# BRITISH CHEMICAL ABSTRACTS

B.—APPLIED CHEMISTRY

JAN. 20 and 27, 1933.\*

# I.-GENERAL; PLANT; MACHINERY.

High-temperature experimental furnace. P. F. THOMPSON (J. Soc. Chem. Ind. Victoria, 1932, 32, 693— 699).—A miniature blast furnace in which temp. up to 1800° can be obtained is described; it comprises a shaft of magnesite or chromite bricks, 14 in. high and 4 in. square, into which is placed a vertical carbofrax tube to contain the charge. The space, above the grate, between the tube and the bricks is filled with gas-C ( $\frac{1}{4}$ — $\frac{1}{2}$  in.), which is burned by blowing air from below the grate by means of a small Roots' blower.

Improvements in the use of the Lees and Chorlton heat-conductivity apparatus. C. H. LEES and H. A. NANCARROW (Phil. Mag., 1932, [vii], 14, 811–823).—A modified apparatus is described (cf. *ibid.*, 1896, 41, 495) and the theory of temp. distribution in a heated horizontal circular disc is discussed. The consts. of the apparatus are determined by using Sn foil, the thermal resistance of which is neglected. This is then replaced by a plate of the material under investigation. The following heat conductivities have been determined : glass 0.00232 and 0.00219, slate 0.00539. E. S. H.

Thermal conductivity of [heat] insulators at low temperatures. E. RAISCH and W. WEYH (Z. ges. Kälte-Ind., 1932, 39, 123–125; Chem. Zentr., 1932, ii, 579). —At  $-200^{\circ}$  the thermal conductivity of powdered MgCO<sub>3</sub>, slag wool, powdered SiO<sub>2</sub>, silk, and cork particles approaches that of air. A. A. E.

Thermal conductivity and the plate efficiency of a rectifying column. C. P. WARDEN (J.S.C.I., 1932, 51, 405-411T).—Experimental work performed on a fractionating column (9 in. internal diam.), fitted with bubble-cap plates, showed that the efficiency of fractionation across the plate increased as the thermal conductivity of the plate material increased. The column was fitted with sets of plates made of "Vitreosil," cast Fe, and "Alpax" (an Al alloy), with thermal conductivities of 0.73, 26, and 86 B.Th.U./ft./hr./sq. ft./° F., respectively.

Use of low temperatures in the separation of the constituents of gaseous mixtures. F. POLLITZER (Z. ges. Kälte-Ind., 1932, 39, 90–94; Chem. Zentr., 1932, ii, 578–579).—The drying of gases, and the separation of  $C_6H_6$ , coal gas, natural gas, or coke-oven gas, and of  $C_2H_4$ ,  $C_2H_6$ , etc. from the last-named, are discussed. A. A. E.

Use of modern gas-heated equipment for industrial drying processes. W. HIND (Gas World, 1932, 97, Ind. Gas Suppl., 120-126).—Various types of apparatus are described and approx. drying temp. for many materials are given.

New filtration technique. M. DOLCH (Chem. App., 1932, 19, 16—17; Chem. Zentr., 1932, i, 1808—1809). —Fine and coarse particles should be homogeneously mixed. The effect of thickness of layer, and the application of pressure, are discussed. A. A. E.

**Evaporation.** M. JAKOB and W. FRITZ (Forsch. Gebiet Ingenieurw., 1931, A, 2, 435–447; Chem. Zentr., 1932, i, 1762).—A study of the transfer of heat to  $H_2O$  from smooth horizontal heating plates. A. A. E.

Refractometric measurement of ethylene glycol type antifreeze mixtures. E. H. HARVEY (Amer. J. Pharm., 1932, 104, 734–736).—Curves are given showing the val. of  $n_D$  for 1:9-9:1 H<sub>2</sub>O-glycol mixtures and the temp. at which crystals appear on freezing; with the 1:1 mixture crystals appear at --38° and with the 7:3 mixture at --15° ( $n_D$  1·3642). A. R. P.

Modification and calibration of Kühl's sedimentation apparatus. Its use in determining the granular composition of cement. K. KOYANAGI (Cement, 1932, 5, 371—383).—The apparatus is modified by more accurate control of temp. of the sedimentation process by means of a transformer and by including an agitator and thermometer in the charging arrangement. The discharger is arranged so that only the sedimented cement grains can be taken out of the sedimentation tube without changing the vol. of EtOH. The size of grains was measured by direct microscopical determination, but the application of Stokes' law affords an accurate method of calibration of this apparatus.

C. A. K.

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Some aspects of plasticity and its determination [for rubber etc.]. G. W. USHERWOOD (Trans. Inst. Rubber Ind., 1932, 8, 227-240).—A modified plastometer of the compression type is described in which a cylindrical test-piece 1 cm. high and 1 sq. cm. in crosssection is subjected at 100° to a pressure of 1 or 2 kg. between circular platens of the same cross-sectional area. The height of the test-piece is measured after compression for 30 sec. and after recovery for 30 sec. Results with typical C black stocks are cited. D. F. T.

Cleaning of screw stoppers. J. M. GUTHRIE and G. G. PHILIP (J. Inst. Brew., 1932, 38, 537-538).— Phenolic substances, the most troublesome impurities found on the stoppers of beer bottles when returned, are destroyed by soaking overnight in 0.05% KMnO<sub>4</sub>, followed by washing with aq. Ca(HSO<sub>3</sub>)<sub>2</sub>. C. W. G.

Superheating of steam for heating and process work. A. F. WEBBER (Fuel Econ., 1932, 8, 161-164).

A. R. P.

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

High-pressure and high-temperature steam-pipe producer gas made from anthracite and small coke in work. J. A. AITON (Engineering, 1932, 134, 720-723).

Oils for furnaces and central-heating plant .-See II. [Hg dropping pump for] determining O<sub>2</sub> in Fe etc.-See X. [Plant for] varnish manufacture .- See XIII. Rubber in industry .- See XIV. Moisture in flour etc.-See XIX. Measuring gas concns.—See XXIII.

See also A., Dec., 1216, Intensive drying agents. 1225, Modified Haughton-Hanson thermostat. Freezing mixtures. PATENTS. MOISTILL WOY

Manufacture of a thermophoric mixture. T. P. BELL, Assr. to THERMOPHOR MANUFG. Co., INC. (U.S.P. 1,850,166, 22.3.32. Appl., 2.7.30).-The mixture comprises NaOAc 87, Na<sub>2</sub>S<sub>2</sub>O<sub>4</sub> 8.5, glycerin 3.5, and CaCl<sub>2</sub> 1 wt.-%. F. Y.

Heat-insulating material. E. L. FRANCIS. From GYPSUM, LIME, & ALABASTINE, CANADA, LTD. (B.P. 383,248, 13.8.32).-The material comprises 60-50% of ground gypsum millboard and 40-50% of micaceous flakes (exfoliated vermiculite)  $\frac{1}{8} - \frac{1}{2}$  in. in size. L.A.C.

Foam stabiliser for fire extinguishers. A. BERGHAUSEN, ASST. to E. BERGHAUSEN CHEM. Co. (U.S.P. 1,848,042, 1.3.32. Appl., 15.8.28).-An aq. or alkaline extract (or a mixture thereof) of leguminous plants of the genus Medicago sativa, e.g., lucerne, is used. D. J. N.

Water-softening plant. UNITED WATER SOFTENERS, LTD., R. T. PEMBERTON, H. S. LAWRENCE, and J. I. AUSTEN-WALTON (B.P. 384,045, 26.10.31).

H<sub>2</sub>O-softening gels.—See VII. Heat-insulating cement. Materials for bearings etc .- See IX. Heat-resisting alloy. Thermocouples-See Х. Container for drying materials. Evaporators. Removing particles from gases.—See XI.

# II.-FUEL; GAS; TAR; MINERAL OILS.

Design and operation of continuous vertical retorts. C. A. POULSON (Gas World, 1932, 97, 515-518).-The gas-making capacity of vertical retorts can be increased 10% or decreased 33% from normal working without altering the calorific val. Optimum results are obtained by blending, but the product from a mixture of two or more coals is by no means an average of the constituents. Slow scurfing ( $\lt$  48 hr.) prolongs the life of the retort wall, the temp. of which should be kept as low as possible by regulation of the air input. A step-grate producer is favoured; this must be kept clean to ensure max. CO production. The rate of combustion must be kept const. to ensure complete reduction of  $CO_2$ ; a fuel-bed temp. of 900° is suggested. The retorts should be kept always under slight pressure and to obtain max. efficiency the following conditions must be observed : steady chimney pull, even quality and pressure of producer gas, and correct mixture of CO and air in the combustion chambers. R. N. B.

New methods of construction of rotating-grate [gas] producers. W. KIRNICH (Chem. Fabr., 1932, 5, 433-437).-Heat balances and cost tables for

a small rotating-grate plant are compared. This and the related purifying plant are described. R. N. B.

Large-scale carbonisation of peat at different temperatures. G. KEPPELER and H. HOFFMANN (Brennstoff-Chem., 1932, 13, 401-406).-An Oldenburg peat has been carbonised in chamber ovens, or similar plant, at 450°, 550°, and 800°, the yields being, respectively, coke 57.1, 43.5, and 34.0%; tar 2.6, 6.6, and 5.6%; liquor 15.5, 17.5, and 17.4%; gas 24.8, 32.4, and 39.3%. On carbonisation at 800° considerable shrinkage occurred and the coke had a low crushing strength. The tar produced at 800° resembled a hightemp. bituminous coal tar in containing appreciable quantities of C<sub>10</sub>H<sub>8</sub> and anthracene. The paraffin wax content of the tars fell from 12.6% (450°) to 0.6%(800°), the free C rose from 3.6 to 26.6%, and the pitch (excluding free C) rose from 23.0 to 58.2%. Complete gas and tar analyses are tabulated.

#### A. B. M.

Gasification of small coke in built-in producers. E. DUBOIS and J. SCHMID (Gas- u. Wasserfach, 1932, 75, 921-926).-The effect of clinkering periods on the efficiency of step-grate producers, using small coke for heating vertical chamber ovens, has been investigated. Temp. measurements show the existence of a central cold region just before clinkering. The vals. just before and after clinkering of CO<sub>2</sub> content, calorific val., steam content, and gas-outlet temp. are: 4.2, 8.1%; 1282, 970 kg.-cal./cu. m.; 26.8, 32.8 g./cu. m.; and 840°, 810°, respectively. Average conditions are reached 2 hr. after this period. A detailed heat and wt. balance has been worked out; the results compare favourably with an external rotating-grate producer, which needs higher-grade fuel but supplies cleaner gas to the settings. R. N. B.

Rapid photochemical detection of iron carbonyl in fuels and addenda. H. KIEMSTEDT (Erdöl u. Teer, 1932, 8, 253-255; Chem. Zentr., 1932, ii, 956).-Fe(CO)<sub>5</sub> is decomposed by light; its presence is indicated by the formation of reddish-brown flocks or sedi-Failure of the test at low concns. can be prement. vented by previous addition of certain substances.

A. A. E.

Chemical basis of the production of water-gas from coke and coal. (a) B. NEUMANN, C. KRÖGER, and E. FINGAS (Gas- u. Wasserfach, 1932, 75, 972-973). (b) F. HEYD (Ibid., 973-974). (c) P. DOLCH (Ibid., 974).-(a) Dolch's results (B., 1932, 1111) are criticised. The val. of the water-gas const. [CO][H20]/[CO2][H2] obtained with a brown-coal coke and its approach to the equilibrium val. is attributed to the high ash content (22%)compared with the 8% ash content of the coke from bituminous coal. The effect of steam on graphite activated with metallic oxides is brought forward in support of this theory. Errors in the evaluation of the const. by Dolch's method, which may lead to vals. <the theoretical, are also due to neglect of the effect of side reactions:  $2C + 2H_2O \rightleftharpoons CO_2 + CH_4$  and C + $2H_2O = CO_2 + 2H_2$ .

(b) The sp. effect of alkali or Fe oxides in the coke is pointed out. Disregard of this leads to erroneous results.

(c) DOLCH replies to the above criticisms. Further experiments have been carried out at 800° with two cokes of low ash content ( $2\cdot3$  and  $5\cdot3\%$ ). In both cases the water-gas const. does not change appreciably with time, but approximates to the theoretical val.  $0\cdot92$ . R. N. B.

Formation of impurities in town's gas and their effect on the distribution system. NAUSS (Gas- u. Wasserfach, 1932, 75, 985-988).-The reactions involved in the formation of rust from Fe and the H<sub>2</sub>O, CO<sub>2</sub>, O<sub>2</sub>, HCN, and H<sub>2</sub>S present in the gas are discussed. Although H<sub>2</sub>S may not be detected at the purifier outlet it can be formed later in appreciable amounts from the CS, still present or by hydrolysis of COS formed by the reaction  $CS_2 + CO_2 = 2COS$ . If benzol is removed by washing with tar oil, the NH<sub>2</sub>Ph and sulphides present can react with CS2 to form H<sub>2</sub>S. CS<sub>2</sub> can also react with NH<sub>3</sub> and with alkalis which may be present in Luxmasse to produce H2S. The reactions involved are described and have been shown to occur in small-scale experiments. The removal of CS<sub>2</sub> is therefore an additional necessity for the complete elimination of corrosion troubles; this may be effected by adsorption or by catalytic hydrogenation and hydrolysis to H.S. R. N. B.

The gum problem in town gas. W. H. FULWEILER Gas J., 1932, 200, 570-572) .--- Both liquid- and vapourphase gum may be formed from town gas. The former is typical of systems where condensation can occur, e.g., in carburetted water-gas manufacture. It is neutral or slightly acidic, insol. in alkali, and contains < 0.5%N. It decomposes on heating to give large quantities of indene and styrene from which it is formed by oxidation and polymerisation; cyclopentadiene and butadiene are not important constituents. The polymerisation is favoured by high O2 concns. and by traces of mercaptans, but is inhibited by phenolic substances. The gumforming constituents can be removed by oil washing or by low-temp. condensation. Vapour-phase gum is typical of straight coal gas and is dispersed in the gas in the form of ultramicroscopic particles. It is strongly acidic, sol. in alkali, and contains > 5% N; on heating it decomposes violently to form C,  $CO_2$ , CO, oxides of N, and a trace of oil. It is formed by the action of oxides of N on hydrocarbons. These oxides occur in the products of combustion in the setting, and probably reach the coal gas by leakage through the retort wall. Experiments show that gas freed from NO forms no gum and exhibits no particle formation under the ultramicroscope. Steam removes up to 95% of these particles, but if NO is still present a fresh no. will be formed. Four fractions of condensate were treated with NO, NO2, and O2, alone and mixed; NO alone was found to be the most active gum-forming agent. A survey of a large no. of org. compounds showed C<sub>10</sub>H<sub>8</sub> and thiophen had least and pyrrole and picoline most effect on gum formation. R. N. B.

Brown-coal tar oil in industrial and centralheating plant. A. SOLBACH (Petroleum, 1932, 28, No. 47, Ölfeuerung, V, 3-4).—Fuel oils derived from brown-coal tar are now equal in quality to petroleum oils. Data relating to two such oils suitable respectively for industrial firing and for central heating are tabulated. A. B. M.

Measurement of the viscosity of tar. G. BARR and A. L. THOROGOOD (J.S.C.I., 1932, 51, 381-392T) .-In "British Standard Specification for Tars (Nos. 1 and 2) for Road Purposes, No. 76, 1930" viscosities are specified in "sec." indicated by a Hutchinson Junior tar tester at 25° or by a Redwood-type viscosimeter at 30°. Suitable tolerances have been found for the former instrument, the most important dimensions being the diams. of the bulb and of the tar container; the velocity of descent is proportional to the apparent wt. When abs. viscosities were determined at 25° by Stokes' method, using X-rays to follow the fall of spheres through unstirred tar, the vals. varied with the thermal history; in one case an 8-fold variation was found and actual setting apparently occurred at room temp. Some pretreatment will need to be standardised before accurate comparisons are possible, but from the data for 3 tars in which hysteresis could not be recognised, approx. conversion equations have been deduced:  $\gamma = 1.67(M - V_{\rho})T_{\rm H} = 4.44\rho T_{\rm R}$ , where  $\eta$  and  $\rho$  are the density and viscosity of the tar, M and V the mass and vol, of the Hutchinson tester, and  $T_{\rm H}$ and  $T_{\rm R}$  are the times (sec.) given by the Hutchinson and Redwood-type instruments, respectively, at the same temp. The viscosity at 25° may be from 1.9 to 3.0times that at 30°.

Synthetic benzine from water-gas. A. SCHAAR-SCHMIDT and M. MARDER (Brennstoff-Chem., 1932, 13, 412-413; cf. B., 1929, 1003).—The saturated hydrocarbons of a benzine prepared by the Fischer-Tropsch process have been shown to consist of about 33% of hydrocarbons containing *tert.*-bound C atoms and 67%of hydrocarbons unattacked by SbCl<sub>5</sub> (cf. B., 1932, 493). Even the fraction corresponding in b.p. to *n*-heptane, obtained by careful fractionation of the saturated hydrocarbons, contained some hydrocarbons having *tert.*-bound C atoms. The remainder may be either *n*-hydrocarbons and/or hydrocarbons containing quaternary-bound C atoms. A. B. M.

Production of carbon monoxide-hydrogen mixtures suitable for the synthesis of benzine. F. FISCHER, H. PICHLER, and R. REDER (Brennstoff-Chem., 1932, 13, 421-428).-Gas mixtures containing CO and  $H_2$  in approx. the ratio (1:2) required for benzine synthesis may be produced by mixing coke-oven gas with generator gas or with water-gas (which may be produced simultaneously in the coke oven), by the direct gasification of coal, or by the interaction of CH<sub>4</sub> with steam, and/or CO2, or O2, etc. Heat balances have been drawn up for the more important of these processes. Laboratory experiments have shown that a mixture of CH<sub>4</sub> and steam can be converted almost completely into CO and  $H_2$  by passage over a Ni-Al catalyst at 800°/1 atm. or at  $600^{\circ}/0.1$  atm. (time of contact < 1 sec.). Both laboratory and technical-scale experiments have shown that a gas suitable for the synthesis of benzine can be produced by passing coke-oven gas and steam over hot coke. In the larger-scale experiments a small watergas generator was used, the fuel bed being alternately blown with air and subjected to the action of the mixed

steam and coke-oven gas; the gas produced (blast 1 min., run 3 min.) had the composition  $CO_2 2 \cdot 4$ ,  $C_nH_m$  nil,  $O_2 0 \cdot 4$ ,  $CO 28 \cdot 2$ ,  $H_2 52 \cdot 3$ ,  $CH_4 2 \cdot 5$ , and  $N_2 14 \cdot 2\%$ . The yield of benzine from this gas, expressed in therms and referred to the quantity of coal used, is estimated at  $26 \cdot 4\%$ . A. B. M.

Reaction mechanism of the benzine synthesis, and engine performance and other properties of the products (" gasol," benzine, Diesel oil, paraffin wax). F. FISCHER and H. KOCH (Brennstoff-Chem., 1932, 13, 428-434).—The experimental results of investigations of the Fischer-Tropsch synthesis of benzine from  $CO + 2H_2$  are best explained by the assumption of the intermediate formation of carbides (cf. B., 1926, 475, 939; A., 1927, 748) which react with the  $H_2$  to form radicals such as CH, CH<sub>2</sub>, and Me, which in turn polymerise and condense to form various hydrocarbons. The reduction of  $CO_2$  by  $H_2$  to form liquid hydrocarbons can be effected only in the presence of additional catalysts, e.g., Cu-Zn, which first reduce the CO2 to CO; otherwise only  $CH_4$  is formed. The conclusion that CO is not formed as an intermediate stage in the reduction of CO<sub>2</sub> to CH<sub>4</sub>, and that the presence or intermediate formation of CO is necessary for the production of benzine, is confirmed by experiments on the decomp. of HCO<sub>2</sub>H and MeOH in contact with the benzine catalyst; the former yields principally CO2 and only 10-20% of gaseous and liquid hydrocarbons, whereas the latter yields considerable quantities of benzine similar to that produced from CO and H2. The "gasol," i.e., the mixture of C2-C5 hydrocarbons, formed in the reaction will probably be most efficiently utilised by conversion into the corresponding alcohols. The chemical composition and engine performance of the light oil and Diesel oil fractions are discussed (cf. B., 1929, 1003; 1932, 584, 920). The yield of paraffin wax amounts to about 5% of that of the oil; the wax which is obtained by extraction of the catalyst is of high m.p., e.g., 75-85°, and contains constituents which are of very high mol. wt. and are only slightly sol. in Et.O. A. B. M.

Benzol recovery. F. BLACKBURN (Gas J., 1932, 200, 565-570).-The calorific val. of town gas can be reduced by addition of low-grade gas or by stripping out benzol. The former method decreases the saleable coke by the amount necessary to manufacture watergas or producer gas, which may have a high cost per therm. Removal of benzol increases the thermal capacity of the works by 4% for a capital expenditure of approx. half that needed for the production of the same no. of gaseous therms. C10H8 and unsaturated hydrocarbons are removed in the process. A plant using the wash-oil method is described; oil is pumped at a rate of 10 gals./ 1000 cu. ft. of gas and leaves the washer containing  $2 \cdot 5 - 3 \cdot 5\%$  of benzol. The crude benzol is distilled off and rectified by successive alkali, acid, and H<sub>2</sub>O washes. The liquid is again distilled, the total loss being approx. 7%; any residue is used for carburetting water-gas. The wash oil, which tends to sludge and thicken in use, should be changed every 3 months and can also be used for carburetting. The yields of crude and refined benzol were 3.09 and 2.89 gals./ton of coal; the washer efficiency was 88.6%. The calorific val. of the gas,

which had a final  $C_{10}H_8$  content of 0.53 grain/100 cu. ft., decreased by 37 B.Th.U./cu. ft. The overall cost of production is estimated to be 8.7d./gal. R. N. B.

Oxidation test for the stability of benzols on storage. W. H. HOFFERT and G. CLAXTON (Gas J., 1932, 200, 494—499).—The effect of gas rate, temp., and the material of the container on the oxidation of benzol to form gum is discussed. The data obtained have been used to formulate a standard test.  $O_2$  is bubbled at 35 c.c./min. for 3 hr. through 100 c.c. of benzol heated on a boiling H<sub>2</sub>O-bath. 75% of the liquid is then distilled off, and the residue evaporated on a H<sub>2</sub>O-bath for  $1\frac{1}{2}$  hr., further heated at 98—105° for 1 hr., and then weighed to give a val. for the total of preformed and potential gum. All apparatus must be well cleaned to avoid inhibiting effects, and the test should be carried out in absence of direct sunlight. R. N. B.

Oil for industrial furnaces. H. VON SCHROETER (Petroleum, 1932, 28, No. 47, Ölfeuerung, V, 1—2).— The advantages of oil firing, the types and requisite properties of oils used for this purpose, and the conditions necessary for efficient combustion are very briefly discussed. A. B. M.

Fuel oil in metallurgical melting and heating practice. T. F. UNWIN (Metallurgia, 1932, 7, 49-51).

Representation of the combustion equations of fuel oils in terms of the specific gravity. J. K. FIGLMÜLLER (Petroleum, 1932, 28, No. 47, 1-4).—The  $CO_2$  (or CO) and  $O_2$  contents of the flue gases have been calc. as functions of the "air factor" (theoretical air required/air supplied) and the *d* of the oil by means of the relations between the composition of the oil and its *d*, viz., %H = 26 - 15*d* and %C = 74 + 15*d*. A simple graphical method of representing the results is described. A. B. M.

Production of ceresins from Grozni crude oil. L. G. ZHERDEVA (Azerbaid. Neft. Choz., 1932, No. 5, 78-83).—Recommended modifications are discussed. CH. Abs.

Standardisation of the Conradson coking test [for lubricating oils]. F. SCHULZ and A. BALADA (Petroleum, 1932, 28, No. 46, 5-6).—The apparatus and method used in the modified test adopted by the Lubrication Subcommittee of the Czechoslovakian Standardisation Committee are described (cf. B., 1927, 547). The method has been in use for 5 years with satisfactory results. A. B. M.

Hydrogenation of petroleum products (without cracking). A. SACHANEN and B. TARASSOV (Petroleum, 1932, 28, No. 46, 1-4; cf. B., 1932, 666).—The influence of temp., pressure, and catalysts on the hydrogenation of a cracked kerosene (b.p. 195-250°) has been studied. Complete hydrogenation (the I val. falling from 35-38 to nil, the aromatic + olefine hydrocarbon content from 36% to nil, and the NH<sub>2</sub>Ph point rising from 59.0° to 72.0°) was effected by using spongy Pt as catalyst, an initial H<sub>2</sub> pressure of 200 atm., a max. temp. of 300°, and a time of heating of 2 hr. With no catalyst a slow hydrogenation of the olefines only occurred; use of a powdered Ni + Co catalyst increased the rate of reaction tenfold, about 80% of the olefines being hydrogenated after

3 hr., but only slight hydrogenation of the aromatics was effected. Increased pressure and raised temp. both produced a marked increase in the rate of reaction. The catalytic effect of Ni was greater when mixed with kaolin (and moulded into balls) than when used in the powdered form. Many metals and oxides, e.g., Al<sub>2</sub>O<sub>3</sub>, CuO, Mn<sub>2</sub>O<sub>3</sub>, had no catalytic effect. Hydrogenation of higher-boiling petroleum products under the above conditions was very slow; for this purpose  $MoS_3$  was a more active catalyst than Ni + Co. A. B. M.

Catalytic hydrogenation of hydrocarbons and mineral oils. A. SZAYNA (Przemysł Chem., 1932, 16, 221-223, 229-249) .- The products of hydrogenation of paraffins are shorter-chain paraffins and eventually gaseous hydrocarbons; naphthenes (decahydronaphthalene) first undergo rupture of condensed rings to yield monocyclic hydrocarbons with side-chains, which are next eliminated, so that the final products are paraffins and cyclohexane derivatives. Single aromatic nuclei are comparatively stable ; thus Ph2 yields 70% of unchanged Ph2, 15% of C6H6, 6% of cyclohexane, and 4% of methylcyclopentane, whilst  $C_{10}H_{14}$  and anthracene yield  $C_6H_6$ and homologues, together with gaseous hydrocarbons. Cylinder oil, cracking oil, gas oil, and other mixtures yield mixtures of benzine, b.p.  $< 200^{\circ}$ , together with cyclic compounds, according to the proportion of naphthenes and aromatic hydrocarbons in the original mixture. The thermal decomp. (cracking) of hydrocarbons commences at about 400°, whilst the addition of H begins at about 300°; in the presence of H, the former reaction is largely suppressed, and condensation reactions are entirely absent. The velocity of hydrogenation increases with pressure. Oxides and sulphides of Mo catalyse both hydrogenation and decomp. Highquality lubricating oils are obtained by low-temp. hydrogenation of oils of high viscosity. R. T.

Separation of gaseous mixtures.—See I. Thermal conversion of  $C_2H_4$  and  $C_2H_6$ .—See III. Azo dyes from tar phenols.—See IV. Sulphite waste liquor [as fuel etc.].—See V. Mineral black.—See XIII.

See also A., Dec., 1201, Colloidal C from carbohydrates. 1212, Catalytic activity of C. 1213, Catalyst decomp. of CS<sub>2</sub>. 1224, Calorimetric apparatus [for coals]. 1226, Use of the Br-H<sub>2</sub>O pipette. 1230, Artificial coalification. 1262, Naphthenic acids from petroleum.

#### PATENTS.

[Heat-]treatment of carbonaceous material. W. E. TRENT, Assr. to TRENT PROCESS CORP. (U.S.P. 1,850,521, 22.3.32. Appl., 4.11.27).—Coal-oil emulsions etc. are carbonised in superimposed perforated metal trays supported in a retort chamber (A) by horizontal rows of heat-resisting metal rods the ends of which project through the walls of A and through the vertical heating flues at both sides. The rods conduct heat to the trays and the gases evolved pass upward through the superimposed layers of material to the gas exit. Vertical midfeathers are provided in the heating flues to ensure a circuitous path for gases through successive rows of rods. The trays may be introduced at one end of the setting and may traverse successively several horizontal rows or be withdrawn after a single passage. Alternatively, trays may be omitted and the material fed vertically through the carbonising chamber between the staggered rows of heated rods. H. E. T.

Electric arc treatment of vaporised carbonaceous materials. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 382,690, 24.8.31).—By adding a finelydivided inert solid, *e.g.*, sand, to the gases or vapours undergoing treatment, the walls of the apparatus surrounding the arc are kept free from deposits of C etc. A. B. M.

**Operation of coal-distillation plants.** S. P. MILLER, Assr. to BARRETT Co. (U.S.P. 1,849,197, 15.3.32. Appl., 17.4.29).—A portion of the gas stream carrying suspended heavy tar, pitch, and free C is scrubbed at high temp. to retain fractions of low b.p. and then mixed with the unscrubbed portion. The hot, mixed gases are condensed, producing tar oils conforming in b.p. and free C content to commercial specifications for creosoting. H. E. T.

Burners for [flameless] catalytic combustion [of gaseous or vaporised fuels]. V. V. WALLIN (B.P. 381,783, 18.12.31. Swed., 31.12.30).—The catalysts are incorporated in the cylindrical or corrugated walls of the burner between which an air-fuel mixture passes without obstruction. A. B. M.

Manufacture of amorphous carbon. ATELIERS GÉNÉRAUX DE CONSTRUCTION SOC. ANON. (B.P. 382,406, 9.10.31. Belg., 16.1.31).—Water-gas is allowed to react with CaC<sub>2</sub> in the presence of steam at about 250°  $(3CO+3H_2+4CaC_2+H_2O = 4CaO+4H_2+11C)$ . The CaO may be removed from the product by extraction with HCl. The water-gas is made preferably by passing  $CO_2$ , formed as a by-product in the manufacture of pure  $H_2$ , and steam over Fe at a red heat. A. B. M.

Apparatus for producing and utilising gas. J. DELATTRE-SEGUY, Assr. to UNIVERSAL OIL PRODUCTS Co. (U.S.P. 1,850,945, 22.3.32. Appl., 4.6.27).—The production of gas from any conventional gas generator is controlled automatically to consumption requirements, and maintained at substantially const. composition, by magnetic valves (A) regulating the gas outlet and the steam and air inlets. Variations in pressure in a gasstorage accumulator operate A through switches which also control the compressing pump. Thermostatic regulation controls the gas supply to the consuming apparatus. H. E. T.

Increasing the efficiency of gas-purifying plants working with gas-purifying mass. F. LENZE and A. RETTENMAIER (B.P. 383,338, 31.8.31).—The removal of  $H_2S$  is effected by treatment with bog-Fe ore or other purifying mass as in usual practice, but higher reaction activity and purification efficiency are attained if the material and the gas are dry and at temp. of 35—50°. By removing the S from the mass after each fouling, high concus. of CN compounds (e.g., Prussian-blue) can be obtained. H. E. T.

Purification of combustible gases from hydrogen sulphide. G. SZIGETH (B.P. 382,650, 29.7.31. Hung., 1.6.31).—In purifying gases containing > about 1% of H<sub>2</sub>S by the dry process with hydrated Fe<sub>2</sub>O<sub>3</sub>, the crude gas is diluted with purified gas before entering the purifier in order to avoid an undesirable rise of temp. therein. The purified gas may also be cooled before addition to the orude gas. A. B. M.

Distillation of bituminous schists. Soc. DES SCHISTES ET PÉTROLES DE FRANCHE-COMTÉ (B.P. 381,881, 29.4.32. Fr., 19.5.31).—The crushed schist, of 10—15 mm. particle size, is distilled at about 750° in an externally-heated, slightly inclined, rotary retort, the internal wall of which is provided with helical and longitudinal ribs for regulating the rate of passage of the material. The distilled schist is quenched by falling into a vat of water, the steam formed thereby, admixed if desired with other steam and/or inert gas, being passed through the retort and withdrawn, under suction, at the upper end thereof with the gases and vapours of distillation.

A. B. M.

Manufacture of bituminous products. P. LECH-LER (B.P. 382,842, 27.2.32).—Petroleum asphalt is treated, in the molten state or in solution in an inert solvent, with a polymerising agent, e.g., conc.  $H_2SO_4$  or anhyd. AlCl<sub>3</sub>. A product of increased stability and higher softening point is formed, suitable for the manufacture of paints, emulsions, etc. A. B. M.

[Treatment of] containers for asphalt and analogous bituminous substances which tend to adhere to the surfaces of metals. J. McC. SANDERS (B.P. 381,632, 23.7.31).—The inner surfaces of the Fe or steel containers are treated with a reagent, *e.g.*, an aq. solution of an org. acid  $(H_2C_2O_4)$  or an acid salt  $(NaH_2PO_4)$  and glycerin, or of a hygroscopic salt  $(CaCl_2)$ , which loosens the film of oxide thereon.

A. B. M.

[Alloy steel for apparatus for] cracking of hydrocarbons. VEREIN. STAHLWERKE A.-G. (B.P. 382,355, 25.8.31. Ger., 27.8.30).—The steel contains 2-13%Cr, 0.3-4% Al, and up to 2% of one or more of the elements Si, Mo, V, Ti, Be. [Stat. ref.] A. R. P.

Cracking of heavy oils and apparatus therefor. AKTIS A.-G. (B.P. 383,384, 24.10.31. Ger., 31.12.30).— Hydrogenation is effected by passing heavy oil vapours with superheated steam through a coke carburettor in a high-frequency electric field at 500,000—800,000 periods/sec. with a superposed d.c. of 500—1000 volts. The gas produced may be used for driving engines and the exhaust gases utilised for raising and superheating the steam. Suitable apparatus is described. H. E. T.

Treatment [purification] of petroleum oil. Reclaiming used lubricating oils. W. S. BAYLIS, ASST. to FILTROL CO. of CALIFORNIA (U.S.P. 1,849,653-4, 15.3.32. Appl., 14.10.26).---(A) Crude lubricating oil is agitated with acid-treated clay and a little acid  $(H_2SO_4)$  at 100° in a jacket-still and steam is then blown through the mixture, which is afterwards filter-pressed. The treatment is repeated on the filtered oil in similar apparatus. The primary and secondary stills are connected to a common condenser and are operated under vac. The clay removed in the second filtration may be used in the primary still. (B) Na silicate is added to the mixture instead of acid. D. K. M.

Production of hydrocarbons [by hydrogenation]. J. MARUHN and L. TÜBBEN (U.S.P. 1,850,022, 15.3.32. Appl., 23.5.31. Ger., 16.12.25. Cf. U.S.P. 1,807,122; B., 1932, 137).—The reaction takes place gradually after the press plunger has reached the position of min, vol. D. K. M.

Refining of liquid hydrocarbons by means of liquid sulphur dioxide. EDELEANU GES.M.B.H. (B,P. 382,556, 18.4.32. Ger., 2.5.31).—The hot vapours leaving the extract and raffinate condenser pressure evaporators are passed through a contact apparatus, in which they are scrubbed by the extract and raffinate solution flowing towards the evaporators. By this means the  $H_2O$  and light oil constituents of the hot vapours are led back to the evaporators and pass with the solution to the evaporation stages of low pressure range wherein they are separated in suitable drying and gas-purifying apparatus. A. B. M.

Composition for maintaining the efficiency of [internal-combustion] engines. R. JOHN, ASST. to AUTOMOTIVE PROCESS CORP. (U.S.P. 1,849,456, 15.3.32. Appl., 23.2.27).—A fuel consisting of gasoline (1 gal.) and a solution (2 c.c.) of SbCl<sub>3</sub> (1 lb.) in fusel oil (1 lb.) and gasoline (1 lb.) removes and prevents C deposition in the cylinders. D. K. M.

Lubricating oils. R. C. MORAN, Assr. to VACUUM OLL CO. (U.S.P. 1,850,561, 22.3.32. Appl., 16.8.29).— The addition of 0.5—3% of Nicolet and de Milt's "phenylstearic acid," prepared by the interaction of olcic acid and  $C_6H_6$  in the presence of AlCl<sub>3</sub>, improves the lubricating power, but does not raise the pour test or increase the corrosion and sludging tendency.

E. L.

Generator for producing acetylene under pressure, of the type "carbide into water." C. CLOOS (B.P. 383,765, 16.12.31. Ger., 16.12.30).

Cracking system [for hydrocarbon oils]. E. J. SHAEFFER and E. P. BROWN, Assrs. to STANDARD OIL Co. (U.S.P. 1,851,526, 29.3.32. Appl., 8.3.24).

Apparatus for heating and cracking oil. J. C. BLACK and E. W. GARD (U.S.P. 1,845,739, 16.2.32. Appl., 5.2.29).

Cracking of hydrocarbons. H. L. Pelzer, Assr. to Sinclair Refining Co. (U.S.P. 1,845,554, 16.2.32. Appl., 4.4.30).

Treatment [cracking] of hydrocarbons. W. M. CROSS, ASST. to GASOLINE PRODUCTS CO., INC. (U.S.P. 1,847,082, 1.3.32. Appl., 8.4.27.)

Conversion [cracking] of hydrocarbons. C. P. DUBBS and J. G. ALTHER, ASSIS. to UNIVERSAL OIL PRODUCTS Co. (U.S.P. 1,847,388, 1.3.32. Appl., 30.6.20).

Distillation apparatus [for hydrocarbons]. J. C. Ryder, Assr. to Petroleum Derivatives, Inc. (U.S.P. 1,849,029, 8.3.32. Appl., 21.1.24).

Apparatus for vacuum dehydration of hydrocarbons. H. MAGNUS (U.S.P. 1,849,496, 15.3.32. Appl., 29.9.27. Ger., 7.10.26).

Apparatus for hydrocarbon oil conversion. J. B. HEID, Assr. to UNIVERSAL OIL PRODUCTS Co. (U.S.P. 1,850,930, 22.3.32. Appl., 10.9.26).

Conversion of [hydrocarbon] oils. L. J. GARY, Assr. to UNIVERSAL OIL PRODUCTS CO. (U.S.P. 1,848,875 -6, 8.3.32. Appl., [A] 9.6.22, [B] 3.3.27. Renewed [A] 3.3.27). Conversion [cracking] of hydrocarbon oils. W. M. CROSS, ASST. to GASOLINE PRODUCTS Co., INC. (U.S.P. 1,849,479, 15.3.32. Appl., 12.10.25).

Cracking of [hydrocarbon] oil. J. D. SEGUY, Assr. to UNIVERSAL OIL PRODUCTS Co. (U.S.P. 1,850,291, 22.3.32. Appl., 3.1.28).

Cracking of hydrocarbon oils. C. P. DUBBS, Assr. to UNIVERSAL OIL PRODUCTS CO. (U.S.P. 1,850,261, 22.3.32. Appl., 12.12.18).

Distillation of hydrocarbon oils. W. H. BAHLKE, Assr. to STANDARD OIL Co. (U.S.P. 1,847,858, 1.3.32. Appl., 3.10.27).

Conversion of petroleums. C. P. DUBES, Assr. to UNIVERSAL OIL PRODUCTS CO. (U.S.P. 1,850,745, 22.3.32. Appl., 24.10.21).

Treating petroleum oil. G. EGLOFF, Assr. to UNIVERSAL OIL PRODUCTS CO. (U.S.P. 1,850,869, 22.3.32. Appl., 27.10.23. Renewed 19.6.29).

Preparing and cracking hydrocarbon materials. F. A. HOWARD, Assr. to STANDARD OIL DEVELOPMENT Co. (U.S.P. 1,851,429, 29.3.32. Appl., 7.5.23).

Distillation of lubricating stock. M. H. TUTTLE (U.S.P. 1,851,550, 29.3.32. Appl., 7.8.29).

Apparatus for filtering oil [for internal-combustion engines], C. F. Scort (B.P. 383,562, 19.5.32).

**Petroleum and heavy-oil burners.** Soc. Anon. LE CARBONE (B.P. 383,440, 1.12.31. Fr., 16.1.31. Addn. to B.P. 346,963).

Pure  $C_{10}H_8$ ,—See III. Roofing felts.—See V. NH<sub>3</sub> from gas mixtures. NH<sub>4</sub>Cl from coke-oven gas. S from fuel gas. H<sub>2</sub>.—See VII. Binding materials for pavement aggregates.—See IX. C for pigment. Graphite writing leads.—See XIII.

### **III.—ORGANIC INTERMEDIATES.**

Thermal conversion of ethylene and ethane into other hydrocarbons, with special reference to the formation of acetylene. F. FISCHER and H. PICHLER (Brennstoff-Chem., 1932, 13, 406-411).-When C<sub>2</sub>H<sub>4</sub> was passed through a heated tube (10 cm. long; 3 mm. diam.) under atm. pressure the C2H2 content of the reaction gas was a max.  $(15 \cdot 2\%)$  at  $1200^{\circ}$ , with a rate of gas supply of 60 litres/hr.; at higher temp., other conditions being the same, separation of C occurred. CH<sub>4</sub>, light oil, and tar were also produced, the light oil containing about 50% of  $C_6H_6$ . Dilution of the initial  $C_2H_4$  with  $H_2$ , combined with a shorter time of heating and a higher temp., inhibited the formation of C and liquid products and increased the yield of C<sub>2</sub>H<sub>2</sub> to > 70% of the C<sub>2</sub>H<sub>4</sub> used. By passing a mixture of  $C_2H_4$  and  $H_2$  (or  $CH_4$ ) through a tube at 1250° and then passing the products through a polymerising zone, e.g., another tube at 900°, increased yields of liquid products were obtained. Addition of a small quantity of O2 to the C2H4-H2 mixture did not improve the yield of C2H2. Much higher yields of C2H2 (up to 90% of the  $C_2H_4$  used) were obtained when  $C_2H_4$ , either alone or diluted with  $H_2$  or  $CH_4$ , was subjected to thermal decomp. at 1300–1400° under reduced pressure (0.1 atm.) and with very short times of heating. The dehydrogenation of  $C_2H_6$  proceeded in stages; at 1000°/0·1 atm. and in admixture with  $H_2$  the  $C_2H_6$  was converted principally into  $C_2H_4$ , whereas at higher temp., e.g., 1300°, other conditions remaining the same, the principal product was  $C_2H_2$ . A. B. M.

Ethyl ether and its decomposition products. R. NEU (Pharm. Zentr., 1932, 73, 753–759).—A discussion of theories of the decomp. of  $\text{Et}_2O$ , and of methods of purification and storing. A. A. L.

Solvents in the chemical technical industry. L. IVANOVSZKY (Allgem. Oel- u. Fett-Ztg., 1932, 29, 598-603).—The properties of available solvents and their behaviour with different wax constitutents of polishes or shoe-creams are discussed, with especial reference to the "retention" effect. (Cf. B., 1932, 873, 946.) E. L.

Separation of gaseous mixtures.—See I. Benzine synthesis. Hydrogenation of hydrocarbons.— See II. [Products from] cellulose fermentation. Lactic and succinic acids from fermentation liquors.—See XVIII. Determining  $C_2H_4O$ .— See XXIII.

See also A., Dec., 1197, System MeOH-COMe<sub>2</sub>. 1210, Esterification of alcohols in AcOH. 1212, Catalytic hydrogenation and polymerisation. 1213, Ni catalyst for hydrogenation. 1215, At. H for org, preps. 1227, Esterification resin as ground-joint lubricant. 1243, Formation of azoxy-, azo-, hydrazo-, and benzidine compounds. 1246, Prep. of aromatic anhydrides. 1251, Prep. of reduction products of benzoin, and of 1:2-diacetylfluorene. 1252, Prep. of chloranil. Synthesis of 1:2-benzanthraquinone. 1253, Synthesis of camphor. 1259, Synthesis of diphenylene sulphide. 1260, Prep. of *iso*indolines. 1262, Naphthenic acids from petroleum.

#### PATENTS

Catalyst for production of methanol [methyl alcohol] and other carbon compounds. A. T. LARSON, ASST. to E. I. DU PONT DE NEMOURS & CO. (U.S.P. 1,844,857, 9.2.32. Appl., 14.5.25).—A uniform mixture of an oxide of Ti, Cr, Mn, Zn, or Mo, and an oxide of a good heat-conducting metal (Cu), is granulated and reduced in  $H_2$  at 250—350°. C. H.

Non-corrosive alcoholic solution. W. S. CALCOTT and H. W. WALKER, Assrs. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,847,711, 1.3.32. Appl., 11.9.28).—The corrosion of Fe by aq. MeOH, EtOH, glycerol, or glycol is inhibited by adding a small amount of  $H_2O$ sol. alkylamine or alkylolamine to the solution. C. R.

Manufacture of derivatives of chelidamic acid. SCHERING-KAHLBAUM A.-G. (B.P. 381,143, 30.6.32. Ger., 10.7.31).—Ag salts of dialkyl di-iodochelidamates are etherified with alkyl, alkenyl, or aralkyl halide, and the ester groups hydrolysed. Products useful as contrast media in X-ray photography are thus obtained from Me 3 : 5-di-iodochelidamate with MeI (decomp. 176°; Me ester, m.p. about 125°), EtI [m.p. 174° (decomp.) ; Me ester, m.p. 131°], PrI [m.p. 156° (decomp.); Me ester, m.p. 89°], BuI [m.p. 145° (decomp.) ; Me ester, m.p. 82°], CH<sub>2</sub>PhCl [m.p. 167° (decomp.) ; Me ester, m.p. 120°], allyl iodide [m.p. 143—144° (decomp.); Me ester, m.p. 98°]. C. H.

Manufacture of crystalline anhydrous citric acid. C. PFIZER & Co. (B.P. 380,813, 19.6.31. U.S., 7.1.31).—Hydrated citric acid is added to a saturated aq. solution of citric acid at between 41° and 100°, whereby anhyd. acid is pptd., or aq. citric acid solution is either (a) conc. in vac. to  $d \cdot 1 \cdot 41$  at 65 · 6° and allowed to deposit anhyd. acid above 41°, or (b) evaporated at  $\leq 32$  mm. until sufficient anhyd. acid has separated ( $\leq 32$  mm. hydrated acid separates). C. H.

Manufacture of assistants in the textile and related industries and dispersing agents. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 380,851, 10.4.31. Cf. B.P. 380,431; B., 1932, 1114).—OH-free amines or amides, preferably  $H_2O$ -sol. and of  $C_6$ — $C_{30}$ , are condensed with polyethylene glycols having > $5 \cdot C_2H_4 \cdot O \cdot$  groups, or mono-ethers or -esters thereof, or with a corresponding quantity of ethylene oxide or halohydrin. Suitable amines and amides are octadecyland dodecyl-amines, amides of oleic, stearic, naphthenic, and coconut oil acids, dodecane- and *p*-toluene-sulphonic acids. C. H.

Agents for diminishing or suppressing foaming and frothing and the application thereof. IMPERIAL CHEM. INDUSTRIES, LTD., A. MACARTHUR, and A. STEWART (B.P. 383,293, 29.7.31).—Frothing of, e.g., glue or dextrin solutions is checked by the addition of  $\gg 1\%$  of a solution of a H<sub>2</sub>O-insol. soap of a non-alkali metal in an org. solvent, e.g., a 5% solution of Zn stearate in pine oil, E. L.

Production of aryImercapto compounds. IMPERIAL CHEM. INDUSTRIES, LTD., and K. W. PALMER (B.P. 381,237, 6.7.31).—A dihydroxydiphenyl sulphide is heated with a mixture of Na<sub>2</sub>S and NaOH, whereby 2 mols. of hydroxythiophenol are produced; a monohalogenophenol may be used in place of the dihydroxydiphenyl sulphide. The prep. of *p*-hydroxythiophenol, 6-hydroxy-*m*-thiocresol, m.p. 42—43°, and *o*-hydroxythiophenol, b.p. 134—136°/65 mm., is described.

Manufacture of methyl-*p*-aminophenol sulphate (metol). A. W. M. DICKINS (U.S.P. 1,844,844, 9.2.32. Appl., 29.1.25).—*p*-Hydroxyphenylglycine is decarboxylated by heating in 12 pts. of cresol above 170°.

C. H.

Manufacture of methyl-*p*-aminophenol sulphate [metol]. W. T. MACLEESTER (U.S.P. 1,844,926, 9.2.32. Appl., 17.8.22).—*p*-Hydroxyphenylglycine is decarboxylated by heating in cresol at 165—170°. C. H.

Isolation of  $\alpha$ -phenylethylene  $\alpha\beta$ -dichloride. I. G. FARBENIND. A.-G. (B.P. 381,459, 5.3.32. Ger., 13.5.31). —A mixture of the dichloride and chlorohydrin, obtained, e.g., from styrene and HOCl, is dissolved in C<sub>6</sub>H<sub>6</sub> or other H<sub>2</sub>O-immiscible org. solvent, the solution is stirred with alkali (aq. KOH) without being allowed to boil, washed with H<sub>2</sub>O, and finally fractionated. The chlorohydrin is converted into lower-boiling oxide, and the dichloride distils at 93°/5 mm. Either component may function as solvent. C. H.

Manufacture of reaction [additive] products of hydroxydiphenyls and amino-materials [vulcanisation accelerators]. GOODYEAR TIRE & RUBBER CO., Assees. of W. D. WOLFE (B.P. 380,898, 30.7.31. U.S., 18.12.30).—Additive compounds of amines and hydroxydiphenyls are obtained by mixing the ingredients in a common solvent. Examples are:  $C_2H_4(NH_2)_2 +$ 2 o-C<sub>6</sub>H<sub>4</sub>Ph·OH, m.p. 78—80°;  $\beta$ -C<sub>10</sub>H<sub>7</sub>·NH<sub>2</sub> + p-C<sub>6</sub>H<sub>4</sub>Ph·OH, m.p. 130—131°;  $C_2H_4(NH_2)_2 +$  2 p-C<sub>6</sub>H<sub>4</sub>Ph·OH, m.p. 137—138°; cyclohexylamine + p-C<sub>6</sub>H<sub>4</sub>Ph·OH, m.p. 108—109°. C. H.

Manufacture of 2:2'-diaminodiphenyl-4:4'-disulphonic acid. A. CARPMAEL. From I. G. FARB-ENIND. A.-G. (B.P. 381,213, 1.7.31).—Ph<sub>2</sub> is disulphonated with excess of 100% H<sub>2</sub>SO<sub>4</sub> or 20% oleum, dinitrated with mixed acid, and finally reduced. C. H.

Manufacture of a triaminodiphenylsulphonic acid and of carbazole compounds therefrom. A. CARPMAEL. From I. G. FARBENIND. A.-G. (B.P. 381,212, 1.7.31).—Ph<sub>2</sub> is monosulphonated, trinitrated, and reduced to give 2:2':4'-triaminodiphenyl-4sulphonic acid, which is converted by dil. acid at 160° into 3-aminocarbazole-7-sulphonic acid, or at 200° into 3-aminocarbazole. C. H.

Oxidation of (A) polynuclear aromatic hydrocarbons, (B) acenaphthene, (C) acenaphthylene. (D) Purification of anthraquinone. A. O. JAEGER, Assr. to Selden Co. (U.S.P. 1,844,395, 1,844,392, 1,844,390, and 1,844,389, 9.2.32. Appl., [A] 17:2.30, [B] 11.9.28, [c] 29.8.28, [D] 15.8.28).--(A) In the vapourphase catalytic oxidation of polynuclear aromatic hydrocarbons (C10H8) a series of 3 or more converters is used, the speed in the first converter being > allows of complete conversion, and the products are condensed after each converter. (B) Acenaphthene and (C) acenaphthylene are oxidised in vapour phase in presence of base-exchange substances containing V, (B) in nonexchangeable form. (D) Crude anthraquinone is subjected to vapour-phase catalytic oxidation to remove impurities, the activity of the catalyst being damped by addition of alkali so as to prevent substantial oxidation of anthraquinone. C. H.

[Preparation of] solid pure naphthalene and similar solid pure substances from the molten substances. GES. F. TEERVERWERTUNG M.B.H., F. KRAFT, and S. MULLER (B.P. 380,990, 14.11.31).—The pure molten  $C_{10}H_8$  (or other coal-tar solid) is taken up on cooling drums and the pure solid removed with scrapers. C. H.

Manufacture of 6-bromo- and 4 :6-dibromo-2hydroxynaphthalenes [6-bromo- and 4 :6-dibromo- $\beta$ -naphthols]. W. W. GROVES. From I. G. FARB-ENIND. A.-G. (B.P. 380,563, 10.8.31).—1 : 6-Dibromoor 1 : 4 : 6-tribromo- $\beta$ -naphthol is heated with K<sub>2</sub>SO<sub>3</sub> in aq. MeOH or EtOH, whereby Br in position 1 is lost. 4 : 6-Dibromo- $\beta$ -naphthol has m.p. 134°. C. H.

Purifying intermediates.—See IV. Regeneration of V catalysts.—See VII.  $BuOH-COMe_2$  seed mashes.—See XVIII.

#### IV.—DYESTUFFS.

New vat dyes. J. FORMÁNEK (Z. anal. Chem., 1932, 90, 255-271).—Data relating to the colour and wavelength of absorption bands of xylene and H<sub>2</sub>SO<sub>4</sub> solutions of vat dyes introduced since 1927 are tabulated. F. L. U.

Preparation of azo dyes from phenols of primary tar. I. UBALDINI and G. TURCO (Annali Chim. Appl., 1932, 22, 647-657; cf. B., 1930, 648).—The phenols were extracted from this tar in two ways: (1) with aq. NaOH, followed by pptn. with  $CO_2$  or NaHCO<sub>3</sub>, which leaves the org. acids in solution, resinous phenols being then oxidised by  $CO_2$ -free air and removed as pitch; (2) with MeOH or EtOH. They were diazotised and coupled with NH<sub>2</sub>Ph, p-NO<sub>2</sub>·C<sub>6</sub>H<sub>4</sub>·NH<sub>2</sub>, benzidine, C<sub>10</sub>H<sub>7</sub>·NH<sub>2</sub>, p-NH<sub>2</sub>·C<sub>6</sub>H<sub>4</sub>·SO<sub>3</sub>H, 4-NH<sub>2</sub>·C<sub>10</sub>H<sub>6</sub>·SO<sub>3</sub>H, 1:3:6- and 2:6:8-NH<sub>2</sub>·C<sub>10</sub>H<sub>5</sub>(SO<sub>3</sub>H)<sub>2</sub>, and 1:8:3:6and 1:8:4:6-NH<sub>2</sub>·C<sub>10</sub>H<sub>4</sub>(OH)(SO<sub>3</sub>H)<sub>2</sub>. Dyeing tests were made. T. H. P.

See also A., Dec., 1214, Photoanisotropic effect with dyes. Sensitisation of photographic emulsions by dyes. 1243, Azo dyes etc. 1250, Dyes from 7 : 7-pp'tetra-alkyldiaminodiphenylacenaphthenones. 1256, Dye from acacia wood. Plant dyes. 1258, Eosin-B.

### PATENT.

Purification of vat dyes and intermediates. H. J. WEST, ASST. to SELDEN CO. (U.S.P. 1,845,378, 16.2.32. Appl., 13.1.30).—Nitrated crude dibenzanthrone, or other intermediate or vat dye resistant to NaOCl, is treated with NaOCl, whereby impurities are removed. A brighter green is obtained, oxidised on the fibre to a black free from brown tone. C. H.

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

Analysis of sized cotton : determination of zinc and magnesium, and some qualitative tests. A. GEAKE (J. Text. Inst., 1932, 23, T 279-292).-The cotton is extracted with dil. HCl, and the metals are determined in suitable portions of the filtered extract by pptn. with alcoholic 8-hydroxyquinoline. Zn and Fe are pptd. with the "oxine" from acid solution, whilst Ca is pptd. as oxalate and Mg as oxinate in alkaline solution. Vals. for Zn given by the oxine method agree with those obtained by a modification of the Price-Judge electrolytic method (B., 1906, 643). The average Mg content for all classes of cotton amounts to about 0.25% (as MgCl<sub>2</sub>) and this amount must be deducted in analyses of grey sized cotton, although with bleached material no correction is necessary. In newly woven cloth the ZnCl<sub>2</sub> is found entirely on the warp, but after storage, particularly at high R.H., migration to the weft occurs. Analyses of warp and weft therefore yield information as to storage conditions. Qual. tests for Zn, Mg, Al, and china clay, based on colour reactions, are described. The F content of raw unsized cotton is of the order 0.1% on the wt. of the cotton. B. P. R.

Variation in the properties of cotton fibre in relation to its position on the surface of the seed. I. Fibre-length, -weight, and -strength. R. S. KOSHAL and N. AHMAD (J. Text. Inst., 1932, 23, T 211-266). B. P. R.

Cortical cells of Merino, Romney, and Lincoln wools. M. T. GABRIEL (J. Text. Inst., 1932, 23, T 171-176).—The wool fibres are disintegrated by the action of bacteria isolated from pink rotted wool and the liberated cells are examined. The cortical cells of fine Australian Merino fibres are similar to those of coarse Lincoln fibres. B. P. R.

Determination of cotton, wool, silk, and artificial silks in mixed textiles. P. KRAIS and H. MARKERT (J. Text. nst., 1932, 23, P 213-217).—The various fibres present are successively removed by treatment with COMe<sub>2</sub> (acetate rayon), aq. Ca(CNS)<sub>2</sub> (viscose rayon and natural silk), H<sub>2</sub>SO<sub>4</sub> (cotton), or NaOH (wool), and correction factors are used to make allowance for the small amounts of the substantially insol. fibres that dissolve in the different solvents. B. P. R.

Shrinkage of cotton yarn and the viscosity of its solutions in aqueous caustic soda-cuprammonium hydroxide. S. M. NEALE and W. A. STRINGFELLOW (J. Text. Inst., 1932, 23,  $\pm 177-182$ ).—Max. shrinkage of the yarn in the above mixture occurs at concess. of NaOH between 0·1N and 0·3N, and is very sharp and pronounced for concess. of cuprammonium hydroxide from 0·05N to 0·1N. The solutions obtained by dissolving the cotton in the mixed liquids containing a still higher proportion of cuprammonium show no marked change in viscosity over the range of NaOH conce. within which yarn shrinkage occurs. B. P. R.

Cyanine in fibre analysis. A. HERZOG (Melliands Textilber, 1932, 13, 121-123, 181-182; Chem. Zentr., 1932, ii, 946).—Hemp is coloured greenish-blue; flax is not stained. Applications of the test in the examination of various fibres and celluloses are described.

A. A. E.

Apparatus for scouring small samples of wool and a modified apparatus for determining dry weights. W. C. MILLER and D. M. BRYANT (J. Text. Inst., 1932, 23,  $\pm 267-273$ ).—The samples, in fine-mesh wire-gauze containers, are submitted to an up and down motion in standard scouring baths under const. conditions of temp. and agitation. They are dried in modified U-tubes through which a current of hot dry air is passed until accumulation of H<sub>2</sub>O in a condensing indicator and a CaCl<sub>2</sub> drying tube ceases. Connexions between the sample tubes and the drying apparatus are made by Hg seals. B. P. R.

Controlled temperature and humidity room for textile testing at University College, Nottingham. C. H. EDWARDS (J. Text. Inst., 1932, 23,  $\pm 274-278$ ).— Humidity is controlled by drawing the air either through a tower containing moistened coke or through one carrying trays of fused CaCl<sub>2</sub>, the operation of the fans being automatically regulated by changes in length of a bundle of human hairs. The consumption of CaCl<sub>2</sub> is approx. 15 cwt. per annum. The temp. is controlled by a "Satchwell" type air thermostat and suitable relays and switches operating electric heaters. B. P. R.

Measurement of the porosity of textiles. G. BARR (J. Text. Inst., 1932, 23, P 206-212). B. P. R.

Standardisation in textile testing. J. LOMAX (J. Text. Inst., 1932, 23, P 217-220). B. P. R.

Measurement of the levelness of worsted yarns. G. R. STANBURY (J. Text. Inst., 1932, 23, p 197-205). B. P. R.

High-speed rayon spinning. H. JENTGEN (Melliand Text. Month., 1932, 4, 493-495, 545-549).—A review and discussion.

Adsorption of water by rayon. A. R. URQUHART and N. ECKERSALL (J. Text. Inst., 1932, 23, T163— 170; cf. B., 1930, 152).—The regenerated cellulose rayons give curves similar to those given by cotton and mercerised cotton, with a like hysteresis. The abs. vals. of the regain are higher even than those of mercerised cotton, and the highest hygroscopicity appears to be exhibited by cellulose regenerated from cellulose nitrate. Esterification reduces the hygroscopicity of cellulose, but, unlike cotton and the regenerated cellulose rayons, acetate rayon does not give a sigmoid curve. B, P, R.

Action of ammonium sulphite on white fir. W. S. HEPHER and E. C. JAHN (Paper Trade J., 1932, 95; T.A.P.P.I. Sect., 215-220).—Experimental digestions have been carried out on lowland white fir (*Abies grandis*), using  $(NH_4)_2SO_3$  as pulping reagent; 72-73% of pulp was obtained by digestion with 26-35% of the reagent at 175° for 6-7 hr. Smaller amounts of reagent result in degradation of cellulose. Addition of aq.  $NH_3$ yields higher-grade cellulose with low pentosan content. Two experimental digesters are described and illustrated. T. T. P.

Acid penetration in sulphite pulping. R. B. HANSEN and S. HAZELQUIST (Paper Trade J., 1932, 95; T.A.P.P.I. Sect., 225-227).—The various factors affecting the penetration of wood blocks by bisulphite cooking liquor of defined characteristics have been investigated. Penetration is a straight-line function of the time, and is most rapid when the wood contains 30-40% of moisture. It is also facilitated by rise in temp. and by increase in the free SO<sub>2</sub> concn. "Burnt cooks" are not necessarily due to defective penetration. It is concluded that penetration is not, in general, a deciding factor on a commercial scale, since it is scarcely possible to achieve max. temp. without complete penetration unless the initial acid temp. is  $< 35^{\circ}$ . H. A. H.

Relative stabilities of rag and purified sulphite pulps. H. F. LEWIS (Paper Trade J., 1932, 95; T.A.P.P.I. Sect., 239-252) .- The deterioration of selected rag and highly purified wood pulps of the "Alpha" type, under the influence of a no. of degrading agents, has been extensively investigated. Heat and alkaline solutions in combination with air, O2, N2, and also acids and artificial light from C-arc and Hg-quartz lamps have all been used to carry out accelerated ageing tests, the resulting degradation being ascertained by a-cellulose, Cu no., and viscosity determinations, and by other chemical tests. It is pointed out that no one analytical val. is sufficient to measure all the various physical and chemical changes taking place during the natural degradation of cellulose. The Alpha pulps contain about 90–92% of  $\alpha$ -cellulose and 5% of pentosans as compared with 96.5-98% and 0.7%, respectively, for the best rag pulps. It is concluded that rag stocks withstand degradation from all the causes examined much better than do the Alpha pulps. 27 graphs are given. H. A. H.

Variations in cooking kraft pulp. R. REID (Paper Trade J., 1932, 95; T.A.P.P.I. Sect., 220).—The endpoint of sulphate digestions has been arbitrarily determined by the time taken to reach a certain degree of "freeness" in a laboratory beater. The Cl no. has been found to be closely related to this figure, giving results in less time (15 min.). Yield varies approx. 3% for each unit change in Cl no. from normal (6, Kramfors). Variation of alkali content of liquor up to 10% is necessary to maintain standard results from summer and winter woods. T. T. P.

Bleaching of ground wood. W. HIRSCHKIND (Paper Trade J., 1932, 95; T.A.P.P.I. Sect., 213-214).—A hyposulphite (preferably  $\text{ZnS}_2O_4$ ;  $0\cdot 1-2\cdot 0\%$  on the wt. of wood) is added, the reaction being complete in 10 min. It is claimed that the method gives good results with the darkest ground woods, and to a smaller extent with sulphite and sulphate pulps. Unbleached sulphite pulp may largely replace bleached pulp in newsprint, owing to the enhanced colour of groundwood. Washing-out of reaction products is claimed to be unnecessary. T. T. P.

Direct chlorination as an aid in the bleaching of sulphate pulp. J. D. RUE and J. S. SCONCE (Paper Trade J., 1932, 95; T.A.P.P.I. Sect., 192-200).—A 2-stage laboratory bleaching process is described, involving direct chlorination, followed by the addition of CaO so as to give a typical hypochlorite bleach during the second stage. The effects of a no. of variables on physical and chemical properties of the resulting pulp are examined. Factors affecting the development of this process on a commercial scale are also investigated. H. A. H.

Elimination of pitch trouble [in pulp and paper mills]. O. BRAUNS (Pulp and Paper Canada, 1932, 33, 333-336, 383-388).-The occurrence, nature, and methods of eliminating pitch have been investigated. Extraction tests, though estimating the amount of pitch present, give no indication of the likelihood of pitch deposition. The general opinion that seasoning of the wood prior to cooking decreases pitch trouble by oxidation is not confirmed. Only about 4% of pitchy substances are removed from the wood during the bisulphite cooking process, but conditions during cooking have no effect on the conversion of pitch into the troublesome variety. Pitch deposition at various points in the paper mill is considered to be due to pptn. of the unstable suspension, especially under the influence of Ca" and Mg" present in the supply water.  $SO_4$ ", Cl', and  $CO_3$ " are without effect, hence experiments with mineral acids alone gave negative results. By conversion of the unstable suspension into a stable emulsion, pitch trouble may be eliminated. The use of  $Al_2(SO_4)_3$  alone for this purpose does not give wholly concordant results, but in conjunction with sulphite waste liquor a satisfactory degree of peptisation is obtained. H. A. H.

Utilisation of sulphite[-cellulose] waste liquor. H. K. BENSON (Paper Trade J., 1932, 95; T.A.P.P.I. Sect., 229—232).—A no. of commercial uses are reviewed. It is suggested that as a further outlet it might be possible to utilise the liquor as fuel for the pulp cooking process. H. A. H.

Reworking of straw by Sudakov's method. S. I. KHAZANOV and N. A. STRUNNIKOV (Bumazh. Prom.,

1932, 11, No. 4, 47–51).—The straw is digested for 12 hr. with  $2 \cdot 23 - 2 \cdot 6\%$  NaOH (NaOH 16–18% of wt. of air-dry straw) in the cold, drained, treated for  $2 \cdot 5 - 3$  hr. at  $2 \cdot 2 - 3$  atm. with superheated steam, washed, pressed, disintegrated, and bleached for 6 hr. at 30–35° with CaOCl<sub>2</sub> (3–8% active Cl). CH. ABS.

**Examination of paper and cellulose in ultraviolet light.** V. GRUENMAN (Le Papier, 1932, **35**, 531— 533; Chem. Zentr., 1932, ii, 947).—Celluloses of different origin show markedly different fluorescence colours, but with bleached materials the differences are small. In papers the test is complicated by differences in sizing and weighting. The quartz lamp affords a rapid test for stability towards light, but the effect of the atm. is not thereby taken into account. A. A. E.

Determination of xanthate-sulphur and of "impurity" sulphur of viscose. T. VITALE (Annali Chim. Appl., 1932, 22, 603-606).—A sample (1-1.5 g.)of the viscose is spread in a thin layer on the bottom of a 400-c.c. beaker with a glass rod bent at a right-angle and coagulated completely by 5 successive treatments with 10 c.c. of EtOH, acting for 1 min. The residual film of pure xanthate is dissolved in 10 c.c. of 20% NaOH solution and mixed with 15-20 c.c. of 3% H<sub>2</sub>O<sub>2</sub> solution, the S being then determined (cf. B., 1929, 13). The EtOH washings are mixed with 25 c.c. of 3% H<sub>2</sub>O<sub>2</sub> solution and the S is determined as usual. T. H. P.

Determining the time of ink absorption of blotting paper. ANON. (Paper Trade J., 1932, 95; T.A.P.P.I. Sect., 211).—The T.A.P.P.I. tentative standard method is described. H. A. H.

Determination of rate of absorption of water by bibulous papers. ANON. (Paper Trade J., 1932, 95; T.A.P.P.I. Sect., 212).—The T.A.P.P.I. tentative standard method is described. H. A. H.

Determination of water-resistance of paper. ANON. (Paper Trade J., 1932, 95; T.A.P.P.I. Sect., 208).—The T.A.P.P.I. tentative standard method, using a sugar-starch-dye indicator, is described.

H. A. H.

Permeability of gases and vapours through packing papers and a simple measuring apparatus. T. AONO (J. Soc. Chem. Ind., Japan, 1932, 35, 443— 444 B).—Apparatus and procedure are described, and results are given for the permeability of air through various papers at about 20°. E. S. H.

Sizing characteristics of wax sizes [for the paper industry]. O. F. NEITZKE (Paper Trade J., 1932, 95; T.A.P.P.I. Sect., 201-203).—The sizing efficiency, as measured by ink penetration, of rosin size is compared with that of commercial sizes made from rosin and hydrocarbon waxes, the latter being considerably the more effective. The increase in sizing brought about by raised drying temp. is more pronounced in the case of rosin-wax size than with rosin alone. A size containing 25% of wax gave the highest degree of resistance, both higher and lower percentages showing a marked decrease. With sizes of high wax content  $p_{\rm H}$  control is essential. H. A. H.

Rosin sizing [of paper]. H. A. HARRISON (World's Paper Trade Rev., 1932, 98, 1274-1276, 1314-1318, 1351—1354, 1388; Papermaker, 1932, 84, 11—13, 24—25 r.s.).—The detailed experiments given in the author's previous paper (B., 1932, 767) are summarised and discussed. The significance of Klemm's and of Oeman's work on the crit. relationship between the moisture content and the temp. of the sheet is stressed, and a no. of drying schemes are illustrated. Recent innovations in the application of rosin size are described. H. A. H.

Cellulose fermentation,-See XVIII.

See also A., Dec., 1236, Identification of common carbohydrates.

# PATENTS. From off solar and

Making a felt component. P. DREWSEN, ASST. to BARRETT Co. (U.S.P. 1,850,791, 22.3.32. Appl., 16.2.26). —Raw bast fibres (flax, jute, etc.) are beaten and cooked in aq. NaOH or CaO (containing about 10% of alkali on the wt. of the fibre) at approx. 100°. The product is made into felt paper suitable for impregnation with tar etc. B. P. R.

Composition of matter [for roofing felts]. C. R. ECKERT, ASST. to BARRETT CO. (U.S.P. 1,849,867, 15,3.32. Appl., 10.9.26).—Fibrous material, e.g., felt, is treated with a mixture of 60—98% of asphalt (m.p. 32°) and 40—2% of paracumarone resin. C. A. K.

Manufacture of lignin derivatives. G. C. HowARD (U.S.P. 1,848,292, 8.3.32. Appl., 15.10.30).—Waste sulphite liquor is treated at  $< 100^{\circ}$  with solid CaO to ppt. first CaSO<sub>3</sub> (optionally recovered at this stage) and a lignin product. This latter is separated, washed with aq. Ca(OH)<sub>2</sub>, and digested with Ca(OH)<sub>2</sub> under such conditions, e.g., 1—8 hr. at 40 lb. gauge pressure, that the org. combined S is reduced from 32 pts. to about 16 pts. per 500 pts. of lignin substance and the product becomes insol. in aq. acids. After removal of CaSO<sub>3</sub> (formed during digestion) by extraction with cold aq. H<sub>2</sub>SO<sub>3</sub> a lignin product is obtained which dries to a light powder, is insol. in conc. HCl and H<sub>2</sub>SO<sub>4</sub>, and finds application in the linoleum, rubber, explosives, and moulding industries etc. D. J. N.

Manufacture of cellulose acetate. KODAK, LTD., Assees. of T. F. MURRAY, JUN., and H. LE B. GRAY (B.P. 383,043, 29.10.31. U.S., 5.11.30).—Cellulose acetate sol. in COMe<sub>2</sub> is made in one process by adding  $\ll 20\%$  of an aldehyde to the acetylating mixture. A. G.

Treatment of cellulose prior to nitration. M. O. SCHUR and B. G. Hoos, Assrs. to BROWN Co. (U.S.P. 1,848,553, 8.3.32. Appl., 19.3.29).—Higher yields (99.5% of theoretical) are obtained if the material, e.g., high- $\alpha$ -cellulose wood pulp, is pretreated with a small quantity (< 1%) of nitrocellulose by passing it, in the form of waterleaf tissue, through an aq. suspension of nitrocellulose preferably stabilised, e.g., with soap. D. J. N.

Production of ornamental markings or decorative effects on materials of celluloid-like character. A. EICHENGRÜN (B.P. 382,824, 1.2.32. Ger., 19.2.31).— The material is rendered plastic (e.g., by heat) and pressed in contact with woods which show a decided grain. By first staining the wood with sol. dyes colour effects are produced. D. J. N. Spinning of cuprammonium silk. BRIT. BEM-BERG, LTD. (B.P. 383,507, 7.3.32. Ger., 5.3.31. Addn. to B.P. 356,457; B., 1931, 1044).—The used pptg. liquid, which is withdrawn laterally from the spinning vessel, is returned thereto for re-use, via a collecting vessel, with complete exclusion of air; the stream of pptg. liquid issuing with the filament is worked up for recovery of Cu and NH<sub>3</sub>. F. R. E.

[Wet] treatment of artificial textile filaments, threads, and like products. B. BORZYKOWSKI (B.P. 383,510, 10.3.32. Ger., 2.4.31).—The perforated spools containing the spun bobbins or the pots containing the spun cakes, the inner thread layers of which are protected by a perforated elastic sleeve, are placed in a vessel one above the other and just covered by a const. level of treatment liquid. Treatment liquid is led from another container, at a const. adjustable pressure, into the interior of the bobbins or cakes so as to pass outwardly through the thread layers. F. R. E.

Separation of wood fibres. G. H. ELLIS, Assr. to INSULITE Co. (U.S.P. 1,850,832, 22.3.32. Appl., 13.6.25. Renewed 27.6.28).—Wood chips are steamed to soften the cementing substances and slowly fed into a grinding machine; the issuing material is again steamed and further ground. B. P. R.

Production of chemical wood pulp. G. A. RICH-TER, Assr. to BROWN CO. (U.S.P. 1,849,334, 15.3.32. Appl., 1.5.26).—Wood chips are thoroughly saturated with a 10% aq. solution of Na<sub>2</sub>SO<sub>3</sub>, treated with H<sub>2</sub>O and SO<sub>2</sub> to produce a bisulphite cook liquor having a combined SO<sub>2</sub> content of  $\lt$  1%, and cooked under pressure at raised temp. B. P. R.

Papermaking composition. G. A. RICHTER, Assr. to BROWN Co. (U.S.P. 1,850,139, 22.3.32. Appl., 22.5.28).—Two kinds of pre-liberated pulps, one substantially unbeaten and of a difficultly hydratable character, and the other highly beaten and easily hydratable (about 5—15% by wt. of the total pulp), are mixed and beaten to the required slowness for papermaking. B. P. R.

Composition for making transparent sheet material. E. M. KRATZ, ASST. to MARSENE PRODUCTS Co. (U.S.P. 1,847,656, 1.3.32. Appl., 3.5.30).—A composition which develops neither colour nor odour on keeping contains gelatin (80%), a sulphonated naphthenic acid (12%), and a light  $H_2O$ -white mineral oil (8%) and is adjusted to  $p_{\rm H}$  6.2. D. J. N.

Manufacture of sheets, board, slabs, etc. from fibrous material. E. R. HARRAP and R. H. TURNER (B.P. 382,775, 23.11.31).—Calcined magnesite or hydrated MgO (e.g., 23%) is incorporated with fibrous material (e.g., asbestos 75%) and a binder (e.g., starch 2%) and the resulting sheets are treated with aq. ZnCl<sub>2</sub> (d 1.09-1.175), which reacts with the magnesite to give a strong H<sub>2</sub>O-resisting Mg–Zn oxychloride cement. D. J. N.

Making of paper suitable for capacitors. A. L. ALLEN, ASST. to GEN. ELECTRIC Co. (U.S.P. 1,850,702, 22.3.32. Appl., 25.1.30).—Substantially non-porous kraft paper < 0.0005 in. thick is produced by beating

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the pulp for 36—40 hr., the beater roller being adjusted closer to the bedplate at intervals during the process. B. P. R.

[Heat-sensitive] recording paper. F. G. MORE-HOUSE, ASST. to RADIO CORP. OF AMERICA (U.S.P. 1,850,600, 22.3.32. Appl., 18.12.29).—A coagulating coating (NiSO<sub>4</sub>, CuSO<sub>4</sub>, PbNO<sub>3</sub>, etc.) is first applied to the surface of the paper and on it is superimposed a waxy emulsion which is subsequently dried. The paper is useful in the recording of pictures received by radio transmission. B. P. R.

[Washable, grease-resisting] wall paper. E. F. ARNOLD, ASST. to E. I. DU PONT DE NEMOURS & CO. (U.S.P. 1,848,686, 8.3.32. Appl., 2.1.31).—The paper is coated with a matte-drying cellulose lacquer containing wax-like substances, *e.g.*, natural or synthetic waxes or metal stearates. Typical formulæ are given. D. J. N.

**Treatment [retting] of vegetable fibres.** T. P. HAUGHEY (B.P. 383,627, 15.5.32. U.S., 16.5.30).—See U.S.P. 1,814,155; B., 1932, 461.

**Drying webs of fabric.** H. BUTHION (B.P. 383,447, 10.12.31. Fr., 17.6.31).

Bath vat for the spinning or subsequent liquid treatment of artificial silk and the like. E. WURTZ (B.P. 384,133, 15.2.32).

Purified rosin [for paper size].-See XIII.

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

Bleach liquor and the use of liquid chlorine. T. NAKAMURA, S. EDA, and H. USHIO (J. Soc. Chem. Ind., Japan, 1932, 35, 460—464 B).—The bleach liquor prepared by passing  $Cl_2$  gas into  $Ca(OH)_2$ , until an excess of 15—20%  $Ca(OH)_2$  remains is more rapid in action than ordinary bleaching powder. The  $Ca(OH)_2$  should be > 90% pure and the presence of MgO, Al<sub>2</sub>O<sub>3</sub>, or Fe<sub>2</sub>O<sub>3</sub> should be avoided. E. S. H.

Determination of the hydrogen-ion concentration in boiling acid and bleaching liquor. S. SAMUELSEN and K. HAUG (Papir-Journalen, 1931, 19, 218—221, 229—233, 241—244, 254—256; Chem. Zentr., 1932, i, 1845).—Conductivity measurements confirm previous observations (A., 1930, 418) that above 100° the  $p_{\rm H}$  in acid H<sub>2</sub>SO<sub>3</sub> or sulphite solutions approaches the neutral point. The potential of the glass electrode in H<sub>2</sub>SO<sub>3</sub> solutions is a linear function of  $p_{\rm H}$ , but H, quinhydrone, and Sb electrodes are unsuitable for potentiometric measurements. Both dissociation consts. of H<sub>2</sub>SO<sub>3</sub> and bleaching liquors the glass electrode can be used for the range  $p_{\rm H}$  1—10 at room temp. L. S. T.

Behaviour in chemicking of materials dyed with some vat and insoluble azo dyes. D. A. DERRETT-SMITH and C. R. NODDER (J. Text. Inst., 1932, 23, r 293—308).—The excessive tendering effect shown on chemicking in daylight cotton yarns dyed with many red, orange, and yellow vat dyes appears to be a photocatalytic phenomenon. In the dark, the tendering is of the same order as that shown by undyed yarn. The least tendering is produced by Caledon Red BNS, Indanthrene Golden Orange 3G, and Caledon Yellow 3GS.

Caledon Jade Green XS produces an effect similar to that with undyed yarn, whilst Caledon Blue RCS and GCDS exert a protective action. Several of the naphthol dyes give no greater tendering than that obtained with undyed yarn, and others again have a protective effect. The region of max. tendering both in the light and in the dark is between  $p_{\rm H}$  7 and 7.5, whilst comparatively little degradation occurs in liquors of  $p_{\rm H} = 10 - 11 \cdot 5$ . Indanthrene Rubine R produces increased tendering at  $p_{\rm H}$  7 with increasing depth of dyeing, and this dye and Cibanone Yellow R cause unduly severe tendering in the presence of light at  $p_{\rm H}$ > 10 and should not be used in goods that have to be bleached. B. P. R.

Determination of sulphur-black dye on the fibre. R. S. OSIPOV (Izvest. Tekstil. Prom. Torgov, 1931, 10, No. 12, 68-71).—The N content is determined by Kjeldahl's method. CH. ABS.

Stability of waterproofing agents prepared from aluminium compounds. M. M. CHILIKIN and M. N. SUSSMANN (Izvest. Tekstil. Prom. Torgov, 1931, 10, No. 12, 73-75).—Exposure to air and light greatly decreases the degree of waterproofness of fabric passed through (a) a soap, stearin, and paraffin bath, (b) a bath containing Al acetate or formate. The nature of the Al salt is of secondary importance. CH. ABS.

Bleaching of sulphate pulp, and of ground wood. —See V. Soap improver.—See XII.

See also A., Dec., 1238, Dyeing of cellulose derivatives.

#### PATENTS.

Textile printing by means of vat dye preparations. I. G. FARBENIND. A.-G. (B.P. 380,860, 29.6.31. Ger., 27.6.30).—Substituted or unsubstituted anthraquinone-sulphonic or -carboxylic acids or salts, or corresponding leuco-compounds or anthrones, are added to the printing paste. C. H.

After-treating [delustring] artificial silk. BRIT. BEMBERG, LTD. (B.P. 383,149, 16.3.32. Ger., 16.3.31.). —Artificial silk is treated successively in separate baths with solutions of a metal hydroxide, e.g.,  $Ba(OH)_2$ , and of a metal salt, e.g.,  $ZnSO_4$ , in such a way that there is formed within the silk filaments of  $H_2O$ -insol. metal salt and a  $H_2O$ -repellent metal hydroxide. A. J. H.

Machines for dyeing and washing articles of textile materials. J. RABASSA (B.P. 383,552, 5.5.32).

Dispersing agents etc.—See III.

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

Economics of the Petersen tower system [of sulphuric acid manufacture]. F. SCHUCH (Chem.-Ztg., 1932, 56, 933—934; cf. B., 1932, 979, 1118).— A rejoinder to articles by Petersen and Rabe asserting lack of originality in many points in Petersen's system and claiming advantages in erection costs for Rothammel and Bodamer's design. C. I.

Purification of brine for ammonia-soda factories. M. I. NEKRITSCH (Ukrain, Chem. J., 1932, 7 [Tech.], 17— 31).—The brine, containing 1.5—5N-MgSO<sub>4</sub> and CaCl<sub>2</sub>, is treated in the cold with  $2\cdot 3$  litres of milk-oflime and  $7\cdot 3$  kg. of Na<sub>2</sub>CO<sub>3</sub> per cu. m., and allowed to settle during 10 hr. before use. In this way 90% of the impurities are pptd. as Mg(OH)<sub>2</sub> and CaCO<sub>3</sub>, leading to considerable economies in NH<sub>3</sub> and heat during the later stages of prep. of Na<sub>2</sub>CO<sub>3</sub>. R. T.

Influence of titanium oxide on the sintering of magnetic sand in Japan. T. KATO (Suiyokwai-Shi, 1932, 6, 837—844).—The higher is the  $\text{TiO}_2$  content, the higher is the sintering temp. (> 1250°). Magnetite containing 4.5% SiO<sub>2</sub> but no  $\text{TiO}_2$  sintered at 1100° and had m.p. 1150°. CH. ABS.

Utilisation of nephelite waste. M. BUDYANSKAYA (Min. Suir., 1932, 7, No. 5—6, 61—67).—Permutit was obtained by fusing a mixture of nephelite, quartz (or sand), and Na<sub>2</sub>CO<sub>3</sub> at 1300°, and decomposing the vitreous mass with H<sub>2</sub>O. The alkaline liquid, containing 8—10% SiO<sub>2</sub>, on acidification and activation of the product, affords SiO<sub>2</sub> gel of high adsorptive power.

#### CH. ABS.

CO-H<sub>2</sub> mixtures.—See II. Bleach liquor.— See VI. Determining ZnS in lithopone.—See XIII. Whiting [in rubber].—See XIV.

See also A., Dec., 1215, Prep. of at. H. 1216, Hydrates of Mg perchlorate. Prep. of phosphorescent substances. 1217, Ca phosphates and silicophosphates. 1218, Preps. of active Th ppts. and of pure H<sub>2</sub>S. 1219, Prep. of dithionates. Pbchamber violet acid. 1221, Determination of N<sub>2</sub> in inert gases. 1222, Determination of CO<sub>2</sub>. Testpaper for CS<sub>2</sub>.

#### PATENTS.

Manufacture of phosphoric acid. I. HECHEN-BLEIKNER, ASST. to CHEM. CONSTRUCTION CORP. (U.S.P. 1,851,179, 29.3.32. Appl., 25.2.30).—Finely-ground phosphate rock containing a relatively high content of F compounds is mixed with hot  $H_2SO_4$ , d < 1.53, and when evolution of HF is complete the mixture is diluted with dil.  $H_3PO_4$  to a concn. suitable for filtration.

L. A. C.

Apparatus for making hydrofluoric acid. W. J. HARSHAW and C. S. PARKE, Assrs. to HARSHAW CHEM. Co. (U.S.P. 1,842,092, 19.1.32. Appl., 4.2.28).—Claim is made for a rotating cylindrical retort with a delivery tube for the HF gas at one end of the rotating axis and containing Fe balls which grind the  $CaF_2$  during the period of reaction with the  $H_2SO_4$ . A. R. P.

**Production [synthesis] of ammonia.** D. PYZEL, Assr. to SHELL DEVELOPMENT Co. (U.S.P. 1,849,357, 15.3.32. Appl., 26.9.28).—The gases, after passing over the catalyst at, e.g., 100 atm., are cooled and compressed, e.g., to 200 atm., to facilitate removal of the  $NH_3$ ; the residual gases are expanded to the original pressure and mixed with fresh  $N_2$  and  $H_2$  before being returned to the catalyst chamber. L.A.C.

Recovery of ammonia [from gas mixtures]. L. S. DEITZ, JUN., ASST. to UNITED STATES VANADIUM CORP. (U.S.P. 1,849,420, 15.3.32. Appl., 1.5.29).—The gas mixture is brought in contact with  $V_2O_5$  and  $H_2O$  at 30—80°, and the product is heated at 200—250° to expel the NH<sub>3</sub> and H<sub>2</sub>O. L. A. C.

Purification of by-product ammonia. A. O. JAEGER, Assr. to SELDEN Co. (U.S.P. 1,844,393, 9.2.32. Appl., 15.3.29).—Org. compounds are oxidised by passing the  $NH_3$  together with an excess of air over a zeolite catalyst at 300—500°. The catalyst contains CuO and/or Fe<sub>2</sub>O<sub>3</sub> as well as a small amount of Bi<sub>2</sub>O<sub>3</sub> and, if desired, other oxidation catalysts; 13 examples of such catalysts are given. A. R. P.

Production of ammonium chloride from cokeoven gases and the like. J. W. HACKER and T. C. LLOYD (U.S.P. 1,849,923, 15.3.32. Appl., 1.10.28).— NH<sub>3</sub> liquor is passed repeatedly through the hot gases to absorb NH<sub>4</sub>Cl and the solution obtained, after removal of tar and concn. nearly to saturation, is clarified by treatment with active C or Cl<sub>2</sub> before crystallisation.

L. A. C.

Production of solid diammonium phosphate, and mixed salts containing same, from solutions of phosphoric acid. METALLGES. A.-G., and H. LEHRECKE (B.P. 383,278, 25.7.31).—H<sub>3</sub>PO<sub>4</sub>, alone or mixed with suitable fertilisers, is atomised, *e.g.*, by rotary dispersion plates, into a mixture of NH<sub>3</sub> and, *e.g.*, air (H<sub>3</sub>PO<sub>4</sub>: NH<sub>3</sub> = 1:2 mols.) under conditions such that the temp. is maintained at 60—70° and dry (NH<sub>4</sub>)<sub>2</sub>HPO<sub>4</sub> is formed as powder. The issuing gases are scrubbed with H<sub>3</sub>PO<sub>4</sub> to extract residual NH<sub>3</sub>. L. A. C.

Production of potassium sulphate, ammonium sulphate, and alumina from alunite. H. TANAKA (U.S.P. 1,850,038, 15.3.32. Appl., 2.1.29. Jap., 13.1.28). —Alunite is calcined at about 600° and extracted with aq. NH<sub>3</sub>; after filtration, the solution is conc. to crystallise mixed  $K_2SO_4$  and  $(NH_4)_2SO_4$  for use as a fertiliser, and the residue is treated with  $SO_2$  and  $H_2O$  at 60—70° to yield  $Al_2(SO_4)_3$  solution which, after filtration, is heated at 100° to ppt.  $5Al_2O_3,3SO_2$ ; the ppt. is calcined at about 900° to yield pure  $Al_2O_3$ . L. A. C.

Determination of potassium. E. SHERRIL (U.S.P. 1,849,960, 15.3.32. Appl., 22.12.25. Renewed 9.5.30). —The vol. of the K Na cobaltinitrite pptd. from a solution of unknown concn. is compared with that pptd. from a solution of known K content, both solutions, after addition of  $Na_3Co(CN)_6$ , being centrifuged simultaneously in tubes having funnel-shaped upper ends leading into narrow graduated tubes for collecting and measuring the ppts. L. A. C.

Production of anhydrous aluminium chloride. C. B. CLARK, Assr. to GEN. CHEM. Co. (U.S.P. 1,851,272— 3, 29.3.32. Appl., [A] 8.11.27, [B] 27.3.28).--(A) A mixture of aluminous material and C is treated at > 850° (preferably 1150--1350°) with a mixture of S vapour and HCl, prepared by passing HCl through S maintained at 300-350°. (B) A mixture of aluminous material with excess C is treated at 850-1350° with a mixture of preheated air or  $O_2$ , HCl, and S vapour or a compound containing S. The AlCl<sub>3</sub> formed passes as vapour into a condenser. L. A. C.

Separate recovery of [sodium] aluminium [fluoride] and phosphoric acid from substances containing these constituents. H. LEHRECKE (U.S.P. 1,850,017, 15.3.32. Appl., 20.2.29. Ger., 19.11.28).— The  $H_2SO_4$  solution resulting from the decomp. of aluminous phosphate rock is treated with sufficient NaF to ppt. all the Al as  $Na_3AlF_6$ , and the filtrate is neutralised to  $NaH_2PO_4$  and treated with  $CaCO_3$  to remove the  $SO_4''$ . The Al may also be removed by addition of NaCl and passage of HF into the solution.

A. R. P.

Manufacture of fluorine compounds of aluminium. ALUMINIUM, LTD., Assees. of W. H. GITZEN and G. H. WAGNER (B.P. 383,780, 5.1.32, U.S., 29.1.31).—Aluminous material (e.g.,  $Al_2O_3, 3H_2O$  which has been calcined at 300—850°), mixed with  $Na_2CO_3$  if  $Na_3AlF_6$  is required, is charged into a tower in which it is treated at 400—700° with a F-containing gas, e.g., HF,  $H_2SiF_6$ , introduced near the bottom of the tower at such a rate that it all reacts before reaching the top. The product is withdrawn from the lower end of the tower. L. A. C.

**Zeolite product.** A. O. JAEGER and J. A. BERTSCH, Assrs. to SELDEN Co. (U.S.P. 1,840,450, 12.1.32. Appl., 18.3.26).—Claim is made for zeolites containing catalytically active bases in non-exchangeable form, and diluents which are also catalytically active in a different respect and the particle size of which is  $< 60\mu$ ; 16 examples of such catalysts are described and examples of their use are given. A. R. P.

Water-softening gels. O. LIEBKNECHT, Assr. to PERMUTT CO. (U.S.P. 1,849,985, 15.3.32. Appl., 25.2.31. Ger., 12.11.29).—Artificial zeolites prepared from Na silicate and Na aluminate or  $Al_2(SO_4)_3$  are improved chemically and physically if the original mother-liquor in the gel be displaced by a relatively dil. salt solution prior to drying and granulating. The alkali content of such a gel, and thus its base-exchange capacity, can be increased by treatment with a dil. alkali solution either before or after drying. C. J.

Production of solid mixed chlorides of magnesium and calcium in divided form. S. B. HEATH, Assr. to Dow CHEM. Co. (U.S.P. 1,851,308, 29.3.32. Appl., 5.11.28).—Solutions containing a large excess of CaCl<sub>2</sub> or of MgCl<sub>2</sub> are conc. to yield a slurry of crystals and mother-liquor and the slurry is flaked, *e.g.*, by cooling on a rotating drum. Solutions of intermediate composition are conc, in vac. and the tachydrite (CaCl<sub>2</sub>,2MgCl<sub>2</sub>,12H<sub>2</sub>O) crystals deposited are removed and washed with H<sub>2</sub>O to yield a liquor rich in CaCl<sub>2</sub>, which is returned to the mother-liquor for further conc., and crystals rich in MgCl<sub>2</sub>, which are melted and flaked. L. A. C.

Gypsum calcining furnace. J. EKLUND, Assr. to ERIE CITY IRON WORKS (U.S.P. 1,841,940, 19.1.32. Appl., 28.4.28).—The furnace comprises an Fe kettle set on a well-shaped combustion chamber and surrounded by a cylindrical brick shell from which it is separated by an annular space. The furnace is heated by a coal dust-air burner, the flames from which circulate in the well, and the hot gases pass through the annular space around the kettle and into the stack through flues extending across the kettle. Part of the flue gases are returned to the combustion chamber to regulate the heat therein. A. R. P.

Production of zinc oxide. H. REINHARD (U.S.P. 1,842,287, 19.1.32. Appl., 25.6.29. Ger., 3.12.23).---

Zn is distilled from a retort with a horizontal flue entering a wider vertical flue in which a CO flame is burned from a burner directed against the wall of the retort flue in such a way that the flame spreads over the opening through which the Zn vapour enters the vertical flue. The Zn thus mixes with the partly burnt gases and the mixture is burned to ZnO and  $CO_2$  by the current of air passing up the vertical flue. A. R. P.

Manufacture of zinc sulphide. E. C. GASKILL (U.S.P. 1,849,453, 15.3.32. Appl., 4.12.26).—A finelydivided mixture of ZnO and S is heated at about 700°, cooled, screened, reheated at about 700°, and again cooled; air is excluded during the whole process.

L. A. C. Regeneration of [vanadium] catalysts [used in the oxidation of naphthalene derivatives]. A. O. JAEGER, Assr. to SELDEN Co. (U.S.P. 1,848,723, 8.3.32. Appl., 5.11.27).—The spent catalyst is heated first at 200—500° in a current of Cl<sub>2</sub>, COCl<sub>2</sub>, NOCl,  $C_2H_4Cl_2$ , or similar volatile chloride, and then in air or  $O_2$  with or without steam. A. R. P.

Removal of germanium from zinc sulphate solutions. W. E. MITCHELL, ASST. to ANACONDA COPPER MINING CO. (U.S.P. 1,848,264, 8.3.32. Appl., 10.5.30).—ZnSO<sub>4</sub> liquors derived from leaching roasted Zn ores with  $H_2SO_4$  are treated with ZnO to remove the greater part of the GeO<sub>2</sub>, then with CuSO<sub>4</sub> (1 g. per litre) and Zn dust (3—20 g. per litre) to remove the remainder. A. R. P.

**Preparation of tungstic oxide gel.** W. A. PATRICK and E. H. BARCLAY, Assrs. to SILICA GEL CORP. (U.S.P. 1,848,266, 8.3.32. Appl., 31.7.29).—Aq. Na<sub>2</sub>WO<sub>4</sub> is treated with an acid of such concn. that the final solution will be 0.1-0.5N with respect to that acid. For 10% aq. Na<sub>2</sub>WO<sub>4</sub> 2.8N-, for 6.5% 5N-, and for 4% 8.8N-acid is required when the solution is not stirred, but when the mixture is vigorously agitated the acid should be 4.5, 8.5 and 15N, respectively. When the solution has set to a gel this is broken up and the sol. salts are removed by washing with hot H<sub>2</sub>O. The gel is dried first in a current of air at 75-120° and then slowly heated to 300-400°. A. R. P.

Electric production of carbon disulphide. H. H. Dow, Assr. to Dow CHEM. Co. (U.S.P. 1,849,140, 15.3.32. Appl., 30.11.26).—Preheated S vapour produced in an external vaporiser is passed through an electrically heated mixture of charcoal and conducting C.

L. A. C.

**Production of hydrogen.** J. A. PEREY, Assr. to UNITED GAS IMPROVEMENT Co. (U.S.P. 1,848,654, 8.3.32. Appl., 30.8.30).— Purified coke-oven gas is scrubbed and cooled to a temp. sufficient to remove all the gases but  $H_2$  and  $N_2$ , and the separated hydrocarbons are passed through a glowing coke bed to crack them into C and  $H_2$ . The coke is kept hot by intermittent blowing with air, and more  $H_2$  is formed by passing steam through the coke with the hydrocarbons. All the CO obtained in the various stages is passed with steam over a catalyst to give CO<sub>2</sub> and  $H_2$  which are separated in the usual way. A. R. P.

Utilisation of the nitrogen from nitrosyl chloride. KALI-FORSCHUNGS-ANSTALT G.M.B.H. (B.P. 383,506, 7.3.32. Ger., 9.7.31. Addn. to B.P. 329,200; B., 1930, 662).—The gas mixture obtained by the thermal decomp. of NOCl followed by rapid cooling and the addition of air or  $O_2$  is treated with a countercurrent of HNO<sub>3</sub>, H<sub>2</sub>O, or waste liquor obtained in the manufacture of KNO<sub>3</sub>, to extract the NO<sub>2</sub>. L. A. C.

Refining of [native sulphur] ore. B. ANDREWS (U.S.P. 1,841,697, 19.1.32. Appl., 13.12.29).—The ore is passed continuously in perforated buckets attached to an endless conveyor through a tube shaped like a broad W with elongated outer arms and filled with  $H_2O$ . Steam is passed into the central peak of the tube to heat the  $H_2O$  therein above the m.p. of S, the hydrostatic pressure in the outer limbs of the tube serving to raise the b.p. of the  $H_2O$  above the m.p. of S. Means are provided for withdrawing the S from the limbs of the tube and for removing the rock residue from the buckets. A. R. P.

Purification of sulphur [recovered from fuel gases]. M. SHOELD, Assr. to KOPPERS Co. (U.S.P. 1,851,411, 29.3.32. Appl., 26.4.29).—The S, after washing with  $H_2O$  at about 38°, is worked to a slurry with  $H_2O$  and treated with excess of a salt (e.g.,  $CuSO_4$ ) capable of forming an insol. thiocyanate innocuous to plant life; the mixture is filtered and the S used in paste form or dried. L. A. C.

Conversion of ferrophosphorus [into phosphorus thiochloride]. W. H. WOODSTOCK and G. A. MCDONALD, Assrs. to VICTOR CHEM. WORKS (U.S.P. 1,848,813, 8.3.32. Appl., 13.3.30).—Finely-ground Fe<sub>2</sub>P is treated with  $S_2Cl_2$  to obtain a residue of FeCl<sub>2</sub> and S and a distillate of PSCl<sub>3</sub>. The residue is treated with  $Cl_2$  to recover  $S_2Cl_2$  and the last of the P as PSCl<sub>3</sub>.

A. R. P.

Thermophoric mixture.—See I. Catalyst for  $NH_3$  oxidation. Welding fluxes.—See X. Electrolysis of molten salts.—See XI. Fertilisers and manures.—See XVI. Ca lactate from whey.—See XIX.

# VIII.-GLASS; CERAMICS.

Relation between the composition and the density and optical properties of glass. I. Soda-limesilica glasses. G. W. MOREY and H. E. MERWIN (J. Opt. Soc. Amer., 1932, 22, 632-662).-Measurements of d, n, and  $n_{\rm F}$ -n<sub>c</sub> were made on 185 glasses in the region from mixtures intermediate between the RO,SiO<sub>2</sub> and RO,2SiO<sub>2</sub> ratios and pure SiO<sub>2</sub>. The effect of heat treatment on d was studied and the condition of maximal d was chosen as the "corresponding state." The relationship between composition and property are discussed; no justification is found for the assertion that definite compounds exist in and determine the properties of the glasses. The Gladstone-Dale formula (for the additive relationship between composition and n) gave % departures little > one half as large as those given by the Lorentz-Lorenz or Eykman formula, and one third as large as those by the Lichtnecker formula. J. A. S.

Temperature variation of the thermal conductivity of Pyrex glass. R. W. B. STEPHENS (Phil. Mag., 1932, [vii], 14, 897—914).—The thermal conductivity of Pyrex glass (80.5% SiO<sub>2</sub>, 2% Al<sub>2</sub>O<sub>3</sub>, 12.5% B<sub>2</sub>O<sub>3</sub>, 4% Na<sub>2</sub>O) over the temp. range  $-180^{\circ}$  to 250° can be represented by  $K = -0.00352_3 + 0.00245_4 \log_{10} T$ , where T is the abs. temp. J. W. S.

Analysis of glass and of its raw materials. V. I. PANASIUK and I. PISARENKO (Ukrain. Chem. J., 1932, 7 [Tech.], 1-4).—For analysis  $\lt$  50 g. of glass should be used. SiO<sub>2</sub> is determined by titrating the ppt. of K<sub>2</sub>SiF<sub>6</sub>; if this is thoroughly washed, the results differ by > 0.04% from those obtained gravimetrically. R. T.

Refractory linings for modern blast furnaces. M. BARRETT (Chem. & Ind., 1932, 972—973).—The present trend is to use a material relatively high in  $Al_2O_3$ , following both American and German practice in which the val. is > 40%. Clays corresponding with this content are unusual in England, and it should not be assumed that synthetic mixtures of the desired composition are as suitable for the purpose as naturally occurring aluminous clay. C. A. K.

Dinas bricks.-See IX.

#### PATENTS.

Manufacture of [lead] glass. T. GOLDSCHMIDT A.-G. (B.P. 383,186, 25.4.32. Ger., 14.9.31).—Pb or Pb K silicates produced by a melting process are used instead of the oxides or carbonates in the manufacture of the glass. L. A. C.

[Treatment of] glass articles [to prevent violent ebullition]. W. M. DANIEWSKI, ASST. to CORNING GLASS WORKS (U.S.P. 1,850,537, 22.3.32. Appl., 22.12.28. Fr., 5.3.28).—The interior surface of the vessel (glass,  $SiO_2$ , porcelain) is cleaned, wetted with aq.  $Na_2SiO_3$ (d 1·21), drained, dried, treated with boiling conc. HCl, drained, and the inside surface heated, thus forming an adhesive film of  $SiO_2$  gel. The film may be reactivated by heat. J. A. S.

Production of enamels. C. J. KINZIE, Assr. to TITANIUM ALLOY MANUFG. Co. (U.S.P. 1,848,567, 8.3.32. Appl., 7.3.27).—Enamels containing as opacifier  $\text{ZrO}_2$  formed by decomp. of  $\text{ZrSiO}_4$  in the frit are claimed; e.g., by fusion of a mixture of potash felspar (124.9), Na<sub>2</sub>CO<sub>3</sub> (40.2), NaNO<sub>3</sub> (17.5), Na<sub>2</sub>B<sub>4</sub>O<sub>7</sub> (125), BaCO<sub>3</sub> (35), ZnO (42.5), Pb<sub>3</sub>O<sub>4</sub> (42.5), CaCO<sub>3</sub>(15), CaF<sub>2</sub> (36.5), Al(OH)<sub>3</sub> (20.2), and ZrSiO<sub>4</sub> (116.3) a frit is obtained containing 14.8% ZrO<sub>2</sub> and having a softening point of 657°. A. R. P.

Furnace mechanism and process for bloating clay. E. M. WYATT and H. F. WEISS, ASSTS. to AMER. FACE BRICK RESEARCH CORP. (U.S.P. 1,850,221, 22.3.32. Appl., 7.10.29).—The argillaceous material, after passing through a rotary kiln at the sintering temp., is fed in a uniform layer upon an inclined slab where its upper surface is exposed to the bloating temp. At the bottom of the incline the now continuous belt of material passes over a roller (treated with SiO<sub>2</sub> dust etc. to prevent surface sticking) and proceeds along a dusted horizontal slab in the next furnace chamber where the other surface is bloated and the interior further sintered. After passing through an annealing chamber the belt of material is cut up into the desired shape. J. A. S.

Preparation of [coloured] clay products. C. W. PARKS (U.S.P. 1,848,743, 8.3.32. Appl., 3.5.30).— Clay products, e.g., bricks, are fired at  $1100^{\circ}$  in air in a furnace chamber, which is then closed, and, when the temp. has fallen to 900°, filled with a reducing gas in which the products are cooled to 550° or lower before again slowly admitting air. A. R. P.

Making a refractory containing silicon carbide. E. B. FORSE and C. F. GEIGER (U.S.P. 1,849,289, 15.3.32. Appl., 11.5.28).—The ware is fired in a tunnel kiln in which provision is made for a 48-hr. period in an oxidising atm. at  $\gg 800^{\circ}$ , to remove the carbonaceous centres in the SiC grains, followed by a rapid (6-hr.) heating at  $\ll 1200^{\circ}$  in an atm. containing  $\gg 5\%$  O<sub>2</sub>, to mature the bond without oxidising the SiC. Such ware containing < 12% SiO<sub>2</sub> has a modulus of rupture >1000 lb./sq. in. at 1350°. J. A. S.

Manufacture of hard objects of carbon silicide or like substances. A. L. MINGARD (B.P. 383,540, 15.4.32. Fr., 11.5.31).—C electrodes, one of which has attached to it a shaped C article, are embedded in a 30:7 mixture of Si and C in an electric furnace, so that on striking the arc a pocket of Si vapour forms around the article and converts it into SiC. L. A. C.

Manufacture of glass tubes and similar products. N.V. MAATS. TOT BEHEER EN EXPLOIT. VAN OCTROOIEN, and L. S. VELLO (B.P. 383,521, 30.3.32. U.S., 23.12.31. Addn. to B.P. 383,146).

Manufacture of non-splinterable lenses, and other forms of non-splinterable or laminated glass. W. WILLIAMS, and INVESTORS MANAGING TRUST, LTD. (B.P. 383,696, 25.9.31).

Drying floors for china clay. R. J. VARCOE (B.P. 383,941, 13.8.32).

Dental crowns.—See X.

#### IX.—BUILDING MATERIALS.

Improvement of the strength of cements. II. T. YOSHIOKA and H. IIJIMA (J. Soc. Chem. Ind., Japan, 1932, 35, 481—482B; cf. B., 1931, 842).—With a fixed amount of Portland cement, greater strength can be obtained by adding certain inert materials. E. S. H.

Fine cement. A. EIGER (Tonind.-Ztg., 1932, 56, 532-533, 558-560; Zement, 1932, 21, 348-349; Chem. Zentr., 1932, ii, 911-912).—Increase in the internal surface causes an increase in strength only up to a certain limit. A relation between hydration and strength is derived from particle size-reaction curves. Moderate sized particles are best. A. A. E.

Water in set cement. F. M. LEA (Cement, 1932, 5, 395–399).—The methods used for dividing the  $H_2O$  into "free" and "combined"  $H_2O$  are discussed. C. A. K.

Determination of quality of Dinas bricks. A. S. GINZBERG, B. P. SELIVANOV, and A. I. TZVETKOV (Metallurg, Russia, 1930, 5, 344—359).—U.S.S.R. standards are described. Corrections leading to greater accuracy in *d* determinations are mentioned. Micrographical analysis reveals changes of structure which affect the quality without materially altering *d*.

CH. ABS.

Cheap flameproofing agent for wood. C. G. SCHWALBE and K. BERLING (Chem.-Ztg., 1932, 56,

909—910).—Aq. solutions of  $HCO_2Na$  and NaOAc introduced into the wood by the usual processes are recommended. The best results are obtained with green or air-dried wood impregnated under pressure; the process is not so suitable for seasoned wood. Varying concns. may be used and the addition of a small amount of Na<sub>2</sub>HPO<sub>4</sub> is beneficial. E. H. S.

Bamboo. I. Relation between composition and strength. S. UNO (Bull. Utsunomiya Agric. Coll., 1932, No. 2, 25-42).—Phyllostachys reticulata, P. peberula, P. edulis, P. jithophila, Dendrocalamus latiflorus, Bambusa stenostachys, B. oldhami, and B. vulgaris var. stricta were examined. The strength of the wood increases with decrease in pentosan content and with increase in crude cellulose. CH. ABS.

Paint failure on cement floor. Road-marking paints.—See XIII. Rubber in industry.—See XIV. See also A., Dec., 1217, Setting of aluminous cements.

#### PATENTS.

[Heat-]insulating cement. H. N. CLARK, Assr. to REFRACTORY AND ENG. CORP. (U.S.P. 1,851,038, 29.3.32. Appl., 7.1.31).—The cement contains mineral wool 45-65 (55)%, diatomaceous earth 10—30 (20%), bentonite 11—18 (15)%, and asbestos 5—20 (10)%.

C. A. K.

Manufacture of pastes, mortars, concrete, etc. having a cement base. Soc. D'APPLICATIONS DES PÂTES DE CIMENT (S.A.P.A.C.I.) (B.P. 383,475, 22.1.32. Mexico, 23.1.31).—A mixture containing 100 pts. of cement, 1—40 pts. of fibrous materials, *e.g.*, flax, asbestos, and 1—25 pts. of tripoli is made into a paste with H<sub>2</sub>O. C. A. K.

Porous structure such as sound absorbent plaster. A. W. SCHORGER, Assr. to C. F. BURGESS LABS., INC. (U.S.P. 1,848,386, 8.3.32. Appl., 6.4.28).—A mixture of 12—20-mesh slag (300),  $CaSO_4, 0.5H_2O$  (125), NaNH<sub>4</sub>HPO<sub>4</sub>,4H<sub>2</sub>O (2),PhSO<sub>3</sub>Na (1), and H<sub>2</sub>O (85 pts.) is claimed. A. R. P.

Clinker heat-treatment. H. M. LARMOUR and S. C. PIERCE, JUN., ASSTS. to YOSEMITE PORTLAND CEMENT CORP. (U.S.P. 1,849,492, 15.3.32. Appl., 19.3.29).— Before grinding, Portland cement clinker is re-heated to clinkering temp. and cooled, in a reducing or neutral atm. C. A. K.

Making cellular stone-like material [from blastfurnace slag etc.]. C. H. HUNSAKER (U.S.P. 1,849,090, 15.3.32. Appl., 12.5.30).—A predetermined quantity of  $H_2O$  is sprayed into a mass of molten slag. The physical structure of the product is determined by the homogeneity of the  $H_2O$  addition and by the slow cooling afterwards *in situ*. C. A. K.

Manufacture of vesiculated brick and similar articles. J. J. F. BRAND, Assr. to A. H. PEMBERTON and G. C. EARLE (U.S.P. 1,851,660, 29.3.32. Appl., 28.6.28). —Raw clay is mixed with an acid and a base to release gases in the plastic mass, which is then calcined. The porous mass is ground, mixed with a further quantity of clay, and formed into brick. C. A. K.

Manufacture of structural materials for bearings and other machine parts. VEREIN, KUGELLAGERFABR- IKEN A.-G. (B.P. 383,557, 12.5.32. Ger., 15.5.31).— Fibrous material is saturated with an easily removable material, e.g., sugar or  $Na_2CO_3$ , and is embedded in the base material, e.g., artificial resins or metal alloys of low m.p. The finished bearing is then treated with a solvent which leaves the fibres porous so that lubricants may be absorbed. C. A. K.

Composition for building blocks. O. A. NELSON, Assr. to H. W. KAVLOR (U.S.P. 1,850,845, 22.3.32. Appl., 22.7.29).—A plastic mass obtained by grinding hydrated CaO together with a small quantity of diatomaceous earth and resin, S, or CaCl<sub>2</sub> is mixed with a further quantity of diatomaceous earth and moulded. The blocks are then steamed at 150 lb. pressure for 3—8 hr. A suitable composition is (approx.): diatomaceous earth 84, hydrated CaO 14, binder 2%. C. A. K.

Road and building materials, electric insulation materials, and the like. H. V. GRÖNROOS (B.P. 383,722, 20.10.31).—A mixture of approx. equal pts. by wt. of clay and sand is heated, *e.g.*, in a revolving furnace, at a temp. such that a doughy mass is formed by the melting of the easily fusible constituents of the clay; the product, after cooling, pulverising, and admixture with an equal wt. of sand, is again heated to partial fusion and run into moulds. Up to 50% of the sand and/or clay in the first heating or of the sand in the second heating may be replaced by pulverised volcanic scoria, slate ashes, siliceous rock, etc. L. A. C.

Composition for the manufacture of artificial stone, wood substitutes, or the like. F. W. ENGHOLM (B.P. 383,779, 5.1.32).—A mixture of calcined magnesite, French chalk, marble dust, straw, hay, etc., and MgCl<sub>2</sub> solution is moulded. L. A. C.

Binding material for the mineral aggregates of pavements and its use. D. McK. HEPBURN, S. S. SADTLER, and E. F. CAVO, ASSTS. to AMIESITE ASPHALT CO. OF AMERICA (U.S.P. 1,846,107, 23.2.32. Appl., 13.11.29).—Fuel oil containing 40-50% of asphalt is mixed with 0.25-1% of Al stearate or oleate and 2-7%of S and the mixture is heated at  $235-240^\circ$  with agitation until a mobile black liquid is obtained which cools to a viscous, ductile, H<sub>2</sub>O-resistant adhesive.

A. R. P.

Manufacture of artificial cementitious glazed plates and the like. F. BIERLING (B.P. 383,471, 13.1.32).—The coloured facing cement layer is mixed with a 5—10% solution of HCl and is rendered waterproof by the addition of linseed oil, gum tragacanth, or other densifying agent. C. A. K.

Production of articles covered by cold process with a glaze-like coating. K. and C. FRIEDRICH (U.S.P. 1,850,099, 22.3.32. Appl., 13.4.28).—Articles to be glazed are made from a mixture of ground porous materials, *e.g.*, pumice, and cement. Such materials retain water sufficiently long to allow the cement mortar glaze to set properly. The latter may be rendered more colloidal by a small addition of Zn soaps. After setting is complete the article is coated with a nitrocellulose varnish. C. A. K.

Road-surfacing. S. E. FINLEY (B.P. 383,808, 29.1.32).—See U.S.P. 1,845,405; B., 1932, 1033.

Building bricks, blocks, etc. G. H. C. RATCLIFFE, and LONDON BRICK CO. & FORDERS, LTD. (B.P. 383,774, 24.12.31).

[Apparatus for] coating of tiles, slabs, bricks, and like articles with sand etc. E. HODGKINSON (B.P. 384,228, 6.7.32).

Apparatus for drying or mixing stone or the like. B. G. W. BARTLETT (B.P. 383,657, 25.7.31).

Roofing felts. Slabs etc. from fibrous material. --See V.

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

Dearsenication of iron ores. W. RUFF and E. SCHEIL (Stahl u. Eisen, 1932, 52, 1193—1195).—As present as FeAs and FeAsO<sub>4</sub> in Fe ores cannot be removed by simple roasting, but As in the form of As<sub>3</sub>O<sub>3</sub> or arsenites can be readily volatilised in this way. After reducing FeAsO<sub>4</sub> to FeAs practically all the As can be volatilised as metal by heating the ore in CO<sub>2</sub>; both processes can be effected in one operation by heating the ore at 900° in an atm. of 60% CO<sub>2</sub> and 40% CO or of 80% CO<sub>2</sub> and 20% CO. After this treatment an ore containing 64.5% Fe, 0.73% As, and 1.1% Sb retained only 0.035% As and 0.04% Sb. The presence of H<sub>2</sub>O in the gases retards removal of As, hence CO is a better reducing agent to use than H<sub>2</sub>.

Elimination of arsenic from iron ores. B. P. SELIVANOV, S. A. POGODIN, A. A. ZVYAGIN, E. Y. LIFSHITZ, and M. Y. JEMS-LEVI (Soobshch. Vsesoy. Inst. Met., 1931, No. 3–4, 54–67).—As was best removed from the Kerchensk ore (0.13% As) by heating at > 900° in a mixture of CO (25-40%) and CO<sub>2</sub> or in H<sub>2</sub>O vapour in presence of coke (5-10%). CO and H<sub>2</sub> (1:1) retards removal of As owing to partial reduction of Fe<sub>2</sub>O<sub>3</sub> and absorption of As by Fe. CH. Abs.

Reduction of iron oxide by carbon and potassium cyanide at high temperatures. F. KÖRBER and H. H. MEYER (Arch. Eisenhüttenw., 1932-3, 6, 173-182).—The evolution of gas when various mixtures of Fe ores with coke, wood charcoal, and C produced by cracking oils on the ore are heated suddenly at 1000-1300° is shown in a series of graphs. The rate of evolution is greater with porous ores, e.g., minette, than with dense ores, e.g., hæmatite, especially when the C is deposited in the pores by cracking. Mixtures of  $Fe_2O_3 + 2KCN$  commence to react at 440°, and at 560° all the Fe<sub>2</sub>O<sub>3</sub> is reduced to Fe<sub>3</sub>O<sub>4</sub>; above 560° reduction to Fe occurs and is completed at 680° without the intermediate formation of FeO. Sudden heating to 1200° results in violent evolution of  $N_2 + 2CO$  and complete reduction to Fe, the K<sub>2</sub>O formed volatilising. Sudden heating to 800-1000°, however, results in violent evolution of only half the theoretical quantity of gas, due to the formation of K2Fe2O4 which by itself is not reduced energetically by KCN below 1300°. Most Fe ores even in grains as large as 2-4.5 mm. react violently with KCN when suddenly heated above 800°. Ores containing Mn yield MnO with KCN below 1200°, but above this temp. some Mn is formed as

metallic Fe promotes reduction of MnO. The greater violence of reduction of Fe ores by KCN compared with C is attributed to the better contact due to the volatility of KCN at high temp. The effect of this violent gas evolution on blast-furnace practice is discussed; when part of the charge is held up by arching and then suddenly falls into the hot zone of the furnace the sudden increase in pressure produced by the almost instantaneous reduction of the ore has a very deleterious effect on the furnace masonry. The sudden volatilisation of KCN in the furnace has a similar effect. A. R. P.

Effect of tin and copper on chemical stability of cast iron. V. V. SKORCHELLETTI and A. I. SHULTIN (Soobshch. Vsesoy. Inst. Met., 1931, No. 1–2, 33–37). –Addition of Sn (2%) to Fe (C 3.5, Si 1.5, Mn 0.5,  $S + P \ge 0.5\%$ ) reduces the mechanical strength and considerably increases resistance towards acids. Addition of Cu (1.66%) increases the strength and the resistance towards HCl, HNO<sub>3</sub>, and AcOH (Cu 0.4%), but decreases the resistance towards H<sub>2</sub>SO<sub>4</sub> and AcOH (Cu > 0.4%). For Sn + Cu, 1.3% and 1.5%, respectively, give the best results, although for HNO<sub>3</sub>, Sn + Cu = 3.5% is favourable. CH. ABS.

Corrosion of grey cast iron by nitric acid. Y. YAMAMOTO (Suppl. Sci. Papers Inst. Phys. Chem. Res., Tokyo, 1932, 19, No. 16, 1—11).—Exothermic phenomena occur at the surface of grey cast Fe during and after immersion in HNO<sub>3</sub>. The extent of the rise in temp. varies with the concn. of the acid, reaching a max. with approx. 30% HNO<sub>3</sub> and then diminishing. The rate of oxidation after immersion is lowered and the rise in temp. reduced when a layer of C is formed over the layer of Fe<sub>3</sub>C, C, etc. first formed, as is the case with > 17% HNO<sub>3</sub>. Loss of wt. and depth of penetration are maximal with 27% HNO<sub>3</sub>. E. H. B.

Effect of oxygen pressure on corrosion of steel. U. R. Evans and C. W. BORGMANN (Trans. Faraday Soc., 1932, 28, 813-814).—A reply to Lee (cf. B., 1932, 1035). E. S. H.

Affinity and cutting [of metals]. W. GUERTLER (Z. Metallk., 1932, 24, 229–230).—When two elements having a chemical affinity for one another are rubbed together combination takes place in the surface layer. This reaction is particularly noticeable with widely dissimilar pairs, e.g., Cu, Ag, or Fe with S or P, but can also be detected with two metals, e.g., Pb and Mg yield  $Mg_2Pb$ . The bearing of these facts on the mechanism of friction, wear, and cutting of metals is discussed briefly. A. R. P.

Machinability of steel as indicated by its macrostructure. F. E. ROBINSON and C. T. NESBITT (Proc. Inst. Mech. Eng., 1932, 22, 383—417).—The difficulty in obtaining steel which gave satisfactory results in the process of boring and machining gun barrels led to the examination of its macrostructure. In the most suitable steels etching with Rosenhain and Haughton's reagent revealed well-defined bands ("phosphide lines") which were practically parallel with the axis of the bar. With unsatisfactory steels the characteristic lines were revealed, but in all cases were forked and irregular or much finer in structure. C. A. K. **Residual metals in open-hearth steel.** C. E. WILLIAMS and J. D. SULLIVAN (Met. & Alloys, 1932, 3, 240-245).—The trend of the content of foreign metals in basic open-hearth steel is considered, and the variation is attributed to the inclusion of alloy scrap, *e.g.*, automobile parts, in the charge. Figures in relation to Ni, Cu, Sn, Mn, and Cr are given. C. A. K.

Behaviour of oxidised iron in a current of chlorine. O. MEYER (Arch. Eisenhüttenw., 1932-3, 6, 193-197).—The determination of oxide inclusions in Fe by heating the metal in  $Cl_2$  and analysing the unattacked residue leads to erroneous results, as even at relatively low temp. and high dilution of the  $Cl_2$  with  $N_2$  the oxides are appreciably attacked. The effect of particle size on the results is discussed. A. R. P.

Ageing of soft steel and of steels of various origins. H. von Köckarrz (Mitt. Forsch.-Inst. Ver. Stahlw. Dortmund, 1932, 2, 193-222; Chem. Zentr., 1932, ii, 600).—Experiments with steel containing 0.07or 0.1% C are discussed. O in the form of sol. oxides may be the cause of ageing. A. A. E.

Structural changes in steel during hardening and tempering. H. HANEMANN, U. HOFMANN, and H. J. WIESTER (Arch. Eisenhüttenw., 1932-3, 6, 199-207).-Determination of the lattice consts. of the residual austenite has shown that, both during the crystallisation of tetragonal martensite and during the decomp. of austenite into cubic martensite, the transformation of supercooled austenite occurs without change in the distribution of the C atoms, and cannot therefore be correlated with a metastable equilibrium between phases of different C content or with a lengthening of the equilibrium lines in the Fe-C diagram. The martensite crystallisation is explained as follows. The driving force is the strong tendency of the Fe atoms in the supercooled austenite to revert to the less dense packing of the a-Fe lattice, and this tendency is opposed by the presence of the C atoms, which at low temp. lose their power of diffusing through the Fe lattice; at a definite temp., however, this tendency becomes so great that it overcomes the resistance of the C atoms and the martensite transformation begins, but proceeds only to partial completion owing to the opposing action of vol. changes. The formation of cubic martensite on tempering and during the decomp. of austenite is attributed to the movement of the C atoms to the middle of the bisphenoid formed in the  $\alpha$ -Fe lattice by two atoms in the cube corners and two atoms in the middle of the cube. The separation of cementite is attributed to a local enrichment of C by diffusion. A. R. P.

Magnetic properties of cast steel intended for permanent magnets. A. F. STOGOV and E. I. PELTZ (Soobshch. Vsesoy. Inst. Met., 1931, No. 5-6, 30-37).--After double tempering at 780-1000° (preferably 800--850°) the residual inductance and coercive force of the steel (C 0.91-1.14, Cr 2.18-2.33, Mn 0.49-0.55%) increased; samples tempered after annealing behaved similarly. Keeping samples at the hardening temp. for > 5 min. lowers their magnetic properties.

CH. ABS.

Verkh-Isetsk transformer steel. A. F. Stogov and E. I. PELTZ (Soobshch, Vsesov, Inst. Met., 1931, No. 1-2, 12-17).-Heating and rolling conditions were determined. CH, ABS.

Effect of hydrogen on steel. L. JACQUÉ (Compt. rend., 1932, 195, 878—880).—H<sub>2</sub> under pressure (e.g., 150 kg. per sq. cm.) at 400—700° removes C from the external layer ; this is followed by diffusion outwards of C from an inner layer. Thus in a medium-hard pearlitic steel (0.4% C) at 500° in 20 hr. an outer layer of ferrite 1 mm. thick was formed. Rise of temp, accelerates the action, which also varies greatly with composition. Cu delays it slightly, and Cr greatly provided the C content is low; cold-work facilitates it markedly. C. A. S.

Solubility of hydrogen in some metals and alloys. L. LUCKEMEYER-HASSE and H. SCHENCK (Arch. Eisenhüttenw., 1932-3, 6, 209-214).-The solubility of H2 in Fe, Ni, Cr, Mn, and some Fe-Cr-Ni alloys at 300-1200° is shown graphically. The solubility in  $\delta$ -Fe is < that in  $\gamma$ -Fe, as is to be expected from the difference in the lattice structure ; addition of Ni to Fe increases the solubility of H<sub>2</sub>, whilst Cr reduces the solubility in  $\alpha$ -alloys, but slightly increases the solubility in  $\gamma$ -Fe with 5-15% Cr. The solubility of H2 in Mn increases suddenly in the transition from  $\alpha$  to  $\beta$  and again in the transition from  $\beta$  to  $\gamma$ . Absorption of H<sub>2</sub> by Armco Fe reduces appreciably the notched-impact strength, but has no effect on the Brinell hardness. The rate of evolution of H<sub>2</sub> from ingot steel is shown as a function of the internal pressure. A. R. P.

Determination of oxygen in iron and steel by the vacuum melting method. O. MEYER and R. J. CASTRO (Arch. Eisenhüttenw., 1932—3, 6, 189—192).— A modification of the graphite spiral furnace for heating the metal with C in vac. is described and illustrated; the spiral is heated by a.c. and clamped into its holders by Mo sheets which act as springs, and current is supplied through a heavy Cu plate. Temp. of 2000° can be maintained for several hr. A new Hg dropping pump is described for use in collecting the evolved gas.

A. R. P.

Determination of vanadium in steel. I. WADA and R. ISHII (Bull. Inst. Phys. Chem. Res., Tokyo, 1932, 11, 1266—1278).—In order to avoid the difficulties arising from the presence of  $\text{CrO}_4''$  in  $\text{VO}_3'$ solutions, the  $\text{CrO}_4''$  may be reduced to Cr'' as follows : the solution is made 0.3N in  $\text{H}_2\text{SO}_4$ , and  $\text{H}_2\text{O}_2$  is added drop by drop until the blue colour of perchromic acid no longer appears. The  $\text{VO}_3'$  is unaffected. D. R. D.

Nitriding steel. O. I. VER and A. V. SMIRNOV (Soobshch. Vsesoy. Inst. Met., 1931, No. 1–2, 17–22).— The temp. should be 490—510°, the NH<sub>3</sub> pressure  $\geq$  10 mm., and the rate of flow of gas (for 50 hr.) such that 30% of the NH<sub>3</sub> dissociates. Working directions are given. CH. ABS.

Nitralloys of Soviet manufacture. O. I. VER, A. V. SMIRNOV, and I. F. AFONSKI (Soobshch. Vsesoy. Inst. Met., 1931, No. 3–4, 37–43).—A study of steel for use in the manufacture of nitrided tools.

CH. ABS.

High-aluminium steel alloy. O. I. VER, V. V. SKORCHELLETTI, and A. I. SHULTIN (Soobshch. Vsesoy, Inst. Met., 1931, No. 5-6, 8-16).—Steel containing 10-14% Al is heat-resistant up to 1100° and resists S at 290-310°, but not acid or salt solutions. Cementation is difficult. CH. Abs.

Mechanical properties of chrome-nickel-molybdenum steel. G. L. SAKHAROV, S. A. SKLIZKOV, and S. N. VINOGRADSKI (Soobshch. Vsesoy. Inst. Met., 1931, No. 1–2, 3–6).—Of steels containing C 0.27, 0.27; Si 0.30, 0.24; Mn 0.46, 0.50; S 0.009, 0.017; P 0.016, 0.038; Cr 0.78, 0.88; Ni 2.06, 2.71; Mo 0.74, 0.21; V 0.06, —%, the former was the better. CH. ABS.

Stability of hard alloys. V. FEDOROV and N. TROFIMOV (Azerbaid. Neft. Choz., 1932, No. 5, 41-49).-Durabilities of drilling alloys are : Stalinit 1.0, Sormait, Studite, and Spartan 0.8, Stillite 1.8, Blekor and Vokar 3.0, Pobedit 6.0, Borium 8.5, Widia 10.0. CH. ABS.

Volume changes [in alloys] by diffusion in relation to inverse segregation on rapid solidification. C. HAASE (Z. Metallk., 1932, 24, 258-261).-Chill castings of Cu-Zn alloys with 10, 15, and 23% Cu show marked inverse segregation. By annealing at temp. just below the solidus for several days an increase in vol. takes place accompanied by a slow equalisation of the composition by diffusion. The growth is attributed to a directional diffusion effect in which the primary dendritic crystals grow at the expense of the unoriented ground-mass with the consequent formation of minute voids. The mechanism of solidification of these alloys is explained as follows : Cu-rich primary dendrites form at the surface of the mould and the Zn in the still liquid phase diffuses rapidly into these crystals, leaving hollow spaces into which the Zn-rich liquid is drawn towards the sides of the mould. A. R. P.

Masked hydrogen sickness of brittle copper wires. C. SCHAARWÄCHTER (Z. Metallk., 1932, 24, 234— 235).—The presence of fine hair-cracks in Cu wire-bars is a certain indication that the metal has been annealed in a reducing atm. If such bars are rolled and drawn into wire, these cracks become closed up and a brittle wire is obtained although no hair-cracks can be detected in the microstructure. The characteristics of masked  $H_2$  sickness are rapid fracture on bending, elongated oxide inclusions in close proximity to portions which are free of Cu<sub>2</sub>O, and a typical fracture showing a reddishbrown core surrounded by a lustrous outer zone.

A. R. P.

Recovery [of metals] from the results of coldwork. G. TAMMANN (Z. Metallk., 1932, 24, 220-222). -The hardness, thermoelectric power, and electrical resistance of cold-worked Cu, Ag, and Au return to their original vals. on annealing at < the recrystallising point, and all properties change within the same temp. interval. With Al the resistance and thermoelectric power remain unchanged during low-temp. annealing, whereas the hardness falls rapidly at 200-350°. Recovery of the thermoelectric power, electrical resistance, and hardness of Fe takes place within the ranges 100-350°, 100-500°, and 500-700°, respectively; the corresponding ranges for Ni are 100-350°, 100-750°, and 600-700°. The resistance of cold-worked Pt has completely returned to normal at 300° and that of Pd at 400°, whereas the hardness begins to fall at 600° and

400°, respectively, and is normal at  $> 1200^{\circ}$  and  $1000^{\circ}$ , respectively; recrystallisation of Pt commences at 800° and of Pd at 500°. Hence it appears that the mechanism of recovery from the consequences of cold-work is similar for metals in the same group of the periodic system.

A. R. P.

High-quality hard copper alloys. K. EWIG-DAUES (Z. Metallk., 1932, 24, 214—219).—Methods of melting, deoxidising, casting, heat-treating, and mechanically working high-quality Cu alloys with Sn, Al, and Zn are described briefly. A. R. P.

Tensile properties of copper at low temperature. M.KURODA (Sci. Papers Inst. Phys. Chem. Res., Tokyo, 1932, **19**, 163—167).—Stress-strain relations for Cu over the temp. range 0° to —180° indicate increase in limit of proportionality and tensile strength with fall in temp. No yield point was observed at any temp. (cf. Schoenmaker, B., 1932, 774). It is concluded that the phenomenon of yield is peculiar to Fe and steel and results from slip interference in the grain boundaries, due solely to the duplex structure and not to the low mobility of atoms in the lattice. E. H. B.

Metallurgical considerations in the preparation of nickel-silver castings. E. R. THEWS (Chem.-Ztg., 1932, 56, 961-963).-Addition of Fe to Ni-silver alloys improves the hardness, strength, and elasticity and in low-Ni alloys 1-1.5% Fe has the same whitening effect as 2-4% Ni; the max. permissible Fe content increases with an increase in the Ni and a decrease in the Zn content. Addition of Sn tends to embrittle the alloys, but improves the soundness and makes them more easily polished; Pb improves the casting properties and the ease of cutting; Al up to 1.5% makes the alloys whiter, increases the strength, and prevents formation of blowholes in casting, and W increases the resistance, but has a deleterious effect on the mechanical properties. In making the alloys, the Ni should be added to molten brass of the correct composition ; Al, Mg, Mn, or preferably P are the most satisfactory deoxidising agents, and a casting temp. of  $150-200^{\circ}$  above the f.p. is recommended. The composition of > 100 commercial Ni-silvers is tabulated. A. R. P.

Continuous refining of lead bullion. G. K. WILLIAMS (Chem. Eng. Min. Rev., 1932, 25, 8—12).— In a new refinery at Port Pirie, S. Australia, intermittent batch-treatment has been replaced by a continuous process which follows a similar routine in which the bullion is refined progressively firstly for As and Sb, then for Cu and Au, then for Ag, and finally for Zn. The space occupied by the continuous plant is only 48% of that of the old plant and a substantial increase in output is possible. C. A. K.

Lead in gunmetal melts. B. P. SELIVANOV and A. I. SHULTIN (Soobshch. Vsesoy. Inst. Met., 1931, No. 3-4, 79-80).—The structural distribution of Pb affects the mechanical properties. > 8-9% Pb should be avoided. Treatment at 600-700° for 4-6 hr. is recommended. CH. ABS.

Magnesium and its alloys. R. CAZAUD (Aciers Spéc., 1931, 6, 504-513; Chem. Zentr., 1932, ii, 602).—A discussion of the suitability of the alloys for the construction of ships and aircraft. A. A. E. MBV process of surface protection of aluminium and its alloys. ECKERT (Metallwaren-Ind., 1932, 30, 81-83; Chem. Zentr., 1932, i, 1822).—The article is treated with a solution of Na<sub>2</sub>CO<sub>3</sub> (5%) and Na<sub>2</sub>CrO<sub>4</sub> (1.5%) at 90—100°; if 0.25% of NaOH is also present, 20 min. at 70° is sufficient. The film, apparently a mixture of Cr and Al oxides, is resistant to H<sub>2</sub>O, seawater, salt solutions, and EtOH, but is attacked by acids and alkalis. A. A. E.

Bullard-Dunn process of cleaning (metals). F. T. TAYLOR (Month. Rev. Amer. Electroplaters' Soc., 1931, 18, No. 8, 17—22).—In an electrolytic process the metal is cleaned, and a thin film of Pb is deposited on the cleaned surfaces. CH. ABS.

Aqueous electrolysis in metallurgy. G. EGER (Z. Elektrochem., 1932, 38, 942-964).—A review.

Protective properties of colloids and their behaviour in the electrolytic deposition of metals. P. A. JACQUET (Nature, 1932, 130, 812—813).—Experiments with serum-albumin, gum arabic, gum tragacanth, and dextrin (concns. 1—5 mg. per litre) show a pronounced parallelism between protective action, as measured by the Au no., and the action on the electrolytic deposit. Gelatin and serum-albumin modify considerably the mechanical stress in the Cu deposited, whilst less protective colloids, *e.g.*, gum arabic, have a smaller effect. Dextrin with its high Au no. has no effect in the concn. range studied. The action of the colloids on the Cu must be traced back to an adsorption process. L. S. T.

Electrodeposition of alloys. L. E. STOUT (Washington Univ. Stud. Sci. Tech., 1932, [ii], No. 6, 9-37).--In the Cu-Fe system the composition of the deposit depends on the bath composition, the % Fe in the deposit is independent of c.d., temp., and tartrate content, and the presence of free CN' prevents the deposition of Fe; Cu-Fe alloys of good physical form may be obtained from a cyanide bath in presence of  $K_2C_4H_4O_6$ . CH. ABS.

Use of the compensating colorimeter in the (nickel) electroplating industry. T. J. ZAK (Month. Rev. Amer. Electroplaters' Soc., 1931, 18, No. 9, 15–23).—The Bausch and Lomb compensating colorimeter is used for determining the Ni content and  $p_{\rm H}$  of plating solutions. Deviations of the colorimetric and quinhydrone  $p_{\rm H}$  from H electrode  $p_{\rm H}$  in colourless buffer solutions are also given. CH. ABS.

Electrodeposition of chromium from aqueous chromic acid containing hydrofluoric acid. E. MüLLER and O. Rossow (Z. Elektrochem., 1932, 38, 883–884; cf. A., 1931, 173).—The influence of Na<sub>2</sub>SO<sub>4</sub> and KF on the electrodeposition on Cu of Cr from aq.  $CrO_3$  has been compared. They are approx. equally efficient; more lustrous deposits are obtained with KF, but the deposit tends to be lumpy and the Pb anode to become covered with PbF<sub>2</sub>, with increase in the resistance. D. R. D.

Use of diaphragms in industrial electrolysis of metals. B. BOGITCH (Compt. rend., 1938, 195, 779— 781).—With an impermeable diaphragm when electrolysing Ni in HCl solution with anodes containing 10% of impurity (Fe and Cu) the amount of impurity passing into the catholyte depends mainly on the difference in concn. of electrolyte on either side of the diaphragm; provided that this is  $\gg 10$  g. per litre for concns. of 80—90 g., Ni of 0.01-0.02% of impurity is obtainable. About 20% more energy is consumed, which, however, can be used for heating. C. A. S.

Metallurgy of some variables in arc-welding. F. R. HENSEL and E. I. LARSEN (Met. & Alloys, 1932, 3, 250-254).—With increase in the arc voltage (13-30 volts) N increases and Mn and Si decrease in the weld. Welding with a.c. causes a marked increase in C and Mn, whilst d.c. induces a 300% increase in N absorption, probably due to the short arc used in a.c. welding. Gases drawn from approx. 0.5 in. from the arc contained about 14% O<sub>2</sub>, and when the weld was shielded suitably, the O<sub>2</sub> content was less with increased CO<sub>2</sub> CH<sub>4</sub>, and C<sub>2</sub>H<sub>6</sub>. Micrographs of welded metal were always abnormal for metal carburised according to the McQuaid-Ehn test, as were also those of specimens of pure Fe melted under H<sub>2</sub>. C. A. K.

Blast-furnace linings.—See VIII. Rubber in industry.—See XIV.

See also A., Dec., 1192, Non-conducting modifications of metals. 1196, Systems Au–Cu and Ag–Cu–P. Magnetic alloys. 1200, Wetting of [metallic] powders. 1208—9, Passivity of metals. 1213, Ni catalysts of hydrogenation. 1215, Testing materials by  $\gamma$ -rays. 1216, Following recrystallisation of Ag. 1224, Separation of Rh from Ir.

#### PATENTS

[Reduction] treatment of iron ores and the like. J. W. HORNSEY, Assr. to GRANULAR IRON CO. (U.S.P. 1,841,602, 19.1.32. Appl., 28.1.22).—A mixture of coarsely crushed ore and solid carbonaceous fuel is heated at 850° by the combustion of the fuel with two thirds the air required for its complete conversion into  $CO_2$ , and the reduced product, after cooling in a nonoxidising atm., is separated magnetically. The sponge Fe is then agglomerated into sintered lumps by rotating it at a high temp. in a cylindrical furnace in which a reducing atm. is maintained. A. R. P.

Production of pig iron and iron castings having a fine graphite structure. A. WIRTZ (B.P. 382,685, 17.8.31. Ger., 11.4.31).—Pig Fe is tapped directly from the blast furnace into a gas-heated furnace in which it is kept at 1400—1500° until a test casting shows a finegrained structure; the charge is then cast as usual. A. R. P.

Production of steel. G. A. CODE, Assr. to E. E. STEVENS, I. S. PITMAN, M. R. CODE, C. E. OVENSHIRE, and W. C. BAKER (U.S.P. 1,850,381, 22.3.32. Appl., 14.1.29).—Heating an Fe ore in an electric furnace with a flux and 1—1.5% of a polycarboxylic acid, *e.g.*, mucic acid, is claimed to result in the direct production of steel. A. R. P.

**Production of metal [e.g., steel] castings.** R. W. BAILEY, and ASSOCIATED ELECTRICAL INDUSTRIES, LTD. (B.P. 380,447, 13.6.31).—Before or during the casting of the metal a mixture of readily fusible salts is introduced into the mould so that the fused salts will enter the

space formed between the mould and the casting by the contraction of the latter. A suitable salt mixture (m.p. 530°) consists of CaCl<sub>2</sub> 20, BaCl<sub>2</sub> 44, KCl 24, and NaCl 12%. A. R. P.

Cementation of iron and steel and their alloys. DEUTS. GOLD- U. SILBER-SCHEIDEANSTALT VORM. ROESS-LER (B.P. 379,752 and 379,763—4, 5.6.31. Ger., 7.6.30).—To overcome the retarding effect of alkali carbonates (formed during the operation of a cyanide cementation bath) on the efficiency of the bath in the cementation of Fe and steel, substances are added which convert the alkali cyanide into a more active and less stable cyanide, e.g., (A) SrCl<sub>2</sub> or MgCl<sub>2</sub>, (B) BaCl<sub>2</sub>, or (c) BaCl<sub>2</sub> or SrCl<sub>2</sub>, together with BaO or BaCO<sub>3</sub> to regulate the rate of decomp. of the cyanide at the starting up of a new bath. A. R. P.

Bronzing of articles and parts made of iron, steel, and their alloys. B. GUERINI (B.P. 383,567, 23.5.32. It., 23.5.31).—The articles are pickled in 5—10% HCl, then in 10% HF, washed, and immersed for 20—60 min. in a solution obtained by boiling trinitrotoluene or -phenol (2 pts.) and PbO<sub>2</sub> (0.8 pt.) with NaOH (58 pts.) and aq. NH<sub>3</sub> (2 pts., d 0.88) in H<sub>2</sub>O (100 pts.) and adding, after cooling, HNO<sub>3</sub> (2.95 pts.). The treated articles are washed and heated in a vegetable oil to remove all traces of alkali. A. R. P.

Iron alloy resistant to corrosion. Soc. ANON. DES HAUTS-FOURNEAUX FORGES & ACIERIES DE POMPEY (B.P. 383,500, 29.2.32. Fr., 13.11.31).—The alloy contains < 0.05% C, < 0.25% Mn, and < 0.02% Si, P, and S, together with 0.2-0.5% Cu, 0.01-0.5% W, and 0-0.5% Cr; it is produced by adding the Cu to the molten metal before oxidising the C, Si, Mn, P, and S under a CaO-rich slag, and the W and Cr after deoxidation of the refined alloy. A. R. P.

Acid-resisting metal [iron] alloys. J. J. V. ARMSTRONG (B.P. 383,364, 1.10.31).—The alloys consist of Fe with 7—25% Ni, 2—30% Cr, 0.1—5% Ta, 0.1—4.5% Mo, and 0.1—2% V, with  $\gg 1\%$  C. Part of the Ta may be replaced by Nb and part or all of the Mo by W. A. R. P.

Heat-, rust-, and acid-resisting ferrous alloy. P. A. E. ARMSTRONG (U.S.P. 1,850,953, 22.3.32. Appl., 19.6.25).—An alloy for steel valves for internal-combustion engines comprises Fe with  $\gg 1\%$  Si, 1—20 (9) % Cr, and 1.5—4.5 (3)% Al. A. R. P.

[High-sulphur] iron and steel alloys. F. KRUPP A.-G. (B.P. 381,248, 10.7.31. Ger., 25.7.30).—Fe alloys with < 0.45% C and 0.12-0.5% S are rendered readily workable by addition of  $\gg 1\%$  Mn and 0.1-25%Cr. The alloys may contain  $\gg 0.5\%$  P and  $\gg 1\%$  Si, and some (< 5%) of the Cr may be replaced by one or more of the elements Al, Ti, V, and Cu. Up to 10% of Ni, W, and Mo alone or together may also be present. A. R. P.

Iron-nickel alloys. INTERNAT. GEN. ELECTRIC Co., INC., Assees. of ALLGEM. ELEKTRICITÄTS-GES. (B.P. 382,336, 6.8.31. Ger., 27.8.30).—Alloys of high initial permeability contain 50—60% Fe and 50—40% Ni with 3-4% Al. The best properties are obtained by annealing at 900—1100°, chilling, rolling to 5—30 (25)% reduction, and tempering at 480—650°. [Stat. ref.] A. R. P.

Nickel-iron alloy springs. R. STRAUMANN (B.P. 383,174, 12.4.32. Ger., 18.4.31).—Heat-compensated watch and clock springs are made of an alloy of Fe with 25-40 (27)% Ni,  $0\cdot 1-3 (1)\%$  Be, and 5-30% W, Mo, Ta, or V, or mixtures of two or more of these elements (8% W). A. R. P.

Magnetic material [nickel-iron alloy] and magnet core. J. W. ANDREWS and R. GILLIS, ASSTS. to WESTERN ELECTRIC CO., INC. (U.S.P. 1,845,113, 16.2.32. Appl., 31.12.27).—An 80:20 Ni-Fe alloy melted under oxidising conditions is powdered and the powder annealed at 925°. The particles are then insulated by coating them with a mixture of  $\text{CrO}_3$  (5.5), talc (5), and water-glass (4.5 pts.) containing 50% of solids and a  $\text{SiO}_2$ : Na<sub>2</sub>O ratio of 1.58:1. After forming the insulated powder into cores under 100 tons per sq. in. the cores are annealed at 500° to produce high magnetic stability. A. R. P.

Manufacture of magnetic structures [nickel-iron alloy dust cores]. R. GILLIS, ASST. to WESTERN ELECTRIC CO., INC. (U.S.P. 1,845,144, 16.2.32. Appl., 8.11.28).—The insulated alloy dust is pressed into a core under 100 tons per sq. in. and annealed in an airtight container at  $T^{\circ}$ , where  $T = -0.382N^2 + 50N - 1056$ and N is the % Ni in the alloy. For the 74% Ni alloy  $T = 550^{\circ}$ . A. R. P.

Laminated core structure. R. M. PFALZGRAFF, Assr. to GEN. ELECTRIC Co. (U.S.P. 1,850,726, 22.3.32. Appl., 20.5.31).—The core is built up of thin steel sheets coated with a film of basic  $FePO_4$  which acts as an insulator. A. R. P.

Manufacture of nickel steels. ELECTRO METALLURG. Co., Assees. of F. M. BECKET (B.P. 382,754, 2.11.31. U.S., 18.11.30).—The Ni is introduced into the steel charge, after decarbonising, by addition of a Ni–Si alloy formed by reducing a mixture of Ni matte and  $SiO_2$ with C in the electric furnace. In making Ni–Cr steels a mixture of chromite, Ni matte, and a Fe–Cr–Si alloy is charged directly into the decarbonised steel bath under a highly basic slag. A. R. P.

Manufacture of metallic alloys [18:8 chromiumnickel steel]. R. S. READ, Assr. to CRUCIBLE STEEL Co. of AMERICA (U.S.P. 1,844,598, 9.2.32. Appl., 11.8.30).—A mixture of low-C steel scrap and sufficient manganiferous Fe ore to remove all the C from the charge is built up inside walls made of bundles of steel scrap and placed below the C electrodes of an arc furnace ; the remainder of the charge consisting of the necessary Ni and scrap 18:8 Cr–Ni steel is built up around the outside of these walls and the whole is melted down, tested for C, and refined to the correct degree by the usual additions under a CaO slag which prevents absorption of C from the electrodes. Finally, the required quantity of Fe–Cr alloy is added and the charge teemed and cast in the usual way. A. R. P.

Production of chromium alloys [ferrochromium] low in carbon. T. R. HAGLUND (B.P. 382,796, 11.12.31). —A slag containing 20—40%  $Cr_2O_3$ , <15% SiO<sub>2</sub>, and sufficient CaO to desulphurise the alloy, and having m.p. > 1750°, is heated above 2000° in an electric arc furnace and a mixture of chromite and carbonaceous reducing agent just sufficient for reduction is continuously fed on to the top of the molten slag in such a way that no reduction occurs until it has been substantially dissolved by the slag bath. The ratio  $(Al_2O_3 + Cr_2O_3 + SiO_2): (CaO + MgO)$  in the slag should be > 3:4. A. R. P.

Welding rods [for fusion-deposition of irontungsten carbide alloys]. F. KRUPP A.-G. (B.P. 383,942, 15.8.32. Ger., 19.9.31).—The rod comprises a tube of Fe or an Fe alloy packed with a sintered mixture of WC and Fe with or without Cr, Si, and Mn. For depositing an alloy containing 62% W,  $4\cdot3\%$  C, and  $32\cdot7\%$  Fe the wt. ratio of sheath to core is 1:4 and the core contains  $77\cdot5\%$  W,  $5\cdot5\%$  C, and 16% Fe. Up to 30% Cr or  $Cr_4C_3$ , 5% Si, and 10% Mn may be added to the core material. A. R. P.

Froth flotation concentration of [carbonate] ores. W. TROTTER, ASST. to MINERALS SEPARATION NORTH AMERICAN CORP. (U.S.P. 1,850,991, 22.3.32. Appl., 4.8.26).—Carbonate concentrates from Cu and Pb ores are obtained by flotation, using as promoter > 4 lb. of a xanthate or similar compound per ton of ore. A. R. P.

[Collector for use in the] flotation of ores. A. H. NEV (U.S.P. 1,847,664, 1.3.32. Appl., 2.2.27).—Derivatives of 1-mercaptobenzthiazole, especially the 5-chloro-3-methyl- and 5-ethoxy-compounds, are claimed.

[Collector for use in] concentration of ore, minerals, and the like [by flotation]. J. L. STEVENS, Assr. to RACONITE CHEM. Co. (U.S.P. 1,847,367, 1.3.32. Appl., 8.4.29).—The reaction products of SCl<sub>2</sub> and alkali xanthates are claimed. They are heavy oils of the general formula (RO  $\cdot$ CS<sub>2</sub>)<sub>2</sub>S. A. R. P.

Sintering of ore fines, flue dust, sulphide or other concentrates. T. W. CAVERS and G. M. LEE (U.S.P. 1,847,596, 1.3.32. Appl., 26.11.28).—SiO<sub>2</sub> or CaO is added to the material so that the ratio  $SiO_2$ : (CaO + MgO) = 2:1, and the mixture is sintered at a temp. at which there is no reaction between the Fe<sub>2</sub>O<sub>3</sub> and SiO<sub>2</sub>. A. R. P.

Continuous annealing furnace. O. JUNKER GES.M.B.H. (B.P. 383,899, 21.5.32. Ger., 18.6.31).---The sag of strip or wire passing through a furnace is regulated by a tension feeler which actuates means to alter the tension on the wire. C. A. K.

Centrifugal metal-casting process. H. GONSCHEW-SKI (B.P. 380,576, 24.8.31. Ger., 15.9.30).—The use of  $H_2O$ -cooled Cu, Ag, or Al moulds having a smooth outer wall free from ribs or fins is claimed. A. R. P.

Composition for use in metallurgical operations. A. H. DAVIES (U.S.P. 1,848,323, 8.3.32. Appl., 4.5.28. Renewed 26.5.31).—A mixture of  $KClO_3$  (12—20),  $Na_2B_4O_7$  (2—8), NaF (2—8), and  $MnO_2$  (1—4 pts.) is claimed for use in scavenging molten metals, particularly Fe and its alloys. A. R. P.

Apparatus for heat-treating metallic articles. L. C. ZIMMERMAN, Assr. to WESTERN ELECTRIC Co., INC. (U.S.P. 1,850,576, 22.3.32. Appl., 30.6.26).—A sherardising drum which can be both rotated and tilted is housed so that an induced air current may cool the whole surface of the drum before opening. C. A. K.

Brittsh Chemical Abstracts-B.

Hot-metal mixer. J. S. MOHR and W. G. BORN, Assrs. to J. MOHR & SONS (U.S.P. 1,850,330, 22.3.32. Appl., 8.7.31).—A molten-metal container (cylindrical) with a flattened top and having a pouring spout is mounted on rocking mechanism. C. A. K.

Flux for brazing and welding. I. T. Hook, Assr. to AMER. BRASS Co. (U.S.P. 1,848,884, 8.3.32. Appl., 11,4.29).—A flux consisting of Na salts mixed with 5—25% of finely-divided Si is claimed. A. R. P.

Copper-beryllium-manganese alloy. SIEMENS & HALSKE A.-G. (B.P. 380,570, 17.8.31. Ger., 24.12.30).— The alloy contains 0.5—20% Be and 0.5—25% Mn with up to 10% of one or more of the elements Ti, Cr, Fe, Ni, Co, Si, Mg, Li, Zn, Cd, Al, Sn, P. The heat-treatment comprises quenching from 500—800° and tempering at 250—500°. A. R. P.

Bright annealing of brass and other alloys containing zinc or cadmium. ELECTRIC RESISTANCE FURNACE CO., LTD., and A. G. E. ROBIETTE (B.P. 383,762, 11,12.31).—The atm. in the annealing furnace is obtained by passing an inert gas over Zn, Cd, or turnings of the same alloy as that being annealed and heated at the same temp. as the annealing furnace, so that the partial pressure of the Zn or Cd in the gas is the same as that from the alloy. A. R. P.

[Zinc] alloy. H. F. SCHROEDER and C. D. RUSSELL, Assrs. to RUSELITE CORP. (U.S.P. 1,850,419, 22.3.32. Appl., 8.10.30).—The alloy contains 90% Zn, 5% Cu, 3.5% Al, 0.5% Cr, 0.12% Mo, and 0.15% Ta. A. R. P.

Improvement of nickel-alkaline-earth metal alloys. SIEMENS & HALSKE A.-G. (B.P. 382,573, 27.8,31. Ger., 21.10.30).—Alloys of Ni with  $\geq 10\%$  C and  $\geq 10\%$ of an alkaline-earth metal, e.g., Mg, are quenched from 750—1350° and aged at 380—600° (500°). The alloys may contain up to 45% (in all) of one or more of the metals Al, Cr, Co, Fe, Cu, Mn, Si, Ta, Ti, V, W, B, Ce, Mo, Zn, and Sn. A. R. P.

Cleaning and polishing preparation for silver and the like. A. ROSENBERG (B.P. 383,726, 23.10.31). —A mixture of china clay or kieselguhr 46, CaCO<sub>3</sub> 46,  $(NH_4)_2SO_4$  5, KAg(CN)<sub>2</sub> 1.5, and Mg powder 1.5% is claimed. Salicylic acid, BZOH, or K H tartrate may wholly or partly replace the  $(NH_4)_2SO_4$ . A. R. P.

Manufacture of articles from the noble metals and their alloys. W. C. HERAEUS GES.M.B.H. (B.P. 383,681, 9.9.32. Ger., 13.9.30).—The articles, either in the finished or semi-finished state, are subjected to a heat-treatment in contact with a solid or gaseous element or compound which diffuses into the metal and increases its hardness or strength, e.g.,  $H_2$  for Pd alloys, B or Si or volatile compounds thereof for Au and Pt alloys. [Stat. ref.] A. R. P.

Manufacture of [enamelled gold alloy] dental crowns and the like and materials therefor. R. HEJCMANN (B.P. 379,485, 28.7.31. Hung., 28.7.30). --Claim is made for a dental crown the front portion,

A. R. P.

at least, of which comprises an alloy of Au (100), Ag (15), Cu (10), and Pt (12.5 pts.) coated with an enamel made by mixing 10% of a white opacifier and 5% of white clay with the product obtained by sintering at 1000° a mixture of SiO<sub>2</sub> (6.5), Na<sub>2</sub>B<sub>4</sub>O<sub>7</sub> (2), Na<sub>2</sub>CO<sub>3</sub> (1.65), NaNO<sub>3</sub> (0.3), Na<sub>3</sub>AlF<sub>6</sub> (1.2), and SnO<sub>2</sub> (0.5 pts.). A, R, P.

Treatment of precious metal-containing materials. DEUTS. GOLD- U. SILBER-SCHEIDEANSTALT VORM. ROESSLER (B.P. 382,884 and 382,901, [A] 29.4.32, [B] 24.5.32. Ger., [A] 4.5.31, [B] 25.7.31).-(A) Alloys containing a high proportion of Ag and Cu with relatively little Au and Pt metals are electrolysed in 4% aq. Cu(NO<sub>3</sub>)<sub>2</sub> containing 4% NaNO<sub>3</sub> to obtain a Pt-Au sludge at the anode and Ag-Cu crystals at the cathode. The sludge is boiled with HNO3 to remove Ag and the residue of Au and Pt cast into anodes for electrolytic refining of the Au. The cathode crystals are roasted and leached with H<sub>2</sub>SO<sub>4</sub> to remove Cu, leaving a residue containing > 98% Ag. (B) Scrap containing Au, Ag, and Pt metals is melted and blown with air preferably enriched in O<sub>2</sub> to oxidise the base metals and convert the whole into a finely-divided form from which the base-metal oxides, e.g., CuO, ZnO, and NiO, are removed by leaching with  $H_2SO_4$ , leaving a product which is further refined by electrolysis or by cupellation and parting. The molten scrap may also be treated with 5-7% S and granulated; the brittle granules are then crushed, roasted, and leached. A. R. P.

[Platinum alloy] catalyst [for ammonia oxidation]. C. W. DAVIS, ASST. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,850,316, 22.3.32. Appl., 14.3.29).— Gauzes or perforated plates of an alloy of Pt with 2—50% Rh are claimed. A. R. P.

[Platinum-iridium] alloy. R. G. WALTENBERG, H. E. HOLBROOK, and B. BRENNER, ASSTS. to H. A. WILSON CO. (U.S.P. 1,850,819, 22.3.32. Appl., 6.3.31).— An alloy of 70—90% Ir with one or more of the metals Pt, Pd, Rh, or Ru is claimed. The 80:20 Ir-Pt alloy is especially suitable for electrical contact points.

A. R. P. [Ruthenium] alloy. R. G. WALTENBERG, H. E. HOLBROOK, and B. BRENNER (U.S.P. 1,850,818, 22.3.32. Appl., 6.3.31).—An alloy of 50—90 (70)% Ru with Pt, Ir, or Rh is claimed, especially for electrical contact points. A. R. P.

[Precious metal] thermocouples. G. SIEBERT G.M.B.H. (B.P. 381,137, 14.6.32. Ger., 20.6.31).— Couples consisting of Pt or a Pt alloy wire and a wire containing 3—15 (10)% Re together with Pt and/or another metal of the Pt group are claimed. A. R. P.

Treatment of argentiferous manganese ores. J. L. BARBER. From F. H. SHARPE (B.P. 380,653, 27.11.31).—The finely-ground ore in a pulp ratio of 4-5:1 is treated with SO<sub>2</sub>, which dissolves the MnO<sub>2</sub> as MnSO<sub>4</sub> and MnS<sub>2</sub>O<sub>6</sub>. The residue is agitated with 6% aq. CaS<sub>2</sub>O<sub>3</sub> to extract the Ag and Cu and the solution is treated with the solution obtained by boiling aq. Ca(OH)<sub>2</sub> with S. The pptd. Ag<sub>2</sub>S and CuS are collected and roasted, the SO<sub>2</sub> being passed into the CaS<sub>2</sub>O<sub>3</sub> filtrate to convert excess of CaS into CaS<sub>2</sub>O<sub>3</sub> and regenerate the solution for further use. The Mn solution is evapBritish Chemical Abstracts-

orated and the residue heated to convert the  $MnS_2O_6$ into  $MnSO_4$  with the liberation of  $SO_2$ , which is used again in the first stage. A. R. P.

[Tungsten-carbon] thermocouple. E. HERZOG and H. L. WATSON, ASSIS. to GEN. ELECTRIC CO. (U.S.P. 1,849,832, 15.3.32. Appl., 20.4.27).—The graphite and W members of the couple are heated separately at 2000° for 2 hr. prior to assembly, to effect complete graphitisation in the first case and develop a stable, coarse-cryst. structure in the second. A. R. P.

Manufacture of a composition of matter [hard alloys]. P. M. MCKENNA (B.P. 383,387, 27.10.31. U.S., 28.10.30).—An intimate mixture of 30—70 at.-% W and/or Mo and 70—30 at.-% of one or more carbides of the elements V, Nb, and Ta is welded to form a homogeneous product by heating it to 2000° by the induction of eddy currents in the compressed mixture. A. R. P.

[Tungsten] metal alloys for electrical contacts. G. N. SEGER and J. A. WEIGER, Assrs. to P. R. MALLORY & Co., INC. (U.S.P. 1,848,437-8, 8.3.32. Appl., [A] 26.8.25, [B] 27.3.26).—(A) A mixture of W (72) and C (0.5) is pressed into shape and sintered in  $H_2$  at 1000° to produce a porous body, which is then heated in contact with Cu (27.5%) until the pores are completely filled with Cu. The product is suitable for making electrodes for spot-welding. (B) Mo or Ta may replace the W, and Ag, Au, Pt, or Pd the Cu. A. R. P.

Composition of matter [tungsten-tantalum carbide alloy]. P. M. McKENNA, Assr. to VANADIUM ALLOYS STEEL CO. (U.S.P. 1,848,899, 8.3.32. Appl., 28.10.30).—Claim is made for sintered intimate mixtures of W and/or Mo with TaC and/or NbC, particularly the 50 : 50 W-TaC alloy. A. R. P.

Production of a hard metal [alloy containing titanium carbide]. DEUTS. EDELSTAHLWERKE A.-G., Assees. of SIEMENS & HALSKE A.-G. (B.P. 383,327, 18.8.31. Ger., 21.8.30).—Claim is made for a sintered alloy containing > 50% TiC embedded in or cemented with Fe, Co, or Ni, or alloys of these metals with Cr, Mo, or W. [Stat. ref.] A. R. P.

Manufacture of a [zirconium-uranium] alloy. J. B. GRENAGLE, Assr. to W. W. VARNEY (U.S.P. 1,845,145, 16.2.32. Appl., 21.10.29).—A mixture of  $ZrO_2$  and  $U_3O_8$  is reduced with C in an arc furnace and the resulting alloy is refined with  $MnO_2$ . The product is suitable for making cutting alloys and corrosionresistant alloys with Fe. A. R. P.

Production of beryllium alloys of the heavy metals. I. G. FARBENIND. A.-G. (B.P. 383,200, 12.5.32. Ger., 28.5.31).—Briquettes of BeO and Mg or Mg-Al alloy filings are introduced into molten Cu at 1300° or molten Fe at 1600°, whereby Be enters the Cu or Fe and the excess Mg is distilled off. A. R. P.

Preparation of moulding sands for easily oxidisable metals such as magnesium. G. MICHEL, Assr. to Soc. "LE MAGNESIUM INDUSTRIEL" (U.S.P. 1,849,767, 15.3.32. Appl., 24.3.28. Fr., 5.7.27).—The sand is mixed with small quantities of graphite and  $C_{10}H_8$  and the baked mould is dressed with a suspension of graphite in aq.  $NH_3$  or  $(NH_4)_2B_2O_7$ .  $NH_4$  salts may also be mixed with the sand to improve the plasticity. A. R. P.

Manufacture of magnesium. G. GIRE and R. FOUQUET (B.P. 382,899, 20.5.32. Fr., 21.5.31).—An intimate mixture of MgO and Si, Fe-Si, or Mg<sub>2</sub>Si is heated at 1200—1450° in vac., whereby pure Mg sublimes. A. R. P.

Magnesium alloys for production of castings in permanent moulds. I. G. FARBENIND. A.-G. (B.P. 382,420, 23.10.31. Ger., 11.11.30).—Chill- and diecasting of Mg alloys with  $7 \cdot 5$ —10 (10)% Al and 1—2 (1)% Zn are claimed. [Stat. ref.] A. R. P.

Magnesium-base alloys. AMER. MAGNESIUM CORP., Assees. of R. T. WOOD and H. H. BLOCK (B.P. 380,669, 15.12.31. U.S., 6.8.31).—Mg alloys with a high resistance to corrosion contain 0.1—15 (6)% Sn, 0.1—5 (1)% Zn, and 0.1—20 (1)% Cd; one or more of the metals Pb (0.1—10%), Mn (0.1—5%), and Hg (0.1—0.5%) may also be added. A. R. P.

Modifying aluminium alloys containing silicon. LIGHTALLOYS, LTD., Assees. of A. PACZ (B.P. 380,577, 24.8.31. Ger., 23.8.30).—Alloys of Al with 5—30 (12)% Si are melted under a flux comprising a mixture of Na<sub>2</sub>CO<sub>2</sub> and a fluoride or double fluoride which itself does not produce modification, e.g., CaF<sub>2</sub>, Na<sub>2</sub>SiF<sub>6</sub>, or Na<sub>3</sub>AlF<sub>6</sub>. Up to 40% of a 1:1—3:2 KCl: NaCl mixture may be added to lower the m.p. of the flux, and further improvement of the alloy may be effected by adding  $0\cdot1$ — $0\cdot3\%$  Na through the molten flux and by subsequent heat-treatment of the castings. A. R. P.

Modifying aluminium and alloys consisting mainly or partly of aluminium without any added silicon. A. PACZ (B.P. 382,691, 24.8.31. Ger., 23.8.30). —The alloys are melted under a flux containing a fluoride, other than an alkali fluoride, an alkali carbonate, e.g.,  $Na_2CO_3$ , and a mixture of alkali chlorides, e.g., 60:40 KCl-NaCl. The alloying constituents in the resulting casting are in a highly dispersed state. A. R. P.

Aluminium-silicon alloys. R. S. ARCHER and L. W. KEMPF, Assrs. to ALUMINUM CO. OF AMERICA (U.S.P. 1,848,816, 8.3.32. Appl., 23.12.30).—The alloys contain  $2\cdot5$ —14 (10—14)% Si,  $0\cdot1$ — $0\cdot5$ % Mg,  $0\cdot1$ —  $1\cdot5$ % Cu, and  $< 0\cdot4$ % Fe. The elongation of the alloys is markedly increased by reducing the Fe content to a min. A. R. P.

(A) Treatment of aluminium-silicon alloys. (B) Modifying aluminium alloys containing silicon.
A. PACZ, ASST. to ALUMINUM CO. OF AMERICA (U.S.P. 1,848,797-8, 8.3.32. Appl., 17.8.31. [A] Austr., 23.12.30, [B] Ger., 20.11.30).-(A) Al alloys containing 3-35% Si are modified by melting them under a salt flux and introducing an alkali metal through the flux.
(B) The flux used has an acid reaction ; e.g., it consists of, or contains, B<sub>2</sub>O<sub>3</sub>, a fluosilicate, or a bifluoride.

(A) Copper-silicon-zinc alloys. (B) Coppersilicon-zinc-aluminium alloys. L. P. WEBERT, Assr. to AMER. BRASS Co. (U.S.P. 1,848,857–8, 8.3.32. Appl., 15.1.30).—The alloys comprise Cu with (A)  $1-4\cdot5\%$  Si, 1-15% Zn,  $0\cdot5-4\%$  Sn, and  $0\cdot1-0\cdot5\%$  71,

Mn, or (B) 1-4.5% Si, 1-10% Zn, 1-6% Al, and 0.1-1.5% Mn. A. R. P.

Manufacture of shaped articles from masses containing silicon. J. Y. JOHNSON. From I. G. FARBENIND, A.-G. (B.P. 382,295, 15.7.31).—A mixture of 60% of commercial Si powder (90% Si), 20% of clay, 15% of NaKSiO<sub>3</sub>, and 5% of a 1 : 1 KCl-NaCl mixture is made into a plastic mass with H<sub>2</sub>O, pressed into shape, dried, and fired at 900–950° for 3 hr. The product is then shaped as desired and finally hardened at 1200– 1250°. A. R. P.

Hardening of aluminium alloys. H. C. HALL (B.P. 382,422, 24.10.31).—Alloys capable of pptn.hardening are quenched from 480—540° and aged in an agitated oil-bath at 110—180°. A. R. P.

[Flux for] autogenous welding [of aluminium alloys]. J. W. MEADOWCROFT, Assr. to E. G. BUDD MANUFG. Co. (U.S.P. 1,845,029, 16.2.32. Appl., 12.1.24). —The filler rod is coated with a mixture of  $K_2CO_3$  3.0, KCl 3.7, LiCl 6.9,  $K_2SO_4$  7.2,  $Na_2B_4O_7$  20.0,  $H_3BO_3$ 21.0, and  $Na_2CO_3$  38.2%. A. R. P.

Electrodeposition of metals [e.g., iron], and cathodes therefor. K. W. PALMAER (B.P. 382,482, 18.1.32. Swed., 8.5.31).—The cathode consists of amalgamated metal plates to which a const. stream of Hg is supplied on both sides from a perforated pipe running along the top of the cathode. A. R. P.

Anode for iron plating. J. R. CAIN, Assr. to RICHARDSON CO. (U.S.P. 1,848,002, 1.3.32. Appl., 8.3.27).—A fused or sintered mixture of FeS and Fe is claimed for use as an anode in FeCl<sub>2</sub> electrolytes. A. R. P.

Electrodeposition of indium. D. GRAY, Assr. to ONEIDA COMMUNITY, LTD. (U.S.P. 1,849,293, 15.3.32. Appl., 22.11.26. Renewed 5.6.31).—The electrolyte contains 40 g. In per litre as  $InCl_3$  and 50 c.c. of 85% $HCO_2H$  per litre. The chloride solution is treated with aq.  $NH_3$  until a slight turbidity forms before adding the  $HCO_2H$ . Electrolysis is effected at 18—100° with a c.d. of 0.025—2 amp. per sq. in. A. R. P.

Installation for electrical welding of metals. E. BORNAND and H. A. SCHLAEPFER (B.P. 383,859, 1.4.32. Switz., 6.4.31).

Alloy steel apparatus.—See II. Conversion of  $Fe_2P$ . ZnO.—See VII. Metal-melting furnace. Coating metal filaments with salts. Magnetic materials. Electrical contact.—See XI.

#### XI.—ELECTROTECHNICS.

Recent improvements in photoelectric cells. N. R. CAMPBELL (J. Sci. Instr., 1932, 9, 369-373).

Determining [H'] in liquors.—See VI. Magnet steel. Determining  $O_2$  in Fe etc. Cleaning metals. Aq. electrolysis. Electrodeposition of metals and alloys. Arc-welding.—See X. Sterilisation in brewing.—See XVIII.

See also A., Dec., 1192, Non-conducting modifications of metals. 1196, Magnetic alloys. 1213, Electrolysis of fused acetates and propionates.

1215, Testing materials by  $\gamma$ -rays. 1217, Radiochemical methods. 1218, Prep. of active Th ppts. 1260, Prep. of *iso*indolines.

#### PATENTS

Electric induction furnace [for melting scrap metal]. A. E. GREENE (U.S.P. 1,851,575, 29.3.32. Appl., 3.12.28).—A furnace comprising an annular channel of relatively small cross-section communicating with the chamber containing the charge, and forming a closed secondary circuit containing molten metal, together with a primary coil associated with the secondary circuit, whereby a relatively high voltage is induced therein, is claimed. J. S. G. T.

Arrangement in electric induction furnaces without a closed ferromagnetic circuit. ALLMÄNNA SVENSKA ELEKTRISKA AKTIEB. (B.P. 383,058, 10.11.31. Swed., 29.8.31).—A ferromagnetic shell surrounds the furnace winding, and annular ferromagnetic plates are inserted between the turns of the winding in a plane at right angles to the axis of the furnace. J. S. G. T.

Induction furnaces. HERAEUS VACUUMSCHMELZE A.-G., and W. ROHN (B.P. 383,864, 11.4.32. Ger., 15.4.31. Addn. to B.P. 382,002; B., 1933, 25).—Threephase current flows in 3n pancake coils (n > 1) shaped to the hearth of the melting chamber, the coils being wound about axes spaced  $120^{\circ}/n$  apart on the circumference of a circle co-axial with the furnace. J. S. G. T.

Electric evaporators. E. SILTEN (E. SILTEN FABR. CHEM. PHARMAC. PRAEPARATE) and H. HERZOGENRATH (B.P. 383,677, 2.9.31).—Electrodes are arranged in an evaporator vessel closed by a cover and communicating with a surrounding storage vessel having an overflow. H<sub>2</sub>O heated in a condenser connected with the vapour outlet, provided with a valve, is delivered to the storage vessel. J. S. G. T.

Arrangement of [container for] drying animal, vegetable, and mineral raw materials, using electro-osmose and mechanical pressure. K. K. FJELL (B.P. 383,199, 11.5.32).—Narrow vertical notches covered with thin porous material e.g., linen cloth or clay plates, are provided on the inner side of the wall of the container (A), and material to be treated is arranged between two perforated electrodes, preferably coated with porous material, and resting, one under the pressplate and the other on the bottom of A. If desired, Amay be built in sections, J. S. G. T.

Electrolytic apparatus [for electrolysis of molten salts, e.g., magnesium chloride]. (A) L. E. WARD and R. M. HUNTER, (B) H. H. Dow, Assrs. to Dow CHEM. Co. (U.S.P. [A] 1,851,789 and [B] 1,851,817, 29.3.32. Appl., [A] 5.8.27, [B] 10.9.26).—(A) Anodes are arranged between the wall of a vessel (A) containing electrolyte and constituting the principal cathode member, and a supplementary hollow cathode member (B) forming a collecting well (C) for metal liberated by electrolysis, the inner surface of A and the outer surface of B having a downwardly-directed, trough-like projection at their respective active upper ends. Means are provided for passing molten metal from the troughs into C. (B) An axial anode (D), e.g., of C or graphite, and a metal cathode (E) are arranged in spaced relation within a cast-Fe or steel vessel so that electrolyte may circulate freely between D and E while E constitutes a baffle for directing circulation within the vessel. A downwardly-opening, trough-like member, sealed by electrolyte and having an opening for removal of metal collected therein, is arranged above E. J. S. G. T.

[Electrochemical] process of recording electric impulses. M. VOLMER (U.S.P. 1,851,298, 29.3.32. Appl., 7.7.30. Ger., 6.7.29).—Metal, e.g., Ag, electrodeposited from a solution, e.g., aq. AgNO<sub>3</sub>, impregnating a paper or other surface, using electrodes which leave no trace of themselves on the surface, is employed as a catalyst to effect further deposition of the metal.

J. S. G. T.

Coating metal bodies [radio-valve filaments] with one or more alkaline-earth carbonates. VEREIN. GLÜHLAMPEN U. ELEKTRICITÄTS A.-G. (B.P. 381,486, 30.3.32. Ger., 22.4.31).—The filaments or other bodies are subjected to a.c. electrolysis in solutions of alkaline-earth salts of org. acids containing an alkalineearth hydroxide. *E.g.*, the electrolyte may contain 30 g. of  $(HCO_2)_2Ba$  and 2 g. of  $Ba(OH)_2$  per 100 c.c.; it is operated at 60—70° with a.c. at 2—4 volts and 500 cycles. A. R. P.

[Cathode for] thermionic values or electrondischarge tubes. N. V. PHILIPS' GLOEILAMPENFABR. (B.P. 383,502, 4.3.32. Ger., 26.5.31).—A core, e.g., of W, coated with a suspension of material of high electronemitting properties, e.g., BaO, is heated, and Mg and subsequently Ca, Sr, or Ba are vaporised in the tube. J. S. G. T.

Cleaning and degassing electric-discharge tubes. BRIT. THOMSON-HOUSTON CO., LTD. From E. GERMER (B.P. 383,156, 30.3.32).—A discharge is passed through Hg or other vaporisable metal vaporised within the tube. Vapour continuously drawn off from the tube and condensed before passing to the pump is re-delivered to the tube, and finally completely or partly distilled off, before the tube is filled with gas and sealed off.

J. S. G. T.

Electric-discharge tubes. N. V. PHILIPS' GLOEI-LAMPENFABR. (B.P. 383,945, 1.9.32. Holl., 24.11.31).— The tubes are fitted with a mica disc to prevent condensation of vapour, *e.g.*, Na, on a cooler part. J. S. G. T.

Electric-discharge tubes. GEN. ELECTRIC CO., LTD., Assees. of PATENT-TREUHAND GES. F. ELEKTR. GLÜHLAMPEN M.B.H. (B.P. 383,580, 22.6.32. Ger., 8.9.31).—Auxiliary electrodes are arranged inside the tube for facilitating starting. J. S. G. T.

Gas-filled electric-discharge tubes. W. L. W. SCHALLREUTER (B.P. 383,641, 23.11.31).—" Hardening" of the discharge is prevented by continuously exposing, by splashing, the combination of gas with electrode material to a high temp. so that the combination is resolved into its components. J. S. G. T.

Spectral [white light] discharge tube. A. E. JACOBSEN, ASST. to LUMINOUS TUBE LIGHTING CORP. (U.S.P. 1,851,360, 29.3.32. Appl., 25.2.30).—A discharge tube filled with C<sub>2</sub>H<sub>2</sub>, H<sub>2</sub>, and CO<sub>2</sub> is claimed. J. S. G. T. Space-current discharge device. A. A. FREY, Assr. to WESTINGHOUSE ELECTRIC & MANUFG. Co. (U.S.P. 1,851,699, 29.3.32. Appl., 21.12.23).—A Ni coating deposited on a zircon core by heating in Ni(CO)<sub>4</sub>, is heat-treated and, if desired, treated with alkalineearth oxides. J. S. G. T.

Cathode-ray tubes. MARCONI'S WIRELESS TELE-GRAPH CO., LTD., Assees. of V. K. ZWORYKIN and J. C. BATCHELOR (B.P. 383,889, 11.5.32. U.S., 30.6.31).— Parts of the tube are made substantially non-reflective to light emitted, incidentally to the operation of the tube, by other parts of the tube, *e.g.*, a fluorescent screen.

J. S. G. T.

[Preparing plates of] electric accumulators [for storage etc.]. CHLORIDE ELECTRICAL STORAGE Co., LTD. From W. H. CREITZ (B.P. 383,201, 14.5.32).— Unformed plates and wet-treated separators are treated with aq.  $H_2SO_4$ , drained, and sealed in a container.

J. S. G. T.

Electrically removing entrained particles from gas streams. LODGE-COTTRELL, LTD. From RESEARCH CORP. OF NEW YORK (B.P. 383,547, 26.4.32).—Electric fields of high, substantially uniform, and low conen. are established alternately between the discharge and collecting electrode, the latter being maintained at a const. potential, whereby a highly conc. field is established over a small part only of the collecting electrode which is cleaned to prevent sparking.

J. S. G. T.

Manufacture of magnetic materials. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 383,691, 23.9.31).—A fine powder composed of at least two of the metals Co, Ni, Fe, with addition, if desired, of metals of groups IV—VII and/or of Si or Al, is consolidated at 600—1000°. J. S. G. T.

Electrical contact. B. W. JONES and C. F. CAR-PENTER, ASSTS. to GEN. ELECTRIC CO. (U.S.P. 1,849,837, 15.3.32. Appl., 13.9.26).—An alloy of Cu (99%) with Cd (1%) is claimed. A. R. P.

[Protective system for conveyors of vitreous enamelling] electric furnaces. BRIT. THOMSON-HOUSTON CO., LTD., Assees. of R. D. VAN NORDSTRAND (B.P. 383,932, 25.7.32. U.S., 24.7.31).

Electrolytic condensers. MAGNAVOX Co., Assees. of H. J. TVZZER (B.P. 383,225, 28.6.32. U.S., 23.2.32).

Mercury-vapour rectifiers. A.-G. BROWN, BOVERI & Co. (B.P. 383,909, 20.6.32. U.S., 20.6.31).

Luminous electric-discharge tubes. GEN. ELEC-TRIC CO., LTD., Assees. of PATENT-TREUHAND GES. F. ELEKTR. GLÜHLAMPEN M.B.H. (B.P. 383,862, 5.4.32. Ger., 15.5.31).

Metal [mercury] vapour electric-discharge apparatus [rectifier]. F. LUTZ (B.P. 383,289, 8.5.31. Ger., 8.5.30).

Electrical storage batteries. L. FULLER, G. J. A. FULLER, and E. W. SUDLOW (B.P. [A] 383,297 and [B] 383,529, 4.6.31 and 4.2.32, and [C] 383,535, 8.4.32).

[Method of operating] electric-discharge devices. BRIT. THOMSON-HOUSTON CO., LTD., Assees. of J. D. FORNEY (B.P. 384,119, 27.1.32. U.S., 31.1.31). Thermionic valves or electron-discharge tubes [with indirectly heated cathodes]. N. V. PHILIPS' GLOEILAMPENFABR. (B.P. 383,491 and 384,136, [A, B] 17.2.32. Ger., [A] 27.5.31, [B] 1.5.31).

X-Ray installation. C. H. F. Müller A.-G. (B.P. 383,929, 20.7.32. Ger., 24.7.31).

X-Ray devices. BRIT. THOMSON-HOUSTON CO., LTD., Assees, of W. D. COOLIDGE (B.P. 383,356, 24.9.31, U.S., 24.9.30).

**X-Ray apparatus.** BRIT. THOMSON-HOUSTON CO., LTD., Assees. to J. B. WANTZ (B.P. 384,141, 25.2.32, U.S., 28.2.31).

Production of ultra-short-wave radiation, suitable for medical and other purposes. E. E. W. KASSNER (B.P. 383,508, 8.3.32. Ger., 9.3.31).

Cathode ray [photographic] apparatus. BRIT. THOMSON-HOUSTON CO., LID., Assees. of C. A. SABBAH, and P. M. GRAY (B.P. 383,752, 1.12.31. U.S., 1.12.30).

Photometric instruments [for electric incandescence lamps]. BRIT. THOMSON-HOUSTON CO., LTD., Assees. of S. C. HOARE (B.P. 383,597, 18.8.32, U.S., 19.8.31).

Treatment of carbonaceous materials. Cracking of heavy oils.—See II. Paper for capacitors. Recording paper [for radio "pictures"].—See V.  $CS_2$ .—See VII. SiC objects.—See VIII. Insulation materials etc.—See IX. Heat-treating steel. Hardening metals. Coating Fe or steel. Magnetic alloys. Laminated cores. Treating precious metal materials. Alloys for contacts. Ru alloy. Fe-plate. In.—See X.

#### XII.—FATS; OILS; WAXES.

Nature of antioxygens present in natural fats. II. Removal of antioxygens from olive and linseed oils. A. BANKS and T. P. HILDITCH (J.S.C.I., 1932, 51, 411-414 r; cf. B., 1932, 355).-The natural "antioxygens " present in olive and linseed oils can be for the most part removed by boiling the oils with  $H_2O$ . In this process, however, they appear to be decomposed or oxidised, since the material recovered from the aq. extracts does not confer resistance to absorption of O2 when added to an unsaturated fatty oil. Addition of about 0.03% of quinol to olive oil from which the natural "antioxygen" has been removed produced a resistance to O<sub>2</sub> absorption of about the same order as that of the original oil, but the form of the O2 absorptiontime curves was not the same in both cases. Attention is drawn to the need for more exact knowledge of the structure of the peroxidic compound initially produced when  $O_2$  unites with an unsaturated fatty ester, and some unsuccessful attempts to reduce such compounds are recorded.

**Production of margarine.** A. MARKMAN and G. MARGOLIN (Masloboino-Zhir. Delo, 1931, No. 11, 24–25). —The  $H_2O$ : fat ratio is increased (1:1 to 1:5.5), resulting in finer emulsification. The mixture is pasteurised immediately before emulsification. The fermentation process is carried out simultaneously in the mixture of the  $H_2O$  and fat phases. The flavour is improved and the cooling system eliminated. CH. ABS. Emulsification processes in the margarine industry. A. SCHROEDER (Allgem. Oel- u. Fett-Ztg., 1932, 29, 597—598).—Large-scale experiments confirm the conclusions of Mohr and Eichstädt (Marg.-Ind., 1932, 29, No. 18—20), that with the addition of about 0.5% of an oxidised ("Palsgaard" emulsion) oil to the fat, the milk can be incorporated to form a water-inoil emulsion, which is stable up to 50° and therefore does not require cooling during churning. E. L.

Analysis of mixtures of fats and waxes. H. D. MURRAY (J.S.C.I., 1932, 51, 393–394  $\tau$ ).—The analysis of mixtures of fats and waxes is best carried out by separate determinations of the H<sub>2</sub>O, glycerol, unsaponifiable matter containing paraffin, paraffin alone, insol. saponifiables, and sol. saponifiables contained in the specimen, together with a determination of the acid val. and I val. of the sol. saponifiables. Suitable methods are described.

Determination of Reichert-Meissl and Polenske values especially for butter, cheese, and dried milk fats. W. KOENIG and W. WIRTH (Pharm. Zentr., 1932, 73, 759-761).—A quick method based on that of von Lührig (B., 1922, 508 A) is described. The fat content of cheese is determined by van Gulik's method, which is modified for dried milk and cream. A semi-micro-modification of Grossfeld's method for the butyric acid. val. (B., 1927, 667) is described.

A. A. L.

Kinetics of soap making. E. L. SMITH (J.S.C.I., 1932, 51, 337-348 r).-The velocity of saponification of cod-liver and coconut oils and of triolein by the " cold process" has been studied. Aq. NaOH (5N, 7.5N,10N, and 15N) and KOH (10N) were used, the quantity of alkali in excess of that equiv. to the oil being varied. After thorough mixing, which produced lye-in-oil emulsions with globules of average diam. 5-20 µ, the saponification mixtures were kept at const. temp. (25° or 45°). Usually, after an initial period of induction. the reaction accelerated spontaneously to a rate 10-200 times the initial velocity, which did not diminish appreciably until saponification was 80-90% complete. A series of saponifications of an oil with different concns. and quantities of the same alkali gave degree of reactiontime curves which, although not coincident, were parallel between about 30% and 90% reaction. Such results cannot be reconciled with the orthodox theory of interface reaction. Evidence is presented showing that both oil and alkali are sol. in soap, whether it is in aq. colloidal solution or, as in "cold saponification" mixtures, salted out to neat or curd soap. After the initial period of slow interface reaction, saponification must occur mainly in homogeneous solution in the soap phase. This accounts satisfactorily for the autocatalytic nature of the reaction since the reaction medium (the soap) is itself a product of the reaction. The saponification velocity during the period of rapid reaction is independent of the area of interface, excepting that the concn. of alkali and the temp. must be within the limits which yield stable emulsions so that the soap phase remains in intimate contact with the reactants. The velocity with KOH was 4-20 times that with NaOH; this is attributed to the fact that K soaps are salted out

to neat soap rather than curd, a condition favourable to rapid reaction in the soap phase. Rise of temp. from 25° to 45° increased the rate 2-8-fold according to other conditions. The ratio of the saponification velocities of two oils saponified under the same conditions was not a const. independent of such conditions as temp. and the concn. and the nature of the alkali used. The addition of soap or fatty acids reduced or eliminated the period of induction. Oxidised cod-liver oil, which stabilises water-in-oil emulsions, had the same effect. EtOH greatly accelerated the saponification; although it tends to break the emulsion, it "liquefies" the saltedout soap and renders it a better solvent for oil. The naphthols also had powerful catalytic effects on the saponification. Saponification by the cold process was at least 99.95% complete using 5—10% excess over the theoretical requirement of either KOH or NaOH. In the soap-boiling process the concns. of alkali and NaCl in the pan are usually kept adjusted to such vals. that the soap is salted out as neat soap. Conditions are therefore similar to those which obtain in the cold process, and it is probable that saponification occurs mainly in the soap phase. The data presented by McBain and his colleagues in their studies of the soapboiling process can be interpreted satisfactorily in terms of this theory.

Alkalinity of dilute aqueous soap solutions and the effect thereon of the addition of free alkali. W. BLEYBERG and H. LETTNER (Chem. Umschau, 1932, **39**, 241–253).—The  $p_{\text{OH}}$  of solutions of neutral soaps (concn.  $\equiv 0.25$  g. of fatty acid for 100 c.c.) prepared from pure fatty acids or natural oils have been determined. Electrometric measurement cannot be employed when unsaturated fatty acid soaps are present, as hydrogenation occurs at the electrode (Cf. B., 1914, 556), which becomes covered with a tenacious film of pptd. saturated soap; colorimetric determinations were satisfactory in such cases. Figures obtained for solutions of Na and K palmitate  $(p_{0H}/90^{\circ}, 3.17, 3.15 \text{ respectively})$  agree well with those of McBain; for Na and K stearates  $p_{OH}/90^{\circ}$ were 2.99 and 2.98. It has been demonstrated that the [OH'] of neutral soap solutions varies considerably with different soaps, and is much greater, especially at high temp., than the alkalinity corresponding theoretically with the addition of free NaOH in amounts of the order of those hitherto adopted as commercial limits (e.g., 0.02-0.1% of the soap); moreover, the observed [OH'] in soap solutions containing small additions of alkali is actually < that corresponding to the NaOH alone. For Na soaps (0.25% solutions) of coconut, soya-bean, olive, and arachis oils the  $p_{OH}$  vals. were, respectively, 4.45, 4.85, 4.45, 4.65 at 20° and 3.5,  $3 \cdot 4, 3 \cdot 2, 3 \cdot 3$  ([OH'] of the order of  $0 \cdot 0003 - 0 \cdot 0006N$ ) at 90°. It is preferable, therefore, in evaluating textile soaps, to specify limits for the [OH'] of their solutions rather than for the amount of free alkali, since the latter plays only a subordinate part in determining the total alkalinity of the solution. E. L.

Preparation of liquid toilet soaps and shampoos. R. KRINGS (Allgem. Oel- u. Fett-Ztg., 1932, 29, 603– 606).—The raw materials for, and the manufacture of, these soaps is described. E. L. **Refrigeration in liquid soap clarification.** H. KRANICH (Soap, 1932, 8, No. 11, 29–30, 57).—The liquid (coconut oil-potash) soap after finishing should be stored for several weeks at room temp. and then chilled for at least 48 hr. at temp. from  $-4^{\circ}$  to  $1 \cdot 5^{\circ}$ and filtered, preferably with the use of a filter-aid. Suitable plant is briefly described. E. L.

Sodium cholate as a soap improver. J. AUGUSTIN (Soap, 1932, 8, No. 11, 25–27, 67).—The addition of 2–10% of technical Na cholate to solid, powder, or paste soaps etc. improves the detergent, wetting-out, and lathering properties of textile and laundry soaps, soaps containing solvents, per-salts, etc. Small amounts of the cholate can be added to toilet soaps and preps.

E. L.

Colorimetric determination of glycerin in glycerin soap. J. J. J. DINGEMANS (Chem. Weekblad, 1932, 29, 696-698) .- The dichromate method is criticised. Accurate results are obtained by oxidising the glycerol in the filtrate from the separation of fatty acids with 3% KMnO4 to aldehydes and determining the latter colorimetrically with Schiff's reagent. The intensity of the colour is not directly proportional to the glycerin content, therefore comparison is made against a series of synthetic standard soaps containing up to 10% of glycerin. Sugars do not interfere; dextrins must be pptd. with EtOH and the latter removed completely. The method is applicable in presence of vanillin, thymol, heliotropin,  $H_3BO_3$ , borax, perborates, persulphates, beeswax, or PhCHO, but not in the presence of CH<sub>2</sub>O or honey. S. C.

Analysis [determination of hydroxy-acids] of oleines and stearines. V. BOULEZ (Bull. Mat. Grasses, 1932, 16, 298–300; cf. B., 1907, 221).—The content of OH-acids and lactones is calc. from the acid and sap. vals. of the original sample and of the product obtained by acetylating with  $Ac_2O$  in the presence of xylene and fused NaOAc. It is claimed that anhydrides are not formed by this method, and the process is adapted for the determination of the Ac (or OH) val. of castor oil. E. L.

Tung-seed and oil from Empire sources. ANON. (Bull. Imp. Inst., 1932, 30, 271-282).-Seeds of Aleurites Fordii from India, New South Wales, Transvaal, Natal, and Nyasaland have been examined in detail. With the exception of the N.S.W. specimens the seeds were in good condition and furnished oils of satisfactory quality, the oil from the Assam nuts being particularly pale and fully equal to American tung oil in properties. Many of the seeds from Dehra Dun were empty, the oil being correspondingly low in amount, but of fair quality. The Australian seeds were in bad condition, and the oil from them, although usable, was below British Standards Institution standard in n and in the heat test. Expressed oil from A. montana from Ceylon had d25 0.9314, n25 1.5140, acid val. 3.2, Browne heat test 17.3 min.; the oil was equiv. to Chinese A. montana oil and suitable for varnish manufacture.

E. L.

Composition of kapok seeds. R. C. MALHOTRA (J. Indian Chem. Soc., 1932, 9, 413).—Consts. are given for the oils extracted by light petroleum from seeds from Java, Sumatra, and Malay States; these differ somewhat amongst themselves and from those reported by Griffing and Alsberg (B., 1931, 982). H. B.

Shea nuts from the Gold Coast. ANON. (Bull. Imp. Inst., 1932, 30, 282–293).—23 samples of nuts have been examined. The nuts contain  $65-73\cdot5\%$  (av.  $68\cdot5\%$ ) of kernels. The average oil content of the kernels  $(48\cdot4\% \equiv 51\cdot5\%)$  on dry basis) is somewhat higher than that of Nigerian kernels (cf. B., 1930, 825) and the oil contains less unsaponifiable matter  $(3\cdot5 8\cdot9\%$ , av.  $5\cdot3\%$ ). The correlation of a low oil content of the kernels with a high proportion of unsaponifiable matter is supported by the present analyses. E. L.

Removal of acid from oils by distillation with steam. H. SCHÖNFELD (Deut. Parfümerieztg., 1932, 18, 136—137; Chem. Zentr., 1932, ii, 942).—A review. For edible oils the older caustic soda process is preferable. The distilled acids are suitable for the prep. of white soaps. A. A. E.

Hydrogenation of linseed oil. N. E. COCCHINARAS (J.S.C.I., 1932, 51, 403—404r).—Selective hydrogenation of linseed oil, using the Bolton-Lush apparatus, gave results in agreement with Lush's experiments with hydrogenated cottonseed oil and quite opposed to the conclusions of Hilditch and Moore (*ibid.*, 1923, 42, 15T) and of H. K. Moore, Richter, and Van Arsdel (B., 1917, 657), who used the overflow type of apparatus. The rate of hydrogenation of linolenic acid is much > that of linoleic acid. The % of oleic acid and *iso*oleic acid found is very small, whereas the increase in the % of saturated acids is noticeable from the beginning.

[Olive] oil from the Province of Pescara. A. MONTEFREDINE (Annali Chim. Appl., 1932, 22, 607– 615).—506 samples collected from Jan., 1930, to Aug., 1931,gave: acidity  $1\cdot 88$ — $3\cdot 27$  (mean  $2\cdot 56$ ); refractivity at  $25^{\circ}$  (Zeiss)  $60\cdot 3$ — $62\cdot 8$  ( $61\cdot 75$ ), sap. val. 186—195 $\cdot 8$  (192), I val.  $78\cdot 4$ — $83\cdot 4$  ( $80\cdot 65$ ), thermo-sulphuric val.  $41\cdot 2$ —  $44\cdot 5$  ( $42\cdot 5$ ),  $d_{15}^{16}$  0.91631—0.91874,  $d_{140}^{100}$  0.86282— 0.86529; solidification point  $2\cdot 5^{\circ}$  to  $4^{\circ}$ ; liquid acids  $85\cdot 13$ — $86\cdot 37^{\circ}_{0}$ , linoleic acid  $2\cdot 4$ — $7\cdot 3^{\circ}_{0}$ . T. H. P.

Castor oil. II. Variations in oil from different varieties of *Ricinus communis*. E. ANDRÉ and C. BESSÉ. III. Rotatory power. E. ANDRÉ and H. CANAL (Ann. Off. Nat. Combust. liq., 1931, **6**, 243—259, 459—470; Chem. Zentr., 1932, ii, 466—467).—II. Varieties with small seeds produce an oil of low viscosity and high I val. The oil is always dextrorotatory. Limiting vals. are: oil content 32—52%,  $d^{15}$  0.959— 0.9645 (unripe seeds give a max. yield; the oil has highest d); viscosity (50°, Engler) 17.6 to 20.1—20.6; sap. val. 170—182 (average 173—174); I val. 79—90; Ac val 160—180;  $\alpha_D$  +3.32° to +5.22° (1 dm.); the val. for fresh oil increases for a time.

III. The highest  $\alpha_D$  (+9.44° to +9.50°) is given by oil extracted with CS<sub>2</sub> from press residues; pressed oil has  $\alpha_D$  +4.2° to +4.3°, and ricinoleic acid has  $\alpha_D$  +7° to +7.30°. The high val. is attributed to the presence of estolides of ricinoleic acid. Oil from seeds kept moist for several weeks had  $\alpha_D$  +17.20°. Fatty acids were separated by fractional crystallisation of the Ba salts. The estolides have  $\alpha_D$  (10 dm.) +20.12° (triricinoleic),  $+14 \cdot 0^{\circ}$  (diricinoleic), and  $+7 \cdot 16^{\circ}$ (ricinoleic acids). A. A. E.

Shark-egg oil. T. ONO (J. Agric. Chem. Soc. Japan, 1932, 8, 788-795) .- Eggs of Heptranchias deani, Jordan and Starks, contain H<sub>2</sub>O 47.10, crude fat 23.31, crude protein 25.12, ash 0.81 (P 0.54, S 0.26)%. The oil has d<sup>30</sup> 0.9220, n 1.4520, acid val. 6.70, I val. 144.43, sap. val. 171.26, Reichert-Meissl val. 2.9, Ac val. 21.08, unsaponifiable matter 11.66%. Saturated acids  $(21 \cdot 4\%)$ , comprise isopalmitic and a small amount of stearic and palmitic acids. Unsaturated acids (78%) comprise oleic 78, linoleic 14, and clupanodonic acid 6%. Of the linoleic acid 80% is present as an isomeride of which the hexabromide is sol. in Et<sub>2</sub>O. The unsaponifiable matter afforded cholesterol (40), octadecyl  $(5 \cdot 5)$ , cetyl (1.9), and selacyl (25%) alcohols, and an unknown higher alcohol (21%). CH. ABS.

Surface tension of oils. E. CANALS and RAMA-HENINA-RANAIVO (J. Pharm. Chim., 1932, [viii], 16, 431-435).—Not only different oils, but oils of the same species but of different origin, may be distinguished by a determination of their surface tension in H<sub>2</sub>O.

T. McL.

Solvents.—See III. Wax sizes.—See V. Oil in flax seed.—See XVI. Czechoslovakian butters.— See XIX.

See also A., Dec., 1205, System Na oleate-NaOH- $H_2O$ -EtOAc. 1256, Congo copal oil. 1293-4, Vitamins in cod-liver oil.

#### PATENTS.

**Degreasing plant.** B. P. CRAWSHAW (B.P. 383,709, 8.10.31).— $C_2HCl_3$  vapour is admitted above, and condenses on, the work, which is contained in an open tank ( $\mathcal{A}$ ). Escaping vapours are drawn (by a partial-vacuum effect) through an outlet, provided near the upper edge of  $\mathcal{A}$ , into a subsidiary closed vessel; the latter is fitted with a cooling coil and means for withdrawing the condensate, and is connected with  $\mathcal{A}$  by an inclined trap tube. E. L.

Manufacture of an emulsion of wool fat. I. G. FARBENIND. A.-G. (B.P. 383,238, 14.7.32. Ger., 14.7.31). —Wool fat is melted with a natural or synthetic resin and emulsified in  $H_2O$  with the aid of an  $NH_4$  salt of an aliphatic acid above  $C_{10}$ , e.g., stearic or oleic acid, purified tall oil, which, with or without the addition of driers, pigments, etc., can be used as a  $H_2O$ -repelling paint. E. L.

Making a fat-splitting adsorbent. W. S. BAYLIS and C. TIETIG, ASSIS. to FILTROL CO. OF CALIFORNIA (U.S.P. 1,849,655, 15.3.32. Appl., 30.1.29).—A combined fat-splitting and decolorising reagent is prepared by impregnating Filtrol (clay) with excess of 70—100%  $H_2SO_4$  and then treating it, under sulphonating conditions, with a suitable org. reagent, e.g., (a) a 40% solution of stearic acid in  $C_{10}H_8$  or (b) a Pr derivative of  $C_{10}H_8$ , dimethyltetrahydronaphthalene, etc., so as to form, *in situ*, a fat-splitting reagent of the Twitchell or Schrauth type, respectively. E. L.

Extraction of oil from vegetable material. F. P. DENGLER, Assr. L. M. BROWN (U.S.P. 1,850,095, 22.3.32. Appl., 2.8.29).—Penetration of the solvent is assisted and mucilaginous and bitter principles are removed by treating the seeds (e.g., soya beans) with a volatile alkali, especially aq.  $NH_3$ , at  $\gg 82 \cdot 5^{\circ}$  and draining before extraction with a volatile solvent. E. L.

[Solvent] extraction of [fats and] oils, H. ROSEN-THAL, ASST. to COLUMBIA ENG. & MANAGEMENT CORP. (U.S.P. 1,849,886, 15.3.32. Appl., 13.9.28. Cf.U. S.P. 1,802,533; B., 1931, 1146).—Plant for the semi-continuous extraction of oil by solvents gaseous at room temp. is claimed. D. K. M.

Separation of solvents from oils or fats dissolved therein. METALLGES. A.-G. (B.P. 383,495, 24.2.32. Ger., 12.3.31).—The solvent is evaporated under vac. and condensed by direct contact with the cooling medium (chilled  $H_2O$ ), the latter being pre-cooled to below room temp. by circulation through a device wherein a low temp. is produced by the evaporation of  $H_2O$  with the aid of a steam-injector. E. L.

Production of sulphonated oils and fats. CHEM. SEIFENFABE. R. BAUMHEIER A.-G. (B.P. 383,312, 6.8.31. Ger., 6.8.30).—Oils or fatty acids (above  $C_{10}$ ) are treated with a derivative of  $H_2SO_4$  in which alkyl, aryl, acyl, or aralkyl groups replace one or both H atoms (e.g., Me<sub>2</sub>SO<sub>4</sub>) and subsequently with an acid condensing agent, e.g., CISO<sub>3</sub>H, PCl<sub>5</sub>. E. L.

Sulphonation of oils and fats. H. STOCKHAUSEN, F. SCHLOTTERBECK, C. CREMER, and A. HECKING (U.S.P. 1,849,209, 15.3.32. Appl., 5.7.27. Switz., 30.3.27).— Products of enhanced stability to acids, Ca salts, etc. are prepared by sulphonating castor oil with 45—100 wt.-% of  $H_2SO_4$  ( $d \ 1.8$ ); the temp. of the reaction mixture must not exceed 10—15°. E. L.

Lubricating oils.—See II. Dispersing agents. Foam-suppressing agents.—See III. Drying oils. Purified rosin [for soaps].—See XIII. Dusting powder for rubber.—See XIV. [Fats from] edible products. Preservation of foodstuffs etc.—See XIX. Perfumed soaps.—See XX.

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

Changes in weight, abrasion-resistance, and scratch-hardness of stand oil paint films on indoor and outdoor exposure. F. WILBORN, A. LÖWA, and F. WACHHOLTZ (Farben-Ztg., 1932, 38, 180-183, 208-210).-The above properties of films on glass of stand oil paints, pigmented with white lead, Fe<sub>2</sub>O<sub>3</sub>, Al, ZnO, TiO<sub>2</sub>, graphite, etc. were observed for 2 years. Abrasion-resistance and hardness were measured by the sand and lead-pencil tests, respectively. Marked differences were noted between the behaviour of films kept indoors and corresponding films exposed at 45° facing south; thus, of the indoor films, the graphite paint suffers the greatest loss of wt. and hardness, whilst on exposure it shows the smallest change of the series. Pronounced loss of wt. on exposure does not necessarily involve poor durability. In addition to the above "one-coat" tests, built-up systems on glass and metal were also tested. The use of undercoats complicates the problem considerably. S. S. W.

Road-marking paints. H. A. GARDNER (Amer. Paint & Varnish Manufrs.' Assoc., May, 1932, Circ.'

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No. 410, 154—158).—The use of Al paint for roadmarking is criticised, as it efficiently reflects light in one direction only, and appears more or less grey at other angles. In addition to poor visibility, Al paint tends to pick up dirt, whereas a good white paint of gradual chalking characteristics gives diffuse reflection and remains clean. Photographs are given. S. S. W.

Paint failure on cement floor. H. A. GARDNER (Amer. Paint & Varnish Manufrs.' Assoc., May, 1932, Circ. No. 410, 168).—A particularly serious case of paint failure due to hydrostatic pressure of  $H_2O$  under a basement floor comprising 2 layers of cement (6 in. thick) separated by asphalt and asphalt paper is described and illustrated. S. S. W.

Apparatus for determination of solvents and diluents in oil paints and enamels. J. OSTER (Farben-Ztg., 1932, 38, 210).—The paint etc. is steamdistilled under reflux, sand being added to ensure even boiling. A receiver in the form of a U-tube, one arm of which is graduated, is fused on to the condenser tube so that the solvent etc. collects on the top of the condensed  $H_2O$  which, in turn, drips back into the refluxing flask via the return arm of the U-tube. The latter is fitted with a tap, and provision is made for determining solvents etc. heavier than  $H_2O$ .

S. S. W.

Preparation and properties of a natural mineral black. M. W. PHILPOTT (Trans. Inst. Rubber Ind., 1932, 8, 270-278; cf. B., 1930, 1121).-Contrary to previous belief, variation in C content of refined Bideford black is not accompanied by parallel variation in reinforcing effect in rubber. The native material is always acidic and this probably leads to agglomeration of the ultimate particles in drying. Absorption of 0.01Nalkali by a paste of the material is complete in a few hr. Variation in the degree of alkalinity of the medium in which the black is dried does not affect the uniformity of the final product, which, however, is a better reinforcing agent for rubber than either the untreated black or the ordinary refined material. The " alkaline black " is a grey-black powder, d 2.05-2.15, of low tinting strength and contains approx. 32% C. D. F. T.

Determination of zinc sulphide in lithopone. H. C. RHIEM (Farben-Ztg., 1932, 38, 210).—When hithopone is ignited under suitable conditions, e.g., in a Rose crucible in a stream of  $O_2$ , ZnS is quantitatively converted into ZnO, no other normal ingredients showing an appreciable change of wt. on ignition, with the exception of Pb (>0.2% of which is rarely present). ZnS content calc. from loss of wt. on ignition of lithopone is found to be in good concordance with the orthodox (and lengthy) analytical method. S. S. W.

Varnish manufacture. F. ZIMMER (Chem.-Ztg., 1932, 56, 930-932).—The layout of a modern plant, on what is termed the "three-level system" is described, and conveyers and other mechanical handling plant are illustrated. C. I.

Anti-skinning agents for varnishes. J. R. STEWART (Amer. Paint & Varnish Manufrs.' Assoc., May, 1932, Circ. No. 410, 137-145).—Guaiacol, pyrocatechol, and dipentene were found to be the most efficient of a range of possible anti-skinning agents tested. A series of abstracts of the literature of the subject is given. S. S. W.

Anti-oxidants [for varnishes]. H. A. GARDNER and L. P. HART (Amer. Paint & Varnish Manufrs.' Assoc., May, 1932, Circ. No. 410, 135—136).—Preliminary tests (B., 1932, 153) having indicated that addition of anti-oxidants (particularly X156) improves the durability of two different spar varnishes, further tests were undertaken. In a few months' exposure, no advantages were obtained by the use of pyrocatechol, quinol, heptene, and two rubber accelerators. S. S. W.

Varnish exposures—sulphur as anti-oxidant. H. A. GARDNER and G. G. SWARD (Amer. Paint & Varnish Manufrs.' Assoc., May, 1932, Circ. No. 410, 129—134).— Exposure tests of spar varnishes of orthodox and synthetic resin types show the latter to be far superior. The introduction of 0.1% of S in an ordinary ester gum varnish greatly improved its durability, but 0.5% of S had the reverse effect. It is considered that this is a question of anti-oxidant action, but the best method of incorporating the S is not yet established. Typical panels are illustrated. S. S. W.

Solvent losses in pigmented cellulose ester lacquer preparation. O. MERZ (Farben-Ztg., 1932, 38, 236—237).—Such losses can be minimised by grinding in high-b.p. solvents, plasticisers, etc. and using enclosed mills, various types of which are described. The roller-type mill is considered more suitable than the ball mill. Factors controlling solvent losses in enclosed mills, *i.e.*, temp., v.p., exposed surface, degree of saturation of the atm. in the mill, supply of fresh air, are discussed. S. S. W.

Effect of some plasticisers on the ageing of nitrocellulose. H. A. GARDNER (Amer. Paint & Varnish Manufrs.' Assoc., May, 1932, Circ. No. 410, 159—161).— The results of exposure tests of nitrocellulose lacquers containing some relatively new plasticisers in comparison with older types are tabulated and illustrated. The best results were obtained with Bu and Ph phthalates. S. S. W.

Photochemical test for quickly rating the durability of varnishes. S. A. LEVY (Amer. Paint & Varnish Manufrs.' Assoc., May, 1932, Circ. No. 410, 146—153).—Kauri reduction vals. do not give a reliable indication of durability of varnishes made on "alkyd" and some types of phenolic resins. Embrittlement by subjection to arc-lamp irradiation is considered to be more informative, and after trials with rubber and metal foils, sheet rubber (from pure gum-rubber stock) was selected tentatively as the most suitable substratum for the varnished test-pieces. Results of kauri reduction, normal exposure, and light-embrittlement tests are tabulated for orthodox and synthetic resin varnishes.

S. S. W.

Polystyrol resin exposure test. H. A. GARDNER (Amer. Paint & Varnish Manufrs.' Assoc., May, 1932, Circ. No. 410, 162—163).—This resin is practically colourless, transparent, and hard, sol. in aromatic hydrocarbons and chlorinated solvents, but difficultly sol. in COMe<sub>2</sub> and many alcohols. These solutions are incompatible with nitrocellulose solutions. Films obtained from straight solutions of the resin are transparent but of low durability, unless well plasticised, *e.g.*, with Ph phthalate. S. S. W.

Solvents for gum arabic. II. R. TAFT and L. E. MALM (Trans. Kansas Acad. Sci., 1931, 34, 116-117).— The solvents must possess one or more OH groups and have a relatively high dielectric const. CH. ABS.

Sugar resins. H. A. GARDNER (Amer. Paint & Varnish Manufrs.' Assoc., May, 1932, Circ. No. 410, 170).—A xylose-NH<sub>2</sub>Ph resin was found to disintegrate in one week's exterior exposure (straight solution in solvent, 3 coats applied on maple). S. S. W.

Chlorinated rubber resins. H. A. GARDNER and J. R. STEWART (Amer. Paint & Varnish Manufrs.' Assoc., May, 1932, Circ. No. 410, 164—167).—Chlorination of rubber lowers the viscosity, enabling > 20% to be used in C<sub>6</sub>H<sub>6</sub> solutions without impairing the brushing qualities (8% of normal rubber being the max. usable). Films of "rubber resins" show exceptionally good resistance to acid, alkali, and EtOH, but have very poor gloss. Clear and pigmented coatings made up with 1 German and 3 American samples of "rubber resins" were exposed to normal and accelerated weathering, and the results are tabulated, indicating promising durability.

S. S. W.

Synthetic resin laminated sheet products. I. Manufacture and uses. II. Electrical applications and properties. III. Mechanical properties, machining tests, and uses. E. E. HALLS (Brit. Plastics, 1932, 4, 152–154, 176–179, 221–225, 269– 273).

Wax sizes .- See V.

See also A., Dec., 1227, Esterification resin as lubricant.

#### PATENTS.

Production of perfectly homogeneous solutions of drying agents. I. G. FARBENIND. A.-G. (B.P. 383,172, 12.4.32. Ger., 2.5.31. Addn. to B.P. 339,865 and 339,922; B., 1931, 261).—The free fatty acids of drying or semi-drying oils mentioned in the prior patents as solvents for heavy-metal naphthenates etc. are wholly or partly replaced by the free lower olefinic carboxylic acids or their aromatic analogues, or by BzOH or its derivatives. S. S. W.

Manufacture of paints, enamels, or the like and drying oils therefor. F. SCHMID (B.P. 383,372, 8.10.31).—Linseed oil may be refined and deacidified by treatment at room temp. with excess of, e.g., ZnO; the separated sludge may be used for refining a further batch, or added to a paint (prepared by grinding pigment with the refined oil and diluting with commercial drying oils, varnish, etc.) in order to check settling of the pigment. E. L.

Manufacture of films from casein. S. WITTOUCK. Assee. of M. TEILLARD-CHAMBON (B.P. 383,069, 19.11.31, U.S., 27.2.31).—Washed, degreased, and dried casein is brought into colloidal solution in an alcoholic dispersion liquid of low d and rapid evaporation rate by means of an alkaline salt, e.g., Na<sub>2</sub>CO<sub>3</sub>, impurities being pptd. and filtered off. The solution is oxidised energetically, e.g., by H<sub>2</sub>O<sub>2</sub>. The alkaline caseinate is coagulated at a rate controlled by addition of hexamethylenetetramine, trioxymethylene, etc., and poured in a thin layer on a surface, giving strong, impermeable films containing > 80% of casein. S. S. W.

Treatment of carbon [for use as pigment] obtained by the decomposition of a carbon-containing gas in the presence of a metal-containing catalyst. W. OOSTVEEN (B.P. 383,402, 5.11.31).— During the decomp. of the gas, when catalysts containing Fe, Ni, Co, or their compounds are employed, the C black usually becomes contaminated with the catalyst, either as metal or carbide. In the process claimed, such impurities are made to form part of the black pigment. Thus, *e.g.*, the carbides of Co and Ni are converted into sulphides; Fe carbide is treated with tannic or gallic acid, or with phenols, or is converted into Prussian-Blue. H. E. T.

Production of [graphite] writing and drawing leads. J. S. STAEDTLER (B.P. 383,330, 20.8.31. Ger., 8.12.30).—Leads suitable for producing photo-prints from tracings are prepared by incorporating with a graphite "lead" composition fatty material containing fat-sol., light-absorbing colouring matter. The leads are manufactured in the usual manner and then saturated with, *e.g.*, stearin (100 pts.), Sudan-yellow GG (4), Sudan-brown RRN (4), and Sudan-black RT (0.3 pt.). H.E. T.

Production of negatives without photography. E. P. MULLAN (U.S.P. 1,851,369, 29.3.32. Appl., 29.1.30).—A gummed paper base is coated with collodion, and a design etc. is printed on with printing or transfer ink. This impression is reversed by spraying over with an opaque solution, drying, and removing the lines of the design with  $C_6H_6$ . The negative is then coated with rubber and another collodion coating on top. The paper base is stripped off with dil. aq. AcOH, and the completed film mounted on celluloid or glass. J. L.

Purification of rosin. J. N. BORGLIN, Assr. to HERCULES POWDER Co. (U.S.P. 1,849,537, 15.3.32. Appl., 14.12.29).—Wood rosin or low-grade gum rosin is distilled at  $250-290^{\circ}/1-2$  cm. in the presence of 0.3-1.0% of H<sub>3</sub>BO<sub>3</sub> or borax to effect partial decolorisation; the product does not discolour soaps or paper sizes on ageing. S. M.

Manufacture of synthetic [resorcinol] resin. E. E. NOVOTNY, ASST. to J. S. STOKES (U.S.P. 1,849,109, 15.3.32. Appl., 21.8.26).—Resorcinol is heated to  $100-155^{\circ}$  with < 1 mol. proportion of CH<sub>2</sub>O without a catalyst. A fusible solid resin is formed which is substantially H<sub>2</sub>O-free, stable at room temp., and hardened and rendered infusible by addition of more CH<sub>2</sub>O or other methylene compounds. S. M.

[Alkyd] resin composition and its preparation. L. V. ADAMS, ASST. to GEN. ELECTRIC Co. (U.S.P. 1,849,817, 15.3.32. Appl., 1.7.26).—Insol. alkyd resins, heat-hardened to the "C" stage, are rendered sol. by heating with an org. liquid which dissolves both glycerol and phthalic anhydride. The varnish produced may be converted into a moulding resin by subsequent removal of most of the solvent. As preferred solvents indene and its polymeride are cited, but resins, pitches, and degelled oils may also be used. S. M. Production of clear and transparent artificial resin masses. A. NowACK A.-G., and R. HESSEN (B.P. 383,085, 10.12.31. Ger., 10.12.30).—Resitols (cf. B.P. 350,427 ; B., 1931, 818) practically free from volatile constituents, which contain < 10% (preferably15—25%) of resols and have not been converted into the "resite" phase to an extent where compression is no longer possible, are subjected to direct hot compression. Mixtures of novolacs and substances containing reactive methylene groups, e.g., hexamethylenetetramine, may be substituted for the resols, and hardening agents, pigments, fillers, etc. may be incorporated. S. S. W.

Manufacture of [thermoplastic] polymerisation products from indene, styrene, vinyl esters, and like monovinyl compounds. I. G. FARBENIND. A.-G. (B.P. 383,002, 29.9.31. Ger., 2.10.30).—The products are pressed out from the reaction space (while still hot) directly into moulds, or are extruded through nozzles etc., cooled, disintegrated, and pressure-moulded. S. S. W.

Manufacture of moulded polymerisation products. I. G. FARBENIND, A.-G. (B.P. 383,216, 29.9,31. Ger., 2.10.30. Cf. B.P. 383,002; preceding abstract).— Polymerisation products from indene etc. are subjected to injection-moulding while hot. S. S. W.

Floor covering. F. B. GREEN (U.S.P. 1,850,928, 22.3.32. Appl., 1.6.29).—A pale floor covering, which is not slippery when wet, comprises an inert filler (asbestos) and a moderately hard copal crop gum of high m.p. (e.g., 150—220°); tung oil, a small proportion of gum elemi, and cottonseed pitch can be included advantageously. E. L.

Bituminous products.—See II. Roofing felts. Lignin derivatives.—See V. Coating non-metallic substances with metals.—See X.

#### XIV.-INDIA-RUBBER; GUTTA-PERCHA.

Use of rubber in the chemical industry. N. SWINDIN (Soc. Chem. Ind., Chem. Eng. Group, 15th Dec., 1932, 16 pp.).-The development of a method is described which enables tanks of wood, concrete, brick, Fe, or steel to be lined with rubber with little difficulty. In the case of new wood and clean Fe tanks. sheets of warmed unvulcanised rubber are applied to the surface which has been pretreated with 2 coats of rubber solution. The lined tank is gradually filled with hot  $H_2O$  and vulcanisation is effected by continued boiling or application of low-pressure steam. For the lining of old tanks, with uneven, damp, and rusty surfaces, a mixture of stabilised emulsified rubber, Portland cement, and sand is first applied; this forms an excellent foundation for attachment of the rubber sheet as already described. Illustrated accounts are given of the application of rubber to tanks, pipes, joints, valves, and agitators. D. F. T.

Elasticity of rubber. K. HERRMANN and O. GERN-GROSS (Kautschuk, 1932, 8, 181—185).—Considerations as to the inner structure of gelatin are also applicable to that of rubber. In gelatin the polypeptide chains unite along part of their length to form bundles; this not only provides an explanation of the strength, elasticity, and swelling properties, but also dispenses with the need for the frequently postulated cementing substance. The theory is adapted to explain the X-ray characteristics and elastic behaviour of rubber.

D. F. T.

Whiting. II. Properties in rubber. T. R. DAWSON and G. GALLIE (J. Res. Assoc. Brit. Rubber Manufrs., 1932, 1, 99-110; cf. B., 1932, 1043).-Samples of whiting which show only minute differences chemically were not interchangeable when introduced to the extent of 25% in a 95:5 rubber-S mixing, the rate of vulcanisation, tensile strength, mechanical properties, and ageing behaviour being very differently affected. There was no general relation between alkalinity or Mg content and influence on rate of vulcanisation, nor between the Fe or Mn content, and the impairment of the ageing qualities; in one sample the presence of nitrate appeared to be responsible for the bad ageing. The degree of discoloration in the vulcanised product also could not be correlated with the Fe content. D. F. T.

Unvulcanised rubber powder. G. MARTIN (India-Rubber J., 1932, 84, 769-770, 776, and Bull. Rubber Growers' Assoc., 1932, 14, 622-626) .- Unvulcanised highly compounded rubber powder has been known for some years. Uncompounded rubber has now been prepared in powder form by spraying latex and using dextrin to prevent aggregation of the particles. It can also be prepared by a chemical process from latex, and by a mechanical process from latex or dry crêpe rubber. The particles are much bigger than the rubber globules in latex. On mixing the powder with S and other rubber-sol. compounding ingredients, even with 5% of ZnO, satisfactory products can be obtained by vulcanisation under pressure. The powder costs > crêpe or sheet rubber. Various applications are indicated. D. F. T.

Testing [rubber] antioxidants. H. J. STERN and W. PUFFETT (Trans. Inst. Rubber Ind., 1932, 8, 216-226).-In order to obviate the mixing operation and tensile tests involved in examining antioxidants as to uniformity, it is suggested that the effect on the rate of absorption of  $O_2$  by a film of linseed oil be measured. The use of O<sub>2</sub> instead of air approx. doubles the rate of absorption, which may be followed by increase in wt. of the oil or by decrease in vol. of the gas. The method can be adapted to the detection of antioxidants in vulcanised rubber by dissolving the dried COMe2 extract, e.g., from 5 g., in 10 g. of linseed oil. In accordance with Moureu's theory, rubber antioxidants repress fluorescence, e.g., of uranine in aq. COMe<sub>2</sub>. D. F. T.

Antioxidants in rubber-proofing. W. N. LISTER (Trans. Inst. Rubber Ind., 1932, 8, 241-250).—Comparative tests are described on mixtures of crêpe rubber 20, whiting  $4\frac{1}{2}$ , Ti white 9, lithopone  $13\frac{1}{2}$ , Zn stearate 2, S 0·4, mercaptobenzthiazole 0·2, and 1 pt. of various antioxidants: the mixtures were spread on undyed wigan, vulcanised, and exposed to daylight for 7 days. With few exceptions the presence of an antioxidant caused pronounced discoloration; weathering for 4 months led to a still more pronounced result. Under

CL. AV.-LEATHE

these conditions little or no benefit accrued from the presence of any antioxidant. Heat-ageing is not as searching as light-ageing and weathering. D. F. T.

Effect of Captax (mercaptobenzthiazole) and Altax (benzthiazyl disulphide) on Zimate (zinc dimethyldithiocarbamate) acceleration [of rubber vulcanisation]. R. T. VANDERBILT Co. (Vanderbilt News, 1932, 2, No. 4, 12—19).—Mercaptobenzthiazole (I) delays the accelerating action of Zn dimethyldithiocarbamate (II) at low temp. only. Small proportions of (II) as auxiliary accelerator to (I) retard at low temp. and enhance at high temp. Analogous results were obtained with dibenzthiazyl disulphide (III) and (II), except that (III) retards also at high temp.

CH. ABS.

Plasticity [of rubber].—See I. Mineral black. Chlorinated rubber resins.—See XIII.

See also A., Dec., 1232, New synthetic rubbers.

# PATENTS.

Treatment of [rubber] latex. H. C. HOWARD, Assr. to AMER. ANODE, INC. (U.S.P. 1,850,673, 22.3.32. Appl., 8.3.29).—Latex, especially the NH<sub>3</sub>-preserved product, is agitated with an adsorbent, *e.g.*, SiO<sub>2</sub> gel, whereby the alkalinity is reduced. D. F. T.

Dusting powder and the like [for rubber]. R. E. LESTER, ASST. to H. C. BUGBIRD (U.S.P. 1,849,354, 15.3.32. Appl., 9.12.27).—Rubber is worked at a predetermined temp., such as 115— $130^{\circ}$ , in the presence of a dusting powder consisting of a fatty acid salt of an alkaline-earth metal, *e.g.*, Ba stearate or a mixture of this with Ba palmitate, having a m.p. above this temp., and is subsequently vulcanised (at about 150°).

D. F. T.

Manufacture of hard rubber dust. W. A. GIBBONS and E. HAZELL, ASSTS. to REVERE RUBBER CO. (U.S.P. 1,849,920, 15.3.32. Appl., 19.11.29).—Rubber in aq. dispersion, such as latex, is vulcanised with sufficient S, e.g., > 30%; the ebonite dust which is formed is recovered eventually, e.g., by spraying, and consists of relatively uniform globular particles. D. F. T.

Manufacture of porous soft to hard rubber separators, diaphragms, and the like. M. and P. WILDERMAN (B.P. 383,581, 22.6.32. Cf. B.P. 328,274; B., 1930, 678).—A no. of double foils with the semivulcanised powder between them are placed above one another in a casing with distance pieces, pressure then being applied until the top touches the distance pieces; the desired thickness and porosity are thus ensured and space is economised in the vulcaniser. D. F. T.

Manufacture of articles of or containing rubber or similar material. DUNLOP RUBBER Co., LTD., ANODE RUBBER CO., LTD., and G. W. TROBRIDGE (B.P. 383,432, 26.11.31).—In the manufacture of articles by coating backing strata or moulds with an aq. dispersion and subsequent coagulation, uniformity and freedom from bubbles are ensured by first treating the backing strata with a non-coagulating composition comprising one or more polyhydroxy-compounds or their derivatives, e.g., glycerol or glycol Et ether, mixed, if desired, with one or more volatile solvents such as COMe<sub>2</sub> or EtOH.

D. F. T.

Composition of matter [for rubber vulcanisation] and its production. H. GRAY, ASST. to B.F. GOODRICH Co. (U.S.P. 1,850,716, 22.3.32. Appl., 21.6.30).— Vulcanisation is accelerated by the product from the single-stage reaction of an aliphatic amine, e.g.,  $NH_2Bu$ , and an aliphatic aldehyde, e.g., PrCHO, in mol. proportions  $1: \ll 2$ . D. F. T.

Preparation of (A) rubber product, (B) accelerator compound [for rubber]. D. H. POWERS, ASST. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,850,135—6, 22.3.32. Appl., [A] 4.10.26, [B] 9.10.26. Cf. U.S.P. 1,732,532; B., 1930, 205).—The dithiocarbamate formed additively from CS<sub>2</sub> and (A) a primary amine, or (B) a primary arylamine, *e.g.*, NH<sub>2</sub>Ph, is made to react further with an aliphatic aldehyde, *e.g.*, 2—5 mols. of PrCHO.

D. F. T.

[Antioxidant] treatment of rubber. L. H. How-LAND, ASST. to NAUGATUCK CHEM. Co. (U.S.P. 1,849,489, 15.3.32. Appl., 13.11.29).—S derivatives of the phenols of the general formula  $\mathbb{R} \cdot S_x \cdot \mathbb{R}'$ , e.g.,  $\beta$ -naphthyl sulphide, are used (prep. given). The rate of vulcanisation of the mixtures may be adjusted by the addition of a basic substance such as a polyethylenepolyamine.

D. F. T.

Manufacture of stabilised halogen derivatives [of rubber]. I. G. FARBENIND. A.-G. (B.P. 383,154, 24.3.32. Ger., 25.3.31).—Halogenated rubber, *e.g.*, the Cl- or Br-derivative, is heated below 150°, and preferably in a suitable solvent, with a basic substance such as KOH, Na<sub>2</sub>CO<sub>3</sub>, C<sub>5</sub>H<sub>5</sub>N. The product is stable up to about 180°. D. F. T.

Vulcanisation accelerators.—See III. Lignin derivatives.—See V.

# XV.-LEATHER; GLUE.

Application of the goldbeater's skin test to some synthetic tannins. M. NIERENSTEIN (Nature, 1932, 130, 813).—This test is given only by true tannins and its application to the synthetic tannins, digalloylglycol, trigalloylglycerol, tetragalloylerythritol, and hexagalloylmannitol, shows that they possess no tanning properties. L. S. T.

#### PATENT.

Foam-suppressing agents .--- See III.

#### XVI.—AGRICULTURE.

Use of the Troemner balance for measuring the upper plastic limit of soils. L. D. BAVER (J. Amer. Soc. Agron., 1932, 24, 686-690).—Apparatus is described for determining the H<sub>2</sub>O content at which soil pastes begin to flow under known pressure. The relationship between the force applied and the H<sub>2</sub>O content at the point of flow is represented by a logarithmic curve from which the upper plastic limit may be calc. A. G. P.

Rapid method for measuring the stickiness of soils. G. BOUYOUCOS (Soil Sci., 1932, 34, 393—401).— A metal disc is pressed into a sample of well-kneaded soil and the force necessary to remove it is measured by a spring balance. Max. stickiness corresponded with an average pull of 10 lb. per sq. in. in clays to nil in sands. General relationships existed between max. stickiness and clay content, and between max. stickiness and the upper plastic limit, in a no. of soils, but various exceptional cases are recorded. A. G. P.

Phytophysiological soil analysis. E. A. MIT-SCHERLICH (Proc. 2nd Internat. Cong. Soil Sci., 1932, 4, 1-5).—A review and discussion of the author's methods. A. G. P.

Microchemical soil tests. M. F. MORGAN (Conn. State Agric. Exp. Sta. Bull., 1932, No. 333, 111—132).— Rapid micro-technique is described for the following determinations: available P in acid extracts of soil  $(1.5 \text{ c.c. of conc. HNO}_3 + 2 \text{ c.c. of conc. HCl per 200 c.c.})$ by the Mo-blue method; NO<sub>3</sub>' in aq. extracts by NHPh<sub>2</sub>; NH<sub>3</sub> in saturated KCl extracts by Nessler's reagent; active Al by the hæmatin test in extracts made with a solution containing 6 c.c. of glacial AcOH + 10 g. of Ca(OAc)<sub>2</sub> per litre; and replaceable Ca<sup>¬</sup> in saturated-KCl extracts by means of (NH<sub>4</sub>)<sub>2</sub>C<sub>2</sub>O<sub>4</sub>, turbidimetrically. A. G. P.

Electroendosmotic method for determining the charge on soil particles. A. A. KHALIZIEV (Proc. 2nd Internat. Cong. Soil Sci., 1932, 4, 162-163) .- The electrokinetic potential of all soils examined was negative and small. Changes in  $p_{\rm H}$  following dialysis were insignificant. Podsolisation either natural or artificial increased the charge on the particles. The max. pH change induced by treatment with NaOH is associated with the complete displacement of H by Na in the complex. The increased negative potential resulting from the treatment of soil with NaCl was > that produced by CaCl<sub>2</sub>. In small concns. AlCl<sub>3</sub> increased the particle charge, but solutions > 0.01N reversed this effect in podsols and chernozems. In these soils which have no isoelectric point HCl did not effect any "discharge" of particles, even in solutions > 0.01N(i.e., at  $p_{\rm H} < 3$ ). HCl had a discharging effect on laterites which contain an electropositive colloid.

A. G. P.

Steaming for the improvement of garden soils. G. SOHWARTZ (Z. Pflanzenkr. Pflanzenschutz, 1932, 42, 193—232).—Technical details of the steaming process for soil disinfection are recorded and discussed. A. G. P.

Volumetric determination of humus in the soil. I. S. VASOLEX (Pedology, Russia, 1931, 26, No. 4, 34-49).—With a carbonated chernozem, Degtyarev's modification of Schollenberger's method gives results in accord with those obtained by Knop's method. Carbonates and sesquioxides do not affect the results; Mn in large quantities interferes slightly. Soils rich in org. matter (5-15%) require 10-15 c.c. of  $CrO_3$ mixture; otherwise 5 c.c. are sufficient. A temp. of 125-170° should be maintained for 5-15 min.

CH. ABS.

Influence of moisture on rapidity of decomposition of lowmoor peat. S. A. WAKSMAN and E. R. PURVIS (Soil Sci., 1932, 34, 323–336).—The rate of decomp. of peat is largely controlled by its H<sub>2</sub>O content, max. rates corresponding with 50–80% of the total moist peat. Non-nitrogenous constituents were decomposed rather more rapidly than the N complexes. During decomp.,  $CO_2$  and NH<sub>3</sub> were liberated in proportions equiv. to a C: N ratio of 20: 1, and the residuum had an increased proportion of alkali-sol. matter. Drying and subsequent remoistening increased the rate of decomp. A. G. P.

Mitscherlich, Wiessmann, and Neubauer methods of determining the nutrient content of soils. R. STEWART (Imp. Bur. Soil Sci., Tech. Comm., 1932, No. 25, 46 pp.).—The theoretical basis and technique of the methods are described and the significance and interpretation of results discussed.

A. G. P.

Nitrate-assimilating soil bacteria. F. B. SMITH and P. E. BROWN (J. Amer. Soc. Agron., 1932, 24, 749—754).—Species of Azotobacter, Radiobacter, Aërobacillus, Pseudomonas, and Achromobacter isolated from soil were able to assimilate  $NO_3'$ . A. G. P.

Microflora of the ash of Katmai volcano with special reference to nitrogen-fixing bacteria. N. R. SMITH and R. F. GRIGGS (Soil Sci., 1932, 34, 365—373).— Samples of volcanic ash taken 18 years after deposition contained bacteria but no fungi or actinomyces. No N-fixing bacteria were present. In areas covered with liverwort, *B. radiobacter* but not *Azotobacter* were present; there was, however, no evidence of actual N fixation. A. G. P.

Nitrogen fixers of leached alkali soils. J. E. GREAVES and J. D. GREAVES (Soil Sci., 1932, 34, 375– 383).—The N-fixing capacities of a no. of organisms are examined and the efficiencies of various carbohydrates as energy sources recorded. A. G. P.

Influence of temperature on the nitrate content of soil in presence of decomposing cellulose. J. E. FULLER and L. H. JONES (Soil Sci., 1932, 34, 337-351).-Addition of cellulose to soils of low org. N content and stored at various temp. (10-35°) caused a reduction in NO3' content at all temp. throughout the experimental period of 7 weeks. Addition of CaCO<sub>3</sub> lessened the depletion of  $NO_3'$  at temp.  $> 20^\circ$  during the latter half of the period.  $CaSO_4$  was non-effective in this respect. In soils rich in org. N the reduced  $NO_3'$ content following admixture of cellulose persisted for 3-4 weeks, but at temp. of 25° and upwards subsequently lessened and vals. tended to approach those of the controls. Nitrification was accelerated in these soils whether or not treated with cellulose. Crop growth (dry wt. of tomato plants) was in close agreement with the NO<sub>3</sub>' contents of the various soils. CaSO<sub>4</sub> tended to reduce growth. A. G. P.

Causes of low nitrification capacity of certain soils. G. S. FRAPS and A. J. STERGES (Soil Sci., 1932, 34, 353-363).—In these soils nitrification of org. soil-N occurred frequently, but  $(NH_4)_2SO_4$  was not nitrified. Inoculation with active cultures of bacteria, treatment with CaCO<sub>3</sub>, or both, effected nitrification of  $(NH_4)_2SO_4$ . Nitrite organisms were present in soils incapable of nitrification. The effects of varying conditions of inoculation on the production of NO<sub>2</sub>' and NO<sub>3</sub>' are examined. A. G. P.

Leaching of nitrogen [from soils]. O. TORNAU and W. PRASSLER (Z. Pflanz. Düng., 1932, 11B, 507— 518).—Under field conditions N from  $(NH_4)_2SO_4$  was more rapidly leached from the surface (5 cm.) soil than that from NaNO<sub>3</sub>. This is ascribed to the reduced

permeability of soils following treatment with NaNO<sub>3</sub>. Rate of leaching was influenced not only by the total rainfall, but by the distribution of the total with respect to time. The N content of subsoils was much lower than that of surface soils and less definitely affected by applications of fertilisers. Relevant data from lysimeter trials are recorded and discussed. A. G. P.

Decomposition of organic matter in soils related to the nature of the absorbed cations. M. G. CHIZHEVSKY (Proc. 2nd Internat. Cong. Soil Sci., 1932, 3, 174—175).—The rate of decomp. of org. matter in soils artificially saturated with various cations varied in the order :  $\frac{1}{2}$ -saturation with Na +  $\frac{1}{2}$ -saturation with H' >  $\frac{1}{2}$ -saturation with Ca" +  $\frac{1}{2}$ -saturation with H' > saturation with H' > original soil > soil treated with Na<sub>2</sub>CO<sub>3</sub> + CaCO<sub>3</sub> > saturation with Ca". No relationship existed between CO<sub>2</sub> production and the proportion of H<sub>2</sub>O-sol, humus or N present. A. G. P.

Decomposition of organic matter in soil by micro-organisms. S. Osugi and S. Yoshie (Proc. 2nd Internat. Cong. Soil Sci., 1932, 3, 107-110).-Under dry-field and paddy-field conditions additions to soil of available N accelerated the decomp. of org. matter. For the decomp. of glucose and of filter-paper the most suitable C: N ratio was 10:1 under dry-field and 5:1 under paddy-field conditions. For rice straw containing much difficultly decomposable matter the best ratio was 30-20:1. The transition of NH<sub>3</sub>-N to insol. forms following the incorporation of org. matter is much slower in paddy-field than in dry-field conditions and the max. amount of N involved is much smaller. N so fixed becomes available only after a prolonged period. Rates of decomp. of a no. of plant materials and animal manures are recorded (cf. B., 1931, 647). A. G. P.

Acceleration of the degradation of organic substances in stable manure in the soil. J. STOKLASA (Věstn. Českoslov. Akad. Zem., 1932, 8, 219—222; Chem. Zentr., 1932, ii, 423).—The decomp. time can be reduced from 4 years to 1—2 years by suitable inoculation. A. A. E.

Promoting the decomposition of organic matter in soils by phosphatic fertilisers. K. Aso and R. YOSHIDA (Proc. 2nd Internat. Cong. Soil Sci., 1932, 3, 106).—The rate of decomp. of green manures in soil of  $p_{\rm H} 5 \cdot 3$  and having low H<sub>2</sub>O-sol. P content was increased by applications of superphosphate or K<sub>2</sub>SO<sub>4</sub>. The effect of superphosphate was > that of CaO.

A. G. P.

Mobilisation of organic nitrogen in soil. M. KORSAKOVA (Proc. 2nd Internat. Cong. Soil Sci., 1932, 3, 132-133).—Soils are classified according to their ability to mobilise accumulated N. In general, nitrification is limited by a deficiency of suitable material rather than by inherent incapacity. A. G. P.

Importance of the C:N ratio and some other properties of organic matter in its action on plants and for its nitrification. O. LEMMERMANN (Proc. 2nd Internat. Cong. Soil Sci., 1932, 3, 98-105).—In the decomp. of straw, cattle manure, etc., the attainment of a C:N ratio of <20 corresponded with dry matter

losses of approx. 50%. At this stage the material retained (dry matter basis) 2% N, the degree of humification (aq. NH<sub>3</sub> test) was > 30%, and the pentosan content < 12%. No appreciable injury to plant growth results from the use of manure in this condition. Beet leaves, lupins, etc. were nitrified in soil much more rapidly than cattle manure; the rate of nitrification was not closely related to the C:N ratio of the material, although the most rapid nitrification usually occurred in green manure of high protein content. A. G. P.

Soil nitrates as affected by addition of fertilisers and soil amendments. A. B. BEAUMONT (Proc. 2nd Internat. Cong. Soil Sci., 1932, 3, 57-63) .- With increasing applications of CaO the NO3' content of soil was raised to a max. val., beyond which further additions were either ineffective or reduced nitrification. Green manuring checked nitrate accumulation for a period of a few weeks after ploughing-in, but the subsequent nitrification was rapid. Applications of K slightly increased nitrification, but P fertilisers had a negative action. The effects of CaO and manures were not additive. Application of N fertilisers increased the  $NO_3'$  in soils to an extent > the equiv. N added. Weather conditions largely influenced the action of various N fertilisers. In dry seasons the NO3' accumulation was in the order  $NaNO_3 > (NH_4)_2 SO_4 > cotton$ seed meal, and in wet seasons  $(NH_4)_2 SO_4 > NaNO_3 >$ cottonseed meal. A. G. P.

Bacteriological method for determining the fertiliser requirement of soils by the soil-plate method. H. KELLER (Zentr. Bakt. Par., 1932, II, 86, 407-413).—The method involves direct observation of the growth of colonies of *Azotobacter* on soil plates treated with K and/or P. Results are compared with those of the Neubauer and Hertzner processes. A. G. P.

Comparison of methods for determining the availability of phosphorus [in soils]. H. J. SNIDER (J. Amer. Soc. Agron., 1932, 24, 680-685).-General agreement is recorded between the results of the Neubauer and the Truog tests and field trials, in so far as they indicate a deficiency of P and also the higher limit beyond which P fertilisers give no further increase of yield. Differences between the efficiencies of superphosphate and "treble" superphosphate were shown in field trials and by the Truog test, but not in all cases by Neubauer's method. Truog's method showed steadily increasing vals. corresponding with increments in rock P applied, but Neubauer vals. varied with the type of soil used. All methods recorded the superiority of the more finely-divided rock P. A. G. P.

Phosphate deficiency in Montana soils. I. J. NYGARD (Montana Agric. Exp. Sta. Bulls., 1931, No. 240, 32 pp., 1932, No. 259, 27 pp.).—Applications of "treble" superphosphate to P-deficient soils increased the P and (to a smaller extent) the N contents of lucerne. Blackheart of sugar beet was controlled by P dressings. Reduced germination of beet seed followed the application of superphosphate in a manner which permitted contact between seed and fertiliser in a dry seed b.d. The effects of P manuring on a no. of crops are recorded.

A. G. P.

Solubility curves of soil phosphoric acid as a means of determining soil fertility. E. BOBKO (Proc. 2nd Internat. Cong. Soil Sci., 1932, 4, 103–109).— Existing methods for determining the available  $PO_4^{\prime\prime\prime}$  contents of soils are compared. Soils are extracted with solutions of HCl and Ca(OH)<sub>2</sub> of varying conen. and the  $PO_4^{\prime\prime\prime}$  content and  $p_H$  of the extracts determined. "Solubility curves" expressing the relationship between  $p_H$  and  $[PO_4^{\prime\prime\prime}]$  may be utilised for characterising the P status of soils. A. G. P.

Determination of the easily soluble phosphorus in soils. H. J. HARPER (Science, 1932, 76, 415–416).—  $0\cdot 1N$ -AcOH is allowed to percolate through the soil sample and the P is determined colorimetrically, using NH<sub>4</sub> molybdate and SnCl<sub>2</sub>. L. S. T.

Effect of exchangeable base and soil treatments on phosphorus solubility [in soils]. A. T. PERKINS, H. H. KING, and E. J. BENNE (Soil Sci., 1932, 34, 385-392).-The effect of complete replacement of soil bases by H', Fe'', Al'', Ca'', Mg'', K', and  $NH_4$  on the  $H_2O$ -sol. P content of soils is examined. Replacement by K or  $NH_4$  increases the solubility of P. Treatment with  $CaH_4(PO_4)_2$  results in the pptn. of large proportions of PO4'" in Fe and Al soils, less in H, Mg, and Ca soils, and very little in K and NH<sub>4</sub> soils. In acid soils of similar  $p_{\rm H}$  pptn. is greater where acidity is due to adsorbed H' than when due to hydrolysis. Application of  $CaCO_3$  increases the sol. P in Fe, Al, and Mg soils, but decreases it in H, Ca,  $NH_4$ , and K soils. Liming increases P solubility in soils made acid by adsorbed Fe or Al, but decreases it in H soils. This effect is attributed to relative changes in  $p_{\mathbf{H}}$  rather than to the Ca". Addition of KCl has no effect on P solubility, irrespective of the nature of the adsorbed bases. A. G. P.

Determination of the potash requirement of soils. O. ECKSTEIN and A. JAKOB (Proc. 2nd. Internat. Cong. Soil Sci., 1932, 4, 40-45).—Relationships between growth characteristics and composition of plants suffering from K deficiency are discussed. The val. of the Hoffer method for detecting deficiency is generally confirmed. A. G. P.

Aspergillus method for determining the potash requirement of soils. L. E. KLESSLING (Ernähr. Pflanze, 1932, 28, 324—326).—A general parallelism existed between the results of the Dirks, Mitscherlich, and Niklas (Aspergillus) methods. The last-named tends to give too high vals. for org. soils, an increase of 0.5% of humic acid content resulting in a 50% increase in the yield of mycelium. A. G. P.

Factors affecting manganese availability in soils. S. D. CONNER (J. Amer. Soc. Agron., 1932, 24, 726–733). —On the soil examined, poor growth of oats resulted from lack of available Mn. This was remedied by applications of Mn salts,  $NH_4$  salts, urea, or HCl, or by steam-sterilisation. The use of NaNO<sub>3</sub>, tankage, green manure, or CaO did not improve the deficient soil.

A. G. P.

Influence of the form of combination of manganese and iron on the catalytic power of healthy and sour soils. E. PFEIL (Proc. 2nd Internat. Cong. Soil Sci., 1932 4, 30–39).—The catalytic activity of healthy humus-sandy soils is > that of similar but acid soils. This is ascribed to the increased solubility of Mn and Fe under acid conditions, sol. salts being less active than oxides, hydroxides, or carbonates. In acid soils also the Mn and Fe contents may be reduced considerably by leaching. Decreased catalytic power resulting from drying or ignition of soils is due to the conversion of higher into lower oxides of Fe and Mn. A. G. P.

Effect of liming soils on the availability of manganese and iron. L. G. WILLIS (J. Amer. Soc. Agron., 1932, 24, 716—726).—The literature on this subject is discussed and inter-relationships between the oxidative processes in soils and the availability of Fe and Mn are examined. Liming may induce symptoms of Fe deficiency in plants as a result of disturbance of physiological functions irrespective of the solubility of soil-Fe.

A. G. P.

Determining the unsaturation and lime requirement of soils. I. von CSIKY and I. von TÖRÖK (Proc. 2nd Internat. Cong. Soil Sci., 1932, 4, 175–180).— Variations in the technique adopted in determining the hydrolytic acidity of soils by treatment with  $Ca(OAc)_2$ lead to marked differences in the vals. obtained, which are not comparable in soils of different type. Soils are classified as "unconditionally CaO-deficient" and "conditionally CaO-deficient" and characteristic limiting vals. of  $p_{\rm H}$  and hydrolytic acidity (Kappen) associated with the classification are recorded for various soil types. (Cf. B., 1931, 690, 723.) A. G. P.

Liming to increase the productivity of podsols in White Russia. O. S. KEDROV (Proc. 2nd Internat. Cong. Soil Sci., 1932, 4, 135—144).—Application of CaO to these soils increased the % N in the grain and straw of oats, rye, and flax. The P content of grain was not appreciably affected, but that of straw was increased. Although the total N and P assimilated by crops was greater on limed than on unlimed soils the N and citricsol. P contents after cropping were greater in the limed soils. The PO<sub>4</sub><sup>'''</sup> content of the plant sap was increased by liming. Liming did not affect the K contents of the crops to any appreciable extent, but the Ca and Mg contents were increased especially in the straw. There was also an increase in the fat and protein content of rye. A. G. P.

Action of magnesium salts on different soils. O. LEMMERMANN, W. JESSEN, and W. LESCH (Z. Pflanz. Düng., 1932, 11B, 489—507).—In pot cultures, applications of MgSO<sub>4</sub> to very acid soils considerably increased yields of rye. This effect was unrelated to the Mg content of the soils or to the degree of saturation with Ca<sup>\*\*</sup>. No indication of Mg deficiency in these soils was obtained by extraction with 20% HCl or with 10% NH<sub>4</sub>Cl. In general, highly acid soils showed max. response to Mg manuring. CaSO<sub>4</sub> was not antagonistic to H<sup>\*</sup> in soil. A. G. P.

Survey of the smoke-injured area of the Oker foundry. F. SCHUCHT [with H. H. BAETGE and M. DÜKER] (Landw. Jahrb., 1932, **76**, 51–98).—The distribution of Cu, As, Zn, and Pb in soils surrounding the foundry is surveyed. Crop injury is largely due to soil acidity resulting from SO<sub>2</sub> and  $H_2SO_4$  in smoke. Effects of metallic poisons are insignificant. A. G. P.

Relation of standard electrode potentials and ionisation potentials of atoms to cation exchange in soils and the absorption and utilisation of nutrients by plants. H. P. COOPER (Proc. 2nd Internat. Cong. Soil Sci., 1932, 4, 164—174).—Earlier work is discussed. Correlation is established between the proportion of minerals present in plants and the position of the nutrient elements in the electromotive series, and also between the absorption of cations by plants and their removal from soil by electrodialysis. Inter-relationships between the activity of cations in colloidal systems, molar solubilities of salts, the absorption by plants of radiant energy, and the nutrient intake of plants are examined. A. G. P.

Effect of fertilisers on the absorbing complex of chernozems. A. I. PIATENKO (Proc. 2nd Internat. Cong. Soil Sci., 1932, 4, 224—248).—Repeated applications of  $(NH_4)_2SO_4$  (with superphosphate and K salts) reduced, and farmyard manure increased, the adsorptive capacity of a degraded chernozem. Such changes in adsorptive capacity are related to changes in hydrolytic rather than in exchange acidity, an inverse relationship existing between acidity and adsorptive capacity. Changes in the structure of soils are associated with decreased base adsorption. A. G. P.

Effect of the organic constituents of farmvard manure on soil fertility. A. I. ACHROMEIKO (Proc. 2nd Internat. Cong. Soil Sci., 1932, 4, 158-161).-The drying of fresh farmyard manure considerably reduced its crop-producing power. The effect on rotted manure was much less marked. This is ascribed to the reduction in the sol.-N content of the material and the production of conditions unsuitable for bacterial development. Fresh and rotted manure contained a sufficiency of available K but not of available P or N to produce marked crop increases in sand cultures. Under these conditions nitrification was much slower in fresh than in rotted manure. Neither material had an appreciable NO<sub>3</sub>' content initially. In sand cultures, yields of oats and mustard were increased by additions to a complete nutrient of rotted but not of fresh manure. With legumes both materials produced increased yields. Additions to soil of fresh manure decreased, and of rotted manure increased, yields of oats, barley, and mustard. The inhibitory effect of fresh manure is more apparent in acid than in alkaline soils and is due, not to denitrification, but to delayed nitrification both of it sown N constituents and those of added fertilisers. A. G. P.

Rôle of sulphur in plant nutrition. W. L. POWERS (Proc. 2nd Internat. Cong. Soil Sci., 1932, 4, 46–53).— In the soils examined S improved the growth of legumes by increasing the concn. of  $SO_4''$  and of bases (especially Ca) in the soil solution. A. G. P.

Variation in the "effect factor" of the yield formula of Mitscherlich. V. M. KLECHKOV (Proc. 2nd Internat. Cong. Soil Sci., 1932, 4, 110-120).— Existing experimental data are discussed and a mathematical expression is established, representing changes in c resulting from interdependence of growth factors.

A. G. P.

Mathematical interpretation of the effect of nutrients [on plant growth]. A. T. KIRSANOV (Proc. 2nd Internat. Cong. Soil Sci., 1932, 4, 6—13).—In pot cultures, growth curves obtained with oats receiving increasing proportions of  $K_2SO_4$  have a sharper rise, higher max., and more rapid decline than when equiv. amounts of KCl are used. The descending portion of N-growth curves produced by excessive applications of N are steeper when NaNO<sub>3</sub> than when  $(NH_4)_2SO_4$  is applied. The Mitscherlich method is discussed in relation to the effect of external factors and the interaction between soil and fertiliser on the val. c. A modified formula representing growth curves is presented. A. G. P.

Ecology of oats. II. Germination in sugar solutions under outdoor growth conditions and relations between grain production, seedling suction force, and yield. O. TORNAU and K. MEYER (J. Landw., 1932, 80, 271–292; cf. B., 1932, 953).— The effects of a uniform and an interrupted  $H_2O$  supply on seed quality, yield, and blanching (of ears) are examined. A. G. P.

Soil reaction and the behaviour of barley and rice. K. Aso (Proc. 2nd Internat. Cong. Soil Sci., 1932, 4, 14–18).—In pot-culture experiments the optimum  $p_{\rm H}$  for growth of rice was approx. 4.0 and for barley 7.0. A. G. P.

Fertilisation of early potatoes. J. E. METGER and E. H. SCHMIDT (Maryland Agric. Exp. Sta. Bull., 1932, No. 333, 49—62).—Applications of N in any one form were less satisfactory than mixed materials. Best results were obtained with a combination of org. N and a relatively large proportion of inorg. N. Green manure (cowpea, soya bean) alone was insufficient to maintain an adequate supply of N. Fertilisers applied in the rows were more effective than when used as side dressings. A. G. P.

Preservation of the surface in potato silage. G. RUSCHMANN and W. MEYER (Landw. Jahrb., 1932, 76, 99—112).—To preserve surface material in the silo during intervals of exposure, treatment with solutions containing 0.6—1.2% HCl and 6% sugar is effective. Invert sugar is preferable to sucrose or molasses.

A. G. P.

Hard seeds in legumes. W. O. WHITCOMB (Montana Agric. Exp. Sta. Bull., 1931, No. 248, 63 pp.).— Treatment of "hard" seeds with H<sub>2</sub>SO<sub>4</sub>, by scarifying or heating, increased the % germination. A. G. P.

Nitrogen losses in the decomposition and humification of red clover. J. ZOLCINSKI and MUSIEROWICZ (Proc. 2nd Internat. Cong. Soil Sci., 1932, 4, 258—262). —During the humification of red clover there is a steady increase in the % total and protein N, but a considerable loss in the abs. amount of N present in the material. The loss occurs mainly as  $N_2$ . The C:N ratio of the decomposed clover approaches that of the humus of black earths and podsols. The P constituents of the clover undergo no change during humification. No definite relationships exist between time, temp., and degree of humification. Combination between humic acid and Ca is more rapid at higher temp.

The ash content of clover increases during humification nearly as quickly as in the case of lucerne and is influenced by temp. A. G. P.

Effect of additions of nitrogen on the decomposition of sugar-cane trash under field conditions. M. B. STURGIS (J. Amer. Soc. Agron., 1932, 24, 690— 706).—The reduced  $NO_3'$  content of soil resulting from the ploughing-in of trash persists for 3 months. Admixture of 5 lb. of N per ton of trash effectively counteracted this. During the decomp. of trash the available P content of soil increased by 15—20 lb. per acre. After decomp. of the trash (*i.e.*, when the C: N ratio attained that of untreated soil) approx. 14% of the total org. matter remained as carbohydrate. Lignin decomposed more slowly and tended to accumulate if buried deeply in soil, but when incorporated with the surface soil was transformed into a lignin-humus having a lower C content than the original lignin. A. G. P.

Effect of potassium on production of proteins, sugars, and starch in cowpea and sugar-beet plants and the relation of potassium to plant growth. G. JANSSEN and R. P. BARTHOLOMEW (J. Amer. Soc. Agron., 1932, 24, 667--680).—The intake of K by plants was greater when heavy applications of K fertilisers were made. Cowpea plants in low-K nutrients contained more reducing and total sugars and less starch than those from high-K nutrients. The % of total N, protein N, and (in most cases) NH<sub>2</sub>-acid N was greater in low- than in high-K plants. N, sugars, and starch are not limiting factors in the growth of K-deficient plants. Low K contents of plants are associated with characteristic differences in anatomical structure.

A. G. P.

Relation of agronomic practice to the quantity and quality of oil in flax seed. I. J. JOHNSON (J. Agric. Res., 1932, 45, 239—255).—Rates of development in size, wt., no., and oil content of flax seed are recorded. In the synthesis of oil in the seed saturated fatty acids are probably produced initially, but these are gradually transformed into unsaturated acids. The effects of late planting on yield, structural and chemical characteristics of seed are recorded. A. G. P.

Chemistry of Japanese plants. X. Utilisation of plant ash in chemical industries. I. S. KOMATSU and Y. OGATA (Mem. Coll. Sci. Kyoto, 1932, 15, 341— 349).—The stimulatory action of plant ash on the growth of Aspergillus niger in the prep. of saké is ascribed to its content of Ca, Mg, K, and P. Seasonal variations in the ash composition of leaves and twigs of the Hoso tree (Quercus senata) are recorded. A transference of mineral matter from leaf to twig occurs prior to leaf fall. A. G. P.

Plant injury by ammonia gas and its detection. G. BREDEMANN and H. RADELOFF (Z. Pflanzenkr. Pflanzenschutz, 1932, 42, 457-465).—Plants are much more sensitive to NH<sub>3</sub> injury in daylight than in darkness. In injured tissues chlorophyll decomp. and tannin pptn. occur. Leaves of many plants are more sensitive than flower petals. NH<sub>3</sub> in injured tissues is detected by treating 1 g. of the material with 1-2 drops of 1% NaOH on a micro-slide and allowing the NH<sub>3</sub> produced to impinge on a hanging drop of H<sub>2</sub>PtCl<sub>6</sub> solution. The characteristic crystals of the  $NH_4$  salt are examined microscopically. A. G. P.

Relation of calcium and magnesium to the growth and quality of tobacco. J. E. McMURTREY (J. Amer. Soc. Agron., 1932, 24, 707–716).—On certain soils tobacco, although receiving N, P, and K, showed a pathological condition due to deficiency of Mg and Ca. In normal plants the Ca content of the leaf is > 1% and Mg > 0.25%. Where org. manures were used no symptoms of Ca or Mg deficiency were observed.

A. G. P.

Toxicity of ammonium compounds for tobacco. A. B. BEAUMONT (Proc. 2nd Internat. Cong. Soil Sci., 1932, 4, 65—78).—Tobacco plants supplied with NaNO<sub>3</sub> produced much greater yields than when  $(NH_4)_2SO_4$ ,  $NH_4H_2PO_4$ ,  $NH_4Cl$ , or  $NH_4NO_3$  was given. The toxicity of  $NH_4$  was reduced by NaNO<sub>3</sub> to a degree proportional to the % NaNO<sub>3</sub> present. Additions of CaCO<sub>3</sub> improved the early stages of growth where  $(NH_4)_2SO_4$  was supplied, but the toxic effect of  $NH_4$  predominated later and yields were inferior to those of plants receiving NaNO<sub>3</sub>,  $NH_4$  toxicity which is apparent in nutrients containing > 6 p.p.m. cannot be ascribed to physiological acidity produced, but results from poor assimilation and consequent abnormal metabolism. A. G. P.

Wetting, spreading, and emulsifying agents for use with spray fluids. III. Emulsifiers, and soaps containing spraying oils. R. M. WOODMAN (J.S.C.I., 1932, 51, 358—3607).—Mechanical violence in the prep. of spray stock emulsions is discussed. Linseed products are unsuitable as spray emulsifiers. General formulæ for preparing moderately stable soaps containing insecticidal and ovicidal oils and spray substances such as  $C_{10}H_8$  are given, but the % of toxic oil embodied is probably too low to advocate the general use of these soaps.

Bacterial and fungal flora in certain sulphur fungicides. J. F. ADAMS (Phytopath., 1932, 22, 785—786).—Various S preps. had a considerable microflora control, notably of the *B. fluorescens* group and also *Aspergillus* and *Penicillium*. A. G. P.

Action of some contact poisons on forest insects. F. SCHWERDTFEGER (Z. Pflanzenkr. Pflanzenschutz, 1932, 42, 426—440).—Field trials with derris preps. are recorded. A. G. P.

Action of [seed] dusts. R. SUPPER (Z. Pflanzenkr. Pflanzenschutz, 1932, 42, 305-350).—The efficiency of certain dusting materials is examined in soils of varied type under conditions corresponding to heavy rainfall soon after the sowing of treated seed. Reduced activity of the dusts was apparent only in very acid soils in the control of *Fusarium*. For the control of *Helminthosporium* little difference in action was observed in the above conditions. Fungicidal action was complete in most cases after 24 hr. Effects of storing treated seed in a moist and in a dry atm. on the activity of the fungicides are recorded. A. G. P.

Dusting versus spraying of apples. C. L. BURK-HOLDER (Indiana Agric. Exp. Sta. Bull., 1931, No. 356, 28 pp.).—Relative efficiencies of various S treatments

are examined. In general, wet spraying was more effective than dusting. A. G. P.

Arsenical spray residue on cherries. R. H. ROBINSON (Oregon Agric. Exp. Sta. Bull., 1932, No. 298, 15 pp.).—Cherries frequently retained As in excess of the limit of tolerance. Washing with 0.3% HCl removed more As than did 0.5% NaHCO<sub>3</sub>. Residues from bait sprays (molasses + Pb arsenate) were rather more easily removed than those from Pb arsenate alone. A. G. P.

Control of the cochineal insect (*Euleconium* corni, Bche.). T. GANTE and R. ZIMMER (Z. Pflanzenkr. Pflanzenschutz, 1932, 42, 121–123).—Carbolineum preps. and also 5% crude oil emulsions were effective. A. G. P.

Control of the annual nettle. T. YOUNG and R. G. HEDDLE (Scot. J. Agric., 1932, 15, 77–79).—Applications of NaClO<sub>3</sub> (5 lb. in 50 gals. of  $H_2O$  per acre) gave satisfactory results in destroying nettle in rye grass. The latter although scorched at the tips rapidly recovered. A. G. P.

Control of the blossom blight stage of fire-blight. H. R. ROSEN (Science, 1932, 76, 447–448).—A spraying technique which controls blossom blight in apple trees is described. L. S. T.

Control of the wheat midge by cultivation and manuring. H. KLEE (Ernähr. Pflanze, 1932, 28, 323-324).—In soil treatment to destroy larvæ production, the % reduction in the no. of flies was : for kainit (8 cwt. per acre) 59, CaO (16 cwt. per acre) 47, and for CaCN<sub>2</sub> (4 cwt. per acre) 40. A. G. P.

Control of warble flies. W. M. DAVIES and E. JONES (J. Min. Agric., 1932, 39, 805-813).—High % destruction of warbles resulted from the use of derris washes and powder. Similar results were obtained with cubé root (which is richer in rotenone than derris).

A. G. P.

Verticillium wilt of cotton in Mississippi. L. E. MILES and T. D. PERSONS (Phytopath., 1932, 22, 767-773).—The heavier sedimentary and alluvial soils are more favourable to the spread of the disease than the light sandy types. A. G. P.

 $P_2O_5$  in sugar canes.—See XVII.

See also A., Dec., 1226, Aliquot and filter devices [for soil analysis]. 1230, Genetic soil classification. Soils (various). 1289, Citric acid production by *Aspergillus niger*. 1296, N fixation in dead forest leaves.

#### PATENTS

[Ammonium sulphate-nitrate] fertilisers. RUHR-CHEMIE A.-G. (B.P. 383,628, 11.4.32. Ger., 12.4.30).— Residual acid in the fertilisers prepared as described in B.P. 370,993 and 370,995—6 (B., 1932, 618) is neutralised by the addition of suitable substances other than  $NH_3$ , e.g., CaCO<sub>3</sub>, dolomite, slag. L. A. C.

Preparation of a mixed fertiliser containing easily assimilable phosphates and nitrogen. CHEM. FABR. KALK G.M.B.H., H. OEHME, and E. HERRMUTH (B.P. 383,434, 27.11.31. Ger., 28.11.30).—Superphosphate is treated, e.g., in a rotary drum, with a countercurrent of conc. NH<sub>3</sub> gas in excess at a temp.  $> 75^{\circ}$ ; the drum is provided with means to prevent condensed  $\rm H_2O$  from mixing with the reaction products before they have absorbed < 1-2 mols. of  $\rm NH_3$  per mol. of  $\rm P_2O_5$ . L. A. C.

Manufacture of [phosphatic and nitrogenous] fertilisers. (A) H. SVANOE, (B, C) E. R. BOLLER, ASSIS. to E. I. DU PONT DE NEMOURS & CO. (U.S.P. 1,849,508, and 1,849,703-4, 15.3.32. Appl., [A] 25.9.29, [B, C] 31.10.30) .- (A) Phosphate rock is treated with sufficient HNO3 to convert the Ca3(PO4)2 into H2O-sol. phosphate and the product is treated above 40° with sufficient NH<sub>4</sub> carbamate to yield a non-hygroscopic fertiliser. (B) The rock, together, if desired, with CaHPO<sub>4</sub> from a subsequent operation, is treated with HNO3 and the product, after removal of the insol. residue, is treated with NH3 in stages to ppt. successively CaH4(PO4)2 and  $CaHPO_4$ , the ppt. being removed at each stage ; the end-liquor is treated with  $NH_3$  and  $CO_2$  to ppt.  $CaCO_3$  and yield NH<sub>4</sub>NO<sub>3</sub> solution. (c) The rock is treated with HNO3 (e.g., of 50% concn.) and the product, preferably after dilution with liquor from a previous batch, is treated with NH<sub>3</sub> to ppt. and remove CaHPO<sub>4</sub>; part of the liquor is used as the diluent and the remainder is treated with NH<sub>3</sub> and CO<sub>2</sub>. L. A. C.

Preparation of mixed manures containing ammonium nitrate. LONZA ELEKTRIZITÄTSWERKE U. CHEM. FABR. A.-G. (B.P. 383,663, 7.8.31. Switz., 10.8.30).—Hot, conc. (preferably 95%) NH<sub>4</sub>NO<sub>3</sub> solution is stirred with CaCO<sub>3</sub> in heat-insulated apparatus.

L. A. C.

Fungicide [for treating seeds]. F. WILCOXON, Assr. to CROP PROTECTION INST. (U.S.P. 1,849,778, 15.3.32. Appl., 20.10.26).—The use is claimed of CuHg(SCN)<sub>4</sub>, alone or mixed, *e.g.*, with talc. L. A. C.

Solid  $(NH_4)_2HPO_4$ .  $K_2SO_4$  etc. from alunite. S from fuel gas.—See VII.

#### XVII.—SUGARS; STARCHES; GUMS.

Technological evaluation of beet. J. DĚDEK and D. IVANČENKO (Z. Zuckerind. Czechoslov., 1932, 57, 49—53, 59—63, 67—69, 73—77).—Data are reproduced, the purpose of which is to show that the so-called digestion figure (polarisation of the hot aq. extract) gives an insufficient idea of the actual quality of the beet, and that for the exact comparison of beet varieties the ash and N vals. per 100 polarisation, not only for the roots, but also for the juices, should also be included.

J. P. O.

Determination of "harmful nitrogen" in sugar beets. I. I. VOITKEVICH and A. V. TERPUGOV (Nauk. Zapiski Tzuk. Prom., 1931, 11, 315–321).—Differences are attributed chiefly to methods of sampling. The gross sample should be  $\bigstar$  160 roots. CH. ABS.

Phosphoric acid in sugar canes. J. O. CARRERO (Rept. Mayaguez Agric. Expt. Sta., Porto Rico, 1931, 11).—The  $P_2O_5$  content of the juice of various cane varieties varied from 9 to 31 mg. per 100 c.c., the highest results being obtained with POJ 2878, and the lowest with S.C. 12/4 and POJ 2725. Only about 50% of the total  $P_2O_5$  of the cane is recovered in the juice.

J. P. O.

Conductivity measurements for controlling the boiling process [for beet-factory massecuites]. F. Tödt (Deuts. Zuckerind., 1932, 57, 708-709).-The method is based on Claassen's observations that the viscosity of syrups varies distinctly with the degree of supersaturation, and that the conductivity of such syrups varies with the viscosity. Preliminary measurements show the sp. conductivity of a beet syrup between the saturation limits  $1 \cdot 0 - 1 \cdot 25$  to lie between 290 and 132 units. Measurements are being conducted to determine the relations between purities, temp., and saturation nos. with the view of utilising conductivity determinations as a method of controlling the boiling process. J. P. O.

[Sugar] juice coloration during boiling. Influence of alkalinity, air, and iron on sulphured and unsulphured juice. V. STANEK and P. PAVLAS (Z. Zuckerind. Czechoslov., 1932, 57, 81-87)-Coloration of both types of juice increases during boiling in direct proportion to the alkalinity. Na2SO3 and  $Na_{2}S_{2}O_{5}$  exert a bleaching effect, the degree of which is dependent on the amount of SO, present. Air passed through the juice during boiling causes an enhanced darkening effect, even in sulphured juices. Traces of Fe salts act catalytically, hastening the coloration J. P. O. considerably.

Maximum [sugar] boiling-house recovery in connexion with equipment and process. O. D'HOT-MAN DE VILLIERS (Internat. Sugar J., 1932, 34, 428-430). -Changing from white to raw sugar manufacture in Mauritius has resulted in an unexpected increase in overall sucrose recovery, due largely to the disappearance of inversion losses with the conversion of clarification from the acid to the alkaline side, and to higher and more efficient maceration ; boiling-house recovery, however, compared with that in Hawaii and Java, is still low. To improve this the author urges slow and careful boiling, cooling, and curing, and especially the use of ample capacity at the low-grade station. Regarding the boiling process, the von Steitz method is considered to be ideal for conditions in Mauritius, and its adoption will result, with a little superheated steam at the centrifugals and ample equipment capacity, in producing a reasonably large refining crystal very near 99° polarisation. Moreover, there should be a convenient arrangement of the apparatus, making it possible to take back as footing for the first massecuites the low-grade crystals, which should be of a suitable degree of fineness for "seed." J. P. O.

Differentiating between refinery and factory molasses. K. SANDERA (Z. Zuckerind. Czechoslov., 1932, 57, 65-66).-If on centrifuging molasses diluted to 20-40° Bg., to which 3 c.c. of a 15% solution of C2HCl3 or C2H2Cl4 have been added, the presence of ultramarine or of indanthrene be detected in the ppt. obtained, the sample will "with certainty" have originated from a refinery. J. P. O.

Influence of rapid carbonatation on the filtration rate of [sugar] juice. F. PAULIK (Z. Zuckerind. Czechoslov., 1932, 57, 69-72).—Each of the six carbonatation tanks in the author's factory consists of a circular vessel (6.75 m.  $\times 1.63$  m.) having a rounded bottom. The gas distributor (A) consists of 3 radiating arms at

the end of each of which is placed a whirling device which sends the gas up the body of the liquid in a vortex, thus ensuring its max. utilisation. A vessel holding 814 gals. of juice, limed at the rate of 2% CaO on the roots, can be carbonated-off to 0.06% CaO in 5-8 min. During the discharge of the carbonated liquid, A is kept working, thus preventing the scums from subsiding while pumping away. This method of rapid carbonatation results in rapidly filtering scums, which can easily be sweetened-off. J. P. O.

Minimum lime content in the [sugar-juice] carbonatation process. K. D. DEKKER (Arch. Suikerind. Nederl.-Indië, 1931, 39, I, No. 44, 1161-1174).---Carbonatation has the advantage over sulphitation in that it affords 3 independent stages, viz., first carbonatation for removal of non-sugars, second carbonatation for elimination of excess CaO, and final sulphitation for bringing the juice to that  $p_{\rm H}$  at which inversion and glucose decomp. are a min. The influence of the amount of acid in the juice and the dissociation const. of any weak acids that may be present are discussed. J. P. O.

Microflora of carbonated juices preserved with an amount of lime equimolecular to the sucrose content. A. F. IVANOVA-ZHIKHAREVA (Zhur. Sakh. Prom., 1931, 5, 513-515).-Preservation is satisfactory if the surface is covered with a film of crude oil. CH. ABS.

Conductometric determination of the affinability of raw sugar. K. SANDERA and J. SAMAL (Z. Zuckerind. Czechoslov., 1932, 57, 57-59).-Factors influencing the accuracy of this determination have been examined. The amount of sugar used, whether 10 or 20 g., is unimportant, but the rate of flow in washing-off the molasses affects the results markedly, and 60 sec. should be the time taken. Distilled H<sub>2</sub>O only should be employed. Small differences of temp.  $(\pm 1^{\circ})$  can be ignored. Bronze should be specified as constructional material for the basket. J. P. O.

Refining of beet sugar without recrystallisation. L. O. SHNAIDMAN and I. F. ZELIKMAN (Nauk. Zapiski Tzuk. Prom., 1932, 18, 41-86) .- Diffusion juice is sulphited to  $p_{\rm H}$  4.5-5.0, defecated, and carbonated, 2.5% of CaO being used. After filtration and second carbonatation, sulphitation, and filtration, it is treated with norit  $( \ge 0.4\%$  on wt. of sugar) and filtered. The sulphited and filtered thick juice is mixed with remelt of sugar B and, with first run-off of massecuite A, is treated with norit (0.2%), filtered, and boiled. The greens of massecuite A with remelt of sugar C and first run-off of sugar B after treatment with used norit are boiled for sugar B. The massecuite C is boiled from dark run-off of massecuite B and light run-off of massecuite C, previously mixed and treated with used norit. After centrifuging and bleaching the massecuite Cthere are obtained 2 run-offs. The light one is returned for boiling the massecuite C, and the dark one is the final molasses. CH. ABS.

Some notes on the refining of sugar. ANON. (Internat. Sugar J., 1932, 34, 431-432; cf. B., 1932, 1099).—A typical analysis of a new char is given. Its average size lies between 6- and 50-mesh, but an even

grist of 30-36-mesh would probably provide the optimum point between decolorisation and capacity. The amount used may vary within 18 and 120% on the raw sugar according to conditions, but the average plant should work efficiently on 40-50%. It is usual to have 3 or 4 grades in use at a time, the oldest doing the heaviest work on affination syrups, remelts, etc., and the newest on washed liquors and syrup liquors. Schedule-working is preferred to the set system. A typical subdivision of time in a filtration cycle is: refiltration fine liquor, 10 hr. at 1500 gals./hr.; washed sugar liquor, 24 hr. at 1000; No. 2 granulated syrup liquor, 12 hr. at 800; 3rd filtration affination and J. P. O. remelt liquor, 8 hr. at 600.

Uniform determination of colour in the sugar industry. K. ŠANDERA (Z. Zuckerind. Czechoslov., 1932, 57, 44-48).-The use of the following colour standard for the Stammer colorimeter is proposed : 1.0 g. of NiSO4, (NH4)2SO4, 6H2O; 1.2 g. of  $CoSO_4$ ,  $(NH_4)_2SO_4$ ,  $6H_2O$ ; and 0.019 g. of  $K_2Cr_2O_7$ , this giving a colour val. of exactly 5.0° St. It should be freshly prepared and must not be filtered through paper. Its absorption curves differ very slightly in the green and yellow parts of the spectrum from those of J.P.O. solutions of beet molasses.

Controlling crystallisation [in sugar solutions]. P. HONIG (Internat. Sugar J., 1932, 34, 426-428).-Recent work in Java leads to the conclusion that the brasmoscope is of practical val. only when the peculiarities of the boiling system are taken into account, and so long as the fluctuations in the vac. are very small. In regard to secondary grain formation, the two main factors are : the crystallising massecuite in the vac. pan is not quite uniform as regards temp. and concn.; and the irregularities in the process of boiling, due partly to the apparatus itself and partly to the method employed, prevent the juice drawn in from being rapidly and homogeneously divided throughout the crystallising massecuite. J. P. O.

Crystallisation of sugar from fruit syrups. H. REINER (Deut. Destill.-Ztg., 1932, 53, 239-240; Chem. Zentr., 1932, ii, 937).-Polemical. A. A. E.

Determination of sucrose by double polarisation. G. S. LAYUG (Sugar News, 1932, 13, 419-428; cf. B., 1931, 1152).-Taking Walker's method, A, as adopted by the Hawaiian Sugar Technologists' Association, as the standard, the modified Deerr method, B (B., 1928, 423), gave results 0.23-1.97% lower. Very closely agreeing results were obtained by method A, and by a variation of it in which both readings were taken in the absence of Pb, but method B gave quite variable results. J. P. O.

Molisch's and Selivanov's reactions and their use for detecting sucrose in milk. A. CASTIGLIONI (Annali Chim. Appl., 1932, 22, 641-647).-The detection of sucrose, glucose, and lactose by these reactions requires very definite conditions of sugar and acid concn. and of temp. Details of a procedure for detecting sucrose in milk by means of resorcinol are given.

Sugar resins .- See XIII.

See also A., Dec., 1199, Adsorption of sugars by charcoal. 1200, Adsorption compounds of sucrose. 1236, Identification of carbohydrates. Determination of reducing sugars. 1237, New anhydroglucose. 1238, Prep. of maltose. Detection of reducing sugars. 1269, Determination of glucose and sucrose. 1296, Determination of starch in plant tissues.

# XVIII.—FERMENTATION INDUSTRIES.

Sterilisation in brewing by the catadyne process. H. LÜERS (Woch. Brau., 1932, 49, 377-381).-Sterilisation is effected in the catadyne process by H<sub>2</sub>O containing Ag ions produced by passing a weak electric current through the H<sub>2</sub>O as it flows between Ag electrodes. The catadyne H<sub>2</sub>O is odourless and nonpoisonous, and the manufacturing costs are low. Culture yeast and wild yeast are destroyed by exposure for  $\frac{1}{2}$  hr. to catadyne H<sub>2</sub>O with a Ag content of  $25-100 \times 10^{-6}$  g. per litre, whilst mycodermæ, AcOH bacteria, and sarcinæ are more resistant and require  $400-500 \times 10^{-6}$  g. per litre for their destruction. The yeast is killed more rapidly in acid and neutral solution than in alkaline, whereas sarcinæ are more sensitive to a neutral or alkaline reaction. Spores of fungi are not destroyed by exposure to  $500-600 \times 10^{-6}$  g. per litre. The germicidal activity of the catadyne H<sub>2</sub>O decreases very slowly on keeping, but contact with 0.2-0.3% of wort extract is sufficient to destroy it at once. C. R.

Degradation of protein during mashing of malt. P. KOLBACH (Woch. Brau., 1932, 49, 369-372).-Although malting contributes approx. twice as much sol. N to a malt wort as does mashing, the amounts of permanently sol. N produced during the two operations are approx. equal. The degree of degradation of the barley protein is greater during malting than during mashing, and, on an average, 56% of the permanently sol. N produced during malting is formol-N, compared with 23% of formol-N produced during mashing. The production of permanently sol. N during mashing reaches a max. at approx. 58°, whilst the optimum  $p_{\rm H}$ , which is  $4 \cdot 3 - 4 \cdot 7$  at 50°, increases with rising temp. If the permanently sol. N of the mash is divided into colloidal and molecularly sol. N, the proportion of colloidal to molecularly sol. N increases with rising temp., and at 40° 37% of the permanently sol. N consists of formol-N, as against 21% at 70°. Prolongation of the duration of the mash increases the amount of colloidal N at all temp. C. R.

Manufacture of solvents from maize grain [by fermentation]. G. DE BELSUNCE (Bull. Mat. Grasses, 1932, 16, 301-302).-A short review. **E**. L.

Alcoholic fermentation of concentrated musts. E. PARISI, M. SACCHETTI, and C. BRUINI (Annali Chim. Appl., 1932, 22, 616-620).-This fermentation is due to special sugar-tolerant yeasts of the Zygosaccharomyces genus which attack preferentially the fructose, giving, besides the normal products, also acetylmethylcarbinol and  $\beta\gamma$ -butylene glycol; these two compounds may be oxidised separately to Ac2 and then identified as the Ni compound of dimethylglyoxime. T. H. P.

Proteins in white wine. J. RIBÉREAU-GAVON (Ann. Falsif., 1932, 25, 518—524).—In the absence of sufficient tannin, heat-coagulable proteins are present in wines and cause cloudiness on maturing. They may be pptd. by adjusting the  $p_{\rm H}$  to 4.5 with  $H_2 {\rm SO}_4$ , by the addition of tannin, or by treatment with yeast with or without subsequent fermentation. T. McL.

Occurrence of benzoic acid in wine. T. von FELLENBERG and S. KRAUZE (Mitt. Lebensm. Hyg., 1932, 23, 138—139; Chem. Zentr., 1932, ii, 935).—BzOH (up to 16 mg. per litre) was found, by a modification of Mohler and Grossfeld's test, in mouldy or acid wines. New wine is free from BzOH. A. A E.

Cellulose fermentation. H. LANGWELL (Chem. and Ind., 1932, 988-994).-Cellulose-fermenting microorganisms apparently require a mobile liquid medium for their vigorous action and all attempts to prepare a pure culture have failed, since the methods now in use demand a solid culture medium. Fermentation of practically all the pure celluloses and also of starches, sugars, pentosans, hemicelluloses, hydrocellulose, mercerised and parchmentised cellulose may, however, be carried out at 60°; ligno- and cuto-celluloses are not fermentable and undergo fermentation only as the cellulose is liberated from combination. Cereal straws are intermediate between ligno- and true cellulose and leave an unfermentable residue of cellulose, apparently in combination. Bamboos appear to be thoroughly lignified and are virtually unfermentable. Steaming horse-dung was first used as inoculant, but this proved unnecessary, as almost all natural cellulose materials are heavily infected with the necessary organisms. Small amounts of phosphatic and N-containing salts are used as nutrients, and a neutralising agent such as NaHCO<sub>3</sub>, NH<sub>3</sub>, or (NH<sub>4</sub>)<sub>2</sub>CO<sub>3</sub> is added in either one or several portions. Although Fe salts scarcely affect the fermentation, metallic Fe exerts an oligodynamic action on the organisms and must be excluded from the fermenters. Stirring is necessary to keep the cellulose mass submerged, but must be regulated, so that the mash may not become mucilaginous and hence non-mobile. The products formed vary with the conditions and include AcOH, PrCO<sub>2</sub>H, EtOH, CH<sub>4</sub>, CO2, and H2. Aëration increases the EtOH, the CH4 being then replaced by H<sub>2</sub>, and the yield of CO<sub>2</sub> is low when NH3 and high when NaHCO3 is used. Conditions for max. yields of AcOH have been worked out and the process has been applied on an industrial scale. When  $\overline{\mathrm{NH}}_3$  is used, the final mash is mixed with  $\mathrm{Ca(OH)}_2$ , the  $\mathrm{NH}_3$  being recovered and the  $\mathrm{Ca(OAc)}_2$  treated with  $H_2SO_4$  to obtain the AcOH. T. H. P.

Determination [in fermentation liquors] of lactic acid in presence of succinic acid. A. TASMAN (Chem. Weekblad, 1932, 29, 694—696).—The usual method of determining total acids by titration and succinic acid by pptn. as the Ba salt is inaccurate to the extent of  $\pm 20\%$ , due to pptn. of Ba lactate. Results accurate to  $\pm 5\%$ are obtained by oxidising lactic acid with alkaline KMnO<sub>4</sub> to H<sub>2</sub>C<sub>2</sub>O<sub>4</sub> and determining the latter by titration with acid KMnO<sub>4</sub>. Details are given for extracting lactic and succinic acids from fermentation liquors. S. C. Cleaning screw stoppers.—See I. Plant ash [for prep. of saké].—See XVI.

See also A., Dec., 1285, New oxidation enzyme.

# PATENTS.

Preparation of butyl alcohol-acetone seed mashes. C. HANER and O. GAMPER, ASSTS. to PUBLICKER, INC. (U.S.P. 1,848,010, 1.3.32. Appl., 6.8.30).—A sterilised mash containing suitable nutrient materials is inoculated with butylic bacilli, and is aërated with substantially pure  $O_2$  during a portion of the period of propagation. C. R.

Production of gluconic acid [by fermentation]. K. BERNHAUER and L. SCHULHOF, ASSTS. to C. PFIZER & Co. (U.S.P. 1,849,053, 15.3.32. Appl., 26.11.27. Cf. B.P. 370,039; B., 1932, 573).—After growing Aspergillus niger in a nutrient medium at 30°, the mycelium is removed, washed, and used to ferment a solution of carbohydrate containing Ca(OH)<sub>2</sub>, CaCO<sub>3</sub>, or Na<sub>2</sub>CO<sub>3</sub>, but no nutrient salt. The acid is prepared by the usual methods from the gluconate, which can be crystallised from the fermented liquor. C. R.

Non-corrosive aq. alcohols.—See III. Ca lactate from whey.—See XIX.

#### XIX.-FOODS.

Protein content, water absorption, loaf volume, and loaf weight of two series of hard red spring wheats. L. R. WALDRON and C. E. MANGELS (J. Agric. Res., 1932, 45, 209–231).—With a genetically uniform wheat, differences in growth conditions resulted in greater protein variability, smaller variability of  $H_2O$ absorption, loaf wt., and loaf vol., and higher proteinloaf vol. correlation than occurred in wheats of varied origin grown under uniform soil conditions. Interrelationships are discussed statistically. A. G. P.

Evaluation of potato flour. B. LAMPE (Z. Spiritusind., 1932, 55, 247-248) .-- When 5% of potato flour, which developed a yellowish or bluish-grey colour when stirred into H<sub>2</sub>O, was admixed with wheaten or rye flour, the mixture did not differ in colour (both dry and in  $H_2O$  from that of the pure wheaten or rye flour. The baked products from the pure and admixed flours were also alike. Suggested standards for potato flour used for substitution are : moisture content  $\gg 12\%$ , residue after extracting the ash with 10% HCl > 0.15%, and the odour from the dry flour and from the flour stirred into cold and hot (50-60°) H<sub>2</sub>O should be pure. Determinations should be made of the colour,  $p_{\rm H}$ , reaction to litmus of the steam from the boiled flour, acidity to NaOH, and ash, for all of which rigid standards are difficult to fix. C. R.

Micro-examination of flour, paste, and bread. P. BRUÈRE (J. Pharm. Chim., 1932, [viii], 16, 420-421). -By the consecutive use of 0.5% bromocresol-green and phenosafranine in 60% EtOH, glutens are coloured blue and cellulose rose, whilst starch remains colourless. T. McL.

Rapid determination of moisture in flour and other finely-divided materials. E. A. FISHER and

J. THOMLINSON (J.S.C.I., 1932, 51, 355–358 T).—The material is mixed with powdered  $CaC_2$  and the loss of wt. due to loss of  $C_2H_2$  determined. The loss of wt. (expressed as % of the flour)  $\times 1.385 + a$  calibration const., K, equals the % moisture content. The apparatus employed is described and illustrated. The method is rapid and accurate under certain conditions, but has limitations which are discussed.

Determination of sulphuric acid in flour. P. BRUÈRE (J. Pharm. Chim., 1932, [viii], 16, 417–420).— Flour is shaken with 90% EtOH and left for 24 hr. 20 c.c. of the decanted liquor are added to 10 c.c. of recently boiled  $H_2O$  and titrated with 0.05*N*-NaOH to  $p_H 8.2$ , using phenolphthalein and then phenol-red as indicators. A blank titration is carried out on the reagents. T. McL.

Effect of sucrose, cooked potato, potassium bromate, and malt on baking strength at various yeast concentrations. R. H. HARRIS (Canad. J. Res., 1932, 7, 51–63).—The max. useful concn. of yeast is normally  $3\cdot0\%$ ; stimulants, such as potato extract, cause starvation with higher concn. in the absence of sucrose. In the presence of yeast stimulants the addition of malt or cooked potato improved the size and condition of the loaf. Cooked sweet potato acted both as a yeast stimulant and as a source of fermentable sugars. KBrO<sub>3</sub> produced larger loaves of poor grain and texture in the presence of sugar and malt with high yeast concn. T. McL.

**Rope prevention [in bread].** H. H. BUNZELL, M. FORBES, and R. SHERMAN (Arkady Rev., 1932, July and Sept. Reprint. 8 pp.; cf. B., 1931, 41).—AcOH is more efficient than either  $Ca(H_2PO_4)_2$  or tartaric acid. Whilst the amount of acid required varies according to the degree of infection, 0.8% on the wt. of the flour is usually sufficient. The addition of  $Ca(H_2PO_4)_2$  reduces the amount of AcOH required, T. McL.

Souring of sweet concentrated skim milk. W. MOHR and W. MULLER (Milchw. Forsch., 1932, 13, 388-393).—With starter cultures the souring process ceased after 8—10 days when approx. 2% of lactic acid had been formed. Re-inoculation and aëration did not advance the process. With yoghurt cultures 4-4.5%of lactic acid was produced. A. G. P.

Comparison of the principal constants used in determining the watering of milk. J. CERF (Lait, 1932, 12, 300–317, 400–413, 522–535; Chem. Zentr., 1932, ii, 939).—Bouin's const. and vals. of n, f.p., and Mathieu and Ferré's "C.M.S.R." are determined. In pathological milk only f.p. and "C.M.S.R." are applicable, and only the latter for milk treated with  $Cr_2O_7$ ".

A. A. E.

[Microchemical] determination of arsenic [in milk]. J. F. RETH (Pharm. Weekblad, 1932, 69, 1358-1374).—A method for determining 0.5- $-10 \times 10^{-6}$  g. As in 25 c.c. of milk is outlined. The org. matter is destroyed by heating with H<sub>2</sub>SO<sub>4</sub> and H<sub>2</sub>O<sub>2</sub> to 150°, the last traces of fat being removed with a small quantity of HNO<sub>3</sub>. Measurements were made on the isolation of the As as a mirror, which was titrated with I, but the results were low and inconsistent. Satisfactory results

are obtained by removing  $AsCl_3$  by distillation in a stream of HCl from a micro-distillation apparatus (described). The As in the distillate is then determined colorimetrically on HgCl<sub>2</sub> paper if the amount is  $\langle 20 \times 10^{-6}$  g. or directly by titration if  $\rangle$  this amount. (Cf. A., 1930, 799, 1198.) S. C.

Constants of Czechoslovakian butters. O. LAXA (Ann. Falsif., 1932, 25, 529–537).—The Reichert-Meissl val. (24-32) and the Polenske val.  $(1\cdot 0-4\cdot 4)$ are higher than those of butters from other countries. Curves are given showing the monthly variation in the consts. of butter fat. T. McL.

Behaviour of sulphurous acid in fruit juices. A. WIDMER, F. BRAUN, and O. E. KALBERER (Mitt. Lebensm. Hyg., 1932, 23, 82—94; Chem. Zentr., 1932, ii, 634).—Apple juice and the juice of pears harvested ripe and not stored combines with little  $SO_2$ . Juice of certain other pears is rich in aldehydes and combines with much  $SO_2$ . The aldehyde content of freshly expressed juice falls very rapidly. A. A. E.

Sugar content of fruit syrup.P. BERG (Konserven-<br/>Ind., 1932, 19, 313—315; Chem. Zentr., 1932, ii, 937).—<br/>The extract content of commercial samples was  $64 \cdot 6$ —<br/> $72 \cdot 9\%$ .A. A. E.

Tomato juice or tomato pulp. C. H. CAMPBELL (Canning Age, 1931, 12, 113—118).—Juice contained total solids 7.2 (sol. 6.7), ash 0.9 (salt-free 0.25), acidity (citric) 0.57, pectin 0.17%. Cooked tomatoes should not be pulped cold because of increased vitamin-*C* destruction. CH. ABS.

Solubilising and determination of solubility of cocoa. T. VON FELLENBERG (Mitt. Lebensm. Hyg., 1932, 23, 29–45; Chem. Zentr., 1932, ii, 462).—Treatment with steam and alkali is detected by means of I solution. For detection of alkali 0.1 g. is boiled with MeOH (30 c.c.); the extract is ashed, and the ash treated with H<sub>2</sub>O (0.5 c.c.) and tested with litmus paper. More strongly solubilised products are heated on a H<sub>2</sub>O-bath with H<sub>2</sub>O (5 pts.) and tested with litmus. To test for NH<sub>3</sub>, 2 g. of cocoa powder and 1 g. of MgO are enclosed in a flask with litmus paper for 10 min. A. A. E.

Freezing time of ice and aqueous foods. R. PLANK (Z. ges. Kälte-Ind., 1932, **39**, 56–58; Chem. Zentr., 1932, ii, 905).

Margarine. Determining Reichert-Meissl vals. etc.—See XII. Sugar from fruit syrups. Detecting sucrose in milk.—See XVII.

See also A., Dec., 1223, Determining Al in milk. 1256, Yellow colouring matter of Khapli wheat. 1270, Colour reaction for lecithin etc. 1276, Determination of Fe in milk. 1293–4, Vitamins (various).

#### PATENTS.

Cereal treatment process. W. C. ANDERSON, Assr. to M. C. MASON (U.S.P. 1,850,123, 22.3.32. Appl., 26.2.29). —Cereals, such as unmilled rice, are heated in a revolving cylinder so that the temp. is raised to 49° in about 20 min. and then further to 74° during the next 25 min., whereby the keeping properties are improved and development of rancidity is minimised. E. B. H. Production of soluble dried milk. C. KNOCH and A. E. SAUNDERS (B.P. 383,193, 3.5.32).—Milk is precondensed to 1 of its vol. within 30 min. in a circulating vac. condenser, then discharged through fine nozzles on to a steam-heated drum with enamelled surface. The dried milk is then scraped off. E. B. H.

**Recovery of calcium lactate from whey.** J. T. TRAVERS, ASST. to OHIO SANITARY ENG. CORP. (U.S.P. 1,850,643, 22.3.32. Appl., 24.10.27).—Whey is clarified in two stages and the lactose fermented to lactic acid, which is neutralised with CaO. Ca lactate is also recovered from the clarification tanks. E. B. H.

**Preparation of whipped cream.** L. ROUSH (B.P. 382,972, 17.8.31).—Air is forced through porous material at a pressure of 3—10 oz. per sq. in. into cream in a suitable container (which is described). Whipping is thus carried out without affecting the emulsion. E. B. H.

Manufacture of concentrated [nitrogenous] edible products [from animal tissue and separation of fats therefrom]. L. W. MAPSON, J. T. MAC-CURDY, H. O. NOLAN, and CAMBIO PRODUCTS, LTD. (B.P. 382,946, 23.7. and 13.10.31. Cf. B.P. 378,399; B., 1932, 959) .- Such edible products rich in vitamins are prepared from animal tissue by digestion with 0.02-0.5 wt.-% of papain at 60-80° and at  $p_{\rm H}$  4.5-5.0. An accelerator such as a CN or SH compound may be used. Concn. is effected by evaporating to a paste or drying and powdering. After digestion, the fats, oils, waxes, or lipoid-sol. vitamins may be separated from the digested proteins by centrifuging, by gravity, and/or by the use of H<sub>o</sub>O-immiscible solvents; or non-saponifiable oils, fats, and waxes may be added for the concn. of lipoidsol. physiologically active principles. E. B. H.

Preservation of foodstuffs or other materials against rancidity. M. R. COE (B.P. 383,661, 4.8.31. U.S., 4.12.30).—Rancidity in fats or fatty foods does not occur in light of wave-lengths between 4900 and 5600 Å.; wave-lengths outside this range can be excluded by the use of transparent green wrappers or the addition of dyes etc. to the food itself. E. B. H.

Casein films .--- See XIII.

# XX.-MEDICINAL SUBSTANCES; ESSENTIAL OILS.

Detection of methyl alcohol in spirit preparations. I. BERG. II. W. MEYER (Pharm. Ztg., 1932, 77, 1262, 1263).—I. Improvements in the method of Patzsch (B., 1933) are described.

II. The method using morphine is preferred.

A. A. L.

Preparation of nitroglycerin tablets. O. BARTSCH (Dansk Tidsskr. Farm., 1932, 6, 229-241).—Tablets made from lactose, agar-agar, 10% alcoholic nitroglycerin solution, and talc, the mixture having been previously granulated and dried on glass or metal plates for 5 hr. at  $12-15^{\circ}$ , showed a loss of 11% of the nitroglycerin originally used. Drying for 2 hr. at  $35^{\circ}$ increased the loss to 17%, and drying for 23 hr. at  $35^{\circ}$ to 64%. The tablets may be kept in well-closed glass tubes for 4 months without further loss of nitroglycerin, but exposure at room temp. for 48 hr. results in an additional loss of 6%. A method for the determination of nitroglycerin in the tablets is described. H. F. H. Colorimetric determination of terpin hydrate in medicaments. J. PERELMANN (Pharm. Ztg., 1932, 77, 1204—1206).—The adaptation of the following method to the determination of terpin hydrate in tablets and medicinal preps. is described. 1 c.c. of a solution of 0.25—0.3 g. of terpin hydrate in 100 c.c. of EtOH is diluted to 10 c.c. with EtOH and 5 c.c. of this solution are treated with 5 c.c. of 5% aq. phosphomolybdic acid solution and then 5 c.c. of conc. H<sub>2</sub>SO<sub>4</sub> are added in 1-c.c. portions, with shaking between each addition. After 30 min. the mixture is diluted to 25 c.c. with EtOH and compared colorimetrically with similarly treated standards. E. H. S.

Determination of theobromine in pharmaceutical products by Boie's method. H. J. van GIFFEN (Pharm. Weekblad, 1932, 69, 1321—1325).—Theobromine is rapidly and accurately determined by Boie's acidimetric AgNO<sub>3</sub> method (B., 1930, 1168), using phenol-red as indicator. In presence of iodides and thiocyanates a further equiv. of AgNO<sub>3</sub> must be added, whilst acetates (NaOAc-theobromine preps.) and Ac derivatives must be destroyed by a preliminary hydrolysis with NaOH and evaporation with dil. H<sub>2</sub>SO<sub>4</sub>. The method in the Dutch Pharmacopœia is unreliable. S. C.

Microchemical identification of alkaloids [lunasine and lunacrine]. F. AMELINK (Pharm. Weekblad, 1932, **69**, 1390—1396).—Lunasine,  $C_{16}H_{21}N_2O_5$ , m.p. 188—189° (decomp.),  $[\alpha]$ —38°, forming intensely bitter solutions which fluoresce at dilutions of 1:1000, and lunacrine,  $C_{16}H_{20}O_3$ , m.p. 115—116°,  $[\alpha]$ —38°, give more or less characteristic colours with conc.  $H_2SO_4$ , Fröhde's, Erdmann's, Marquis', and Wasicky's reagents. Characteristic, microcryst. *compounds* (illustrated) are obtained with PtCl<sub>4</sub>, AuCl<sub>3</sub>, HgCl<sub>2</sub>, K<sub>3</sub>Fe(CN)<sub>6</sub>, K<sub>4</sub>Fe(CN)<sub>6</sub>, KOH, NaI, NaBr, (NH<sub>4</sub>)<sub>2</sub>SO<sub>4</sub>, Co(NO<sub>3</sub>)<sub>2</sub>, picrolonic acid, and Dragendorff's reagent, using 0·5—0·1% solutions. The dimensions of the various cryst. ppts. are given in mµ. S. C.

[Microscopical] staining of various kinds of strophanthus seeds with sulphuric acid. M. WAG-ENAAR (Pharm. Weekblad, 1932, 69, 1340-1349).-Colourings produced in sections of strophanthus seeds by a mixture of conc.  $H_2SO_4$  and glycerin (3:1) have been studied. This reagent is more satisfactory than 80% H<sub>2</sub>SO<sub>4</sub> and the colours are more intense, more permanent, and do not run together. The cell constituents in S. kombe seeds are stained mainly green ; some red cells occur in S. hispidus, but in some cases one lobe is stained red and the other green, and S. gratus stains red. These colours are ascribed to the fission products, hydroxymethyl- and methyl-furfuraldehyde, of cymarigenin glucoside or fructoside (green) and rhamnoside (red), respectively. Similar colours are obtained with pure glucoside and rhamnoside (g-strophanthin). The active constituent is also readily stained vellow with a mixture of equal vols. of glycerin and 10% NaOH or aq. NH2, but this reagent does not differentiate glucoside from rhamnoside. S. C.

Tobacco smoke. Z. MARGASIŃSKI (Przemysł Chem., 1932, 16, 224–225, 250–251).—The nicotine content of tobacco smoke is inversely proportional to the velocity of combustion of the cigarette, and directly to

the nicotine content of the tobacco. The smoke from 1 cigarette, containing 1 g. of tobacco, contains  $2 \cdot 1 - 4 \cdot 3$  mg. of nicotine, whilst the cigarette-end, 1 cm. in length, retains  $1 \cdot 9 - 2 \cdot 5$  mg. of nicotine. The treatment of cigarettes with "Bonicot" (2% aq. Fe NH<sub>4</sub> alum,  $0 \cdot 27\%$  citric acid) does not affect the nicotine content of the smoke; 50% of the nicotine is removed by filtering through  $0 \cdot 03$  g. of cotton wool. R. T.

Application of adsorbents for rendering tobacco smoke non-toxic. A. SCHAARSCHMIDT, H. HOFMEIER, and P. NOWAK (Chem.-Ztg., 1932, 56, 911-913).— Adsorption agents contained in tobacco containers, *i.e.*, cigar and cigarette holders, are inefficient in denicotinising the smoke, and under certain circumstances may result in increasing the toxicity. Due to the variation in nicotine content of the smoke with the method of smoking, the active life of such adsorbents varies with each individual. The adsorbent should be a part of the cigar or cigarette itself and preferably in the mouthpiece. Quant. experiments supporting these conclusions are described. E. H. S.

Removal of nicotine from tobacco smoke during smoking. I. TRAUBE (Chem.-Ztg., 1932, 56, 963).— The val. of  $SiO_2$ -gel filters in removing objectionable substances from tobacco smoke is discussed. The gel removes about 75% of the nicotine and practically all the resinous and tarry products in the smoke. The flavour of the tobacco is stated to be considerably improved by the removal of the latter substances, so that common tobacco smokes as coolly as do the more expensive varieties if a  $SiO_2$ -gel filter is used. A. R. P.

Ageing of, and changes in, essential oils. G. LOU-VEAU (Rev. Marques Parfum. Savonn., 1932, 10, 22, 208-225; Chem. Zentr., 1932, ii, 932).—Changes suffered by essential oils on keeping are assisted by air, H<sub>2</sub>O, metals, and, particularly, heat and light. A. A. E.

Pure rose otto. W. A. POUCHER (Perf. Essent. Oil Rec., 1932, 23, 375).—Two genuine 1932 Bulgarian oils contained 55% and 62% of citronellol and  $15 \cdot 2\%$  and  $6 \cdot 2\%$  of stearoptene and had congealing points of 17° and  $14 \cdot 2^{\circ}$ , respectively; a revision of the official limits for citronellol is advocated. The evaluation of rose otto by chemical analysis is of doubtful val. owing to the ease of adulteration. A compounded oil is described which has characteristics satisfying the accepted standards for rose oil, but is very difficult to detect when mixed with the pure material. E. H. S.

Determination of cineole in eucalyptus oils. A. T. S. SISSONS (J. Soc. Chem. Ind. Victoria, 1932, 32, 681-686).—The  $H_3PO_4$ ,  $H_3AsO_4$ , resorcinol, and o-cresol methods are reviewed; for accurate results the last-named method is preferred. A. R. P.

Physical constants of cineole in relation to its degree of purity. P. A. BERRY and T. B. SWANSON (Perf. Essent. Oil Rec., 1932, 23, 371-373).—The following consts. of pure cineole are given:  $d_{156}^{156}$  0.9294,  $n^{20}$  1.4575,  $\alpha$  nil, sp. heat 0.42, f.p. 1.3°, m.p. 1.3°, f.p. of mol. mixture with o-cresol (f.p. 30.2°) 55.8°. Dry cineole is hygroscopic, and Na<sub>2</sub>SO<sub>4</sub> is not a satisfactory drying agent; CaCl<sub>2</sub> is effective. E. H. S.

Cheimonanthus fragrans. G. LOUVEAU (Rev. Marques Parfum. Savonn., 1931, 9, 531-533, 573-574, 622—623; Chem. Zentr., 1932, ii, 931—932).—Extraction of the flowers with light petroleum affords paraffin  $(37 \cdot 2\%)$ , white wax  $(13 \cdot 7\%)$ , yellow fatty wax  $(11 \cdot 9\%)$ , and an oil (19%) having an odour of Me anthranilate and decaldehyde. Enfleurage affords an oil having  $d^{15} 0.9243$ ,  $[\alpha]_{\rm D} + 1^{\circ} 45'$ ,  $n_{\rm D} 1 \cdot 4714$ , acid val. 85 · 1, ester val. 90 · 3, ester val. after acetylation 198 · 1, and containing CH<sub>3</sub>Ph · OH (4% free, 2% esterified), linaloöl (8% esterified), other terpene alcohols (6%, chiefly free terpineol), sesquiterpene alcohols (3%, chiefly free farnesol), acyclic aldehydes (0 · 8%, much decaldehyde), terpenes (1%), sesquiterpenes (2%, probably cadinene), indole (<0 · 1%), and NH<sub>2</sub>Ac (0 · 2%). Me anthranilate was not found. After enfleurage the flowers yielded to light petroleum 0 · 3% of an oil having an odour like that of *Piper nigrum* oil. A. A. E.

Decomp. of Et<sub>2</sub>O.-See III. Tobacco.-See XVI.

See also A., Dec., 1223, Determination of metals in org. combination. 1226, Automatic percolator [for drugs]. 1244, Phenacetin. Prep. of *d*- and *l*-miotine, and of *p*-hydroxyphenyl alkyl sulphides. 1245. Halogen analogues of adrenaline and ephedrine. 1263, Pyrrylindoles as antimalarials. 1267, Echitamine in *Alstonia* barks. Micro-detection of alkaloids. Characterisation of arylarsinic acids. 1268, Arylthioarsenites. 1270, Colour reaction for phytosterols etc. 1290, Pure Shiga dysentery toxin. Purification of conc. antitoxins. 1291, Purification of bacteriophage. 1293-4, Vitamins (various). 1296, H<sub>2</sub>O capacity of tobacco.

#### PATENTS.

Perfumes, perfumed cosmetics, perfumed soaps, and analogous preparations. Howards & Sons, LTD. (B.P. 383,472, 18.1.32. Ger., 30.5.31).—A small proportion of 2-cyclohexylcyclohexanol or a homologue or derivative thereof is used as a fixative in such preps. H. R.-D.

Extracting the juice from liquorice. P. CONDOR-ELLI and B. A. Coco (U.S.P. 1,849,569, 15.3.32. Appl., 3.10.29. It., 26.8.29).—Spent liquorice roots are extracted with boiling aq. (2%) NH<sub>3</sub> and/or NH<sub>4</sub> salts, the mass is pressed, and the liquor conc. to a syrup.

E. H. S.

Manufacture of [alkoxy-]derivatives of benzylisoquinoline. CHINOIN FABR. CHEM.-PHARMACEUT. PRO-DUKTE A.-G., and E. WOLF (B.P. 380,874, 9.7.31. Ger., 1.8.30).—Phenylacetic  $\beta$ -hydroxy- $\beta$ -phenylethylamides containing alkoxyl groups preferably in both phenyl residues are treated with POCl<sub>3</sub> (etc.) in a solvent. Homoveratric  $\beta$ -hydroxyhomoveratrylamide gives an isoquinoline derivative, m.p. 145—147°. 3:5-Diethoxyphenylacetic  $\beta$ -hydroxy -  $\beta$  - 3: 5 - diethoxyphenylethylamide, m.p. 90—93°, and the corresponding OMe-compound, m.p. 95°, yield isoquinolines, m.p. 147° (as oxalate) and 99—101°, respectively. C. H.

Manufacture of stable concentrated solutions for therapeutic use. A. HOME-MORTON. From F. HOFF-MANN-LA ROCHE & Co. A.-G. (B.P. 381,012, 4.12.31).— Pyridones or piperidones are used as solvents or solvent auxiliaries in making aq. solutions of alkaloid salts, purine bases, hypnotics, camphor, etc. for injection A mixture of quinine hydrochloride (6 pts.) and 1-methyl-2-pyridone ( $4 \cdot 9$  pts.) is a clear liquid which can be diluted with H<sub>2</sub>O. Other examples use 1- $\beta\gamma$ -dihydroxypropyl-2-pyridone (m.p. 113°), 4-pyridone, 2:2:6trimethyl-4-piperidone, and 1- $\beta$ -hydroxyethyl-2-pyridone. C. H.

Manufacture of stable derivatives of a barbituric acid. A. CARPMAEL. From I. G. FARBENIND. A.-G. (B.P. 380,841, 24.6.31).--5-( $\Delta^1$ -cycloHexenyl)-5-ethylbarbituric acid is converted into Ca, Sr, or Mg salts, which are stable to light and air. C. H.

# XXI.—PHOTOGRAPHIC MATERIALS AND PROCESSES.

Bleacher for sepia toning. R. B. WILLCOCK (Brit. J. Phot., 1932, 79, 728).—A solution of  $CuCl_2$  and HCl is a reliable bleacher before sulphiding. Fine brownblack tones are produced by partly bleaching a sepiatoned bromide print in this solution and then redeveloping in a normal metol-quinol developer. The solution keeps well. J. L.

 $p_{\rm H}$  determination in photographic paper. R. E. LIESEGANG (Z. wiss. Mikros., 1931, 48, 369–370; Chem. Zentr., 1932, i, 1864).—Obliquely torn paper is treated with universal indicator. A. A. E.

Cause of yellowness in sepia toning. E. E. JELLEV (Phot. J., 1932, 72, 480–485).—The yellowness of a toned print increases with increasing dispersion of the Ag<sub>2</sub>S. Stale Na<sub>2</sub>S solutions are partly oxidised to Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub>; any K<sub>3</sub>Fe(CN)<sub>6</sub> left in the emulsion checks the Na<sub>2</sub>S and permits some colloidal dispersion of AgBr by the Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub>, before its conversion into Ag<sub>2</sub>S. Hence prints should be washed quite free of Fe(CN)<sub>6</sub><sup>'''</sup> before sulphiding; washing out is hastened by adding 1.5% of Na<sub>2</sub>CO<sub>3</sub> to the bleaching solution, or by washing with faintly alkaline H<sub>2</sub>O.

In a discussion, F. C. STARNES states that the use of alkali spoils the surface of the paper. J. L.

See also A., Dec., 1214, Grain size in emulsions. Photoanisotropic effect with dyes. Effect of intensity and fogs on latent images. Emulsion sensitisation by dyes. 1215, Testing materials with  $\gamma$ -rays. Grainless emulsion and  $\alpha$ -particles.

#### PATENTS.

Light-sensitive silver halide emulsions. I. G. FARBENIND. A.-G. (B.P. 380,702, 3.2.32. Ger., 3.2.31).— Selenocyanines, *e.g.*, that from 2-methylbenzselenazole ethiodide, sensitise photographic emulsions over the range 4300—5200 Å. Me, alkoxyl, or halogen may be present in positions *para* to the Se. C. H.

Light-sensitive photographic material. I. G. FARBENIND. A.-G. (B.P. 383,313, 7.8.31. Ger., 8.8.30).— Diffusion of filter dyes into the emulsion is avoided by using  $H_2O$ -insol. dyes which are rendered sol. by photographic treating liquids, or by applying a  $H_2O$ -insol. layer (e.g., abietic acid), together with the dye, which layer is rendered sol. by alkalis etc. J. L.

Photo-sensitive material [for colour photography]. AMIRA TRUST, and J. P. WELKER (B.P. 383,311, 4.8.31).—Sensitive emulsion is applied to a ransparent base in the form of lines or particles, with intervening clear, transparent spaces. Various mechanical, photographic, and chemical methods for the production of such material are described. J. L.

Anti-halation layer or filter layer for photographic plates and films. I. G. FARBENIND. A.-G. (B.P. 383,799, 20.1.32. Ger., 21.1.31).—A suitable azo dye, insol. in  $H_2O$ , but decomposable by the usual oxidising reversal baths (KMnO<sub>4</sub> and  $H_2SO_4$ ), is formed, from its components, in gelatin solution. The solution is chilled, washed, melted, and coated in the usual manner. J. L.

Drying of photographic plates or films. A. MURRAY, Assr. to EASTMAN KODAK Co. (U.S.P. 1,849,244, 15.3.32. Appl., 20.5.30).—The rapid drying of developed and fixed plates, as required between the different stages of various processes, is achieved by immersing the plates in conc. Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub> solution (about 65%) at 27°, and then removing excess solution with absorbent cloth. J. L.

Photographic diazo-type films and papers. LE FILM OZAPHANE (B.P. 383,791, 13.1.32. Fr., 16.2.31). —Diazotype papers giving correct gradation in prints from Ag salt printing cliches are characterised in having a max. optical density > 1.6 (and usually > 1.8). A suitable sensitising bath for use with regenerated cellulose films is described. J. L.

Colour photography. KODAK, LTD. Assees. of M. W. SEYMOUR (B.P. 382,974. 20.8.31. U.S., 23.8.30). —Optical apparatus is described for printing positives on lenticular film. J. L.

Toning bath for photographic prints. W. C. NELSON, ASST. to EASTMAN KODAK CO. (U.S.P. 1,849,245, 15.3.32. Appl., 21.7.30).—A modified "hypo-alum" toning bath, containing Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub>,  $(NH_4)_2S_2O_8$ , AgCl, and AuCl<sub>3</sub>, is described. Details of its prep. are given. A wide range of tones is obtainable according to the time of immersion (about 15 min.). The tones are uniform and reproducible, and no sediment is formed during toning. J. L.

[Positive film for use in two-]colour kinematography. Soc. Ital. PER LA CINEMATOGRAFIA A COLORI NATURALI CI. Co. NA., ANON. (B.P. 383,956, 22.5.31. It., 26.5.30).

Method and apparatus for the taking of X-ray photographs. R. A. GARDNER (B.P. 383,329, 19.8.31).

Metol. Chelidamic acid derivatives.—See III. Negatives without photography.—See XIII.

#### XXII.-EXPLOSIVES; MATCHES.

Influence of vaselines of different kinds on the stability of smokeless powders. M. TONEGUTTI (Annali Chim. Appl., 1932, 22, 620-626).—Heatresistance of powders containing vaseline is greater when the vaseline has a high Br val. than when it is less reactive. Highly coloured vaseline is better in this respect than pale forms. Pre-war cordite, C.06, made at Dueneberg for the German Navy, contained a dark vaseline of high Br val. T. H. P.

Nitrite content of cordite, mark C.2. M. TONE-GUTTI and B. DEBENEDETTI (Annali Chim. Appl., 1932 22, 627-630).—The nitrite content of this powder, determined by Angeli and Jolles' method (B., 1932, 401), varies from 1 mg. per 100 g. after 2—3 months to 80—140 h mg. after 10—20 years. The max. figures do not indicate deficient stability, as the amount of nitrite present does not seem to give a certain criterion of the stability of

See also A., Dec., 1210, Detonation of explosives. 1214, Action of heat etc. on Hg fulminate.

#### PATENTS.

Manufacture of (A) [tetranitroaniline] explosives, (B) nitrocellulose explosives, and (c) blasting stick. A. S. O'NEIL and A. G. SCHURICHT, ASSTS. to WESTERN CARTRIDGE CO. (U.S.P. 1,849,355—6 and 1,849,378, 15.3.32. Appl., [A] 12.3.25, [B, C] 28.10.26).—(A) A detonator composition is prepared by mixing tetranitroaniline (TNA) with, or dissolving it in, a nitro-hydrocarbon, e.g., trinitrotoluene (TNT). TNA alone or in admixture with TNT may also be used for sensitising and colloiding nitrocellulose. (B) Nitrocellulose grains are sensitised by surface-treating them with a solution of TNA in an aromatic NO<sub>2</sub>-compound of less sensitiveness. (c) Ground nitrocellulose powder is sensitised with 1—12% of TNA, or its mixture with, or solution in, an aromatic NO<sub>2</sub>-compound less sensitive than itself.

W. J. W.

T. H. P.

Manufacture of blasting powder. R. L. HILL, Assr. to ATLAS POWDER CO. (U.S.P. 1,850,106, 22.3.32. Appl., 26.12.29).—A combustible vegetable product, deficient in O, *e.g.*, sawdust, charcoal, or nutshells, is impregnated with a solution of  $NH_4NO_3$ , the mixture being dried, granulated, and mixed with black powder. (Cf. B., 1932, 1057.) W. J. W.

[Explosive] compositions of matter. W. DE C. CRATER, ASST. to HERCULES POWDER CO. (U.S.P. 1,850,224 -5, 22.3.32. Appl., [A] 3.7.29, [B] 8.8.30).—(A) Products obtained by nitrating quebrachitol, or a 1 : 4 mixture of quebrachitol and glycerin or glycol, and adding an oxidising salt and carbonaceous material are claimed. A suitable mixture is quebrachitol-glyceryl nitrate 40, NaNO<sub>3</sub> 46, wood meal 9, sawdust 4, CaCO<sub>3</sub> 1%. (B) An explosive is obtained by nitrating an optically active isomeride of inositol. The product is stable, less viscous than nitrosugar-nitroglycerin mixtures, and has a higher colloiding power than nitroglycerin. W. J. W.

Lignin derivatives.—See V.

#### XXIII.—SANITATION; WATER PURIFICATION.

Determination of ethylene oxide. O. F. LUBATTI (J.S.C.I., 1932, 51, 361–367 r).—Deckert's method (B., 1931, 180) accounts for  $\geq 90\%$  of the oxide. Using saturated MgCl<sub>2</sub> in place of 22% NaCl in the HCl reagent, nearly theoretical results are obtained. Other sufficiently sol. halides may be employed; with chlorides, solutions should contain  $\leq 30$  g. Cl in 100 c.c. The application of these reactions to the determination of C<sub>2</sub>H<sub>4</sub>O in fumigations is described. A modification of Müller's K<sub>2</sub>Cr<sub>2</sub>O<sub>7</sub> method (A., 1920, ii, 515) was used for checking the results. O. F. L.

Measurement of gas concentrations for control of fumigation. A. B. P. PAGE (J.S.C.I., 1932, 51, 369-374 T).—Three forms of vac.-bottle apparatus for sampling gas are described. In the first, an electrically heated wire cracks off a tube leading to the sampler. This cannot be used with inflammable gases. In the second, a capillary is broken by a modified electric bell. This is safe but bulky. In the third, the end of a tube is fractured by a nail attracted by a hollow solenoid. This is the best form. Errors inherent in the method have been studied for HCN and for  $C_2H_4O$ . No corrections need be applied except an "absorption correction" when determining unusually high concns. of HCN.

Nature and amount of the colloids present in sewage. II. Physical and chemical analysis of sewage. III. Influence of  $p_{\rm H}$  value on physical properties of sewage liquor. E. V. MILLS (J.S.C.I., 1932, 51, 349—355 r, 374—380 r).—II. A study of the types of particles encountered in a fresh, crude Norbury sewage. Ultra-filtration shows the distinction between the dispersed phase and the dispersion medium to be sharp. Quant. centrifuging reveals the presence of three distinct types of particles, of widely different particle size, in the dispersed phase. Both org. and inorg. constituents are dealt with.

III. The changes in the composition and stability of the dispersed phase covering a  $p_{\rm H}$  range of 10 to 2 are discussed. The particles are rendered less stable on either side of the normal, mainly as the result of chemical action. Reference is made to interchange between the dispersed phase and the dispersion medium.

Determination of [dissolved] oxygen [in water] in presence of sulphite. L. W. HAASE (Z. anal. Chem., 1932, 90, 241-246).—To the H<sub>2</sub>O under examination are added successively 1 c.c. each of 0.1N-I, 0.1N-Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub>, 30% NaOH containing KI, and 40% MnCl<sub>2</sub>, and 5 c.c. of conc. HCl. The sample is then titrated with 0.01N-Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub> or -I, according to which is in excess. The quantity of O<sub>2</sub> present can be calc. after the sulphite has been determined in a separate sample. F. L. U.

Determination of residual oxygen in degassed feed-water containing sulphite. W. WESLY (Z. anal. Chem., 1932, 90, 246—255; cf. preceding abstract).— Satisfactory results have been obtained by a modification of Winkler's method, in which the partly oxidised  $Mn(OH)_2$  is filtered in an atm. of N<sub>2</sub> prior to the final iodometric operation. Details are given. F. L. U.

Purification of drinking water by filtering through silvered sand. V. A. UGLOV, A. A. MILLER, and T. A. KAR-KADINOVSKI (Voyenno-Med. Zhur., 1931, 2, 5-11).—Effective filter-sand was prepared by pouring the hot sand into a solution of AgOH in aq. NH<sub>3</sub> and then treating with 20% CH<sub>2</sub>O. CH. ABS.

#### PATENTS.

Purification of polluted liquids. J. T. TRAVERS, C. H. LEWIS, and O. M. URBAIN, ASSTS. to OHIO SANITARY ENG. CORP. (U.S.P. 1,850,644, 22.3.32. Appl., 20.10.28). —Phenolic substances are removed from  $H_2O$  by contact for 30 min. with a granulated kaolinite-bearing substance which has been treated with solutions of Na silicate (d 1.38) and  $H_2SO_4$  (d 1.25) in equiv. proportions and subsequently dried. C. J.

H.O-softening gels.-See VII.

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this powder.