

# BRITISH CHEMICAL ABSTRACTS

## B.—APPLIED CHEMISTRY

MAY 25 and JUNE 1, 1934.\*

### I.—GENERAL; PLANT; MACHINERY.

**Theoretical foundations of the automatic regulation of temperature.** A. IVANOFF (J. Inst. Fuel, 1934, 7, 117—138).—The "potential temp." is defined as the limiting val. of the temp. change which the plant tends to attain for a given alteration in the position of the controls. A theory is developed which permits the calculation of the recorded temp. curve produced by a periodic variation of the potential temp. to be made. The theory is applied to the "on-and-off," the "proportional," and the "floating" methods of control. The influence of the friction and backlash in the control gear on the stability of the control is also discussed.

A. B. M.

**Development of new equipment materials for chemical manufacture.** W. R. HUEY (Ind. Eng. Chem., 1934, 26, 10—16).—Recent developments in air-free stoneware, alloy-clad steel, armoured  $\text{SiO}_2$  ware, Be alloys, Durichlor (high-Si Fe containing 4% Mo), 5—7% Cr steels, Haveg (a phenolic resin with asbestos fibre filler), paints and non-metallic coatings for metal, stainless steels, synthetic rubber, Sn plating, and Transite (a mixture of asbestos and Portland cement moulded under pressure) are discussed and their applications indicated.

D. K. M.

**Ball milling.** A. M. GOW, M. GUGGENHEIM, A. B. CAMPBELL, and W. H. COGHILL (Amer. Inst. Min. Met. Eng., Tech. Publ., 1934, No. 517, 52 pp.).—The effects of vol. of ball charge, size of discharge opening (I), feed rate (II), slipping of balls (III), density of the pulp for different mill speeds, and for (I)—(III) of different vols. of ball charge on power consumption, the power required by the gradual addition of the ore at different speeds, the relation of grinding capacity and efficiency at various speeds to ball size and grindability, and to the amount of ore in the mill, are illustrated graphically and discussed. The importance of the removal of finished material from the circuit when grinding with a circulating load is indicated. A formula is given by which the power required by a mill may be calc. from its dimensions, and also that required by a laboratory mill grinding under similar conditions. Stage grinding is discussed.

D. K. M.

**Studies in agitation. III. Simple agitator as classifier.** A. McL. WHITE and S. D. SUMERFORD (Ind. Eng. Chem., 1934, 26, 82—83; cf. B., 1933, 943).—Curves are given showing the sieving analyses of samples of a suspension of sand in  $\text{H}_2\text{O}$  withdrawn from different points of a tank in which an agitator revolved at different speeds. The use of a simple agitator as classifier is indicated.

D. K. M.

**Calculation of the specific surface of a powder.** H. HEYWOOD (Proc. Inst. Mech. Eng., 1933, 125, 383—459).—Fineness of a powder can be best expressed by means of the sp. surface ( $S$ ). An equation is derived for the determination of  $S$  which is applicable to most powders. The data required are the  $d$ , the sieve analysis, a vol. const. determined by measurement, and a surface const. which cannot be measured but can be indirectly obtained from tables given. Examples of the method of calculation, typical photographs, and vals. of the shape const. for particles of various materials are given.

T. W. P.

**Design of fractionating columns. I. Entrainment and capacity.** M. SOUDERS, JUN., and G. G. BROWN (Ind. Eng. Chem., 1934, 26, 98—103).—Entrainment impairs the quality of the distillate, reduces plate efficiency (a mathematical expression is given), and limits the output of fractionating columns. A theoretical equation is derived for the vapour velocity necessary for entrainment, and this is used to calculate a factor ( $C$ ) corresponding to the max. capacity of a no. of operating columns. Curves are given of  $C$  plotted against distance between column plates, showing the effect of vapour velocity on entrainment and on efficiency of the top plate of a column, and also a chart for calculating the allowable mass velocity of the vapour. The effect of the introduction of reflux at, and the withdrawal of side streams from, intermediate points of the column is discussed.

D. K. M.

**Determination of plate efficiency in fractionating columns for complex mixtures.** A. J. V. UNDERWOOD (Inst. Chem. Eng., Mar., 1934, 33—36).—Individual plate efficiencies can be deduced from determinations of liquid compositions, the vapour compositions being calc. from thermal and material balances. The sampling error involved in actual determinations of vapour compositions is thus avoided. Methods of calculation are illustrated for the 3 cases: (1) of miscible components only; (2) of distillation with saturated steam, liquid  $\text{H}_2\text{O}$  being present; and (3) of distillation with superheated steam, liquid  $\text{H}_2\text{O}$  being absent. Data on plate efficiencies are necessary for future improvement in design.

C. I.

**Application of physico-chemical principles to the design of liquid-liquid contact equipment. II. Application of phase-rule graphical methods.** T. G. HUNTER and A. W. NASH (J.S.C.I., 1934, 53, 95—102; cf. B., 1932, 963).—The computations necessary for calculating equipment size and results from industrial extraction processes when equilibrium conditions are not in accordance with the distribution law are

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



described. Graphical methods are employed making use of triangular co-ordinates in which the equilibrium in a three-component system is represented by a binodial curve and tie lines, whereby the results which are obtained from single-, multiple-, and countercurrent-stage contact processes can be easily computed. Each stage of any such process is assumed to be theoretically ideal, *i.e.*, that complete equilibrium is attained between the two phases resulting from such a stage. An actual stage, however, is not ideal and a graphical method of comparing the performance of an actual stage with an ideal stage is suggested. This depends on the fact that the composition of the exit phases from any stage, whether actual or ideal, must always be on the binodial curve.

**Softening of feed-water.** P. MARTINY (Maschinen-schaden, 1933, 10, 61—66; Chem. Zentr., 1933, ii, 3170).— $\text{CaO-Na}_2\text{CO}_3$ ,  $\text{CaO-NaOH}$ ,  $\text{NaOH}$ , or  $\text{NaOH-Na}_2\text{CO}_3$  should be employed according to the  $\text{H}_2\text{O}$  supply. The soda val. and phosphate excess are determined colorimetrically. H. J. E.

**Gas purification.**—See II. Applications of Al.—See X. Cleaning gases.—See XI. Drying of alimentary pastes.—See XIX.

## PATENTS.

**Furnace.** T. T. SCOTT, Assr. to SHEFFIELD STEEL CORP. (U.S.P. 1,917,068, 4.7.33. Appl., 13.11.30).—A reverberatory furnace utilising gas and/or oil fuel is described. B. M. V.

**Open-heath furnace.** H. M. MURPHY (U.S.P. 1,917,807, 11.7.33. Appl., 26.7.32).—A furnace (*F*) in which the fuel does not pass through the regenerators (*R*) is formed with only one passage (at each end) between *R* and *F*. B. M. V.

**Rotary furnace.** G. J. HAGAN (U.S.P. 1,919,650, 25.7.33. Appl., 21.4.31).—The goods, *e.g.*, metal plates, are suspended radially from the roof of an annular furnace, heat is provided from combustion spaces under the floor of certain zones, and the zones are separated by radial partitions which are retracted when the roof is rotated to advance the goods. B. M. V.

**Rotating [drum] furnace.** C. HALLER (U.S.P. 1,916,569, 4.7.33. Appl., 14.7.30).—The furnace is formed with different internal cross-sections at different zones in order to produce longitudinal oscillation of the bath. B. M. V.

**Furnace construction.** C. E. LEHR, Assr. to BETHLEHEM STEEL Co. (U.S.P. 1,924,936, 29.8.33. Appl., 22.8.31).—In a regenerative furnace, at least one section of the chequerwork in each regenerator set is removable (crane) from the flue as a unit. B. M. V.

**Continuous heat-treating furnace.** A. L. STEVENS, Assr. to A. L. STEVENS CORP. (U.S.P. 1,924,218, 29.8.33. Appl., 23.11.31).—The articles are conveyed within the furnace by a walking-beam mechanism and retrieved through the discharge door by an external mechanism having a longer stroke so that the doors may be kept closed as long as possible. B. M. V.

**Rotary kilns.** H. W. K. JENNINGS. From F. L. SMIDT & Co. A./S. (B.P. 407,329, 13.9.32).—A rotary kiln is provided with a no. of satellite cooling tubes (*A*)

at the lower end, the diam. of *A* increasing in the direction of travel (*i.e.*, up the axis of the kiln) and cooling ribs being provided both on the internal helical conveyor blades and the outer surface of the hotter end of *A*. B. M. V.

**Heat exchanger.** H. G. MELCHER, Assr. to J. G. CARRUTHERS (U.S.P. 1,916,768, 4.7.33. Appl., 9.9.32).—An exchanger of the filter-press type is described. Semi-annular passages alternately for each liquid are formed in the thickness of each plate. B. M. V.

**Heat-exchange apparatus.** A. L. STAMSVIK (U.S.P. 1,916,395, 4.7.33. Appl., 14.1.31).—An exchanger of the filter-press type is described in which all the plates except the end ones are alike. B. M. V.

**Heat-interchanging apparatus.** W. A. SCHMIDT, Assr. to INTERNAT. PRECIPITATION Co. (U.S.P. 1,916,337, 4.7.33. Appl., 28.11.31).—In the transfer of heat to or from a gas (*G*) which tends to deposit insulating coatings on the heat-transmitting surface (*S*), a scouring agent is added to *G*, and *S* is so formed that *G* passes in vortical or other high-velocity motion over it. B. M. V.

**Apparatus for cooling or heating granular or semi-liquid substances.** L. NUSBAUM (B.P. 405,484, 7.4.33).—Horizontal conduits (*C*) containing helical conveyors extend across the upper part of a heat-insulated tank (*T*) the bottom of which is filled with a heat-exchange liquid (*L*). *L* can be heated or cooled as required by the circulation of a suitable medium through a coil immersed therein. A pump withdraws liquid from the bottom of *T* and sprays it over the outer surface of *C*, through which the material to be heated or cooled is passed. A. B. M.

**Rotary dryer.** C. O. LAVETT, Assr. to BUFFALO FOUNDRY & MACHINE Co. (U.S.P. 1,919,229, 25.7.33. Appl., 3.6.31).—A dryer for use on the batch vac. system comprises a horizontal, rotating cylinder with a co-axial rotating flue which also supports helical stirring blades inclined in both directions in groups. B. M. V.

**Drying apparatus [cabinet].** H. S. WOOD (B.P. 406,406, 16.8.33).—A single heating means, forming the sole means of effecting circulation of air, is situated in a compartment divided off from the drying chamber between the latter and an exhaust flue. B. M. V.

**Drying apparatus.** O. ELSWORTH (B.P. 407,453, 9.11.32).—Air is heated in a surface heater (*A*) by combustion of fuel and passed under a metallic floor (*B*) supporting the goods (*C*), *e.g.*, coconut kernels or other material that does not pack tightly, then back over the upper surface of *C* to the chimney which carries away the products of combustion of *A* and forms the sole source of draught for the dryer. *B* may be perforated to a limited extent, the holes being smaller near *A* than at the remote end. B. M. V.

**Drying apparatus.** G. LERMUSIAUX and L. DUMERCHÉZ (B.P. 407,603, 3.8.33. Fr., 6.8.32).—Pulverulent material is passed down a tower against a current of hot gases, cascading being effected by fixed inclined baffles and horizontal rollers having a smooth surface, the upper rollers being rotated at a higher speed than the lower. B. M. V.



**Drying of coal and other granular materials.** B. NORTON (B.P. 407,731, 23.9.32 and 13.2.33).—Finely-granular material is subjected while on a foraminous conveyor to currents of air which are alternately upward and downward, and those in contact with the wet material are hotter than later currents. B. M. V.

**Device for the heat-treatment of comminuted materials.** F. E. HOBSON, Assr. to WESTERN COMBUSTION ENGINEERS, INC. (U.S.P. 1,924,788, 29.8.33. Appl., 14.8.31).—A vertical apparatus for the removal of volatile matter (I) from ores etc. is arranged for the low-temp. (I) (mostly  $H_2O$ ) to be delivered into the outgoing heating gases while the higher-temp. (I) is delivered lower down into a condenser. The ore is progressed by joggling the inner ore passage. B. M. V.

**Carrying out [and controlling] highly exothermic oxidation processes.** W. W. TRIGGS. From ZAHN & Co. G.M.B.H. (B.P. 406,919, 24.7.33).—Aryl ethers of high b.p. [ $Ph_2O$ ,  $C_{10}H_7 \cdot OPh$ ,  $p-C_6H_4(OPH)_2$ ] are maintained in heat-exchange relationships with the reaction mass so that heat is taken up by evaporation of the ether, under pressure if desired. Apparatus is claimed. H. A. P.

**Crushers.** BIRDSBORO STEEL FOUNDRY & MACHINE Co., Assees. of E. T. PETERSON (B.P. 407,245, 27.7.33. U.S., 26.8.32 and 20.5.33).—A crusher having a swing jaw, preferably double-faced, has the fixed jaw(s) pivoted at one end (usually the top) and the other end supported by spring-loaded toggles (prevented from completely straightening out) to permit uncrushable pieces to pass. For the various pivots knee-and-socket joints are preferred, having springs to take up lost motion. B. M. V.

**Crushing and/or grinding apparatus.** S. R. TONKIN (B.P. 407,852, 28.6.33).—Crushing is effected between an anvil block and a heavy rotating roller (R) which is caused to reciprocate in a vertical direction by out-of-balance forces produced by an adjustable mass on a separate disc, the shaft bearing near R permitting vertical motion and the other bearing being self-aligning. B. M. V.

**Mills for grinding paints, enamels, inks, and other liquid and viscous substances.** S. SMITH, C. E. TYREMAN, and N. N. MAAS (B.P. 407,778, 14.11.32).—Sealing means for preventing insufficiently ground material from entering the outlet chambers of a single roll mill are described, also a method of reciprocating the roller at a rate not equal to that of revolution. B. M. V.

**Apparatus for subdividing material.** J. K. BLUM (U.S.P. 1,924,536, 29.8.33. Appl., 8.4.27).—A ring gear is formed within a heavy tyre (T) which is driven by a pinion eccentric to both T and its own shaft; T grinds against a fixed casing. B. M. V.

**Separation of solid materials of different specific gravities by pneumatic pressure.** G. RAW (B.P. 407,376, 16.9.32).—The material, e.g., raw coal, is screened into sizes, the dust being subjected to froth flotation and the small subjected to pneumatic separation. The clean small coal is added to the raw large coal and subjected to pneumatic separation, the fine

filling the interstices of the large so that, certainly at this stage, the static processes described in B.P. 274,587 and 297,757 (B., 1927, 735; 1928, 878) may be used. (Note.—B.P. 274,587 in the abstract referred to is erroneously given as B.P. 274,578.) B. M. V.

**Centrifugal separators.** AKTIEB. SEPARATOR (B.P. 407,634, 3.10.33. Swed., 5.10.32).—Below a bowl for the separation of, e.g., mineral oil and  $H_2O$  a baffle is provided to prevent very viscous oil- $H_2O$  emulsion, which has crept down from the  $H_2O$ -collecting chamber and stopped the bowl, from clogging the bowl drains. B. M. V.

**Atmospheric cooling tower.** P. E. FLUOR, Assr. to FLUOR CORP., LTD. (U.S.P. 1,916,724, 4.7.33. Appl., 5.7.32).—The claims relate mainly to vertical external louvres and internal splashing plates of a timber tower. B. M. V.

**Mercury-vapour condenser and steam generator.** C. E. LUCKE, Assr. to BABCOCK & WILCOX Co. (U.S.P. 1,919,029, 18.7.33. Appl., 9.7.28).—The  $H_2O$ -tubes are of U- or other return-bend shape and are expanded into steam and  $H_2O$  drums, avoiding the use of flat plates. B. M. V.

**Centrifugal separators.** SHARPLES SPECIALTY Co., Assees. of A. U. AYRES (B.P. 407,084, 5.7.33. U.S., 12.9.32).—A sealing baffle is provided near the discharge weir for lighter constituent to prevent flow of air and consequent entrainment of spray of heavy constituent. B. M. V.

**[Centrifugal] filter.** A. M. HARKNESS, Assr. to GEN. CHEM. Co. (U.S.P. 1,921,296, 8.8.33. Appl., 22.9.32).—A centrifuge of the type in which an internal conveyor is mounted directly on a main shaft and the basket (B) on a sleeve shaft (S) driven by a train of gears (G) at a slightly lower speed is provided with a dynamo brake on S which effects increased braking action when B tends to be accelerated by the friction of accumulated solid material, the control being effected by alteration of the angular position of the gear box (against springs) when increased torque is transmitted to G. The nett result is that although increased power must be provided by the main motor, G is relieved of strain. B. M. V.

**Pressure filters.** W. W. NUGENT (U.S.P. 1,918,980 and 1,919,034, 18.7.33. Appl., [A] 3.4.30, [B] 7.4.31).—(A) A no. of filter bags (F) are secured to nozzles attached to a central hollow shaft, F are interleaved with spacing material and rolled up, and the whole is placed in a casing, the filtration being outwards through the bags. (B) A single, long filter bag is coiled several times on itself and treated similarly. B. M. V.

**Continuous pressure filter.** C. BUDKE (U.S.P. 1,917,696, 11.7.33. Appl., 12.6.31).—A rotary drum is provided with filter medium etc. on the interior and is operated under pressure. A fixed axial element embodies a passage for prefilter in its lower part and a worm conveyor for cake in the upper. B. M. V.

**Valve for rotary filters.** S. E. WOODWORTH, Assr. to E. M. HAMILTON, F. A. BEAUCHAMP, and S. E. WOODWORTH (U.S.P. 1,917,818, 11.7.33. Appl., 23.11.31).—The multi-port disc valve is caused to change quickly.



from suction to pressure by imparting a slight oscillation to the non-rotating part of the valve. B. M. V.

**Centrifugal bowl.** G. J. STREZYNSKI, Assr. to DE LAVAL SEPARATOR CO. (U.S.P. 1,916,870, 4.7.33. Appl., 25.6.31).—A centrifuge with the spaces near the axis made ample for very viscous lighter liquid is described. B. M. V.

**Strainer systems for filters.** PATERSON ENG. CO., LTD., and W. SMALLEY (B.P. 406,025, 17.8.32).—In a sand filter, U- and 7-shaped concrete blocks are described for connecting a main channel to perforated pipes in the lower part of the sand. B. M. V.

**Apparatus for straining liquids or gases.** VICKERS-ARMSTRONGS, LTD., and J. WARDLE (B.P. 406,303, 22.8.32).—End caps and methods of fastening the wire of a filter comprising a wire wound on a fluted mandrel are described. B. M. V.

**Apparatus for separating solids, semi-solids, and the like from liquids.** H. E. PARTRIDGE (B.P. 407,001, 26.8.32).—The liquid is caused to flow up and down, over and under concentric baffles so as to separate both sinking matter and foam, the overflow for clear liquid being below the surface and a spiral skimmer being provided for the foam. At one or more points of reversal from downflow to upflow, jets of air may be provided to afford a lifting effect. B. M. V.

**Purification of liquids.** M. C. SMITH (B.P. 407,807, 26.1.33. U.S., 16.3.32).—A clarification tank for sewage etc., in which newly formed flocs are agitated with older flocs and a portion of the mixed liquid taken out of circulation for ultimate settling, is arranged so that the incoming liquid flows over the surface of the pool and a return flow is produced downwards past a heap of settled flocs (*H*) along the bottom of the pool and upwards into the new stream by means of a no. of paddle wheels on horizontal shafts. The treated liquid flows out of the range of the paddles over *H*. B. M. V.

**Screening or filtering apparatus.** H. A. BRASSERT & Co., LTD. From H. A. BRASSERT (B.P. 406,688, 2.8.32).—A rotary cylindrical screen (*S*) is formed with the filtering elements in separate pockets or portholes (*P*) of sufficient depth to hold the residue collected during one revolution. At one point in a revolution the *P* come between passages for the supply of backflush and removal of sludge, making substantially fluid-tight joints with the inner and outer surfaces of *S*. B. M. V.

**Filter presses.** MANOR ENG. CO., LTD., and E. W. MALKIN (B.P. 407,776 and 407,782, [A] 10.11.32, [B] 21.11.32).—In filter presses of the plate-and-frame or like type, (A) the press is closed by hydraulic rams embodied in tie-bars which are separate from the side bars, which latter take the wt. of plates etc.; (B) the plates are suspended from an overhead runway by rollers or other antifricition means. B. M. V.

**Bubbler-plate columns, for use in fractional distillation and other purposes.** J. H. WEST (B.P. 406,980, 1.6.32 and 31.5.33).—In a bubbling column filled with foraminous troughs (*A*) and underposed imperforate troughs, those trough units which, being at the sides, are half the width of the others are provided

only with one downflow pipe (*B*) whereas the larger troughs have two pipes so that the weir length (upper circumference of *B*) is in const. ratio to the floor area of *A*. The flow is zigzag, *B* being at alternate ends of *A*. The spaces between the units, forming the upflow for vapours, are calc. to be the min. consistent with avoidance of entrainment. B. M. V.

**Bubble cap.** K. M. URQUHART (U.S.P. 1,918,005, 11.7.33. Appl., 2.2.32).—The elongated caps are formed with twin curves, to guide ascending vapours into a downward course and collect centrifugally separated spray in a channel, whence it is delivered to the tray below. B. M. V.

**Recovery of volatile liquids from solvents.** W. K. LEWIS, Assr. to STANDARD OIL DEVELOPMENT CO. (U.S.P. 1,919,594, 25.7.33. Appl., 1.2.28).—Petrol, e.g., is stripped from absorption oil by passage counter-current to an inert gas, the temp. being raised and/or the pressure decreased progressively downwards, and condensates collected from several zones. B. M. V.

**Distilling pressure-converted products by contained heat.** E. J. SHAEFFER, G. W. WATTS, E. P. BROWN, and R. E. WILSON, Assrs. to STANDARD OIL CO. (U.S.P. 1,924,520, 29.8.33. Appl., 10.4.26).—Vapour and liquid from a pressure cracking chamber (*A*) are led to a vaporising chamber (*B*) maintained at a relatively reduced pressure. Liquid is allowed to accumulate in *B* (to steady the flow) and is drawn off at a const. rate through an outlet below the liquid level, though a higher overflow is provided to take care of rushes, both flows being stripped by steam or other inert gas in a tower (*C*). Vapours from both *B* and *C* are passed through an entrainment separator (*D*), from which the liquid returns to *C*, and the vapour passes on to a fractionator. No heat is supplied except that of the stripping gas to the bottom of *C*. B. M. V.

**Treatment [dosing] of liquid.** A. C. DRESHER, Assr. to COCHRANE CORP. (U.S.P. 1,917,704, 11.7.33. Appl., 27.12.29).—Displacement  $H_2O$  for a treating liquid which is to be delivered into a main stream is caused to drop down through a visible column of oil. B. M. V.

**Treating a liquid with a second liquid that is not miscible therewith.** R. LEISER (B.P. 405,349, 8.8.32. Austr., 8.8.31).—The liquids are continuously and intimately mixed, e.g., by passing one or both through an atomising nozzle, and are then passed through a chamber (*C*) in which they are not subjected to further agitation. Their speed of travel through *C* is such that the desired treatment (e.g., extraction) is complete when the liquids leave *C*; the duration of treatment is thus the same for each of the particles of liquid, which leave *C* in substantially the same serial order as that in which they entered. The liquids pass thence to a separator. A. B. M.

**Apparatus for treating liquids.** J. N. JACOBSEN, Assr. to PFAUDLER CO. (U.S.P. 1,918,914, 18.7.33. Appl., 19.8.32).—Liquid, e.g., milk, to be deodorised and/or pasteurised is continuously circulated from and to a storage tank through a heater and a vac. vessel into which it is sprayed. B. M. V.



**Apparatus for introducing gases or liquids into flowing gases or liquids.** G. ORNSTEIN (B.P. 406,233, 13.10.33. Ger., 14.10.32).—A fall in pressure is produced by a Venturi throat, weir, or other means in the main flow, which creates a flow in a first by-pass containing a Venturi, thus further reducing the pressure at its own throat; if necessary, additional by-passes with throats are added until the pressure of the flowing fluid, which may be initially high, is reduced sufficiently to draw in the other fluid, the pressure of which may be low.

B. M. V.

**Controlling the temperature of chemically reacting liquids.** H. O. FORREST and P. K. FROLICH, Assrs. to NAT. SYNTHETIC CORP. (U.S.P. 1,916,473, 4.7.33. Appl., 31.1.30).—An exothermic reaction between a gas (*G*) and a liquid (*L*) is effected in a closed system at a total pressure (*P*) > the v.p. of *L*, *P* being regulated to maintain the temp. at the optimum, heat being withdrawn, if necessary, by vaporisation and condensation at another point of *L* or of an inert volatile liquid.

B. M. V.

**Apparatus for forming emulsions.** W. R. HOWARD (U.S.P. 1,925,049, 29.8.33. Appl., 20.12.28. Renewed 21.1.32).—The apparatus comprises two hollow, rotating cylinders placed end to end in a bath of preformed emulsion and provided with propellers and helical teeth-blades to cause a circulation through and outside them.

B. M. V.

**Effecting emulsification.** GAS LIGHT & COKE CO., D. G. MURDOCH, and W. V. SHANNAN (B.P. 407,153, 9.12.32).—A mixture of medium (*A*), e.g.,  $H_2O$  and an emulsifying agent, and the material to be emulsified (*B*), e.g., tar, is ejected through jets against anvils submerged in *A* or in a partly or wholly formed emulsion of *A* and *B*, the liquid being continuously circulated through a pump and sinuous conduit back to the jets. One method of operation is to have *A* and *B* present in the final proportions throughout, additional quantities of each being admitted in const. ratio through orifice-meters.

B. M. V.

**Pasteurisation.** F. C. REEDER, Assr. to FULTON SYLPHON CO. (U.S.P. 1,925,002, 29.8.33. Appl., 4.8.30).—The heating liquid (*L*) is heated by injection of steam in two stages in which the temp. are < and > that of pasteurisation, respectively. The first-stage steam is thermostatically controlled by the temp. of *L* in that stage, and the second-stage steam by that of the liquid (e.g., milk) to be pasteurised.

B. M. V.

**Removal of gases from milk or cream or other liquids.** ALUMINIUM PLANT & VESSEL CO., LTD., and T. E. FRENCH (B.P. 407,743, 30.9.32).—The liquid is passed in thin layers over conical surfaces arranged base to base, the apices of the upright cones being provided with gas vents, and is subjected to a vac. insufficient to produce boiling at the temp. employed. The surfaces should be matt or roughened.

B. M. V.

**Device for testing the viscosity of liquids.** M. B. WHEELER (U.S.P. 1,924,969, 29.8.33. Appl., 20.1.31).—One disc of a device similar to a disc-grinder is driven at const. speed in a bath of the fluid to be tested; the other disc lifts a wt. by means of a fusee cord until a point of balance is obtained.

B. M. V.

**Separation and collection of dust particles, and/or globules of liquid, from gaseous fluids.** T. B. COLLINS (B.P. 406,687, 30.7.32 and 31.3.33).—Separation is effected in a no. of horizontal pipes (*P*) extending across a collecting vessel, *P* being formed with slots along the lower side and provided with internal baffles producing rapid rotation of the gas streams.

B. M. V.

**Regeneration of catalytic and like contact masses.** HOUDRY PROCESS CORP., Asses. of E. HOUDRY (B.P. 407,699, 21.9.32. U.S., 17.10.31).—Distributing units for admitting regenerating gas into a contact mass comprise double-walled tubes having closed ends and apertures in the walls, which are not opposite each other.

B. M. V.

**Adsorption system.** B. P. FONDA, Assr. to SILICA GEL CORP. (U.S.P. 1,924,849, 29.8.33. Appl., 21.10.31).—For the dehydration of air a pair of adsorbers are provided with a pair of electric heaters in the inlet conduits and with switches connected with the outlet valves so that the adsorber being regenerated has the current switched on.

B. M. V.

**Fire-extinguishing compound.** A. J. GILLES, Assr. to OUTRITE FIRE EXTINGUISHER CORP. (U.S.P. 1,924,401, 29.8.33. Appl., 25.4.31).— $NaHCO_3$  or other material capable of emitting  $CO_2$  is coated with beeswax (preferably dissolved in  $CCl_4$ ) for preservation. Addition of fuller's earth or other silicate is advantageous.

B. M. V.

**Utilisation of solid carbon dioxide as refrigerant.** F. HEYWOOD, and IMPERIAL CHEM. INDUSTRIES, LTD. (B.P. 407,328, 13.9.32).—A solid block of  $CO_2$  is placed in contact with the bottom of a metallic container (*A*) the other 5 walls of which are heat-insulated. An outer casing is provided permitting convection currents around *A* and down into the room to be cooled (*B*) under control of a shutter regulated by the temp. in *B*.

B. M. V.

**Apparatus for measuring colour.** D. NICKERSON (U.S.P. 1,924,747, 29.8.33. Appl., 13.11.28).—A colorimeter utilising Maxwell discs is adapted to average the colour of a large area so as to be suitable for raw cotton etc. Sample and discs are simultaneously observed.

B. M. V.

**[Self-acting sludge valve for] water-softening apparatus.** UNITED WATER SOFTENERS, LTD., and R. T. PEMBERTON (B.P. 408,064, 9.12.32).

Measuring gases.—See II.

## II.—FUEL; GAS; TAR; MINERAL OILS.

Yorkshire, Nottinghamshire, and Derbyshire coalfield. South Yorkshire area. Analysis of commercial grades of coal. II. ANON. (Dept. Sci. Ind. Res., Fuel Res., Survey Paper No. 31, 1934, 37 pp.; cf. B., 1932, 214).—Proximate and ultimate analyses, calorific vals., and laboratory assays at 600° are recorded for a further series of commercial grades of coal from South Yorkshire collieries. A. B. M.

**Artificial formation of coal from sphagnum moss, pine, and beech wood.** C. G. SCHWALBE and K. E. NEUMANN (Angew. Chem., 1934, 47, 205).—By the action of  $H_2O$  vapour and  $CO_2$  on the above materials



at 150°/25 atm. for approx. 1500 hr. a coal is formed without previous bacterial treatment. M. S. B.

**Preparation of coal for the market.** R. G. EVANS (Proc. Tech. Sect. Paper Makers' Assoc., 1934, 14, 363—391).—A description of separating, washing, and dry-cleaning processes and plant.

**Rational coal marketing and preparation.** W. H. TYCE (Proc. S. Wales Inst. Eng., 1934, 50, 89—109).—A discussion.

**Spontaneous ignition of Italian fuels.** F. MAGALDI (Annali Chim. Appl., 1934, 24, 3—20).—Physical and chemical factors causing or favouring spontaneous combustion of Italian fuels of recent formation (humic, xyloid, and pitchy lignites) are studied, particular attention being paid to the volatile constituents, smouldering point, and composition of the distilled gas. The capacity of a coal to absorb  $O_2$  gives an indication of its tendency to spontaneous ignition, but does not show definitely if this will occur. T. H. P.

**Coal and coal-bitumens.** D. J. W. KREULEN (Chem. Weekblad, 1934, 31, 104—107).—The material extracted from coal by  $C_5H_5N$  or other solvent is a sol consisting of an oily disperse medium and a disperse phase containing protective compounds and nuclei of humic substances. The quantity of bitumen extracted is governed by the surface tension of the solvent rather than by the temp. used; this explains the high yield obtained by Vignon with quinoline. The difficulty of reproducing results is ascribed to the occurrence of flocculation. The nature of the nuclei varies according to the degree of carbonisation of the coal, and this fact is employed to interpret the behaviour of different kinds of coal on extraction. The loss of coking properties resulting from oxidation is probably due to the destruction of the micellary units. H. F. G.

**Hydrogenation of coal, pitch, wood, and corn.** H. ISOBE (J. Fuel Soc. Japan, 1934, 13, 13—16).— $H_2$  of 90—96% purity was prepared by passing steam through charcoal at 500—950° and removing the  $CO_2$  from the gas formed. Oils were produced from coal, pitch, wood, and corn by heating them, preferably admixed with a suitable vehicle (e.g., tar oil), with  $H_2$  (initial pressure 80—100 atm.) to 420—450° in a 500-c.c. shaking autoclave, in presence of a  $Co_2O_3$ ,  $Ni(OH)_3$ ,  $MoO_3$ , or other catalyst. The yields from an Ikushubetsu coal amounted to 80—90% of heavy tar, or rather less light oil, according to the conditions of operation. Practically all the combustible matter of wood was converted into oils containing about 35% of gasoline. A. B. M.

**Can German graphite replace foreign graphite in the German economy?** E. BUCHHOLTZ (Chem.-Ztg., 1934, 58, 153—156).—The various uses of graphite (I) in German industry are outlined. Although the (I)-bearing gneiss of Bavaria contains on an average only 20% of (I), the product should replace imported material, since the somewhat higher price is compensated by better quality. H. F. G.

**Detection of traces of pyridine, especially in charred wood.** A. BRÜNING and M. SCHNETKA (Chem.-Ztg., 1934, 58, 156—157).—The  $BrCN-NH_2Ph$  reaction is not sp. for  $C_5H_5N$  (I), since furfuraldehyde also gives

a red colour.  $BrCN$  and benzidine or *o*-tolidine yield sp. carmine-red and orange-red colorations, respectively, with (I). A positive result of the test (made usually on a steam-distillate of the charred wood) is not, however, proof of arson, since if wood is burned in a restricted supply of air (I) is formed; the same occurs with leather, hair, wool, and other org. materials containing N. H. F. G.

**Variation of bulk density of coal and its bearing on coke-oven operation.** G. A. DUMMETT and G. J. GREENFIELD (Gas World, 1934, 100, Coking Sect., 38—44).—On theoretical grounds the bulk density ( $D$ ) of a coal increases with increased compression, size, and ash content, but passes through a min. val. with increase in moisture ( $M$ ) content. The grading of a coal in terms of % remaining on a series of sieves is inaccurate; this is replaced by a size index obtained from the sieve aperture and the % of oversize left on each sieve. The influence of  $M$  on the  $D$  of coal, compressed and uncompressed, after an 11-ft. drop and without drop, for various size indices is shown graphically;  $D$  passes through a min. Thus under standard coking conditions it is calc. that a coal having 6% of  $M$  requires the min. amount of heat for carbonisation; it is suggested that raw coals should be adjusted to optimum  $M$  content before treatment. R. N. B.

**Controlled cracking in continuous vertical retorts.** E. B. TOMLINSON (Gas J., 1934, 205, 195—196).—A cracking space is left at the top of the retort ( $R$ ) by continuously feeding in small amounts of coal at regular intervals and controlling the rate of coke extraction. Optimum results were obtained with the coal charge 7 ft. down, 84.8 therms of gas of 528 B.Th.U./cu. ft. being obtained against 81.6 therms of gas of 477 B.Th.U. under normal conditions. The throughput, however, is reduced from 6.1 to 5.2 tons/day. The coke obtained had a higher  $d$  and the tar resembled horizontal-retort tar. Difficulties such as stopped off-takes, dust in the gas, and reduction in the effective length of  $R$  have been partly overcome by introducing the coal by a centrally disposed pipe terminating just above the top of the coal charge. R. N. B.

**Chemistry in the gas and coking industries.** P. DAMM (Gas- u. Wasserfach, 1934, 77, 209—212).—The effect of temp. on the primary and secondary decomp. of coal is discussed in relation to coke, gas, and tar yields and  $H_2O$  produced. Gas production is also correlated with volatile matter and ultimate analysis of coal. In general, max. gas evolution as shown by pressure in the retort occurs at 400—450°. R. N. B.

**Wet process for removal of hydrogen sulphide from coke-oven gas.** F. F. SMITH and D. R. PRYDE (Gas World, 1934, 100, Coking Sect., 44—46).—Dil. aq.  $FeSO_4$  in contact with the  $NH_3$  and  $HCN$  in coke-oven gas gives a suspension of  $FeNH_4$  ferrocyanide.  $H_2S$  is removed from gas by scrubbing with this suspension, which is regenerated by aeration in a tower. The  $S$  formed is separated by flotation. A plant for treating 2500 cu. ft. of gas per hr. is described, the amounts of  $H_2S$ ,  $HCN$ , and  $NH_3$  remaining at the inlet (outlet) of the scrubber after a typical "run" being: 700 (0.0—0.3) pts./10<sup>5</sup>, 0.25 (0.001) grain/cu. ft.,



and 1.7 (0.6) grains/cu. ft. 80% of the S, of approx. 90% purity, is recovered; extraction with  $C_6H_6$  under pressure gives a pure product. The costs of the process, including capital charges and credit for S, are estimated to be 0.44d./1000 cu. ft. R. N. B.

**Properties of coal gas rendered non-poisonous by W. J. Müller's process.** W. J. MÜLLER and E. GRAF (Gas- u. Wasserfach, 1934, 77, 122—124).—The process, which consists of a catalytic oxidation followed by absorption of the  $CO_2$  in aq. NaOH (cf. Austr. P. 113,333), replaces the CO of the gas by an approx. equal vol. of  $H_2$ ; there is also a slight increase in the  $CH_4$  and  $C_nH_m$  contents of the gas. There results a slight increase in gross calorific val. and an approx. 25% decrease in  $d$ . These alterations, however, necessitate no change in domestic or other appliances using gas. The time required to boil a kettle at the same gas pressure is shorter, the CO content of the combustion products is lower, and the min. pressure at which the flame is extinguished is lower with the treated than with the untreated gas. The lower  $d$  of the treated gas has the advantage of permitting the use of a lower pressure in the distributing system. A. B. M.

**Electrical gas purification with especial reference to the electrostatic tar-removal process in gas-works and coke-oven plants.** H. EIRING (Gas- u. Wasserfach, 1934, 77, 113—119).—Data are given relating to the operation of electrostatic tar-pptn. plants in the gasworks at Keilehaven-Rotterdam, Itzehoe, Hellerup-Kopenhagen, and elsewhere. The plant at Keilehaven has a designed capacity of 80,000 cu. m. of gas per day, but has been operated successfully at a 35% overload. The tar fog in the gas (averaging 1—1.2 g./cu. m., but occasionally as high as 4 g./cu. m.) is almost completely removed. The energy consumption is 1.4—1.5 kw.-hr. per 1000 cu. m. of gas. The pressure loss in the plant even when overloaded is only 3 mm.  $H_2O$ -gauge. Results of comparative tests illustrate the much higher efficiency of the electrostatic plant over mechanical tar extractors. There is a corresponding increased efficiency in the subsequent removal of the  $C_{10}H_8$ ,  $NH_3$ , S, and benzol. The position of the low-temp. cooling process in modern gas-purification plant is discussed; it is concluded that the max. efficiency is attained by combining the processes, using electrostatic pptn. in the first stage of gas purification, and providing a low-temp. cooling plant to follow the benzol-recovery plant in order to effect a final drying of the gas. A. B. M.

**Acetone content of "dissous" gas [dissolved acetylene].** R. KRAUS and W. LEITENBERGER (Angew. Chem., 1934, 47, 200—202).—This is simply given by the saturation val. of  $C_2H_2$  with  $COMe_2$  (I) vapour. The dependence of (I) content on the pressure in the holder and the temp. of the escaping gas can be expressed by a nomogram. M. S. B.

**Separation of benzene hydrocarbons from coke-oven gas by absorption.** G. V. KOPELEVICH (Coke and Chem., U.S.S.R., 1932, No. 2, 62—66).—A theoretical scheme involving absorption in oil is described. CH. ABS.

**Causes of the decomposition of absorbing oils in the absorption of benzene from coke-oven gas.** G. V. KOPELEVICH and A. I. BRODOVICH (Coke and Chem., U.S.S.R., 1932, No. 4, 35—42).—Data are recorded. CH. ABS.

**Distillation of crude benzene in continuous fractionation columns.** G. N. TIUTIUNNIKOV (Coke and Chem., U.S.S.R., 1932, No. 2, 26—29).—A discussion. CH. ABS.

**Viscosity of asphalt-bitumen and tar in relation to temperature and velocity of shear.** W. RÖDIGER (Kolloid-Z., 1934, 66, 351—357).—Determinations of the viscosity of soft Mexico bitumen are in accordance with the Hagen-Poiseuille law, but distilled coal tar obeys the law only at higher temp. Tar-bitumen mixtures exhibit structure viscosity at 57°, especially when of medium composition. In a mixture containing 17.4% of bitumen and of medium particle size the structure viscosity diminishes with falling temp. and vanishes at 30°. E. S. H.

**Practical testing of a continuous petroleum still.** A. H. GOODLIFFE (Inst. Chem. Eng., Mar. 21, 1934, 1—31).—The still consisted of 2 bubbling-hood columns (A, B) each of 22 trays, the vapour from the head of A passing into the bottom of B. B is fitted with a reflux-condenser head and  $H_2O$  separator, and the heating medium for A and B is steam at 205°. Liquid-level and automatic temp. controls are fitted. The plant is intended for the production of white spirit from the lighter fraction of a variety of roughly topped crude petroleum. Product balances (residue, white spirit, tops, and loss) and steam balances are given. Heat-transfer coeffs. of the preheaters and condensers are worked out. For an analysis of the performance of B the "true b.p." of samples from each tray were determined, together with mol. wts. and  $d$ . Curves between mols.-% distilled and temp. for each tray are then drawn, corrections for pressure variation being applied. To determine plate efficiencies the correction for deviation from Raoult's law was obtained by the use of an equilibrium still. This val. varies with temp. and is plotted against it. Owing to the slight changes in composition it is not practicable to determine with accuracy the efficiencies of the central plates, but on certain assumptions those of the upper and lower ones are deduced. It is shown that the theoretical feed plate and the theoretical no. of plates or overall plate efficiency can be calc. The latter figure proved to be 16%. Its lowness is partly due to the hindering effect of  $H_2O$  in the column, but principally to inadequate reflux ratios in certain trays. Nomographs are given of sensible heats and latent heats of petroleum oils. C. I.

**Behaviour of motor spirit towards sulphuric acid and the determination of individual hydrocarbon groups.** BANDTE (Angew. Chem., 1934, 47, 152—153).—Wendehorst and Knoche's remarks (cf. B., 1934, 179) are criticised. E. S. H.

**[Behaviour of motor spirit towards sulphuric acid and the determination of individual hydrocarbon groups.]** WENDEHORST (Angew. Chem., 1934, 47, 153).—A reply (cf. preceding abstract). E. S. H.



**Variation in m.p. of mineral oils accompanying change of state: segregation in oils.** P. WOOG, J. GIVAUDON, and F. DAYAN (*Compt. rend.*, 1934, 198, 744–746; cf. B., 1932, 135).—When a paraffin-containing oil that has been completely melted is kept at 0° for 1 hr., cooled to –75°, and then allowed to warm up, its flow point is lowered by varying amounts, the max. being 25.8°. This is due to segregation of the paraffin.

C. A. S.

**Refining, testing, and utilisation of petroleum oils. II. Fractionation.** G. N. CRITCHLEY (*Fuel*, 1934, 13, 68–81; cf. B., 1934, 353).—The theory underlying the processes of distillation and fractionation is briefly discussed and a description is given of types of plant used for these processes in the petroleum industry.

A. B. M.

**Constitution of petroleum fractions obtained by high-vacuum distillation.** N. DĂNĂILĂ and R. VERONA (*Bul. Chim. Soc. Română Științe*, 1932, 35, 37–44).—The products of fractional distillation of petroleum under reduced pressure are of superior quality to those obtained at atm. pressure, and possess a distinctly lower olefine content, pointing to the occurrence of cracking at the comparatively low temp. employed in the latter case.

R. T.

**Volumetric determination of olefine and aromatic hydrocarbons in petroleum and tar fractions.** N. DĂNĂILĂ, T. IONESCU, and R. VERONA (*Bul. Chim. Soc. Română Științe*, 1932, 35, 107–135).—Dănăilă, Andrei, and Melinescu's method (B., 1924, 857) is to be preferred.

R. T.

**Crude benzol recovery from vertical-retort gas.** H. J. REYNOLDS (*Gas World*, 1934, 100, 278–281).—The working of a renovated wash-oil plant producing benzol (I) at 8.56d./gal. is contrasted with that of a modern installation. The (I) produced has a low *d* (0.820) owing to a high paraffin content.

R. N. B.

**Fundamental variables in mixed-phase cracking [of petroleum].** H. SYDNOR (*Ind. Eng. Chem.*, 1934, 26, 184–187).—The variables are temp. (I), pressure (II), time and conversion per pass (III). (I), (II), and (III) were varied independently in laboratory experiments, and it was found that increase of each caused decreased yield of gasoline. Increase of (I) and (III) increased the proportion of lighter fractions in the gasoline produced; (II) had little effect.

D. K. M.

**Vapour-phase cracking [of petroleum].** C. R. WAGNER (*Ind. Eng. Chem.*, 1934, 26, 188–189).—Vapour-phase cracking at 510–565°/100 lb. per sq. in. (I) yields gas and raw distillates less olefinic than those from processes operating at >565°/100 lb. per sq. in. (II). The validity of the statement that the properties of gasoline are the same for a given time-temp. index (cf. Geniesse and Reuter, B., 1931, 327) is questioned. The character of the feed in processes operating under (II) affects that of the products, though not to the same extent as in processes operating in (I).

D. K. M.

**Development of oil cracking.** P. C. KIETH and W. B. MONTGOMERY (*Ind. Eng. Chem.*, 1934, 26, 190–194).—A historical review.

D. K. M.

**Pyrolysis of saturated hydrocarbons.** F. E. FREY (*Ind. Eng. Chem.*, 1934, 26, 198–203).—The literature is reviewed and the theories of the primary decomp. reactions of paraffins and the rôle of temp., time, and pressure are discussed. The available experimental evidence furnishes no proof of any theory. Reference is made to the decomp. of cycloparaffins.

D. K. M.

**Decomposition of saturated petroleum hydrocarbons under oxidising conditions at low temperatures.** A. W. BURWELL (*Ind. Eng. Chem.*, 1934, 26, 204–207).—The liquid-phase oxidation of petroleum by air or O<sub>2</sub> at 120–160°/150–500 lb. per sq. in. in presence of a catalyst, e.g., Mn soap or the partly oxidised unsaponifiable matter from a previous charge, proceeds more readily with rise in temp. and increase of pressure. Probable reactions are given, deduced from a consideration of the end-products.

D. K. M.

**Destructive hydrogenation of petroleum hydrocarbons.** W. J. SWEENEY and A. VOORHIES, JUN. (*Ind. Eng. Chem.*, 1934, 26, 195–198).—Graphs are given showing the effect of H<sub>2</sub> pressure and reaction temp. in simple and destructive hydrogenation (I), based on free-energy relations, and correlating % H<sub>2</sub>, A.P.I. gravity, and the average b.p. of the virgin, cracked, and hydrogenated petroleum products. (I) gives higher yields of gasoline than cracking. Vol. yields of >115% of gasoline have been obtained by hydrogenation.

D. K. M.

**Oxidation of petroleum by means of air.** R. KLATT (*Petroleum*, 1934, 30, No. 12, 1–6; No. 13, 1–8).—The patent literature on the subject is presented in tabular form. A series of experiments has been carried out with various forms of apparatus on the production of H<sub>2</sub>O-sol. acids by the air-oxidation of petroleum. In the optimum experimental arrangement the oil vapours, mixed with preheated air and steam, were passed through a tinned-steel tube packed with a suitable catalyst, at 350–400°, and thence to a condensing system. Fe, Al, and brass turnings possessed only moderate catalytic activity for this reaction; the best catalyst was V<sub>2</sub>O<sub>5</sub>-pumice, the activity of which improved with use. The max. yield (g. of KOH required for neutralisation) was 20 g. from 1 litre of oil. The H<sub>2</sub>O-insol. condensate was unchanged petroleum and could be recirculated. A tar neutral oil, treated in the same way, also yielded H<sub>2</sub>O-sol. acids.

A. B. M.

**Effect of peroxides in knock in internal-combustion engines.** M. SERRUYS (*Compt. rend.*, 1933, 197, 1592–1593; 198, 49–50; cf. B., 1927, 692).—Less power was produced but knock was more pronounced when the temp. of the explosive mixture before ignition was raised to 310° than when raised to 250°; this conflicts with the view that knock is due to peroxides, as these are destroyed at 300° (cf. B., 1933, 850), but supports the author's theory (cf. B., 1933, 293).

C. A. S.

**Combustion in motors.** P. DUMANOIS (*Compt. rend.*, 1934, 198, 50–51).—The apparent discrepancy between the author and Serruys (cf. B., 1933, 850 and preceding abstract) is explicable by the observation (cf. A., 1930, 1256) that a knocking mixture inflames at



260° through formation of peroxides, and at 650° through heat. If therefore the temp. at the end of compression is substantially < or > 260°, sufficient peroxides to cause knock are not formed, but if the temp. is > 650° the mixture inflames with explosion before the igniting spark passes in fashion apparently similar to what happens near 260° through formation of peroxides.

C. A. S.

### Short-cut method of hydrocarbon analysis. II. Application to analysis of stabiliser bottoms.

R. ROSEN and A. E. ROBERTSON (Ind. Eng. Chem. [Anal.], 1934, 6, 12—18; cf. B., 1931, 871).—Apparatus is described wherewith a sample (e.g., 3 c.c.) of a liquid mixture of  $C_3H_8$ ,  $C_4H_{10}$ ,  $C_5H_{12}$ , and  $C_6H_{14}$  can be distilled under const. pressure (200 mm.), the distillate being collected in vapour form in an initially evacuated bulb, the pressure in which gives a measure of the amount distilled. From the results obtained by fractionating mixtures of known composition graphs have been constructed by means of which the composition of an unknown mixture can be obtained from the temp. readings corresponding to three different "per cents-off" (e.g., 10, 40, and 70%) on the distillation curve. Graphs are also given which permit correction to be made, where necessary, for the presence of butylene and  $iso-C_4H_{10}$ .

A. B. M.

**Variation of the dielectric constants of oils in the streaming state.** J. TAUSZ and P. SZÉKELY (Petroleum, 1934, 30, No. 6, 1—12).—An apparatus has been designed whereby the dielectric const. ( $K$ ) of a thin (0.005 cm.) annular layer of oil contained between concentric cylinders can be determined while the inner cylinder is rotated. With increasing rate of shear of the oil  $K$  at first decreases; with mineral oils  $K$  then reaches an approx. const. val., whereas with fatty oils the initial relatively rapid decrease is followed by a slower but continual decrease. The curve for castor oil occupies a position between the above two types of oil.

A. B. M.

**Variation of the dielectric constants of oils in the streaming state.** J. TAUSZ and P. SZÉKELY (Petroleum, 1934, 30, No. 10, 1—12).—An apparatus for determining the  $\eta$  of oil films is described. The results show that Poiseuille's law does not hold for very thin oil films (0.8—1  $\mu$  for mineral oils; 1—2  $\mu$  for fatty oils). Vals. of dielectric const. are doubtful, because of numerous experimental difficulties encountered, but appear to increase with decreasing thickness of film, whilst the electrical conductivity remains const.

E. S. H.

**Petrolatum in printing ink.**—See XIII. **Pb hazards with  $PbEt_4$ .**—See XXIII.

See also A., Apr., 384, **Extraction apparatus [for coal]**. 389, **Catalysts for benzene synthesis**.

### PATENTS.

**Solid fuel.** S. S. COLE, Assr. to KOPPERS CO. OF DELAWARE (U.S.P. 1,924,180, 29.8.33. Appl., 8.7.29).—To raise the m.p. of the ash a solid fuel is coated with a mixture of oil and hydrated  $Al_2O_3$ , the latter being approx. 2 wt.-% of the fuel.

B. M. V.

**Illuminant burning with a multicoloured flame.** R. KOSTER, Assr. to H. PREHN (U.S.P. 1,923,313, 22.8.33.

Appl., 20.10.30. Finl., 16.10.29).—Claim is made for a mixture of metaldehyde or  $(CH_2)_6N_4$  and < 2 flame-colouring metal salts, e.g., NaCl, KCl,  $Li_2CO_3$ , or  $CuCl_2$ .

A. R. P.

**Destructive hydrogenation of distillable carbonaceous materials.** H. E. POTTS. From INTERNAT. HYDROGENATION PATENTS CO., LTD. (B.P. 406,006, 7.7.32).—Coal, coal tars, mineral oils, etc. are treated with  $H_2$  under pressure and at elevated temp. in presence of a small proportion of  $Cl_2$ , Br, or  $F_2$  in conjunction with C, P, S, Se, Te, As, Sb, Si, or B (preferably in the form of a suitable compound, e.g.,  $C_2H_4Br_2$ ,  $PhBr$ ,  $CHCl_3$ , etc.), and an oxide, hydroxide, sulphide, or phosphate of a metal of group V or VI.

A. B. M.

**Measurement of gases.** T. W. STONE, Assr. to WESTERN GAS CONSTRUCTION CO. (U.S.P. 1,924,468, 29.8.33. Appl., 20.6.27).—The total flow of raw gas from a producer is measured by an orifice-meter ( $A$ ), and a by-pass flow is pumped through a scrubber supplied with  $H_2O$  at standard temp., the vol. of the flow before and after scrubbing being measured on meters  $B$  and  $C$ , to enable the total flow to be calc. in terms of standard gas.

B. M. V.

**Liquid seal for [waterless] gasholders.** K. JAGSCHITZ, Assr. to MASCHINENFABR. AUGSBURG-NÜRNBERG A.-G. (U.S.P. 1,924,281, 29.8.33. Appl., 12.4.30. Ger., 17.4.29).—The use of a coal-tar fraction, b.p. 210—450° (or closer), is claimed; it should be free from pitch, dust,  $C_{10}H_8$ , anthracene, and phenols, have  $d$  approx. 1.1, viscosity 1.8—3.5° (Engler) at 50°, and give no ppt. at about 30°. A preferred method of manufacture is to take the above fraction, supercool it for several days, and redistil the filtrate therefrom, using the new 250—450° fraction for the seal.

B. M. V.

**Production of coal gas for storage under high pressure.** C. O. RASMUSSEN (B.P. 406,239, 6.11.33).—The gas produced during the earlier stages of the coal-distillation process, viz., that having a calorific val. of about 675 B.Th.U./cu. ft., is carburetted with oil gas produced in the coal-distillation retorts or in separate oil-gas retorts, and is then compressed into cylinders.

A. B. M.

**Production of benzol from fuel-distillation gas.** J. E. POLLAK. From BENZOLA GES.M.B.H. (B.P. 405,992 and 405,996, 15.8.32).—(A) Thickening of the wash oil (I) used for the recovery of benzol (II) from coke-oven gas etc. is avoided by washing the gas, prior to oil-scrubbing, with a relatively large vol. of  $H_2O$ . The (I) freed from (II) and/or the residue from the redistillation of the crude (II), after separation of the  $C_{10}H_8$  by cooling, is distilled, the distillate is again cooled to separate  $C_{10}H_8$ , again distilled, and the product reintroduced as (I) into the process. By these means an increase of > 35% in the (II) recovered has been effected. (B) A further increase in the yield of (II) can be effected by heating the coal in the retorts or ovens strongly during approx. the first half of the total heating period, e.g., by using during that period a fuel consumption 25—50% > normal.

A. B. M.

**Treatment of exhaust gases from internal-combustion engines.** J. HARGER and A. ELLIOTT (B.P. 405,976, 12.5.32 and 20.4.33).—The exhaust gases



are passed through a Venturi injector, whereby they are mixed with the required amount of air, and then through a casing (C) containing granular catalytic material consisting of bauxite, or other material rich in  $\text{Al}(\text{OH})_3$ , which has been activated by being impregnated with a compound of Fe, Mn, Cu, or Ti. If desired, a second oxidising zone containing CuO may be provided within C. The CO and excess petrol vapour in the gases are thereby completely oxidised. A. B. M.

**Removal of carbon deposits.** W. G. LOVELL and T. A. BOYD, ASSRS. to GEN. MOTORS RES. CORP. (U.S.P. 1,924,722, 29.8.33. Appl., 28.8.29).—Compositions of aliphatic amides which will remove varnish are suitable for softening C deposits in internal-combustion engines; preheating to  $> 65^\circ$  is advantageous. A mixture of  $\text{HCO}\cdot\text{NEt}_2$ , benzol, and EtOH is claimed. B. M. V.

**Removal of hydrogen sulphide from natural gas.** A. P. THOMPSON, ASSR. to GEN. CHEM. CO. (U.S.P. 1,922,872, 15.8.33. Appl., 22.12.27).—Natural gas is mixed with a small quantity of air and passed through a heat exchanger (I) and auxiliary heater into a catalyst chamber (II) containing bauxite impregnated with  $\text{Fe}(\text{NO}_3)_3$  and calcined at  $400^\circ$ . The temp. in (II) is kept at  $< 275^\circ$  ( $225^\circ$ ) to avoid decomp. of the gas but to allow the reaction  $2\text{H}_2\text{S} + \text{O}_2 = 2\text{H}_2\text{O} + 2\text{S}$  to take place. The treated gases are passed back through (I) and thence through a cooler and collector for the S. A. R. P.

**Conversion of phenolic bodies and low-temperature tars into hydrocarbons.** SOC. DES CARBURANTS SYNTHÉTIQUES (B.P. 406,151, 25.4.33. Fr., 11.5.32).—Phenols or low-temp. tars are treated with  $\text{H}_2$ , under pressures from atm. to 20 kg./sq. cm., in presence of catalysts consisting of mixtures of reducible and non-reducible oxides of the metals of groups III, IV, and VI, e.g., a mixture of activated  $\text{Al}_2\text{O}_3$  and activated blue oxide of Mo, and at temp. ranging from  $360^\circ$  (for a pressure of 20 kg./sq. cm.) to  $430^\circ$  (for atm. pressure), the temp. being so chosen that it is  $<$  the lower limit necessary for the conversion of the reducible oxides into metals under the conditions of operation. The catalysts are activated by being preheated to  $< 700^\circ$ , and when necessary can be regenerated by heating in air or  $\text{O}_2$  at  $500^\circ$  for about 2 hr. A. B. M.

**Conversion of high-boiling hydrocarbon oils into lower-boiling hydrocarbon oils.** W. E. WARWICK, ASSR. to STANDARD OIL CO. (U.S.P. 1,920,331, 1.8.33. Appl., 9.11.25).—High-boiling hydrocarbon oil is continuously passed through a zone in which it is heated to  $> 370^\circ$  under pressure and is discharged into an enlarged chamber (A), at a predetermined point (B), where conversion takes place. The unvaporised oil in A is maintained at conversion temp. by continuously withdrawing a portion at a point (C) remote from B, passing it through an independent heating zone, and returning it to A at a point remote from B and C. H. S. G.

**Production of hydrocarbon distillates.** R. P. RUSSELL, ASSR. to STANDARD-I-G. CO. (U.S.P. 1,916,441, 4.7.33. Appl., 7.1.29).—Heavy petroleum hydrocarbons are heated to  $> 400^\circ$  and discharged into a reaction zone (A) maintained at  $> 50$  atm. The vapours

are collected in a rectification zone (B) maintained under the same pressure as in A. Fresh oil is passed through a coil in the upper part of B and discharged into the vapours in the lower portion thereof. The reflux condensate is collected without releasing the pressure, mixed with a gas rich in free  $\text{H}_2$ , and recirculated through a heating zone to A. Vapours removed from B are condensed separately. H. S. G.

**(A) Treatment of hydrocarbon oils. (B) Refining of gasoline-containing distillates.** R. B. DAY, ASSR. to UNIVERSAL OIL PRODUCTS CO. (U.S.P. 1,920,247—8, 1.8.33. Appl., [A] 8.6.31, [B] 25.5.32).—(A) Hydrocarbon oils, e.g., gasoline distillate, are treated in the liquid phase with aq. HCl in presence of Al, Mn, Zn, Cr, Fe, Cd, Co, Ni, Sn, Pb, Sb, Bi, As, Cu, and Hg, or brass. (B) Gasoline-containing distillates are treated with aq. HCl in presence of Zn, Cu, or brass at a temp. substantially above the initial b.p. of the distillate, under sufficient pressure to preclude substantial vaporisation. H. S. G.

**Hydrogenation of hydrocarbon oils.** H. W. FISHER, ASSR. to STANDARD-I-G. CO. (U.S.P. 1,920,140, 25.7.33. Appl., 3.7.29).—A vol. of oil containing in suspension a catalyst (C) of such  $d$  as would normally settle out is maintained in an elongated, vertical reaction zone (A) at decomp. temp. and under a  $\text{H}_2$  pressure  $> 20$  atm. The oily suspension is continuously removed from the bottom of A, mixed with fresh oil, heated, and returned to the upper end of A at a rate adapted to prevent settling out of C. H. S. G.

**Treatment of distillate petroleum products.** J. B. RATHER, L. C. BEARD, JUN., and O. M. REIFF, ASSRS. to SOCONY-VAC. CORP. (U.S.P. 1,916,437—8, 4.7.33. Appl., [A] 20.6.30, [B] 21.6.30).—Colour deterioration and gum formation in light petroleum distillates are retarded by the addition thereto of  $> 0.01\%$  of (A) nicotine, (B) thiocarbanilide. H. S. G.

**Treatment of cracked [petroleum] distillates.** R. E. BURK, ASSR. to STANDARD OIL CO. (U.S.P. 1,919,825, 25.7.33. Appl., 28.8.29).—Gum inhibitors are formed *in situ* by interaction between an added halogenated hydrocarbon ( $\text{C}_2\text{H}_4\text{Br}_2$ , chlorinated petroleum fractions) and aminating agents ( $\text{NH}_3$ ,  $\text{NaNH}_2$ ). H. A. P.

**Resolution of [petroleum] emulsions.** T. B. WAYNE (U.S.P. 1,919,871, 25.7.33. Appl., 31.5.32).— $\text{H}_2\text{O}$ -sol. resinous products obtained by condensing phenols, naphthols, etc. with a variety of "resinophorous" aliphatic compounds, e.g., polyhydric alcohols, aliphatic aldehydes, or fatty acids ( $> \text{C}_8$ ), and solubilised by sulphonation, or condensation with aromatic sulphonic acids or alkylamines, or both, are claimed as resolving agents for petroleum and other  $\text{H}_2\text{O}$ -in-oil emulsions. Thus  $o\text{-C}_6\text{H}_4(\text{CO}_2\text{H})_2$  or its anhydride is combined with equimol. amounts of diethylene glycol and oleic acid (I) at  $200\text{--}210^\circ$  and the product sulphonated with  $\text{ClSO}_3\text{H}$  or oleum at  $90\text{--}140^\circ$ ; or  $\text{PhOMe}$ ,  $\text{CH}_2\text{O}$ , and (I) are condensed in  $\text{H}_2\text{O}$  at  $80\text{--}100^\circ$  and the product is sulphonated; or *m*- or *p*-cresol is condensed with  $\text{COMe}_2$  in acid solution, and the product sulphonated, or condensed with  $2\text{C}_{10}\text{H}_7\cdot\text{SO}_3\text{H}$ , the resulting sulphonic acids being used as such or further condensed with hydroxyamines, e.g.,  $\text{NH}(\text{C}_2\text{H}_4\cdot\text{OH})_2$ . H. A. P.



**Manufacture of stabilised motor fuels.** GULF REFINING Co., Assees. of E. AYRES (B.P. 406,658, 26.8.32. U.S., 8.9.31).—Agents are added (a) to prolong the induction period prior to gum formation (I) [ $\alpha$ -C<sub>10</sub>H<sub>7</sub>·OH, quinol-NH<sub>3</sub>, *s*-C<sub>6</sub>H<sub>3</sub>(OH)<sub>3</sub>, PO(OPh)<sub>3</sub>, benzidine, *o*-C<sub>6</sub>H<sub>4</sub>Me·NH<sub>2</sub>] and (b) to decrease rate of (I) at the end of this period (NHPh<sub>2</sub>, NPhMe<sub>2</sub>, C<sub>10</sub>H<sub>7</sub>·NHPh, amyl alcohol, xylydine, and *m*-C<sub>6</sub>H<sub>4</sub>Me·NH<sub>2</sub>) (together < 0.01%). H. A. P.

**Fuel[-treating] composition.** E. C. HENNEN (U.S.P. 1,925,048, 29.8.33. Appl., 23.2.32).—The composition (C) comprises benzol 30 oz., C<sub>6</sub>H<sub>2</sub>Me(NO<sub>2</sub>)<sub>3</sub> 2, *o*-C<sub>6</sub>H<sub>4</sub>Cl·NO<sub>2</sub> 8, technical white oil 30, castor oil or other high-heat-resisting lubricant 25,  $\alpha$ -C<sub>10</sub>H<sub>7</sub>·NH<sub>2</sub> 16, COMe<sub>2</sub> 11, and an acetate 6 oz.; 1 gal. of C is added to 400 gals. of petrol. B. M. V.

**Producing compositions of fuel oil and powdered coal.** RADIOCHEMISCHES FORSCHUNGSINST. G.M.B.H. (B.P. 406,067, 9.9.32. Ger., 10.10.31).—A mixture of powdered coal and oil, stabilised by the addition of a small proportion, e.g., 0.1–2.5%, of a gelatinising substance (paraffin wax, ozokerite, or stearic acid), is treated with about 1% of NH<sub>3</sub>, whereby the tendency to set on cooling is inhibited. Air and/or N<sub>2</sub> may be injected into the material during mixing. A. B. M.

**Manufacture of lubricants.** J. Y. JOHNSON. From I.G. FARBENIND. A.-G. (B.P. 407,379, 10.6., 17.8., 15.10., and 20.10.32).—An improved lubricant, or addition to lubricants, comprises a lubricating oil, grease, or wax to which is added a "voltolised" product produced by subjecting substances substantially composed of paraffin wax hydrocarbons having mean mol. wt. > 330 (> 350), in admixture with ordinary soft and/or hard paraffin wax and/or oils rich in H<sub>2</sub>, to treatment with a silent, high-frequency electric discharge and separating the resulting products by distillation *in vacuo*, selective solvents, or by fractional pptn. or crystallisation from any soft and hard paraffin wax and from middle oils. Various applications of the process are shown in 32 examples. [Stat. ref.]

H. S. G.

**Manufacture of heavy lubricating oils.** GULF REFINING Co., Assees. of H. G. SMITH (B.P. 407,812, 31.1.33. U.S., 1.3.32).—A wax-free lubricating oil is obtained by centrifuging a dewaxing stock comprising a mixture of naphtha, unpressable non-centrifugeable wax-containing distillates, and residuals capable of wax modification from a different type of crude oil, the % of residuals lying between the vals. calc. from the formulæ:  $R = 65 - 5.6\sqrt{(V-50)}$  and  $R = 85 - 5.6\sqrt{(V-50)}$ , where  $R$  is the vol.-% of residuals in the mixture and  $V$  the viscosity (Saybolt Universal) of the distillate.

H. S. G.

**Vacuum distillation of lubricating oils.** RED RIVER REFINING Co., Assees. of J. E. SCHULZE (B.P. 407,551, 21.4.33. U.S., 5.5.32).—Lubricating oil (I) constituents are separated from a mineral oil charging stock by flash-distillation at an elevated temp. and a diminished pressure > 50 mm. (> 20 mm.) Hg, and the resulting vapours are condensed under a correspondingly low pressure. The distillates are then redistilled under a still lower pressure (> 10 mm. Hg) and in such manner that the distillation temp. rises progressively. The

desired (I) fractions are successively withdrawn and condensed under a correspondingly low abs. pressure while rapidly withdrawing therefrom vapours and/or gases containing unstabilising constituents, thereby obtaining by direct overhead distillation (I) not requiring acid treatment or filtration.

H. S. G.

**Distillation of wax materials.** W. H. BAHLKE, Assr. to STANDARD OIL Co. (U.S.P. 1,921,860, 8.8.33. Appl., 5.10.29).—Crude or slack wax, previously liquefied by preheating, is admixed with steam and forced through a coil where the wax vapours are superheated, but not cracked. The vapour mixture is discharged into an enlarged chamber where it is cooled, and the resulting condensate is caused to descend countercurrent to the steam-vapour mixture, the cooling of the vapours being so controlled as to secure a wax condensate of desired high m.p.

H. S. G.

**Oil-distillation apparatus.** A. E. PEW, JUN., Assr. to SUN OIL Co. (U.S.P. 1,924,879, 29.8.33. Appl., 6.8.31).

**Distillation of hydrocarbons.** C. D. GARD, Assr. to UNION OIL Co. OF CALIFORNIA (U.S.P. 1,924,602, 29.8.33. Appl., 30.5.30).

**[Distillation] treatment of hydrocarbon oils.** A. S. BAILEY and E. M. REYNOLDS, Assrs. to TEXAS Co. (U.S.P. 1,924,534, 29.8.33. Appl., 12.2.29).

**Distillation of petroleum hydrocarbons.** C. F. TEARS, Assr. to UNIVERSAL OIL PRODUCTS Co. (U.S.P. 1,925,013, 29.8.33. Appl., 25.6.23. Renewed 12.1.29).

**Fractionation of petroleum.** W. W. LOWE and H. N. LYONS, Assrs. to DOHERTY RESEARCH Co. (U.S.P. 1,923,271, 22.8.33. Appl., 21.5.24).

**Vapourisation of oil.** A. E. HARNBERGER and C. B. WATSON, Assrs. to PURE OIL Co. (U.S.P. 1,928,102, 26.9.33. Appl., 28.2.28).

**Treatment [cracking] of oils.** W. G. LAIRD, Assr. to HEAT TREATING Co. (U.S.P. 1,926,009, 5.9.33. Appl., 30.7.26).

**Cracking of [hydrocarbon] oil.** G. EGLOFF, Assr. to UNIVERSAL OIL PRODUCTS Co. (U.S.P. 1,924,848 and 1,927,159, [A] 29.8.33, [B] 19.9.33. Appl., [A] 10.7.26, [B] 30.12.25. Renewed [A] 2.10.30, [B] 4.6.29).

**Cracking of hydrocarbon oils.** W. B. D. PENNIMAN (U.S.P. 1,922,322, 15.8.33. Appl., 6.3.22. Renewed 3.8.27).

**[Cracking] treatment of petroleum hydrocarbons.** A. G. DAVIS, Assr. to GASOLINE PRODUCTS Co., INC. (U.S.P. 1,922,528, 15.8.33. Appl., 10.12.25).

**[Cracking] treatment of hydrocarbons.** A. D. SMITH, Assr. to JENKINS PETROLEUM PROCESS Co. (U.S.P. 1,923,016, 15.8.33. Appl., 13.2.29). J. PERL, Assr. to DOHERTY RESEARCH Co. (U.S.P. 1,923,278, 22.8.33. Appl., 4.2.22. Renewed 5.3.29).

**[Cracking] treatment of hydrocarbon oils.** O. BEHMER, Assr. to TEXAS Co. (U.S.P. 1,925,526, 22.8.33. Appl., 13.8.25). J. D. SEGUY, Assr. to UNIVERSAL OIL PRODUCTS Co. (U.S.P. 1,927,187, 19.9.33. Appl., 26.7.30).

**Conversion of petroleum oil.** C. P. DUBBS, Assr. to UNIVERSAL OIL PRODUCTS Co. (U.S.P. 1,927,156, 19.9.33. Appl., 21.10.22. Renewed 17.7.30).



**Apparatus for treating hydrocarbons.** W. R. HOWARD, ASST. to UNIVERSAL OIL PRODUCTS CO. (U.S.P. 1,924,859, 29.8.33. Appl., 4.3.27). E. J. MCKEE and R. R. RAKESTRAW, ASSTS. to WESTERN OIL & REFINING CO. (U.S.P. 1,927,042, 19.9.33. Appl., 1.5.29).

**Refining of hydrocarbons.** (A) O. G. KAASA, (B) E. C. HERTHEL, ASSTS. to SINCLAIR REFINING CO. (U.S.P. 1,923,150 and 1,924,687, [A] 22.8.33, [B] 29.8.33. Appl., [A] 15.8.31, [B] 1.11.29).

**[Refining] treatment of hydrocarbon oils.** J. B. HEID, ASST. to UNIVERSAL OIL PRODUCTS CO. (U.S.P. 1,924,855, 29.8.33. Appl., 29.8.30).

**Coke-removal system.** W. H. BAHLKE, ASST. to STANDARD OIL CO. (U.S.P. 1,927,059, 19.9.33. Appl., 31.3.31).

**Apparatus for treating paraffin.** L. H. MACOMBER (U.S.P. 1,922,382, 15.8.33. Appl., 4.8.30).

**Drying coal. Separating solid materials. Centrifugal separators. Distilling pressure-converted products. Emulsification.**—See I. EtOH from  $C_2H_4$ .—See III.  $(NH_4)_2SO_4$  from oil-refinery sludge.—See VII. Acid-resisting alloy.—See X. Mineral drying oils.—See XII. Fertilisers. Peat manure. Insecticide.—See XVI. Laxative. Antirachitic substance.—See XX.

### III.—ORGANIC INTERMEDIATES.

**Thermal decomposition of higher paraffin hydrocarbons in an atmosphere of hydrogen. Hydrogenation of *n*-octadecane and paraffin.** J. GÓRNIK and A. SZAYNA (Przemysł Chem., 1934, 18, 57–62).— $C_{18}H_{38}$  undergoes conversion into a series of *n*-hydrocarbons ( $C_3$ – $C_{17}$ ) on heating with  $H_2$  at  $440^\circ/265$  atm., and similar results are obtained with paraffin wax at  $440^\circ$  and  $446^\circ$ . These results are explained on the assumption that the probability of rupture of any C–C linking is equal.

R. T.

**Dehydration of alcohol by absorbent and recuperated vapour.** USINES DE MELLE. G. DU BOIS (Chem. et Ind., 1934, 31, 280–281).—Polemical (cf. B., 1933, 953).

A. R. P.

**Detection of glycerol in foodstuffs and medicinal preparations and in cosmetics.** K. TÄUFEL and H. THALER (Pharm. Ztg., 1934, 79, 341–342).—The dry  $H_2O$ -extract is evaporated with excess of  $CaO$  paste and extracted with abs. EtOH– $Et_2O$  to eliminate carbohydrates. The dry extract is distilled with cryst.  $H_3PO_4$  and the resulting acraldehyde (I) oxidised to epihydrinaldehyde (II) by 3%  $H_2O_2$  and conc. HCl, excess of  $H_2O_2$  being destroyed by KI followed by  $Na_2S_2O_3$ ; (II) is then detectable colorimetrically by addition of phloroglucinol in  $Et_2O$  (cf. A., 1934, 169). Results are given for 24 materials. The sensitiveness is  $5 \times 10^{-6}$  g. of (I); allyl alcohol, eugenol, and substances yielding hydroxymethylfurfuraldehyde do not interfere. In presence of sucrose the sample is first inverted with  $H_2SO_4$ .

J. G.

**Analysis of technical solvents.** VI. F. HAUCK (Chem.-Ztg., 1934, 58, 75–76; cf. B., 1934, 85).—The determination of aromatic hydrocarbons (I), aliphatic hydrocarbons ("benzine") (II), and terpenes (III) in a

mixture is effected by first measuring the  $n$  of the mixture,  $n_m$ , and then removing (I) with conc.  $HNO_3$ . The vol. change measures (I). From this,  $n_m$ , and an assumed  $n$  for pure (I), a val. ( $n_s$ ) for the residual (II)–(III) mixture is calc. (III) is removed with conc.  $H_2SO_4$  [using 85%, 92%, and fuming (20%  $SO_3$ ) acids successively, to moderate the reaction] and  $n_b$  measured for the residual pure (II). The proportions of (II) and (III) are then calc. from  $n_s$  and  $n_b$ . This method of working overcomes the difficulty arising from the attack of (III) by  $HNO_3$ .

G. H. C.

**Dissolved  $C_2H_2$ . Pyrolysis of saturated hydrocarbons. Detecting traces of  $C_5H_5N$ .**—See II. Effects of dyed textiles on the skin.—See VI. Determining N in  $CaCN_2$ .—See VII. Determining  $NH_2$ -acids in preserves.—See XIX.

See also A., Apr., 373, Anodic oxidation of lactic to pyruvic. Electrolytic reduction of camphoric acid imide, and oxidation of piperidine. 375, Piperidine metavanadate. 394, Determination of  $COMe_2$ . 397, Prep. of organo-Mg compounds. 425, Determination of  $CHCl_3$  and nitrotoluene.

### PATENTS.

**Manufacture of hydration products of olefines.** H. DREYFUS (B.P. 407,722, 13.9.33).—EtOH and  $Et_2O$  are produced by passage of  $C_2H_4$  and steam over alkali or alkaline-earth metaphosphates at  $150$ – $350^\circ/ > 1$  atm. ( $300^\circ/50$  atm.). The process is applicable to higher olefines.

H. A. P.

**Sulphation of olefines [propylene].** B. T. BROOKS and E. J. CARDARELLI, ASSTS. to STANDARD ALCOHOL CO. (U.S.P. 1,919,617, 25.7.33. Appl., 10.12.30).—Gaseous  $C_3H_6$  is treated with 65–85% aq.  $H_2SO_4$  at  $< 50$  lb. per sq. in. and  $10$ – $40^\circ$  (e.g., 80%  $H_2SO_4$  at  $25^\circ/100$  lb. per sq. in.). The main product is  $Pr^s_2SO_4$ .

H. A. P.

**Production of alcohols.** H. T. BÖHME A.-G. (B.P. 406,714, 9.8.33. Ger., 3.9.32. Addn. to B.P. 381,746 and 385,488; B., 1933, 11, 182).—The processes of the prior patents are carried out in absence of a solvent; e.g., the Ca or Na salts of coconut-oil fatty acids are heated with excess Ca or Na formate and a Cu chromate catalyst at  $280^\circ/140$ – $280$  atm. in  $H_2$ .

H. A. P.

**Manufacture of ethyl alcohol [from ethylene].** B. T. BROOKS, ASST. to STANDARD ALCOHOL CO. (U.S.P. 1,919,618, 25.7.33. Appl., 22.8.31).— $C_2H_4$  is separated from  $C_3H_6$  and higher olefines present in cracked hydrocarbon gases by compression to  $300$ – $500$  lb. per sq. in./ $15$ – $24^\circ$  in presence of a solvent oil (or to  $500$ – $550$  lb. per sq. in./ $-12^\circ$  in absence of a solvent), and the mixture of  $C_2H_4$  with saturated hydrocarbons thus obtained is absorbed in  $90$ – $100\%$   $H_2SO_4$  at  $70$ – $100^\circ$  ( $80$ – $90^\circ$ ) at the same pressure; the resulting  $EtHSO_4$  is finally hydrolysed.

H. A. P.

**Manufacture of high-molecular mercaptans.** HENKEL & CO., G.M.B.H. (B.P. 407,181, 22.2.33. Ger., 4.4.32).—Aliphatic or hydroaromatic disulphides containing  $< C_8$  are treated with reducing agents ( $H_2O$ -sol. H sulphides, sulphides, or polysulphides), e.g., didodecyl disulphide with aq. NaHS at the b.p. gives dodecylthiol, b.p.  $142$ – $145^\circ/15$  mm.

H. A. P.



**Manufacture of cyclic ethers.** H. DREYFUS (B.P. 407,035, 1.9.32).—Polyhydric alcohols (ethylene glycol, glycerol) are dehydrated to cyclic ethers by heating in the form of (alkali or alkaline-earth) salts or mixtures with metallic oxides (at 160–200° in presence of HCl) and distilling away the ether as formed. An inert diluent of high b.p., e.g., Ph<sub>2</sub>, may be added. H. A. P.

**Manufacture of sulphonation products of aliphatic carbinols.** I. G. FARBENIND. A.-G. (B.P. 407,187, 28.2.33. Ger., 29.2.32).—Condensation products of aliphatic ketones or mixtures of ketones are reduced to carbinols, which are sulphonated by standard methods. The products are textile assistants (wetting agents for mercerising baths). Thus, mesityl oxide is reduced by Pt-H<sub>2</sub> at 200° or Ni-H<sub>2</sub> at 120–160° and the resulting CHMeBu<sup>δ</sup>-OH treated with ClSO<sub>3</sub>H at 0–5° or at 8–15° in Et<sub>2</sub>O. H. A. P.

**Manufacture of sulphonic acids.** W. W. TRIGGS. From FLESCHE-WERKE A.-G. F. GERBSTOFFFABR. U. CHEM. PRODUKTE (B.P. 406,889, 15.5.33).—Acid-stable, H<sub>2</sub>O-sol. products of use as textile assistants, e.g., as wetting, dispersing, and softening agents, are prepared by interaction of org. OH-compounds with alkyl-di- or -tri-sulphonic acids or their derivatives (and neutralisation of the product with alkalis). Examples are: Bu ricinoleate + CH<sub>2</sub>(SO<sub>3</sub>H)<sub>2</sub> (I); potato starch + (·CH·SO<sub>3</sub>H)<sub>2</sub>; methylcyclohexanol + (·CHCl·SO<sub>3</sub>H)<sub>2</sub>; cetyl alcohol (II) + (I); dodecyl alcohol + CHO·CH(SO<sub>3</sub>H)<sub>2</sub> (III) or + acetonetrisulphonic acid (and P<sub>2</sub>O<sub>5</sub>); (II) + NH<sub>2</sub>·CH(SO<sub>3</sub>H)<sub>2</sub> (IV); and undecyl alcohol + (III) or (IV). H. A. P.

**Manufacture of aminoalkylsulphonic acids and their salts.** W. W. GROVES. From I. G. FARBENIND. A.-G. (B.P. 406,788, 10.10.32).—Hydroxyalkylsulphonic acids or their salts are heated with NH<sub>3</sub> or an amine [in presence of an electrolyte having a neutral or alkaline reaction, e.g., Na<sub>2</sub>CO<sub>3</sub>, Na<sub>2</sub>SO<sub>4</sub>, Na<sub>2</sub>SO<sub>3</sub>, Ca(OH)<sub>2</sub>]. Thus OH·CH<sub>2</sub>·CH<sub>2</sub>·SO<sub>3</sub>Na with aq. NH<sub>2</sub>Me at 250°/73 atm. gives methyltaurine in almost quant. yield; NH<sub>3</sub> and NH<sub>2</sub>Et give taurine and ethyltaurine. Similarly, Na hydroxypropanesulphonate and aq. NH<sub>2</sub>Me give Na methylaminopropanesulphonate. H. A. P.

**Preparation of oxalic acid [from cellulosic material].** CONSORT. F. ELEKTROCHEM. IND. G.M.B.H. (B.P. 407,839, 23.5.33. Ger., 30.5.32).—Cellulose is extracted from wood etc. by (65–75%) H<sub>2</sub>SO<sub>4</sub> (at 50°) and the filtered solution oxidised (after dilution to 40–60% H<sub>2</sub>SO<sub>4</sub>) by HNO<sub>3</sub> and O<sub>2</sub> in presence of V<sub>2</sub>O<sub>5</sub>. Apparatus is claimed in which the solution is circulated through an absorption tower in countercurrent to the N oxides formed. H. A. P.

**Production of potassium oxalate.** R. KOEPP & Co. CHEM. FABR. A.-G. (B.P. 407,225, 14.6.33. Ger., 20.6. and 16.9.32).—The yield of K<sub>2</sub>C<sub>2</sub>O<sub>4</sub> (I) obtained by heating HCO<sub>2</sub>K (II) increases with decrease of partial pressure of H<sub>2</sub>, rise in temp., and increase in free alkali content. (II), which may contain (I) as diluent, is heated (in a ball mill) at 260–530° (300–400°) in presence of free alkali corresponding to the temp. employed (3–5% KOH) under a partial pressure of H<sub>2</sub> > the equilibrium pressure (> 1 atm.). The H<sub>2</sub>

may be removed by a stream of gas free from oxidising compounds (e.g., O<sub>2</sub>, CO, N<sub>2</sub>O). H. A. P.

**[Preparation of] alkoxyacetic acids.** H. A. BRUSON, Assr. to RESINOUS PRODUCTS & CHEM. CO., INC. (U.S.P. 1,920,137, 25.7.33. Appl., 28.9.32).—Na or K alkoxides of branched-chain monohydric aliphatic alcohols > C<sub>5</sub> are condensed with CH<sub>2</sub>Cl·CO<sub>2</sub>H or CH<sub>2</sub>Br·CO<sub>2</sub>H. The products form soap-like Na salts and oil-sol. heavy-metal salts. β-Octyl-, b.p. 160°/18 mm., sec.-hexyl-, b.p. 132–142°/15 mm., and βδ-dimethylamyl-oxyacetic acid, b.p. 137°/7 mm., are described. H. A. P.

**Manufacture of aliphatic [acid] anhydrides.** H. DREYFUS (B.P. 407,065, 26.8.32. Addn. to B.P. 387,692; B., 1933, 341).—In the manufacture of anhydrides from aq. or anhyd. aliphatic acids (AcOH) by thermal decomp., the acid is preheated by passage through a bath of molten inorg. halides, metal oxides, salts of weak acids, e.g., molybdates, arsenates, borates, or vanadates, or a thermally stable org. compound of high b.p. Thus, 95% AcOH is preheated by passage through a NaCl-LiCl (65:35) bath at 350°, and decomposed by a NaCl-KCl (1:1) bath at 750°. H. A. P.

**Manufacture of aliphatic [acid] anhydrides.** H. DREYFUS (B.P. 407,335 and 407,367, [A, B] 9.9.32).—(A) Aliphatic acids (AcOH) are dehydrated to anhydrides by passage (in absence of O<sub>2</sub>) over salts of the lower oxyacids of P (Ca phosphite on SiO<sub>2</sub> gel or pumice) at 600–900° (600–750°). (B) The usual catalysts for thermal dehydration (e.g., phosphates, tungstates) are used in presence of their reduction products (in presence of a reducing gas, e.g., H<sub>2</sub>, CO) at 300–900° (600–800°) (Ca phosphate + phosphite at 700°). H. A. P.

**Manufacture of aliphatic amines.** J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 406,700, 1.9.32).—Alcohols > C<sub>4</sub> and NH<sub>3</sub> are passed over dehydrating catalysts (ThO<sub>2</sub>, Al<sub>2</sub>O<sub>3</sub>, WO<sub>3</sub>, SiO<sub>2</sub> gel, Al phosphate, synthetic zeolites) at < 10 atm. (about 400°/200 atm.). Examples are: isoamyl alcohol → mono- and di-isoamylamines, isoheptyl alcohol → mono- and di-isoheptylamines, dodecyl alcohol → 90% of dodecylamine + 10% of didodecylamine. H. A. P.

**Synthesis of urea.** H. J. KRASE and H. C. HETHERINGTON (U.S.P. 1,923,489, 22.8.33. Appl., 27.6.28).—Compounds of CO<sub>2</sub> and NH<sub>3</sub> are autoclaved at 120–200° (150°) with an excess of 15–300 (100)% of NH<sub>3</sub>, whereby a yield of > 43% of urea, based on the CO<sub>2</sub> used, is obtained. A. R. P.

**Manufacture of amides of higher fatty acids.** J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 406,691, 17.8.32).—Amides of fatty acids > C<sub>10</sub> are prepared by passing NH<sub>3</sub> through the molten acid at < 250° in presence of a dehydrating catalyst (SiO<sub>2</sub> gel, fuller's earth, zeolites, H<sub>3</sub>PO<sub>4</sub>-pumice). Thus, stearic acid and NH<sub>3</sub> in presence of SiO<sub>2</sub> gel at 150–170° give a 96% conversion into amide in 12 hr. H. A. P.

**Manufacture of disodium carbimide [iminodicarboxylate].** MATHIESON ALKALI WORKS, and R. B. MACMULLIN (B.P. 407,200, 27.3.33. U.S., 25.4.32).—Dry Na carbamate is heated at > 200°. H. A. P.



**Manufacture of acylacetic hydroxyarylamides.** A. CARPMAEL. From I. G. FARBENIND. A.-G. (B.P. 407,408, 22.9.32).—Acylacetic esters are heated with hydroxyarylamines or arylamines containing an enolisable CO group, *e.g.*, 1-*m*-aminophenyl-3-methyl-5-pyrazolone, in presence (if desired) of an inert solvent, *e.g.*, PhCl, xylene. Examples are: acetoacet-*m*-hydroxyanilide and its 6-Cl-derivative, -7-hydroxy-2-naphthalide, m.p. 210° (decomp.), and -5-hydroxy-1-naphthalide, m.p. 173° (decomp.); propionacet-, benzoylacet-, *p*-nitrobenzoylacet-, *iso*- and *tere*-phthaloylbisacet-, diphenyl-4:4'- and naphthalene-1:5-dicarboxybisacet-*m*-hydroxyanilide; terephthaloylbisacet-4-hydroxy-*m*-toluidide; 1-(2':3'-hydroxynaphthamido)-3-acetoacetamidobenzene; 1-(2':3'-hydroxynaphthamido)-4-acetoacetamido-2:5-dimethoxybenzene; and  $\omega$ -terephthaloylbis[1-acetamido-4-(2':3'-hydroxynaphthamido)-2:5-dimethoxybenzene]. H. A. P.

**Catalytic dehydrogenation of partly or wholly hydrogenated polynuclear hydrocarbons.** J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 406,808, 4.11.32).—Polynuclear aromatic hydrocarbons are formed by heating their H-derivatives at 300°/1 atm. in the vapour or liquid phase with a (S or O) derivative of a metal (of group VI) having a difficultly reducible oxide. Examples are: tetrahydronaphthalene (I)  $\rightarrow$  C<sub>10</sub>H<sub>8</sub> at 350° in N<sub>2</sub> over NiCO<sub>3</sub>-Mo sulphide-Florida earth; 2-phenyldecahydronaphthalene  $\rightarrow$  2-C<sub>10</sub>H<sub>7</sub>Ph (II) at 500° in steam and in contact with ZnO-MgO-MoO<sub>3</sub> (III); naphthyltetrahydronaphthalenes  $\rightarrow$  dinaphthyls at 450° over W sulphide in N<sub>2</sub>; 2-cyclohexyltetrahydronaphthalene  $\rightarrow$  (II) at 500° over MoO<sub>3</sub> in H<sub>2</sub>; dicyclohexylbenzenes  $\rightarrow$  C<sub>6</sub>H<sub>4</sub>Ph<sub>2</sub> (IV) (1:4-C<sub>6</sub>H<sub>4</sub>Ph<sub>2</sub>, m.p. 209°) over (III) at 500°; 2-benzyltetrahydronaphthalene  $\rightarrow$  2-C<sub>10</sub>H<sub>7</sub>·CH<sub>2</sub>Ph, m.p. 54–56°, over (III); (I)  $\rightarrow$  C<sub>10</sub>H<sub>8</sub> over (III) at 550°; cyclohexyldiphenyl  $\rightarrow$  (IV) over 5ZnO:4Al<sub>2</sub>O<sub>3</sub>:1CaO at 600° in steam; and methylcyclohexylbenzenes  $\rightarrow$  methyldiphenyls over (III) at 500° in steam. H. A. P.

**Preparation of phenols.** G. B. ELLIS. From Soc. DES USINES CHIM. RHÔNE-POULENC (B.P. 406,646, 22.8.32 and 6.2.33).—The appropriate alkali arylsulphonate (I) is heated with 1–1.7 (1.3) mols. of free alkali or alkali phenoxide at 280–370° in a current of steam. Alternatively, (I) is added to a mixture containing excess of alkali as the reaction proceeds. The last traces of phenol are removed by adding an acid gas (SO<sub>2</sub>, CO<sub>2</sub>) to the steam towards the end of the reaction. Yields of 90% of theory of PhOH, using 1–1.2 mols. of NaOH, are claimed. H. A. P.

**Manufacture of imides of [peri]-dicarboxylic acids.** A. O. JAEGER, L. C. DANIELS, and H. J. WEST, Assrs. to SELDEN Co. (U.S.P. 1,919,889, 25.7.33. Appl., 31.12.29).—The alkali-metal (Na) salt of the acid (naphthalic or anthracene-1:9-dicarboxylic acid) is heated with a salt of NH<sub>3</sub> or a primary amine in aq. solution. H. A. P.

**Manufacture of furfural[dehyde].** H. J. BROWNLEE, Assr. to QUAKER OATS Co. (U.S.P. 1,919,877–8, 25.7.33. Appl., [A] 26.1.27, [B] 16.1.28).—(A) Economy of steam and an approx. uniform distillate are obtained in the production of furfuraldehyde (I) from pentosan-

containing materials (II) and non-volatile aq. acids by connecting a no. of digesters in series and operating them so that steam used for heating and distillation passes through liquors successively richer in (I). (B) The same effect is produced by passing (II) and sufficient acid for hydrolysis in countercurrent to steam through a horizontal autoclave. H. A. P.

**Manufacture of nitrogeneous condensation products [vat dyes and intermediates].** I. G. FARBENIND. A.-G. (B.P. 407,194, 11.3.33. Ger., 19.3.32).—Pyridino-pyrenes or -chrysenes are oxidised (by CrO<sub>3</sub>) to quinones which may be halogenated (*e.g.*, by SO<sub>2</sub>Cl<sub>2</sub>) if desired. The products are yellow vat dyes. Examples are mono-, m.p. 280°, and di-pyridinopyrenequinone, and dipyridinochrysenequinone (Cl- and Br-derivatives). H. A. P.

**Manufacture of sulphuric esters of leuco-derivatives of vat dyes.** I. G. FARBENIND. A.-G. (B.P. 407,702, 21.9.32. Ger., 21.9.31).—The dye is reduced by CS<sub>2</sub> and NH<sub>3</sub> or a primary aliphatic or hydroaromatic amine in a *tert*.-amine (C<sub>5</sub>H<sub>5</sub>N) and the product esterified by addition of sulphonating agents (SO<sub>3</sub>, ClSO<sub>3</sub>H). *S* and *sec*. amines may be added to the reduction mixture. Leuco-H sulphates (as Na salts) are prepared from 5:7:5':7'-tetrabromoindigo, 5:7:6'-trichloro-6:6'-dimethoxy-, -7:7'-dinitro-, and -4:4'-dimethylthioindigo, and 3:4:8:9-dibenzpyrenequinone. H. A. P.

**Manufacture of organo-lead compounds.** F. O. RICE (B.P. 407,036, 4.6.32. U.S., 31.8.31).—Hydrocarbons or org. O derivatives are heated at 500–1000°/ < 1 atm. (850°/0.8 mm.) and the products passed over finely-divided (sublimed) Pb at a lower temp., and then rapidly cooled (to –80° and finally to –190°) to separate the lead alkyls. COMe<sub>2</sub> and Et<sub>2</sub>O give mainly the Me, and heptane the Me and Et, derivatives. Apparatus is described. H. A. P.

**Manufacture of mercurated hydrocarbons [for use as seed disinfectants].** IMPERIAL CHEM. INDUSTRIES, LTD., and F. L. SHARP (B.P. 406,725, 4.8.32).—PhMe and higher homologues are heated with aq. Hg(OAc)<sub>2</sub>. It is claimed that the use of excess Hg(OAc)<sub>2</sub> over 1 equiv. gives polymercurated products. H. A. P.

**Carrying out exothermic oxidations.**—See I. Phenols from hydrocarbons.—See II. Seed disinfectants.—See XVI. [Products by] bacterial fermentation.—See XVIII.

#### IV.—DYESTUFFS.

**Action of light on dyes.** H. REIN (Angew. Chem., 1934, 47, 157–161).—The fading of dyes in light is highly dependent on the nature of the light, the humidity, and O<sub>2</sub> pressure. After-treatments with Auxanin B, Cu or Ni salts or dichromate which increase the light-fastness diminish the extinction coeff. (I), and fast dyes have lower (I) than more sensitive dyes of the same colour. Dyeings on wool are less sensitive to climatic differences than are dyeings on cotton, and are therefore more suitable as standards. A. G.

**Effects of dyed textiles on the skin.**—See VI.



See also A., Apr., 400, Prep. of azo dye from 2-amino-*p*-cymene. Tetra-arylmethane derivatives as dyes. 422, Cyanine dyes. 464, *Berberis laurina* [in dye industry].

## PATENTS.

**Monoazo dyes.** IMPERIAL CHEM. INDUSTRIES, LTD., and M. MENDOZA (B.P. 407,016, 7.7.32).—*N*-Hydroxyethyl derivatives of aminonaphtholsulphonic acids (I) (prepared by condensation with  $\text{CH}_2\text{Cl}\cdot\text{CH}_2\cdot\text{OH}$ ) are coupled with diazotised *o*-hydroxy-, *o*-methoxy-, or *o*-carboxy-amines, and the resulting dyes, where an *o*-hydroxyazo group is present, converted into metal derivatives. Brighter and bluer shades are obtained than with the parent (I). Examples of coupling components are the  $\cdot\text{C}_6\text{H}_4\cdot\text{OH}$  derivatives of 2:8:6-, 2:5:7-, and 1:8:4- $\text{NH}_2\cdot\text{C}_{10}\text{H}_5(\text{OH})\cdot\text{SO}_3\text{H}$ , and 1:8:3:6- $\text{NH}_2\cdot\text{C}_{10}\text{H}_4(\text{OH})(\text{SO}_3\text{H})_2$ . H. A. P.

**Manufacture of azo dyes [ice colours].** A. G. BLOXAM. From SOC. CHEM. IND. IN BASLE (B.P. 407,206, 11.4.33).—Diazotised 2-amino-5-acetamidoquinol-1-aryl 4-methyl ethers give with 2:3-hydroxynaphthoic aryl-amides violet dyes of good fastness to light,  $\text{Cl}_2$ , and kier-boiling. Examples are the 1-Ph ether  $\rightarrow$  2:3-hydroxynaphthoic *p*-anisidide (I), 1-*o*-tolyl ether  $\rightarrow$  (I), 2:3-hydroxynaphthoic 5-methoxy-*o*-toluidide (II) or 5-chloro-2:4-dimethoxyanilide, 1-*p*-anisyl ether  $\rightarrow$  2:3-hydroxynaphthoic anilide or (I), and the 1-*p*-tolyl ether  $\rightarrow$  2:3-hydroxynaphthoic *o*-anisidide or (II). H. A. P.

**Manufacture of [sulphonated] azo dyes.** I. G. FARBEIND. A.-G. (B.P. 407,055, 9.9.32. Ger., 10.9.31).—Red acid wool monoazo dyes are obtained by coupling diazotised arylamines ( $\text{NH}_2\text{Ph}$ ,  $\text{C}_6\text{H}_4\text{Me}\cdot\text{NH}_2$ ,  $\text{NH}_2\cdot\text{C}_6\text{H}_4\cdot\text{OMe}$ , etc.) with alkyl-, aralkyl-, or arylsulphonamido- (or -sulphonalkylamido-) alkylcarboxy-derivatives of aminonaphthols or their sulphonic acids. Examples of coupling components are the *N*-*p*-toluenesulphonamidoacetamido-derivative of *H*-acid [1:8:3:6- $\text{p}\cdot\text{C}_6\text{H}_4\text{Me}\cdot\text{SO}_2\cdot\text{NH}\cdot\text{CH}_2\cdot\text{CO}\cdot\text{NH}\cdot\text{C}_{10}\text{H}_4(\text{OH})(\text{SO}_3\text{H})_2$ ], the *p*-toluenesulphon-methyl- and -ethyl-amidoacetamido-derivatives of *K*-acid, the *p*-toluenesulpho-methyl- and -benzyl-aminoacetamido-derivatives of  $\gamma$ -acid, and the methanesulphomethylamido-acetamido- and -propion-amido-, and the benzylsulphomethylamidoacetamido-derivatives of *K*-acid. H. A. P.

**Manufacture of azo dyes containing metals.** J. Y. JOHNSON. From I. G. FARBEIND. A.-G. (B.P. 406,778, 29.9.32).—The metal derivatives of dyes having 8-hydroxyquinoline or its derivatives as end-component and  $\leq 1 \text{ SO}_3\text{H}$  or  $\text{CO}_2\text{H}$  in the mol. are claimed as dyes for leather, silk, and wool. Examples are:  $m\text{-NH}_2\cdot\text{C}_6\text{H}_4\cdot\text{SO}_3\text{H} \rightarrow$  8-hydroxyquinoline (I) (Cr, orange; Fe, brown);  $\text{NH}_2\text{Ph} \rightarrow$  8-hydroxyquinoline-5-sulphonic acid (II) (Cr, orange-yellow);  $p\text{-NH}_2\cdot\text{C}_6\text{H}_4\cdot\text{SO}_3\text{H}$  (III)  $\rightarrow$  8-hydroxy-5-methylquinoline (IV) (Cr, brown);  $1:7\text{-NH}_2\cdot\text{C}_{10}\text{H}_6\cdot\text{SO}_3\text{H} \rightarrow$  (IV) (Cr, brown); (III)  $\rightarrow$  5-chloro- or 5-bromo-8-hydroxyquinoline (Cr, brown); 4-aminoazobenzene-3:4'-disulphonic acid  $\rightarrow$  (II) (Cr, brown-red);  $m\text{-C}_6\text{H}_4(\text{OH})_2 \rightarrow$  benzidine-3:3'-disulphonic acid  $\rightarrow$  (I) (Cr, red-brown); picramic acid (V)  $\rightarrow$  *H*-acid  $\rightarrow$  (I) (Cr, green);  $p\text{-NH}_2\cdot\text{C}_6\text{H}_4\cdot\text{NO}_2 \rightarrow$  (II) (Cr, yellow-red on wool);  $o\text{-NH}_2\cdot\text{C}_6\text{H}_4\cdot\text{OMe} \rightarrow$  (II) (Cr, brown); and

(V)  $\rightarrow$  (II) (brown-violet on wool). Except where otherwise stated the shades given are on leather. H. A. P.

**Manufacture of water-soluble diazoimino-compounds.** I. G. FARBEIND. A.-G. (B.P. 407,840, 23.5.33. Ger., 23. and 28.5.32. Addn. to B.P. 320,324; B., 1930, 233).—Diazonium salts free from solubilising groups are condensed with derivatives of piperidine, 2:3-diaryl- or -dialkyl-indoles, carbazole, or higher fused-ring derivatives containing a solubilising group ( $\text{CO}_2\text{H}$ ,  $\text{SO}_3\text{H}$ ). Examples are: *p*-toluidine  $\rightarrow$  piperidine-3-sulphonic acid; 2:1:5- $\text{NH}_2\cdot\text{C}_6\text{H}_3\text{Me}\cdot\text{NO}_2 \rightarrow$  2-methylpiperidine-5-sulphonic acid; 2:1:4- $\text{NH}_2\cdot\text{C}_6\text{H}_3\text{Me}\cdot\text{Cl}$  (I)  $\rightarrow$  piperidine-2-carboxylic acid; 2:4:1- $\text{NH}_2\cdot\text{C}_6\text{H}_3\text{Cl}\cdot\text{OMe} \rightarrow$  2:3-dimethylindole-5-sulphonic acid; 4:1:3- $\text{NH}_2\cdot\text{C}_6\text{H}_3\text{Me}\cdot\text{NO}_2 \rightarrow$  2:3:5-trimethylindole-7-sulphonic acid; *m*- $\text{NH}_2\cdot\text{C}_6\text{H}_4\cdot\text{Cl}$  (II)  $\rightarrow$  tetrahydrocarbazole-7-sulphonic acid;  $o\text{-NH}_2\cdot\text{C}_6\text{H}_4\cdot\text{NO}_2 \rightarrow$  tetrahydrocarbazole-5:8-disulphonic acid; (I)  $\rightarrow$  tetrahydrocarbazole-6-carboxylic acid; 1-aminoanthraquinone  $\rightarrow$  8-carboxytetrahydrocarbazole-6-sulphonic acid; and (II)  $\rightarrow$  1:2-benzo-3:4-dihydrocarbazole-7-sulphonic acid. The products are used as stable diazo compounds in printing and dyeing. H. A. P.

**Manufacture of anthraquinone dyes.** (A, B) IMPERIAL CHEM. INDUSTRIES, LTD., N. H. HADDOCK, and F. LODGE and (B) C. H. LUMSDEN (B.P. 406,689 and 406,733, [A] 2.8.32, [B] 1.9.32).—(A) Chlorides of anthraquinonecarboxylic acids (I) are treated with 2-nitro-4-aminophenylthioglycolic acid and the products reduced after (if desired) amidation of replaceable halogen in the anthraquinone nucleus. The final dyes are applicable to animal fibres by the processes of B.P. 377,740 and 394,312 (B., 1932, 1026; 1933, 858). Examples of (I) are: 1-aminoanthraquinone-2-carboxylic acid, 1-chloro-4-bromoanthraquinone-2-carboxylic acid (+  $\text{NH}_2\text{Ph}$ ), 4-bromo-1-aminoanthraquinone-2-carboxylic acid (+  $\text{NH}_2\text{Ph}$ ), and 5-benzamidoanthraquinone-1-carboxylic acid. (B) Aminoanthraquinones and their derivatives are acylated by dinitrodiaryl disulphide dicarboxylic acids ( $\text{NO}_2$ :  $\text{S}\cdot\text{S}\cdot$  is *o*-) and the products reduced to the corresponding *o*-aminothiols, which when condensed with  $\text{CH}_2\text{Cl}\cdot\text{CO}_2\text{H}$  etc. give *o*-aminothioglycolic acids, which are applied to animal fibres by the processes of B.P. 377,740 (B., 1932, 1026). Examples are: 2:2'-dinitro-4:4'-dicarboxydiphenyl disulphide + 1-aminoanthraquinone (I) (yellow), or its 4-OMe- (II) (orange-scarlet), 4-OH- (as 4-OMe-), 5-OMe- (orange-yellow), 4-NHMe- (blue-violet) or 5-Cl- (as 5-OMe-) -derivatives, and 2:2'-dinitro-6:6'-dicarboxydiphenyl disulphide + (I) (yellow) or (II) (scarlet). The shades given are on wool after lactamisation by inorg. acid. H. A. P.

**Colour preparation for butter, oleomargarine, etc.** L. ADLER (U.S.P. 1,920,231, 1.8.33. Appl., 31.7.30).—A suitable oil-sol. and  $\text{H}_2\text{O}$ -insol. dye (e.g., yellow-AB or -OB) is dispersed in  $\text{H}_2\text{O}$  with gum arabic, in the approx. proportions: colour 2—3,  $\text{H}_2\text{O}$  100 pts., gum  $\frac{1}{2}$ —1 pt. E. L.

**Food-fat and oil-colouring material.** A. F. FILES, ASSR. to FILES PACKETING MACHINE CO. (U.S.P. 1,921,738, 8.8.33. Appl., 17.3.32).—1 pt. of yellow-AB with 9 pts. of yellow-OB (or a proportionate amount of other



suitable dyes) are mixed with 24 pts. of lactose, the dry mixture being substantially oil-free. Even colour distribution in the fat is claimed with such mixtures.

E. L.

**Manufacture of [unsymmetrical thio-]indigoid dyes.** SOC. CHEM. IND. IN BASLE (B.P. 406,914 and 407,578, [A] 13.7.33, [B] 14.6.33. Switz., [A] 15.7.32, [B] 23.6.32).—(A) The dyes are prepared by condensation of suitable derivatives of 2-hydroxy- and 2-hydroxy-3:6-dialkyl-thionaphthens (or the 4-halogeno-derivatives of the latter). The products may subsequently be halogenated. Examples are (the shades given are on cotton): 4-chloro-1:2-diketo-3:6-dimethyltetrahydrothionaphthen-1-*p*-dimethylaminoanil (I) + 1-chloro-2:3-naphthathioindoxyl (VI) (blue-violet); 4-chloro-2-hydroxy-3:6-dimethylthionaphthen (II) + 4-chloro-1:2-diketo-6-methyltetrahydrothionaphthen-1-*p*-dimethylaminoanil (violet-red); (II) + 5-ethoxy-1:2-diketotetrahydrothionaphthen-1-*p*-dimethylaminoanil (rose); (II) + 1:2-naphthathioindoxyl-1-*p*-dimethylaminoanil (bordeaux); 2-hydroxy-3:6-dimethylthionaphthen + 1:2-diketo-6-methyltetrahydrothionaphthen-1-*p*-dimethylaminoanil (rose) (brominated, red to bordeaux); 1:2-diketo-3:6-dimethyltetrahydrothionaphthen-1-*p*-dimethylaminoanil (III) + 2:1-naphthathioindoxyl (IV) (red-brown); (III) + (VI) (blue-violet); (I) + 5-chloro-2-hydroxy-3-methylthionaphthen (V) (bluish-rose); (I) + (IV) (blue-bordeaux); (II) + 5-chloro-1:2-diketo-4-methyltetrahydrothionaphthen-1- (red-violet) and 8-chloro-1:2-naphthathioindoxyl-2-*p*-dimethylaminoanil (red-violet); (II) + (III) (bluish-rose); and (III) + (V) (rose) (brominated, red). (B) Products derived by standard methods from monohalogenated 2-hydroxythionaphthens containing *m*-dialkyl substituents are afterwards halogenated. Examples are: 6-chloro-2-hydroxy-3:5-dimethylthionaphthen + thionaphthenquinone-1-*p*-dimethylaminoanil (I) (rose), or its 5-OEt- (V) (scarlet), 4-chloro-6-methyl (red-violet), 5-chloro-4-methyl (IV) (red-violet), or 5-chloro-3-methyl (rose) derivatives, or the 2-*p*-dimethylaminoanils of 2:3-naphththioisatin (II) (bluish-violet, redder on halogenation), its 1-Cl-derivative (III) (violet), or 1:2-naphththioisatin (VI); 3-chloro-2-hydroxy-4:6-dimethylthionaphthen + (I) (blue-red), (II) (violet-blue), (III) (red-blue), (IV) (rose), (V) (scarlet), (VI) (bordeaux), or 5-chloro- (rose) or 4-chloro-6-methylthionaphthenquinone-1-*p*-dimethylaminoanil (mauve). H. A. P.

**Leuco-esters of vat dyes. Nitrogenous vat dyes.**—See III.

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

**Influence of moisture on cocoons of *Bombyx mori* during and after their formation.** W. WAGNER (Mitt. Textilforsch. Krefeld, 1933, 9, 16—21).—Many faults in subsequent processing are due to exposure of cocoons to atm. having too high a R.H. during spinning or storing. High temp. accentuates the effect; the R.H. should be  $\geq 50\%$  and the temp.  $\geq 25^\circ$ . Cocoons are affected locally.

A. G.

**Surgical catgut ligatures. X-Ray diffraction studies.** G. L. CLARK, R. K. FLEGE, and P. F. ZIEGLER

(Ind. Eng. Chem., 1934, 26, 440—445).—The structural characteristics of surgical catgut ligatures as revealed by the  $K\alpha$  ray of Cu, and the effect of processing conditions on that structure, are discussed. Resemblances and differences between collagen fibres and gelatin jellies are listed, and it is suggested that fibrils of the former are composed of bundles of protein mols. arranged parallel to the long axis of the fibre and held together by co-ordinate linkings between adjacent mols. Catgut rendered plastic by immersion in certain swelling agents is almost wholly amorphous, but after the application of tension, or drying at const. length, there is X-ray evidence of parallel micellar arrangement into long chains. Elevated temp. required for sterilisation, and certain tubing fluids usually employed, both tend to lower the degree of orientation. Quality resides to a large extent in structural units. Mark's formula (B., 1933, 298), relating tensile strength after stretching and micellar dimensions, is shown to be applicable, and further formulæ are deduced.

H. A. H.

**Moisture content of vistra and vistra-crêpe yarns.** W. KÖNIGS (Mitt. Textilforsch. Krefeld, 1933, 9, 45—46).—Measurements on 138 samples during one year showed  $H_2O = 7\text{--}17\%$ , the nominal val. being 11%.

A. G.

**Sorption of water by cellulose.** S. E. SHEPPARD and P. T. NEWSOME (Ind. Eng. Chem., 1934, 26, 285—290).—The view that  $H_2O$  vapour is sorbed both by surface (or chemisorption) and by capillary condensation is accepted. Wood pulp has a higher sorption than cotton cellulose, but this is not affected by beating.

A. G.

**Wood-pulp [screen] fractionation.** O. KRESS and F. W. BRAINERD (Paper Trade J., 1934, 98, T.A.P.P.I. Sect., 163—167).—It is characteristic of groundwood (G) fractions that increasing degree of fineness is accompanied by increased burst and tensile strengths and  $d$ , only the finest fraction (passing 200-mesh) approximating to the strength of the original pulp. It is suggested that fractionation in a single screen may be sufficient to characterise G pulp. Fractionation of chemical pulps (both sulphite and sulphate) shows the opposite effect, the coarser fractions chiefly determining strength, which decreases as the fibres become shorter. Bleached birch sulphate appears to be an exception. Chemical purity [as determined by  $\alpha$ -cellulose (I) and lignin contents, and Cu no. (II)] and especially colour also fall off markedly with decrease in fibre length. This is ascribed to the presence of immature fibres and of degraded and non-cellulosic matter. The effect of beating on the fractional composition of different types of chemical pulps has been investigated. They vary so widely that it is considered bad practice to beat such pulps together. It is shown that max. strength is not attained until the fibres have been very much cut by the beater roll. The ability of bleached pulp to resist such cutting seems to be related to its (I) content and (II).

H. A. H.

**Comparison of the German and Swedish methods for determining the degree of cooking of sulphite and sulphate pulps.** D. JOHANSSON (Papier-Fabr., 1934, 32, 172—175).—Comparison of different methods used in Germany and Scandinavia show variable results.



It is suggested that the Roe Cl no. should be used as a basis of classification, using  $\text{KMnO}_4$  methods with suitable conversion tables to the Roe units for easy-bleaching and semi-bleached pulps. D. A. C.

**Determination of hardness of unbleached sulphite and soda pulps.** MEMO. No. 2, FASERSTOFF-ANALYSENKOMM. DES VEREINS DER ZELLSTOFF- U. PAPIERCHEMIKER (Papier-Fabr., 1934, 32, 157—159).—The  $\text{KMnO}_4$  method for moist and dry pulps is described, together with a disintegrator suitable for the latter material. D. A. C.

**Standard method for determination of lignin in unbleached and bleached pulps.** MEMO. No. 3, FASERSTOFF-ANALYSENKOMM. DES VEREINS DER ZELLSTOFF- U. PAPIERCHEMIKER (Papier-Fabr., 1934, 32, 169—170).—Noll's method is described (cf. B., 1931, 1005; 1932, 12), together with a standard instrument for pulverising the sample. D. A. C.

**Strength in wood-pulp papers.** H. A. HARRISON (Ind. Eng. Chem., 1934, 26, 458—461).—Factors affecting the strength of paper are considered (cf. B., 1931, 966). It is believed that fibrillation in itself is not of such importance in producing strength as is commonly thought. Evidence in favour of this view is summarised. Experiments are given to show the effect of wetting-out agents on the rate of hydration and strength development. With kraft pulp suppression of hydration is due to frothing; this does not occur with unbleached sulphite pulp. Numerous photomicrographs and strength data are included. H. A. H.

**Physical tests of paper.** ANON. (Paper Trade J., 1934, 98; T.A.P.P.I. Sect., 178).—A TAPPI Committee report. Modifications to the rate of applying the load during the standard tensile and bursting tests are proposed. H. A. H.

**Penetration of electrolytes into wood.**—See IX. Testing sizes.—See XII. Saccharification of wood.—See XVII. Preserving wool.—See XVIII. Agar.—See XX.

See also A., Apr., 352, Structure of fibres. 408, Condensation products of aromatic hydroxy-aldehydes [for lignin detection].

#### PATENTS.

**Elimination from wool and animal spinning fibres of a similar nature of adhering pitch or grease.** J. F. A. SPANKE (PÜSCHEL & Co.) (B.P. 407,331, 31.7.33. Ger., 14.9.32).—The fibrous material (I) in its natural and unmoistened condition is subjected to a mechanical treatment below  $0^\circ$  so as to break up the brittle pitch and grease and separate it from (I).

F. R. E.

**Production of low-viscosity cellulose fibre.** G. A. RICHTER, Assr. to BROWN Co. (U.S.P. 1,923,641, 22.8.33. Appl., 17.7.28).—A mixture of cotton and wood fibre is treated with dil. aq.  $\text{KMnO}_4$ , washed, treated with  $\text{NaHSO}_3$  to remove the  $\text{MnO}_2$  deposit, again washed, and finally digested in aq.  $\text{Na}_2\text{S}$ . A. R. P.

**Conditioning of cellulose fibre for nitration.** M. O. SCHUR and B. G. HOOS, Assrs. to BROWN Co. (U.S.P. 1,919,962, 25.7.33. Appl., 20.2.30).—Wood pulp is mer-

cerised with a large excess of caustic alkali, washed free from alkali, de-watered to a fibre content of 25—75%, finely shredded, dried, and nitrated. F. R. E.

**Purification of cellulose.** C. HENNINGSEN, Assr. to DU PONT RAYON Co. (U.S.P. 1,919,329, 25.7.33. Appl., 16.1.28).—Aged alkali-cellulose is treated with 8—18% aq.  $\text{NaOH}$  at  $20^\circ$  to remove impurities, centrifuged, washed free of alkali, and dried. The product, which contains 98—99% of  $\alpha$ -cellulose and has a cuprammonium viscosity of 2, may be reconverted into alkali-cellulose and xanthated without intermediate ageing. F. R. E.

**Manufacture of cellulose esters.** KODAK, LTD., Assees. of C. J. MALM (B.P. 407,355, 15.9.32. U.S., 16.9.31).—After pretreatment of cellulose at elevated temp. with a mixture of a fatty acid and a relatively large amount of a chlorinated aliphatic hydrocarbon (I) (not  $\text{CHCl}_3$  or  $\text{CCl}_4$ ), a catalyst ( $\text{H}_2\text{SO}_4$ ) and a fatty acid anhydride are added and the temp. is maintained until a clear solution is obtained. The ester may be pptd. with  $\text{H}_2\text{O}$  at or above the b.p. of (I). F. R. E.

**Manufacture of cellulose esters.** BRIT. CELANESE, LTD. (B.P. 407,509, 26.1.33. U.S., 26.1.32).—Cellulose of cuprammonium viscosity 20—100 centipoises, produced by subjecting high-viscosity cellulosic material (bleached cotton linters) to the action of acids ( $\text{H}_2\text{SO}_4$ ,  $\text{HCl}$ ) or neutral oxidising agents ( $\text{H}_2\text{O}_2$ ), is pretreated and esterified with a fatty acid anhydride, a solvent (fatty acid) for the ester, and a catalyst ( $\text{H}_2\text{SO}_4$ ). F. R. E.

**Manufacture of films, foils, and the like containing cellulose derivatives.** H. DREYFUS (B.P. 407,351, 9.9.32).—After forming in the required shape, the materials are passed through a gaseous medium, isolated from the surrounding atm. and into which solvent or softening agent for the cellulose derivative is introduced, and thence through the coagulating liquid. F. R. E.

**Manufacture of artificial filaments and the like.** BRIT. CELANESE, LTD., and P. F. C. SOWTER (B.P. 407,359, 4.7.32).—Stretched materials composed of regenerated cellulose, but especially of org. derivatives of cellulose, are treated, in order to reduce their tendency to crease, with a restricted quantity of a solvent or softening agent (I) (thiocyanates,  $\text{EtOH}$ , glycol monoacetate, Turkey-red oil, at elevated temp. etc.) so that only the outer layers are acted on. The (I) is then rapidly removed by washing. F. R. E.

**Production of yarns comprising artificial filaments.** BRIT. CELANESE, LTD., H. DREYFUS, and W. A. DICKIE (B.P. 407,357, 8.7.32).—Spun yarns of good extension are produced from continuous filaments of cellulose derivatives by severing at least some of the filaments and subjecting to a controlled shrinking of 5—30% with solvents or softening agents ( $\text{CH}_2\text{Cl}_2$ ,  $\text{C}_2\text{H}_4\text{Cl}_2$ ,  $\text{C}_6\text{H}_6$ , etc.). F. R. E.

**Manufacture of shrinkable bottle caps or the like.** SOC. CHEM. IND. IN BASLE (B.P. 407,492, 2.1.33. Switz., 8.1.32).— $\text{COMe}_2$ -insol. cellulose formate-acetate (cf. B.P. 343,889; B., 1931, 480) in (85% aq.)  $\text{HCO}_2\text{H}$  is coagulated or pptd. on a suitable mould by  $\text{H}_2\text{O}$  or an aq. liquid. Fillers (e.g.,  $\text{BaSO}_4$ ) may be added. H. A. P.



**Proofing or sizing of paper or cardboard with paraffin in course of machine manufacture of said paper or cardboard.** A. THIRIET and J. MEYER (B.P. 406,771, 26.9.32).—Melted paraffin wax, with or without products assisting the sizing or proofing, is applied to the materials in the required quantity from a cylinder of regulatable speed or by means of a pump, shortly before the strip passes to the last drying cylinder, by transfer, brushing, or spraying. F. R. E.

**Sized pulp stock and product therefrom.** W. H. RANDALL, Assr. to FIDELITY TRUST CO. (U.S.P. 1,918,781, 18.7.33. Appl., 24.6.29).—A sizing composition consisting of untreated rosin, paraffin wax, etc. dry-mixed with hydrated fibres (chemical wood pulp) is added to the pulp stock in the beater, and the sized pulp is die-moulded and dried. F. R. E.

**Production of paper or like cellulosic material having a marbled or like appearance.** A. DIAMAND (B.P. 406,661, 29.8.32).—The paper (*P*) is damped over predetermined areas and fed to a point where it comes in contact with a pigment, which is carried by a film of  $H_2O$  or other medium flowing by gravity towards *P*, and is impressed on the undamped areas; the excess moisture is afterwards removed by evaporation or mechanical means. F. R. E.

**Colorimeter.**—See I.  $H_2C_2O_4$  from cellulose.—See III. Constructional material.—See IX. Articles from cellulose derivatives. Plasticising cellulose acetate. Impregnated product [paper].—See XIII. Treating sisal fibres.—See XVI.

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

**Behaviour of matt and super-matt rayons in dyeing.** W. WELTZIEN and K. SCHULZE (Mitt. Textilforsch. Krefeld, 1933, 9, 51–59).—Delustring viscose rayon with oil increases the absorption of direct dyes and diminishes that of basic dyes. Delustring with  $TiO_2$  has little effect on the absorption of basic dyes by viscose or acetate rayons (I), but increases the absorption of Celliton Fast dyes by (I). (I) of different titres behave differently in black dyeing. Matt (I) does not resist blacks for viscose as well as does lustrous (I), and when matt (I) is to be left white only the Type 8000 dyes can be recommended. A. G.

**Dyeing chrome sheep skins black.** A. S. VINOGRADOVA (Izvest. Tzentr. Nauch.-Issledov. Inst. Kozh. Prom., 1932, No. 2, 29).—Mixtures suitable for brush-dyeing are specified. CH. ABS.

**Dyeing light box leather a brown colour resistant to wet and dry friction.** R. L. METLITZKAYA (Izvest. Tzentr. Nauch.-Issledov. Inst. Kozh. Prom., 1932, No. 2, 25–26).—Three methods are described. CH. ABS.

**Deleterious effects of dyed textiles on the skin.** K. SCHULZE (Mitt. Textilforsch. Krefeld, 1933, 9, 27–33).—Lists are given of the dyes and intermediates which produce eczema in sensitive individuals, and a table is included of the colour reactions of the most important of the latter materials. A. G.

**Adherence of cellulose acetate film to aeroplane fabric.** R. STRATTA (L'Ind. Chimica, 1934, 9, 319–322).—The method here described for measuring this adher-

ence (*A*) has been applied to fabrics treated with dopes made up with various solvents. The results do not vary greatly with the composition,  $\eta$ , or no. of coats applied. A high content of epichlorohydrin does, however, increase *A*,  $CH_2Ph\cdot OH$  being rather less effective. Between fairly wide limits, the  $\eta$  of the dope is virtually without influence in this respect. T. H. P.

**[Use of rubber dispersions in] textile finishes.** H. P. STEVENS and R. GAUNT (Bull. Rubber Growers' Assoc., 1933, 15, 653–666).—Rubber latex does not penetrate the fibres, but merely enters between them; mercerisation or xanthation does not result in closer union of fibre and rubber. The conditions of dipping and squeezing, however, affect the results considerably. Sometimes there appears to be preferential absorption of serum so that the cloth is deficient in rubber. The damp "feel" of latex-treated fabrics can be eliminated by soaking the finished material in warm  $H_2O$ . Impregnation of stockinette with latex gives a material resembling elastic webbing in properties. D. F. T.

**Manufacture of rubber-lacquer materials for rain-proof wear.** ANON. (Gummi-Ztg., 1934, 48, 317–318, 341–342).—The production of rain-proof material, by applying to fabric several coatings of rubber solution and then of lacquer, possibly with an intermediate and final cold-vulcanisation, so as to impart a leather-like surface-finish, is described. D. F. T.

**Examination of weighted silks. I. Quantitative analysis of silk weightings. II. Swelling of highly weighted silks in cuprammonium solution.** W. WELTZIEN and A. SCHOTTE (Mitt. Textilforsch. Krefeld, 1933, 9, 12–16, 23–27).—I [with (Frl.) H. CORSTEN]. Weighted silk is ashed with  $HNO_3$  and  $H_2SO_4$ , and the  $SiO_2$  remains undissolved. Sn is distilled in a current of HCl and HBr and determined in the distillate.  $P_2O_5$  is separated from  $SiO_2$  by filtration, and determined with oxine molybdate. The  $SiO_2$  is ashed and weighed.

II [with (Frl.) W. RHEIN]. Weighted silk swells less in cuprammonium (I) than does unweighted, a weighting of 50% reducing the swelling by about  $\frac{1}{2}$ . Crêpe yarns are, however, little affected. Faults due to irregular weighting can be diagnosed by microscopical examination of fibres in (I). A. G.

**Action of light on dyes.**—See IV. Detergents.—See XII. Dyeing pig skins.—See XV.

See also A., Apr., 359, Absorption of dyes by cellulose.

## PATENTS.

**Dyeing of animal fibres [fur dyes].** J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 407,066, 1.9.32, 30.3.33, and 24.8.33).—Furs, hairs, leather, feathers, etc. are dyed with monoalkyl ethers of 1:4- $C_{10}H_6(OH)_2$ , 1:4-dihydroxyanthracenes, or 1:4:1':4'-tetrahydroxy-2:2'-dinaphthyls or -dianthranyls in presence of an oxidising agent ( $H_2O_2$ ). The fibre may be mordanted, if desired, with Fe, Cu, Cr, etc. Examples are: 1:4- $C_{10}H_6(OH)_2\cdot OMe$ , reddish to greenish-blue (Cr, Cu, Fe); 1-hydroxy-4-methoxy- or -ethoxy-anthracene, olive-green; and 1:1'-dihydroxy-4:4'-dimethoxy-2:2'-dinaphthyl or -dianthranyl, olive-green. H. A. P.



**Carroting of fur and compositions therefor.** C. L. WEIRICH (U.S.P. 1,919,141, 18.7.33. Appl., 21.5.31).—Yellowing of the fur is avoided by carroting with an aq. liquor containing  $\text{HgNO}_3$  (1.6%),  $\text{HNO}_3$  (1.0),  $\text{NH}_4\text{F}$  (0.03), and  $\text{H}_2\text{O}_2$  (0.75). A. J. H.

**Dyeing of cellulose ester and ether materials.** IMPERIAL CHEM. INDUSTRIES, LTD., and A. H. KNIGHT (B.P. 407,037, 9.6.32).—Non-phototropic yellow to orange-brown shades on Celanese etc. are given by azo dyes from diazotised nitroanilines and *m*-5-xyleneol. Examples of first-components are: *p*- $\text{NH}_2\cdot\text{C}_6\text{H}_4\cdot\text{NO}_2$  (red-orange), 1:2:5- $\text{NH}_2\cdot\text{C}_6\text{H}_3(\text{OMe})\cdot\text{NO}_2$  (yellow-orange), *m*- and *o*- $\text{NH}_2\cdot\text{C}_6\text{H}_4\cdot\text{NO}_2$ , 4:1:3- $\text{NH}_2\cdot\text{C}_6\text{H}_3\text{Me}\cdot\text{NO}_2$ , and 1:2:4- $\text{NH}_2\cdot\text{C}_6\text{H}_3(\text{OMe})\cdot\text{NO}_2$ . H. A. P.

**Treatment of textile or other materials made of or containing cellulose esters or ethers.** BRIT. CELANESE, LTD., G. H. ELLIS, and E. W. KIRK (B.P. 406,653, 23.7.32).—Compounds added to the material to improve the fastness of (aminoanthraquinone) dyes (to acid vapours), *e.g.*, thiocarbamide (I) or the alkyl, aralkyl, or aryl derivatives of (I), urea, or  $\text{NH}_2\text{C}(\text{NH}_2)_2$ , are fixed by steaming (with dry steam at 5 lb. per sq. in.). H. A. P.

**Treatment of textile and other materials.** BRIT. CELANESE, LTD., H. C. OLPIN, and G. H. ELLIS (B.P. 406,686, 27.7.32).—The fastness of (aminoanthraquinone) dyes (on cellulose esters or ethers, to acid vapours) is improved by treatment with acylated arylamines containing  $\text{NH}_2$  or substituted  $\text{NH}_2$  indirectly linked to the nucleus. Preferred examples are: *p*-acetamido- or *p*-benzamido-benzyl-diethylamine, diethylaminoacetanilide, and bisdiethylaminoacet-*p*-phenylenediamide (0.5–2%). The agents may be applied as aq. dispersions or added (in  $\text{COMe}_2$ ) to the spinning bath, and may be fixed by steaming. H. A. P.

**Vat-dye printing.** L. LICHTENSTEIN and J. KLEIN (U.S.P. 1,919,792, 25.7.33. Appl., 1.10.31).—The use of glucose or  $\text{SnO}$  activated by a *p*-quinone (Na anthraquinone-2-sulphonate) as reducing agents in printing pastes is claimed. The pastes are suitable for discharge-printing and do not deteriorate on slow drying. H. A. P.

**Treatment of textile materials [containing cellulose derivatives].** BRIT. CELANESE, LTD. (B.P. 407,449, 7.11.32. U.S., 7.11.31).—Cellulose acetate (etc.) rayon fabric is impregnated with 0.5–2.0% of a dissolved or emulsified lower monohydric alcohol ester of one of the higher fatty acids (*e.g.*, Me, Et, Pr, and Bu stearates and palmitates, but especially Me stearate), whereby it acquires increased durability and scroop, and a diminished tendency to "ladder." A. J. H.

**Protection of wool, fur, hair, feathers, etc. against attack by moth.** I. G. FARBERIND. A.-G. (B.P. 407,356, 15.9.32. Ger., 16.9.31. Addn. to B.P. 324,962; B., 1930, 416).—The (alkyl) sulphonamides of the prior specification are dissolved in small quantities of esters of  $\text{H}_3\text{PO}_4$  (*e.g.*,  $\text{Me}_3\text{PO}_4$ ,  $\text{Et}_3\text{PO}_4$ ,  $\text{Et}_2$  butylglycol phosphate) to give solutions which can be diluted with  $\text{C}_6\text{H}_6$ ,  $\text{CCl}_4$ , etc. and used for impregnation of the fabrics. H. A. P.

**Sulphonated carbinols. Sulphonic acids.**—See III. Preserving furs, textiles, etc. Fireproofing.—See IX. Plasticising cellulose acetate.—See XIII.

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

**Mechanical enrichment of langbeinite.** J. K. ŁYSAKOWSKI (Przemysł Chem., 1934, 18, 45–49).—Satisfactory separation of langbeinite (I) from NaCl is not obtained by fractional milling of the mineral, although the larger grains (> 3 mm.) are on the whole poorer in NaCl than the smaller ones. If milled (I) is exposed to  $\text{H}_2\text{O}$  vapour at  $108^\circ$ , only KCl is moistened; the powder can then be fractionated by transport through a field of 6000 volts, when the KCl undergoes polarisation, and moves to the electrode; the degree of fractionation is, however, too small to be of practical val. R. T.

**Bromine method for determining ammonia-nitrogen in chemically pure salts.** B. I. LEVI (Trans. Sci. Inst. Fertilisers, Moscow, 1932, No. 92, 165–168).—The error involved in determining  $\text{NH}_3$  by measuring  $\text{N}_2$  evolved on addition of Br in alkaline solution lies in the method of adding the  $\text{Br}\cdot\text{H}_2\text{O}$ . CH. ABS.

**Bromine method for determination of nitrogen in technical products and fertilisers.** M. L. CHEPELEVETZKI, S. I. POZDNYAKOVA, and R. D. FAIN (Trans. Sci. Inst. Fertilisers, Moscow, 1932, No. 92, 168–176).—Reaction of  $\text{NH}_4\text{-N}$  with Br is best effected at  $p_{\text{H}}$  7.5–9.5. The use of  $\text{PO}_4^{3-}$  buffers is recommended; oxidation of  $\text{NH}_3$  to  $\text{NO}_2$  in presence of  $\text{Fe}^{3+}$  is thereby eliminated. CH. ABS.

**Bromine method for determining total nitrogen in calcium cyanamide.** M. L. CHEPELEVETZKI and R. D. FAIN (Trans. Sci. Inst. Fertilisers, Moscow, 1932, No. 92, 177–180).— $\text{CaCN}_2$  is boiled with  $\text{K}_2\text{SO}_4$  and  $\text{H}_2\text{SO}_4$  for 45 min., the liquid diluted, and an aliquot part used. CH. ABS.

**Influence of alkaline agents on the crystallisation of calcium aluminates and the binding of cements.** SÉAILLES (Ciment, 1933, 38, 9–10; Chem. Zentr., 1933, ii, 2578).—The crystallisation of Ca aluminate is controlled by the  $p_{\text{H}}$ , independently of the nature of the base. According to whether the  $p_{\text{H}}$  is > or < 12,  $4\text{CaO}\cdot\text{Al}_2\text{O}_3\cdot 12\text{H}_2\text{O}$  (I) or  $3\text{CaO}\cdot\text{Al}_2\text{O}_3\cdot n\text{H}_2\text{O}$  separates. Free  $\text{Ca}(\text{OH})_2$  is harmful, causing separation of (I) at  $p_{\text{H}}$  > 12. H. J. E.

**Determination of carbon dioxide in air by  $p_{\text{H}}$  measurements.** Y. KAUKO (Angew. Chem., 1934, 47, 164–167).—The concn. of  $\text{CO}_2$  in the air can be determined by bubbling the air for a few min. through 0.001*N*- $\text{NaHCO}_3$  and measuring the  $p_{\text{H}}$  of the solution either electrometrically (quinhydrone) or colorimetrically. Then  $0.86 \log P = \log [\text{H}^+] + 4.89$  ( $25^\circ$ ) or  $+ 4.82$  ( $18^\circ$ ), where  $P$  is the  $[\text{CO}_2]$  in atm. (cf. B., 1933, 305). A. G.

**$\text{H}_2\text{S}$  from coke-oven gas.**—See II. Corrosion [of Fe vats]. Deterioration of steels by  $\text{NH}_3$ .—See X. Na silicate as detergent.—See XII.



See also A., Apr., 367, **Decomp. voltages of fused salts.** 373, **Electrolysis of  $\text{Na}_2\text{BiI}_5$ .** **Synthesis of  $\text{Cu}_3\text{N}$ .** 376, **Concn. of Ga by adsorption.** 377, **Prep. of radium-E.** 381,  **$\text{NHPh}_2$  as reagent for  $\text{HNO}_3$ .** 384, **Purification of Kr.**

## PATENTS.

**Manufacture of contact sulphuric acid.** C. B. CLARK, Assr. to CATALYTIC PROCESS CORP. (U.S.P. 1,923,256, 22.8.33. Appl., 29.3.30).—Hot, dil.  $\text{SO}_2$  from a pyrites-roasting furnace is passed through a dust-removing chamber and then mixed at  $400^\circ$  with gases rich in  $\text{SO}_2$  (from burning S) to give a gas with 10%  $\text{SO}_2$ , which is passed through a V catalyst to produce  $\text{SO}_3$ . A. R. P.

**Production of highly concentrated nitric acid [from ammonia oxidation].** N. CARO and A. R. FRANK (B.P. 405,450, 30.12.32. Ger., 30.12.31).— $\text{NH}_3$  (1 vol.) is oxidised to NO with 1.5–2.5 vols. of  $\text{O}_2$  and the reaction gases are cooled to condense a liquid containing  $\text{HNO}_3$  and oxides of N (the heat of the gases may be used to generate steam). The residual NO and  $\text{O}_2$  are cooled in brine to  $-10^\circ$  to produce liquid  $\text{N}_2\text{O}_4$ , which is mixed with the dil.  $\text{HNO}_3$  and the mixture introduced in a fine spray together with  $\text{O}_2$  into a long tube at 20 atm. pressures, the tube being heated at  $>70^\circ$ . After condensing the  $\text{HNO}_3$ , the dissolved  $\text{N}_2\text{O}_4$  is removed by heating under reflux at atm. pressure and returned to the cooler. A. R. P.

**Production of hydrochloric acid gas.** T. A. MITCHELL, Assr. to L. M. HUGHES (U.S.P. 1,923,324, 22.8.33. Appl., 28.10.30).—Fused lumps of  $\text{CaCl}_2$  are passed downwards through a tower up which is passed at  $310\text{--}540^\circ$  a current of  $\text{SO}_2$  and sufficient steam to produce  $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$  with the liberation of HCl. A. R. P.

**Treatment of alkaline-earth carbonates.** W. W. PLOWMAN and W. FELDENHEIMER (B.P. 405,391, 26.9.32).—The finely-powdered material, e.g., chalk, witherite, or magnesite, is agitated with a dil. gum solution containing a small quantity of  $\text{Na}_2\text{SiO}_3$ , NaOH, or  $\text{Na}_2\text{CO}_3$ , whereby the carbonate remains in suspension and the impurities settle out. The milky fluid is evaporated to dryness in a film dryer to obtain a product suitable for incorporation into rubber mixes. A. R. P.

**Separating substances [salts] from solutions thereof.** K. BURROUGHS (U.S.P. 1,916,825, 4.7.33. Appl., 29.11.30).—In a cyclic process, the solution is continuously and rapidly circulated through a refrigerator and more slowly through a separator, where the crystals are settled. B. M. V.

**Recovery of potash salts from liquors containing borax.** C. F. RITCHIE, W. A. GALE, and W. H. ALLEN, Assrs. to AMER. POTASH & CHEM. CORP. (U.S.P. 1,921,481, 8.8.33. Appl., 16.7.29).—Claim is made for a cyclic process of removing KCl and borax from conc. Searles Lake brine, based on the principle that KCl alone crystallises from a boiling saturated solution of the two salts on cooling to about  $50^\circ$ , the mother-liquor remaining supersaturated with respect to  $\text{Na}_2\text{B}_4\text{O}_7 \cdot 5\text{H}_2\text{O}$  provided that agitation is avoided. After settling, to collect the KCl, further cooling yields borax crystals. A. R. P.

**Conversion of potassium chloride into potassium sulphate.** A. HOLZ (U.S.P. 1,922,682, 15.8.33. Appl., 15.8.31).—A 2 : 1 mol. mixture of KCl and  $(\text{NH}_4)_2\text{SO}_4$  (I) is passed by means of a screw conveyor through an inclined tubular furnace heated at  $>$  the volatilisation point of  $\text{NH}_4\text{Cl}$  (II) and at  $<$  the m.p. of  $\text{K}_2\text{SO}_4$ . The (II) is collected in a chamber through which  $\text{H}_2\text{O}$  is sprayed, the solution is distilled with CaO and the  $\text{NH}_3$  collected in  $\text{H}_2\text{SO}_4$ , and the (I) recovered for re-use. A. R. P.

**Recovering glaserite [from Searles Lake brine].** H. T. WOODWARD, Assr. to BURNHAM CHEM. CO. (U.S.P. 1,923,407, 22.8.33. Appl., 21.8.29).—The mixed product of glaserite (I) and borax (II) obtained in one of the stages of working up Searles Lake brine is treated with dil. aq. NaOH, which dissolves (II) and leaves relatively pure crystals of (I). A. R. P.

**Treatment of minerals.** E. P. SCHOCH (U.S.P. 1,924,519, 29.8.33. Appl., 3.9.30).—Polyhalite is freed from NaCl by leaching with a saturated solution of  $\text{MgSO}_4$  in such quantity that the [NaCl] is insufficient to ppt. astrakhanite; the temp. is maintained at  $10\text{--}35^\circ$ . B. M. V.

**Producing salts [e.g., nitre cake] in globular form.** L. F. NICKELL, Assr. to MONSANTO CHEM. CO. (U.S.P. 1,923,877, 22.8.33. Appl., 8.8.29).—Streams of fused  $\text{NaHSO}_4$  containing small quantities of odorants, e.g.,  $\text{C}_6\text{H}_4\text{Cl}_2$  or a PhOH derivative, are sprayed against one another at an angle of  $90^\circ$  to produce fine globules for use as a cleanser. A. R. P.

**Manufacture of dry sodium aluminate.** G. H. WAGNER, Assr. to NAT. ALUMINATE CORP. (U.S.P. 1,923,464, 22.8.33. Appl., 4.4.28).— $\text{Al}_2\text{O}_3$  is added to hot, conc. NaOH (750 g. per litre) until the wt. ratio of  $\text{Al}_2\text{O}_3$  : NaOH = 0.9 : 1.1, and the mixture is heated to  $350\text{--}400^\circ$  and cooled rapidly. A. R. P.

**Preparation of bromates.** C. A. HOCHWALT and J. B. WALIUSZIS, Assrs. to MORTON SALT CO. (U.S.P. 1,919,721, 25.7.33. Appl., 19.3.32).—A 25% solution of KBr is anodically oxidised, using  $\text{K}_2\text{CrO}_4$  as depolariser, and the yellow crystals of  $\text{KBrO}_3$  obtained are redissolved and the solution is freed from  $\text{CrO}_4^{2-}$  by agitation with Zn dust and a very small quantity of HBr. A. R. P.

**Manufacture of ammonium sulphate [from acid sludge in oil refining].** N. V. DE BATAAFSCHE PETROLEUM MAATS., Assees. of J. D. RUYTS (B.P. 405,556, 24.7.33. U.S., 16.8.32).—Acid sludge from petroleum refining is mixed with cold saturated aq.  $(\text{NH}_4)_2\text{SO}_4$  and treated with  $\text{NH}_3$  at  $80\text{--}90^\circ$  until the acidity is reduced to 0–0.2%, the liberated oil is removed, the solution cooled to separate  $(\text{NH}_4)_2\text{SO}_4$  crystals, and the mother-liquor returned to the process. A. R. P.

**Manufacture of prepared calcium chloride [monohydrate].** S. B. HEATH, Assr. to DOW CHEM. CO. (U.S.P. 1,922,697, 15.8.33. Appl., 4.11.29).—Flake  $\text{CaCl}_2 \cdot 2\text{H}_2\text{O}$  is passed through a rotary furnace (I) into which is passed a countercurrent of hot ( $300\text{--}500^\circ$ ) moist gases (II) which heat the charge to  $150\text{--}160^\circ$  and maintain a partial pressure of  $\text{H}_2\text{O}$  in (I) above that of the monohydrate but below that of the dihydrate. The



moisture in (II) is supplied by passing back part of the effluent gases from (I). A. R. P.

**[Production of flake] zinc sulphate.** E. A. TAYLOR, ASSR. to GRASSELLI CHEM. CO. (U.S.P. 1,922,902, 15.8.33. Appl., 19.1.31).—A solution of  $\text{ZnSO}_4$  is evaporated until it contains 34%  $\text{H}_2\text{O}$ , at which stage  $\text{ZnSO}_4 \cdot \text{H}_2\text{O}$  will be in suspension; the slurry is then run over a rotating,  $\text{H}_2\text{O}$ -cooled drum to produce a film 1–2 mm. thick which is broken into small flakes. A. R. P.

**[Zinc sulphide] fluorescent material [for X-ray screens].** SIEMENS-REINIGER-WERKE A.-G. (B.P. 406,957, 8.11.33. Ger., 24.10.33).—Claim is made for cryst.  $\text{ZnS}$  or  $(\text{Zn}, \text{Cd})\text{S}$  containing 0.5–2 p.p.m. of Ni, which is stated to prevent persistence of luminescence after irradiation has ceased. A. R. P.

**Manufacture of luminescent screens suitable for use in Braun tubes and like apparatus.** TELEFUNKEN GES. F. DRAHTLOSE TELEGRAPHIE M.B.H. (B.P. 405,964, 8.8.32. Ger., 6.8.31).—The binder used to hold the luminescent material in place is  $\text{H}_3\text{BO}_3$ ,  $\text{B}_2\text{O}_3$ , or borax, or mixtures of these. A. R. P.

**Manufacture of zinc meta-arsenite.** L. P. CURTIN (U.S.P. 1,924,065, 22.8.33. Appl., 23.4.32).—A solution of  $\text{As}_2\text{O}_3$  in aq.  $\text{Na}_2\text{CO}_3$  is poured at  $80^\circ$  into aq.  $\text{ZnSO}_4$  containing a little  $\text{AcOH}$ . A. R. P.

**Continuous production of litharge in solid phase from pieces of metallic lead.** G. SHIMADZU (B.P. 407,169, 21.1.33).—The Pb is rapidly rotated in a heated horizontal drum (*D*) while jets of preheated air and steam are blown on to the metal from nozzles projecting downwards from an axial pipe. In this way the sub-oxide first formed is rubbed off and further oxidised to  $\text{PbO}$  while in suspension in *D*. The fine  $\text{PbO}$  powder produced is automatically blown out of *D* into a collecting chamber by the action of the jets. A. R. P.

**[Manufacture of insoluble] chromates and protectives.** W. V. GILBERT (B.P. 406,445, 6.12.32).—Protective chromate pigments are prepared by adding a 20% solution of Ba, Sr, Ca, Zn, or Pb nitrate to a boiling 30% solution of  $\text{K}_2\text{CrO}_4$  or  $\text{Na}_2\text{CrO}_4$  in large excess, boiling for 30 min., and washing and drying the ppt. at  $120^\circ$ . A. R. P.

**Production of monobasic aluminium sulphite.** T. GOLDSCHMIDT A.-G., ASSEES. OF CHEM. FABR. BUCKAU (B.P. 406,855, 20.1.33. Ger., 25.1. and 22.2.32).—A compact cryst. ppt. of  $\text{Al}_2\text{O}_3 \cdot 2\text{SO}_2 \cdot x\text{H}_2\text{O}$  is obtained by heating at  $70$ – $150^\circ$  under pressure solutions of  $\text{Al}_2\text{O}_3$  in aq.  $\text{SO}_2$  in which the ratio  $\text{SO}_2 : \text{Al}_2\text{O}_3$  is  $> 2 : 1$ . A. R. P.

**Treatment of mineral sand for separation of one constituent [zircon] therein from another.** M. A. CORBETT (B.P. 406,018 and 406,043, 12.8.32).—(A) For the separation of zircon from rutile, monazite, quartz, and other constituents of beach sands the material is subjected to flotation in a pine oil circuit in presence of small quantities of a soap, e.g., Na oleate, a caustic alkali, and a higher unsaturated fatty acid, e.g., oleic acid. The zircon concentrate may be further cleaned by a repetition of the process after treatment with a dil. mineral acid, e.g.,  $\text{HCl}$ . (B) The soap used is

derived from a sulphonated unsaturated alcohol, e.g., oleyl alcohol. A. R. P.

**Production of precipitated titanic oxide.** B. LAPORTE, LTD., I. E. WEBER, and A. N. C. BENNETT (B.P. 405,669, 12.5.32).— $\text{TiO}_2$  produced from a dil., feebly acid sulphate solution by hydrolysis is washed and dispersed in dil.  $\text{HNO}_3$ ; the resulting suspension is added to a 7–8%  $\text{TiO}_2$  solution resulting from the decomp. of ilmenite with  $\text{H}_2\text{SO}_4$ , and the mixture boiled. The  $\text{TiO} \cdot \text{OH}$  ppt. so produced settles readily and the pigment produced by its calcination has a high covering power. A. R. P.

**Preparation of stabilised titanous salt solutions.** R. M. MCKINNEY, ASSR. to KREBS PIGMENT & COLOR CORP. (U.S.P. 1,922,816, 15.8.33. Appl., 27.4.31).—Acid  $\text{Ti}(\text{SO}_4)_2$  solutions containing  $\text{FeSO}_4$  are treated with tartaric, citric, or, preferably, lactic acid, then with  $\text{Ca}(\text{OH})_2$  to remove  $\text{SO}_4^{--}$  and  $\text{Na}_2\text{S}$  to ppt.  $\text{FeS}$ , and the filtered solution is reduced electrolytically. A. R. P.

**Obtaining pure carbon dioxide.** G. A. BRAGG, ASSR. to KOPPERS CO. OF DELAWARE (U.S.P. 1,924,178, 29.8.33. Appl., 9.9.31).—A gas containing  $< 10\%$  of  $\text{CO}_2$  and no other acids is scrubbed with an alkali borate solution, which is subsequently heated to drive off  $\text{CO}_2$ . B. M. V.

**Production of hydrogen peroxide by distillation.** J. MÜLLER (U.S.P. 1,924,954, 29.8.33. Appl., 19.12.29. Ger., 3.1.29).—A suitable solution [e.g.,  $\text{H}_2\text{S}_2\text{O}_8$  (I)] is distilled by downflow through a heated Pb coil 60 m. long and 75 mm. internal diam., i.e., such that by the time evolution of  $\text{H}_2\text{O}_2$  starts the velocity is very high and the Pb but little attacked, being protected by a travelling film of (I). B. M. V.

**Utilisation of nitrosyl chloride.** KALI-FORSCHUNGS-ANSTALT G.M.B.H. (B.P. 406,553, 27.6.33. Ger., 12.11.32).—After conversion of  $\text{NOCl}$  by treatment with  $\text{O}_2$  into a mixture of  $\text{NO}_2$  and  $\text{Cl}_2$ , this mixture is caused to combine with alkali chlorides to form alkali nitrates. W. J. W.

**Sulphur burner. Production of sulphur dioxide.** I. BENCOWITZ, ASSR. to TEXAS GULF SULPHUR CO. (U.S.P. 1,917,692–3, 11.7.33. Appl., [A, B] 16.7.31).—Molten S is burned in a similar way to heavy furnace oil. High-pressure air is used for atomisation and the flame is of the whirling type. B. M. V.

**Sulphur melter.** E. E. BRAGG, ASSR. to GEN. CHEM CO. (U.S.P. 1,918,684, 18.7.33. Appl., 1.5.29).—In a melting pot are a no. of steam-heated, vertical return tubes spaced  $> 3.5$  in. apart and 8 in. from the wall of the pot. B. M. V.

**Production of sulphur from gases containing sulphur dioxide.** D. TYRER, and IMPERIAL CHEM. INDUSTRIES, LTD. (B.P. 406,343, 24.8.32).—After reduction of the  $\text{SO}_2$  by treatment with carbonaceous material, the gases, together with excess  $\text{SO}_2$ , are passed over a catalyst at  $600$ – $800^\circ$  to convert  $\text{COS}$  and  $\text{H}_2\text{S}$  into S, which is then separated. W. J. W.

**Manufacture of insoluble sulphur.** A. J. GRACIA, ASSR. to GOODYEAR TIRE & RUBBER CO. (U.S.P. 1,923,723, 22.8.33. Appl., 5.10.32).—A mixture of flowers of S and



$C_8H_8$  is agitated at  $80^\circ$  to dissolve  $8\lambda$  (solubility  $11.7$  g. per  $100$  c.c.), leaving a residue of  $Sp$ . A. R. P.

**Extraction of iodine from aqueous solutions [brines].** C. W. JONES, Assr. to JONES CHEM. CO., INC. (U.S.P. 1,918,039, 11.7.33. Appl., 23.2.28).—The brine is treated with sufficient  $Cl_2$  to liberate the I, and the solution is then sprayed down a tower up which a current of air is passed, the I-laden air being conducted up another tower down which aq.  $Na_2CO_3$  is sprayed to absorb the I. A. R. P.

**Extraction of iodine from natural waters and the like.** L. C. CHAMBERLAIN, Assr. to DOW CHEM. CO. (U.S.P. 1,922,693, 15.8.33. Appl., 2.3.31).—The I is liberated by treating the  $H_2O$  with  $Cl_2$  and adsorbed on active charcoal ( $C$ ) from which it is subsequently liberated by steaming at  $100$ – $200^\circ$  and then at  $200$ – $300^\circ$ . For the treatment of brines the chlorinated liquor is passed down a tower packed with  $C$ , and when this is saturated with I steam is passed upwards through the  $C$ . A. R. P.

**Removal of iodine from dispersion in a liquid medium.** H. H. DOW, Assr. to DOW CHEM. CO. (U.S.P. 1,916,922, 4.7.33. Appl., 20.12.29).—The liquid is passed in thin films over a series of laths arranged in a zig-zag manner in a tower up which a current of air is blown to expel the I. A. R. P.

**Solid  $CO_2$  as refrigerant.**—See I.  $H_2S$  from natural gas.—See II.  $K_2C_2O_4$ .  $Na_2$  carbimide.—See III. Brine electrolysis.—See XI. Pigments.—See XIII. Fertilisers.—See XVI.

## VIII.—GLASS; CERAMICS.

**Commercial utility of a deposit of magnesite-bearing rocks in the Anglo-Egyptian Sudan.** W. H. TYLER and W. J. REES (Trans. Ceram. Soc., 1934, 33, 104–127).—An investigation of the possibility of using a Sudan rock ( $A$ )—approx. composition: talc 49.5,  $MgCO_3$  41.5%—as a raw material for the manufacture of  $MgO$  bricks ( $D$ ) is described. Tests are described which show that sound bricks of satisfactory properties can be made from raw  $A$ , provided that sufficient  $MgO$  is added to make the  $MgO/SiO_2$  ratio of the mixture  $>$  that of  $2MgO/SiO_2$  (forsterite). The properties (e.g., refractoriness, high-temp. tensile and under-load strength, reversible thermal expansion, porosity, and slag-resistance) of (1) laboratory- and (2) works-made bricks, prepared from a mixture ( $C$ ) of 50% of  $A$  with 50% of dead-burnt Grecian  $MgO$  ( $B$ ), and fired at  $1500^\circ$ , are described; in the under-load test (2) did not show the sudden failure by shearing typical of  $D$ . Specimens, the properties of which are given, made from mixtures of  $B$  with calcined  $A$  were very strong, due to the greater development of forsterite around the periclase grains. The effect of adding  $Fe_2O_3$  to  $C$  is described and discussed. The results of preliminary trials in industrial furnaces (basic open-hearth and electric) suggest that the type of brick made from  $C$  will form a satisfactory substitute for  $D$ . An air-separation method of concentrating  $A$ , the properties of the  $MgO$ -rich concentrate, and the use of the talc-rich fraction for bonding pure dead-burnt  $MgO$  are described. The hydration tendency of dolomite was reduced by adding 10% of talcose con-

centrates and firing to  $1580^\circ$ ; it is concluded that the addition of 15% of  $A$  before ramming will increase the life of rammed-dolomite furnace hearths. The economics of the use of  $A$  are considered. A. L. R.

**Drying of clay.** H. H. MACEY (Trans. Ceram. Soc., 1934, 33, 92–103; cf. B., 1934, 18).—The nature of clay, and the mechanism of shrinkage on drying, the stages of which are explained, are described. Modern drying practice, the prevention of cracking, and factors governing the development of strain during drying are discussed. A. L. R.

**Rapid drying of general earthenware.** T. SIMPSON (Trans. Ceram. Soc., 1934, 33, 85–91).—The principles of humidity drying are discussed and the construction and operation of a rapid dryer (e.g., 90 min.) for earthenware goods described. A. L. R.

**New equipment materials.**—See I. Furnace repairs.—See X.

## PATENTS.

**Heat-resisting glass giving daylight effects.** W. H. RISING, Assr. to CORNING GLASS WORKS (U.S.P. 1,924,752, 29.8.33. Appl., 3.9.29).—A blue-green borosilicate glass containing Zn (or other group-II metal having at. wt. 60–120), Co, and Fe, the  $FeO$  being 4–16 times the  $CoO$ , is claimed. B. M. V.

**Formation of plastic clay masses.** D. H. ROWLAND and K. WETZEL, Assrs. to LOCKE INSULATOR CORP. (U.S.P. 1,925,058, 29.8.33. Appl., 11.11.29).—Prior to formation of clay articles by means other than casting, the slip is deflocculated (to increase its fluidity) by means of a substance ( $A$ ) without the addition of  $H_2O$ , and then slowly reflocculated by means of a suitable neutralising substance ( $B$ ). E.g.,  $A$  may be  $Na_2CO_3$ , Na silicate, aq.  $NH_3$ ,  $NaOH$ , and  $Na_2C_2O_4$ ; and  $B$   $CaSO_4$  and Portland cement in kerosene. B. M. V.

**Coating refractories with metal.** J. D. MORGAN, Assr. to DOHERTY RES. CO. (U.S.P. 1,924,876, 29.8.33. Appl., 30.12.29).—A refractory body is covered with wire which is subjected to arc-welding as it is wound on. B. M. V.

**Manufacture of linings for casting-mould cavities.** J. D. ALLEY, Assr. to AMER. BRAKE SHOE & FOUNDRY CO. (U.S.P. 1,924,267, 29.8.33. Appl., 29.7.32).—A mould or core which may be of the composition described in U.S.P. 1,882,701 (B., 1933, 711) is finally heated at a temp. sufficient to vitrify the bond but not the  $SiO_2$ , i.e., to  $1150^\circ$ , during 4–5 hr. followed by cooling during 12–15 hr. B. M. V.

**Manufacture of an abrasive body.** E. E. NOVOTNY and J. N. KUZMICK, Assrs. to J. S. STOKES and RAYBESTOS-MANHATTAN, INC. (U.S.P. 1,924,748, 29.8.33. Appl., 20.2.31).—The bond comprises a thermo-setting resin and the wetting agent an alcohol of the furfuryl-benzyl type. The  $pH$  is maintained above 7 to retard resinification of the alcohol. B. M. V.

**Production of preformed abrasive.** E. S. MERRIAM (U.S.P. 1,924,648, 29.8.33. Appl., 18.7.32).—An aluminous abrasive is bonded by additional  $Al_2O_3$  formed in the interstices by burning Al in  $O_2$ . B. M. V.



Production of [casting mould for preparing] ceramic liquid resistances. PORZELLANFABR. KAHLA (B.P. 408,123, 28.11.32. Ger., 28.11.31).

## IX.—BUILDING MATERIALS.

**Alkali determination and analytical procedure for normal cements.** W. MARSCHNER (Zement, 1931, 20, 466; Chem. Zentr., 1933, ii, 2579).—2 g. of the cement are dissolved in dil. HCl,  $\text{SiO}_2$  is separated, and the filtrate is evaporated to dryness, dissolved in HCl, and the  $\text{H}_2\text{SO}_4$  pptd. with  $\text{BaCl}_2$ . The filtrate is evaporated to dryness, and treated with aq.  $\text{Ba}(\text{OH})_2$  until alkaline to phenolphthalein. After evaporation to dryness, the residue is treated with hot  $\text{H}_2\text{O}$ , filtered, washed, and alkali determined in the filtrate. H. J. E.

**Air-hardening lime-mortar.** II. A. STOIS and F. W. MEIER (Angew. Chem., 1934, 47, 202—204; cf. B., 1934, 277).— $\text{SiO}_2$  in the quartz sand employed in mortar is attacked by  $\text{Ca}(\text{OH})_2$  with the formation of Ca silicate, not only in the moist mixture but in the hardening mortar also, and this contributes to the strengthening of the mortar. The  $\text{SiO}_2$  is activated by the action of  $\text{H}_2\text{O}$ . M. S. B.

**Sand-lime bricks.** G. E. BESSEY (Dept. Sci. Ind. Res., Building Res., Spec. Rept. No. 31, 1934, 62 pp.).—Sand-lime bricks have advantages over clay bricks in light-reflecting properties, uniformity, and absence of efflorescences, but are not so resistant as the best clay bricks to frost action. A detailed account is given of the materials and manufacturing processes, properties, and testing. T. W. P.

**Clinker minerals and their formation.** L. FORSÉN (Angew. Chem., 1934, 47, 162—163).—Technical cements correspond with a frozen, not a real, equilibrium. Methods of calculating compositions from the analytical data assuming a real equilibrium are incorrect. Cement-burning consists in the dissolution of CaO and silicate materials and of  $\beta\text{-}2\text{CaO} \cdot \text{SiO}_2$  formed in the solid phase and in the crystallisation of  $3\text{CaO} \cdot \text{SiO}_2$  (I) and  $\alpha\text{-}2\text{CaO} \cdot \text{SiO}_2$ . The max. CaO content corresponds with (I) and no free CaO in the residual melt;  $2\text{CaO} \cdot \text{SiO}_2$  is formed in proportion to the deficit of CaO below this amount. A. G.

**Durability of slates for roofing.** C. M. WATKINS (Dept. Sci. Ind. Res., Building Res., Bull. No. 12, 1934, 14 pp.).—The poorest types of slate give high vals. for  $\text{H}_2\text{O}$  absorption. Relative durability can be assessed by the results from repeated wetting and drying of specimens, but this test does not give any indication of the effects of acid atm. Details of the most satisfactory test—the effect of  $\text{H}_2\text{SO}_4$  solutions on specimens—are given. T. W. P.

**Strength of asphalt mixtures.** H. T. HORSFIELD (J.S.C.I., 1934, 53, 107—115 r).—An asphalt paving mixture offers a dual resistance to continuous deformation, the interlock and friction developed between particles of the mineral aggregate being supplemented by the viscous resistance of the bitumen. In order to obtain a high frictional resistance a close-packed mineral aggregate is desirable. The packing of spheres of various sizes, to obtain min. voidage, is investigated mathematically as a guide for experimental work. A

characteristic feature of a plastic solid is its shearing stress-rate of flow relation, and experiments have been carried out on bitumen-sand mixtures to determine this relation. The curves suggest that a mixture initially liquid may become a plastic solid under stress. A bituminous sand mixture is liquid when laid hot in a road surface, but after cooling and consolidation it becomes a plastic solid. If rutting is to be avoided the traffic loading must not exceed the internal frictional resistance of the mixture.

**Chemical analysis of wood, and its importance in the chemical industry.** J. WIETELAK and R. SCHILLAK (Przemysł Chem., 1934, 18, 52—56).—Data are given for Southern pine, *Thuja plicata*, *Chamaecyparis nootkatensis*, *Ochroma lagopus*, and *Aspidosperma polynuron* wood. R. T.

**Determination of the moisture content of wood.** J. S. RANKIN (J. Roy. Tech. Coll., 1934, 3, 212—217).—A method of determination depending on the variation with moisture content of the capacity of a condenser of which the wood is the dielectric is described. H. S. P.

**Temperature relations of wood-destroying fungi.** C. J. HUMPHREY and P. V. SIGGERS (J. Agric. Res., 1933, 47, 997—1008).—Of the 64 species and strains of wood-destroying fungi investigated, 62 failed to grow at  $> 46^\circ$ . Only 10 had an optimum growth temp. of  $> 32^\circ$ , whilst 42 grew best at  $24\text{--}32^\circ$ . P. G. M.

**Influence of temperature on rate of natural penetration of electrolytes into wood.** O. MAASS (Canad. J. Res., 1934, 10, 180—189).—The rates of lateral diffusion (I) of NaOH, HCl, and NaCl into chips of black spruce heartwood decrease in the above order. (I) increases with the temp., although wood  $d$  has no effect. Pretreatment of a chip with NaOH renders it almost as permeable to NaCl as to NaOH. Longitudinal diffusion is most rapid with HCl, followed by NaCl and NaOH of equal rate. Diffusion of  $\text{H}_2\text{O}$  into air-dried chips is facilitated by rise in temp. J. L. D.

**New equipment materials.**—See I. Binding of cements.—See VII. Soaking-pit construction. Protecting pipes with "Dalmine" coating.—See X. Al primers on wood.—See XIII. Eternit tubing.—See XXIII.

See also A., Apl., 376, Hydrated Ca aluminates.

## PATENTS.

**Manufacture of dental castings and composition therefor.** T. E. MOORE, ASSR. to RANSOM & RANDOLPH Co. (U.S.P. 1,924,874, 29.8.33. Appl., 7.11.32).—A dental mould is formed of plaster of Paris (25) and  $\text{SiO}_2$  (at least partly as cristobalite, 74 pts.), the degree of expansion by heat being increased by addition of NaCl, KCl, or LiCl (0.8 pt.). B. M. V.

**Manufacture of [coloured] granular material.** R. L. ATKINSON, ASSR. to EMPIRE TRUST Co. (U.S.P. 1,925,065, 29.8.33. Appl., 9.2.31).—Granules of finely-porous clay are heated to harden without closing the pores, then separated into sizes, and treated with: (1) dust particles of the same or another material which acquires a suitable colour after moderate heating, or (2) a solution of mineral colouring agent, or (3) a



mixture of (2) absorbed in (1). A suitable heat-treatment follows, to fix the colour etc. B. M. V.

**Manufacture of roofing.** R. W. CUTLER (U.S.P. 1,924,181, 29.8.33. Appl., 16.6.28).—The "body" is formed of a suspension of a combustible fibre in a fire-proof binder, *e.g.*, salts and clay, and, after sheeting, is provided with a waterproof coating, *e.g.*, of synthetic resin, which is relatively brittle at high atm. temp.; the product is finally baked. B. M. V.

**Constructional material.** A. C. FISCHER, Assr. to PHILIP CAREY MANUFACTURING CO. (U.S.P. 1,924,047, 22.8.33. Appl., 15.8.27).—The material comprises a paper, felt, or textile fabric backing coated with a dense waterproof mastic, *e.g.*, polymerised tung or linseed oil or asphalt of m.p. 150–225°, and provided with an outer protective coating of  $\text{Na}_2\text{SiO}_3$ . A. R. P.

**Preservation of wood, furs, etc. [against fungi].** GRASSELLI CHEM. CO. (B.P. 407,691, 15.7.32. U.S., 18.7.31).—The wood, furs, etc. are treated with a solution or suspension in  $\text{H}_2\text{O}$  (in presence of wetting agents) or oil of non-dyeing thiazoles (<1%) containing salt-forming groups (attached to the hetero-nucleus) or their derivatives. Examples are:  $\psi$ -thiohydantoin, 2:4-diketotetrahydrothiazole, rhodanine, 4-methyl-2-aminothiazole, 2-aminobenzthiazole and various substitution products, and 2-hydroxy- and 2-thiol-benzthiazole. H. A. P.

**Preservation of wood, textiles, etc.** E. I. DU PONT DE NEMOURS & CO. (B.P. 406,979, 26.5.32. U.S., 26.5.31).—Wood, cloth, etc. are protected from fungal attack by impregnation with thiouram mono- or poly-sulphides  $[\text{S}(\text{CS-NMe}_2)_2]$ , which may be applied in an org. solvent or in suspension in  $\text{H}_2\text{O}$  in presence of wetting agents etc. H. A. P.

**Protective treatment of wood.** A.-G. CONSOLIDIERTE ALKALIWERKE (CONSOLIDIERTE ALKALIWERKE), Assees. of R. FALCK (B.P. 407,058, 9.9.32. Ger., 9.9.31).—The wood is treated with a mixture of a chlorinated  $\text{C}_{10}\text{H}_8$  or xylene derivative (I) containing a substance, *e.g.*, wax, resin, pitch, asphalt, or linseed oil varnish, which forms a film in the outer layers of the wood and prevents further evaporation of (I). A. R. P.

**Fireproofing [of wood, textiles, fibres, etc.] and the prevention of corrosion therewith.** S. C. SMITH (B.P. 405,673, 3.8.32).—The material is impregnated with aq.  $(\text{NH}_4)_2\text{SO}_4$  buffered to  $p_{\text{H}}$  7 with a 1:2 mol. mixture of  $\text{NaNH}_4\text{HPO}_4$  and  $\text{H}_3\text{BO}_3$  or  $\text{NH}_4\text{H}_2\text{PO}_4$  and  $\text{Na}_2\text{B}_4\text{O}_7$ , and is thus rendered practically non-corrosive towards metals with which it may come in contact. A. R. P.

**Manufacture of cleansing materials [for wall-paper etc.].** E. A. EIPPER (B.P. 406,746, 8.9.32).—A mixture of flour (1 lb.) and  $\text{H}_2\text{O}$  (1 pint) is boiled and vigorously stirred during the addition of  $\text{Na}_2\text{CO}_3$  (0.5 oz.) and  $\text{NaCl}$  (0.5 oz.) together with a small quantity of a substance which prevents fermentation, and the mixture is kneaded into a plastic mass during cooling. A. R. P.

**Rotary kilns.**—See I. **Wood glue.**—See XV.

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

**Recent improvements in the construction and operation of soaking pits.** W. KREBS (Stahl u. Eisen, 1934, 54, 101–109, 133–137, 152–158).—The construction and operation of twelve types of modern soaking pits are critically discussed with especial reference to efficiency, economy in heating, and costs. Gas heating is preferred to coal or coal-dust firing; preheating of gas and air is necessary when only blast-furnace gas is available, but the addition of coke-oven gas to produce a mixture with a calorific val. (C) of 1400–1700 kg.-cal. per cu. m. is recommended since preheating of the gas is then unnecessary. If gas mixtures with C 1700–2000 kg.-cal. per cu. m. are available the air also need not be preheated. High-pressure burners are more economical than low-pressure, and a single large hearth than a multi-compartment furnace. A. R. P.

**Repairs to steel furnaces.** W. LISTER (Metallurgia, 1934, 9, 145–147).—Practical details are given of the best procedures for lining open-hearth steel furnaces with dolomite, magnesite, and ganister. A. R. P.

**Lecture demonstration of the blast-furnace process.** K. POSTHUMUS (Chem. Weekblad, 1934, 31, 112–113).—This process may be demonstrated simply by placing a layer of glowing charcoal at the bottom of a flower pot, blowing a strong current of air through the hole at the bottom, and adding layers of  $\text{Fe}_2\text{O}_3$  and C when combustion is active. 10–15 g. pellets of Fe may be thus prepared. H. F. G.

$\alpha \rightleftharpoons \gamma$  **transformation of steels from the viewpoint of its dilatometric and magnetic effects.** J. SEIGLE (Chim. et Ind., 1934, 31, 282–288).—The shape of dilatometric curves (I) for steel and the results of magnetometric measurements during the  $\alpha \rightleftharpoons \gamma$  transformation can be satisfactorily explained on the assumption that they depend solely on the ratio of  $\alpha$ - to  $\gamma$ -Fe existing at any particular moment. Pure  $\alpha$  is stable only below the A1 point and pure  $\gamma$  only above the A3 point; within this range the Fe is a mixture of  $\alpha$  and  $\gamma$ , the proportions of which may be determined geometrically from (I). A. R. P.

**Surface of thin [iron] sheets.** E. MARKE (Stahl u. Eisen, 1934, 54, 149–152).—Examples are given and discussed of faults which occur in the manufacture of thin sheet Fe due to gas and slag inclusions, to the rolling-in of scale produced in annealing, to incorrect pickling (etching pits), and to faulty rolling technique. A. R. P.

**Corrosion at the surface line.** J. HOMMÉ (Przemysl Chem., 1934, 18, 49–52).—The velocity of corrosion of Fe vats containing saturated sylvinitic solution diminishes exponentially with depth from the surface. R. T.

**Exterior protection of metal pipes by cement mixtures ("Dalmine" coating).** A. ROCCA (Bull. Soc. Ing. Civ. France, 1933, 86, 890–921).—Cement coatings fulfil general protective requirements and have the special advantage of neutralising any acidity in subterranean  $\text{H}_2\text{O}$ . Concrete coatings are, however, difficult to transport, heavy, and are not resistant to



Mg salts or, entirely, to stray electric currents. Cement coatings have most usually been used up to the present for internal protection. "Dalmine" coating is prepared from cement and asbestos and is intended to avoid these defects and to provide a cement covering at a cost not much above that of bituminous preps. Its properties can be varied widely by varying the ratio of fibre, cement, and  $H_2O$ . The coating is very uniform, but can be varied according to the soil traversed. For protection against electrical currents a compound coating of Dalmine and bitumen is recommended. Conditioning of the coated pipes requires 48 hr. and is carried out in a warm, damp atm. The usual thickness of the coating is 2–4 mm. Should failure occur, any corrosion is general, not local. Physical tests of the coated pipes are described. C. I.

**Corrosion of steel. Physico-chemical tests on "Dalmine" coating.** O. SCARPA (Bull. Soc. Ing. Civ. France, 1933, 86, 922–965).—The theory of corrosion of Fe is discussed. Variations in corrosion in different parts of a specimen (e.g., a pipe) are usually due to varying [O]. Of less importance are variations in the composition of the Fe and the external e.m.f. Tests of a protective coating include tests of porosity as no coating is completely impervious. Porosity of a cement coating such as "Dalmine" (cf. preceding abstract) is best determined by conductivity measurements on a sample impregnated with an electrolyte. These are supplemented by photomicrography. Samples were left for 12 months in a corrosive soil with a continuous p.d. of 10 volts between the steel tube and the exterior, and the electrical resistance ( $R$ ) of the Dalmine coating was then found to be 400,000 ohms per sq. cm. With immersion in a 3% NaCl solution  $R$  was 10,000–30,000 ohms per sq. cm. Pieces of pipe buried for 3 or 4 years in a corrosive soil showed no signs of corrosion and undiminished  $R$ . An experiment demonstrating the passivating effect of  $Ca(OH)_2$  solution on Fe is described. The free CaO content of Dalmine mixture is 0.1–0.3%, the lowness of the figure being due to interaction of the cement CaO with silicates from the asbestos. Tests of removal of this CaO by a current of  $H_2O$  and of the action of solutions of NaCl,  $MgSO_4$ , etc. are described. C. I.

**Catalytic decomposition of iron carbide.** F. ROLL (Giesserei, 1933, 20, 233–235; Chem. Zentr., 1933, ii, 3182).—In casting grey cast Fe the presence of coal dust on the mould surface may produce ferrite on the surface of the casting. This is attributed to the action of gases produced when the C burns.

H. J. E.

**Low-carbon cast iron.** H. PORTIER (Bull. Assoc. tech. Fonderie, 1932, 6, 323–332; Chem. Zentr., 1933, ii, 3182).—A cast Fe with 2.5–2.6% C had the optimum properties on addition of 2.25–2.75% Si and 0.5–1% Mn.

H. J. E.

**Calorimetric investigation of the annealing processes in hardened carbon steels.** F. WEVER and G. NAESER (Mitt. Kaiser-Wilh.-Inst. Eisenforsch., 1933, 15, 37–47; Chem. Zentr., 1933, ii, 3184–3185).—The temp. dependence of the rate of annealing of a steel (0.97% C) has been measured in a special calorimeter

for use up to 400°. The dependence of the heat effect in annealing on the C content has been measured at 175° and 350°. The rate of decomp. of martensite increases very rapidly above 100°, whilst austenite decomposes and cementite formation increases above 200°.

H. J. E.

**Heat effects on annealing quenched carbon steels and their significance.** F. STÄBLEIN (Tech. Mitt. Krupp, 1933, 37–39; Chem. Zentr., 1933, ii, 3185; cf. preceding abstract).—The first stage in the heat effect is attributed to the energy liberated in the transformation from tetragonal to cubic  $\alpha$ -Fe, and the heat of formation of carbide. The third state of the heat effect is due to the heat of crystallisation of cementite.

H. J. E.

**Magnetic ageing [of soft cast steel].** J. MUIR (J. Roy. Tech. Coll., 1934, 3, 205–211).—The variation with age of the magnetic properties of certain steels is described.

H. S. P.

**Alloy steels in industry.** [Sir] H. C. H. CARPENTER (Metallurgia, 1934, 9, 175–178).—A review.

**Chemically stable steels.** A. VOSMAER (Chem. Weekblad, 1934, 31, 109–112).—The proprietary names, compositions, and heat-resisting and non-rusting properties of a considerable no. of steels and other alloys are given and discussed briefly.

H. F. G.

**Chromador steel. A new high-tensile steel for structural work.** G. ROBERTS (Engineering, 1934, 137, 415–416).—The use of high-tensile steels in structural work is economical only if the % increase in strength ( $A$ ) is  $>$  the increase in cost ( $B$ ). In chromador steel ( $C$ ),  $A$  is 50% and  $B$  15–20%. An average analysis of  $C$  is C 0.22, Mn 0.8, Si nil, Cr 0.9, Ni nil, and Cu 0.3%, with ultimate strength 37–43, min. yield point 23 tons/sq. in., and min. elongation 17%. A span crippling-load test gave a val. of 1.53–1.68 for the ratio of ultimate strength of  $C$  to that of mild steel.

C. A. K.

**Deterioration of chromium-tungsten steels in ammonia gases.** P. R. KOSTING (Met. & Alloys, 1934, 5, 54–56).—When subjected to the corrosive action of a 3:1 mixture of  $H_2$  and  $N_2$  with 10% of  $NH_3$  at 300°/600 atm. for 1 year an alloy with 0.81% W and Cr nil showed the greatest deterioration, but a steel containing W up to a max. of 2.85% resisted such attack. Addition of W to Cr steels did not increase resistance to corrosion, but addition of Cr to W steels was very beneficial. Steels containing  $>$  2% Cr were satisfactory. The upper limit for C was 0.35%.

C. A. K.

**Direct and indirect reduction of ferromanganese in the electric furnace.** M. S. MAXIMENKO (Metallurg, 1933, 8, No. 3, 4–10).—By increasing the pressure of  $CO$ , reduction is increased from 14 to 33%. Advantages are discussed.

CH. ABS.

**Electrographic determination of metals in alloys, with special reference to steel analysis.** A. GLAZUNOV and J. KŘIVOHLAVÝ (Chem. Obzor, 1932, 7, 258–263; Chem. Zentr., 1933, ii, 3164).—The method described is applicable to elements forming solid solutions in steel. A correction must be applied for elements forming carbides or steel pearlite structures. H. J. E.



**Rapid titrimetric determination of manganese in steel, cast iron, and iron alloys by the persulphate-arsenite method.** D. LOMBARDO (Metall. ital., 1933, 25, 415—428; Chem. Zentr., 1933, ii, 3461).—The effect of conditions and the presence of other elements on the determination of Mn by oxidation with  $(\text{NH}_4)_2\text{S}_2\text{O}_8$  and determination with  $\text{Na}_3\text{AsO}_3$  or  $\text{As}_2\text{O}_3$  has been studied. H. J. E.

**Diffusion of zinc and iron at temperatures below the m.p. of zinc.** G. RIGG (Month. J. Inst. Metals, 1934, 1, 51—63).—On heating rolled Zn sheet in contact with clean Fe diffusion commences at  $< 300^\circ$  and is fairly rapid at  $380^\circ$ , proceeding by the formation of cones of diffusion products spreading outwards from points of close contact into the body of the Zn and then across its surface. The process appears to be independent of the v.p. of the Zn and to be governed by the nature and smoothness of the Fe surface. Two well-defined layers of diffusion products are formed; that next to the Fe (*A*) is always about 0.08 mm. thick, contains about 17% Fe, and continuously moves away from the Fe surface, being converted into a Zn-rich layer containing  $> 11\%$  Fe. The rate of penetration of the Fe into the Zn depends on time and temp. and is independent of the purity of the Zn; the thickness of *A* with electrolytic Zn is, however, slightly  $>$  with common Zn. A. R. P.

**Malleability of nickel and of monel metal.** O. W. ELLIS (Month. J. Inst. Metals, 1934, 1, 149—164).—The temp. (*T*)—malleability (*M*) graph for hard-drawn Ni rod is a straight line between  $20^\circ$  and  $500^\circ$  and again at  $> 840^\circ$ ; in the softening range between  $500^\circ$  and  $840^\circ$  the graph is a curved line convex to the temp. axis. No simple relation between the energy of blow and the reduction of height in forging could be established at any temp. *M* is increased rapidly by annealing at  $> 750^\circ$  and reaches a well-defined max. after annealing at  $820^\circ$ , at which temp. softening is most rapid. *T-M* curves for monel metal are of a similar type to those for Ni. A. R. P.

**Testing the tin coating of tinplate.** F. EISENKOLB (Stahl u. Eisen, 1934, 54, 109—110).—The Sn is determined by dissolution in HCl and titration with  $\text{FeCl}_3$ ; and the Pb by dissolution of 1 g. of filings of the plate in 15 c.c. of  $\text{HNO}_3$  and 85 c.c. of  $\text{H}_2\text{O}$  in a Pt dish, followed by electrolysis, using the dish as cathode and a Pt-spiral anode, and iodometric determination of the deposited  $\text{PbO}_2$ . The porosity of the coating is best determined by the "ferroxyl test," using a gelatin solution of  $\text{K}_3\text{Fe}(\text{CN})_6$ . A. R. P.

**Methods of prospecting, extracting, and treating auriferous metals.** C. BERTHELOT (Chim. et Ind., 1934, 31, 3—31, 262—279).—A review of modern practice. A. R. P.

(A) Influence of quantity of lead salts on extraction of gold by the cyanide processes. (B) Influence of concentration of alkali cyanide on its consumption in cyanide processes. M. MLADENOVIC and V. STAJIC (Bull. Soc. Chim. Yougoslav., 1933, 4, 179—182, 183—186).—(A) Extraction (%) of Au and Ag by NaCN (*I*) from ores is at a max. when the relative concn. of  $\text{Pb}(\text{OAc})_2$  is 2 kg./ton or ore.

(B) Extraction (%) of Ag by aq. (*I*) attains a certain max. limiting val. as the concn. of (*I*) increases. Au is practically completely leached out after 12 hr. of extraction, whilst the Ag content of the residue is little affected by prolonging the process above 12 hr. R. T.

**Present-day gold refining.** ANON. (Metallurgia, 1934, 9, 157).—Notes on the Wohlwill and Moebius electrolytic refining processes for Au and Ag, on the treatment of anode slimes, and on the cupellation refining of Au and Ag. A. R. P.

**Alloys of silver with beryllium.** H. A. SLOMAN (Month. J. Inst. Metals, 1934, 1, 31—50).—The system has been examined by thermal and micrographic methods, using alloys made in a BeO crucible and melted in vac.; the eutectic is at 10.4 at.-% Be and  $881^\circ$  and the solubility of Be in Ag rises with temp. to a max. of 3.5 at.-% at the eutectic temp. An arrest point at  $750^\circ$  occurs on the thermal curves of all alloys containing two phases, probably due to a polymorphic transformation of  $\beta$ . Addition of Cu to Be-Ag alloys produces an immiscibility gap which disappears again on further addition of Ni. Standard Ag alloys with a high resistance to tarnish in a moist atm. containing  $\text{H}_2\text{S}$  can be obtained by replacing 0.5—1% Cu by Be; these alloys are also more resistant to the action of vinegar and of fruit and vegetable juices than is the ordinary Cu-standard Ag. A. R. P.

**Review of [metal] rustproofing processes with reference to the use of town's gas.** O. W. ROSKILL (Metallurgia, 1934, 9, 185—188).—The spraying, sherardising, parkerising, cosletting, and other processes are dealt with.

**Light alloys.** A. VOSMAER (Chem. Weekblad., 1934, 31, 107—109).—The composition of a no. of (principally) Al alloys are given and discussed briefly in relation to the constitution and phase diagrams. H. F. G.

**Behaviour of some light alloys towards marine corrosion.** J. COURNOT, M. CHAUSSAIN, and H. FOURNIER (Compt. rend., 1934, 198, 85—87).—Comparison of resistance to corrosion due to alternate immersion and emersion in and out of sea- $\text{H}_2\text{O}$  at room temp. for 25 days of Al alloys containing (I) Mg 6—9, Mn 0.37—0.54, and Si 0.21—0.32%, (II) Mg 2—3, Mn 1—3, Sb 0.2—0.5, and Si 0.3—0.55%, (III) ordinary duralumin, and (IV) special duralumin containing Ni and Cr showed that (I) was less attacked than (III) and about the same as (IV), but decidedly  $>$  (II). A class-(I) alloy containing 0.34% Mn was corroded only half as fast as one containing only 0.03% Mn (cf. B., 1933, 832). Purity of materials is essential. C. A. S.

**Thermal properties of aluminium and their application.** A. DE BIRAN (Rev. Aluminium, 1933—4, 2263—2278, 2311—2332).—Data on the thermal conductivity, expansion, heat reflexion and radiation, and mechanical properties of Al and its alloys are tabulated and discussed and an account is given of the val. of these properties in determining the use of these metals for, e.g., pistons for internal-combustion engines, radiators, heat insulators, etc. A. R. P.

**Transverse tests on sand-cast aluminium alloy bars.** C. E. PHILLIPS and J. D. GROGAN (Month. J. Inst.



Metals, 1934, 1, 85—94).—Comparative tests in the bending and tensile machines on sand-cast Al alloy specimens have shown that the latter test is to be preferred for determination of the ductility of a metal. A. R. P.

**Influence of gases in an 8% copper-aluminium alloy on normal and inverse segregation.** I. G. SLATER (Month. J. Inst. Metals, 1934, 1, 123—125).—In sand-cast 8% Cu-Al alloy normal segregation of the Cu was observed when the vol. of cavities due to gas absorption was < 2%, and inverse segregation when the vol. was > 2%. External gas pressure had no effect on the nature of the segregation. A. R. P.

**Rate of age-hardening of duralumin.** J. O. LYST (Met. & Alloys, 1934, 5, 57—58).—Duralumin quenched and aged at room temp. (A) hardens appreciably in 1.75 hr., at 0° in 36 hr., and at -48° (B) not within 14 days. If removed to A, specimen B hardens in 1.75 hr. C. A. K.

**Formulae concerning viscous and plastic flow in soft metals.** E. W. FELL (Month. J. Inst. Metals, 1934, 1, 117—122).—The flow in a prolonged hardness test is compared with that in tensile test-pieces under a const. stress per unit area of cross-section. A. R. P.

**Corrosion of metals, and colloid electrochemistry.** V. A. KISTYAKOVSKI (Uspekhi Khim., 1933, 2, 23—7248).—A review. CH. ABS.

**Mounting of small metallographic specimens and metal powders in bakelite.** H. M. SCHLEICHER and J. L. EVERHART (Met. & Alloys, 1934, 5, 59—60).—Specimens are placed in a small crucible, which serves as a mould, and covered with Bakelite resinoid BR-0014, a viscous liquid. The temp. is maintained at approx. 85° overnight and then at 130° for 2 hr. The moulded form may then be removed and polished. Metal-powder specimens are stirred into the vehicle, which must be fresh, before hardening, or may be simply dusted on to Bakelite varnish smeared on a cover glass. C. A. K.

**Chromium-plating of nickel layers.** J. KORPIUN, E. VOGEL, and K. SCHNEIDER (Naturwiss., 1934, 22, 135).—The fact that specimens of Ni from different plating baths are not so suitable for Cr-plating is due, not to the different amounts of H<sub>2</sub> absorbed by the Ni, but to diffusion of the H<sub>2</sub>. The smaller is the size of the Ni nuclei, the greater is the diffusion const., agreeing with the assumption that diffusion takes place, not through the mass of the metal, but only along the surface crystallites. The H<sub>2</sub> will be in the interfacial layers of the Ni and Cr, and may attain such great pressure that the deposit of Cr is no longer adherent. The risk of breaking away is less, the thicker is the Ni layer, or if the basic metal, e.g., Fe, is more permeable to H<sub>2</sub>. A. J. M.

**Measurement of (A) internal stresses in, (B) adhesion of, electroplates.** R. J. PIERSOL (Metal Clean. Finish., 1933, 5, [A] 456—459, [B] 503—506, 516—517).—(A) Equipment and methods are described. (B) The nature and measurement of adhesion are discussed. CH. ABS.

**New equipment materials.**—See I. Cleaning blast-furnace gas. Electrocleaning. —See XI. [Ag

from] fixing baths. —See XXI. Solubility of Cu. —See XXIII.

See also A., Apr., 356, Systems Al-Zn, Li-Cd, Sb-Bi, Pt-Cr, Cu-Pd, Mg-Tl, Cu-Zn-Ni, and Fe-C. Influence of cathodic H on stability of steel. 357, Ferromagnetism of Mn-Al-Cu alloys. 365, Equilibrium between metals, oxides, and silicates in the melt. 368, H overvoltages of Fe-Cr alloys in aq. KOH. Passivity of Pb. 372, Prep. of Si and silicides. Electrolysis of metals. Electrodeposition of Au. 373, Cathodic and colloidal Ag. Cr-plating. Electrolytic prep. of rare-earth amalgams. Cathodic deposits. 374, Prep. of sputtered metal films. 376, Tarnishing of Ag. 381, Determination of Pb and Cu. 382, Detection and determination of Cu. Micro-determination of Fe. Determination of Ni, Cr, Sb, and Pt metals. Separation of Ir and Rh. 384, Measurement of corrosion and of  $p_H$ . 389, Alloy skeletons as catalysts.

#### PATENTS.

**Production of industrial iron by means of iron sponge.** H. ESSER (B.P. 406,455, 6.1.33. Ger., 13.1.32).—Sponge Fe is intimately mixed with powdered alloying constituents, e.g., 1—10% of 20% ferrophosphorus, or, if wrought Fe is required, with powdered basic or acid open-hearth slag, and the mixture is pressed into rods or tubes which are sintered in a neutral atm., until diffusion of the constituents occurs, and then passed through an extrusion press at a temp. and pressure which are regulated according to the properties required. A. R. P.

**Purification of [sponge] iron from sulphur.** R. H. VON SETH and B. M. S. KALLING, Assrs. to A. JOHNSON & Co. (U.S.P. 1,923,286, 22.8.33. Appl., 3.3.32. Swed., 27.1.32).—In the manufacture of sponge Fe by the reduction of Fe ore with carbonaceous gases, CaO is added to the charge and the reduced product is ground and washed with hot H<sub>2</sub>O to remove the CaS formed. The purified Fe contains < 0.02% S. A. R. P.

**Flux [for iron welding rods].** A. R. NYQUIST (U.S.P. 1,922,692, 15.8.33. Appl., 25.3.30).—Fe rods for arc-welding are coated with a 1 : 1 : 1 : 1 mixture of MgSO<sub>4</sub>, KNO<sub>3</sub>, CaCO<sub>3</sub>, and MgCO<sub>3</sub>. A. R. P.

**Stainless metal [iron or steel].** C. HARDY, Assr. to HARDY METALLURGY. Co. (U.S.P. 1,922,038, 15.8.33. Appl., 6.10.31).—An 8 : 18 : 74 mixture of powdered Ni, Cr, and Fe (all through 200-mesh) is pressed into shape at < 20,000 lb. per sq. in. and heated at 900—1200° (1000°) in a non-oxidising atm. (H<sub>2</sub>), and the resulting bars are worked in the usual way. A. R. P.

**Annealing [steel].** L. L. LEWIS, Assr. to BLAIR STRIP STEEL Co. (U.S.P. 1,921,934, 8.8.33. Appl., 30.8.30).—The articles are heat-treated in a closed container and a reducing gas is passed across the seal during cooling, to prevent ingress of air. A. R. P.

**Dephosphorisation of steel.** SOC. D'ELECTRO-CHIM., D'ELECTRO-MÉT., ET DES ACIÉRIES ELECTR. D'UGINE (B.P. 405,633, 29.7.32. It., 31.8.31).—The steel (I) after blowing is intimately mixed with a slag (II) containing SiO<sub>2</sub>, CaO, and Fe<sub>2</sub>O<sub>3</sub> in the ratio 3 : 65 : 20, either by



allowing (I) and (II) to fall in thick streams simultaneously into a ladle, or by removing the refining slag from (I) in the converter, adding (II), and blowing for a short period to induce turbulent mixing. A. R. P.

**Treatment of metals [steel tubes].** H. R. LOWSTUTER (U.S.P. 1,923,058, 15.8.33. Appl., 19.8.30).—In drawing steel tubes the inner and outer surfaces are coated with a suspension of  $H_3BO_3$  and Al powder in a resin varnish, the tube is heated to destroy org. matter and to cause the  $B_2O_3$  to fuse and make the Al adhere to the steel, and drawing is continued until the desired size of tube is obtained without further annealing. A. R. P.

**[Working of high-carbon] ferrous alloys.** F. R. BONTE (B.P. 406,131, 24.2.33).—Cast steel with 1.5–2 (1.7)% C and 0.6–0.9 (0.75)% Si is hot-rolled, worked to the desired shape, and then annealed at  $>$  the crit. temp. to produce graphitisation of the hypereutectoidal C. A. R. P.

**Nitriding [ferrous alloys].** J. J. EGAN, Assr. to ELECTRO METALLURG. CO. (U.S.P. 1,923,814, 22.8.33. Appl., 11.8.31).—The alloys are heated in an atm. of  $NH_3$  in contact with activated  $SiO_2$  sand which is prepared by treating sand with HF or by immersing it in fused NaOH at  $350^\circ$  and washing with hot HCl. A. R. P.

**[Cobalt–chromium–iron] metallic alloys.** KINZOKU ZAIRYO KENKYUSHO (B.P. 405,607 and 405,650, 2.7.32. Jap., [A] 28.7.31, [B] 15.4.32).—Alloys with a low coeff. of thermal expansion and high resistance to corrosion consist of (A) Co 50–60, Cr 5–12, Fe 28–45%, and  $<$  2% each (or  $>$  5% in all) of Mn, Ti, V, Al, Mg, Si, or B, or (B) Co 10–59.99, Cr 5–12, Fe 28–70, Ni 0.01–30%, and  $<$  2% each (and  $<$  6% in the total) of Mn, Ti, V, Al, Mg, Si, B, C, W, Mo, and Cu. A. R. P.

**Metal container [of chromium steel].** A. B. KINZEL, Assr. to ELECTRO METALLURG. CO. (U.S.P. 1,924,043, 22.8.33. Appl., 2.9.30).—Parts of the vessel subject, when made in plain C steel, to caustic embrittlement are made of an Fe alloy with 5–30% Cr and  $>$  8% Mn and having an  $\alpha$ -ferritic structure. A. R. P.

**Case-hardening of iron, steel, and alloy steels.** ROESSLER & HASSLACHER CHEM. CO. (B.P. 406,346, 24.8.32. U.S., 24.8.31).—The articles are heated at  $<$   $900^\circ$  ( $835$ – $850^\circ$ ) in a fused salt bath containing 30–60% of  $BaCl_2$  and 10–20% of NaCN together with alkali chlorides or carbonates to lower the m.p. and increase the fluidity. The process is especially applicable to the case-hardening of steels containing Al, Si, V, Cr, Mo, Mn, W, or Ni. A. R. P.

**Thermally hardening steel.** E. C. BAIN and E. S. DAVENPORT, Assrs. to UNITED STATES STEEL CORP. (U.S.P. 1,924,099, 29.8.33. Appl., 20.11.31).—If  $\theta_1$  be a temp. above the crit.,  $\theta_2$  the temp. of rapid pearlite formation, and  $\theta_3$  that of conversion of austenite (A) into martensite (M), then the (C- or alloy) steel is quenched from  $\theta_1$  to between  $\theta_2$  and  $\theta_3$  and maintained within that range for a period long enough for A to be converted into a structure other than pure M, and is finally cooled to room temp. B. M. V.

**Concentration of [nickel–copper sulphide] ores by flotation.** INTERNAT. NICKEL CO. OF CANADA, LTD.,

Assees. of W. T. MACDONALD (B.P. 406,741, 5.9.32. U.S., 23.9.31).—The Cu mineral is floated in presence of NaCN and, if desired,  $ZnSO_4$ , which inhibit flotation of pentlandite and pyrrhotite; addition of  $CuSO_4$  to the tailings re-activates these minerals, which can then be floated away from the gangue. A. R. P.

**Acid-resisting [copper] alloy.** W. J. BRADDOCK (U.S.P. 1,916,602, 4.7.33. Appl., 20.2.33).—Claim is made for an alloy of Cu 90–94 (92), Al 3–5 (4), and Ni 3–5 (4)% which can be drawn into wire or rolled into tubes for use in petroleum refineries. A. R. P.

**[Copper] alloy.** W. C. SMITH, Assr. to ALLIED PROCESS CORP. (U.S.P. 1,923,955, 22.8.33. Appl., 16.11.31).—Claim is made for high-conductivity Cu which has been deoxidised with such an amount of Li that 0.002–0.03% remains in the metal. A. R. P.

**Metallurgical furnace. [Zinc-distillation retort.]** E. H. BUNCE and A. O. ASHMAN, Assrs. to NEW JERSEY ZINC CO. (U.S.P. 1,922,274, 15.8.33. Appl., 28.1.31).—The furnace comprises a vertical retort (I) in a gas-fired heating chamber and with a hopper and side tube leading to the Zn condenser at the top. The lower end of (I) opens into a large brick chamber (II) divided in its lower part into several chambers by vertical brick walls, each chamber being provided with a horizontal graphite electrode in the bottom and current being passed from one to another of these electrodes through the charge and over the dividing walls. (I) and (II) are kept continuously full of coked agglomerates of ZnO and coal dust; most of the Zn is expelled during the passage of these through (I), and the remainder by the additional electrical heating supplied in (II). A. R. P.

**Volatilising zinc.** NEW JERSEY ZINC CO., Assees. of W. MCG. PEIRCE and R. K. WARING (B.P. 406,560, 6.7.33. U.S., 12.5.33).—For the purification of Zn by distillation, a rectifying column (I) is built up of SiC refractory trays (II) within and extending vertically above a rectangular, firebrick heating chamber fired with gas or oil burners. (II) are so constructed as to retain shallow pools of molten Zn and are provided with staggered holes and circumferential channels for allowing the metal to pass from one tray to the next and for distributing it down the walls of (I). Molten Zn is continuously supplied to the top of (I), so that the rising vapours from the lower (II) passing counter-current to the Zn flow are effectively freed of the less volatile impurities. A. R. P.

**Protection of lead [against corrosion].** COMP. GÉN. D'ELECTRICITÉ (B.P. 407,276, 16.10.33. Ger., 25.11.32. Addn. to B.P. 372,936; B., 1932, 683).—Pb cables or pipes for laying underground are smeared with a mixture of vaseline 55, rosin 40, and S 5%, whereby an adherent, protective film of PbS is formed on the surface. A. R. P.

**Extraction of gold from its ores.** P. A. NEUMANN (U.S.P. 1,923,948, 22.8.33. Appl., 16.12.31).—The ore is agitated with dil. aq. KCN and, without filtering, Zn dust is added to ppt. the Au, which is then caught in Hg by passing the pulp through a centrifuge containing a Hg pool which forms a layer around the walls when the machine is rotating. A. R. P.



[Dental] alloy. J. ADERER (U.S.P. 1,924,097, 29.8.33. Appl., 2.6.33).—The alloy is composed of Au 30–40 (33), Pd 35–50 (39), Ag 10–23 (10), Cu 4–20 (20), and Zn 2–6 (3) pts. by wt. B. M. V.

Recovery of precious metals, such as gold, platinum, and the like, from ore bodies. V. C. J. NIGHTINGALL (U.S.P. 1,922,975, 15.8.33. Appl., 15.4.31. Austral., 10.12.30).—The apparatus comprises a laterally rocking table carrying a Hg cathode (C), above which is a Pb anode (A) and feed hopper so disposed that the ore pulp, which contains  $K_2SO_4$  or  $Na_2SO_4$  in solution passes over A on to C, whereby electrolytic amalgamation of the Au, Ag, and Pt is obtained. A. R. P.

Separation of solid impurities from molten metals [e.g., sodium]. ROESSLER & HASSLACHER CHEM. CO. (B.P. 406,339, 24.8.32. U.S., 24.8.31).—The metal (Na) is melted in an inert atm. in an Fe tank (I) fitted with a conical bottom and sump (II) in which the heavier impurities ( $NaCl$ ,  $CaCl_2$ ,  $CaO$ , etc.) settle and from which they are continuously withdrawn by means of a screw conveyor working in a closed tube inclined at  $45^\circ$  so as to allow the liquid Na to drain back into (II). The purified Na is withdrawn from (I) by means of suction through an immersion filter. A. R. P.

Cleaner for metal articles. O. ROTH, JUN. (U.S.P. 1,923,642, 22.8.33. Appl., 23.8.32. Ger., 24.3.30).—Claim is made for a rectangular block of  $Na_2CO_3 \cdot 10H_2O$  (I) wrapped in Al foil which acts as an anode when brought into contact with the metal to be cleaned, (I) acting as an electrolytic cleanser. A. R. P.

Manufacture of articles, such as machine parts, tools, protective surfaces, and insertions, from metal powder or metal-powder mixtures. A. UHLMANN (B.P. 405,983, 2.8.32).—Pressed shapes of a mixture of powdered metals are sintered in a reducing atm. containing volatile compounds by means of an induced high-frequency current. A. R. P.

Preventing coarse crystallisation at the solidification of metallic castings. VEREIN. STAHLWERKE A.-G. (B.P. 405,842, 24.4.33. Ger., 2.5.32).—Wires or strips of the metal to be cast, or of an isomorphous metal having a m.p.  $\geq 50^\circ$  above that of the metal, are inserted into the mould to provide nuclei for inducing fine-crystal growth during solidification of the casting. A. R. P.

[Agglomerates containing calcium for] treatment of metals. C. HARDY, Assr. to HARDY METALLURG. CO. (U.S.P. 1,922,037, 15.8.33. Appl., 28.6.30).—Agglomerates for desulphurising or deoxidising Fe, Cu, or other metals (M) are prepared by stirring the finely-powdered M into molten Ca or other alkaline-earth or alkali metal to obtain a porous brittle product. A. R. P.

Organic compound [inhibitor for metal-pickling baths] and its treatment. J. H. GRAVELL (U.S.P. 1,921,668, 8.8.33. Appl., 15.5.31).—Di-*o*-tolylthiourea (I) is dissolved in conc.  $H_2SO_4$  and the solution added to the pickling bath so that (I) separates in a finely-divided, almost colloidal form. A. R. P.

Metal-casting from gelatin reliefs [for photo-mechanical printing plates]. A. MURRAY, Assr. to

EASTMAN KODAK CO. (U.S.P. 1,917,387, 11.7.33. Appl., 11.5.32).—The gelatin mould is coated with non-aq. liquids containing an aromatic carboxylic acid, e.g., salicylic, phthalic, cinnamic, or anisic acid, and one or more of the following: isoamyl or  $Bu^+$ , phthalate, quinoline,  $Pr^+$  lactate, anis- or cinnam-aldehyde, decahydronaphthalene. A. R. P.

Coatings for metal-casting moulds. ARMSTRONG CORK CO., Assees. of E. C. EMANUEL (B.P. 406,582, 14.8.33. U.S., 1.12.32).—A suspension of cork dust (I) in an aq. alkali, e.g.,  $(NH_4)_2CO_3$ ,  $Ca(OH)_2$ , or aq.  $NH_3$ , is sprayed on to the mould and heated until (I) is carbonised and a uniform, bright black coating is produced. Suitable mixtures are obtained by dispersing in 160 g. of  $H_2O$ , 60 g. of casein, 20 g. of  $Na_2HPO_4$ , 10 g. of  $Na_2SO_3$ , 30 g. of  $CaO$ , and 100 c.c. of cork dust finer than 80-mesh. A. R. P.

Manufacture of copper and copper alloy tubes. F. W. and L. H. FRENCH and H. B. RATHBUN, Assrs. to AMER. BRASS CO. (U.S.P. 1,916,474, 4.7.33. Appl., 10.12.30).—To prevent internal scale during annealing, the tubes are filled with  $N_2$  or other inert gas and the ends sealed. B. M. V.

Melting of non-ferrous metals [brass]. G. S. EVANS, Assr. to MATHIESON ALKALI WORKS (U.S.P. 1,921,868, 8.8.33. Appl., 21.1.31).—Scrap brass is melted in an induction furnace with the addition of 0.1–0.4% of  $Na_2CO_3$  to form a liquid slag on which insol. impurities (dirt, oxides, etc.) float as a dry scum. A. R. P.

Bearing. C. F. SHERWOOD, Assr. to SHERWOOD PATENTS, LTD. (U.S.P. 1,916,338, 4.7.33. Appl., 13.11.29).—A porous metal bearing is formed from a briquette of powdered Cu, Sn, graphite, and a lubricant volatile at a temp.  $<$  that of a bath of molten cyanide in which the briquette is immersed. B. M. V.

Hard cemented carbide materials. A. H. STEVENS. From FIRTH-STERLING STEEL CO. (B.P. 406,822, 18.11.32).—Mixtures of finely-powdered carbides of Ti, W, Mo, Cr, Ta, Nb, V, Zr, or U with the oxide of the same or another metal of this group, sufficient C to reduce this oxide and carburise the metal, and a binding agent, e.g., Co, Ni, or Fe, are pressed into shape and sintered at a high temp. in  $H_2$  until a coherent metallic mass is produced. A. R. P.

Hard alloy [containing aluminium carbide]. N. V. MOLYBDENUM CO., and J. OPPENHEIMER (B.P. 406,012, 18.7.32).—Claim is made for sintered alloys containing Al carbide and a carbide of W, Mo, Ti, Mn, Ta, V, Zr, or Si, together with 3–25% of Cu, Ni, Co, Fe, or Cr as binder. A. R. P.

Thermal or thermochemical treatment of [tungsten] metal wire or the like. GEN. ELECTRIC CO., LTD., Assees. of PATENT-TREUHAND-GES. F. ELEKTR. GLÜHLAMPEN M.B.H. (B.P. 406,440, 25.11.32. Ger., 25.11.31).—For annealing W or other wire in a non-oxidising atm. or for coating it with W from a mixture of  $WCl_6$  and  $H_2$  the wire is drawn continuously through a wide glass tube (I) connected at each end through narrow-bore tubes with narrow chambers containing Hg seals, the pressure on the Hg at the ends remote



from (I) being kept constantly just < that in (I) by an arrangement of self-adjusting manometers. (I) contains two electric terminals through holes in which the wire passes, so that the length between them is heated by resistance to the desired temp. A. R. P.

**Making metallic [molybdenum] films upon bodies of non-conducting [tantalum] oxides, especially for oxide filaments in discharge tubes.** E. WIEGAND, Assr. to TELEFUNKEN GES. F. DRAHTLOSE TELEGRAPHIE M.B.H. (U.S.P. 1,923,406, 22.8.33. Appl., 30.3.27. Ger., 1.4.26).—A paste of Mo powder and sugar syrup or heavy paraffin is spread on a core of  $Ta_2O_5$  (I) and the whole is heated under non-oxidising conditions to carburise the Mo and reduce the upper surface of (I) to TaC. A. R. P.

**Production of magnesium.** OESTERR. AMER. MAGNESIT A.-G. (B.P. 406,958, 9.11.33. Austr., 30.11.32. Addn. to B.P. 362,835; B., 1932, 232).—The crude Mg dust is distilled at atm. or slightly higher pressure in an inert gas. A. R. P.

**Manufacture of aluminium-magnesium alloys.** A. H. STEVENS. FROM ALUMINIUM, LTD. (B.P. 405,788, 9.1.33).—Alloys of Al with 5–20% Mg are cast in sand moulds containing 2% of  $H_3BO_3$  and tempered with a 25–40% solution of diethylene glycol. The Al should contain < 0.8 (0.2–0.3)% of (Si + Fe) and the castings should be annealed at 275–450° to cause the Mg to enter into solid solution. A. R. P.

**Protecting aluminium, magnesium, zinc, and their alloys against corrosion.** P. PRIER (U.S.P. 1,923,502, 22.8.33. Appl., 6.4.31. Fr., 24.4.30).—The articles are immersed in a hot solution containing an alkali phosphochromate 1.5, an alkali thiomolybdate 1.5, an alkali orthophosphate 0.5, and an alkali tartrate, citrate, acetate, or the like 1.5%.

**Apparatus for smelting aluminium and other light metals.** J. SCHÜFFLER, Assr. to KOPPERS CO. OF DELAWARE (U.S.P. 1,924,201, 29.8.33. Appl., 1.2.32. Ger., 31.1.31).—Electrical resistors are placed in channels in the furnace roof, the channels being deep and the upper parts forming flues for the circulation of gases. (Cf. B.P. 383,103; B., 1933, 235). B. M. V.

**Treatment of the surfaces of aluminium or aluminium alloy articles.** ALUMINUM COLORS, INC., Assees. of H. BENGSTON (B.P. 406,988, 31.8.32. U.S., 20.11.31).—The metal surface is anodically oxidised in 25%  $H_2SO_4$  and the film is converted into a hard, abrasion-resistant, and impervious coating by immersion in  $H_2O$  at 80–100° for 10–30 min. A. R. P.

**Production of chromium-plated [aluminium] article.** G. L. MOORE, Assr. to ALUMINUM CO. OF AMERICA (U.S.P. 1,923,790, 22.8.33. Appl., 24.11.28).—Articles of Al alloys are coated with a thin film of Sn by brushing the surface with molten Sn; they can then be Cr-plated in the usual bath. A. R. P.

**Electrolytic deposition of chromium.** H. KISSEL, Assr. to UNITED CHROMIUM, INC. (U.S.P. 1,922,853, 15.8.33. Appl., 26.1.28. Ger., 1.12.27. Renewed 1.3.32).—The electrolyte is made by boiling in 1 litre of  $H_2O$   $Cr_2(SO_4)_3$ , aq. 250, KH tartrate 50, NaOAc 50,

and  $H_3BO_3$  10 g. A sol. Cr electrode is used and deposition is effected at 20–60° with 0.5–1 amp. per sq. dm. A. R. P.

**Black-finishing [chromium-plated] metal surfaces.** ROESSLER & HASSLACHER CHEM. CO. (B.P. 406,033, 19.8.32. U.S., 19.8.31).—A hard, bright, black finish is imparted to Cr-plated Cu, Ni, or steel articles by immersing them for a short time in fused NaCN at 700–900°. A. R. P.

**[Tantalum] metal deposition and product thereof.** J. B. GREENAGLE, Assr. to W. W. VARNEY and UNIVERSAL ALLOYS, INC. (U.S.P. 1,922,847, 15.8.33. Appl., 1.3.30).—A mixture of  $TaCl_5$  and C is heated at 500–700° in a current of  $Cl_2$ , whereby  $TaCl_2$  is stated to be formed. The product is extracted with MeCN to give a solution containing 10% Ta; after addition of 1%  $KHF_2$  as conducting salt it is claimed that good deposits of Ta can be obtained by electrolysis. A. R. P.

**Electrolytic deposition of nickel from nickel salt solutions.** FALCONBRIDGE NIKKELVERK A/S. (B.P. 405,902, 15.8.33. Norw., 27.8.32).—In the electrolytic refining of Ni the Ni cathode sheets are first pickled for 12–70 hr. in 1%  $H_2SO_4$  at 50° while a current of air is blown through the solution; flaking of the deposit is thus avoided. A. R. P.

**Heat-treating comminuted materials.**—See I. **Litharge from Pb.**—See VII. **Coating refractories with metal.** **Casting-mould cavities.**—See VIII. **Adhering rubber to metal.**—See XIV. **Characters on Al.**—See XXI.

## XI.—ELECTROTECHNICS.

**Electric cleaning of blast-furnace gas.** RICHARME (Rev. Mét., 1933, 30, 402–418, 423–452, 471–477).—The principles of the electrostatic method of purifying gases are reviewed and an account is given of the operation of the Lodge-Cottrell, Elga, Siemens-Schuckertwerke, and Lurgi processes, several installations being described in each case with reference to diagrams of the plant. The economics of these processes are compared with those of wet scrubbers, with special reference to their use in removing suspended dust from Fe blast-furnace gases. A. R. P.

**Electro-cleaning with sodium metasilicate.** F. J. HENNING and T. K. CLEVELAND (Metal Clean. Finish., 1933, 5, 497–502).—Directions for the prep. and operation of  $Na_2SiO_3$  baths are given. CH. ABS.

**General properties of liquid organic dielectrics.** V. KARAPETOFF (Trans. Electrochem. Soc., 1934, 65, 123–133).—The more important properties are outlined and briefly discussed with special reference to the work of A. Gemant. H. J. T. E.

**Mechanism of the cupric sulphide-magnesium rectifier.** M. ANASTASIADIS (Compt. rend., 1933, 197, 1397–1399).—The mechanism of the Elkon rectifier (cf. U.S.P. 1,751,361; B., 1931, 69) is discussed. C. A. S.

**Dry cells with solid radioactive electrolyte and ionised air.** L. BOUCHERT (Compt. rend., 1933, 197, 1598–1599).—Two suitably hollowed discs, one of Zn, the other of brass, are insulated from each other by a



mica ring, and the lower hollow is filled with powdered  $\text{UO}_2(\text{NO}_3)_2$  cemented in with paraffin. At first the e.m.f. is 0.60–0.70 volt, usually 0.65–0.68, but after 6 months it falls to about 0.54, at which it has remained approx. const. (within 2%) for several years. C. A. S.

**Gas purification.** Dielectric consts. of oils.—See II. Determining moisture in wood.—See IX. Magnetic ageing of steel. Steel analysis. Reducing ferromanganese. Colloid electrochemistry and corrosion. Au refining. Cr-plate on Ni. Testing tinplate. Electroplates.—See X. Destroying mould spores on bread.—See XIX. Regeneration of fixing baths.—See XXI.

See also A., Apr., 356, Conductivity of Mg-Tl alloys. 367, Decomposition voltages of fused salts. 368, H overvoltages of Fe-Cr alloys in aq. KOH. 372, Alkaline accumulator. Prep. of Si and silicides. Electrolysis of metals. Electrodeposition of Au. 373, Electrolysis of  $\text{Na}_2\text{BiI}_5$ . 373, Cathodic and colloidal Ag. Cr-plating. Electrolytic prep. of rare-earth amalgams. Cathodic amalgams. Anodic oxidation of lactic to pyruvic ion. Reduction of camphoric acid imide. Oxidation of piperidine. Synthesis of  $\text{Cu}_3\text{N}$ . 374, Prep. of sputtered metal films. 377, Prep. of radium-E. 383, Photoelectric colorimeter, nephelometer, and densitometer. 384, Measurement of corrosion and of  $p_{\text{H}}$ .

#### PATENTS.

**Insulating material.** A. A. FREY, Assr. to WESTINGHOUSE ELECTRIC & MANUFACTURING CO. (U.S.P. 1,924,311, 29.8.33. Appl., 6.1.31).—An inorg. coating for transformer laminations which will withstand annealing temp. comprises a refractory oxide and a binder, e.g.,  $\text{Al}_2\text{O}_3$  40–60, Na silicate 30–2, and  $\text{H}_2\text{O}$  20–80%. B. M. V.

**[Portable] electrolytic apparatus [for electrolysis of brine].** D. J. EVANS (B.P. 407,700, 21.9.32).—Supply of brine to the cell(s) is controlled by a valve co-operating mechanically with a switch controlling the supply of current. J. S. G. T.

**Apparatus [conductivity cell] for measuring the electrical conductivity of liquids.** THERMAL SYND., LTD., and B. MOORE (B.P. 407,734, 29.8.32).—Electrodes, supported on rigid tubular glass or quartz immersion members (M) and attached at their upper ends to a stopper, fit and register accurately with the open mouth of the cell, the free ends of M being sealed together. J. S. G. T.

**Production of high-emission thermionic cathodes.** RADIO-A.-G. D. S. LOEWE, and E. WALDSCHMIDT (B.P. 406,431, 14.11.32. Ger., 16.11.31).—W, Mo, or Cr wires are coated with a porous film of Ba, Sr, or Ca salt of the wire metal by immersion in aq.  $\text{K}_3\text{Fe}(\text{CN})_6$  containing  $\text{Ba}(\text{OH})_2$ ,  $\text{Sr}(\text{OH})_2$ , or  $\text{Ca}(\text{OH})_2$ . The film is dried, heated, and bombarded with atomised Ba in the valve, so that the  $\text{WO}_3$ ,  $\text{MoO}_3$ , or  $\text{CrO}_3$  is reduced to metal and the pores are filled up by the additional BaO formed. A. R. P.

**Manufacture of (A) an electrode [for neon tubes], (B) gaseous-conduction devices.** F. L. HUNTER, JUN.,

Assr. to FANSTEEL PRODUCTS CO., INC. (U.S.P. 1,922,244—5, 15.8.33. Appl., [A] 13.9.30, [B] 28.11.30).—(A) The electrode consists of a hollow Ta cylinder packed with graphite and containing a cartridge of  $\text{BaO} + \text{Al}$ , which yields metallic Ba on heating. (B) The pressure in a gaseous-conduction (e.g., Ne) tube (I) is reduced and the electrodes are degassed, the gas being utilised to increase the pressure in (I). The walls of (I) are conditioned by impressing a voltage of  $> 1000$  volts per ft. between the electrodes. A. R. P.

**Vacuum tube.** F. S. McCULLOUGH (U.S.P. 1,924,368, 29.8.33. Appl., 13.3.24).—The anode forms most of the outer bulb and is preferably of Ni coated with Cr or U oxides to prevent oxidation at glow temp. Radiating fins are provided. B. M. V.

**Photoelectric devices.** H. C. RENTSCHLER, Assr. to WESTINGHOUSE LAMP CO. (U.S.P. 1,923,844—5, 22.8.33. Appl., 14.1.31).—The photosensitive cathode comprises Ni or a precious metal sputtered with a film of (A) Zr or (B) V. A. R. P.

**[Pasting tubular electrodes of] electric storage batteries.** L. FULLER, G. J. A. FULLER, and E. W. SUPLOW (B.P. 407,994, 27.9. and 13.12.32).

**Adsorption system.**—See I. Lubricants.—See II. Bromates. Luminescent screens. Stable Ti salt solutions.—See VII. Welding rods. Zn-distillation retort. Protecting Pb. Precious metals from ores. Articles from metal powders. Wires. Mo films on Ta oxides. Treating Al. Cr-plated Al. Cr- and Ta-plate. Ni refining.—See X.

#### XII.—FATS; OILS; WAXES.

**Determination of butter in fats containing it.** C. VALENCIEN and J. TERRIER (Mitt. Lebensm. Hyg., 1933, 24, 231–236; Chem. Zentr., 1933, ii, 3503).—Bertram's method gives low vals. with  $< 50\%$  of cacao fat (I) present. In this case an equal amount of (I) should be added and the analytical result halved. H. J. E.

**Detergents—old and new.** H. A. SWEET (Amer. Dyestuff Rep., 1934, 23, 198–206).—The properties and uses of Igepon-A (A) and -T (T) are described. A is most efficient as a wetting and scouring agent at low temp. ( $> 55^\circ$ ), and T at high temp. The pptn. of soap in hard  $\text{H}_2\text{O}$  is prevented by the presence of  $\leq 10\%$  of A or T (calc. on the wt. of soap). A. J. H.

**Value of sodium silicate as a detergent.** III. Siliceous silicate in water containing either calcium bicarbonate or carbon dioxide. J. D. CARTER and W. STERICKER (Ind. Eng. Chem., 1934, 26, 277–281; cf. B., 1932, 312).—The detergent powers of Na oleate (I) are seriously diminished by  $\text{Ca}(\text{HCO}_3)_2$  and less so by  $\text{CO}_2$ . These substances have less effect on mixtures of (I) and silicate ( $\text{Na}_2\text{O}, 3.25\text{SiO}_2$ ), which then become better detergents than is soap alone. The improvement is ascribed to the formation of acid soap and to the pptn. of Ca compounds. A. G.

**Precipitation in polymerised linseed oil.** H. ULRICH (Farben-Ztg., 1934, 39, 359–360).—The formation of white flocculi in stand oils on keeping is due to



saturated glycerides which are not readily sol. in polymerised oil. G. H. C.

**Determination of adhesion, especially for testing sizes with tension-metres.** W. WELTZIEN and W. BÖCKING (Mitt. Textilforsch. Krefeld, 1933, 9, 47–49; cf. B., 1933, 618).—Adhesion (*A*) of yarn was determined by measuring the tension in a running thread passing around a rod of the required material. On glass, cuprammonium rayon < viscose < acetate rayon. *A* is greatly reduced by a good linseed oil size. There is little difference between the *A* of oiled or sized yarn to glass, brass, Fe, or wood. A. G.

**Determination of the iodine values of some Indian oils by the Kaufmann method.** N. N. GODBOLE, AMARENDA, and U. DATT (Fettchem. Umschau, 1934, 41, 2–3, and Allgem. Oel- u. Fett-Ztg., 1934, 31, 143–145).—Analyses of 13 fats (linseed, sesamé, and coconut oils, tallow, etc.) showed excellent agreement between I vals. obtained by the Hanus method (I) and the Kaufmann Br-NaBr-MeOH reagent (II), the max. discrepancy being 3% of the I val. The I vals. obtained by (II) were always slightly higher (by 0.8–1.5%) than the figures from (I) in the case of oils having I vals. > 50, whilst for oils with I vals. < 50 (I) yielded the higher vals. E. L.

**Change in composition of sunflower-seed oil during ripening of the seeds.** K. H. BAUER [with (Miss) U. KANGOWSKI] (Fettchem. Umschau, 1934, 41, 1–2).—Oil from the seed of sunflower plants (all grown from seed obtained from one inflorescence) was examined by the SCN method at different stages of maturity of the crop; the I val. remained practically const. (144.3–143), but the oleic acid content rose steadily during ripening at the expense of the linoleic and saturated acids, which simultaneously decreased in amount. Fatty acids from the final sample of oil contained oleic 28.02, linoleic 65.02, and saturated acids 6.83%. E. L.

**Technical manifoldness [applications] of castor oil.** W. OBST (Allgem. Oel- u. Fett-Ztg., 1934, 31, 58–59). E. L.

**Brazilian babassu palm and its kernel-oil.** R. LÜDE (Fettchem. Umschau, 1934, 41, 51–53).—The tree (*Orbignia martiana*) and the expression of the oil from its fruit-kernels on a technical scale is described. The oil closely resembles the "urucury" and coconut oils of Brazil; physical characteristics of the three oils are tabulated. G. H. C.

**Tallow substitute from vegetable oils.** M. S. PATEL and B. S. KANVINDE (Dept. Ind. Bombay Presidency, 1934, Bull. No. 8, 8 pp.).—Experiments on hydrogenation of various combinations of groundnut (I), coconut (II), castor (III), cottonseed, and linseed oils are reported. A mixture containing (I) 80, (II) 15, (III) 5% is hydrogenated with a Ni catalyst to a product closely resembling animal tallow at a cost about 10% > that of the imported natural article. G. H. C.

**Composition of grapeseed oil.** C. OTIN and M. DIMA (Allgem. Oel- u. Fett-Ztg., 1934, 31, 107–115).—A hot-pressed oil from the seeds of black grapes from south Bessarabia had  $d_{40}^{20}$  0.9225,  $n_D^{20}$  1.4765, acid

val. 4.72, sap. val. 184.4, I val. (Hanus) 123.7, OH-val. 34.82. The composition of the oil was: oleic acid 31.0, OH-acids 11.78,  $\alpha$ -linoleic acid 36.03,  $\beta$ -linoleic acid 7.71,  $\alpha$ -linolenic acid 0.14, stearic acid 2.16, palmitic acid 6.17, glyceryl residue 4.04, unsaponifiable matter 0.59%. E. L.

**Determination of the iodine value.** C. H. LIBERALLI (Rev. Soc. Brasil. Quim., 1933, 4, 250–263).—The methods of Hübl (I), Waller, Wijs, Hanus, and Winkler (II) are critically reviewed. It is recommended that (I) (at present in official use in Brazil for food analysis) shall be discarded and replaced by (II), which is already the official method for pharmaceutical analysis. E. L.

**Dielectric consts. of oils.**—See II. Agar.—See XX.

See also A., Apr., 391, Coccerin. **Micro-determination of OAc and OH in fatty acids.** 458–462, **Vitamins (various).** 465, **Seed oils of *Cydonia vulgaris* and *Cassia occidentalis*.** Millet oil. Coffee oil. 466, **Quick I val. method.**

#### PATENTS.

**Preparation of fat-soluble vitamin concentrates.** H. A. HOLADAY and A. BLACK, Assrs. to E. R. SQUIBB & SONS (U.S.P. 1,919,369, 25.7.33. Appl., 10.11.32).—Cod-liver oil is saponified with hot conc. alcoholic NaOH. The hot product (containing < 25 wt.-% of H<sub>2</sub>O) is treated with a vitamin-solvent soap-precipitant, e.g., Et<sub>2</sub>O, C<sub>2</sub>H<sub>5</sub>Cl<sub>2</sub>·OEt, or COMe<sub>2</sub>. Various modifications of the process are described. E. L.

**Manufacture of (A) polymerised unsaturated hydrocarbons [mineral drying oils] of relatively light colour, (B) products containing oxygen-absorbing mineral hydrocarbon polymerides.** J. HYMAN, Assr. to VELSICOL CORP. (U.S.P. 1,919,722–3, 25.7.33. Appl., [A] 13.11.30, [B] 27.4.33).—(A) The light fraction (I) distilling below 113° and rich in unsaturated hydrocarbons, obtained from unrefined vapour-phase cracked gasoline (II), is polymerised by contact with active clay etc. and the pale yellow product distilled to yield a transparent, rapidly drying oil. (B) (II) is polymerised, preferably in the vapour phase; the product has I val. < 150 and can be used with linseed oil etc. for paints. S. M.

**[Manufacture of] wax emulsions.** DEUTS. HYDRIERWERKE A.-G. (B.P. 406,862, 16.2.33. Ger., 17.2.32).—NH<sub>4</sub> or alkali salts of carboxylamides derived from sulphocarboxylic acids and containing < 1 alkyl or cycloalkyl residue of < C<sub>8</sub> (cf. B.P. 382,718; B., 1933, 139) are claimed as emulsifying agents for waxes. Examples of the prep. of the agents are: hexadecylamine →  $\beta$ -chloropropionhexadecylamide → disulphide →  $\beta$ -sulphonic acid (Na salt);  $\beta$ -hydroxyethyldecylamine → chloroacetyl derivative → Na sulphionate; trichloroacetyl derivative of naphthenylamine (from acids of b.p. 160–170°/10 mm.) → trisulphonic acid (Na salt). H. A. P.

**Obtaining oil from sea animals and oil-rich fish.** J. O. NYGAARD (B.P. 407,729, 23.9.32. Nor., 24.9.31).—Whale, seal, etc. blubber is treated with hot (> 90°) train oil. The oil is removed, reheated, and the material again treated with it. Prevention of clogging by glue formation is claimed. E. L.



**Lubricants.**—See II. **Alcohols.** **Sulphonic acids.** **Amides of higher fatty acids.**—See III. **Colouring butter, food fat, etc.**—See IV. **Butter fat.**—See XIX.

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

**Aluminium priming paint. Effect on durability of house paints on wood.** F. L. BROWNE (Ind. Eng. Chem., 1934, 26, 369—376).—A large no. of exposure tests, reported in detail, confirm the view that Al primers are superior to ordinary white primers on wood, and that the effect is due to the Al and not to the special media in which it is applied. The formation of fissures in coatings applied over Al in earlier trials (B., 1930, 1038) was not due to the primer having insufficient time to dry, although the cause is not elucidated. G. H. C.

**Minimum oil and resin proportions in paints.** ("Wischfestigkeitszahl.") J. SCHEIBER and E. ROTSAHL (Farbe u. Lack, 1934, 159—160).—Several pigments were separately dispersed in gradually decreasing quantities of linseed oil and solutions of various resins and the paint films dried on glass. The min. quantities of medium (without solvent) necessary for retention of the pigment particles when the film is wiped with a cloth are tabulated and were found to be approx.  $\frac{1}{2}$  of the usual oil absorption data for stiff pastes and independent of the nature of the medium. It is suggested that the formulation of paints can be controlled in this manner. S. M.

**Vehicles and paints [for making oilcloth].** F. FRITZ (Paint and Varnish Prod. Man., 1934, 10, No. 4, 28).—The medium is prepared by dissolving 4—8 pts. of  $S_2Cl_2$  in 15 pts. of benzine, adding slowly 100 pts. of bodied linseed oil, or of rape-seed or castor oil, followed immediately by 20—30 pts. of stand oil heated to 120—150°, and dissolving the product in raw or bodied linseed or tung oil. D. R. D.

**A century of progress in driers.** A. C. ELM (Ind. Eng. Chem., 1934, 26, 386—388).

**Photogenic spots on paint tests.** H. A. GARDNER (Sci. Sect. Nat. Paint, Varnish, and Lacquer Assoc., 1934, Circ. No. 455, 66—68).—Panels painted and dried indoors and then exposed for test at a distant place frequently develop a mottled effect on exposure (in Florida often within 24 hr.). This resembles sooty rain stains; it will not wash off, but comes off if the film chalks. The defect is attributed to photochemical reaction of the driers in the film during the final set, which is not completed indoors. Outdoor conditions, preferably on the test site, are needed in drying test panels. G. H. C.

**Petrolatum in printing ink.** E. MEYER (Amer. Ink Maker, 1934, 12, 13—14).—Petroleum jelly (I) for printing ink should be natural material purified by an adsorption process. Such (I) is probably a colloidal dispersion of paraffin oil (II) in solid paraffin (III), containing a dispersing agent, and does not penetrate paper. Chemically refined (I) and (I) synthesised from (II) and (III) contain no dispersing agent and the oil

soaks through the paper. (I) for printing inks should have medium ductility (threading length) and softness,  $\eta$  60—70 (Saybolt) sec. at 98.9°, m.p. 46.1—48.9°, light amber colour, and no odour. D. R. D.

**Analysis of rosin.** ANON. (Paper Trade J., 1934, 98; T.A.P.P.I. Sect., 161—162).—A TAPPI Committee report. Tests are described for colour, acid val., sap. val., ester no., unsaponifiable matter, ash, and PhMe-insol. no. H. A. H.

**East Indian damar resin.** J. P. PARIJS (Pharm. Weekblad, 1934, 71, 354—367, 410—419).—First-quality damar resin (I) should be colourless to pale yellow and should have ash 0.25%, acid val. (direct)  $\geq 30$  or (indirect)  $\geq 40$ , solubility  $\leq 80\%$  in EtOH and  $\leq 98\%$  in Et<sub>2</sub>O (II). (I) was extracted first with light petroleum and then with (II). The extracts were treated successively with Na<sub>2</sub>CO<sub>3</sub> and NaOH and finally three *carboxylic acids* were isolated (acid vals. are given in parentheses): A, m.p. 98—99° (dir. 97.21); B, m.p. 109—112° (dir. 113.28, indir. 122.48); C, m.p. 122—124° (dir. 152.15, indir. 161.84).  $\alpha$ -Resene from the petroleum extract contains 6.55% O, whereas  $\beta$ -resene from the Et<sub>2</sub>O extract is a hydrocarbon. The botanical aspect is also discussed. S. C.

**Developments in shellac.** ANON. (Paint and Varnish Prod. Man., 1934, 10, No. 2, 20—34; No. 3, 24—28; No. 4, 20—23).—A comprehensive survey of recent research work on its properties and applications. D. R. D.

**Making of putty plastics.** II. E. PERRY (Paint and Varnish Prod. Man., 1934, 10, No. 4, 24—27; cf. B., 1934, 370).—Further formulæ are given. D. R. D.

**New equipment materials.**—See I. **Rubber-lacquer materials.** **Adherence of cellulose acetate to fabric.**—See VI. **Mounting metal specimens.**—See X.

See also A., Apr., 412,  $\beta$ -Amyrin and manila elemi resin. 413, **Constituents of Indian turpentine from *Pinus longifolia*.**

### PATENTS.

**Production of [yellow] iron oxide pigments.** V. FRAZEE (U.S.P. 1,923,362, 22.8.33. Appl., 25.11.27).—A 17—18% FeSO<sub>4</sub> solution is treated with Ca(OH)<sub>2</sub> and air is blown through at 20° until the green ppt. becomes yellow; the temp. is then raised to 60°, O<sub>2</sub> blown through to produce basic Fe<sub>2</sub>(SO<sub>4</sub>)<sub>3</sub> which, in presence of the first ppt., is hydrolysed to Fe(OH)<sub>3</sub> and H<sub>2</sub>SO<sub>4</sub>, the acid is neutralised with scrap Fe, and the last two steps are repeated until a stable product of the desired tint is obtained. A. R. P.

**Manufacture of composite titanium pigments.** I. G. FARBEININD. A.-G. (B.P. 407,674, 18.8.32. Ger., 19.8.31).—Pptn. of TiO<sub>2</sub> is accelerated and products possessing high staining and covering power are obtained by adding TiO<sub>2</sub> nuclei (I) and fillers to the TiSO<sub>4</sub> solution and then heating. (I) are prepared either by the process of B.P. 388,978 (B., 1933, 386), or *in situ* by heating basic Ti(SO<sub>4</sub>)<sub>2</sub> solution. S. M.

**Preparation of (A) insoluble pigments, (B) dispersions of insoluble pigments [e.g., blanc fixe].** H. A. ENDRES, Assr. to B. F. GOODRICH Co. (U.S.P.



1,919,714—5, 25.7.33. Appl., 8.1.29).—(A) Addition of 0.4–2% of  $\text{NH}_4$  oleate or other  $\text{H}_2\text{O}$ -sol. soap (I) previous to drying prevents caking of the particles of  $\text{BaSO}_4$  or other pptd. pigments. (B) 0.25–2% of (I) is added to the suspension of the pigment to effect flocculation; after filtering and washing, 2–5% of (I) or other peptising agent is added to effect re-dispersion. The products are suitable for incorporation into rubber.

S. M.

**Solutions, compositions, preparations, and articles having a basis of cellulose derivatives.** H. DREYFUS (B.P. 407,709, 19.8.32).—The use is claimed of methylene ethylene ether (I) for dissolving cellulose acetates having  $\text{Ac} > 56\%$ , or other cellulose esters which are insol. in aq. (I). Other solvents, plasticisers, and resins may be added.

S. M.

**[Coating] compositions and articles comprising cellulose derivatives.** BRIT. CELANESE, LTD. (B.P. 407,545, 13.4.33. U.S., 16.4.32).—The polymeride of the condensation product of an aromatic aldehyde and an aliphatic ketone, or derivative, can be used with a cellulose ester for making lacquers, yarns, etc. *E.g.*,  $\text{PhCHO}$  and  $\text{COMe}_2$  are condensed to give  $\text{CHPh:CHAc}$  (m.p.  $41^\circ$ ).

S. M.

**Plasticisation and dispersion of cellulose acetate [in water].** W. B. PRATT and R. T. HALSTEAD, ASSRS. to DISPERSIONS PROCESS, INC. (U.S.P. 1,921,582, 8.8.33. Appl., 26.2.29).—Cellulose acetate, treated with a plasticiser ( $\text{PhOH}$ , cresylic acid, etc.) and  $\text{H}_2\text{O}$ , absorbs, *e.g.*, approx. 40% of its wt. of  $\text{PhOH}$  and 40% of  $\text{H}_2\text{O}$  to form a coherent, uniform, plastic mass which can be dispersed in  $\text{H}_2\text{O}$  with a hydrophilic colloid (*e.g.*, alkali caseinate) and used for impregnating purposes, or in the prep. of films and mouldings.

E. L. H.

(A) **Composition [from cashew nut-shell liquid] and its manufacture and use.** (B) **Reacting cashew nut-shell liquid with paraformaldehyde.** (A, B) M. T. HARVEY, ASSR. (of B) to HARVEL CORP. (U.S.P. 1,921,292—3, 8.8.33. Appl., [A] 28.11.28, [B] 22.2.29).—(A) Cashew nut-shell liquid (I) is preheated to  $315^\circ$ , with or without stearine-pitch, cooled, and  $(\text{CH}_2)_6\text{N}_4$  (II) added. The consistency of the product varies with the proportion of (II) and duration of heating; the reaction is arrested if the temp. is maintained at  $> 60^\circ$ . (B) The preheated (I) is dissolved in benzol or other solvent and paraformaldehyde added. (A, B) The products are useful for insulating varnishes, moulding compositions, etc.

S. M.

**Coating composition containing a siccativ.** H. A. BRUNSON, ASSR. to RESINOUS PRODUCTS & CHEM. CO., INC. (U.S.P. 1,920,160, 25.7.33. Appl., 15.9.32).—Pb, Mn, Co, and other multivalent metal salts of acids of the type  $\text{OR}\cdot\text{CH}_2\cdot\text{CO}_2\text{H}$ , in which R is: (a) an alkyl group  $> \text{C}_5$ , (b) a hydroaromatic radical, or (c) an aryl group having  $\leq 1$  alkyl side-chain substituent  $> \text{C}_4$ , are used as driers for tung or linseed oil and alkyl resins. Various examples of suitable acids are given.

S. M.

**Modifying [the properties of] vinyl resins.** F. ROBERTSON, ASSR. to CARBIDE & CARBON CHEMICALS CORP. (U.S.P. 1,921,326, 8.8.33. Appl., 11.9.30).—Vinyl ester resins, pptd. from solution by an alcohol, with or

without  $\text{H}_2\text{O}$ , under alkaline conditions insufficient to effect hydrolysis, are thereby rendered less sol. and less fusible in proportion to the concn. of alkali employed.

E. L. H.

**Manufacture of [cellulose-vinyl resin] impregnated product.** F. GROFF, ASSR. to CARBIDE & CARBON CHEMICALS CORP. (U.S.P. 1,919,697, 25.7.33. Appl., 26.10.31).—A fine stream of a solution of a vinyl resin is injected into an aq. suspension of paper pulp or other cellulosic material and the mixture is agitated; the solid product is separated and dried.

S. M.

**[Resinous] optical cement.** S. E. SHEPPARD, ASSR. to EASTMAN KODAK CO. (U.S.P. 1,921,948, 8.8.33. Appl., 2.1.29).—Lenses etc. are cemented by means of higher polymerides of vinyl acetate (mol. wt. approx. 5000; cf. A., 1927, 1051; 1928, 1186). Up to 33% of polyvinyl chloride and/or 25% of Canada balsam may be added.

E. L. H.

**Manufacture of synthetic resins [from  $\beta$ -elaeostearic acid] and coating compositions containing them.** C. G. GAUERKE, ASSR. to E. I. DU PONT DE NEMOURS & CO. (U.S.P. 1,920,980, 8.8.33. Appl., 26.6.28).—The use is claimed of a resin made by esterifying a polyhydric alcohol (glycerol) with phthalic anhydride and pure  $\beta$ -elaeostearic acid (obtained from tung oil) in presence of  $\text{H}_2\text{SO}_4$ .

S. M.

**Manufacturing of a mass resembling ivory [from casein].** R. ZELLMANN, ASSR. to CHEM. FABR. VON HEYDEN A.-G. (U.S.P. 1,922,007, 8.8.33. Appl., 12.8.30. Ger., 8.2.30).—A "coagel" of colloidal S in casein is pptd. by adding acid ( $\text{HCl}$ ) to a solution of casein in aq.  $\text{NaOH}$  containing Na polysulphide; the product is dried, homogenised, shaped in moulds, and finally completely hardened at  $90$ – $95^\circ$  in 10 hr.

E. L. H.

**Dental impression material.** L. E. HARRISON, ASSR. to DENTAL PLASTICS CO. (U.S.P. 1,920,857, 1.8.33. Appl., 23.6.30).—The use is claimed of a milled and heated mixture of rubber, a fusible resin (balata or gutta-percha), colloids (gelatin and casein), solid lubricants (flake Al and powdered graphite), glycerol, and wax (stearic acid and paraffin wax) in stated proportions together with the usual addenda and a small proportion of  $\text{H}_2\text{O}$ .

S. M.

**Grinding paints etc.**—See I. Insol. chromates. **Litharge.**  $\text{TiO}_2$ .—See VII. Abrasives.—See VIII. **Hydrocarbon polymerides.**—See XII. **Rubber-vulcanisation mould.**—See XIV.

#### XIV.—INDIA-RUBBER; GUTTA-PERCHA.

**Adhesive [rubber] latex:** (A) **Preparation.** (B) **Characteristics.** (A) G. F. BLOOMFIELD and E. H. FARMER. (B) P. SCHIDROWITZ (Bull. Rubber Growers' Assoc., 1934, 16, 116–119).—Latex (I) stabilised with 1% of casein dissolved in aq.  $\text{NH}_3$  is treated twice with approx. 1/10 of its bulk of "20-vol."  $\text{H}_2\text{O}_2$  and warmed on a  $\text{H}_2\text{O}$ -bath after each addition; additional dil. aq.  $\text{NH}_3$  may be introduced to prevent clotting. In comparative tests with normal  $\text{NH}_3$ -preserved (I) 60% centrifuged (I), and 70% evaporated (I), all diluted to 36% rubber content, the treated (I) produces superior adhesion between leather (L) and rubber, L and fabric, L and L, etc.

D. F. T.



**Thermal properties of rubber compounds. I. Thermal conductivity of rubber and rubber-compounding materials.** C. E. BARNETT (Ind. Eng. Chem., 1934, 26, 303—306).—For practical purposes the most satisfactory rubber compound would be one with high thermal conductivity ( $T$ ), ability to withstand high temp. without "reversion," and a low development of heat by mechanical hysteresis effects. Measurements of  $T$  of rubber and its compounding ingredients, using apparatus with an electrical source of heat, gave results substantially confirming those of Williams (B., 1923, 279). Particle shape has a considerable effect on  $T$ , acicular ZnO showing a higher  $T$  when the calendar grain is parallel to the direction of heat flow. Fast- and slow-vulcanising C blacks show no difference in  $T$ , but lamp-black has a higher  $T$  and graphite a still higher one.

D. F. T.

**Scorching [prevulcanisation] of rubber compounds.** T. L. GARNER (Ind. Chem., 1934, 10, 147—148).—Methods adopted for the avoidance of scorching ( $S$ ), and for testing the degree of  $S$  in mixed rubber, are indicated. For the latter purpose the author uses a modified parallel-plate plastometer and compares the softness of pellets, 1 cm. long and 1 sq. cm. in cross-section, at 100° and 70°, respectively, after preheating for 15 min. at 100°.

D. F. T.

**New type of rubber flooring.** H. P. and W. H. STEVENS (Bull. Rubber Growers' Assoc., 1933, 15, 537—544).—Rubber flooring can be made cheaply without the need of steam presses by sheeting in the usual way, vulcanisation being effected subsequently at moderate temp. *e.g.*, < 70°. A no. of formulæ are given for products of various character.

D. F. T.

**Rubber-plasticity control. Significance and value of recovery measurement of Williams' plastometer.** J. H. DILLON (Ind. Eng. Chem., 1934, 26, 345—349; cf. B., 1924, 480).—Recovery measurement with a Williams plastometer has no practical advantage over the usual method of treatment of the experimental results in the plasticity ( $P$ ) control of crude or mixed rubber. Certain results with an extrusion plastometer operating at high rates of shear indicate that this type of instrument offers a better criterion of the  $P$  of rubber than the compression plastometer.

D. F. T.

**Textile finishes. Rubber-lacquer materials.**—See VI. **New equipment materials.**—See I.

See also A., Apr., 412, **Determining I val. of caoutchouc. Hydrogenation of caoutchouc and balata.**

## PATENTS.

**Manufacture of deposited rubber articles.** R. F. MCKAY. From INTERNAT. LATEX PROCESSES, LTD. (B.P. 407,638, 12.10.33).—The dipping former has < 1 groove with a sharp edge. After contact with the rubber-containing fluid, *e.g.*, latex, the rubber collects in the groove(s) and forms a reinforcing rib or bead in the finished article.

D. F. T.

**Rubber compositions and preservation of rubber.** (A) W. L. SEMON, (B) P. C. JONES, Assrs. to B. F. GOODRICH Co. (U.S.P. 1,919,452 and 1,919,726, 25.7.33. Appl., [A] 23.9.31, [B] 22.8.28).—(A) An aryl-naphthylamine containing < 1 OH-group substituted in an aromatic

nucleus, *e.g.*,  $p\text{-OH}\cdot\text{C}_6\text{H}_4\cdot\text{NH}\cdot\text{C}_{10}\text{H}_7$ , is incorporated as an antioxidant. (B) Aminoazo aromatic hydrocarbons containing < 1 condensed ring nucleus or an  $\text{NH}_2$ -substituted aryl group <  $\text{C}_7$ , *e.g.*,  $\text{C}_{10}\text{H}_7\cdot\text{N}_2\cdot\text{C}_{10}\text{H}_6\cdot\text{NH}_2$  or  $\text{NMe}_2\cdot\text{C}_6\text{H}_4\cdot\text{N}_2\text{Ph}$ , are antiagers for rubber. D. F. T.

**Protection of rubber surfaces.** C. L. BEAL, Assr. to B. F. GOODRICH Co. (U.S.P. 1,919,766, 25.7.33. Appl., 16.11.28).—The surfaces are rendered resistant to oxidising substances by treatment with a solution (*e.g.*, in  $\text{H}_2\text{O}$  or  $\text{COMe}_2$ ) of a H halide and the halide of an amphoteric metal, *e.g.*, HCl and  $\text{ZnCl}_2$ .

D. F. T.

**Rubber-vulcanisation mould.** G. W. CROSBY, Assr. to BAKELITE CORP. (U.S.P. 1,920,139, 25.7.33. Appl., 7.3.29).—The mould has a contact surface of heat-resistant plastic composition, *e.g.*, a  $\text{PhOH}\cdot\text{CH}_2\text{O}$  resinoid, containing mica.

D. F. T.

**Adhering rubber to metal.** H. GRAY, Assr. to B. F. GOODRICH Co. (U.S.P. 1,919,718, 25.7.33. Appl., 25.3.30).—The metal is coated with a film of a Mn salt of an org. acid, *e.g.*, a Mn soap, before applying the rubber layer and vulcanising.

D. F. T.

**Alkaline-earth carbonates.**—See VII. **Pigment dispersions. Dental material.**—See XIII. **Wood glue.**—See XV.

## XV.—LEATHER; GLUE.

**Purification and clarification of tanning extracts.** P. S. KONOVALENKO (Izvest. Tzentr. Nauch.-Issledov. Inst. Kozh. Prom., 1932, No. 4, 20—23).—In the use of ox blood (du Perua's method) an increase in the amount of blood may lead to a 5—18% loss of tans. Use of cellulose does not accelerate settling.

Ch. Abs.

**Influence of tanning and non-tanning substances from pine on the diffusion properties of tannides.** N. N. TARASENKO and G. A. ARBUZOV (Izvest. Tzentr. Nauch.-Issledov. Inst. Kozh. Prom., 1932, No. 2, 8—9).—The overtanning of pine extract can be eliminated by using a mixture of non-tans derived from pine together with quebracho-chestnut extracts.

Ch. Abs.

**Acid and fermentative hydrolysis of pine tanning extract.** A. M. SIMSKAYA (Izvest. Tzentr. Nauch.-Issledov. Inst. Kozh. Prom., 1932, No. 1, 9).—Reduction of the mol. wt. by removal of sugar by means of HCl or fermentation does not improve the diffusion of the tans in pine extract.

Ch. Abs.

**Action of tannase on pine tanning extracts.** D. M. MIKHLIN and G. L. GUTKINA (Izvest. Tzentr. Nauch.-Issledov. Inst. Kozh. Prom., 1932, No. 1, 8).—Tannase, a neutral substance which does not reduce Fehling's solution but decomposes tannin with formation of gallic acid, has max. reaction temp. 60°. The sugar: gallic acid ratio indicates that digalloyl is combined with glucose by an ester linking. After the action of the tannase the amount of non-tans and of sugar in the tanning solution increased, whilst that of tans decreased.

Ch. Abs.

**Influence of treatment with hyposulphite on the dyeing power of pine extract.** A. N. MIKHAILOV (Izvest. Tzentr. Nauch.-Issledov. Inst. Kozh. Prom., 1932, No. 4, 24).—Changes in the colloid properties do not noticeably improve the tanning properties.

Ch. Abs.



**Influence of the volume of the precipitate on the accuracy of the  $p_H$  determinations in tanning extracts.** Y. P. BERKMAN (Izvest. Tzentr. Nauch.-Issledov. Inst. Kozh. Prom., 1932, No. 1, 9–10).—Errors are considerable. Correction factors are given. CH. ABS.

**Ratio of the  $p_H$  of tanning solutions;  $p_H$  of hides during diffusion.** G. A. ARBUZOV (Izvest. Tzentr. Nauch.-Issledov. Inst. Kozh. Prom., 1932, No. 2, 18–22).—The Sb electrode is employed. The acid fractions penetrate the hides more rapidly than the tans in diffusion; the  $p_H$  of dyed layers of hides is < that of undyed layers and towards the end of the tanning operation is < that of the tanning solution. The  $p_H$  of the dyed top layer is with pine extract < that of the flesh side; the  $p_H$  vals. are intermediate for oak, and identical for willow, tanning. CH. ABS.

**Treating hides with sulphur and vegetable tanning substances with a preliminary fat-liquoring.** G. K. BAIDAN and A. I. ZHEMOCHIN (Izvest. Tzentr.-Nauch.-Issledov. Inst. Kozh. Prom., 1932, No. 2, 24).—Unhaired hides were pickled and treated with  $\text{Na}_2\text{S}_2\text{O}_4$  to ppt. S on the tissue, and fat-liquored with a mixture of lard and seal oil. After drying and calking, the leather was tanned with willow extract. The cycle is thus reduced to 22 days, and the consumption of tannides diminished by 30%. The leather is of high quality. CH. ABS.

**Adsorptive power of hide powders.** E. S. OVECHKIS and L. DUKARSKAYA (Izvest. Tzentr. Nauch.-Issledov. Inst. Kozh. Prom., 1932, No. 3, 5–8).—British, German, and Russian products are compared. CH. ABS.

**Determination of the oxidation-reduction coefficient in liming solutions [for hides].** E. L. GUTKINA (Izvest. Tzentr. Nauch.-Issledov. Inst. Kozh. Prom., 1932, No. 3, 8–13).—The oxidation-reduction potential (I) is preferably measured with a totally immersed platinised Pt electrode of const. size in a current of  $\text{N}_2$ . (I) increases with increase in the amount of  $\text{Na}_2\text{S}$ . For the determination of the active reaction of the liming liquor a palladised electrode is best. CH. ABS.

**Impregnating pig skins for boxes and dyeing them with a black permanent dye.** G. K. BAIDAN, A. A. PCHELIN, and G. S. RABKINA (Izvest. Tzentr. Nauch.-Issledov. Inst. Kozh. Prom., 1932, No. 2, 27).—The dyed leather was treated with pine tans followed preferably by Na or K chromate. CH. ABS.

**Use of  $p$ -dichlorobenzene in preserving pig skins.** I. M. BARONOV (Izvest. Tzentr. Nauch.-Issledov. Inst. Kozh. Prom., 1932, No. 2, 13).—Deterioration is prevented by addition of  $p\text{-C}_6\text{H}_4\text{Cl}_2$  to salt lyes. CH. ABS.

**Influence of the composition, state, and origin of salt on the preservation processes of skins.** A. G. DAUMAN, A. I. ZHDANOVICH, and M. A. REIZMAN (Izvest. Tzentr. Nauch.-Issledov. Inst. Kozh. Prom., 1931, No. 1, 24–30).—A review. CH. ABS.

**Use of sodium fluoride in salt for hide preservation. [Fluorine in gelatin.]** M. E. ROBERTSON, R. H. MARRIOTT, and F. E. HUMPHREYS (J.S.C.I., 1934, 53, 83–89 T).—Laboratory and large-scale experiments have shown that 0.5–1 wt.-% of NaF or  $\text{Na}_2\text{SiF}_6$

added to a curing salt strongly inhibits the organisms producing "red heat." It also prevents to a considerable extent the growth of the ordinary putrefactive bacteria. Large-scale experiments have also shown that hides cured with NaCl and fluorides have as good a fibre structure after tanning as those cured with NaCl alone. Gelatin (I) made carefully from hides cured with  $\text{NaCl} + \text{Na}_2\text{SiF}_6$  does not contain appreciably more F than does normal (I). The F content of (I) cannot be determined satisfactorily by distillation with  $\text{HClO}_4$  or  $\text{H}_2\text{SO}_4$ . Colorimetric methods are also unsuitable. The F may, however, be determined by ashing with  $\text{Ca}(\text{OH})_2$ , and titrating a dil. HCl solution of the ash with  $\text{Th}(\text{NO}_3)_4$ , using the Zr-alizarinsulphonate complex as an indicator.

**Leather defects and their causes.** F. STATHER (Chem.-Ztg., 1934, 58, 253–255).—The usual leather defects, e.g., grain and insect damage, flaying and curing defects, spews, brittleness, overheating, fugitive colour, insufficient fastness to rubbing and  $\text{H}_2\text{O}$ -permeability, are described. D. W.

**Rate of drying chrome[-tanned] leather.** O. A. HOUGEN (Ind. Eng. Chem., 1934, 26, 333–339).—The following equation ( $E$ ) has been derived experimentally by methods which are described:  $dW/d\theta = -0.282 \times G^{0.6} W \Delta H / L$ , where  $W$  is the free  $\text{H}_2\text{O}$  content of the leather,  $L$  its thickness,  $\Delta H$  the unsaturation of the air,  $G$  the mass velocity of the air current, and  $\theta$  the duration of drying. The equation is valid for vals. of  $W > 1.25$  and of  $G > 10$ . The rate of drying is const. for  $W > 1.25$ . The optimum conditions for drying 10,000 calfskins per 24 hr., deduced from  $E$ , are:  $\theta = 120$  min., length of dryer 30 m., temp. of dryer  $60^\circ$ ,  $G$  39 kg./sq. m./min., and 66% of the air recirculated. D. W.

**Behaviour of [vegetable-tanned] sole leather towards water.** M. BERGMANN and A. MIEKELEY (Collegium, 1934, 117–136).—An apparatus is described for measuring the vol. of  $\text{H}_2\text{O}$  ( $V$ ) taken up by a piece of sole leather placed on a sintered glass filter-plate which lies up to its upper surface in  $\text{H}_2\text{O}$ .  $V$  was greater for the cut edge than for the flesh side, and this in turn was greater in most cases than  $V$  for the grain side of the leather on the filter-plate.  $V$  was increased by liming the raw hides for a longer period and by using  $\text{Ca}(\text{OH})_2\text{-Na}_2\text{S}$  instead of  $\text{Na}_2\text{S}$ . Leather tanned with crude quebracho extract (I) was more resistant to  $\text{H}_2\text{O}$  than that tanned with sulphited extract (II).  $V$  was diminished for both leathers by a drum tannage, the diminution being greater for (II) tannage.  $V$  for drum-tanned (II)-treated leather was increased by repeated alternate wetting and drying, but not for the (I)-tanned leather. Leather can be rendered more  $\text{H}_2\text{O}$ -resistant by complete impregnation with Al soaps applied in  $\text{C}_6\text{H}_6$  or  $\text{CCl}_4$ . D. W.

**Artificial leather prepared from naphthenates and fillers.** A. A. MINEEV (Izvest. Tzentr. Nauch.-Issledov. Inst. Kozh. Prom., 1932, No. 4, 16–19).—Unsuccessful attempts are described. CH. ABS.

**Laboratory concentration of glue solutions.** E. GOEBEL (Farben-Ztg., 1934, 39, 371–372).—A steam-heated apparatus for continuous evaporation of glue liquors in vac. is figured. G. H. C.



**Casein-artificial horn industry and button manufacture.** K. HAUPT (Chem.-Ztg., 1934, 58, 255—256).—Casein is compressed into rods and immediately sliced into discs; these are then treated with  $\text{CH}_2\text{O}$ , dried, and made into buttons. A 35—40% economy is thereby effected. D. W.

**Dyeing skins and leather.**—See VI. **Adhesive latex.**—See XIV. **Unhairing.**—See XVIII.

#### PATENTS.

**Tanning [agents].** I. C. SOMERVILLE and H. R. RATERINK, Assrs. to RÖHM & HAAS Co. (U.S.P. 1,919,756, 25.7.33. Appl., 25.7.32).—In the manufacture of synthetic tanning agents by condensation of aldehydes ( $\text{CH}_2\text{O}$ ) with aryl- or hydroxyaryl-sulphonic acids,  $\text{CS}(\text{NH}_2)_2$  (I), or one of its aldehyde derivatives, or a compound which can give (I) under the conditions of reaction (e.g.,  $\text{NH}_4\text{CNS}$ ), is added to moderate the reaction. Lighter-coloured products are obtained.

H. A. P.

**Production of [alkaline] wood glue.** G. and I. THALHEIMER and S. HIRSCHHEIMER (GEBR. THALHEIMER) (B.P. 406,484, 6.3.33. Ger., 7.3.32).—Claim is made for a dispersion of rubber latex in an alkaline liquid containing colloidal substances such as casein, albumin, dextrin, or leather glue. Examples are given.

A. R. P.

**Azo dyes containing metals.**—See IV. **Fur dyes. Protecting fur etc.**—See VI. **Preserving furs etc.**—See IX.

### XVI.—AGRICULTURE.

**Nature of slick soil in southern Idaho.** P. ISAAK (Soil Sci., 1934, 37, 157—165).—"Slick" soils (impermable areas of low fertility) showed similar chemical analysis and  $p_{\text{H}}$  to normal soils but had higher proportions of colloids and much greater ratios of Na : Ca in the exchange complex. Poor productivity in slick areas is attributable to inferior physical condition.

A. G. P.

**Reaction of soils.** R. CHAMINADE (Ann. Agron., 1933, 3, 799—814).—The nature, measurement, and effects on plant growth of the  $p_{\text{H}}$  of soils are examined.

A. G. P.

**[Effect of] lime and gypsum on carbonate-free solonetz.** E. I. RATNER (Pedology, 1933, 28, 464—475).—Application of CaO brought about a more rapid mineralisation of soil-N, together with a slight rise in  $p_{\text{H}}$  and total alkalinity ( $A$ ).  $\text{CaSO}_4$  and S lowered the mineralisation of N, and lowered the  $p_{\text{H}}$  and  $A$ .  $\text{CaSO}_4$  was most active in improving the physical properties of the soil, whereas the effect of CaO was marked only when large amounts were applied. CaO was most effective in pot experiments using oats and wheat. Application of CaO appears to be the most satisfactory treatment for carbonate-free solonchouks soils. A. M.

**Chemistry of anions in soil.** A. DEMOLON and E. BASTISSE (Ann. Agron., 1934, 4, 53—76; cf. B., 1934, 373).—Treatment of H-clays with solutions of "active" anions (I) ( $\text{PO}_4'''$ , oxalates, silicates, etc.) produces a higher  $p_{\text{H}}$  than that with solutions of "inactive" anions (II) (chloride, nitrate, etc.). Salts of (II) cause a greater fixation of  $\text{PO}_4'''$  by, and a lower proportion

of  $\text{H}_2\text{O}$ -extractable  $\text{PO}_4'''$  in, clays than do salts of (I), the effects being more marked in solutions of high concn. Fixation of  $\text{PO}_4'''$  is greater in Ca- than in K-soils. Sp. differences among (I) and among (II) are examined with special reference to soils from which free  $\text{Fe}_2\text{O}_3$  has been removed. Relationships between the presence of humic and silicic acids and the fixation of  $\text{PO}_4'''$  by clays are discussed. A. G. P.

**Relation of colloid dispersion in soils to chemical changes induced by biological transformations of organic materials.** J. P. CONRAD (Soil Sci., 1934, 37, 179—201).—Normal nitrification of urea in soils results in lowered  $p_{\text{H}}$  and decreased dispersion of colloids, together with an increased concn. of  $\text{NO}_3'$  and bases (notably Mg and Ca) in the liquid phase. In soils in which nitrification is retarded, accumulation of  $\text{NH}_3$  raises  $p_{\text{H}}$  and the degree of dispersion of the colloids. Addition of sucrose to soils containing  $\text{NO}_3'$  is followed by removal of  $\text{NO}_3'$  by soil micro-organisms and a consequent rise in  $p_{\text{H}}$  and dispersion with lowered sp. conductance and base concn. in the soil- $\text{H}_2\text{O}$ . At a later stage corresponding to the breakdown and nitrification of microbial protein the reverse order of changes occurs.

A. G. P.

**Oxidation of organic matter in soils.** D. LEROUX (Ann. Agron., 1934, 4, 26—52).—Soil factors concerned are discussed.

A. G. P.

**"Biological-dynamic" manuring in the light of agricultural chemistry.** K. SCHARRER (Chem.-Ztg., 1934, 58, 245—247, 267—270).—A criticism of the anthroposophical objection to the use of artificial fertilisers.

A. G. P.

**Determinations of manurial requirements of soils.** A. A. D'SIGMOND (Pedology, 1933, 28, 491—496).—A report of the I.S.S.S. commission on manurial requirements at Copenhagen, 1933.

A. M.

**Influence of eight years' successive fertilising with concentrated potash salts and with kainit on the replaceable bases of the "terra roxa" soil.** T. DE CAMARGO and P. C. DE MELLO (Soil Sci., 1934, 37, 167—178).—Repeated treatment with K fertilisers increased the total base-adsorption capacity of soils to extents which decreased in the order  $\text{K}_2\text{SO}_4$  (I) > kainit (II) > KCl (III). The proportion of adsorbed K was higher in soils receiving (II) or (III) than in those treated with (I). The degree of saturation with bases was markedly increased by (III) treatment, but not appreciably altered by (I). The effects of the various fertiliser treatments on the exchange- and hydrolytic-acidity is examined.

A. G. P.

**Annual manuring of vines and the cumulative effects of fertilisers as shown by wood diagnosis.** E. VINET (Compt. rend. Acad. Agric. France, 1933, 19, 937—946; cf. A., 1932, 1179).—The use of a complete fertiliser applied annually for 5 years resulted in an increased content of P and K, but not of N, in the wood. Comparison of  $\text{K}_2\text{SO}_4$  and KCl indicated that  $\text{SO}_4'''$  is more favourable to sugar formation, but less favourable to fruiting, than  $\text{Cl}'$ . Cumulative effects of fertilisers on the mineral constituents of wood were apparent.

A. G. P.



**Recovery of phosphorus from prairie grasses growing on central Oklahoma soils treated with superphosphate.** H. F. MURPHY (J. Agric. Res., 1933, 47, 911—917).—Applications of superphosphate (I) increased the yield and P content of the grasses. Additional treatment with N fertilisers further increased yields, but the P content of the grass remained the same as when (I) alone was applied. The % P in grass treated with N only was the same as that from unfertilised soils. Recovery of added P in the grass was small in all cases. As judged by the amount of P sol. in 0.2N-H<sub>2</sub>SO<sub>4</sub>, the penetration of (I) in soil was mainly restricted to the upper 3 in. A. G. P.

**Effects of chlorates on plants.** G. FRON and R. BERTRAND (Ann. Agron., 1934, 4, 1—25).—The toxic action of NaClO<sub>3</sub> persists in soils for > 8 months, whereas that of KClO<sub>3</sub> (initially comparable) disappears after 3—4 months. Differences in the sensitivity of various species of plants to chlorate injury are established, cereals being among the most resistant. Chlorates control weeds in grain crops without appreciable injury to the crop. A. G. P.

**Destruction of field buttercup in cereal crops.** G. FRON and G. BERTRAND (Compt. rend. Acad. Agric. France, 1933, 19, 892—898).—The successful use of chlorates of K and Na is described (cf. preceding abstract). A. G. P.

**Diagnostic value of the chlorine content of the vine leaf.** J. E. THOMAS (J. Counc. Sci. Ind. Res., Australia, 1934, 7, 29—38).—Relationships between the Cl' contents of soils and of vine leaves and the appearance of vine injury in saline soils are examined. Excessive salinity in soil is associated with Cl' contents > 0.5—0.6% in the dry matter of leaves. A. G. P.

**Influence of the  $p_H$  of a culture solution on the rates of absorption of ammonium- and nitrate-nitrogen by the tomato plant.** H. E. CLARK and J. W. SHIVE (Soil Sci., 1934, 37, 203—225).—In 41-day plants the rate of absorption of NH<sub>4</sub><sup>+</sup> (I) from culture solutions of high  $p_H$  was > from those of low  $p_H$ . The reverse was the case with the rate of absorption of NO<sub>3</sub><sup>-</sup> (II), which showed a max. at  $p_H$  5.0. At  $p_H$  4.0 (I) was <, and at  $p_H$  7.0 >, (II). Max. (I) was > max. (II). With older plants (52 days) the general condition was similar. The influence of  $p_H$  on (II) was, however, less marked, and within the range  $p_H$  4.0—7.0 (II) always exceeded (I) from solutions of corresponding  $p_H$ . The rate of absorption of N per unit wt. of plant tissue decreased in the case of NH<sub>4</sub><sup>+</sup>, and increased in the case of NO<sub>3</sub><sup>-</sup>, as the plants aged. Transference of plants from one medium to another of higher or lower  $p_H$  tended to retard (II), but the corresponding effect on (I) was greater and more clearly defined. The mechanism of these changes is discussed in the light of current theory of permeability and absorption. A. G. P.

**Lead absorption by plants from lead-containing soils.** W. STOLDT (Pharm. Zentr., 1934, 75, 97—98).—The roots and blades of grass both absorbed Pb from soils containing red lead, presumably through the medium of the sol. humic acid. P. G. M.

**Rhizobium species in relation to nodule formation on roots of Florida legumes.** II. W. R.

CARROLL (Soil Sci., 1934, 37, 227—237; cf. A., 1934, 453).—Differences in the capacity for N fixation among various strains of nodule organisms are recorded. Agglutination and complement-fixation tests are compared as a basis of classification. A close protein kinship is established between 15 *Crotalaria* species examined, none of which is closely related to alsike clover or field pea. A. G. P.

**Value of decorticated sugar-beet seed.** F. HANLEY (J. Min. Agric., 1934, 41, 21—28).—Treatment of seed with conc. H<sub>2</sub>SO<sub>4</sub> improved the rate of braiding and the uniformity of the plant and also produced heavier yields of beet. The effects were more marked in seasons in which germination conditions were unfavourable. Milled seed gave results intermediate between acid-treated and untreated seed. A. G. P.

**Hastening the germination of dormant gladiolus cormels with vapours of ethylene chlorohydrin.** F. E. DENNY and L. P. MILLER (Contr. Boyce Thompson Inst., 1934, 6, 31—38; cf. B., 1928, 583).—Sprouting of gladiolus cormels (I) was accelerated by exposure to an atm. containing 3—5 c.c. of 40% chlorohydrin per litre. Different varieties were affected to different extents and the effect was more pronounced in (I) treated in midwinter than either at harvest or late in the dormant period. A. G. P.

**Toxic action in soil of illuminating gas containing hydrocyanic acid.** A. E. HITCHCOCK, W. CROCKER, and P. W. ZIMMERMAN (Contr. Boyce Thompson Inst., 1934, 6, 1—30).—Injury to plant roots in gassed soil is attributable in part to recognised effects of C<sub>2</sub>H<sub>4</sub>, C<sub>3</sub>H<sub>6</sub>, etc., and, in addition, to other, more actively toxic, substances which are retained by the soil (notably HCN, and to a smaller extent PhOH, C<sub>6</sub>H<sub>6</sub>, PhMe, etc.). Storage in the open air eliminates the toxins from soil in a few days, but sealed samples remained toxic for longer periods. The destruction of poisonous substances in soil is largely a biological function. A. G. P.

**Effect of arsenical sheep-dip on germination of Noogoora burr seeds.** J. CALVERT (J. Counc. Sci. Ind. Res., Australia, 1934, 7, 50—52).—Sheep-dips examined, when applied under practical conditions, destroyed the germinative power of the seeds. A. G. P.

**"White ear" disease of oats.** W. SAUERLANDT (Ernähr. Pflanze, 1934, 30, 21—25).—The disease is initiated by a check in the growth of plants and is intensified by K deficiency, unbalanced N<sub>i</sub>:K ratio in fertilisers applied, drought, or sudden fluctuations in soil-H<sub>2</sub>O supply. A. G. P.

**Corn-seed maggot.** III. Method of control. I. C. HARUKAWA, R. TAKATO, and S. KUMASHIRO (Ber. Ohara Inst. landw. Forsch., 1933, 6, 83—111).—A no. of commonly used insecticides examined failed to control eggs or larvæ in soya-bean seed without injury to the seed and were insufficiently active in soil. Examination of poison baits showed NH<sub>3</sub>, EtOH, and human excreta to be fairly efficient attractants, but best results were obtained with cottonseed meal or dried silkworm pupæ. Oviposition in the field was markedly reduced by the



spreading of mixtures of pyrethrum, tobacco powder, or  $C_{10}H_8$  with wood ashes, or of creosote or coal tar with sand. A. G. P.

**Alkali scorch of Bermuda onions.** J. J. TAUBENHAUS and W. N. EZEKIEL (Amer. J. Bot., 1934, 21, 69–71).—Injury to onions during storage and transport was traced to the use of jute bags which had become impregnated with alkali. A. G. P.

**Destruction of leather-jackets [in soils] by chemical means.** P. KAYSING (Ernähr. Pflanze, 1934, 30, 26–29).—Under field conditions applications of kainit (up to 9.5 cwt. per acre) completely controlled leather-jackets. The volatility of  $C_{10}H_8$  rendered this less efficient. A. G. P.

**Nicotine spray for the apple sawfly.** W. STEER (Nature, 1934, 133, 463).—The egg of *Hoplocampa testudinea* is vulnerable, from the time it is laid, to a spray containing 0.05% of nicotine and 0.5% of commercial soft soap. L. S. T.

**Effects of chlorinated water on land plants, aquatic plants, and goldfish.** P. W. ZIMMERMAN and R. O. BERG (Contr. Boyce Thompson Inst., 1934, 6, 39–49).—Watering or syringing of plants with  $H_2O$  containing 50 p.p.m.  $Cl_2$  produced visible injury. With 200–300 p.p.m. tops but not roots were affected, Concns. of 500–1000 p.p.m. retarded the emergence of seedlings and both roots and tops of plants were injured. Cut flowers were damaged by < 10 p.p.m., and goldfish were killed by 1 p.p.m. of  $Cl_2$ . A. G. P.

**Determining N in salts etc.**—See VII.

See also A., Apr., 362, **Structure of soil colloids.** 388, **Soils (various).** 453, **Bacterial N assimilation.** **Tropical soil microbiology.** 463, **Influence of B etc. on growth of flax.** 466, **Tobacco mosaic.**

#### PATENTS.

**Manufacture of nitrogenous fertilisers by destructive distillation of organic material.** C. MATIGNON and P. KACHKAROFF (B.P. 406,602, 12.9.33. Fr., 12.9.32).—Wood, cotton waste, straw, peat, lignite, or leaves is/are subjected to destructive distillation in an atm. of  $NH_3$ , the temp. being slowly raised to 400°; the products obtained are a nitrogenous oil, a combustible gas, an ammoniacal liquor, and a solid carbonaceous residue containing 8–10% N and suitable for use as a fertiliser. A. R. P.

**Manufacture of [peat] manures.** F. HANIEL & Co. G.M.B.H., and E. STREICHER (B.P. 407,174, 9.2.33).—Peat dust rotated in a heated drum is sprayed with aq. suspensions or solutions of fertiliser salts, e.g., superphosphate,  $(NH_4)_2SO_4$ , etc., to give a dry, distributable manure. A. R. P.

**Treatment of plants, parts of plants [e.g., leaves], and raw fibres [e.g., fresh sisal fibres].** H. PLANT (U.S.P. 1,918,558, 18.7.33. Appl., 6.12.32. Holl., 2.11.32).—The plants, without retting or mechanical treatment, are boiled in 9–10% aq. KOH with exclusion of air to remove gums, mucilage, proteins, and pentosans. The residual fibres are washed and treated with 1%  $H_2SO_4$  to remove inorg. salts and degradation products of pectin, then with 3–10%

aq. NaOH to remove pectic acid, and finally with 0.125% HCl to remove  $CaSO_4$ . A. R. P.

**Material for preserving cut flowers and the like.** G. H. WESTBURY, C. R. RODYK, and M. E. WESTBURY (B.P. 406,737, 3.9.32 and 26.9.33).—Claim is made for tablets composed of  $Na_2SO_4$  or  $CuSO_4$  together with a solid compound of  $H_2O_2$  and urea (I). The  $H_2O$  in which the flowers are preserved should contain  $Na_2SO_4$  1–6 and (I) 1.75 grains per pint. A. R. P.

**Manufacture and application of seed disinfectants.** IMPERIAL CHEM. INDUSTRIES, LTD., and F. L. SHARP (B.P. 406,723, 3.8.32).—Dust-free products are obtained by mixing arylmercuriacetates with diluents (talc) and a mixture of oleaginous substances capable of absorbing several times its wt. of  $H_2O$ , e.g., wool fat (I) and olive oil or petroleum jelly (II); oleic acid, beeswax, and (II); or lanogen [obtained by treating (I) with bone-C in light petroleum] and (II). H. A. P.

**Immunisation of seed grain and the like.** E. I. DU PONT DE NEMOURS & Co. (B.P. 406,996, 26.5.32. U.S., 26.5.31).—Seed grain, bulbs, corms, and tubers are protected against bacterial or fungal attack by treatment with an aq. suspension of, or by coating with a diluted powder containing, a thiouram mono- or polysulphide [ $S(CS \cdot NMe_2)_2$ ,  $S_2(CS \cdot NMe_2)_2$ ]. H. A. P.

**Immunisation of seed grain and the like.** GRASS-ELLI CHEM. Co. (B.P. 407,708, 15.7.32. U.S., 18.7.31).—Seed grain, corms, and tubers are protected against fungoid or bacterial attack by treatment with non-dyeing thiazoles (< 1%) containing salt-forming groups (attached to the hetero-nucleus) in the form of diluted powders or solutions in  $H_2O$  or oil (in presence of a wetting agent). Examples are:  $\psi$ -thiohydantoin, 2:4-diketotetrahydrothiazole, rhodanine, 2-aminobenzthiazole and various substitution products, and 2-hydroxy- and 2-thiol-benzthiazoles. H. A. P.

**Manufacture of insecticide carrier, spreader, and emulsifier.** W. H. VOLCK, Assr. to CALIFORNIA SPRAY CHEM. CORP. (U.S.P. 1,922,607, 15.8.33. Appl., 29.10.28).—Brown, neutral lubricating oil (2 vols.) is agitated for 30 min. at 35–40° with 95–97%  $H_2SO_4$  (1 vol.), 1 vol. of  $H_2O$  is added, and the middle layer is separated and extracted with EtOH (3 vols.). The extract is treated with  $Na_2CO_3$  to neutralise  $H_2SO_4$  (which is pptd. as  $Na_2SO_4$ ), and the clear liquid is diluted, exactly neutralised, and distilled to recover EtOH. Tars are removed from the aq. solution by extraction with  $C_6H_6$ , and the purified liquor is evaporated to 30–40% of solids. For use as an insecticide it is diluted to 3% of solids and suitable oils are emulsified in the solution. A. R. P.

**Seed disinfectants.**—See III. [**Fertiliser by**] **alcoholic fermentation.**—See XVIII.

#### XVII.—SUGARS; STARCHES; GUMS.

**Scholler method for the saccharification of wood.** H. BRAHMER (Tekn. Tidskr. Kemi, 1933, No. 11; Cellulosechem., 1934, 15, 45).—The max. yield of sugars is obtained by pumping dil.  $H_2SO_4$  through the wood pulp contained in an autoclave and removing the sugars so formed as rapidly as possible from the reaction zone.



The yield is 30–39% of fermentable sugar, giving about 200 litres of spirit per ton of wood. The costs of the process show it to be suitable only for large-scale production.

D. A. C.

**Microscopy of food products. IV. Starches and their characteristics.** C. H. BUTCHER (Food, 1934, 3, 244–246; cf. B., 1934, 298).—Technique is described. Aq. I is preferable to I in aq. KI since it stains gluten, remains of cell-walls, and true starch granules deep brown, yellow, and blue, respectively; I vapour from flakes of I placed on the slide also stains selectively. Chlorazol Fast Red K is preferable to methylene-blue (I) for photographic work, but (I) provides better definition of the edges and concentric markings of the granules. Individual starches may be identified (a) from the crit. temp. at which the granules swell and burst; (b) by warming with EtOH–KOH, which acts on different starches at different rates; or (c) by determining whether or not the arms of the dark cross apparent in polarised light intersect on the hilum.

J. G.

**Effects of heat exposure on wheat starches.** C. E. MANGELS (Cereal Chem., 1934, 11, 86–94).—Air-dried starches (A) isolated in the laboratory from, respectively, bleached and unbleached hard red spring (B), bleached hard red winter, bleached soft red winter, and unbleached durum wheat patent flours were heat-treated for 8 hr. Exposure to 80°, 100°, and 120° exerts very little effect (slight increase) on the sp. rotation of A; exposure to 100° slightly decreases the resistance to diastase. The swelling capacity or viscosity (C) of A from B in 0.1N-NaOH is very little affected by temp. of 80°, 90°, or 100°. Heat-treatment produced a much greater increase in C in winter wheat starches than in starches from B wheats, but the effect was smaller at 80° and 90° than at 100°. Heat-treatment of durum A produced about the same increase in C as in winter wheat A.

E. A. F.

**Density of dextrin.** W. HÖNSCH (Chem.-Ztg., 1934, 58, 76).—Four well-dried samples of commercial dextrin gave  $d_{20}^{20}$  1.527–1.593. The figure given in Beilstein's "Handbuch der Organische Chemie," 1893, 1, 1088 (3rd Ed.) is a misquotation.

G. H. C.

**Decorticated sugar-beet seed.**—See XVI.

See also A., Apr., 394, **Micro-detection of monoses in presence of reducing bioses. Identification of sugars.** 449, **Cryst. hexaoxe from starch.**

PATENT.

**Alcoholic fermentation.**—See XVIII.

## XVIII.—FERMENTATION INDUSTRIES.

**Origin of copper and arsenic in hops, and their influence on brewing and the quality of beer.** H. HAMPP (Allgem. Brauer- u. Hopfen-Ztg., 1933, 73, 659–664; Chem. Zentr., 1933, ii, 2603).—All hops contain As and Cu, derived from the soil. The amount of Cu is increased by spraying. The amounts of Cu and As present have no influence on brewing, and are too small to be harmful.

H. J. E.

**Glassy product from malt.** C. BIERNAX (Bull. Assoc. anc. Elèves Inst. sup. Fermentat. Gand, 1933, 34, 60–70, 152–157; Chem. Zentr., 1933, ii, 2603).—

The effect of conditions of germination on the production of the glassy material has been studied. The phenomenon is due to a deficiency of cytase. The glassy material is insol. in  $C_6H_6$ , EtOH, Et<sub>2</sub>O, CS<sub>2</sub>, or CCl<sub>4</sub>, but dissolves in NH<sub>3</sub>.

H. J. E.

**Enzymes of vegetable and fungus origins and their application in unhairing and in preserving wool.** E. K. KAVERZNEVA and E. M. OLEINIKOVA (Izvest. Tzentr. Nauch.-Issledov. Inst. Kozh. Prom., 1932, No. 2, 24).—Proteases (I) from sprouting soya beans contain enzymes of the pepsin and trypsin type, active at  $p_H$  4–8. Tryptase has optimal activity on gelatin at  $p_H$  7.4 and on peptone at  $p_H$  7.0. HCNO is depressant. Hide powder is energetically dissolved by soya-bean extracts at  $p_H$  8.0. The activity of (I) is lowered by storage. (I) easily dissolve collagen; they have practically no effect on elastin and none on keratin. (I) are slightly activated in presence of 0.05–0.1% Na<sub>2</sub>SO<sub>4</sub> and (NH<sub>4</sub>)<sub>2</sub>SO<sub>4</sub>. Tryptase is only slightly adsorbed by kaolin and the solution is activated if sawdust (II) is introduced. (II) is a good unhairing agent.

CH. ABS.

**Estimating the potato utilisation [in distilleries].**

B. DREWS and B. LAMPE (Z. Spiritusind., 1934, 57, 83–84).—The quantity (kg.) of potatoes mashed in the distillery (W) is given by:  $W = 0.706MBs/S$ , where M is the vol. of sweet wort (litres) and B its extract content (Balling), s the sp. gr. of the mash filtrate, and S the starch content of the potatoes. From a table given, W per 100 litres of mash can be read directly knowing only S and B. A mashing residue of 2% is assumed, and an addition of malt corresponding to 2 lb. per cwt., while a normal method of saccharification is necessary.

I. A. P.

**Determination of carbon dioxide in beer.** J. L. BAKER and H. F. E. HULTON (J. Inst. Brew., 1934, 40, 171–173).—A sample of the beer, collected under conditions precluding loss of CO<sub>2</sub>, is added to a known vol. of standard Ba(OH)<sub>2</sub> solution and excess of alkali is titrated (phenolphthalein) against standard H<sub>2</sub>C<sub>2</sub>O<sub>4</sub> in presence of BaCl<sub>2</sub>. To determine the equiv. of acids other than CO<sub>2</sub>, a known vol. of the beer is boiled to remove CO<sub>2</sub>, and, after cooling, added to Ba(OH)<sub>2</sub> and titrated as before. The difference between the two titrations gives a measure of the CO<sub>2</sub> present, allowance having been made for the vol. of beer taken in each case. The process is not applicable to black beers.

I. A. P.

**Measurement of beer turbidity due to cooling.** E. HELM (Woch. Brau., 1934, 51, 105–107).—Beer is maintained at exactly 0° for 48 hr. and the turbidity (T) induced is measured by comparing with normal beer to which varying amounts of freshly prepared BaSO<sub>4</sub> are added. Measurement must occupy  $\geq 2$  min., and is carried out in a comparator containing H<sub>2</sub>O at a standard temp. Differences in cooling temp. give different T vals., pasteurised beer (I) being more affected than unpasteurised beer (II). The T of (I) disappears more rapidly than that of (II) on returning to room temp. A cooling period  $> 48$  hr. gives little further increase in T of (II), but appreciable increase for (I). High storage temp. favours increased T on cooling.

I. A. P.



**Volatile acid in wines containing sulphur dioxide.**

A. A. PERAZZO and A. C. ARBECCHI (Anal. Assoc. Quim. Argentina, 1933, 21, 156—158).—A slight excess of 0.2*N*-I is added before determination of volatile acids by Cazenave's method. R. K. C.

**Ferric casse of wine.** L. CASALE (L'Ind. Chimica, 1934, 9, 306—313).—In a solution containing the acids present in wine, Fe exists only in small part as salts and mostly forms colloidal compounds of  $\text{Fe}(\text{OH})_3$  with absorbed acid ions. Of such compounds, those with  $\text{PO}_4'''$  and tannin are the most readily insolubilised. The former becomes insol. when the  $[\text{Fe}]$  is not too low, the  $p_{\text{H}}$  about 2.9, and org. salts are in low concn.; for the latter insolubilisation occurs at  $p_{\text{H}}$  about 4.4 and when the concn. of org. salts is high. In either case pptn. is aided by clarification with casein. Phosphates dissolve both these classes of colloidal compounds. The practical bearings of these results are considered. T. H. P.

**Dehydrating EtOH.**—See III. Ag-Be alloys [for vinegar].—See X.

See also A., Apr., 449, **Activity of technical invertase preps.** 452, **Fermentation of sucrose by beer yeast.** 464, **Carbohydrate composition of barley grain.** 465, **Enzymic clarification of sweet wines.**

## PATENTS.

**Manufacture of invertase preparations.** L. WALLERSTEIN, ASSR. to WALLERSTEIN CO., INC. (U.S.P. 1,919,675—6, 25.7.33. Appl., [A] 30.8.29, [B] 30.9.31).—Invertase is pptd. from yeast-autolysis liquid (I), conc. at  $\geq 40^\circ$ , by adding a volatile,  $\text{H}_2\text{O}$ -sol. pptg. agent (II) (e.g.,  $\text{COMe}_2$ ). The ppt. is dried at  $\geq 40^\circ$  and brought to standard concn. by mixing with starch, glucose, etc. Alternatively, the enzyme is dissolved in  $\text{H}_2\text{O}$ , and glycerin (III) (40—60%) or sugar syrup added to give the desired concn. The products are odourless and stable. After recovery of (II), the conc. residue has valuable feeding or medicinal properties. In a modified method, (I) is conc. in presence of (III) at  $\geq 40^\circ$ , or concn. may be by dialysis, ultra-filtration, or adsorption and elution, (III) being added (final concn. 30—70%) to give the desired enzyme concn. Use of PhMe etc. as preservative is unnecessary. I. A. P.

**Alcoholic fermentation and product thereof.**

F. M. HILDEBRANDT, ASSR. to U.S. INDUSTRIAL ALCOHOL CO. (U.S.P. 1,921,991, 8.8.33. Appl., 20.11.29).—Molasses wort is fermented with a mixed culture of yeast and bacteria, the latter causing the yeast to flocculate and to collect with the molasses sediment at the bottom of the fermenting vessel. The yeast-free liquor and the filtrate from the residue are passed to the stills, and the residue is fermented again with dilute molasses, preferably at  $p_{\text{H}}$  4.0—4.5. The final residue is filter-pressed, the product being friable and having 60—70% of moisture; it may be further dried by the usual methods. Alternatively, the first residue may be dried without re-fermentation. The product is of val. as a stock or chicken food, or as a fertiliser. The characteristics of the bacterium used are quoted; it appears to be related to *Staphylococcus* sp., and under the

conditions employed has little effect on the sugar or alcohol. I. A. P.

**Effecting bacterial fermentation without multiplying the cells.** S. BAKONYI, ASSR. to DEUTS. HYDRIERWERKE A.-G. (U.S.P. 1,920,735, 1.8.33. Appl., 31.1.29. Ger., 21.2.28).—An active selected strain of the bacterium is brought to its max. vitality by developing on a suitable nutritive mash. This is now added to the main mash, the composition of which is unfavourable to further multiplication (*M*). Fermentation (*F*) is rapid, and waste of mash constituents in building up new cells is avoided, whilst sterilisation of the main mash and addition to it of nutrient substances is unnecessary. Optimum conditions for *F*, as distinct from *M*, can be employed. At the close of *F*, dead bacteria and hypertrophic forms are present, but no permanent forms. The process can be used for  $\text{BuOH-COMe}_2$  bacteria, and also for producing lactic acid or  $\text{PrCO}_2\text{H}$ , EtOH and  $\text{COMe}_2$ ,  $\text{Pr}^s\text{OH}$ , etc. I. A. P.

**Carrying out fermentations and similar biochemical reactions by means of bacteria.** S. BAKONYI, ASSR. to DEUTS. HYDRIERWERKE A.-G. (U.S.P. 1,920,736, 1.8.33. Appl., 31.1.29. Ger., 3.8.28).—Dilution of worts (caramelised molasses, sulphite liquor, etc.) to a carbohydrate concn. of 2—3%, to avoid inhibition due to antifermmentative substances, is uneconomic. However, improved fermentation of such liquors is obtained by carrying out a preliminary fermentation in a diluted mash (1—3% of carbohydrate), highly conc. mash (e.g., 25—30% of carbohydrate) being gradually added after fermentation has become active. Under these conditions the bacteria remain resistant to antifermmentative substances. Addition of  $\text{PO}_4'''$  and CaO may be desirable. I. A. P.

## XIX.—FOODS.

**Wheat-meal fermentation time tests for evaluating soft wheats.**

O. B. WINTER and A. G. GUSTAFSON (Cereal Chem., 1934, 11, 49—56).—The wheat-meal fermentation time test (B., 1933, 281, 601; 1934, 166) shows relatively greater differences between individual samples and between varieties than any of the other 3 tests (flour protein content [*B*], loaf vol. [*C*], and dough expansion vol. by Wilsie's method [*D*]) examined. There is a fair positive correlation between "time" and, respectively, *C* ( $0.66 \pm 0.6$ ), and *D* ( $0.64 \pm 0.07$ ), but not between "time" and *B*. A modification of the test, in which the expansion of the dough ball is measured instead of the fermentation time, is about equal to the older method in accuracy and val., and requires less of the operator's time, but possesses the disadvantage of requiring 30 g. of meal in place of 3.5 or 10 g. in the older form of the test. E. A. F.

**Possibility of characterising hard and soft wheats according to the ratio between total and amino-nitrogen of their seeds and energy of autolysis of the latter.** A. V. BLAGOVESHCHENSKY and N. I. SOSSIEDOV (Cereal Chem., 1934, 11, 117—120).—Hard wheats show a higher  $\text{NH}_2$ -index (ratio of total N to  $\text{NH}_2\text{-N}$  [*A*]) than soft wheats when grown under identical conditions. The energy of proteolysis of hard and soft wheats is correlated with their *A*. E. A. F.



**Chemistry of corn [maize] seed germination.** R. C. MALHOTRA (Cereal Chem., 1934, 11, 105—109; cf. B., 1934, 120).—Starch (*A*), hemicelluloses (*B*), heat calcs. (*C*), fats (*D*), and dry wt. decreased, sugars (*E*) increased, whilst ash and total N remained const. (the last-named, however, was transferred from one tissue to another) during the germination of maize. The embryo contributed *D*, and the endosperm supplied carbohydrates. When isolated embryo was allowed to germinate, *D* (converted into *A* and then into *E*), *B*, *E*, and *C* decreased. Chemical ingredients of embryo-less endosperm, other than *A* (which was converted into *E* by auto-digestion), did not change. E. A. F.

**Simplified determination of carotene in [wheat] flour extracts.** W. F. GEDDES, D. S. BINNINGTON, and A. G. O. WHITESIDE (Cereal Chem., 1934, 11, 1—24).—The difference in hue of gasoline flour extracts (*A*) and aq. solutions of  $K_2CrO_4$  (*B*) employed in the determination of gasoline colour vals. (*C*) is practically eliminated when Hg-arc irradiation (*D*) is substituted for white light. While the use of *D* reduced the differences between the samples by 50%, this was > offset by the greater precision in matching, the use of *D* giving a greater differentiation between flours, lower variability between observers, and a significantly lower random error. With *D*, the colorimetric standards of Kent-Jones [ $B + Co(NO_3)_2$ ] and of Sprague (Naphthol-yellow + Orange G) are inferior to *B* when permanency and reproducibility are taken into account. The transmittancy (*E*) decreases with increasing  $p_H$ , the effect being greatest at  $p_H$  6—7 (A., 1927, 952). Within the region  $p_H$  7.3—8.5, the change in *E* is < 1% and is undiscernible. The use of buffers in making up *B* is unnecessary. A comparison of *C*, obtained with *D*, with spectrometric (*F*) determinations of carotene (*G*) on the same *A* gave a correlation of +0.985 and a straight-line regression (*H*), the equation for *H* giving the arbitrary *C* units in terms of *G*. The *G* equiv. for the Winton gasoline colour standards fall on irregular vals., and directions are given for the prep. of  $K_2CrO_4$  standards (*I*) corresponding to even *G* units (using *D*, and a colourless, redistilled solvent for *A*). The modified *I* for the determination of *G*, employing both the standard series method (*K*), using Nessler tubes, and a Duboscq colorimeter (*L*), gave results in agreement with the *F* method, but the experimental error was significantly higher with *L*. The *K* method of comparison, using special tubes with plane-parallel bottoms, calibrated at fixed depths of 40 and 80 mm., is recommended. Although the suggested method is not as accurate as the *F* method, it is more rapidly and easily effected, and the equipment is less expensive, so that it is more suitable for routine work. E. A. F.

**Quick ash methods [of determination in cereal products].** E. B. WORKING and E. J. ANDERSON (Cereal Chem., 1934, 11, 94—98).—0.1 or 0.3 g. of flour is moistened with a 70% EtOH solution of  $Mg(NO_3)_2$  and the ashing effected in special light-wt. Pt dishes in, respectively, 5—10 or 7—15 min. E. A. F.

**Diastatic activity in doughs and suspensions.** Q. LANDIS (Cereal Chem., 1934, 11, 24—35).—Chemical methods are at present inadequate for determining the

total sugars present in fermenting doughs. Two fermentation methods due, respectively, to Schultz and Kirby (A., 1933, 597), and to Schultz and Landis (A., 1932, 303), are described which are believed to give satisfactory results. The potential sugar concn. (*P*) in buffered suspensions and yeast-free doughs may be expressed by the equation:  $S_p = p + s \log t / \log 2$ , where *p* is the % sugar at 1 hr., *s* the amount formed during the 2nd hr. of diastasis, and *t* the time. *p* in some fermenting doughs and suspensions is shown to be > that in yeast-free doughs and to consist of a linear and a logarithmic phase. E. A. F.

**Drying equipment for alimentary pastes.** D. S. BINNINGTON and W. F. GEDDES (Canad. J. Res., 1934, 10, 221—233).—An apparatus is described for the drying of pastes at a const. temp. and humidity, and also means for maintaining steady a temp. gradient. J. L. D.

**Standard [A.A.C.C.] baking test under English conditions.** D. W. KENT-JONES (Cereal Chem., 1934, 11, 57—65).—Results obtained in applying the A.A.C.C. standard baking test (B., 1928, 463) to European conditions indicate that this test is not suitable for evaluating the baking properties of the usual types of commercial flour; progress is more likely to be made by a more thorough study of the physical properties of doughs. E. A. F.

**Standard [A.A.C.C.] baking test under English conditions.** W. F. GEDDES, R. K. LARMOUR, and C. E. MANGELS (Cereal Chem., 1934, 11, 66—69).—A criticism of the viewpoint of the above paper (cf. preceding abstract). E. A. F.

**Laboratory baking test—a science or a fine art?** M. J. BLISH (Cereal Chem., 1934, 11, 70—73).—A criticism of Kent-Jones' paper (cf. *supra*) and a justification of the A.A.C.C. standard baking test. E. A. F.

**Determination of the ash of salt bread.** M. SGARZI (Annali Chim. Appl., 1934, 24, 97—104).—Various methods are discussed. Bernardini and Gauthier's method (B., 1931, 461) gives higher results than the official Italian method, for which latter certain simplifications are suggested. T. H. P.

**Destroying mould spores on bread by ultra-violet radiation.** J. W. READ (Cereal Chem., 1934, 11, 80—85).—Freshly baked bread heavily infected with mature *Aspergillus*, *Penicillium*, *Rhizopus*, and *Mucor* spores was subjected for varying periods at given distances to ultra-violet radiation (*A*) from 3 types of Hg-vapour lamp (*B*) and from the open  $C_4$ -type of C lamp without reflectors or screens. The infected loaves (*C*) were then wrapped in sterile waxed paper and incubated at 34—35°. The C lamp (*D*) appears more suitable (higher intensity of the shorter fungicidal wave-lengths) for commercial use than *B*. The fungicidal potency (*E*) of *D* decreased in the order "C," "U," "K," and "Magnesium" carbons. *E* is unaffected if *C* are wrapped in transparent sheeting (e.g., Cellophane) before subjecting to *A*. "Proteo" (diabetic) bread can be disinfected on a commercial scale by 2-min. treatment with *A* in a specially devised apparatus. E. A. F.

**Bread and cracker flours.** J. MICKA (Cereal Chem., 1934, 11, 110—112).—The requirements of flours for



these purposes are compared from the viewpoint of their effect on the colour of the product, their absorption, and their fermentive properties. The cracker baker has a more difficult task in selecting suitable flour, since this is principally responsible for the desired qualities (*e.g.*, bloom) in the finished product. E. A. F.

**Classification of biscuit and cracker products from the machine viewpoint.** O. JOHNSON (Cereal Chem., 1934, 11, 113—116).—A brief account is given of the various types of machines used (in the U.S.A.) for forming biscuits and crackers. E. A. F.

**Variations in the density of milk at 15° in relation to various factors.** I. L. PAZZAGLIA and M. ZIRANO (Annali Chim. Appl., 1934, 24, 55—57).—Storage of milk in ice raises its *d*, which does not return to its original val. when the milk warms to its original temp. T. H. P.

**Aldehyde value of milk.** G. BUOGO (L'Ind. Chimica, 1934, 9, 301—302).—The aldehyde (formol) val. (*V*) of milk (*cf.* Steinegger, A., 1906, ii, 130) serves as a measure of the casein content. As a rule the val. increases with *d*, if the % of fat remains const. and normal. For milks (10) from the district of Pavia, the ratio casein : *V* is 1.75. This is much > vals. given by other authors and indicates the richness in proteins of Pavian milk. T. H. P.

**Vogherese milks, their simplified molecular constants and sero-densimetric constants.** T. PICCIOLI (Annali Chim. Appl., 1934, 24, 87—96).—During about a year, 120 samples of milk from herds of various breeds were examined for: *d* of milk and serum, fat, residue less fat, lactose, Cl', simplified mol.-concn. const. (M.-C.), and sero-densimetric const. (S.-D.). For M.-C., 13.3% gave 64—65, 20.8% 65—66, 22.5% 66—67, 17.5% 67—68, 14.1% 68—69, 9.1% 69—70, and 2.5% 70—71. For S.-D. (*cf.* Olivari, B., 1929, 658), 13.3% gave 33.5—34, 23.3% 34—34.5, 21.6% 34.5—35, 28.3% 35—35.5, 9.1% 35.5—36, and 4.1% 36—36.5. The S.-D. val. detects < 5% of added H<sub>2</sub>O. The vals. for *d* of milk and serum, fat, and residue less fat are similarly classified. T. H. P.

**Effect of egg products on the whipping properties of ice-cream mixes made from butter and dried skim-milk.** C. C. WATTS and C. D. DAHLE (J. Agric. Res., 1933, 47, 967—977).—The addition of 0.5% of dried egg yolk to butter (I)—dried skim-milk mixtures improves the whipping properties; the effect is less pronounced if the (I) is replaced by cream (II). The addition of ovo-lecithin is also beneficial, whilst soya-bean lecithin is detrimental. The failure of (I) mixtures to whip as readily as (II) mixtures is due to the absence of a lecithin-protein complex. P. G. M.

**Effect of washing on the keeping quality of hens' eggs.** R. L. BRYANT and P. R. SHARP (J. Agric. Res., 1934, 48, 67—89).—Loss of wt. due to desiccation of eggs during storage is not increased by washing with various cleansing or disinfectant preps. The apparently greater deterioration of washed eggs is due to bacterial infection through the larger pores from dirt originally on the shell. Dipping in oil reduces the loss of wt. during storage. Egg white of *p<sub>H</sub>* 9.6 is germicidal at all temp. but in samples of *p<sub>H</sub>* 7.5 bacteria developed at all temp. > 0°. A. G. P.

**Firmness of albumin as an inherited characteristic.** F. W. LORENZ, L. W. TAYLOR, and H. J. ALMQUIST (Poultry Sci., 1934, 13, 14—17).—The existence is indicated of genetic factors which control the firmness of the albumin of eggs. A. G. P.

**The canning industry.** T. N. MORRIS (J. Soc. Arts, 1934, 82, 555—574).—A lecture.

**Canning of apricot purée.** A. SHALLAH and W. V. CRUESS (Fruit Products' J., 1934, 13, 205).—Small apricots are washed, steamed, and pulped, pits and skins being separated mechanically. The purée is sweetened with 25% of sugar, canned, exhausted, and processed. Dilution (1 : 1) with H<sub>2</sub>O gives a pleasant beverage. E. B. H.

**Chemical changes of muscle proteins in canning.** Y. OKUDA and K. YAMAFUJI (Bull. Chem. Soc. Japan, 1934, 9, 75—83).—When whale-, rabbit-, hen-, or fish-muscle proteins are sealed in glass and heated at 130—140°, the *p<sub>H</sub>* changes towards neutrality; peptone, peptide, and NH<sub>2</sub>-acid N increase (making the canned product more liable to putrify after being opened); the N and S contents are reduced, owing to liberation of NH<sub>3</sub> and H<sub>2</sub>S; cysteine and cystine are partly interconverted, and partly decomposed, especially at a high *p<sub>H</sub>* at which arginine and histidine are also decomposed; and decomp. of lysine is greater at low *p<sub>H</sub>*, whilst that of tryptophan, tyrosine, and proline is insignificant. E. W. W.

**Examination of canned foods.** S. LANCEFIELD (Food, 1934, 3, 247—248).—Methods for examination of the unopened and opened tin and contents are briefly indicated. J. G.

**Determination of amino-acids (glutamic acid) in tomato preserves.** G. BUOGO (Annali Chim. Appl., 1934, 24, 79—82).—The determination is effected by formol titration, with litmus paper as indicator. For genuine products, the ratio of glutamic acid to reducing sugars is < 10%, for carrots 26.6%, for pumpkins 29.1%, and for red beet infinity. T. H. P.

**Alimentary variations of vegetables cultivated, without fertilisers, under ordinary agricultural conditions.** H. LAGATU and L. MAUME (Compt., rend., 1933, 197, 1558—1560).—The amounts of N<sub>2</sub>, P<sub>2</sub>O<sub>5</sub>, and K<sub>2</sub>O in the dry org. material of the cotyledons of the vine (1929—32) and potato (1928—31) grown without fertilisers in different regions are expressed in ternary diagrams. The total N + P<sub>2</sub>O<sub>5</sub> + K<sub>2</sub>O diminishes regularly as the age of the leaf increases. The equilibrium between these three constituents, however, is largely determined by external, and especially by climatic, conditions. J. W. B.

**General results with silage made with addition of mineral acid.** J. C. DE RUYTER DE WILDT (Vereen. Exploit. Proefzuivelboerderij, Hoorn, Ann. Rep., 1932, 1933, 209—229).—Comparative data are recorded on pit silage (I) and silage from a wooden silo made by the Defu method (II) [addition of 0.2 kg. of sugar and 0.8 kg. of dil. HCl (1 : 4) per 100 kg. of grass; 1—1.6 kg. of acid, according to the nature of the material]. The *p<sub>H</sub>*, lactic acid, PrCO<sub>2</sub>H, and AcOH vals. are



recorded for (I) of various origin. Changes in nitrogenous constituents are described; addition of acid restricts protein breakdown and particularly  $\text{NH}_3$  production. Sugar, minerals, and dry matter of (I) sap (drainings) are considered; also formation of moulds, appearance of (I), odour, palatability, and effect on the health of animals. (II) is favoured. NUTR. ABS. (m)

**Essential nutritive properties of common protein supplements. I. Relative efficiency of the proteins.** H. S. WILGUS, JUN., L. C. NORRIS, and R. C. RINGROSE (Poultry Sci., 1933, 12, 331—332).—The efficiencies of protein supplements, expressed as a % of that of standard caseinogen, form the descending series: vac.- and drum-dried white fish meal, dried skim milk, sardine meal, flame-dried white fish meal, expeller-process soya-bean oil meal, Asiatic sardine meal, steam-dried menhaden meal, meat scrap, flame-dried menhaden meal, hydraulic-process soya-bean oil meal, whale meal, maize gluten meal, and dried blood.

NUTR. ABS. (m)

**Detecting glycerol in foodstuffs.**—See III. **Ag-Be alloys [for fruit juices].**—See X. **Determining butter in fats. Determining I val.**—See XII. **Artificial horn.**—See XV. **Effects of heat on wheat starches. Microscopy of starches.**—See XVII.

See also A., Apr., 434, **I content of milk.** 439, **Soya-bean milk and chicken protein.** 455, **Counting bacteria in milk.** 458—462, **Vitamins (various).** 465, **Enzymic clarification of fruit juices.**

## PATENTS.

**Production of soya[-bean] flour.** M. NEUFELD & Co. (B.P. 407,866, 20.7.33. Ger., 20.7.32).—Shelled or unshelled soya beans are soaked in acidulated  $\text{H}_2\text{O}$  for a few hr., washed, and then soaked in  $\text{H}_2\text{O}$  at  $75^\circ$  for about 2 hr. The beans are then dried, shelled, and ground to a flour, which is heat-treated at various temp. to produce a "biscuit," "cocoa," or "coffee" flavour. E. B. H.

**Production of sour milk.** O. GOLL (B.P. 407,880, 30.8.33. Ger., 9.9.32).—By the addition to heated full-cream and/or skimmed milk of edible gelatin (0.20—0.25% on the quantity of milk) and sugar prior to inoculation with a "starter," a sour milk may be produced which remains uniformly liquid even after long storage. E. B. H.

**Neutralisation of butter fat.** E. M. DAVIS, Assr. to SWIFT & Co. (U.S.P. 1,919,502, 25.7.33. Appl., 4.2.32).—In the manufacture of butter from sour or acid cream, after neutralising, pasteurising, churning, and removal of the buttermilk, the butter is washed with  $\text{H}_2\text{O}$  containing  $\text{Na}_3\text{PO}_4$  (about 2—3 lb. of  $\text{Na}_3\text{PO}_4 \cdot 12\text{H}_2\text{O}$  per 150-lb. batch of butter) to soften the curd, which dissolves in the  $\text{H}_2\text{O}$ . Starter may be added after the washing. The butter is stored in a cooler for some days, and mixed, in 5—25% proportion, with butter from normal cream. E. L.

**Preparation of ice cream.** W. O. HERRMANN and W. HAEHNEL, Assrs. to CONSORT. F. ELEKTROCHEM. IND. (U.S.P. 1,921,124, 8.8.33. Appl., 23.8.32. Ger., 23.7.31).—Addition of up to 1% of polymerised vinyl alcohol

increases the apparent creaminess and reduces the production of ice crystals in ice cream. E. B. H.

**Production of cheese.** HANSEATISCHE MÜHLENWERKE A.-G. (B.P. 407,461, 17.11.32. Ger., 17.11.31).—By the addition of natural phosphatides ( $> 2\%$ , calc. as lecithin, on the total wt. of the product) the crumbling of certain cheeses during ripening may be eliminated. E. B. H.

**Preservation of animal raw materials.** J. O. NYGAARD (B.P. 407,728, 23.9.32. Norw., 24.9.31).—Whale, seal, etc. flesh and bones are dehydrated and preserved by heating in train oil, preferably in vac. E. L.

**Treatment of edible nuts.** C. K. and J. E. BIZZELL (B.P. 407,821, 27.2.33. U.S., 15.3.32).—See U.S.P. 1,887,256; B., 1933, 890.

**Drying apparatus. Pasteurisation. Removing gases from milk etc.**—See I. **Colouring butter, food fat, etc.**—See IV. **Fat-sol. vitamin concentrates.**—See XII. **Artificial ivory [from casein].**—See XIII. **Invertase preps. [Stock feed by] alcoholic fermentation.**—See XVIII.

## XX.—MEDICINAL SUBSTANCES; ESSENTIAL OILS.

**Bacterial content and bactericidal action of some common medicaments.** J. P. TODD and (Miss) H. L. SMITH (J. Roy. Tech. Coll., 1934, 3, 324—326).—Under ordinary storage conditions  $\text{HgCl}_2$ ,  $\text{NaCl}$  (I), strychnine hydrochloride (II), benzamine lactate (III), atropine sulphate (IV), and cocaine hydrochloride are free from living micro-organisms, but glucose and gum arabic are not, although in these cases ordinary filtration greatly reduces their numbers. After moistening with  $\text{H}_2\text{O}$  containing non-sporing organisms (*Staph. aureus* and *S. lutea*) and drying over  $\text{H}_2\text{SO}_4$  in a vac. at room temp., (III), (IV), quinine hydrochloride, and (II) are sterile, conc. solutions of these substances exerting a bactericidal action, but spore-bearing organisms (*B. megatherium*) survive this treatment. Both types survive with (I). J. W. B.

**Sterilisation of hexamine solutions.** M. H. VICKERS (Pharm. J., 1934, 132, 414).— $(\text{CH}_2)_6\text{N}_4$  (I) dissociates when heated in aq. solution, but the  $\text{NH}_3$  and  $\text{CH}_2\text{O}$  recombine if the solution is kept in a closed container for 24 hr. Solutions containing  $< 40\%$  of (I) can be sterilised by autoclaving or by tyndallisation. S. C.

**Evaluation of nitroglycerin solution.** P. HORKHEIMER (Pharm. Ztg., 1934, 79, 353—354).—The D.A.B. VI method gives unreliable results. Merck's method is the better: 10 g. of a 1% nitroglycerin solution, 10 c.c. of alcoholic 0.5N-KOH, 50 c.c. of  $\text{H}_2\text{O}$ , and exactly 0.25 c.c. of conc.  $\text{H}_2\text{O}_2$  solution are boiled under reflux for 30 min. and then titrated hot with 0.5N-HCl to phenolphthalein. E. H. S.

**Analysis of tablets.** D. POPOV (Khim. Farm. Prom., 1933, 164—167).—The analysis of tablets containing diethylallylacetanilide, aspirin, amatin, diplosal, antipyrine, pyramidone, glyceryl nitrate, veramon, and phenobarbital is discussed. CH. ABS.

**Determination of some constituents of aloes.** P. VALAER and G. E. MALLORY (Amer. J. Pharm., 1934,



106, 81—96).—The determination of aloes (I) in medicinal preps. is best effected by a colorimetric method based on the red colour given by  $\text{Et}_2\text{O}$  extracts of free emodin (II) and other hydroxyanthraquinones with  $\text{NH}_3$ , combined (II) being determined after hydrolysis by  $\text{H}_2\text{SO}_4$ .  $\text{CH}_2\text{Ph}\cdot\text{OH}$  and  $\text{NH}_3$  must be used when phenolphthalein is present. The Fe content of all varieties of (I) is high. A. E. O.

**Agar.** A. ITANO (Ber. Ohara Inst. Landw. Forsch., 1933, 6, 59—72).—The composition of seaweeds utilised in the manufacture of agar is recorded. The I content of the seaweeds was 0.045—0.079, and of the agar 0.00118—0.01017%. The I in agar decreases with the amount of  $\text{H}_2\text{SO}_4$  used in the boiling process, and 40—50% of it may be removed by washing. Small amounts of I are retained by agar even after dialysis and reprecipitation. Its various applications in medicine and in the foodstuff, explosive, soap, and paper industries are summarised. A. G. P.

**Extraction and assay of crude ergot.** M. R. THOMPSON (J. Amer. Pharm. Assoc., 1932, 21, 1135—1141; 1933, 22, 736—745).—A method for the assay of the crude drug is described. The U.S.P. X process for the prep. of the fluid extract is inefficient; a large amount of the total activity of the drug is destroyed during extraction in the concn. of the large quantity of the exhaust percolate. The U.S.P. General Type Process "C" for fluid extracts when applied to ergot is much superior to Type Process "B" now specified. A considerable loss of activity during manufacture is avoided and the product is suitable for direct assay by the cock's-comb, rabbit-uterus, or colorimetric method. A satisfactory technique for applying Broom and Clark's isolated rabbit-uterus method is described in detail, as also are chemical tests for ascertaining the degree of exhaustion of the drug. The work of Wokes and Elphick on  $p_{\text{H}}$  and extraction is confirmed. E. H. S.

**Stabilisation of the active principles of digitalis.** G. CHessa (Arch. Farm. sperim., 1934, 57, 96—103).—Digitoxin in digitalis leaves can be stabilised by autoclaving the leaves with  $\text{EtOH}$  vapour under  $\frac{1}{2}$  atm., or by ultra-violet irradiation, the latter method being the more expedient and economic. R. N. C.

**Value of Finnish *Dryopteris Filix mas* and *D. spinulosa* extracts.** K. KILLINEN (Finlands Apotek. Tidskr., 1932, No. 8—9, 149—158; Chem. Zentr., 1933, ii, 3453—3454).—Vals. are given for the filicin content of the extract obtained from different parts of the two sources by the methods of the Finnish and German pharmacopœias. H. J. E.

**Distribution of nicotine in the smoking of cigarettes.** C. PYRIKI (Chem.-Ztg., 1934, 58, 279).—In the in-drawn smoke there is 19—27% of the total nicotine (I), in the smoke at the lighted end 34—47%, and in the stump there is an increase of 13—17% of (I) (20% with raw Bulgarian tobacco). These vals. are different from those obtained by Wenusch (A., 1934, 556). E. H. S.

**Nicotine content of cigar and pipe smoke.** V. L. NAGY and L. BARTA (Angew. Chem., 1934, 47, 214—

215).—Nicotine passes quantitatively into the smoke on burning any variety of tobacco. P. G. M.

**Determination of ammonia in tobacco smoke.** L. BARTA (Angew. Chem., 1934, 47, 215—216).—The alkylamine (as  $\text{NH}_3$ ) and  $\text{NH}_3$  contents are  $\geq 0.03\%$ . A micro-analytical method is described in detail. (Cf. B., 1933, 43.) P. G. M.

**Determination of morphine in opium.** N. RUSTING (Pharm. Weekblad, 1934, 71, 333—338).—2 g. of opium, pasted with 2 c.c. of  $\text{H}_2\text{O}$ , are treated with 10 c.c. of 5%  $\text{MnCl}_2$  solution and 1 g. of coarse, freshly ignited  $\text{CaO}$  free from  $\text{MgO}$ , and filtered and washed on a 3G3 Jena filter with slight suction until the filtrate = 22 c.c. Then 0.3 g. of  $\text{NH}_4\text{Cl}$ , 20 c.c. of  $\text{Et}_2\text{O}$ , and some glass splinters are added, the morphine (I) is separated, and titrated (Me-red) with  $N\text{-HCl}$  after being washed with a saturated aq. solution of (I). S. C.

**Evaluation of drugs by tests of odour and taste.** C. LUCKOW (Pharm. Zentr., 1934, 75, 191—195).—A review (cf. Wasicky, Pharm. Monatsh., 1933, 14, 31—34). R. K. C.

**Rapid determination of arsenic in arsphenamine.** H. N. WRIGHT (Proc. Soc. Exp. Biol. Med., 1933, 31, 170—172).—In Gaebel's method of direct titration with I the reaction reaches equilibrium when  $7.55 \pm 0.03$  mols. of I (instead of 8 mols.) have been used if the  $p_{\text{H}}$  is  $\leq 2$ . CH. ABS.

**[Yields of] essential oils [from raw materials of varied origin].** T. RUEMELE (Pharm. Zentr., 1934, 75, 173—176).—The yields (0.025—65.0%) of various oils from 100-kg. lots of the raw materials (157 samples) are given, together with  $d$ , b.p., and setting points of the most important (51 different oils). Removal of terpenes from an oil causes an increase (0.11—6.4%) in  $d$ , with the exception of cassia oil (—0.85%). E. H. S.

**Detecting glycerol in medicinal substances etc.**—See III. Catgut ligatures.—See V. Determining I val.—See XII.

See also A., Apr., 346, Determining quinine. 396, Determination of  $\text{N}(\text{C}_2\text{H}_4\cdot\text{OH})_3$  [in cosmetics]. New class of hypnotics. 403, Amines similar to papaverine. 413, Reactions of eucalyptol. Prep. of pure *d*-neomenthol. 417, Derivatives of 2-aminopyridine, and of 8-aminoquinoline. 418, Quinoline derivatives. 421,  $\text{NHEt}_2$  salt of phæophorbide. 422—3, Alkaloids (various). 425, Identification of santonin. Detection and determination of novocaine. 426, Determination of alkaloids. Tests for atropine and strychnine. 456, Pptn. of insulin. 457, Prep. etc. of prolactin, prolan, theelin, and theelol. 458—462, Vitamins (various). 464, *Berberis laurina* [as source of berberine]. 465, Determination of  $\text{NH}_3$  in tobacco.

#### PATENTS.

**Production of ointments containing lithium compounds.** C. THALER (B.P. 407,752, 11.10.32).— $\text{LiOH}$  is boiled with an unsaturated fatty acid and an essential oil of the terpene series in presence of  $\text{EtOH}$  until neutral. Using olive oil fatty acids and the oil of *P.*



*sylvestris*, a cryst. substance, m.p.  $260^{\circ}$  (sinters  $246^{\circ}$ ), is obtained. H. A. P.

**Manufacture of soluble bismuthylmannonates.** R. PASTERNAK and C. P. AMMERMAN, Assrs. to C. PFIZER & Co. (U.S.P. 1,919,742, 25.7.33. Appl., 22.4.31).—Na and K bismuthylmannonates are prepared by interaction of  $\text{Bi}(\text{NO}_3)_3$ , the alkali *d*-mannonate, and alkali hydroxide in  $\text{H}_2\text{O}$ , and pptn. with  $\text{EtOH}$ . H. A. P.

**Mineral oil emulsion.** [Laxative.] H. NOONAN, Assr. to DRUG PRODUCTS Co., INC. (U.S.P. 1,920,926, 1.8.33. Appl., 6.11.30).—Refined mineral oil is emulsified by an aq. jelly containing psyllium seed, agar-agar, and gelatin. E. H. S.

**Production of antirachitic substance.** A. J. PACINI, Assr. to SUN-A-SURED, INC. (U.S.P. 1,920,587, 1.8.33. Appl., 4.2.28).—An aq. suspension of a lipin, e.g., cholesterol, is treated with an enzyme, e.g., a prep. of *Aspergillus oryzae*. E. H. S.

**Treatment of tobacco.** A. J. PACINI, Assr. to C. M. RICHTER (U.S.P. 1,920,588, 1.8.33. Appl., 5.12.30).—Tobacco is damped with  $\text{H}_2\text{O}$  containing either aromatic substances (coumarin) and agents which counteract the opacity thereof, e.g.,  $\text{Mn}(\text{OAc})_2$ , or clearing and hygroscopic materials, e.g., glycerol, mono- or di-ethylene glycol,  $\text{CaCl}_2$ , and is then irradiated with infra-red, ultra-violet, or visible rays. E. H. S.

**Invertase preps.**—See XVIII.

## XXI.—PHOTOGRAPHIC MATERIALS AND PROCESSES.

**Criterion of the speed of negative emulsions for use in routine work.** F. LAPEYRE (Bull. Soc. Franç. Phot., 1933, 20, 269—270; cf. B., 1933, 333).—The density range of the printing paper, specified in the method, is changed from 1.2 to 0.9. The latter figure corresponds to a gamma of 0.6, which is more suitable for average negatives. J. L.

**New formula for the representation of the characteristic curves [of photographic emulsions].** F. CHAPUIS (Sci. Ind. phot., 1933; Bull. Soc. Franç. Phot., 1933, 20, 270—279; 1934, 21, 15—27).—On the assumption that the action of light on an emulsion is analogous to the compression of a perfect gas, the elementary equation  $D = D_{\text{max}}[E/(E + E_0)]$  is obtained. Taking opacity of the emulsion, development and exposure times, and other complexities into consideration, a series of other equations is obtained, and tested. Practical applications of the formulæ are discussed. J. L.

**Photographic emulsion: stability of finished plates.** B. H. CARROLL, D. HUBBARD, and C. M. KRETCHMAN (Bur. Stand. J. Res., 1934, 12, 223—230).—The changes occurring in finished photographic plates are probably due to continued after-ripening. It is shown that a crit. region of  $[\text{Br}^-]$  exists, in accordance with predictions from the Ag-gelatin equilibrium. Production of fog by adding acid to  $\text{NH}_3$ -process emulsions is attributed to increase in  $[\text{Ag}^+]$ . J. W. S.

**Mode of action of photographic developers in relation to metol-quinol.** J. CUENAT (Z. wiss. Phot.,

1934, 32, 239—256, 257—277).—The speed of development, threshold val., gamma, latitude, covering power, keeping properties, fog, etc. have been determined for a large no. of different developers on four types of emulsion. The effects of the time of development and temp. changes have also been investigated. The properties of the emulsion used constitute the most important factor in development. Suitable compositions of metol-quinol developers are able to give the same results as those obtained with other developers. J. L.

**Electrolytic regeneration of [photographic] fixing baths.** K. C. D. HICKMAN, C. R. SANFORD, and W. J. WEYERTS (J. Soc. Mot. Pict. Eng., 1931, 17, 568—590; Sci. Publ. Kodak Res. Labs., 1931—2, 15, 165—174. Cf. B.P. 381,903; B., 1933, 44).—The best plating of Ag is obtained when the solution contains some sulphite, a little free acid, 10—1000 p.p.m. of gelatin (or its degradation products), a similar amount of an activator, e.g.,  $\text{CS}(\text{NH}_2)_2$ ; when it is vigorously stirred; or when the c.d. is  $< 3$  amp./sq. ft. The Ag deposited is secondary Ag, and the precautions are necessary to prevent formation of sulphide. The construction and working details of commercial plating cells and plant are detailed. J. L.

**Automatic silver-recovery control [from photographic fixing baths].** K. C. D. HICKMAN (J. Soc. Mot. Pict. Eng., 1931, 17, 591—603; Sci. Publ. Kodak Res. Labs., 1931—2, 15, 183—185).—The apparatus described previously (cf. preceding abstract) requires careful control of solution concn. and electric current to obtain good Ag deposits. An automatic control (which, however, has been found to be unnecessary in large industrial plant) was devised in which standard vols. of  $\text{H}_2\text{O}$ , fixer, and  $\text{Na}_2\text{S}$  solution are delivered from siphons at regular intervals, mixed, and run into a colorimeter cell, where the content of colloidal  $\text{Ag}_2\text{S}$  is recorded by passing a beam of light through the solution on to a Ni-resistance bolometer in one arm of a Wheatstone bridge. With a 2% alteration of light intensity, relay apparatus is operated which suitably adjusts the plating conditions. J. L.

**Reducing action of [photographic] fixing baths on the silver image.** H. D. RUSSELL and J. I. CRABTREE (J. Soc. Mot. Pict. Eng., 1932, 18, 371—397; Sci. Publ. Kodak Res. Labs., 1931—2, 15, 235—240).—The rate of reduction (I) is greater in acid fixer than in plain  $\text{Na}_2\text{S}_2\text{O}_3$  solution, and least in alkaline (1%  $\text{Na}_2\text{CO}_3$ ) fixer. In plain fixer, (I) is increased only by  $\text{O}_2$  (e.g., dissolved air, agitation of the solution) or oxidising agents. In acid fixer, (I) is increased by decreasing  $p_{\text{H}}$  (especially to  $< 4$ ), increasing sulphite concn., raising temp., and the addition of hardeners. (I) is much greater in fine- than in coarse-grained emulsions. (I) is reduced by the accumulation of Ag halides and development products in the fixer. The theories are discussed that Ag is dissolved by acid S compounds, or  $\text{Ag}_2\text{O}$  is formed and dissolved in  $\text{Na}_2\text{S}_2\text{O}_3$  to form  $\text{Ag}_2\text{S}_2\text{O}_3$ , which is sol. in excess fixer. These results are of importance for sensitometric work with positive or negative motion-picture film, but the amount of reduction is negligible for ordinary work. J. L.



**Effect of moisture on photographic sensitivity.** S. E. SHEPPARD and E. P. WIGHTMAN (Ber. 8th Internat. Kong. Phot., Dresden, 1931, 157—163; Sci. Publ. Kodak Res. Labs., 1931—2, 15, 190—195).—Plates were bathed in distilled  $H_2O$ , or kept in air of R.H. 50—100% for varying times, or treated briefly with steam, some being left in the moist atm. up to 16 hr. Treatment before exposure and development produced loss of sensitivity, increasing with keeping in a saturated atm. Pretreatment with steam produces much the greatest effect. Steaming after exposure causes intensification of the latent image on high-speed plates (but slight reduction with medium-speed plates). The desensitisation is largely reversible by keeping the plates *in vacuo* or ordinary (50% saturated) air, the recovery varying somewhat with the conditions of treatment. The theoretical bearing of these results is discussed. J. L.

See also A., Apr., 374, **Photochemical reactions**. 375, **Light-sensitive piperidine metavanadate**.

## PATENTS.

**Photographic bleaching-out layers.** I. G. FARBERIND. A.-G. (B.P. 406,917, 21.7.33. Ger., 21.7.32).—The bleaching-out layer is cast from a solution containing the appropriate dye and auxiliaries and a cellulose ester, ether, or ether-ester containing free OH and produced either by partial acylation or etherification of cellulose, or by partial hydrolysis of an ester or ether. H. A. P.

**Coloured screening layer for sensitive photographic elements.** M. W. SEYMOUR, Assr. to EASTMAN KODAK CO. (U.S.P. 1,921,545, 8.8.33. Appl., 29.10.31).—A non-diffusing coloured layer is composed of a colloidal suspension of an indophenol dye (I) in gelatin (II). (I) is pptd. from suitable components in the (II) solution. The layer may be coated on top of, or beneath, the emulsion layer, or as an anti-halation layer on the back of the support. The colour is easily removable by treating with an alkaline solution of  $Na_2S_2O_4$ . J. L.

**Manufacture of composite films.** VOIGTLÄNDER & SOHN A.-G. (B.P. 407,573, 6.6.33. Ger., 6.6.32).—The intermediate layer between the photographic emulsion and the film base (B), which aids their adhesion, is prepared by coating B with a solution of gelatin and B (e.g., cellulose acetate) in a mixture of org. solvents with a little  $H_2O$ . J. L.

**Photographic production of written characters or representations, or a surface coloration, on aluminium and aluminium alloys.** SIEMENS & HALSKE A.-G. (B.P. 407,830, 29.3.33. Ger., 30.6.32, 19.11.32, and 9.2.33).—A coating of oxide is formed on the surface of the Al by treatment with, e.g.,  $CrO_3$  or  $H_2C_2O_4$ . This layer is uniformly impregnated with Ag halides, or other light-sensitive salts or dyes. The sheet is then exposed under a negative, and toned, fixed, etc. in the usual manner. If Au-toned and heated strongly, heat-resisting, red-coloured images may be obtained. Layers consisting of fluorides, or phosphate, may be formed together with, or instead of, the oxide layer. J. L.

**Optical cement.**—See XIII.

## XXII.—EXPLOSIVES; MATCHES.

**Reaction for the stability of explosives.** O. DRUETZKE (Bull. Soc. Chim. Yougoslav., 1933, 4, 169—178).—Nitrocellulose powder heated at  $130^\circ$  undergoes conversion into a more labile, readily detonating modification, the EtOH extract of which gives a reddish-violet coloration with EtOH-KOH. R. T.

**Evaluation of nitroglycerin solution.** Agar.—See XX. **CO in warfare.**—See XXIII.

See also A., Apr., 376, **Microscopical study of detonation**. 389,  $C_2H_2$ -Hg complex salt.

## PATENTS.

**Explosive.** G. A. PRITCHETT and H. G. WALKER, Assrs. to MONITE EXPLOSIVES, INC. (U.S.P. 1,923,327, 22.8.33. Appl., 14.8.31).—Claim is made for a mixture of  $NaClO_3$  (50—100-mesh) 30,  $NaNO_3$  (8—18-mesh) 55, wood flour 5,  $CaCO_3$  1, bonded with dinitrotoluene at  $50^\circ$ , to give a mixture which sets hard on cooling. A. R. P.

**Manufacture of absorbent materials and compounds [explosives] therefrom.** C. P. SPAETH and LER. V. CLARK, Assrs. to E. I. DU PONT DE NEMOURS & CO. (U.S.P. 1,923,848, 22.8.33. Appl., 3.4.30).—Sphagnum moss, balsa wood, cork, wood pulp, or bagasse pith is impregnated with starch and then with an  $NH_4NO_3$  and nitroglycerin explosive. A. R. P.

**Pyrotechnic composition for producing yellow smoke.** G. U. GRAFF (U.S.P. 1,920,254, 1.8.33. Appl., 18.1.33).—The composition contains  $K_2Cr_2O_7$  66, Bi tetroxide or subnitrate 20, Mg 14 or 15 pts. by wt. B. M. V.

**Cellulose for nitration.**—See V.

## XXIII.—SANITATION; WATER PURIFICATION.

**Atmospheric pollution.** ANON. (Dept. Sci. Ind. Res., Rept. 19, 1933, 99 pp.; cf. B., 1930, 1132).—Daylight determinations by the KI method at two stations in Halifax showed 17% loss of sunlight at the more heavily polluted station although the difference in the amount of deposited matter was not exceptionally high. Measurements made in Salford indicate that the ratio of the summer and winter totals of ultra-violet light was 25:1, whereas sunlight was in the ratio of 7:1. The green deposit on Cu structures in inland towns and where urban and marine conditions coincide consists mainly of basic sulphate, thus indicating the importance of the small amount of  $SO_2$  in the atm. as a corrosive agent. The basicity of the deposit slowly increases and owing to its insolubility forms a protective layer. In the case of Fe the sulphate produced hydrolyses and leaves a flocculent and loosely adherent rust of no protective val. C. J.

**Experimental air-conditioning for the Butte Mines.** W. B. DALY and A. S. RICHARDSON (Amer. Inst. Min. Met. Eng. Tech. Publ., 1934, No. 530, 16 pp.).—Aq.  $CaCl_2$  (I) cooled at the surface in a cooling-tower is carried in a closed circuit by insulated pipes to cooling-coils (C) underground.  $H_2O$  is sprayed into the forcibly circulated mine air, thereby cooling it; it then falls on to C and is collected and re-sprayed. (I) is delivered to C at  $2.8^\circ$  above the surface temp. and the air is



cooled to about  $4.4^{\circ}$  above the temp. of (I). The system reduces the dust in the mine air and generally increases the dryness of the mine, but the latter tends to increase the dustiness and to some extent offsets the former. It is believed that a mine-air temp. of  $24^{\circ}$  with 75% R.H. is practicable.  
D. K. M.

**Carbon monoxide in warfare.** A. MURER (L'Ind. Chimica, 1934, 9, 299—301).—Filter-masks containing either  $\text{I}_2\text{O}_5 + \text{H}_2\text{SO}_4$  or hopcalite ( $\text{MnO}_2$  with oxide of Cu, Co, or Ag) to combat CO formed in mines and, during war, by the explosion of shells etc. are described.  
T. H. P.

**Action and use of the respiratory filter [of a gas mask].** H. REMY (Chem.-Ztg., 1934, 58, 276—278).—The active constituents and construction of dust, gas (absorption, adsorption, and chemical), and colloid (mist) filters are described.  
E. H. S.

**Lead hazards associated with the distribution and use of gasoline containing lead tetraethyl.** I. R. A. KEHOE, F. THAMANN, and J. CHOLAK (J. Ind. Hygiene, 1934, 16, 100—128).—No evidence of absorption, intoxication, or increased excretion of Pb was found in any case of men exposed to petrol containing  $\text{PbEt}_4$  or its combustion products over a period of 6 months.  
H. G. R.

**Incubator hygiene. III. Germicidal properties of formaldehyde, sulphur dioxide, chloropicrin, and chloroacetophenone.** R. GRAHAM and V. M. MICHAEL (Poultry Sci., 1934, 13, 40—43).—A dosage sufficient for the treatment of *S. pullorum* was employed.  $\text{CH}_2\text{O}$  was not retained in forced-draught incubators 3 hr. later. Increased initial concns. of  $\text{CH}_2\text{O}$  were injurious to eggs. Chloropicrin, chloroacetophenone, and  $\text{SO}_2$  were unsuitable for fumigation of incubators.  
A. G. P.

**Derris in fly sprays. Kerosene extracts of Derris root as house-fly sprays. Comparative tests of extracts of Derris and of Pyrethrum.** II. F. L. CAMPBELL, W. N. SULLIVAN, and H. A. JONES (Soap, 1934, 10, 83, 85, 103, 105; cf. B., 1934, 430).—In laboratory and large-scale tests, kerosene extracts of *Pyrethrum* had the more rapid paralysing effect on flies, but those of *Derris*, although slower in action, produced the greater kill.  
A. G. P.

**Estimating hardness removal from surface-water supplies.** P. C. STEIN (J. Amer. Water Works' Assoc., 1934, 26, 371—378).—The hardness varies greatly according to climatic conditions and an adaptation of the stream-flow duration curve of the supply to give a hardness-duration curve is a useful instrument in determining the relative softening costs of proposed alternative sources of supply.  
C. J.

**Coagulation [in water purification].** M. C. SMITH (J. Penn. Water Works Operators' Assoc., 1933, 5, 56—62).—Prechlorination sometimes aids coagulation. Economies are recorded.  
CH. ABS.

**Removal of fluorides from drinking waters.** C. S. BORUFF (Ind. Eng. Chem., 1934, 26, 69—71).— $\text{F}^-$  in  $\text{H}_2\text{O}$  may be reduced from 3.0 to 1.0 p.p.m. by treatment with 34 p.p.m. of  $\text{Al}_2(\text{SO}_4)_3$  (I) followed by filtration; or from 5.0 to 1.0 p.p.m. with 170 p.p.m.

of (I) or by double treatment with 85 and 51 p.p.m. of (I). The optimum  $\text{pH}$  range for removal of  $\text{F}^-$  is 6.25—7.5. Treatment with  $\text{Na}_2\text{Al}_2\text{O}_4$  (II) (24 and 41 p.p.m.) reduces  $\text{F}^-$  from 5.0 to 4.8 and 4.4 p.p.m., respectively. Fresh synthetic zeolite removes  $\text{F}^-$ , but its capacity is small and regeneration with aq. NaCl does not restore the original  $\text{F}^-$ -removal power of the zeolite. Passing  $\text{H}_2\text{O}$  through a bed of active  $\text{Al}_2\text{O}_3$  reduces the  $\text{F}^-$  content from 5.0 to 1.4—2.3 and from 3.0 to 0.6—2.2 p.p.m., depending on the quantity of  $\text{H}_2\text{O}$  passed through. Regeneration of the  $\text{Al}_2\text{O}_3$  can be effected by 5% aq. NaCl, 2% aq. NaOH, or 2N-HCl.  $\text{SiO}_2$  gel, Na silicate (III) +  $\text{Al}_2(\text{SO}_4)_3$  (III) + (II), or  $\text{FeCl}_3$  with and without  $\text{Ca}(\text{OH})_2$  give smaller removals. When  $\text{H}_2\text{O}$  was treated with sufficient  $\text{Ca}(\text{OH})_2$  to remove  $\text{HCO}_3^-$  and Mg hardness, the  $\text{F}^-$  content was reduced from 5.0 to 3.0 and from 3.0 to 2.1 p.p.m.  
D. K. M.

**Solubility of copper in water in relation to the use of this metal in water-main construction.** V. FROBOESE (Gas- u. Wasserfach, 1934, 77, 225—231).—A [Cu] of  $> 1.5$  mg./litre imparts taste to drinking- $\text{H}_2\text{O}$ . A method for the determination of [Cu] of  $< 1$  mg./litre, depending on the colour of  $\text{Cu}(\text{CNS})_2$ , is described; higher concns. are determined by weighing the ppt. formed on addition of salicylaldoxime reagent (cf. A., 1930, 1393). The effect of  $\text{O}_2$  and  $\text{CO}_2$  on the solubility of Cu in distilled and drinking- $\text{H}_2\text{O}$  has been investigated, the former being the controlling factor. The equilibrium between  $\text{Cu}_2\text{O}$  and  $\text{CuO}$  in the  $\text{H}_2\text{O}$  is discussed;  $\text{Cu}_2\text{O}$  always appears if the pipes are new. A protective layer of  $\text{CuCa}(\text{CO}_3)_2$  is assumed to be formed, as a high Ca content tends to inhibit dissolution of Cu.  
R. N. B.

**Chemical behaviour of "eternit" tubing [in water].** L. KAATZ and H. E. RICHTER (Gas- u. Wasserfach, 1934, 77, 119—122).—The reactions occurring when "eternit" (highly compressed cement-asbestos) tubing (T) is brought in contact with tap- $\text{H}_2\text{O}$  have been studied. In general, the free  $\text{Ca}(\text{OH})_2$  from the cement reacts with the  $\text{CO}_2$  or  $\text{Ca}(\text{HCO}_3)_2$  in the  $\text{H}_2\text{O}$  with the production of  $\text{CaCO}_3$ , which is deposited on the walls of T, forming a protective layer. If the  $\text{H}_2\text{O}$  contains Fe some may be pptd. as  $\text{Fe}(\text{OH})_3$  with the  $\text{CaCO}_3$ . In presence of  $\text{H}_2\text{O}$  of high  $\text{CO}_2$  content no  $\text{CaCO}_3$  layer is formed and T may be progressively attacked until it disintegrates.  
A. B. M.

**Detecting glycerol in cosmetics.**—See III. Effects of dyed textiles on the skin.—See VI. Effects of chlorinated  $\text{H}_2\text{O}$  on goldfish etc.—See XVI.

#### PATENTS.

**Purification of liquids by means of activated carbon.** N. V. OCTROOIEN MAATS. "ACTIVIT" (B.P. 406,104, 25.11.32. Holl., 25.11.31).—Drinking- $\text{H}_2\text{O}$  is purified by being passed through a sand filter within which is a layer of granular activated C, the rate of flow of the  $\text{H}_2\text{O}$  being adjusted to give the required degree of purification. Under these conditions the C retains its activity indefinitely. If desired, the C may be intermixed with the sand.  
A. B. M.

**Purifying liquids.**—See I.