaporated to 10—20 c.c. and the determination is carried out as usual. Results are accurate and the method obviates the use of an autoclave. H. F. G.

**Determination of "silver husk" in rice.** A. GOUDSWAARD (Pharm. Tijds., 1933, 10, 112—120).—Determination of silver husk in rice is a measure of the vitamin-B content. The I test is useful qualitatively, but is not quant. The ash and  $\text{P}_2\text{O}_5$  contents are not proportional to the amount of unpolished rice. More satisfactory results are obtained from a determination of crude cellulose by digesting rice with 10%  $\text{HNO}_3$ , cellulose remaining undissolved. A double-staining method is most satisfactory in which rice is steeped for 1 min. in dil.  $\text{K}_4\text{Fe}(\text{CN})_6$  in AcOH, then in  $\text{FeCl}_3$ , and finally in PhOH-fuchsin. The husk (unpolished rice) is stained red and the kernel, where husk is removed or damaged (polished rice), deep blue. The colours are permanent. S. C.

**Effect of pasteurisation on nutritive properties of milk.** W. G. SAVAGE (Lancet, 1933, 224, 429—433, 485—488).—A summary of the literature. The known changes in cow's milk produced by pasteurisation are slight. Insol. Ca is increased by approx. 6%, I is reduced by approx. 20%, and there is an unimportant reduction of vitamin-C. Pasteurised milk appears to be less growth-promoting than raw milk for animals the Ca needs of which are  $\leftarrow$  that of the calf. L. S. T.

**Detection of the heating of milk.** H. EILMANN (Milch. Forsch., 1933, 15, 86—102).—Kohn and Klemm's modification of the Schern-Gorli ring reaction, the Standfuss-Sörensen blood-corpucle method, and Rothenfusser's diastase and Ilzhöfer's peroxidase determinations give more certain results in detecting period-pasteurised milk when the reactions are performed together than if the individual methods are used. E. B. H.

**f.p. of milk.** O. STÜBER (Milch. Forsch., 1933, 15, 22—41).—Previously published results by the author and others are used to show the val. of the f.p. determination of milk as an indication of  $\text{H}_2\text{O}$  addition and the influence of various factors on this property have been studied. An improved apparatus is described, and it is shown that the degree of supercooling does not affect the val. of the f.p. E. B. H.

**Determination of the residual nitrogen of milk.** F. MÜNCHBERG (Milch. Forsch., 1933, 15, 50—76).—The determination of non-protein-N is valuable in the estimation of proteolytic action by various micro-organisms. N determinations in various sera are used as a

means of differentiating between raw, period-pasteurised, and high-temp.-pasteurised milks. A method for the determination of urea is described. E. B. H.

**Determining the total bacterial count of milk.** A. KÜSTER and H. MOOG (Milch. Zentr., 1933, 62, 117—120).—The method according to the circularised decree of the Prussian Minister for Agriculture (of 10.12.32) is criticised. 24-hr. incubation is insufficient for the formation of all colonies and 37° is not the optimum temp. for general growth. Using the standard culture medium, incubation at 30° for 48 hr. is recommended. E. B. H.

**Microscopy of milk foam in reflected light.** N. KING (Milch. Forsch., 1933, 15, 103—109).—The foams obtained with milk, separated milk, cream, and butter fat were examined. Butter-fat foam was obtained by adding egg-yolk lecithin. The walls of the bubbles in separated milk foam were thinner than the others. E. B. H.

**Rapid detection of triacetin in butter by means of a sensitive reaction for acetic acid.** G. DE VITO (Annali Chim. Appl., 1933, 23, 56—58).—Much  $\leftarrow$  0.1% of triacetin may be detected by shaking 20 g. of the butter vigorously with 10 c.c. of  $\text{H}_2\text{O}$ , filtering through a wet filter, boiling the filtrate for 1 min. with a few drops of alcoholic KOH (50%), acidifying faintly with  $\text{HNO}_3$ , and adding, in order, an equal vol. of 5%  $\text{La}(\text{NO}_3)_3$ , a few drops of 0.1N-I, and dil.  $\text{NH}_3$  until opalescence appears. When the liquid is boiled, the pptd. basic La acetate turns violet. T. H. P.

**Seasonal variation and annual cycle of constants of butters in the north of France.** II. M. POLONOVSKI and M. THOMAS (Lait, 1933, 13, 466—474; cf. B., 1933, 409).—Variations are attributed mainly to changes in food and habits of the cows. E. B. H.

**Composition of shell eggs.** L. C. MITCHELL (J. Assoc. Off. Agric. Chem., 1932, 15, 310—326).—Fresh eggs are very uniform in composition and it is suggested that the osmotic action between white and yolk on storage may be a useful index of age. The average moisture content of fresh yolk (49.53%) increased to 53.46% after about 9 months' cold-storage, crude protein-N increased from 0.32 to 0.44% (dry basis), and fat decreased from 63.16 to 62.41%. The average  $\text{H}_2\text{O}$  content (87.8%) of fresh whites dropped to 86.7%, the total N decreased from 14.11 to 13.77% (dry), and glucose from 3.31 to 3.14%. The average ratio of white to yolk is 63.8 : 36.2. H. R. J.

**Decomposition of lecithin in eggs.** L. C. MITCHELL (J. Assoc. Off. Agric. Chem., 1932, 15, 282—284).—An unusually rapid type of (sour) spoilage with de-shelled eggs is described (distinct from ordinary putrefaction), whereby a bacterial infection with presumably a lecithinase action decomposes the lipins. In 16—26 days fatty acids were increased 15-fold, the normal lipin- $\text{P}_2\text{O}_5$  content was reduced from 0.36% to 0.02%, and lipin-N (i.e., choline) was greatly decreased. H. R. J.

**Vitamin-C content of the Winesap apple as influenced by fertilisers.** M. T. POTTER and E. L. OVERHOLSER (J. Agric. Res., 1933, 46, 367—373).—Apples from trees receiving complete fertiliser were a more effective source of vitamin-C for guinea-pigs than those from unmanured trees. A. G. P.

[Determination of] aluminium in ash of plant materials, fruit juices, etc. L. HART (J. Assoc. Off. Agric. Chem., 1932, 15, 285—289).—The mixed Al and Fe phosphates separated at  $p_{\text{H}}$  4 are dissolved in acid, Fe is separated by cupferron, and Al determined by means of 8-hydroxyquinoline. H. R. J.

Storage experiments with Texas citrus fruit. W. H. FRIEND and W. J. BACH (Texas Agric. Exp. Sta. Bull., 1932, No. 446, 40 pp.).—Effects of temp. and growth conditions on the safe period of storage are examined. Use of waxed paper wraps gave some improvement, but fungicidal washes were ineffective in prolonging the storage limit. Heavy applications of K fertiliser reduced the keeping quality of fruit as compared with that from unmanured trees. In citrus fruit stored at  $-0.5^{\circ}$  to  $0^{\circ}$  for 16 weeks there was little change in the sugar and acid contents of the juice. A. G. P.

Tea tannin and cup quality. C. R. HARLER (Quart. J. Sci. Dept. Indian Tea Assoc., 1932, 101—119).—Of the factors affecting colour of tea, seasonal fluctuations of tannin are the more important. Protein content of the leaf is probably also important since it may render oxidised tannin insol. No correlation has been found between (a) crop curve and tannin change, or (b) climatic conditions (*i.e.*, sunshine etc.) and seasonal variation in tannin. Heavy nitrogenous manuring depresses the tannin content of leaf. The Löwenthal and hide-powder methods are unsatisfactory for determining tannin mixtures in tea infusions. E. B. H.

Tea-cider. ANON. (Tea Quarterly, 1932, 5, 126—127).—A process for the manufacture of tea-cider (a popular Javanese beverage) from sugared tea infusions and tea mould (German Tee Pd.) is described. E. B. H.

Determination of crude fibre [cellulose] in potatoes and potato products. G. STEINHOFF (Z. Spiritusind., 1933, 56, 61—62).—The method of Kürschner and Hanak (B., 1931, 44) as modified by Belucci (B., 1932, 444), using 5 g. of sample, 45 c.c. of 80% AcOH, and 4.5 c.c. of  $\text{HNO}_3$  ( $d$  1.4), gave results for ashless fibre in good agreement with those given by earlier methods, including that of Puranen and Tomula (B., 1930, 1104), and is much more expeditious. J. H. L.

Vim oat-feed. I. Digestibility. C. J. WATSON, G. W. MUIR, W. M. DAVIDSON, and J. I. DORE (Sci. Agric., 1933, 13, 382—394).—The level of feeding of roughages, within certain limits, did not markedly affect the coeffs. of digestibility. Vals. for oat feed (offal from the milling of rolled oats) were lower than those of hay and oat straw. When mixed with other roughages oat feed tended to reduce the crude-fibre digestibility of the whole ration to  $<$  that anticipated from a consideration of the separate constituents. A. G. P.

Factors affecting the palatability of pasture plants. A. B. BEAUMONT, R. E. STITT, and R. S. SNELL (J. Amer. Soc. Agron., 1933, 25, 123—128).—Grass receiving N and mineral fertilisers was eaten more readily than that receiving minerals only or unmanured. Growth stage was an important factor in palatability. A. G. P.

Sorghum silage as a source of vitamin-A for dairy cows. O. C. COPELAND and G. S. FRAPS (Texas Agric. Exp. Sta. Bull., 1932, No. 473, 12 pp.).—Sorghum silage even when fed in large amounts furnished rather  $<$  normal requirements of vitamin-A for maintenance, and milk produced had low and variable vitamin-A contents. Results of trials with various rations including sorghum silage are recorded. A. G. P.

Supplementary feeding with chalk and calcium phosphate with special reference to the calcium and phosphate contents of Bulgarian feeding-stuffs. I. POPPOV (Jahrb. U. Sofia, Agronom. Fakult., 1930—31, 9, 199—232; Bied. Zentr., 1932, 3, A, 136).—The val. of a no. of home-grown feeding-stuffs as sources of Ca and P is examined. With typical rations supplementary feeding with chalk or  $\text{Ca}_3(\text{PO}_4)_2$  did not increase the yield or the Ca or P contents of milk. A. G. P.

Determination of iron in feeding-stuffs. G. S. FRAPS and J. F. FUDGE (J. Assoc. Off. Agric. Chem., 1932, 15, 307—310).—The colorimetric method of Elvehjem and Hart (A., 1926, 443) tends to give low results. The best results were given by the A.O.A.C. method (direct colour development with a large excess of KCNS). The authors' ferrocyanide-colorimetric method gave consistent vals. except with meat and bone scraps. H. R. J.

Determination of starch in feeding-stuffs. G. S. FRAPS (J. Assoc. Off. Agric. Chem., 1932, 15, 304—307).—An improvement of the A.O.A.C. acid hydrolysis method is described. H. R. J.

Concn. of liquids.—See I.

#### PATENTS.

Making concentrated coffee products. E. J. LORAND, ASSR. to PENNSYLVANIA STATE COLLEGE (U.S.P. 1,866,414—5, 5.7.32. Appl., 13.6.28).—A conc. sol. coffee extract is prepared by (A) heating ground, roasted coffee with 4 times its wt. of anhyd. glycerin (or its related compounds) at  $80-90^{\circ}$  under vac. and filtering hot, or (B) extracting roasted coffee with a mixture of mono- and di-saccharides in conc. solution at  $70-90^{\circ}$ . E. B. H.

Alkali iodide [for cattle food].—See VII. Preservative [for fodder].—See XVIII.

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

Changes and keeping qualities of ferrous iodide syrups. E. PAJETTA (Officina, 1932, 5, 261—267).—Oxidation to  $\text{Fe}^{\text{III}}$  is greater in presence of  $\text{H}_3\text{PO}_4$  than in that of citric acid, and is increased by raising the temp. Inversion of sucrose is more rapid in syrups containing  $\text{H}_3\text{PO}_4$ . CH. ABS.

Simplified rapid method for examination of mineral salves with regard to  $\text{Ag}^+$ ,  $\text{Hg}^{++}$ ,  $\text{Pb}^{++}$ ,  $\text{Bi}^{+++}$ ,  $\text{Al}^{+++}$ ,  $\text{Zn}^{+++}$ , K as cations and  $\text{NO}_3^-$ ,  $\text{I}^-$ ,  $\text{Cl}^-$ ,  $\text{OAc}^-$ , and boric acid as anions. E. JOREK (Pharm. Ztg., 1933, 78, 434).—A scheme for the detection of these ions is given. E. H. S.

Composition of Fowler's solution. C. MORTON (Quart. J. Pharm., 1933, 6, 1—4).—Conductivity and e.m.f. measurements show that all the As in the Arsenical Solution, B.P., 1932, is present as  $\text{As}_2\text{O}_3$ , and that

dissolution takes place, in the first instance (with the aid of KOH) by virtue neither of peptisation nor of formation of K orthoarsenite, but through half the  $As_2O_3$  dissolving as K meta-arsenite and the remainder dissolving unchanged in the resulting solution. The  $KAsO_2$  regenerates  $As_2O_3$  on subsequent neutralisation with HCl. W. S.

**Determination of arsenic in medicinal preparations.** E. S. BINOVA and R. L. RATHORODSKA (Farm. Zhur., 1932, 11—12, 335—337).—The modification of Bek-Merez' method is based on the coloration of  $HgBr_2$  paper by  $AsH_3$ . CH. ABS.

**Bactericidal efficiency and toxicity of creosote and its components.** L. GERSHENFELD, R. PRESSMAN, and H. C. WOOD, JUN. (J. Amer. Pharm. Assoc., 1933, 22, 198—204).—The PhOH coeffs. of creosote (I) (17 samples) for both *B. typhosus* and *S. aureus* ranged from 2.4 to 3.9. The high-boiling fraction (215—220°) had the highest bactericidal power and guaiacol (II) and creosol (III) were only half as powerful as was (I), but the xyleneols and ethylguaiacol were more efficient than was either (I) or (II). The min. lethal dose (guinea-pig) of either (I) or (II) is about 0.55 c.c./kg., injected intraperitoneally, and fractions of b.p. >210° are less toxic than those of lower b.p. E. H. S.

**Bactericidal efficiency of 2% phenol ointments. Ointment bases for bactericidal bases.** L. GERSHENFELD and R. E. MILLER (Amer. J. Pharm., 1933, 105, 186—193, 193—198).—Ointments containing 2% of PhOH in lanoline (24.5%) and petrolatum (73.5%), with or without a little  $H_2O$ , have no bactericidal action against *Staph. aureus* in agar at  $p_H$  6.8—7.2 (cf. B., 1932, 1054), but possibly have bacteriostatic action. Bases for 2% PhOH and 0.1%  $HgCl_2$  ointments are described, which are effective against *Staph.* on agar.  $H_2O$ -miscible bases, e.g., vanishing creams, are best. R. S. C.

**Bromometric determination of sympatol.** E. KÄLLSTRÖM (Pharm. Zentr., 1933, 74, 269—272).—The effect of time of bromination, concn. of the reactants, acidity, and temp. on the bromometric determination of sympatol base,  $p-NHMe \cdot CH_2 \cdot CH(OH) \cdot C_6H_4 \cdot OH$  (I), is studied. Optimum results (error  $\pm 2\%$ ) are obtained when 0.04—0.06 g. of (I), 25 c.c. of  $H_2O$ , 25 c.c. of 0.1N-KBrO<sub>3</sub>, 1 g. of KBr, and 5 c.c. of 5N-HCl are kept for 15 min. in the dark, 1 g. of KI is added, and the I titrated with 0.1N- $Na_2S_2O_3$  [1 c.c. of 0.1N-KBrO<sub>3</sub>  $\equiv$  0.004178 g. (I)]. J. W. B.

**Indian Artemisias.** S. KRISHNA and B. S. VARMA (Quart. J. Pharm., 1933, 6, 23—30).—A study of the effects of climate, season of harvesting, soil conditions, etc. on the santonin contents of certain species of Indian *Artemisias* reveals them as of potential competitive val. in relation to Russian *Artemisia*, the high santonin content of which has hitherto given rise to a Russian monopoly for the supply of this anthelmintic. W. S.

**Digitalis preparations with added glycerin.** C. FOCKE (Arch. Pharm., 1933, 271, 248—251).—Addition of up to 30% of glycerin decreases the rate of absorption, but not the activity, of *Digitalis* extracts. R. S. C.

**Sterilisation of pharmaceutical preparations.** I VI. C. E. COULTHARD (Pharm. J., 1933, 130, 266—268,

286—287, 315—316, 338—339, 358—360, 382—383).—A general survey is made of the technique, and of the thermal, filtrational, and chemical methods, of sterilisation. The paper has special reference to the B.P. 1932 official instructions as to sterilisation. W. S.

**Decomposition of alkaloids in aqueous solution, particularly during sterilisation. VI. Ecgonine.** R. DIETZEL and O. STEEGER (Arch. Pharm., 1933, 271, 251—263; cf. B., 1930, 965).—The conductivity of aq. solutions of ecgonine (I) and its hydrochloride is unaffected by sterilisation by heat, whence it is concluded that no decomp. occurs. The acidic and basic dissociation consts. of (I) at 18—98° are determined. R. S. C.

**Effect of radio vibrations on some drugs.** D. I. MACHT (J. Amer. Pharm. Assoc., 1933, 22, 205—212).—Solutions of *Digitalis*, Mercurochrome, eserine salts, cocaine hydrochloride, and PhCHO, exposed to vibrations from a wireless set, underwent a greater chemical change than the control solutions. E. H. S.

**Chlorine-combining power of drugs.** J. STAMM (Pharmacia, 1928, No. 11—12, 4 pp.; Chem. Zentr., 1933, i, 95).—A 0.1% aq. extract was treated with excess of bleaching powder solution, acidified, treated with KI after 5 min., and then titrated with  $Na_2S_2O_3$ . The Cl val. depends on the age, ripeness, and mode of storage etc. of the drugs. A. A. E.

**Indifferent fluid extracts according to the Italian Pharmacopoeia V.** M. PERRINO (Officina, 1932, 5, 212—214, 277—289).—Methods are criticised and determinations of the properties and consts. of extracts of boldus, senega, sarsaparilla, rhubarb, valerian, and viburnum are compared. CH. ABS.

**Assay of podophyllum.** C. N. SPRANKLE and C. B. JORDAN (J. Amer. Pharm. Assoc., 1933, 22, 188—194).—For the control of the manufacture of the resin by the cold process the U.S.P. IX method is suitable, but only about one half the total resin is determined. The U.S.P. X method is unsatisfactory. For the determination of the total resin content the following modification of Warren's method (B., 1930, 393) gives accurate results: 10 g. of the drug are digested for 3 hr. with 60 c.c. of EtOH on a  $H_2O$ -bath, then transferred to a percolator, and percolated with warm EtOH until 95 c.c. have been collected. The liquid is cooled and made to 100 c.c.; 10 c.c. are extracted with 10 c.c. of  $CHCl_3$  + 10 c.c. of 0.6% HCl and then the acid layer is washed 3 times with 15 c.c. of EtOH- $CHCl_3$  (1:2) each time. The combined  $CHCl_3$  extracts are shaken with 10 c.c. of 0.6% HCl and this acid layer is again washed 3 times with 15-c.c. portions of EtOH- $CHCl_3$  mixture. The solvent extracts are evaporated, taken up in 1 c.c. of abs. EtOH, again evaporated, and dried at 80°. E. H. S.

**Extraction of morphine from opium by the lime method.** G. BAUMGARTEN (Arch. Pharm., 1933, 271, 216—217).—Morphine (I) is completely extracted from opium by this method (B., 1931, 905). The apparent higher content of (I) obtained by Eder's method (Pharm. Acta Helv., 1932, 259) is inexplicable. R. S. C.

**Determination of minute quantities of morphine and opium.** A. D. ROZENFELD (Farm. Zhur., 1932, 8—9, 246—251).—(a)  $HIO_3$  (5%, 1 c.c.) and aq.  $NH_3$

(10%, 0.2 c.c.) are added to 2 c.c. of the slightly acid sample, the colour being compared with that of a standard after 2 and 5 min. (b) The sample (3 c.c.) is treated with 1 drop of  $\text{CuSO}_4$  in  $\text{HCl}$ , 0.2—0.4 c.c. of  $\text{H}_2\text{O}_2$ , and 0.2 c.c. of aq.  $\text{NH}_3$ , and the colour compared with that of a standard after 15—20 min. CH. ABS.

**Determination of alkaloids in ipecacuanha root.** J. BÜCHI (Pharm. Ztg., 1933, 78, 448—450).—The addition of  $\text{HCl}$  in the extraction of alkaloids from the root by the D.A.B. VI method, as suggested previously (cf. B., 1930, 965), is unnecessary provided the drug is disintegrated sufficiently. S. C.

**Determination of nicotine in tobacco.** C. PYRIKI (Pharm. Zentr., 1933, 74, 253—257).—Nicotine is not completely removed by steam-distilling 10 g. of tobacco and 2 g. of  $\text{MgO}$  until the distillate amounts to 300 c.c. It is better to use 10 g. of  $\text{K}_2\text{CO}_3$  or 3 g. of  $\text{NaOH}$ . If tobacco contains  $> 3\%$  of nicotine 5 g. should be employed. S. C.

**Adenine-nucleotide and -nucleoside content of commercial organ extracts acting on the circulation.** G. JOOS (Klin. Woch., 1932, 11, 1906; Chem. Zentr., 1933, i, 78).—Lacarnol (I), Padutin, Eutonon, and Myoston were examined; they do not necessarily all contain the same active principle. Adenosine is apparently the active constituent of (I). A. A. E.

**Non-heptane constituents of Jeffrey pine oil.** C. W. SONDERN (J. Amer. Pharm. Assoc., 1933, 22, 214—217).— $\text{COMe}_2$ ,  $\text{MeOH}$  (?),  $\text{EtOH}$ , aldehydes, and  $\text{EtCO}_2\text{H}$  (?) are present in the oil. E. H. S.

**Analysis of sweet orange oil and lemon oil. I. Determination of aldehyde. II. Mechanism and measurement of variability of the oils.** Y. R. NAVES (Parfums de France, 1932, 10, 198—205, 225—232; Chem. Zentr., 1933, i, 142—144).—I. Neutralised oil (20 or 10 g., respectively) is treated with 10 c.c. of 5%  $\text{NH}_2\text{OH}\cdot\text{HCl}$  in 80%  $\text{EtOH}$  and then with 10 c.c. of 0.5*N*- $\text{KOH}\cdot\text{EtOH}$  and 2 drops of 4% bromophenol-blue solution; the mixture is occasionally shaken during 2 hr. at room temp., and is then titrated with 0.5*N*- $\text{HCl}$ , a blank determination being also made. The difference  $\times 1.008$  gives the % of total aldehyde as citral. Bennett and Salamon's method gives lower, and probably more accurate, vals., the difference being due to transformation products, the formation of which is accelerated by free  $\text{NH}_2\text{OH}$ . The difference for properly stored commercial oils should be 0.30—0.90% and 0.40—0.60%, respectively.

II. On storage of the oils in presence of air, aldehyde peroxides are formed. For the determination of the peroxide 5 g. of oil are heated at  $100^\circ$ , with shaking, for 3—4 min. with 5 c.c. of standard  $\text{SnCl}_2\cdot\text{HCl}$ ; the cold liquid is extracted with 15 c.c. of light petroleum (which is washed with 10 c.c. of 5%  $\text{HCl}$ ), and the aq. liquids are titrated in  $\text{CO}_2$  with 0.01*N*-I. Limonene freshly distilled over  $\text{Na}$  contains  $\geq 0.015\%$ . Orange oil which gave aldehyde vals. of 1.82% and 10.08% (see above) and contained 6.18% of peroxide contained  $\text{CH}_2\text{O}$ , *dl*-carvone, and a trace of a saturated oxy-compound, m.p.  $183^\circ$ . Orange oil freed from aldehyde with  $\text{HSO}_3^-$  exhibited an increasingly great oxidative change during 43 days. A. A. E.

**Estimation of volatile oil in cloves.** L. C. MITCHELL and S. ALFEND (J. Assoc. Off. Agric. Chem., 1932, 15, 293—298).—The amount of moisture determined by distillation with  $\text{PhMe}$  is subtracted from the loss in wt. at  $98\text{—}100^\circ/50$  mm. during 3—4 hr. H. R. J.

**Determination of refractive index of essential oils.** A. MAYRHOFER [with E. SOMMER] (Pharm. Presse, 1932, 37, 129—133; Chem. Zentr., 1933, i, 267).—In Alber's visual method mixtures of paraffin oil and  $1\text{-C}_{10}\text{H}_7\text{Br}$ , cineole, or amyl alcohol are used as comparison liquid. A. A. E.

**Detecting Ag in Bi salts.**—See VII. Ampoule glasses.—See VIII. Colour standards for cod-liver oil etc.—See XII. [Tobacco-beetle] fumigation.—See XVI.

## XXI.—PHOTOGRAPHIC MATERIALS AND PROCESSES.

**Action of various substances on unsensitised orthochromatic and panchromatic emulsions.** U. SCHMIESCHEK (Jahrb. Abt. Luftbildwes. Navigat. D.V.L., 1932, 6, 33—43; Chem. Zentr., 1933, i, 555).—The sensitising or desensitising action of various alkalis, salts, acids, and oxidising or reducing agents on Agfa plates is detailed. A. A. E.

**Effect of  $p_{\text{H}}$  and concentration of reducing agent on the developing power of a [photographic] developer.** W. REINDERS and M. C. F. BEUKERS (Ber. int. Kongr. wiss. angew. Phot., 1931, 8, 171—178; Chem. Zentr., 1933, i, 362).—The velocity of development of a photographic developer depends on the  $p_{\text{H}}$  and not on the buffer employed, except when borax is used in presence of a substance containing two *ortho*-OH groups, when (probably owing to complex formation) retardation is observed. The effect of  $p_{\text{H}}$  is much greater for quinol (I) and pyrogallol than for substances containing the  $\text{NH}_2$  group in the  $\text{C}_6\text{H}_5$  nucleus. The influence of concn. is particularly great with (I), and much smaller for *p*-methylaminophenol; at const.  $p_{\text{H}}$  the velocity of development increases with the developer content. The max. val. observed for (I) by Sheppard and Mees was due to the use of const. alkali concn. instead of const.  $p_{\text{H}}$ ; at high concns. (I) behaves as a weak acid. A. A. E.

**Influence of selective absorption of three-colour inks on character of reproduction.** C. P. ARON (Phot. J., 1933, 57, 197—200).—The difficulties of correct colour reproduction are discussed. Graphs showing the % reflection of various sets of "3-colour" inks over the spectral range 400—700  $\text{m}\mu$  are given. J. L.

## XXIII.—SANITATION; WATER PURIFICATION.

**Detection of traces of carbon monoxide in air.** H. HARTRIDGE (Nature, 1933, 131, 654).—Attention is directed to a more sensitive haemoglobin method, using the reversion spectroscope, than that described by Ackermann (B., 1933, 334). L. S. T.

**Determination of the phenol coefficient of disinfectants.** V. JENSEN and E. JENSEN (Dansk Tidsskr. Farm., 1933, 7, 77—94).—The  $\text{PhOH}$  coeff. of a disinfectant is defined as the ratio of the min. concns. of the disinfectant and of  $\text{PhOH}$  which will kill *Micrococcus*

*aureus* in 2 min. at 20°. Details are given together with results for a no. of commercial products. The vals. obtained are lower than the Rideal-Walker coeffs., but are in the same order. R. P. B.

**Disinfectant action of potassium and sodium iodides. I.** T. KUNZMANN (Z. Hyg., 1933, 114, 623—628).—The lethal action of KI towards *B. coli* and *Staph. pyogenes aur.* was > that of NaI. Within the pH range 6.5—7.5 [H<sup>+</sup>] had no effect on the toxicity of the two iodides. Mixtures of KI and NaI having [I<sup>-</sup>] such as was lethal when applied as KI showed only a growth-inhibiting action. A. G. P.

**Factors affecting the efficiency of sewage sedimentation.** G. J. SCHROEFFER (Sewage Works' J., 1933, 5, 209—232).—From this viewpoint the  $\eta$  of the liquid is of more importance than its  $d$ ; the  $d$ , concn., and shape of the solids are of influence in the order named, whilst flocculation and coagulation exert variable effects. The factors controlling plant design are arranged in the following order of importance: detention period, inlet and outlet effects, depth and ratio of length to depth, baffling, velocity of flow, shape of tank, and bottom surface area. C. J.

**Required capacity of separate digestion tanks for an activated-sludge plant.** W. S. STANLEY (Sewage Works' J., 1933, 5, 309—311).—Two years' operating experience at San Antonio, Tex., indicated that under the conditions appertaining 60 days is the min. period for proper digestion, a 40% reduction in volatile matter being obtained. The solids contents of the sludges were: primary 4.5%, activated 0.8%, digested 3.7%. It is estimated that the digestion capacity needed is 5.5 cu. ft. *per cap.* or 40 cu. ft. *per lb.* of volatile matter added *per day.* C. J.

**Sludge-ripeness studies. II. Effect of pressure on digested and chemically treated [sewage] sludges.** D. ALTHAUSEN and A. M. BUSWELL (Sewage Works' J., 1933, 5, 241—261; cf. B., 1932, 530).—The rate at which H<sub>2</sub>O can be expressed from sludge is considered to be a measure of its degree of ripeness. A prediction of the stage to which digestion has proceeded can be obtained by comparing the H<sub>2</sub>O remaining in a cake obtained by pressing 50 g. of wet sludge for 2½ min. at 1000 lb. per sq. in. with either (a) the amount present after pressing for 30 min. or (b) that obtained by subjecting the dry cake to a high vac., soaking in H<sub>2</sub>O, and again pressing; the val. (b) is independent of the ripeness of the sample. C. J.

**Chemical treatment of [sewage] sludge to facilitate disposal.** C. C. AGAR (Sewage Works' J., 1933, 5, 270—277).—The use of Ca(OH)<sub>2</sub>, CaOCl<sub>2</sub>, FeCl<sub>3</sub>, alum, and chlorinated copperas at a no. of American plants is discussed. The first two are suitable for deodorising sludge in a poorly digested condition, whilst the others are mainly used as conditioning agents prior to dewatering the sludge. C. J.

**Mistreatment of water.** C. R. KNOWLES (J. Amer. Water Works' Assoc., 1933, 25, 490—503).—Natural waters polluted by mine wastes may be rendered totally unfit for use in times of drought. The trouble may be minimised by impounding during periods of high dilution, but the quality should then be further protected

by grading and sodding a strip < 500 ft. wide around the reservoir and removing all growths between high- and low-H<sub>2</sub>O levels. The treatment of public H<sub>2</sub>O supplies with an acid coagulant frequently results in increased hardness, and hard boiler-H<sub>2</sub>O is often mistreated by haphazard use of unsuitable compounds. In the discussion, C. H. CHRISTMAN recommends the use of Na aluminate with alum for straight clarification or with Ca(OH)<sub>2</sub> and Na<sub>2</sub>CO<sub>3</sub> for softening. C. J.

**Effect of a small impounding reservoir on stream pollution.** G. M. RIDENOUR (Sewage Works' J., 1933, 5, 319—331).—A year's observations of the purification effected on a polluted stream during its passage through an impounding reservoir with an average detention period of 2.9 days show that the biochemical O<sub>2</sub> demand of the stream was reduced by 66.5% in the summer and 52.5% in the winter, a reduction which otherwise would not have occurred until after approx. 19 miles of normal stream flow. C. J.

**Comparing waters by data obtained by incomplete analysis.** K. L. MALYAROV (Nef. Choz., 1931, 20, 374—386).—Methods for the analysis of bore-hole waters are discussed. CH. ABS.

**Colorimetric determination of hydrogen sulphide in water by means of phosphotungstic acid.** L. N. LAPIN and W. O. HEIN (Z. Hyg., 1933, 114, 605—609).—The method is based on the blue coloration produced by the action of H<sub>2</sub>S on phosphotungstic acid. A definite colour is given by 0.003 mg. of H<sub>2</sub>S in 100 c.c. of H<sub>2</sub>O. In amounts ordinarily present in natural waters, K<sup>+</sup>, Na<sup>+</sup>, NH<sub>4</sub><sup>+</sup>, Li<sup>+</sup>, Fe<sup>2+</sup>, Fe<sup>3+</sup>, Cl<sup>-</sup>, Br<sup>-</sup>, NO<sub>3</sub><sup>-</sup>, SO<sub>3</sub><sup>2-</sup>, SO<sub>4</sub><sup>2-</sup>, and PO<sub>4</sub><sup>3-</sup> do not affect the intensity of the colour reaction. Addition of tartaric acid prevents the formation of ppts. due to high concns. of K<sup>+</sup> or Mg<sup>2+</sup>. Certain org. compounds also produce the blue coloration. A. G. P.

**Detection and determination of iron in drinking water.** J. PRESCHER (Pharm. Zentr., 1933, 74, 237—238).—When KCNS is used to determine Fe<sup>3+</sup>, Cl<sub>2</sub> is not recommended for oxidation of any Fe<sup>2+</sup> present, as it causes the colour of the Fe(CNS)<sub>3</sub> to fade gradually; it may, however, be used if the excess is removed. A commercial form of colorimeter is described. H. F. G.

**New Atlanta turbidimeter [for water].** P. WEIR (J. Amer. Water Works' Assoc., 1933, 25, 584—589).—As the Pt-wire and Jackson candle turbidimeters are unsatisfactory for use with H<sub>2</sub>O of low turbidity it is suggested that stock solutions of raw river H<sub>2</sub>O or suspensions of fuller's earth of known turbidity should be diluted with double-distilled H<sub>2</sub>O and the standards thus prepared used for the determination of low turbidities by direct comparison of transmitted light. Suitable apparatus is described. C. J.

**Disinfectant soaps.**—See XII. Pyrethrum [insecticides].—See XVI. Creosote. Ointments.—See XX.

#### PATENT.

**Insecticides.** H. KIMURA (B.P. 390,971, 9.6.32).—A mixture of dried *Perilla nankinensis* and an insecticide is extracted with petroleum oil and the extract mixed with Japanese pepper and wintergreen, pine, and peppermint oils. E. H. S.